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## 2012 ANNUAL MONITORING REPORT

# Tansley Quarry Hanson Brick Ltd. Burlington, Ontario

**Submitted to:**  
Hanson Brick Ltd.  
5155 Dundas Street West  
Burlington, Ontario  
L7R 3Y2

REPORT



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## **1.0 INTRODUCTION**

### **1.1 Background and Purpose**

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

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

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

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

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

### **1.2 Site Description and Quarry Development**

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

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



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

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

Pumping from the quarry sump was carried out on an as needed intermittent basis throughout 2009 to 2012. Pumping occurred for an average of 4 hours per day and daily pumping volumes averaged 406 m<sup>3</sup>/day.

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

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

### **1.3 Precipitation**

Figure 4 shows the monthly precipitation for the Millgrove Station and Hamilton Airport from 2002 to 2012. The Millgrove Station, located at an elevation of 255.1 masl, was discontinued in April 2006, and hence data from Hamilton Airport, which is located within a 25 km radius of the site at a similar elevation of 237.7 masl, have been utilized to date. It should be noted that the Hamilton Airport station was monitored by Environment Canada until 2011. The station is now monitored by NAV CANADA, and although the data are provided by Environment Canada, it is our understanding that the data were not quality checked by Environment Canada. The information



indicates that the area received approximately 775 mm of precipitation in 2012, approximately 31% less than received in 2011 (1119 mm).

Figure 5 shows the water budget (precipitation and surplus) for the Hamilton Airport from 2002 to 2012. The water budget assumes a 150 mm holding capacity for fine to sandy loam that supports pasture and shrubs, similar to pre-development site conditions. The surplus is the water that remains in the soil after evapotranspiration. On an average annual basis, the surplus indicates water available for infiltration and runoff. This available water can potentially affect groundwater levels. The water budget shows that water was available for infiltration and runoff during five months of the year, i.e., January to April 2012, and December 2012. The highest precipitation (approximately 170 mm) was observed in October 2012. With the exception of the highest rainfall event that occurred in October 2012, the water budget indicates that on average the period from May to November 2012 was relatively dry with little water available for infiltration and runoff.

## **2.0 QUARRY PUMPING RATES**

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

During 2012, quarry dewatering was carried out by a portable diesel pump set up at the quarry sump that discharged via piping to the decant pond from a 15 cm (6-inch) diameter pipe. The pump is operated daily while site operations are in progress. This can vary for the full shift or until the sump is drained down depending upon the volume of water accumulated in the quarry bottom from groundwater and runoff. On average, in 2012 the sump pump was operated for six hours each day.

A summary of the 2012 records of sump discharge are presented in Table 1 and summarized on Figure 6. Pumping volumes provided by Hanson for January 2012 and February 2012 were calculated based on the water level rise in the decant pond and the known geometry of the pond following the same methodology as for previous years. In March 2012, a flow meter was installed on the discharge line from the pump. Pumping volumes from March 2012 to December 2012 are based on flow meter readings. Over the 2012 period, the discharge rate ranged between 31 m<sup>3</sup>/day to 660 m<sup>3</sup>/day, with an average discharge rate of 392 m<sup>3</sup>/day. Based on these volumes, in virtually all instances the daily discharge exceeded 50 m<sup>3</sup>/day above which a PTTW is required. PTTW No. 1718-8WPJUV was obtained in September 2012 and allows for a maximum daily discharge rate from the sump of 4,320 m<sup>3</sup>/day.

The total estimated volume of water pumped from the quarry in 2012 was 46,206 m<sup>3</sup> based on the reported daily pumping volumes. The direct catchment area of the current quarry is approximately 32,000 m<sup>2</sup>. By dividing the total pumped volume by the catchment area, the equivalent amount of precipitation would be approximately 1.44 m per square metre per year which is almost twice the total annual precipitation for the area. This indicates that seepage accounts for a significant component of the total amount of water pumped from the quarry. The effective precipitation from direct catchment that reports to the sump could be in the range of 0.5 m to 0.6 m of the total precipitation of 0.775 m. This contribution would be approximately 35 to 42 % of the total 1.44 m per square metre per year of water pumped from the quarry. The balance (58 to 65%) would be derived from seepage which would be equivalent to seepage inflow rates of 0.85 to 0.96 L/s averaged on an annual basis.



Seepages of this general magnitude have been observed from the granular alluvial deposits (6 to 8 m thick) that overlie low permeability glacial till where the contact forms a spring line. The points of inflow include the western and southern faces of the overburden cut. The exposed shale in the pit walls appears dry.

### **3.0 GROUNDWATER LEVEL MONITORING**

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

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

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

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

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

Water levels have also been monitored, where available, from a network of 11 private wells since 2005 to the present. These private wells comprise eight TNA wells (wells owned by members of the TNA namely Featherstone, Finucci, Wiggins and the five Hendervale wells) and three wells identified under the 2007 Baseline Survey (Bekkers, Simms and Wettlaufer). It should be noted that the Hendervale property is now owned by Iron Horse Equestrian Complex but the names of the wells have been retained for consistency. Private well names





reflect either the names of the property owners or the name of the property. Private well details are provided in Table 2, and where possible, associated with an MOE Water Well Record number. The MOE Water Well Record for each well is provided in Appendix B. All private wells were installed with data loggers suspended from direct read cables. Loggers have been installed in the Featherstone, Finucci and Hendervale Barn wells since June 2005. Loggers have been installed in the Hendervale ABC Barn, Hendervale XYZ Barn and Hendervale Cottage wells since February 2006 and in the Hendervale House well since 2007. Loggers were installed in the Bekkers, Simms, Wiggins and Wettlaufer wells in early 2008. The logger in the Wettlaufer well was subsequently removed by the tenants in June 2008. The domestic wells were not surveyed and approximate elevations were estimated from Ontario Base Map (OBM) contour plans such that the water level data cannot be compared directly with the groundwater elevations reported for the monitoring wells.

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

### **3.1 Water Levels in MW-Series Wells**

#### **3.1.1 Well Nest MW-01**

Well nest MW-01 is located at the northeastern corner of the site along Tremaine Road (Figure 7) and is approximately 625 m north of the current north quarry face and 715 m north of the quarry sump. This nest is comprised of an overburden, intermediate shale and deep shale well. Groundwater levels in the overburden well varied between 162.90 masl and 164.62 masl. This is within the historical range of fluctuations (163.02 masl and 165.54 masl) observed from between 2002 and 2011 (Figure C.1). Groundwater levels in the intermediate well were approximately the same as those of the overburden well and varied between 162.91 masl and 164.64 masl. This is within the historical range of water levels (161.14 masl and 164.64 masl) recorded for the well between 2002 and 2011. Groundwater levels in the deep bedrock well ranged from 159.26 masl to 160.13 masl. These groundwater levels were also within the range of water levels (158.19 masl to 161.27 masl) previously observed for the well. The groundwater levels all occur in the overburden.

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

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

#### **3.1.2 Well Nest MW-02**

Well nest MW-02 is located at the north end of the site and is approximately 625 m north of the north quarry face and 715 m north of the quarry sump. The nest is comprised of an overburden, intermediate shale and deep



shale well. In 2012, groundwater levels in the overburden well ranged between 165.36 masl and 166.40 masl. This is within the historical range of water levels observed for the well. This is within the range of groundwater levels observed historically (164.94 masl and 166.66 masl). Over the 2002 to 2012 period, groundwater levels in the overburden showed minimal fluctuation except during the dry period decline in 2007 and the 2012 dry period. Groundwater levels in the intermediate shale well varied between 160.86 masl and 161.90 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 158.46 masl and 159.25 masl (Figure C.2).

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

### **3.1.3 Well Nest MW-03**

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

In 2012, groundwater levels in the overburden well ranged between 164.07 masl and 165.26 masl and groundwater levels in the intermediate well ranged between 160.54 masl and 161.51 masl (Figure C.3). These groundwater levels all occur in the overburden and are indicative of a slight downward gradient of groundwater flow. Although both the overburden and intermediate shale well showed a decline in groundwater levels in 2007, the groundwater levels in the overburden well have rebounded to pre-2007 levels whereas the groundwater levels in the deep shale well have remained approximately 1 m to 2 m below pre-2007 levels but respond synchronously with the seasonal fluctuations of the overburden well. The post-2007 vertical separation of the water levels between the overburden and intermediate shale wells indicating downward gradients is consistent with the other monitoring wells at the site suggesting that at MW-03, the pre-2007 data were not representative.

### **3.1.4 Well Nest MW-04**

Well nest MW-04 is located on the western edge of the quarry site adjacent to the CNR railway line and is approximately 320 m from the quarry sump. During 2012, groundwater levels in the overburden well ranged between 164.37 masl and 166.30 masl. This is within the range of historical groundwater elevations.



Groundwater level fluctuations in the overburden well follow typical seasonal responses including the 2007 water level decline and the smaller decline of 2012 (Figure C.4).

Prior to initiation of the sinking cut in September 2007, groundwater levels in the intermediate and deep shale wells occurred in the overburden, and ranged between approximately 161 masl and 165 masl (Figure C.4). Since initiation of the dry period of 2007 and the concurrent sinking cut in September 2007, groundwater levels in the intermediate and deep wells have declined several metres and now occur in the shale bedrock. The water levels in the intermediate well now occur slightly below the top of the bedrock surface, approximately 4 to 5 m below pre-sinking cut levels. In 2012, groundwater levels in the intermediate well ranged between 157.69 masl and 158.61 masl (Figure C.4). This is similar to the groundwater levels observed between 2009 and 2011.

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

### **3.1.5 Well Nest MW-05**

Well nest MW-05 is located at the southwestern end of the quarry site and is approximately 50 m southwest of the quarry sump. This well nest is comprised of an overburden well, overburden/bedrock straddle well, intermediate well and a deep well. During 2012, groundwater levels in the overburden well ranged between 159.58 masl and 161.23 masl. Groundwater levels in the straddle well ranged between 157.51 masl and 158.75 masl. Both the overburden and straddle wells reflects seasonal fluctuations (Figure C.5).

Prior to initiation of the sinking cut in August 2007, groundwater levels in the intermediate well ranged between 158.41 masl and 161.73 masl and occurred in the overburden. By 2008, the groundwater level in the intermediate well was approximately 10 m lower than historical levels at approximately 150 masl and occurred within the upper shale bedrock. The elevation of 150 m corresponds to the floor of the 2008 sinking cut indicating that the water level lowering was in response to dewatering of the sinking cut. Since July 2009, the water levels have gradually declined from approximately 148 masl to 147.50 masl by the end of 2011. Groundwater levels in 2012 ranged from 147.36 masl to 147.57 masl. Based on the comparatively close proximity of MW-05 to the shale pit and the current pit floor elevation of approximately 140 masl, it would appear that the water level in the intermediate well is being influenced by the dewatering activities at the pit.

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



### **3.1.6 Well Nest MW-06**

Well nest MW-06 is located on the eastern edge of the quarry site and approximately 30 m northeast of the quarry face. During 2012, the groundwater levels in the overburden well ranged between 158.76 masl and 160.35 masl. Groundwater levels in the straddle well installed in mid-2007 were very similar to the overburden groundwater levels, ranging between 158.72 masl and 161 masl. The groundwater levels were within the range observed historically. In general, the groundwater levels in the overburden and straddle wells were slightly lower (approximately 1 to 2 m) than the water levels observed before August 2007, prior to initiation of the sinking cut. The decline in water levels can be attributed to the proximity of the wells to the excavation.

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

### **3.1.7 Well Nest MW-07**

The MW-07 well nest is located near the centre of the property and 400 m north of the quarry face. The well nest is comprised of an overburden and deep shale well. In 2012, the groundwater levels in the overburden well varied between 163.62 masl and 165.04 masl (Figure C.7). Groundwater levels have shown a slight seasonal fluctuation over the 2002 to 2012 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.

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 top of 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. A similar response was noted in well MW-02 and continued monitoring should assist in clarifying this response. Groundwater levels observed in the overburden and shale at well nest MW-07 are indicative of downward hydraulic gradients. No significant influence of quarry related drawdown is noted at well MW-07.

### **3.1.8 Well Nest MW-08**

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



of the overburden and deep shale (Figure C.8). In December 2011 the deep shale water level declined several metres to coincide with that of the intermediate shale well.

The water level trends suggest that there was some drawdown effect from the sinking cut excavation in 2007 compounded by the dry year conditions. The water level in the intermediate shale appears to have been lowered approximately since 2008. The 2 to 3 m decline in the deep shale well since January 2012 may reflect pit drawdown or the 2012 dry season influence. Continued monitoring will establish the trend.

### **3.1.9 Well Nest MW-09**

Well nest MW-09 is located approximately 80 m northwest of the quarry face. The well nest consists of an overburden well, overburden/bedrock surface straddle well and deep shale well (Figure C.9). The deep shale well is sealed into very low permeability shale and is not anticipated to recover. The bedrock surface straddle well experienced a decline in water level of approximately 7.5 m during development of the overburden sinking cut in 2007 but the water level elevation has remained comparatively stable around 155 m to 156 m since 2008 suggesting that quarry deepening is having little effect. The overburden well demonstrates a strong seasonal fluctuation of approximately 4 m varying in elevation from approximately 160.45 masl to 164.67 masl. This is consistent with recharge related to the occurrence of seasonal surface flooding within the area of the well.

### **3.1.10 Well Nest MW-10**

Well nest MW-10 is located approximately 180 m northwest of the quarry face. The nest consists of an overburden well, an intermediate shale well that also straddles the bedrock surface and 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 and is not anticipated to recover in the near future.

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 5 m below that of the overburden well demonstrating downward hydraulic gradients. Both wells experienced water level decline in 2007 followed by recovery to pre-decline conditions. There is no direct indication of quarry related drawdown at this location.

### **3.1.11 Well Nest MW-11**

Well nest MW-11 is located approximately 300 m northeast of the quarry face on the adjacent Hendervale property, within approximately 90 m of the Hendervale Main Barn well. The well nest is comprised of an overburden, straddle and 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 and is not anticipated to recover in the near future.

The groundwater levels in the overburden and straddle well were similar and displayed similar seasonal trends in water level fluctuation of approximately 2 m to 3 m (Figure C.11). The groundwater levels in both wells ranged between approximately 163 masl and 166 masl. Groundwater levels in the overburden and straddle wells occur



in the overburden within approximately 3 m of ground surface. There is no direct indication of quarry related drawdown at this location.

### **3.2 Water Levels in TW-Series Wells**

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

Well TW-1 is located approximately 600 m west of the quarry and was completed at a depth of 18.29 metres below ground surface (mbgs). The well was cased through overburden to the top of bedrock (15.98 mbgs), and the lower 3 m left as open hole in the weathered shale. Groundwater levels in 2012 ranged between 163.31 masl and 165.56 masl and show a slight seasonal level fluctuation trend (Figure C.12). The water levels are consistent with nearby monitoring wells MW-04 and MW-11.

Well TW-2 is located approximately 1500 m north of the quarry and was cased through overburden to a depth of 18.3 mbgs and finished as open hole in hard glacial till overburden to a depth of 32 mbgs. The well has been dry since its construction in August 2007 (Figure C.13).

Well TW-3 is located approximately 1000 m northeast of the quarry. It was cased through overburden to the top of bedrock (19.82 mbgs) and completed as open hole in shale to a depth of 23.62 mbgs. Groundwater levels at well TW-3 ranged between 154.93 masl and 157.31 masl in 2012 (Figure C.14) and showed similar water level fluctuations to that of TW-1.

### **3.3 Water Levels in Private Wells**

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

#### **■ Featherstone Well**

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



■ **Finucci Well**

Groundwater levels in the Finucci well located approximately 475 m northwest of the quarry (Figure C.16) recorded subsequent to the initiation of the sinking cut in August 2007 were within the general range of historical groundwater levels recorded at the well prior to quarry operation. The logger in the Finucci well malfunctioned in 2009 and was subsequently replaced in March 2010. Operation of the well continued through 2012 on pump cycle drawdowns fluctuating approximately 6 to 7 m.

■ **Hendervale Wells**

The Hendervale wells are located approximately 400 m to 600 m west of the quarry. MOE water well records indicate that the Hendervale barn wells are completed in the shale bedrock, whereas the Hendervale and Cottage wells may be completed in the overburden. The groundwater level hydrograph for the Hendervale Main Barn well (Figure C.17) fluctuated between approximately 158 masl and 164 masl. Based on the hydrograph, there appears to have been a greater demand on the well since October 2009. The Hendervale Cottage well (Figure C.18) and Hendervale House well (Figure C.21) continued to show similar water level trends. Groundwater levels in the Hendervale ABC Barn well (Figure C.19) and Hendervale XYZ Barn well (Figure C.20) reflect usage of one or both wells in May and August 2010 that resulted in a drawdown of approximately 4 to 5 m. Similarly, the hydrographs show heavy usage of the wells in the latter half of 2011 and 2012, resulting in a drawdown of approximately 8 to 10 m. This is consistent with the timing of equestrian events where large quantities of water are required for washing show horses. It should be noted that the wells are relatively close and installed at similar depth therefore pumping of one well is usually reflected in the water levels of the other. All the barn wells now pump into cisterns on the site.

■ **Simms Well**

The Simms well is located approximately 1500 m northwest of the quarry. The groundwater levels at the Simms well (Figure C.22) have shown very large fluctuations in groundwater levels over time. Groundwater level fluctuations of up to 27 m (the full depth of the well) have been observed in the Simms well and they are considered to be a characteristic of a well reliant on well bore storage.

■ **Wettlaufer Well**

The groundwater level in the Wettlaufer well, also located approximately 1500 m northwest of the quarry showed little variation over the available monitoring period from January to June 2008. The logger installed in the Wettlaufer well was removed by the tenants in June 2008 (Figure C.23). The logger has not been re-installed in the Wettlaufer well to date.

■ **Wiggins Well**

Groundwater levels in the Wiggins well located 700 m north of the quarry ranged between approximately 153 masl and 165 masl between late 2007 and the end of 2009. Hanson installed a cistern in December 2008 and the use of the well as a source of domestic water supply was discontinued in January 2009. Since the installation of the cistern and the cessation of well usage, the groundwater levels have risen slightly, fluctuating between approximately 165 masl and 167 masl (Figure C.24).



■ **Bekkers Well**

Groundwater levels at the Bekkers well located approximately 1000 m northeast of the quarry ranged between approximately 148 masl and 160 masl (Figure C.25) and showed a pattern indicative of seasonal groundwater fluctuations and a large reliance on well bore storage noted by levels periodically approaching the bottom of the well.

### **3.4 Summary of Groundwater Level Responses to Quarrying**

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

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

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

The deep shale wells MW-01, MW-02, MW-03, MW-07 and MW-08 are completed in shale with low to moderately low hydraulic conductivity conditions in the range of  $10^{-8}$  m/s based on the results determined from the water level recovery rates following sampling as indicated on the respective hydrographs. There was a slight lowering of approximately 1 m to 2 m in the deep shale at well MW-08 during 2012 which may be related to the dry year conditions or some quarry dewatering. Continued monitoring will clarify the trend.

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

## **4.0 GROUNDWATER QUALITY**

Groundwater quality sampling of MW-Series monitoring wells and off-site private wells was conducted between November 13 and 16, 2012 consistent with previous water quality sampling carried out in November 2002, May 2003, January 2007, October 2008, November/December 2009, October 2010 and November 2011. 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 2 to 3 minutes prior to sampling in order to clear the water lines of standing water and ensure that samples taken were representative of fresh groundwater.

The procedures followed for collection of all water samples included:

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

For quality control purposes a duplicate sample was taken for every 10 groundwater samples collected and submitted to the laboratory. The analytical results from the original samples and the corresponding field duplicate sample are an indicator of the reliability of the laboratory analytical procedures and field sampling methodology. Field duplicates were collected from wells MW-06I, MW-07D and MW-11S.

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

## **4.1 On-site Monitor Wells**

Samples were taken from 10 piezometer nests (MW-01 to MW-10) located on the Tansley Quarry site and one piezometer nest (MW-11) located on the Hendervale property in order to provide baseline water quality relative



to nearby private wells. Wells MW-01O, MW-06O and MW-06D were not sampled as sufficient water was not available in the wells after purging. Water quality results for the on-site wells are presented in Tables D.1 and D.2 of Appendix D. Maxxam laboratory certificates are provided in Appendix E.

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

- Aluminum (0.29 mg/L to 100 mg/L) exceeded the ODWS Operational Guidelines (OG) of 0.1 mg/L in all wells sampled.
- Alkalinity (570 mg/L to 730 mg/L) exceeded the OG in wells MW-02O, MW-07O and MW-08O only.
- Hardness exceeded the OG of 80-100 mg/L in all samples with concentrations ranging between 280 mg/L to 34,000 mg/L.
- pH levels were below the OG range of 6.5-8.5 only in well MW-05D (6.11), MW-09D (6.19) and MW-11D (6.14). According to the ODWS, a pH level lower than 6.5 may result in corrosion of specific types of pipe.

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

- Chloride, sulphate, sulphide, copper, sodium, manganese, iron and turbidity exceeded the ODWS Aesthetic Objectives (AO). AOs are non-health-related criteria that reflect parameters that may impair the colour, smell or taste of water.
- Barium, cadmium, chromium, lead, selenium and uranium exceeded the Maximum Acceptable Concentration (MAC) in a number of the wells sampled. Parameters that exceed the MAC have known or suspected adverse health effects when present above a certain concentration. The concentration of barium exceeded the MAC of 1 mg/L in well MW-10O (11 mg/L). The MAC for cadmium (0.005 mg/L) was exceeded in five wells with concentrations ranging between 0.006 mg/L and 0.0087 mg/L. Chromium (0.06 mg/L to 1.5 mg/L) exceeded the MAC of 0.05 mg/L at 13 of the 29 wells sampled whereas lead (0.016 mg/L to 0.081 mg/L) exceeded the MAC at 12 of the 29 wells sampled. Selenium exceeded the MAC of 0.01 mg/L at well MW-10D (0.11 mg/L). Uranium (0.023 mg/L to 0.059 mg/L) exceeded the IMAC of 0.02 mg/L in three of the 29 wells sampled. Uranium may result in kidney damage when ingested in large quantities.
- Arsenic and boron exceeded the ODWS Interim Maximum Acceptable Concentrations (IMAC) in several of the wells sampled. Arsenic exceeded the IMAC of 0.025 mg/L in 10 of the 29 wells sampled, with concentrations ranging between 0.027 mg/L to 0.3 mg/L. Arsenic is a carcinogen and must be removed by treatment where present in drinking water at levels above this concentration.
- Boron concentrations (5.3 mg/L to 9.4 mg/L) exceeded the ODWS IMAC of 5 mg/L in one overburden well (MW-07O) and a number of the intermediate (MW-04I and MW-08I) and deep (MW-01D, MW-02D, MW-03D, MW-04D, MW-07D and MW-10D) shale wells. Infants, the elderly and individuals with kidney diseases are the most susceptible to the toxic effects of boron compounds.



A summary of exceedances of PWQO are provided in Table 5. The 2012 analytical results were below the PWQO with the exception of traces of aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, molybdenum, nickel, selenium, phosphorous, silver, thallium, uranium, vanadium and zinc. The pH level measured in wells MW05-D, MW-09D and MW-11D was below the PWQO specified pH range of 6.5 to 8.5. It should be noted that, with the exception of aluminum and mercury (which did not exceed PWQO and therefore not listed in Table 5) which were filtered prior to analysis, all other samples were unfiltered for comparison to PWQO in Table 5. In all cases, the sample bottles contained visible sediment; therefore the results may be biased high due to metals present in the sediment.

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

## 4.2 Private Wells

During November 2012, water samples were collected from seven private wells (Finucci, Sicard, Sugiyami, Hendervale House, Hendervale Cottage, Simms and Bekkers) and from a cistern that was constructed on the Hendervale farm property in 2011 to supply water to the Hendervale barns. Samples were collected from taps located prior to private water treatment systems. All samples were analysed for a broad suite of general inorganic parameters, metals (including mercury and cyanide) and phenol.

Water quality samples were not obtained from the following wells:

- Featherstone and Wiggins have had cisterns installed and their wells are no longer in use and hence were not sampled.
- There are three cisterns on the Hendervale property, one near the Hendervale ABC Barn well, one near the Hendervale XYZ Barn well and one near the Hendervale Main Barn well. It is our understanding that the cisterns are all interconnected and hence may receive water from any of the barn wells. Water is also pumped into the cisterns from Bronte Creek to augment barn supplies. Two water samples were taken from taps near the Hendervale XYZ Barn well and Hendervale Main Barn well. The water samples collected from the taps near the XYZ Barn and Main Barn wells are therefore considered to be cistern samples.
- The Eno/Myers well (previously called Des Roches) was not sampled considering the residents indicated that the well was not in use in 2012.
- The Robinson well is no longer sampled considering that it is sometimes filled with municipal water.
- The Stevenson well located on the Hanson property is no longer accessible for water quality sampling.



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

- Groundwater is consistently hard, exceeding the ODWS OG of 80 – 100 mg/L in all cases in 2012. The exceedances of the OG for hardness have been seen historically. The ODWS OG are non-health-related criteria that may negatively affect the treatment and distribution of water.
- Sulphate, chloride, iron, manganese, sodium and turbidity showed exceedances of the ODWS AO. These exceedances of the AO have also been observed in historical water quality analysis where available. AO are non-health-related criteria that reflect parameters that may impair the colour, smell or taste of water.
- Although groundwater samples taken from the Sugiyami and Bekkers wells, as well as the Hendervale barn cistern exceeded the ODWS AO of 200 mg/L for sodium, all wells with the exception of the Simms well (sodium concentration of 15 mg/L) exceeded the 20 mg/L criterion for notification of the local Medical Officer. However, it should be noted that the samples taken were of the raw groundwater prior to treatment.

## **5.0 LOGGER INSTALLATION AND WELL REPAIRS**

### **5.1 Logger installation**

Loggers were not installed in any additional wells located in and around the Tansley Quarry in 2012. Loggers are currently installed in the following private wells:

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

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

It should be noted that the Wettlaufer well was fitted with a logger in January 2008. However in June 2008 the logger and pipe were removed by the tenants in order to conduct works on the well. Hanson has no plans to re-install the data logger in the Wettlaufer well at this time.

Of the six wells (Bekkers, Paccione, Proud, Simms, Wettlaufer and Wiggins) originally identified for logger installation under the 2007 Baseline Survey, two well owners (Paccione and Proud) have not consented to the



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logger installation due to issues regarding public disclosure of data obtained from the monitoring program. As of the end of 2012, permission was not received from the well owners for logger installation.

Loggers have been installed in all the on-site overburden, straddle and selected intermediate and deep shale wells as outlined below. A logger was not installed in the overburden well in well nest MW-01 as the PVC pipe was pinched. In addition, a logger has not been installed in the intermediate well in the MW-02 well nest due to the small diameter (< 19 cm) of the PVC pipe. Wells MW-01I, MW-01D, and MW08-D will be fitted with data loggers in 2012.

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



## 5.2 Well Repairs and Water Supply Systems Modification

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

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

## 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 2012) initiation of quarrying activities.



## **6.1 Radius of Influence**

Quarry related groundwater level lowering has been identified at on-site wells within 30 m to 300 m of the pit including wells MW-04, MW-05, MW-06, MW-08 and MW-09 as previously discussed in Section 3.4. The water level lowering of between approximately 2 and 12 m occurred in the overburden and upper-intermediate shale in response to the excavation of the sinking cut in 2007 with little change since that initial excavation period. The water level lowering is largely attributed to the exposure of the shale bedrock surface to drainage into the pit as well as lowering of water levels in the overlying sand alluvium. Considering that deepening of the quarry has not noticeably affected the shale groundwater levels since the excavation of the sinking cut, no anticipated future groundwater level drawdown is anticipated during the sinking cut phase which is anticipated to take an additional 5 to 10 years (Hanson, personal communication, 2012).

A comparison of on-site groundwater levels from August 2007 (before initiation of sinking cut) with September 2012 is provided on Figure 8. As indicated, the current groundwater level lowering is focussed on the quarry excavation. The respective change in water levels is shown on Figure 9.

## **6.2 Well Interference Response**

On March 21, 2007 Hanson entered into an Agreement with a number of private well owners comprising the TNA. Hanson also entered into an AMP Agreement with the Region of Halton on May 8, 2007 (Appendix A). Both agreements provide that Hanson shall proactively ensure a continuous supply of potable water to property owners whose wells may be adversely affected by the quarry operation. In addition to assuring the supply of water to property owners whose wells are adversely affected by the quarry operations the AMP also requires Hanson to construct and operate a PCWS which will service all properties identified within the Potential Zone of Influence as outlined in the AMP. PCWS construction began in December 2011 and continued through 2012. The water distribution system was completed in March 2012 and the communal reservoir was commissioned in February 2013. By following the requirements of the AMP and the PCWS agreement, Hanson will ensure that all property owners within the Zone of Influence of the quarry are provided with a continuous supply of potable water. To date, Hanson has provided cisterns to the Featherstone, Robinson and Wiggins residences. The existing cistern at the Finucci residence was also upgraded to improve sanitary issues caused by having the access port at ground level and the cistern accessible to surface runoff. There have been no long term impacts on private wells in the area that have affected water supplies. There were no well complaints received by Hanson in 2012.

## **7.0 STATUS OF CURRENT MONITORING PROGRAM**

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

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



As off-site residents are placed on cisterns or the PCWS with the associated well decommissioning, water quality and water level monitoring at these locations should be discontinued. We understand that the Featherstone and Finucci wells will be retained for water level monitoring only.

## **8.0 SETTING OF TRIGGER GROUNDWATER LEVELS**

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

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

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

## **9.0 ADEQUACY OF GROUNDWATER MONITORING**

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

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





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

## **10.0 PROPOSED MONITORING PROGRAM**

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

In light of the above, and upon review of the monitoring data collected between 2002 and 2012, the following monitoring program is proposed going forward:

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

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

- Off-site groundwater quality monitoring at the Simms well. Off-site groundwater quality monitoring previously included seven private wells. Six of these wells will be serviced by the PCWS in 2013 with the exception of the Simms well which will be retained in the monitoring program.



- The on-site groundwater quality monitoring program has provided a significant understanding of the groundwater quality conditions beneath the site including spatial and temporal variations. Therefore, at this stage, the water quality monitoring program can be reduced to include only the straddle and intermediate shale wells. These horizons are considered representative of domestic well water quality conditions within the surrounding area. This would include 11 groundwater quality samples from the following wells; MW-01I, MW-02I, MW-03I, MW-04I, MW-05S, MW-05I, MW-06S, MW-08I, MW-09S, MW-10I, and MW-11S.

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

## **11.0 SUMMARY AND CONCLUSIONS**

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

- During 2012, the daily sump discharge from quarry dewatering did not exceed the maximum discharge rate of 4,320,000 L/day as specified by the site water taking permit PTTW No. 1718-8WPJUV.
- The 2012 groundwater level monitoring results are consistent with the previous years' monitoring confirming long term trends since monitoring began. A somewhat steeper seasonal decline in water levels was noted in some wells during 2012 attributed to the drier seasonal conditions compared to previous years (35% less precipitation than 2011).
- The 2012 groundwater level trends for the deep shale wells MW-04, MW-05, MW-06, MW-09, MW-10 and MW-11 are all completed in shale of very low hydraulic conductivity in the range of  $10^{-13}$  to  $10^{-14}$  m/s as determined from the extremely slow recovery rates shown on the respective hydrographs. These wells will not recover to static conditions in the near future.
- Quarry related groundwater level lowering in the range of 2 m to 12 m occurred in the overburden and intermediate shale wells within 30 m to 300 m of the current quarry excavation including wells MW-04, MW-05), MW-06, MW-08 and MW-09 during 2007 in response to the initial excavation of the sinking cut. The respective levels have remained relatively constant since completion of the sinking cut at the end of 2007.
- The range of groundwater level fluctuations seen in private wells was within the range of historical groundwater level responses indicating no drawdown influence from the quarry.
- A review of the groundwater levels suggest that the potential influence of quarry dewatering may extend approximately 500 m from the sinking cut, and has remained unchanged from 2011.
- The groundwater quality results indicate that the groundwater in and around the quarry is very hard and mineralized with naturally occurring substances, such as sodium, potassium, magnesium, calcium, chloride and sulphate. Groundwater is relatively fresh in the shallow overburden, with salinity increasing with depth.



- The groundwater quality parameters in the monitoring wells were below the ODWS criteria with the exception of aluminum, alkalinity, hardness, chloride, sulphate, sulphide, copper, sodium, manganese, iron, turbidity, barium, cadmium, chromium, lead, selenium, arsenic, uranium and boron. These exceedances are considered to be naturally occurring in groundwater in the shale bedrock.
- The groundwater quality parameters in the monitoring wells were below PWQO criteria with the exception of aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, molybdenum, nickel, selenium, silver, thallium, total phosphorus, uranium, vanadium and zinc. These exceedances are considered to be naturally occurring in groundwater in the shale bedrock.
- Groundwater quality in private wells showed non health-related ODWS exceedances of hardness, sulphate, chloride, iron, manganese, sodium and turbidity. With the exception of the sodium concentration at the Simms well (15 mg/l) in all instances, sodium exceeded the 20 mg/L limit above which the local Medical Officer should be notified. Boron exceeded the IMAC at the Sicard and Sugiyami wells.

## **12.0 RECOMMENDATIONS**

- Monitoring of groundwater levels should be continued in 2013 as per the revised monitoring program outlined in Section 10 above;
- Water quality sampling should be conducted annually at MW-Series well nests and private wells as per the revised monitoring program outlined in Section 10 above; and
- Assess trigger levels in monitoring wells MW-01, 02 and 03 as part of subsequent annual reporting as per Section 8 above.



## Report Signature Page

**GOLDER ASSOCIATES LTD.**

Handwritten signature of Sharon Wood in black ink.

Sharon Wood, M.Sc., P.Geol.  
Hydrogeologist

Handwritten signature of Robert Blair in black ink.

Robert Blair, M.Sc., P.Geol.  
Senior Hydrogeologist, Principal

SW/RDB/wlm

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# **TABLES**

**Table 1**  
**2012 Daily Sump Discharge**  
**Tansley Quarry - Hanson Brick Ltd.**

Date	Total Daily (hrs)	Total Daily Volume Pumped (m <sup>3</sup> )	Sump Dewatering Rate	
			(m <sup>3</sup> /hr)	(igal/min)
1-Jan-12				
2-Jan-12				
3-Jan-12				
4-Jan-12	5.4	459	84.6	310
5-Jan-12	5.2	389	75.3	276
6-Jan-12				
7-Jan-12				
8-Jan-12				
9-Jan-12	5.0	413	82.7	303
10-Jan-12	6.3	429	67.7	248
11-Jan-12	6.0	445	74.2	272
12-Jan-12	3.8	298	77.7	285
13-Jan-12	4.8	333	70.1	257
14-Jan-12				
15-Jan-12				
16-Jan-12				
17-Jan-12				
18-Jan-12	5.4	463	85.5	313
19-Jan-12	5.0	406	81.2	298
20-Jan-12				
21-Jan-12				
22-Jan-12				
23-Jan-12	4.1	341	83.5	306
24-Jan-12	6.1	460	75.7	278
25-Jan-12	5.4	421	77.7	285
26-Jan-12				
27-Jan-12				
28-Jan-12				
29-Jan-12				
30-Jan-12	5.5	487	88.5	324
31-Jan-12	6.5	510	78.4	288
1-Feb-12	5.5	450	81.8	300
2-Feb-12	7.3	522	72.0	264
3-Feb-12				
4-Feb-12				
5-Feb-12				
6-Feb-12	4.8	389	81.8	300
7-Feb-12	4.8	351	72.7	267
8-Feb-12	4.8	258	53.3	195
9-Feb-12				
10-Feb-12	5.8	425	73.9	271
11-Feb-12				
12-Feb-12				
13-Feb-12				
14-Feb-12	4.3	301	70.8	260
15-Feb-12	6.3	365	58.4	214
16-Feb-12				
17-Feb-12				
18-Feb-12				
19-Feb-12				
20-Feb-12				
21-Feb-12	5.0	388	77.5	284
22-Feb-12	5.3	403	76.7	281
23-Feb-12	5.3	364	68.2	250
24-Feb-12	5.6	431	77.2	283
25-Feb-12				
26-Feb-12				
27-Feb-12	5.3	332	63.3	232
28-Feb-12				
29-Feb-12				
1-Mar-12				
2-Mar-12				
3-Mar-12				
4-Mar-12				
5-Mar-12				
6-Mar-12				

**Table 1**  
**2012 Daily Sump Discharge**  
**Tansley Quarry - Hanson Brick Ltd.**

Date	Total Daily	Total Daily	Sump Dewatering Rate	
	(hrs)	Volume Pumped (m <sup>3</sup> )	(m <sup>3</sup> /hr)	(igal/min)
7-Mar-12	6.1	462	75.9	278
8-Mar-12	5.2	299	58.0	212
9-Mar-12	5.0	402	80.3	294
10-Mar-12				
11-Mar-12				
12-Mar-12	6.4	513	80.0	293
13-Mar-12	2.4	185	76.4	280
14-Mar-12				
15-Mar-12				
16-Mar-12				
17-Mar-12				
18-Mar-12				
19-Mar-12	7.0	537	76.8	281
20-Mar-12	6.8	514	76.1	279
21-Mar-12	7.0	531	75.8	278
22-Mar-12	4.8	372	78.4	287
23-Mar-12				
24-Mar-12				
25-Mar-12				
26-Mar-12				
27-Mar-12				
28-Mar-12	4.4	352	79.8	292
29-Mar-12	8.0	660	82.5	302
30-Mar-12	7.6	609	80.4	294
31-Mar-12				
1-Apr-12				
2-Apr-12				
3-Apr-12				
4-Apr-12				
5-Apr-12	7.8	622	80.3	294
6-Apr-12				
7-Apr-12				
8-Apr-12				
9-Apr-12	7.8	599	76.4	280
10-Apr-12	6.8	436	63.8	234
11-Apr-12				
12-Apr-12	2.6	203	78.4	287
13-Apr-12				
14-Apr-12				
15-Apr-12				
16-Apr-12				
17-Apr-12				
18-Apr-12	6.0	416	69.3	254
19-Apr-12	4.0	273	68.3	250
20-Apr-12	4.4	263	59.6	218
21-Apr-12				
22-Apr-12				
23-Apr-12	5.2	379	73.4	269
24-Apr-12				
25-Apr-12	6.3	469	74.1	271
26-Apr-12				
27-Apr-12				
28-Apr-12				
29-Apr-12				
30-Apr-12				
1-May-12	6.8	490	72.6	266
2-May-12	5.8	403	70.1	257
3-May-12	3.0	209	69.7	255
4-May-12				
5-May-12				
6-May-12				
7-May-12	5.6	399	71.4	262
8-May-12				
9-May-12				
10-May-12				
11-May-12				

**Table 1**  
**2012 Daily Sump Discharge**  
**Tansley Quarry - Hanson Brick Ltd.**

Date	Total Daily (hrs)	Total Daily Volume Pumped (m <sup>3</sup> )	Sump Dewatering Rate	
			(m <sup>3</sup> /hr)	(igal/min)
12-May-12				
13-May-12				
14-May-12	4.7	337	72.2	264
15-May-12				
16-May-12	7.5	499	66.5	244
17-May-12				
18-May-12	6.4	339	52.8	194
19-May-12				
20-May-12				
21-May-12				
22-May-12	7.7	203	26.5	97
23-May-12				
24-May-12				
25-May-12				
26-May-12				
27-May-12				
28-May-12				
29-May-12	6.8	524	77.6	284
30-May-12				
31-May-12				
1-Jun-12				
2-Jun-12				
3-Jun-12				
4-Jun-12	6.7	445	66.8	245
5-Jun-12	7.4	457	61.6	226
6-Jun-12	6.8	448	66.3	243
7-Jun-12				
8-Jun-12				
9-Jun-12				
10-Jun-12				
11-Jun-12				
12-Jun-12	7.1	468	66.0	242
13-Jun-12	6.2	425	68.8	252
14-Jun-12	5.8	371	63.7	233
15-Jun-12	0.6	31	53.7	196
16-Jun-12				
17-Jun-12				
18-Jun-12	0.7	31	46.7	171
19-Jun-12	2.1	59	28.3	104
20-Jun-12				
21-Jun-12				
22-Jun-12	6.0	167	27.9	102
23-Jun-12				
24-Jun-12				
25-Jun-12				
26-Jun-12				
27-Jun-12				
28-Jun-12	5.4	304	56.2	206
29-Jun-12	2.9	161	55.2	202
30-Jun-12				
1-Jul-12				
2-Jul-12				
3-Jul-12	5.8	250	43.4	159
4-Jul-12				
5-Jul-12				
6-Jul-12	4.2	234	56.2	206
7-Jul-12				
8-Jul-12				
9-Jul-12				
10-Jul-12	4.5	262	58.1	213
11-Jul-12				
12-Jul-12				
13-Jul-12				
14-Jul-12				
15-Jul-12				
16-Jul-12				



**Table 1  
2012 Daily Sump Discharge  
Tansley Quarry - Hanson Brick Ltd.**

Date	Total Daily (hrs)	Total Daily Volume Pumped (m <sup>3</sup> )	Sump Dewatering Rate	
			(m <sup>3</sup> /hr)	(igal/min)
17-Jul-12				
18-Jul-12	7.3	267	36.9	135
19-Jul-12				
20-Jul-12				
21-Jul-12				
22-Jul-12				
23-Jul-12	7.5	458	61.1	224
24-Jul-12				
25-Jul-12				
26-Jul-12				
27-Jul-12	7.3	442	61.0	223
28-Jul-12				
29-Jul-12				
30-Jul-12				
31-Jul-12				
1-Aug-12	7.7	445	58.1	213
2-Aug-12	7.0	437	62.4	229
3-Aug-12				
4-Aug-12				
5-Aug-12				
6-Aug-12				
7-Aug-12				
8-Aug-12				
9-Aug-12	7.5	444	59.2	217
10-Aug-12				
11-Aug-12				
12-Aug-12				
13-Aug-12	6.8	387	57.4	210
14-Aug-12				
15-Aug-12				
16-Aug-12				
17-Aug-12				
18-Aug-12				
19-Aug-12				
20-Aug-12				
21-Aug-12	8.0	386	48.3	177
22-Aug-12	8.0	506	63.3	232
23-Aug-12				
24-Aug-12	8.0	452	56.5	207
25-Aug-12				
26-Aug-12				
27-Aug-12				
28-Aug-12	8.0	473	59.1	216
29-Aug-12				
30-Aug-12				
31-Aug-12				
1-Sep-12				
2-Sep-12				
3-Sep-12				
4-Sep-12				
5-Sep-12				
6-Sep-12				
7-Sep-12				
8-Sep-12				
9-Sep-12				
10-Sep-12				
11-Sep-12				
12-Sep-12				
13-Sep-12	4.3	275	63.3	232
14-Sep-12	7.3	429	59.1	217
15-Sep-12				
16-Sep-12				
17-Sep-12	7.8	473	60.3	221
18-Sep-12				
19-Sep-12	7.8	511	65.9	241
20-Sep-12				

**Table 1  
2012 Daily Sump Discharge  
Tansley Quarry - Hanson Brick Ltd.**

Date	Total Daily (hrs)	Total Daily Volume Pumped (m <sup>3</sup> )	Sump Dewatering Rate	
			(m <sup>3</sup> /hr)	(igal/min)
21-Sep-12				
22-Sep-12				
23-Sep-12				
24-Sep-12				
25-Sep-12				
26-Sep-12	7.9	521	65.8	241
27-Sep-12	9.7	604	62.5	229
28-Sep-12				
29-Sep-12				
30-Sep-12				
1-Oct-12				
2-Oct-12	7.7	476	62.1	227
3-Oct-12	7.7	250	32.6	120
4-Oct-12				
5-Oct-12				
6-Oct-12				
7-Oct-12				
8-Oct-12				
9-Oct-12				
10-Oct-12				
11-Oct-12				
12-Oct-12				
13-Oct-12				
14-Oct-12				
15-Oct-12				
16-Oct-12				
17-Oct-12	6.8	456	67.6	247
18-Oct-12	7.1	484	68.3	250
19-Oct-12	6.0	405	67.5	247
20-Oct-12				
21-Oct-12				
22-Oct-12	6.3	401	63.4	232
23-Oct-12				
24-Oct-12				
25-Oct-12				
26-Oct-12	6.8	448	65.5	240
27-Oct-12				
28-Oct-12				
29-Oct-12	6.3	438	70.0	256
30-Oct-12	6.6	442	67.1	246
31-Oct-12	6.1	425	69.8	256
1-Nov-12	3.5	256	73.3	268
2-Nov-12				
3-Nov-12				
4-Nov-12				
5-Nov-12				
6-Nov-12				
7-Nov-12				
8-Nov-12	5.7	364	64.3	235
9-Nov-12	4.5	310	68.9	252
10-Nov-12				
11-Nov-12				
12-Nov-12				
13-Nov-12	6.5	371	57.1	209
14-Nov-12	6.9	474	68.6	251
15-Nov-12	5.0	357	71.5	262
16-Nov-12				
17-Nov-12				
18-Nov-12				
19-Nov-12				
20-Nov-12				
21-Nov-12	6.8	434	63.5	232
22-Nov-12	7.3	487	66.4	243
23-Nov-12	7.7	480	62.5	229
24-Nov-12				
25-Nov-12				

**Table 1**  
**2012 Daily Sump Discharge**  
**Tansley Quarry - Hanson Brick Ltd.**

Date	Total Daily	Total Daily	Sump Dewatering Rate	
	(hrs)	Volume Pumped (m <sup>3</sup> )	(m <sup>3</sup> /hr)	(igal/min)
26-Nov-12	5.3	333	63.5	233
27-Nov-12				
28-Nov-12				
29-Nov-12				
30-Nov-12	5.9	372	62.8	230
1-Dec-12				
2-Dec-12				
3-Dec-12	6.8	421	61.6	225
4-Dec-12	7.0	421	60.2	220
5-Dec-12	7.1	404	57.0	209
6-Dec-12				
7-Dec-12				
8-Dec-12				
9-Dec-12				
10-Dec-12				
11-Dec-12	4.3	259	61.0	223
12-Dec-12	6.0	376	62.6	229
13-Dec-12	7.1	448	63.3	232
14-Dec-12	2.4	137	56.6	207
15-Dec-12				
16-Dec-12				
17-Dec-12	5.7	323	56.9	209
18-Dec-12				
19-Dec-12				
20-Dec-12				
21-Dec-12				
22-Dec-12				
23-Dec-12				
24-Dec-12				
25-Dec-12				
26-Dec-12				
27-Dec-12				
28-Dec-12				
29-Dec-12				
30-Dec-12				
<b>2012 Annual Total</b>	<b>698</b>	<b>46,206</b>		

**Note:**

Discharge data provided by Hanson Brick Ltd.

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

Property	Current Monitoring	MOE Well Record No.	Water Use	Measured Well Depth (m)	Casing Diameter (cm)	Formation Screened
Bekkers	WL, WQ	2810528	Domestic	22.7	91	Shale
Featherstone	WL	2804215	Domestic	24.5	15	Shale
Finucci	WL, WQ	2807948	Domestic	16.5	15	Shale
Hendervale Main Barn	WL, WQ	2808781	Domestic	12.8	15	Shale
Hendervale ABC Barn	WL, WQ	2808540	Domestic	>29	15	Shale
Hendervale XYZ Barn	WL, WQ	2808537	Domestic	21.4	15	Shale
Hendervale House	WL, WQ	2802793	Domestic	19.4	15	Shale
Hendervale Cottage	WL, WQ		Domestic	8.9	15	Overburden
Sicard	WQ	2803908	Domestic	~18	15	Shale
Simms	WL, WQ	2804679	Domestic	27.4	76	Shale
Sugiyama	WQ	2807647	Domestic	15	15	Shale
Wettlaufer		2807684	Domestic	20.7	15	Shale
Wiggins	WL	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) MOE well records assigned to Hendervale property could not be assigned to each well on property.
- 5) Owner indicated that Hendervale House well was deepened from original depth of approximately 8 m to 26 m.
- 6) MOE well records assigned to Stevenson property (currently owned by Hanson Brick) could not be correlated with well currently identified on property.
- 7) Sicard and Sugiyama well depths are approximate (provided by owner).

**Table 3**  
**Groundwater Level Elevations in MW-Series and TW-Series Wells**  
**September 30, 2002 to December 21, 2012**  
**Tansley Quarry - Hanson Brick Ltd**

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	30-Sep-02	7-Oct-02	10-Oct-02	25-Oct-02	31-Oct-02	17-Dec-02	7-Jan-03	14-Feb-03	20-Mar-03	21-Apr-03	5-May-03	16-Jun-03	14-Jul-03	31-Oct-03
		Easting (m)	Northing (m)																	
MW-01	Overburden	596395	4809597	164.78	0.76	165.54								163.16	163.60	164.29	164.09	164.40	163.52	163.80
	Intermediate			164.78	0.80	165.58		162.56	162.56	162.28	162.36	162.51	163.10	163.18	163.61	164.27	164.23	164.39	163.49	163.78
	Deep			164.78	0.75	165.53		160.39	160.30	160.14	160.06	159.41	159.43	159.74	159.62	160.19	160.26	160.41	160.23	159.79
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		165.64	165.58	165.49	165.64	165.59	165.96	166.66	166.16	166.35	166.31	166.23	165.65	165.93
	Intermediate			166.58	0.76	167.34		160.36	160.31	160.09	160.07	159.79	159.90	162.02	160.19	160.88	160.88	161.29	161.06	160.57
	Deep			166.58	0.74	167.32		152.93	153.15	152.79	152.77	152.50	152.60	152.61	152.69	152.73	152.77	152.70	152.72	152.89
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.22	162.12	162.32	162.08	161.87	162.19	162.13	161.91	161.74	162.14	162.01	162.41	162.61	162.16
	Deep			169.31	0.75	170.06	162.04	162.04	162.06	162.00	161.96	162.04	161.92	161.82	161.86	162.15	162.28	162.36	162.47	161.61
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	163.79	163.94	163.90	163.69	163.67	163.48	163.49	163.48	163.69	164.81	165.04	165.41	165.21	164.71
	Intermediate			167.85	0.94	168.79	161.53	161.51	161.49	161.36	161.33	161.23	161.21	161.14	161.15	161.80	162.03	162.37	162.00	161.71
	Deep			167.85	0.87	168.72	162.15	163.82	163.85	163.63	163.64	163.41	163.41	164.38	163.60	164.65	164.93	161.24	163.06	162.75
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.40	160.33	160.31	160.16	160.09	159.92	159.87	159.76	159.72	160.40	160.73	162.16	161.70	160.45
	Intermediate			166.88	0.84	167.72	158.67	158.68	158.65	158.55	158.64	158.80	158.87	158.78	158.81	159.61	159.75	160.22	159.40	159.25
	Deep			166.88	0.81	167.69	130.45	130.62	130.63	130.84	130.93	131.28	131.50	131.71	132.00	132.16	132.20	132.32	132.44	132.75
	Straddle	596134	4808769	167.03	0.95	167.98														
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	161.76	161.71	161.70	161.62	161.58	161.37	161.30	161.20	161.11	162.31	162.82	163.58	162.92	162.11
	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	162.36	162.85	163.67	162.61	161.58
	Straddle	596351	4808892	166.05	0.84	166.89														
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.46	163.38	163.34	163.14	163.12	162.70	162.64	162.71	162.85	164.07	164.24	164.79	164.43	163.79
	Deep			166.89	0.87	167.76	152.00	152.05	152.00	151.97	152.04	151.96	152.10	151.99	152.26	152.28	152.27	152.29	152.38	152.53
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	160.57	160.36	160.25	160.05	160.00	159.76	159.89	160.19	160.49	161.09	161.07	161.39	161.06	160.39
	Intermediate			162.79	0.84	163.63	160.46	160.26	160.19	159.97	159.95	159.66	159.75	159.91	160.05	160.78	160.80	161.13	160.88	160.33
	Deep			162.79	0.82	163.61	160.51	160.33	160.26	160.26	160.04	159.77	159.94	160.24	160.47	161.09	161.06	161.39	161.07	160.42
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 3**  
**Groundwater Level Elevations in MW-Series and TW-Series Wells**  
**September 30, 2002 to December 21, 2012**  
**Tansley Quarry - Hanson Brick Ltd**

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	12-Jan-04	5-Apr-04	15-Jul-04	15-Oct-04	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	7-Aug-07	
		Easting (m)	Northing (m)																		
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.31	164.57	163.82	163.02	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	164.25	164.55	163.80	162.99	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	160.59	160.80	160.60	160.22	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	166.10	166.29	165.88	165.27	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	161.61	161.87	161.62	161.12	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	153.02	153.09	153.15	153.01	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	163.40	163.68	162.65	162.76	162.64	163.17	162.05	163.06	162.08	163.68	164.37	164.01	162.36		
	Deep			169.31	0.75	170.06	163.28	163.71	163.02	162.63	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	166.10	166.37	165.87	164.71	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	162.72	163.17	162.69	162.12	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	162.81	163.36	163.10	162.01	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	161.50	163.66	161.97	160.66	161.34	163.96	160.75	162.94	162.16	161.47	163.36	163.66	161.85	160.98	
	Intermediate			166.88	0.84	167.72	160.24	160.78	160.15	159.45	161.73	161.05	158.41	160.45	160.19	159.79	160.90	161.07	160.23	160.17	
	Deep			166.88	0.81	167.69	132.94	133.10	133.16	133.11	133.47	133.71	133.94	134.25			134.49	134.75	134.89	134.99	135.69
	Straddle	596134	4808769	167.03	0.95	167.98														160.66	
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	163.66	164.33	163.76	163.25	163.13	164.29	163.27	164.32	163.80	163.63	164.58	164.34	163.97	163.79	
	Deep			165.97	0.90	166.87	163.71	164.32	163.91	162.85	163.43	164.34	162.07	164.19	163.25	163.34	164.46	164.48	163.23	162.07	
	Straddle	596351	4808892	166.05	0.84	166.89														161.91	
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	165.12	165.32	165.54	164.32	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	152.70	152.72	152.86	152.57	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	161.62	161.85	161.51	160.99	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	161.31	161.58	161.26	160.83	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	161.64	161.86	161.51	161.03	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														163.42	
	Straddle	596166	4809014		0.82	166.35															161.86
	Deep	596164	4809012		1.06	166.59															125.54
MW-10	Overburden	596045	4809002	166.77	0.88	167.65														163.88	
	Intermediate	596045	4809002		0.94	167.71															162.36
	Deep	596046	4809003		0.83	167.60															125.09
MW-11	Overburden	595869	4808946	168.31	1.01	169.32														163.42	
	Straddle	595870	4808946		1.04	169.35															163.58
	Deep	595871	4808948		1.12	169.42															126.30
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															

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**September 30, 2002 to December 21, 2012**  
**Tansley Quarry - Hanson Brick Ltd**

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	9-Aug-07	30-Aug-07	6-Dec-07	7-Dec-07	16-Jan-08	23-Jan-08	24-Jan-08	25-Jan-08	31-Jan-08	26-Feb-08	28-Mar-08	24-Apr-08	26-May-08	26-Jun-08	
		Easting (m)	Northing (m)																		
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	165.54	165.54			163.73				163.48	164.40	164.46	164.10	164.00	163.99	
	Intermediate			164.78	0.80	165.58	162.63	162.34	161.14			163.75				163.50	164.42	164.45	164.10	164.01	164.02
	Deep			164.78	0.75	165.53	160.32	160.04	159.53			158.35				158.19	158.27	158.32	158.43	158.42	158.27
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	165.11	164.94	165.33		166.08				165.85	166.19	166.38	166.12	166.06	165.98	
	Intermediate			166.58	0.76	167.34	161.95	161.77	160.93		160.56				160.42	160.25	160.15	160.13	160.12	160.03	
	Deep			166.58	0.74	167.32	153.09	153.06	153.21		153.13				153.06	153.05	152.96	152.88	152.90	152.81	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	162.49	161.92	161.10		161.20				161.17	161.86	161.81	162.05	160.92	160.60	
	Deep			169.31	0.75	170.06	162.29	162.00	160.02		158.91				158.88	159.30	159.49	159.81	159.82	159.46	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	163.79	163.60	162.48		162.97				163.19	163.88	164.48	164.65	164.64	164.50	
	Intermediate			167.85	0.94	168.79	161.28	160.95	157.84		156.27				156.10	156.52	156.84	157.17	157.23	156.91	
	Deep			167.85	0.87	168.72	161.37	161.02	157.95		156.35	156.39		156.25	156.16	156.81	156.96	157.27	157.29	157.04	
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.92	160.63		159.88	159.70		159.72		159.69	159.82	160.36	161.93	161.32	160.58	
	Intermediate			166.88	0.84	167.72	159.91	159.69		153.55	150.23		149.45		149.40	150.21	149.40	149.60	149.88	149.16	
	Deep			166.88	0.81	167.69	135.06	135.13		146.46	146.38		146.32		146.31	146.34	146.31	146.29	146.28	146.27	
	Straddle	596134	4808769	167.03	0.95	167.98	160.62	160.35		158.56	157.58		157.44	157.46	157.36	157.72	158.23	159.06	158.58	157.80	
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	163.78	163.68	163.07		162.77			162.69	161.26	161.24	161.17	161.09	161.03	160.95	160.90
	Deep			165.97	0.90	166.87	162.05	161.70	159.37		158.96		159.20	152.91	152.63	151.60	150.65	149.95	149.17	148.65	
	Straddle	596351	4808892	166.05	0.84	166.89	161.84	161.46	158.77		159.44		159.55	159.56	159.56	159.52	159.54	159.97	159.86	159.54	
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.84	163.49	161.62		161.28	161.27		161.50	161.45	162.09	162.92	163.33	163.42	163.13	
	Deep			166.89	0.87	167.76	152.81	152.78		152.84	152.77	152.81		152.44	152.38	152.60	152.45	152.28	152.35	152.29	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	160.96	160.60	159.56		159.21		159.15	160.11	159.01	159.00	159.23	159.36	159.33	159.26	
	Intermediate			162.79	0.84	163.63	160.91	160.55	160.12		158.69	158.67		158.57	158.51	158.73	158.83	158.96	158.95	158.81	
	Deep			162.79	0.82	163.61	160.99	160.63	159.63		159.17	159.20		157.65	158.97	159.02	159.21	159.34	159.30	159.22	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	163.31	162.70	160.50		160.04	159.97		159.94	159.81	159.96	161.40	162.54	162.80	162.27	
	Straddle	596166	4809014		0.82	166.35	161.83	161.43	156.77		154.32	154.38	154.35	154.44	154.31	154.76	154.91	155.01	155.02	154.90	
	Deep	596164	4809012		1.06	166.59	125.38	125.44	125.53		125.54	125.51		151.51	151.33	151.18	151.00	150.93	150.85	150.78	
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	163.79	163.16	160.89		160.22	160.17		160.42	160.20	160.68	162.86	164.21	164.33	163.62	
	Intermediate	596045	4809002		0.94	167.71	162.31	161.91	159.06		157.81	157.85		157.55	157.55	157.99	159.15	160.02	160.31	159.82	
	Deep	596046	4809003		0.83	167.60	124.88	125.03	125.25		125.30	125.30		158.38	156.90	155.94	155.43	155.10	154.82	154.59	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	163.37	163.14		162.41	163.03		163.44	163.47	163.37	164.25	164.84	164.99	164.66	164.37	
	Straddle	595870	4808946		1.04	169.35	163.58	163.61		162.48	163.20		163.42	163.43	163.28	164.05	164.63	164.81	164.46	164.45	
	Deep	595871	4808948		1.12	169.42	125.19	125.32		125.51	125.58		125.55	153.89	153.67	151.94	151.75	151.68	151.64	151.58	
TW-1		595581	4808946	167.64	0.88	168.52					162.58				163.77	164.12	164.26	163.77	163.26		
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					155.11				155.95	156.09	155.14	155.09	155.28		

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Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	28-Jul-08	27-Aug-08	29-Sep-08	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	26-Jan-10	5-Mar-10
		Easting (m)	Northing (m)																	
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.25	164.11	163.99	164.17	164.33	164.38	164.44	164.46	164.59	163.95	164.29	164.36	164.46	
	Intermediate			164.78	0.80	165.58	164.24	164.11	164.00	164.18	164.27	164.39	164.45	164.46	164.58	163.95	164.29	164.35	164.45	
	Deep			164.78	0.75	165.53	158.39	158.63	158.75	158.77	158.81	158.86	159.19	159.27	159.49	158.84	158.91	159.02	159.22	
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.22	166.15	166.06	166.09	165.96	166.15	166.43	166.13	166.38	165.77	165.87	165.95	166.26	
	Intermediate			166.58	0.76	167.34	159.96	159.96	160.07	160.11	160.63	160.79	161.15	161.35	161.70	160.82	160.93	161.07	161.03	
	Deep			166.58	0.74	167.32	152.81	152.74	152.73	152.73	152.52	152.55	152.59	152.66	152.69	152.75	152.62	152.64	152.64	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	159.88	161.12	162.90	163.00	162.75	162.90	163.35	163.82	164.78	163.95	163.86	164.81	164.01	
	Deep			169.31	0.75	170.06	159.41	159.74	160.44	160.50	160.50	160.56	160.98	161.36	161.66	160.52	160.27	160.24	160.37	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	164.55	164.97	164.97	164.71	164.68	164.63	165.16	165.37	165.96	164.72	164.60	164.78	165.20	164.86
	Intermediate			167.85	0.94	168.79	157.07	157.54	157.89	157.92	157.95	157.96	158.43	158.88	159.02	157.56	157.24	157.17	157.20	157.00
	Deep			167.85	0.87	168.72	157.14	157.70	158.10	157.95	132.85	133.12	133.43	133.80	144.65	151.33	151.83	151.94	125.84	126.01
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	160.17	160.61	160.42	160.34	159.91	159.89	160.09	160.78	162.47	160.57	159.82	159.63	159.77	159.62
	Intermediate			166.88	0.84	167.72	149.64	150.00	150.29	150.16	150.21	149.99	150.39	150.99	150.39	147.96	147.89	147.80	147.85	147.73
	Deep			166.88	0.81	167.69	146.23	146.20	146.19	146.17	133.08	133.13	133.18	133.33	133.49	133.70	133.81	133.88	127.03	127.06
	Straddle	596134	4808769	167.03	0.95	167.98	157.52	158.03	157.92	157.86	157.75	157.67	158.17	158.93	160.31	158.69	158.25	158.13	158.08	157.82
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.82	160.75	160.71	160.69	159.56	159.46	160.02	160.08	160.52	159.64	159.37	159.36	159.76	
	Deep			165.97	0.90	166.87	148.28	148.17	148.22	148.24	152.06	152.94	152.05	151.56	160.60	159.21	159.34	159.19	138.83	
	Straddle	596351	4808892	166.05	0.84	166.89	159.52	160.00	159.81	159.76	159.65	159.59	160.12	160.18	158.22	159.74	159.46	159.33	159.83	
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	163.11	163.88	164.01	163.97	164.14	164.13	164.55	164.59	164.84	163.87	163.92	164.03	164.26	
	Deep			166.89	0.87	167.76	152.27	152.18	152.19	152.08	151.90	151.91	151.89	152.06	152.03	152.06	151.95	152.05	152.06	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	159.39	159.65	159.74	159.77	159.85	159.94	160.28	160.40	160.72		160.13	160.22	161.15	
	Intermediate			162.79	0.84	163.63	159.01	159.28	159.41	159.42	159.45	159.50	159.77	159.94	160.19		159.56	159.71	159.85	
	Deep			162.79	0.82	163.61	159.38	159.63	159.74	159.77	159.83	159.94	160.28	160.39	160.71		160.06	160.15	161.10	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	162.26	163.54	162.88	162.63	162.40	162.16	163.89	164.14	164.64	162.43	154.69	161.18	161.95	
	Straddle	596166	4809014		0.82	166.35	155.19	155.63	155.82	155.81	155.89	155.77	156.10	156.40	156.30	155.08	161.29	154.77	154.92	
	Deep	596164	4809012		1.06	166.59	150.72	150.63	150.57	150.53	127.40	127.44	127.45	127.61	127.86	128.19	128.48	128.65	126.24	
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	163.62	164.65	164.15	163.90	163.56	163.34	164.93	165.45	166.25	163.53	162.53	162.62	163.34	
	Intermediate	596045	4809002		0.94	167.71	159.97	161.01	161.07	161.02	160.40	160.40	161.42	161.84	162.01	159.90	159.21	159.16	159.06	
	Deep	596046	4809003		0.83	167.60	154.37	154.17	153.99	154.03	133.52	133.73	133.96	134.20	134.89	135.58	136.00	136.17	124.93	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	164.68	165.03	164.72	164.61	164.33	164.48	165.21	165.21	166.06	164.15	163.99	164.04	164.53	164.13
	Straddle	595870	4808946		1.04	169.35	164.48	164.80	164.78	164.61	164.39	164.47	165.08	165.18	165.95	164.40	164.19	164.32	164.73	164.38
	Deep	595871	4808948		1.12	169.42	151.53	151.48	151.45	151.39	132.63	132.70	132.82	133.04	133.51	134.11	134.60	134.81	136.59	136.71
TW-1		595581	4808946	167.64	0.88	168.52	163.84	164.52	164.10		163.69	163.86	164.71	164.69	165.38	168.52	163.89		164.38	
TW-2		595621	4810361	176.33	0.82	177.15	Dry	Dry	Dry		Dry	Dry	Dry	Dry	Dry	Dry	Dry		Dry	
TW-3		596411	4810003	166.85	0.70	167.55	154.67	154.70	154.73		155.66	162.98	156.66	156.83	156.55	167.55	155.91		156.83	

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



**Table 3**  
**Groundwater Level Elevations in MW-Series and TW-Series Wells**  
**September 30, 2002 to December 21, 2012**  
**Tansley Quarry - Hanson Brick Ltd**

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	12-Mar-10	25-Mar-10	26-Apr-10	19-May-10	28-Jun-10	27-Jul-10	31-Aug-10	30-Sep-10	18-Oct-10	1-Dec-10	23-Dec-10	26-Jan-11	24-Feb-11	21-Mar-11
		Easting (m)	Northing (m)																	
MW-01	Overburden	596395	4809597	164.78	0.76	165.54		164.49				164.33			164.37			164.23		
	Intermediate			164.78	0.80	165.58		164.50			164.31		164.37		164.23					
	Deep			164.78	0.75	165.53		159.30			159.17		159.16		159.46					
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		166.31		166.18	166.13			166.12			165.83			
	Intermediate			166.58	0.76	167.34		161.12		161.04	160.91		160.97		161.20					
	Deep			166.58	0.74	167.32		152.62		152.69	152.66		153.03		154.25					
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		163.98				163.97		163.88			164.31			
	Deep			169.31	0.75	170.06		160.28			160.26		160.19		160.51					
MW-04	Overburden	595911	4809070	167.85	0.97	168.82		165.73	165.81	165.68	165.46	165.09	164.77	164.64	164.93	165.54	165.37	165.23	165.28	165.80
	Intermediate			167.85	0.94	168.79		157.20	157.37	157.30	157.27	157.12	157.02	156.98	157.08	157.30	157.41	157.42	157.41	157.65
	Deep			167.85	0.87	168.72		126.06	126.15	126.27	126.35	126.52	126.88	126.96	127.01	123.88	123.93	124.07	124.15	124.21
MW-05	Overburden	596135	4808768	166.88	0.88	167.76		159.97	160.64	160.72	160.60	160.36	160.07	159.83	159.85	159.85	159.96	159.88	159.79	160.34
	Intermediate			166.88	0.84	167.72		147.80	147.72	147.66	147.59	147.55	147.44	147.36	147.46	147.44	147.45	147.46	147.47	147.60
	Deep			166.88	0.81	167.69	127.07	127.08	127.12	127.14	127.17	127.16	127.19	127.24	127.21	127.24	127.26	127.29	127.32	127.34
	Straddle	596134	4808769	167.03	0.95	167.98	157.87	158.21	158.64	158.59	158.46	158.27	157.98	157.81	157.89	157.86	157.83	157.72	157.70	158.20
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	159.73					159.87			159.36			159.55		
	Deep			165.97	0.90	166.87	138.95					139.17			139.30			137.40		
	Straddle	596351	4808892	166.05	0.84	166.89	159.87					159.77			159.17			159.66		
MW-07	Overburden	596099	4809348	166.89	0.85	167.74		164.56				164.03			164.10			164.15	164.27	
	Deep			166.89	0.87	167.76		152.01			151.96		152.00		152.60	152.92				
MW-08	Overburden	596295	4809190	162.79	0.87	163.66		161.38				162.06			161.94			161.70		
	Intermediate			162.79	0.84	163.63		160.00			159.79		159.83		160.08					
	Deep			162.79	0.82	163.61		161.40			162.06		161.95		161.69					
MW-09	Overburden	596166	4809014	165.53	0.76	166.29		163.35				162.50			161.21			162.84		
	Straddle	596166	4809014		0.82	166.35		155.09			155.12		155.14		155.47					
	Deep	596164	4809012		1.06	166.59		126.32			126.55		126.67		126.84					
MW-10	Overburden	596045	4809002	166.77	0.88	167.65		164.70				163.96			163.02			164.19		
	Intermediate	596045	4809002		0.94	167.71		159.73			159.49		159.29		159.91					
	Deep	596046	4809003		0.83	167.60		125.17			125.86		126.30		127.17					
MW-11	Overburden	595869	4808946	168.31	1.01	169.32			165.47	165.25	164.99	164.59	163.99	163.79	164.35	165.16	165.00	164.72	164.86	165.64
	Straddle	595870	4808946		1.04	169.35		165.38	165.18	164.89	164.56	164.20	164.12	164.48	165.23	164.91	164.70	164.71	165.32	
	Deep	595871	4808948		1.12	169.42		137.11	137.16	137.42	137.51	137.70	137.90	137.96	129.45	129.51	129.62	129.74	129.82	
TW-1		595581	4808946	167.64	0.88	168.52		165.19				164.39		164.50			164.27			
TW-2		595621	4810361	176.33	0.82	177.15		Dry				Dry		Dry			Dry			
TW-3		596411	4810003	166.85	0.70	167.55		156.53				155.10		155.71			156.69			

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 3**  
**Groundwater Level Elevations in MW-Series and TW-Series Wells**  
**September 30, 2002 to December 21, 2012**  
**Tansley Quarry - Hanson Brick Ltd**

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	18-Apr-11	19-May-11	21-Jun-11	21,26-Jul-11	25-Aug-11	20-Sep-11	28-Oct-11	14-Nov-11	25-Nov-11	21-Dec-11	27-Jan-12	23-Feb-12	28-Mar-12	20-Apr-12
		Easting (m)	Northing (m)																	
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	164.58			163.47		Dry				164.52	164.62	164.49	164.46	164.17
	Intermediate			164.78	0.80	165.58	164.60		163.48		162.86			164.53	164.635	164.495	164.465	164.175		
	Deep			164.78	0.75	165.53	159.77		159.44		159.14			160.02	160.115	160.13	159.91	159.94		
MW-02	Overburden	596248	4809618	166.58	0.78	167.36	166.37			165.76		165.48		166.10		166.40	166.435	166.33	166.32	166.095
	Intermediate			166.58	0.76	167.34	161.62		161.21		160.82		161.35		161.76	161.845	161.9	161.89	161.685	
	Deep			166.58	0.74	167.32	156.43		158.40		158.19		158.63		159.02	159.185	159.25	159.23	159.11	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12	164.71			164.48		163.96		164.40		164.81	165.078	165.198	165.258	165.088
	Deep			169.31	0.75	170.06	160.92		160.82		160.43		160.72		161.09	161.31	161.51	161.47	161.16	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.95	166.22	165.92	165.59		164.74	165.47	165.72	165.75	166.25	166.29	166.3	166.255	165.89
	Intermediate			167.85	0.94	168.79	157.92	158.20	158.16	157.68		157.46	157.77	157.71	157.97	158.32	158.48	158.56	158.605	158.16
	Deep			167.85	0.87	168.72	124.31	124.40	124.51	124.63		124.77	124.88	124.94	124.06	119.17	124.25	127.72	129.84	129.98
MW-05	Overburden	596135	4808768	166.88	0.88	167.76	161.04	162.63	162.10	161.22	160.54	160.24	160.15	160.19	160.13	160.49	160.69	161	161.23	160.975
	Intermediate			166.88	0.84	167.72	147.66	147.85	147.69	147.49	147.55	147.44	147.47	147.35	147.49	147.56	147.54	147.565	147.565	147.455
	Deep			166.88	0.81	167.69	127.37	127.38	127.40	127.41	127.45	127.46	127.46	127.47	126.11	126.15	126.18	126.18	126.21	126.25
	Straddle	596134	4808769	167.03	0.95	167.98	158.60	159.69	159.15	158.49	158.14	157.96	158.09	158.06	158.22	158.59	158.4671	158.5871	158.7471	158.4371
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	160.32			159.97		159.36		159.27		159.98			160.35	
	Deep	165.97	0.90	166.87	137.49		137.60		137.67		137.73	137.10	137.18			137.3	137.34			
	Straddle	596351	4808892	166.05	0.84	166.89	160.43		160.06		159.41		159.34		160.09					
MW-07	Overburden	596099	4809348	166.89	0.85	167.74	164.76			164.17		163.63		164.50		165.01			165.035	164.73
	Deep			166.89	0.87	167.76	154.03		156.74		156.71		157.01		156.95			157.25	157.165	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	162.30			162.30		162.17		162.36		163.17			163.25	
	Intermediate			162.79	0.84	163.63	160.47		160.11		159.74		160.29		160.74			160.76		
	Deep			162.79	0.82	163.61	162.28		162.32		162.17		162.35		159.66			161.315		
MW-09	Overburden	596166	4809014	165.53	0.76	166.29	164.57			163.19		161.59		161.24		163.06			164.673	
	Straddle	596166	4809014		0.82	166.35	155.91		155.74		155.50		155.75		156.22			156.336		
	Deep	596164	4809012		1.06	166.59	126.97		127.14		127.26		127.56		126.58			126.76		
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	166.34			164.59		162.91		163.29		164.90			166.351	165.891
	Intermediate	596045	4809002		0.94	167.71	161.31		160.68		160.08		160.50		161.57			162.715	162.355	
	Deep	596046	4809003		0.83	167.60	127.90		129.13		130.06		131.10		129.32			131.191	131.631	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32	165.94	166.33		164.64		163.97	164.59	164.96	165.07	165.98	166	165.89	165.88	165.32
	Straddle	595870	4808946		1.04	169.35	165.50	165.75		164.98		164.00	164.90	165.09	165.18	165.73	165.814	165.709	165.749	165.319
	Deep	595871	4808948		1.12	169.42	129.92	130.03	130.24	129.51		130.92	131.20	131.45	128.90	129.01	129.197	129.322	129.427	129.572
TW-1		595581	4808946	167.64	0.88	168.52	165.55			164.52		163.72			165.54			165.559278		
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			154.52		155.32			156.79			157.312494		

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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**September 30, 2002 to December 21, 2012**  
**Tansley Quarry - Hanson Brick Ltd**

Hole	Piezometer	Location		Ground Elev (m)	Stick-up (m)	Top of pipe elevation (masl)	25-May-12	20-Jun-12	12-Sep-12	13-Nov-12	13-Dec-12
		Easting (m)	Northing (m)								
MW-01	Overburden	596395	4809597	164.78	0.76	165.54	163.88	163.69	162.9	164.25	
	Intermediate			164.78	0.80	165.58	163.895	163.695	162.905	164.265	
	Deep			164.78	0.75	165.53	159.8	159.67	159.255	159.45	
MW-02	Overburden	596248	4809618	166.58	0.78	167.36		165.81	165.355	165.935	
	Intermediate			166.58	0.76	167.34		161.34	160.86	161.15	
	Deep			166.58	0.74	167.32		158.88	158.46	158.655	
MW-03	Overburden	596108	4809606	169.31	0.81	170.12		164.688	164.078	164.073	
	Deep			169.31	0.75	170.06		161.09	160.54	160.56	
MW-04	Overburden	595911	4809070	167.85	0.97	168.82	165.6	165.56	164.37	164.87	
	Intermediate			167.85	0.94	168.79	158.05	158.29	157.685	157.81	
	Deep			167.85	0.87	168.72	130.15	130.27	130.725	131.17	
MW-05	Overburden	596135	4808768	166.88	0.88	167.76		160.37	159.62	159.58	
	Intermediate			166.88	0.84	167.72		147.53	147.355	147.55	
	Deep			166.88	0.81	167.69		126.28	126.33	126.37	
	Straddle	596134	4808769	167.03	0.95	167.98		158.0371	157.5121	157.6871	
MW-06	Overburden	596355	4808896	165.97	0.98	166.95	159.7	159.56	158.94	158.755	
	Deep			165.97	0.90	166.87	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		164.355	163.62	164.025	
	Deep			166.89	0.87	167.76		156.88	156.5	156.44	
MW-08	Overburden	596295	4809190	162.79	0.87	163.66	162.915	162.95	162.54	162.795	
	Intermediate			162.79	0.84	163.63	160.415	160.29	159.83	160.11	160.37
	Deep			162.79	0.82	163.61	160.955	160.635	160.205	160.275	
MW-09	Overburden	596166	4809014	165.53	0.76	166.29		163.923	161.413	160.448	
	Straddle	596166	4809014		0.82	166.35		156.136	155.731	155.851	
	Deep	596164	4809012		1.06	166.59		126.96	127.175	127.405	126.435
MW-10	Overburden	596045	4809002	166.77	0.88	167.65	165.591	164.921	162.636	161.736	
	Intermediate	596045	4809002		0.94	167.71	162.21	162.075	160.78	160.425	
	Deep	596046	4809003		0.83	167.60	132.181	132.661	133.906	134.841	
MW-11	Overburden	595869	4808946	168.31	1.01	169.32		164.63	163.205	163.695	
	Straddle	595870	4808946		1.04	169.35		165.019	163.604	164.279	
	Deep	595871	4808948		1.12	169.42		129.932	130.702	131.347	
TW-1		595581	4808946	167.64	0.88	168.52		164.454278	163.309278		164.44428
TW-2		595621	4810361	176.33	0.82	177.15		Dry	Dry		Dry
TW-3		596411	4810003	166.85	0.70	167.55		155.772494	154.932494		156.06249

Notes: 1. Shallow wells have screened intervals no deeper than 30' (9 m) below ground, completed in overburden. The overburden ranged from 7 m to 9 m thick in the boreholes on-site.  
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**Table 4**  
**Summary of 2012 Groundwater Quality Exceedances of ODWS**  
**MW-Series Monitoring Wells**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Aluminum	Alkalinity	Hardness	pH	Chloride	Sulphate	Sulphide	Copper	Sodium	Manganese	Iron	Turbidity	Barium	Cadmium	Chromium	Lead	Selenium	Uranium	Arsenic	Boron
ODWS	0.1 mg/L	30-500 mg/L	80-100 mg/L	6.5-8.5	250 mg/L	500 mg/L	0.05 mg/L	1 mg/L	200 mg/L	0.05 mg/L	0.3 mg/L	1 NTU	1 mg/L	0.005 mg/L	0.05 mg/L	0.01 mg/L	0.01 mg/L	0.02 mg/L	0.025 mg/L	5 mg/L
	OG	OG	OG	OG	AO	AO	AO	AO	AO	AO	AO	AO	MAC	MAC	MAC	MAC	MAC	MAC	IMAC	IMAC
MW-01O	Not sampled - insufficient water																			
MW-01I	15	-	780	-	-	-	-	-	-	0.65	29	720	-	-	-	0.016	-	-	-	-
MW-01D	0.29	-	6100	-	13000	1900	4	-	6500	1.1	1.4	130	-	-	0.073	-	-	-	-	6.1
MW-02O	31	730	1900	-	-	1300	0.33	-	-	2.4	72	640	-	-	0.06	0.03	-	0.023	-	-
MW-02I	5.3	-	1000	-	-	1100	-	-	-	0.53	11	290	-	-	-	-	-	-	-	-
MW-02D	22	-	6400	-	14000	2100	-	-	6200	2	42	630	-	-	-	0.018	-	-	-	5.9
MW-03O	10	-	880	-	-	900	-	-	-	0.79	15	590	-	-	-	-	-	-	-	-
MW-03D	9.5	-	5500	-	820	1500	-	-	4100	0.93	15	250	-	-	-	-	-	-	-	5.3
MW-04O	6.5	-	460	-	-	-	-	-	-	0.4	7	210	-	-	-	-	-	-	-	-
MW-04I	7.4	-	2000	-	2100	1800	1	-	1200	0.5	9	120	-	-	-	-	-	-	-	5.9
MW-04D	0.65	-	8400	-	16000	1700	-	-	7100	1.6	1	66	-	-	-	-	-	0.032	-	6.7
MW-05O	43	-	430	-	-	-	-	-	-	10	93	1600	-	-	0.1	-	-	-	-	0.027
MW-05S	100	-	280	-	-	-	-	-	-	14	230	3500	-	-	0.16	-	-	-	-	0.11
MW-05I	5.6	-	320	-	-	-	-	-	-	0.3	100	640	-	-	-	-	-	-	-	0.3
MW-05D	8.1	-	34000	6.11	59000	1200	-	-	21000	5.2	40	470	-	0.007	-	-	-	-	-	5.4
MW-06O	Not sampled - insufficient water																			
MW-06S	19	-	370	-	-	-	-	-	-	1.1	29	1100	-	-	-	-	-	-	-	-
MW-06D	Not sampled - insufficient water																			
MW-07O	36	570	610	-	-	-	-	-	-	1.7	68	770	-	-	0.062	0.032	-	-	-	6.4
MW-07D	8.7	-	1300	-	24000	1500	-	-	900	2.3	18	210	-	0.009	-	-	-	-	-	9.4
MW-08O	58	580	980	-	-	560	0.48	-	-	3.6	110	2500	-	-	0.1	0.05	-	-	0.03	-
MW-08I	8.6	-	4100	-	4100	100	-	-	1500	0.7	13	100	-	-	-	0.02	-	-	-	6.2
MW-08D	4	-	660	-	-	-	-	-	290	0.19	6.5	29	-	-	0.093	-	-	-	-	-
MW-09O	61	-	380	-	-	-	-	-	-	3.9	110	2000	-	-	0.17	0.038	-	-	0.034	-
MW-09S	27	-	600	-	290	560	-	-	250	3.4	54	470	-	-	0.06	0.026	-	-	0.05	-
MW-09D	1.3	-	29000	6.19	52000	1300	-	-	19000	4.7	19	38	-	0.006	-	-	-	-	-	-
MW-10O	870	-	480	-	-	-	-	1.3	-	61	1500	1200	11	-	1.5	0.51	-	0.059	0.3	-
MW-10I	5.2	-	380	-	-	-	-	-	-	0.62	9.7	500	-	-	-	-	-	-	-	0.032
MW-10D	0.37	-	17000	-	36000	1700	-	-	16000	2.4	2.8	41	-	0.0087	0.22	0.011	0.11	-	-	8.1
MW-11O	49	-	410	-	-	-	-	-	-	4.2	100	1900	-	-	0.15	0.042	-	-	0.029	-
MW-11S	91	-	430	-	-	-	-	-	-	13	210	900	-	-	0.19	0.081	-	-	0.078	-
MW-11D	1.4	-	27000	6.14	47000	1300	-	-	16000	4	16	320	-	0.0073	-	-	-	-	-	-

**Note:**

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

**Table 5**  
**Summary of 2012 Groundwater Quality Exceedances of PWQO**  
**MW-Series Monitoring Wells**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Aluminum	Arsenic	Boron	Cadmium	Cobalt	Copper	Iron	Lead	pH	Molybdenum	Nickel	Selenium	Silver	Thallium	Total Phosphorous	Uranium	Vanadium	Zinc
PWQO	0.075 mg/L	0.005 mg/L	0.2 mg/L	0.0005 mg/L	0.0009 mg/L	0.005 mg/L	0.3 mg/L	0.005 mg/L	6.5-8.5 pH units	0.04 mg/L	0.025 mg/L	0.1 mg/L	0.0001 mg/L	0.0003 mg/L	0.01 mg/L	0.005 mg/L	0.006 mg/L	0.02 mg/L
	Interim	Interim		Interim		Interim		Interim						Interim			Interim	Interim
MW-01O	Not sampled - insufficient water																	
MW-01I	15	0.0082	-	0.00052	0.014	0.03	29	0.016	-	-	0.027	-	0.00014	-	0.82	0.013	0.03	0.089
MW-01D	0.29	-	6.1	0.002	-	0.017	1.4	-	-	-	0.037	-	-	-	-	-	-	-
MW-02O	31	0.016	0.3	0.0018	0.03	0.06	72	0.03	-	-	0.067	-	0.00024	0.00032	2.1	0.023	0.07	0.19
MW-02I	5.3	0.0058	1.8	-	0.0056	0.012	11	0.0054	-	-	-	-	-	-	0.35	-	0.012	0.03
MW-02D	22	0.023	5.9	-	0.025	0.085	42	0.018	-	-	0.068	-	-	-	1.4	-	0.054	0.21
MW-03O	10	0.0092	1.3	-	0.0069	0.02	15	0.0063	-	-	-	-	-	-	0.64	-	0.019	0.059
MW-03D	9.5	-	5.3	0.002	-	0.019	15	-	-	-	-	-	-	-	-	-	0.01	0.2
MW-04O	6.5	-	-	-	0.005	0.007	7	-	-	-	-	-	-	-	0.15	0.008	0.01	-
MW-04I	7.4	-	5.9	-	0.0029	0.007	9	0.006	-	-	-	-	-	-	-	-	0.01	-
MW-04D	0.65	-	6.7	0.0044	-	0.03	1	-	-	-	-	-	-	-	-	0.032	-	-
MW-05O	43	0.027	-	0.001	0.052	0.23	93	0.07	-	-	0.09	-	0.00035	0.0005	3.7	-	0.08	0.25
MW-05S	100	0.11	1.3	0.0027	0.1	1	230	-	-	-	0.2	-	0.00065	0.0006	14	0.0062	0.17	1.2
MW-05I	5.6	0.3	2.4	0.00066	0.0036	0.032	100	0.0097	-	-	-	-	-	-	0.46	-	0.01	0.033
MW-05D	8.1	-	5.4	0.007	-	0.08	40	-	6.11	-	0.054	-	0.0058	-	-	-	-	-
MW-06O	Not sampled - insufficient water																	
MW-06S	19	0.02	-	0.001	0.015	0.037	29	0.01	-	-	0.034	-	-	-	1	-	0.032	0.083
MW-06D	Not sampled - insufficient water																	
MW-07O	36	0.017	6.4	0.001	0.032	0.062	68	0.032	-	-	0.067	-	0.00022	0.00047	1.8	0.011	0.077	0.17
MW-07D	8.7	-	9.4	0.009	-	0.072	18	-	-	-	-	-	-	-	-	-	0.032	-
MW-08O	58	0.03	1.8	0.001	0.058	0.094	110	0.05	-	-	0.12	-	0.00033	0.00042	3.8	0.014	0.1	0.3
MW-08I	8.6	0.0057	6.2	0.001	0.005	0.019	13	0.02	-	-	-	-	-	-	0.57	0.006	0.01	0.1
MW-08D	4	0.0087	4.4	0.0049	0.0022	0.019	6.5	-	-	-	-	-	-	-	-	-	0.007	0.044
MW-09O	61	0.034	1.3	0.001	0.067	0.064	110	0.038	-	-	0.14	-	0.00058	0.00051	3.3	0.0056	0.11	0.39
MW-09S	27	0.05	4.7	0.001	0.03	0.027	54	0.026	-	-	0.065	0.3	0.00029	-	2.6	-	0.06	0.15
MW-09D	1.3	-	5	0.006	-	-	19	-	6.19	-	-	-	-	-	-	0.011	-	-
MW-10O	870	0.3	2.1	-	0.91	1.3	1500	0.51	-	-	1.9	-	-	0.0068	57	0.059	1.5	4.4
MW-10I	5.2	0.032	0.63	0.00054	0.0039	0.0056	9.7	-	-	-	-	-	-	-	0.56	-	0.0094	0.022
MW-10D	0.37	-	8.1	0.0087	-	0.018	2.8	0.011	-	0.26	0.28	0.11	-	-	-	0.0097	-	-
MW-11O	49	0.029	-	0.0011	0.049	0.14	100	0.042	-	-	0.1	-	0.00031	0.00049	2.6	0.0069	0.096	0.36
MW-11S	91	0.078	1.7	0.0015	0.12	0.24	210	0.081	-	-	0.24	-	-	0.00051	10	0.0094	0.19	0.55
MW-11D	1.4	-	5	0.0073	-	-	16	-	6.14	-	0.21	-	-	-	-	0.015	-	-

**Note:**

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

**Table 6**  
**Summary of 2012 Groundwater Quality Exceedances of ODWS**  
**Private Wells**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Hardness	Sulphate	Chloride	Iron	Manganese	Sodium	Turbidity
ODWS	80-100 mg/L	500 mg/L	250 mg/L	0.3 mg/L	0.05 mg/L	200 mg/L	5 NTU
	OG	AO	AO	AO	AO	AO	AO
Finucci	500	-	-	0.74	0.11	-	-
Featherstone	Not sampled - cistern installed						
Sicard	Not sampled - resident not home						
Wiggins	Not sampled - cistern Installed						
Sugiyami	1300	910	1800	-	0.1	870	-
Eno/Myers	Not sampled - well not in use						
Robinson	Not sampled - well not in use						
Stevenson	Not sampled - well not in use						
Hendervale House	530	-	-	0.83	-	-	-
Hendervale Cottage	550	-	-	1.2	-	-	7.6
Hendervale Barn Cistern (Main Barn Tap)	420	-	560	-	0.057	320	-
Hendervale Barn Cistern (XYZ Barn Tap)	440	-	590	1	0.067	330	-
Simms	340	-	-	-	-	-	-
Bekkers	720	850	270	-	0.084	230	-

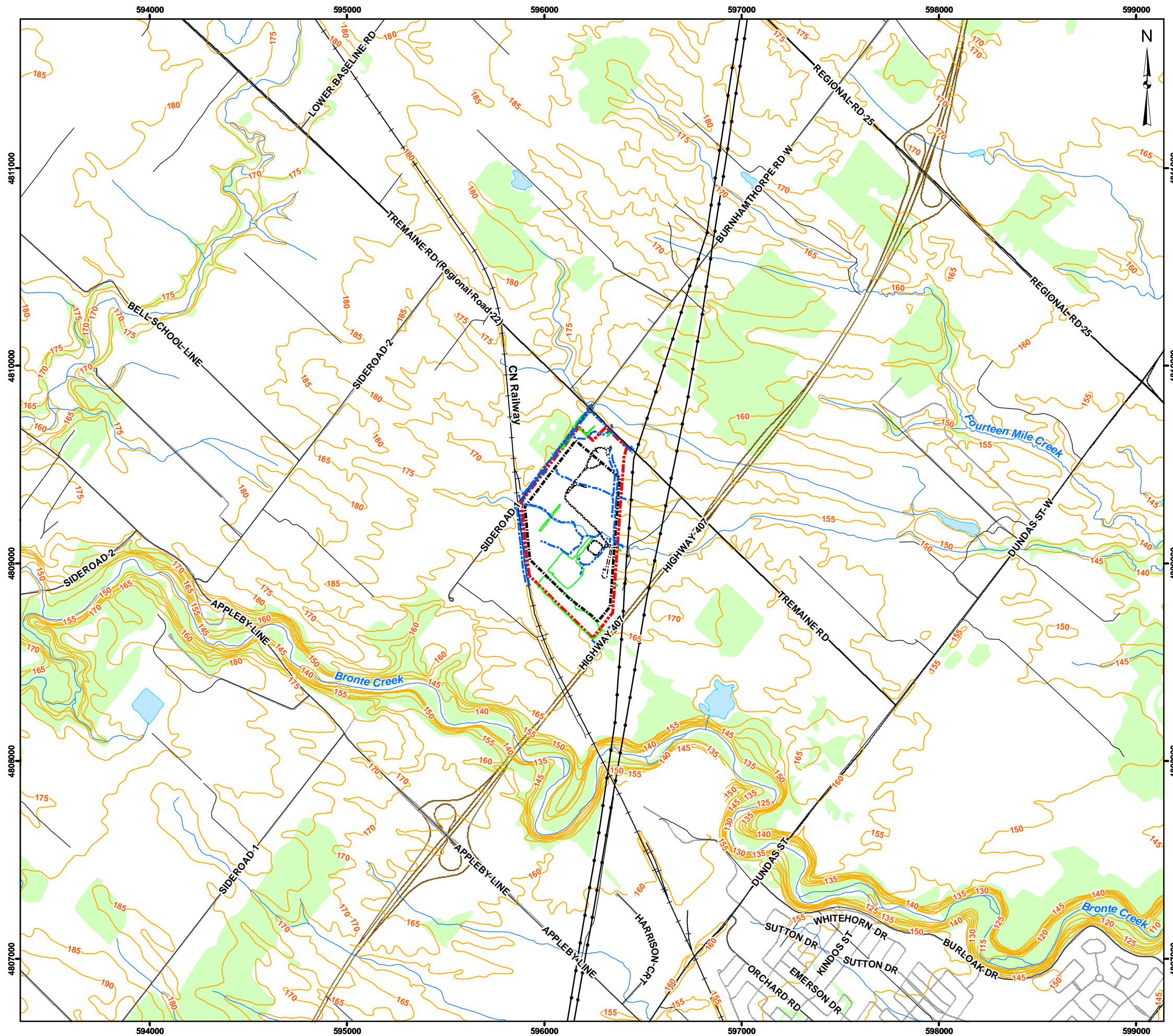
**Note:**

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



# FIGURES

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**LEGEND**

- Railways
- Utility Line
- Topographic Elevation Contour (5m Interval)
- Ditch
- Watercourse
- Water Body
- Wetland
- Limit of Extraction
- Property Boundary
- Wooded Areas

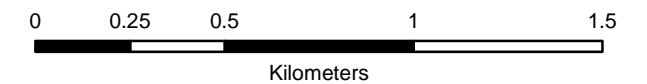
**NOTE**

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



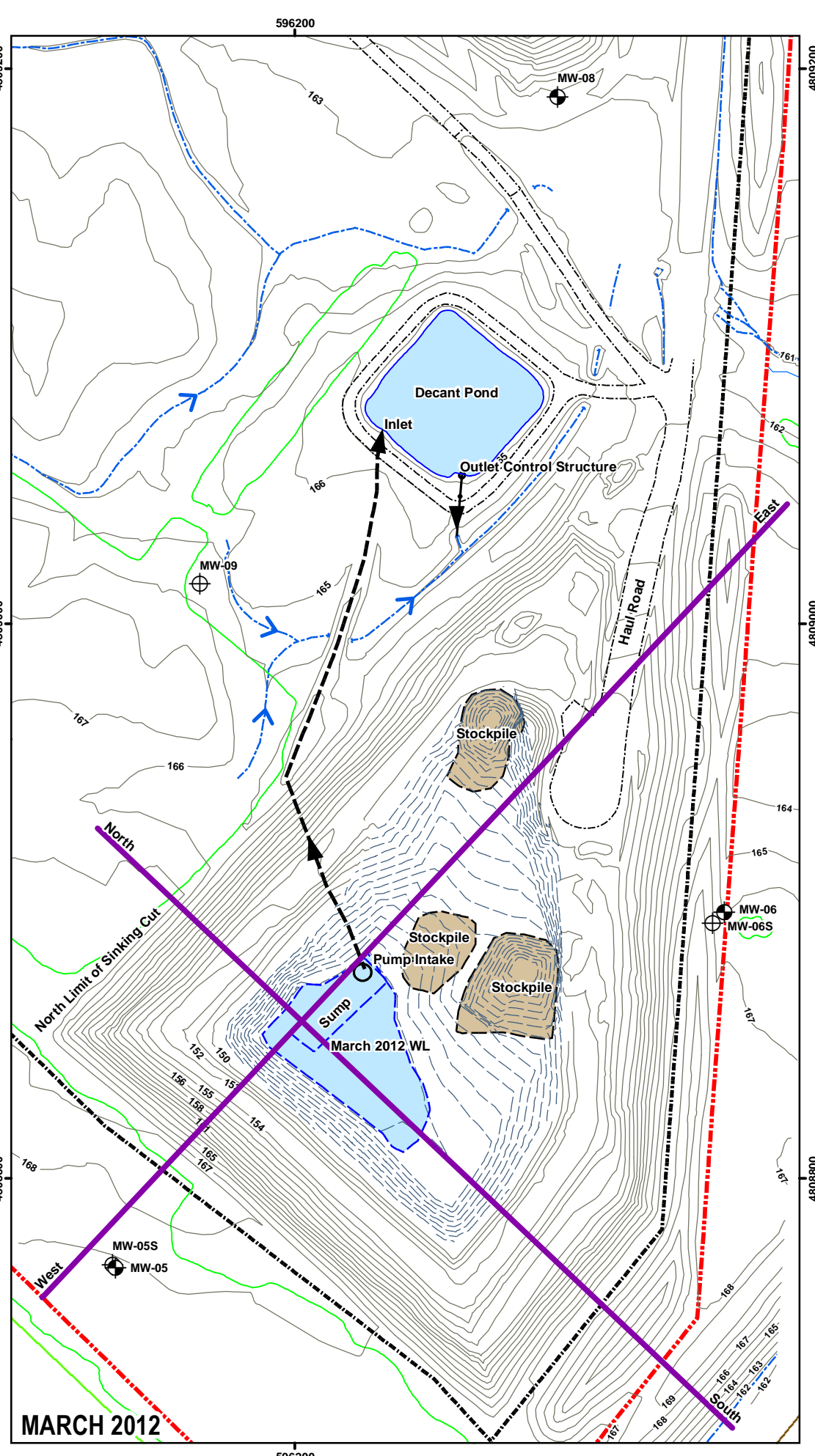
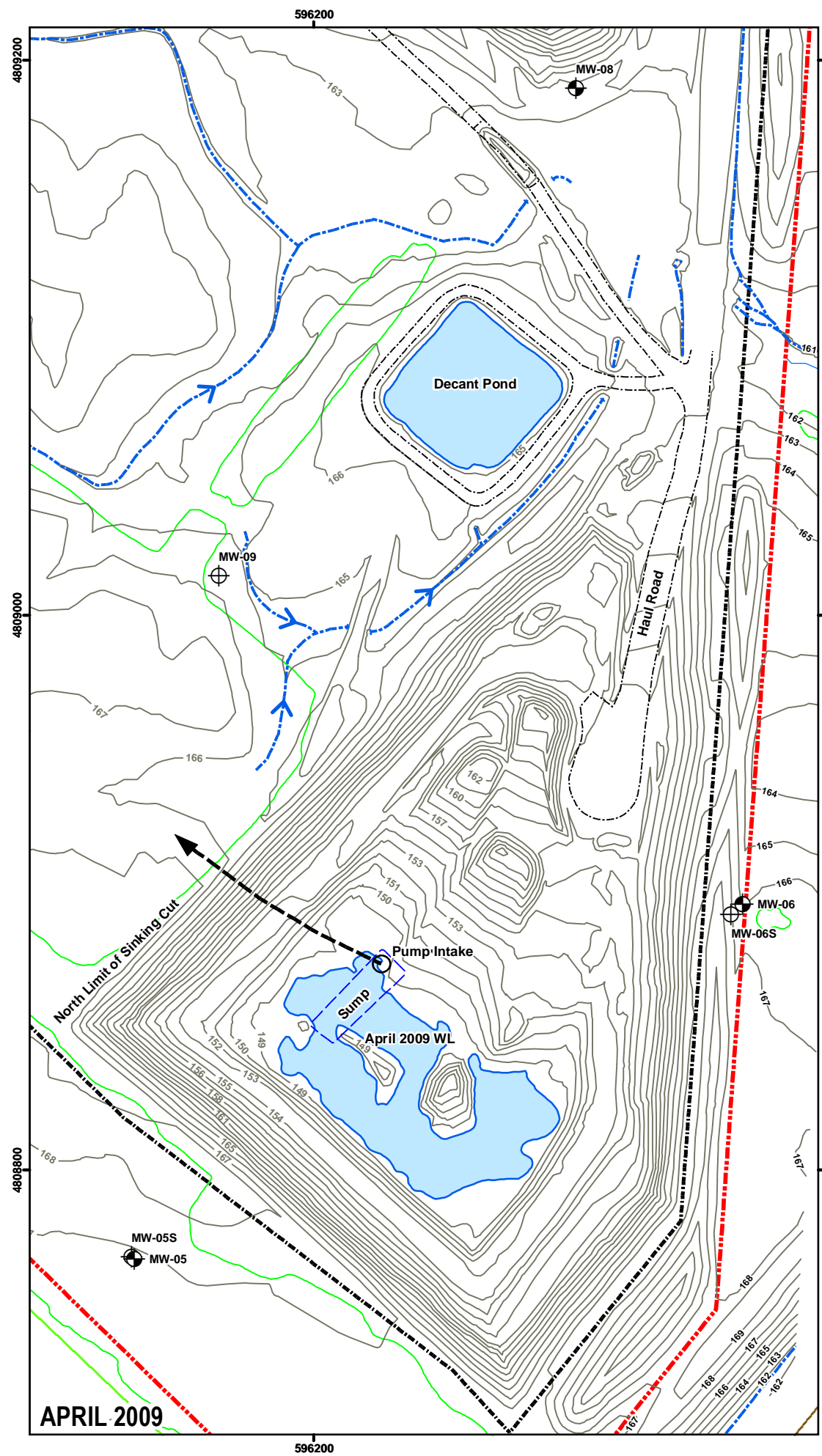
**REFERENCE**

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.



PROJECT	TANSLEY QUARRY 2012 ANNUAL MONITORING REPORT HANSON BRICK LTD.		
TITLE	<b>SITE LOCATION PLAN</b>		
 Mississauga, Ontario	PROJECT NO.	021-1228	SCALE 1:20,000   Ver. 1.0
	DESIGN	KD 18 Dec. 2006	<b>FIGURE: 1</b>
	GIS	KD 13 Mar. 2013	
	CHECK	JB 13 Mar. 2013	
REVIEW	RB 13 Mar. 2013		





**LEGEND**

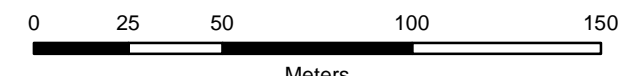
- Monitoring Well (Golder, 2002)
- Monitoring Well (Golder, 2007)
- Test Well (Golder, 2007)
- Section Locations
- Ditch
- Water Body
- Wetland
- Limit of Extraction
- Property Boundary
- Stockpile
- Wooded Areas

- 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.

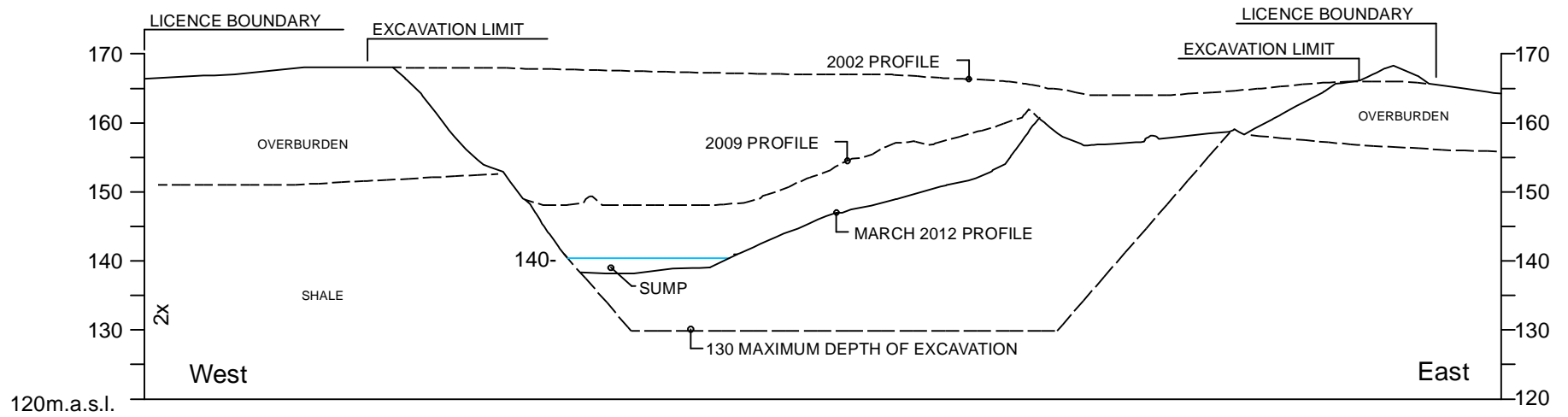
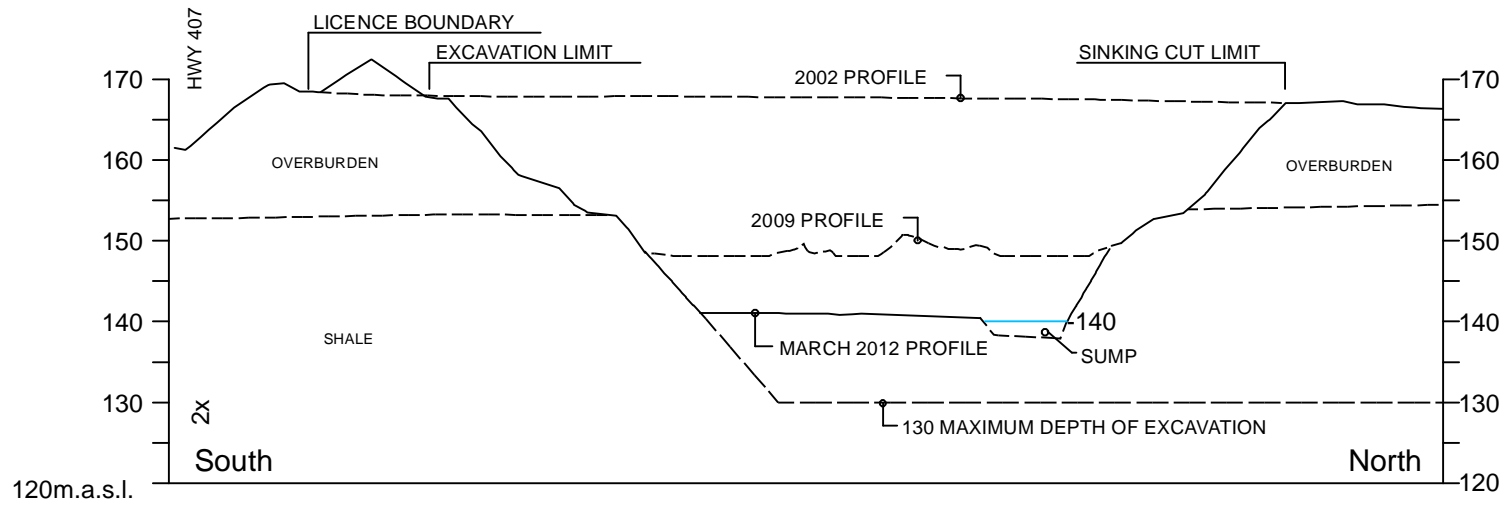


**REFERENCE**

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.




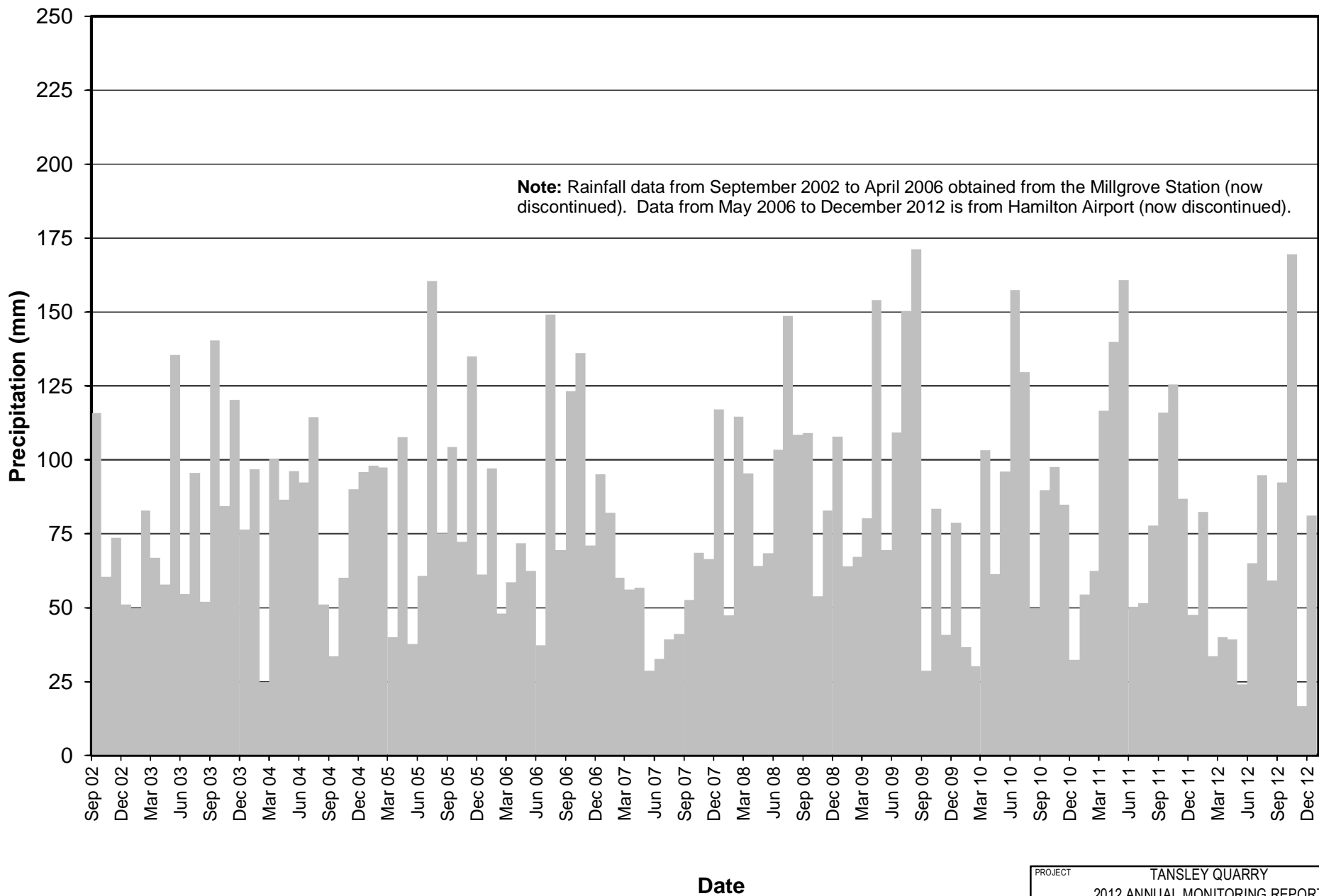
PROJECT	TANSLEY QUARRY 2012 ANNUAL MONITORING REPORT HANSON BRICK LTD.		
TITLE	OPERATIONAL PROGRESS		
	PROJECT NO.	021-1228	SCALE 1:2,000
	DESIGN	KD 18 Dec. 2006	Ver. 1.0
	GIS	KD 2 Apr. 2013	
	CHECK	SW 2 Apr. 2013	
	REVIEW	RB 2 Apr. 2013	
		<b>FIGURE: 2</b>	




**SOURCE:**

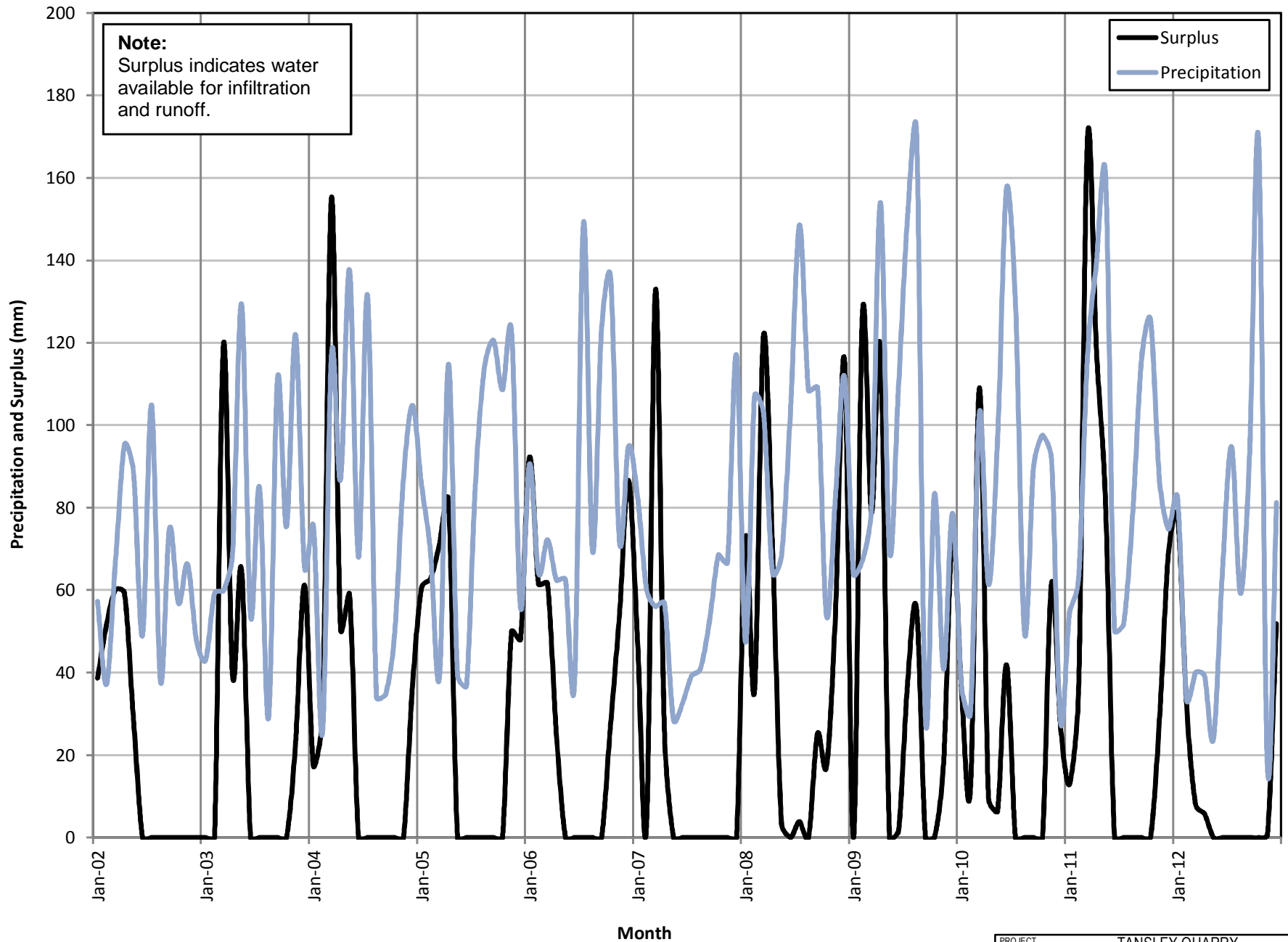
Long Environmental Consultants Inc., April 2012.

PROJECT		TANSLEY QUARRY	
		2012 ANNUAL MONITORING REPORT	
		HANSON BRICK LTD.	
TITLE		<b>CROSS - SECTIONS</b>	
 <p>Golder Associates Mississauga, Ontario</p>	PROJECT NO.	021-1228	SCALE AS SHOWN
	DESIGN	KD	12 Apr. 2012
	GIS	KD	2 Apr. 2013
	CHECK	SW	2 Apr. 2013
	REVIEW	RB	2 Apr. 2013
			<b>FIGURE: 3</b>




PROJECT		TANSLEY QUARRY	
		2012 ANNUAL MONITORING REPORT	
		HANSON BRICK LTD.	
TITLE		MONTHLY PRECIPITATION (MM)	
		MILLGROVE STATION / HAMILTON AIRPORT	
 Golder Associates Mississauga, Ontario	PROJECT NO. 021-1228	SCALE AS SHOWN	
	DESIGN RD 12 Apr. 2012	REV. 0.0	
	GIS RD 19 Apr. 2013		
	CHECK SW 19 Apr. 2013		
REVIEW RB 19 Apr. 2013			

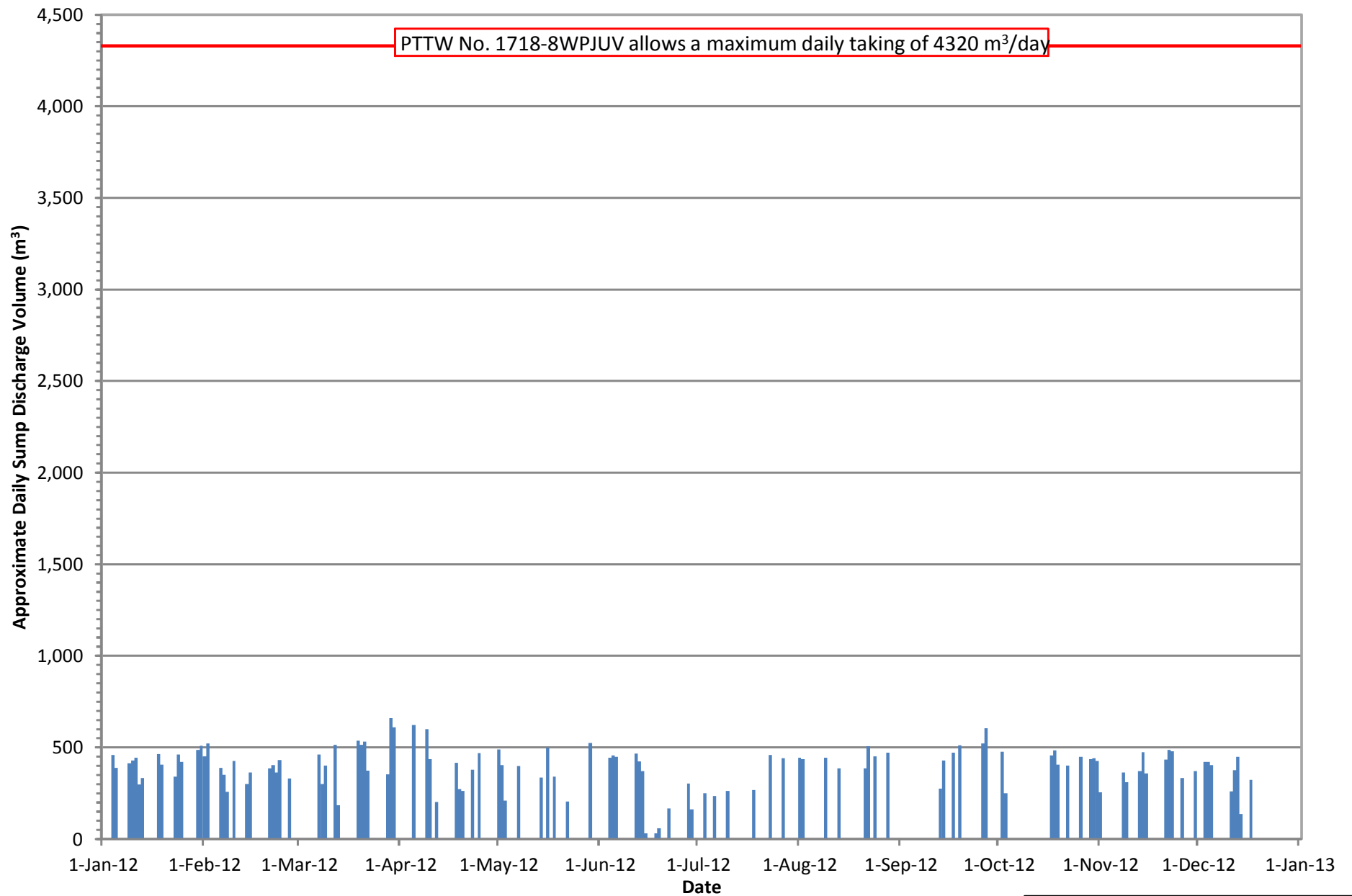
**FIGURE: 4**




**NOTE**

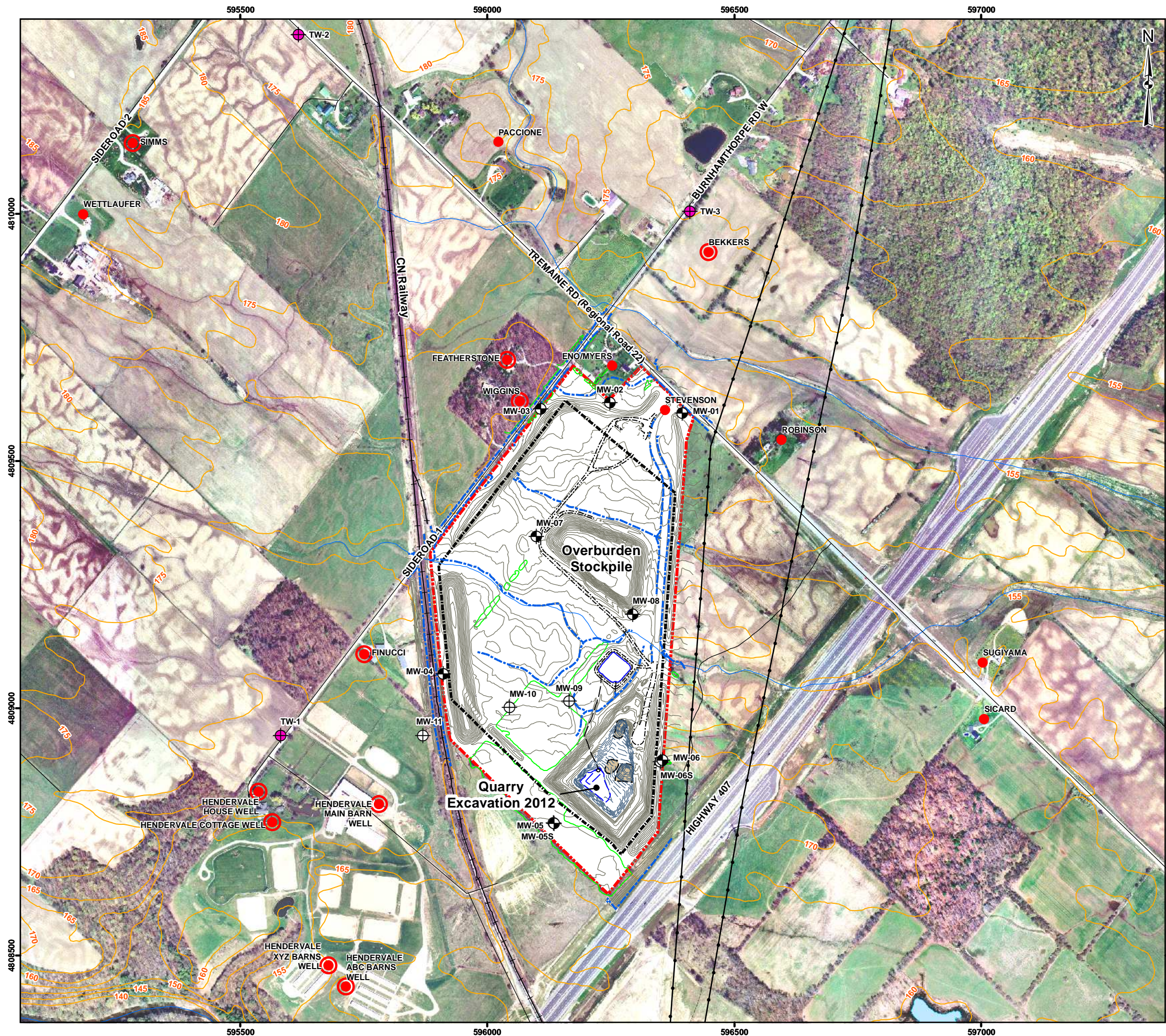
- 1) Surplus indicates water available for infiltration and runoff.
- 2) Monthly water budget estimate using daily data to December 14, 2011; data has undergone only preliminary quality checking by Environment Canada.
- 3) Report will be updated with Environment Canada water balance information when the data becomes available.

PROJECT	TANSLEY QUARRY		
	2012 ANNUAL MONITORING REPORT		
	HANSON BRICK LTD.		
TITLE	WATER BUDGET - HAMILTON AIRPORT		
	SEPTEMBER 2002 - DECEMBER 2012		
 Golder Associates Mississauga, Ontario	PROJECT NO.	021-1228	SCALE AS SHOWN
	DESIGN	KD	12 Apr. 2012
	GIS	KD	3 Apr. 2013
	CHECK	SW	3 Apr. 2013
	REVIEW	RB	3 Apr. 2013
			<b>FIGURE: 5</b>



**SOURCE:**  
 Long Environmental Consultants Inc.

PROJECT		TANSLEY QUARRY	
		2012 ANNUAL MONITORING REPORT	
		HANSON BRICK LTD.	
TITLE			
2012 DAILY SUMP DISCHARGE VOLUMES			
PROJECT NO. 021-1228		SCALE AS SHOWN	REV. 0.0
DESIGN	KD	12 Apr. 2012	 <b>FIGURE: 6</b>
GIS	KD	19 Apr. 2013	
CHECK	SW	19 Apr. 2013	
REVIEW	RB	19 Apr. 2013	



**LEGEND**

- Private Well
- ⊙ Private Well with Level Logger Installed
- ⊕ Monitoring Well (Golder, 2002)
- ⊕ Monitoring Well (Golder, 2007)
- ⊕ Test Well (Golder, 2007)
- Railways
- Utility Line
- Topographic Elevation Contour (5m Interval)
- 2009 Topographic Elevation Contour (1m Interval)
- 2012 Topographic Elevation Contour (1m Interval)
- Ditch
- Watercourse
- Water Body
- Wetland
- 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**

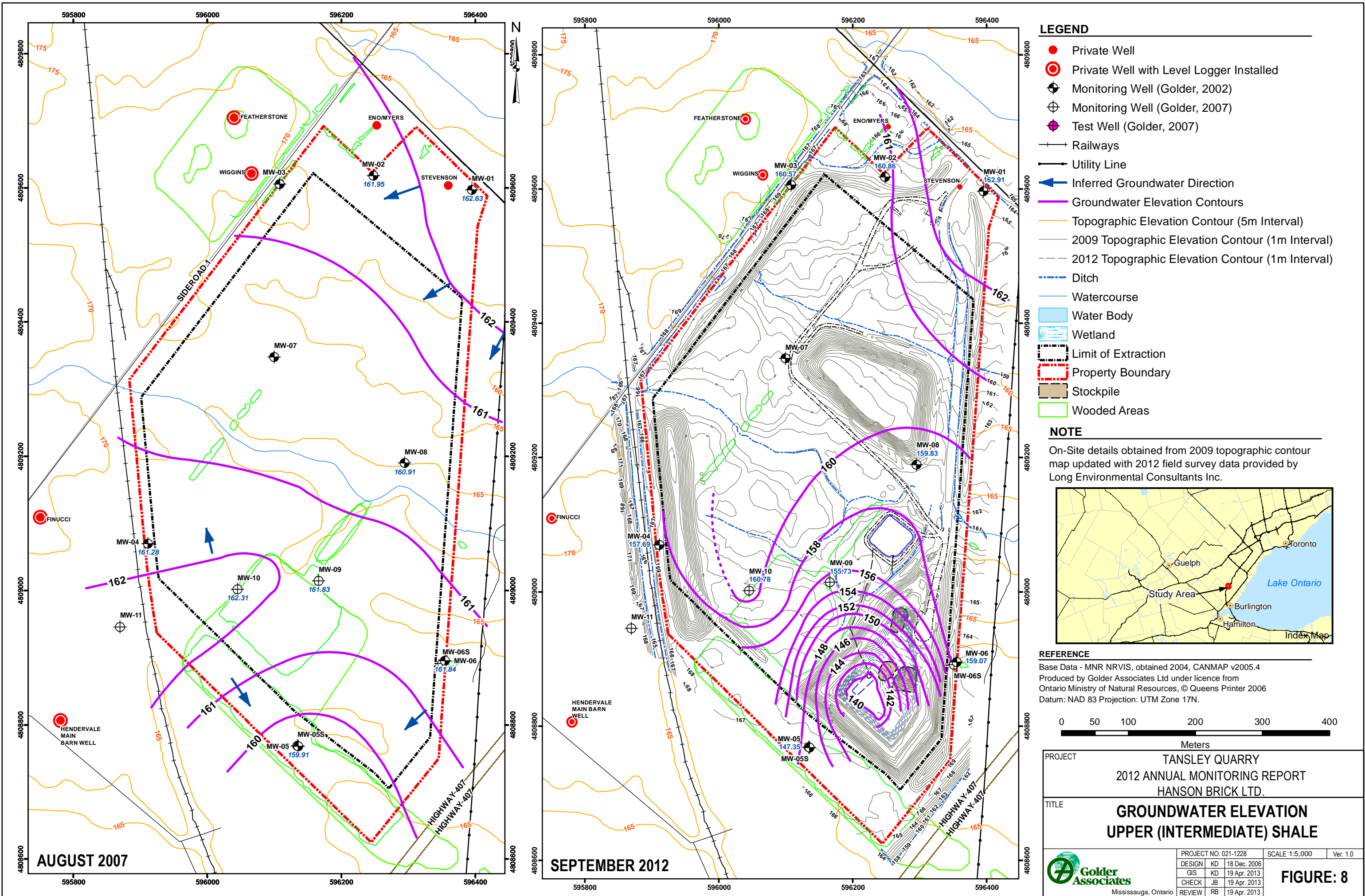
Base Data - MNR NRVIS, obtained 2004, CANMAP v2005.4  
 Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2006  
 Datum: NAD 83 Projection: UTM Zone 17N.  
 Imagery: First Base Solutions, 2002.



PROJECT	TANSLEY QUARRY 2012 ANNUAL MONITORING REPORT HANSON BRICK LTD.		
TITLE	<b>MONITORING WELL NETWORK</b>		
 Golder Associates Mississauga, Ontario	PROJECT NO.	021-1228	SCALE 1:8,000
	DESIGN	KD 18 Dec. 2006	Ver. 1.0
	GIS	KD 19 Apr. 2013	
	CHECK	JB 19 Apr. 2013	
	REVIEW	RB 19 Apr. 2013	

**FIGURE: 7**

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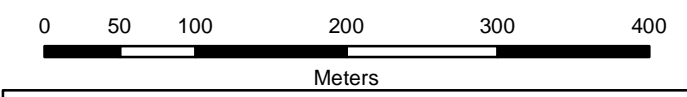
**LEGEND**

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

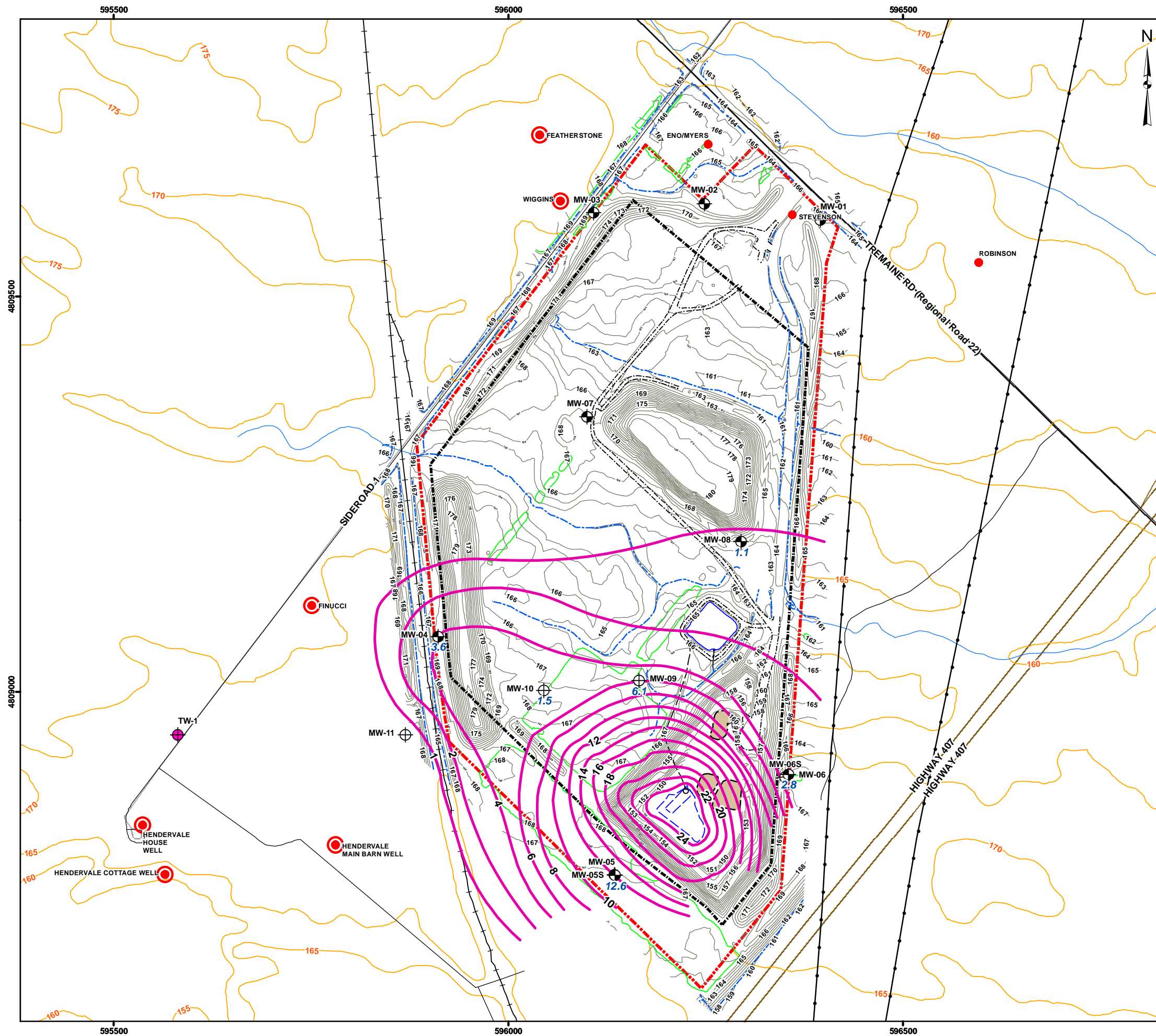
**NOTE**  
 On-Site details obtained from 2009 topographic contour map updated with 2012 field survey data provided by Long Environmental Consultants Inc.



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



PROJECT	TANSLEY QUARRY		
	2012 ANNUAL MONITORING REPORT		
	HANSON BRICK LTD.		
TITLE	<b>GROUNDWATER ELEVATION UPPER (INTERMEDIATE) SHALE</b>		
 Golder Associates Mississauga, Ontario	PROJECT NO. 021-1228	SCALE 1:5,000	Ver. 1.0
	DESIGN KD 18 Dec. 2006		
	GIS KD 19 Apr. 2013		
	CHECK JB 19 Apr. 2013		
	REVIEW RB 19 Apr. 2013		
			<b>FIGURE: 8</b>



**LEGEND**

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

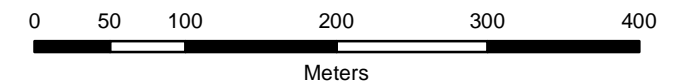
**NOTE**


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.



PROJECT	TANSLEY QUARRY 2012 ANNUAL MONITORING REPORT HANSON BRICK LTD.		
TITLE	<b>DRAWDOWN IN UPPER (INTERMEDIATE) SHALE SEPTEMBER 2012</b>		
 Mississauga, Ontario	PROJECT NO.	021-1228	SCALE 1:5,000
	DESIGN	KD 18 Dec. 2006	Ver. 1.0
	GIS	KD 2 Apr. 2013	<b>FIGURE: 9</b>
	CHECK	SW 2 Apr. 2013	
REVIEW	RB 2 Apr. 2013		





# APPENDIX A

## Regulatory Permits and Agreements

- Adaptive Groundwater Management Plan (AMP)
- Permit to Take Water No. 1718-8WPJUV
- Certificate of Approval, Industrial Sewage Works No. 4408-7AUL75

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 30<sup>th</sup> 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 PZI, 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	PEN	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 located 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)

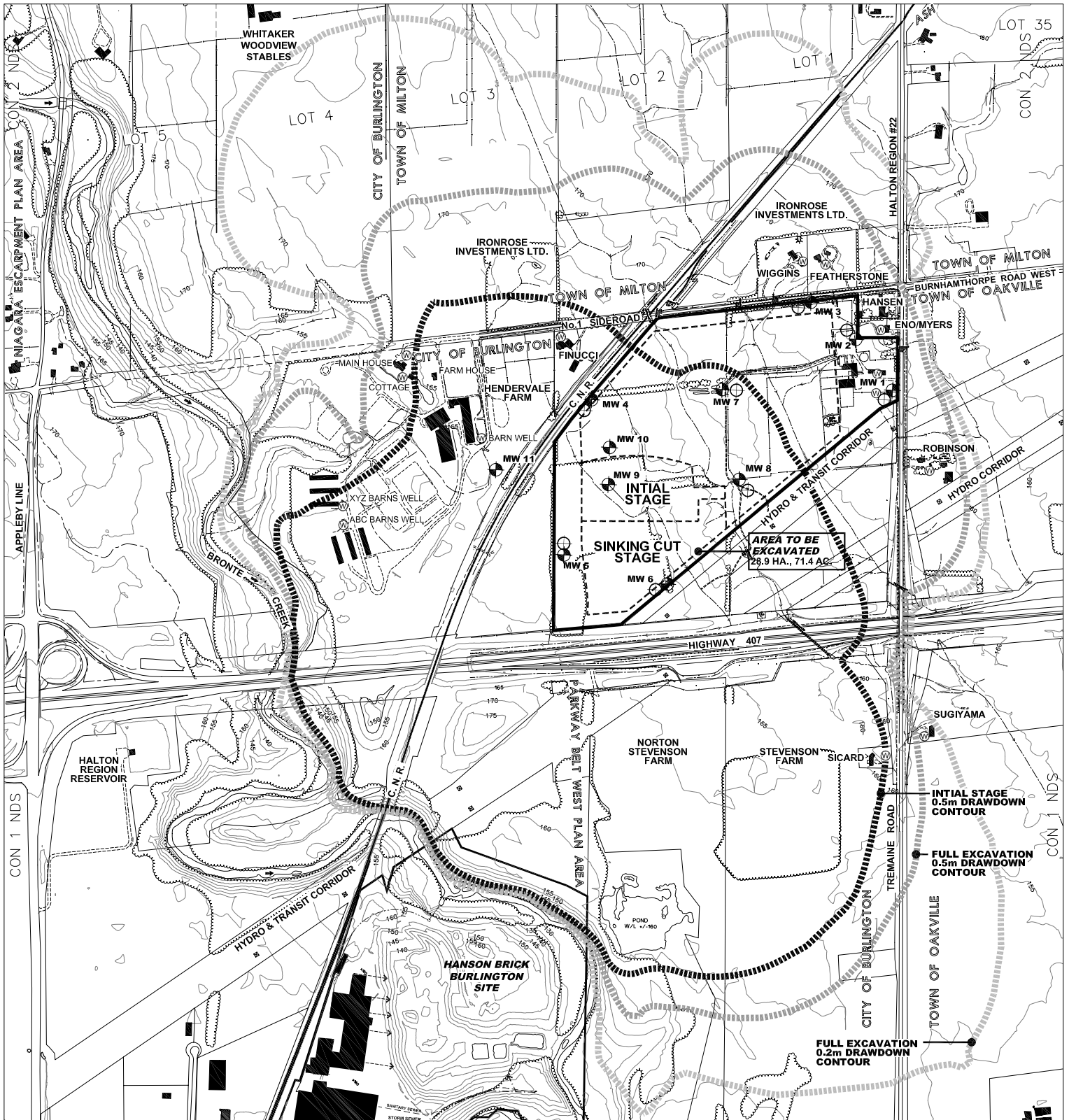
**Water Meter** means a device or mechanism which is the property of Hanson used for the purpose of measuring the flow and quantity of water consumed.

**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)





- ..... INITIAL STAGE, 0.5m PZI
- ..... FULL EXCAVATION, 0.5m PZI
- ..... FULL EXCAVATION, 0.2m PZI

- NESTED MONITOR WELLS 1-11
- SHALLOW MONITOR WELLS 1-8
- EXISTING PRIVATE WELLS

Source: Golder Associates, June 2005

**Figure 1**

**POTENTIAL STEADY STATE ZONES OF INFLUENCE**

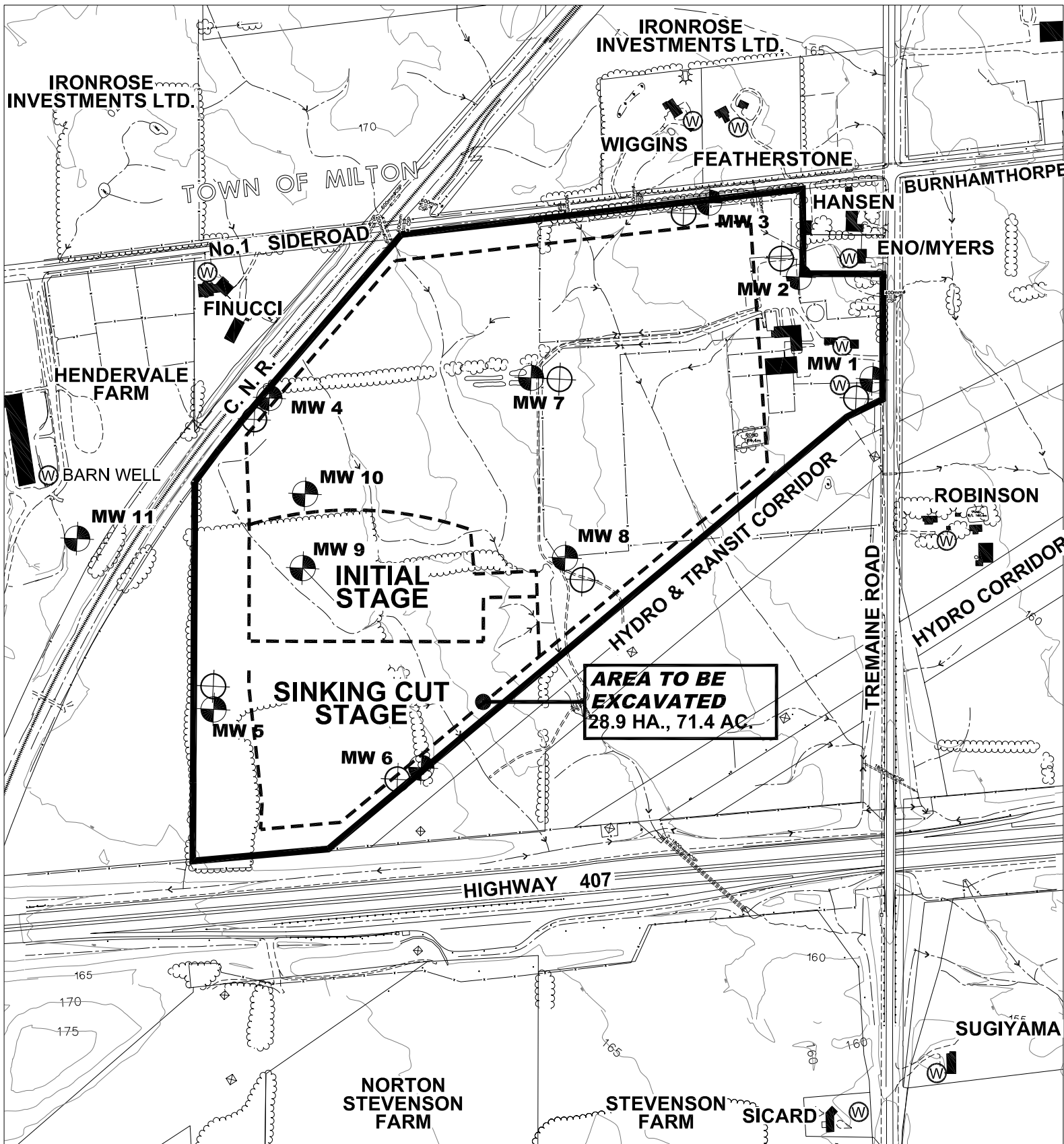
Scale: 1: 12,500

13 November 2006



Hanson Brick Ltd., Tremaine Quarry  
ADAPTIVE GROUNDWATER MANAGEMENT PLAN

Law File 2002-516



- EXISTING NESTED MONITOR WELLS MW1-MW8
- PROPOSED SHALLOW MONITOR WELLS MWS1-MWS8
- PROPOSED SENTINEL WELLS MW9-MW11
- EXISTING PRIVATE WELLS

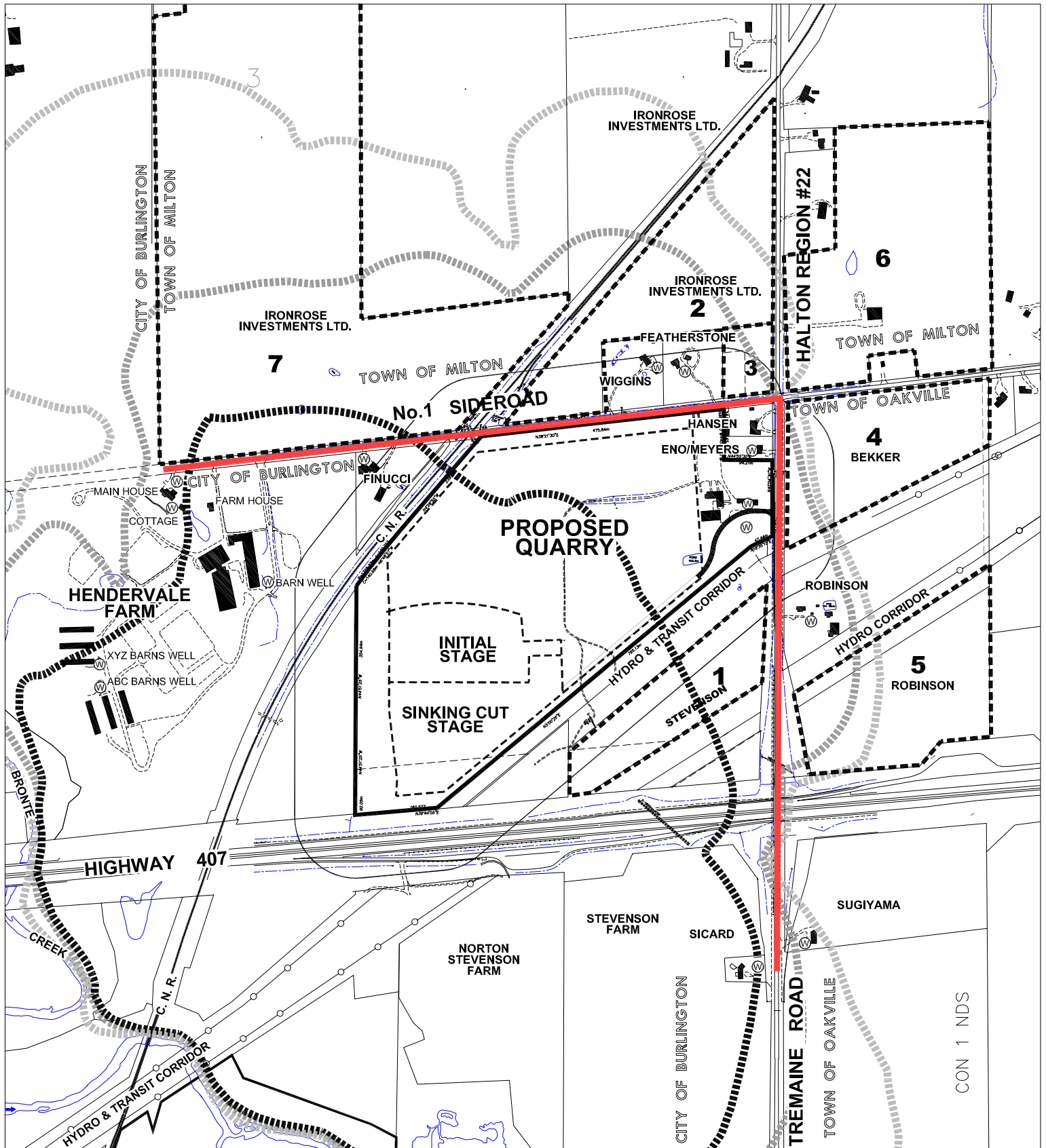
**Figure 2**




**ONSITE MONITOR NETWORK**





Scale: 1:6,000

Source: Golder Associates, June 2005





-  RESIDENTIAL DWELLINGS AND OWNERS NAMES
-  EXISTING VACANT LOTS OF RECORD, 1 - 7
-  EXISTING WELLS

-  COMMUNAL WATER SUPPLY LINE
-  INITIAL STAGE, 0.5m PZI
-  FULL EXCAVATION, 0.5m PZI
-  FULL EXCAVATION, 0.2m PZI

**Figure 3**  
**COMMUNAL WATER SUPPLY LINE**

Scale: 1 : 10,000

13 November 2006



TABLE 1.1 Groundwater Level Monitoring Program

<i>Monitoring well /depth</i>	<i>Monitoring Frequency</i>	<i>Comments</i>
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

<i>Monitoring well</i>	<i>Monitoring Frequency</i>	<i>Comments</i>
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

<i>Monitoring well</i>	<i>Monitoring Frequency</i>	<i>Comments</i>
MWS1	C	
MWS2	C	
MWS3	C	
MWS4	C	
MWS5	C	
MWS6	C	
MWS7	C	
MWS8	C	

TABLE 1.4 Domestic wells

<i>Domestic well*</i>	<i>Monitoring Frequency</i>	<i>Comments</i>
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.

**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
						<b>Total Taking:</b>			

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 31<sup>st</sup> 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 devices, 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](http://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.



Ontario

Ministry of the Environment  
Ministère de l'Environnement

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

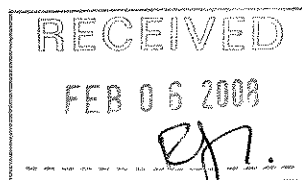
*You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:*

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.



*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 Conditions 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.

<b>Table 1 - Effluent Limits</b>	
<b>Effluent Parameter</b>	<b>Concentration Limit</b> (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:

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

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

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

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

## 8. REPORTING

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

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

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

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

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

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

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

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

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

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.
3. Condition 3 is included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the work.
4. Conditions 4, 5 and 6 are imposed to ensure that the effluent discharged from the works and meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.
6. Condition 7 is included to require the owner to demonstrate on a continual basis that the quality of the effluent from the approved works is consistent with the effluent limits specified in the certificate and that the approved works does not cause any impairment to the receiving watercourse.
7. Condition 8 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

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



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

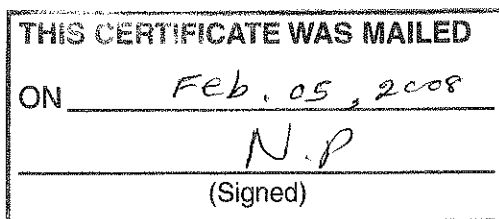
The Director  
 Section 53, *Ontario Water Resources Act*  
 Ministry of the Environment  
 2 St. Clair Avenue West, Floor 12A  
 Toronto, Ontario  
 M4V 1L5

\* 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](http://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](http://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*

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

RC/

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



# **APPENDIX B**

## **Borehole Logs**



PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW1

SHEET 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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH % RETURN	FR/FX-FRACTURE F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
								RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY			
								TOTAL CORE %	SOLID CORE %			TYPE AND SURFACE DESCRIPTION	10 <sup>-11</sup> K <sub>v</sub> cm <sup>2</sup> /sec	10 <sup>-7</sup> 10 <sup>-6</sup>			
								80 60 40 20	80 60 40 20	80 60 40 20	5 15 20	5 15 20	5 15 20	5 15 20	5 15 20		
10		--- CONTINUED FROM PREVIOUS PAGE --- Very weak to weak, moderate to highly weathered red SHALE.  1% Green coloured			1												
11																	
12					2												
13		Run 3: Pounded out of drill in minute pieces. Low RQD strictly mechanical.			3												BENTONITE SEAL
14																	
15	RQ Core	Run 4: As above			4												
16		Red Shale, weak, slightly weathered 10% green coloured.			5												
17																	
18		Highly friable interval. Disking every 0.25".		145.80 18.00	6												SAND
19		Discontinuities are all perpendicular to the core axis.		145.10 18.70	7												
20		CONTINUED NEXT PAGE															

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:



PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW1

SHEET 4 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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
									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					
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA				HYDRAULIC CONDUCTIVITY										
TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION				10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>							
30		--- CONTINUED FROM PREVIOUS PAGE --- Zone of broken core and increased weathering. Shale is highly friable, very weak and weathered.		14																
31		Highly weathered and friable.		132.91 30.89																
32		Red shale, moderately weathered, weak, friable.		131.71 32.09																
33				16																
34				17																
35	RQ Core	Fracture surfaces are planar and smooth to rough.		18																
36				19																
37		Extremely friable zone. Discontinuities		126.70 37.10																
38		Red shale, fresh, weak to moderately strong.		125.80 38.00																
39				20																
40																				SAND

CONTINUED NEXT PAGE

MISS. ROCK 021-1228.GPJ GLDR\_CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW1

SHEET 5 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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
								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					
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY											
TOTAL CORE %	SOLID CORE %					DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	2	4	6					
40		--- CONTINUED FROM PREVIOUS PAGE ---																	
40		Red shale, fresh, weak to moderately strong.																	
41		10% grey-green coloured.			21														
42					22														
43	RQ Core	Red shale, fresh, weak, 10% green coloured.		120.80 43.00															SAND
44					23														
45					24														
46		END OF BOREHOLE		117.67 46.13															
47																			
48																			
49																			
50																			

MISS. ROCK 021-1228.GPJ GLDR\_CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW2

SHEET 1 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Sept.26&30, 2002

DATUM:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR	% RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION	
										RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY						
										TOTAL CORE %	SOLID CORE %			DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>	10 <sup>-4</sup>			
										80	80	80	5	30	60	80	80	80	80			80
0		GROUND SURFACE		165.90																		
		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		164.99																		BENTONITE SEAL
		Very dry and crumbly during sampling. (ML)		0.91																		
2																						
3																						
		As above		162.60																		
		Colour changes to brownish-grey.		3.30																		
4																						
		TILL, grey, firm-hard, moist SILTY CLAY, occ. gravel. (GM-ML)		161.73																		
				4.17																		
5	AUGER																					SAND
6																						
7																						
		TILL, very hard, dry, brown bouldery CLAY SILT TILL, occ. cobbles. (CM)		158.89																		
				7.01																		
8																						
9																						
		BEDROCK		156.86																		
		Red shale, very weak, friable. Fresh, moderately weathered upper 3.05 to 4.57m from bedrock surface recovered as rubble/broken core.		9.04																		BENTONITE SEAL
10																						
		CONTINUED NEXT PAGE																				

MISS. ROCK 021-1228.GPJ GLDR. CAN.GDT. 15/1/04 PS

DEPTH SCALE

1 : 50



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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE F-FAULT			SM-SMOOTH			FL-FLEXURED			BC-BROKEN CORE			DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
									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								
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY													
TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION			10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>											
20		--- CONTINUED FROM PREVIOUS PAGE --- Red shale, weak, moderately weathered. Some very weak red shale bands. Friable.		20.00	6																	
21					7																	
22					8																	SAND
23				142.60 23.30	9																	
24		Slight strength increase to moderately strong in green coloured shale bands.			10																	
25	HO CORE				11																	
26		Discontinuity surfaces are perpendicular to core axis, planar and smooth. They appear to be bedding parallel, mechanically induced fractures.			12																	
27					13																	SAND
28																						
29																						BENTONITE SEAL
30		CONTINUED NEXT PAGE																				

MISS. ROCK 021-1228.GPJ GLDR\_CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW2

SHEET 4 OF 5

LOCATION: Refer to Plan

DRILLING DATE: Sept.26&30, 2002

DATUM:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION	
									RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY						
									TOTAL CORE %	SOLID CORE %			TYPE AND SURFACE DESCRIPTION	10 <sup>-11</sup> K <sub>v</sub> cm/sec	10 <sup>-10</sup>	10 <sup>-9</sup>					
									80	80	80	80	80	80	80	80	80	80			80
30		--- CONTINUED FROM PREVIOUS PAGE ---																			
31		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																	
32				14																	
33				15																	
34				16																	
35				17																	
36				18																	
37				19																	
38				20																	
39				21																	
40				22																	
		CONTINUED NEXT PAGE																			

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

PROJECT: 021-1228

# RECORD OF DRILLHOLE: 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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION				
									CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3	DIP w.r.t. CORE AXIS			DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY	
									SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	B-BEDDING	TOTAL CORE %	SOLID CORE %						TYPE AND SURFACE DESCRIPTION	10 <sup>-11</sup>	10 <sup>-10</sup>	10 <sup>-9</sup>
									VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED	80	60	40	20	80	60						
40		--- CONTINUED FROM PREVIOUS PAGE ---																						
41		Red shale, moderately strong, fresh to slightly weathered. Rock is mainly red coloured with green bands (4"-2") every 1' to 2'.		20																				
42				21																				
43	HD CORE			22																SAND				
44		Gypsum coat at 43.5, 3mm thick.		23																				
46		END OF BOREHOLE		119.77 46.13																				

MISS. ROCK 021-1228.GPJ GLDR\_CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:



PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW3

SHEET 2 OF 4

LOCATION: Refer to Plan

DRILLING DATE: July 24 & 25, 2002

DATUM:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
									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					
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY												
TOTAL CORE %		SOLID CORE %				DIP w.r.t. CORE AXIS		TYPE AND SURFACE DESCRIPTION		10 <sup>-11</sup> K, cm/sec										
10		--- CONTINUED FROM PREVIOUS PAGE ---																		
		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																
11		TILL, brown, hard, moist, gravelly SAND and SILT (SG-MG), some clay, some sub-rounded cobbles. (BASAL TILL)		10.67																
		Auger refusal on Boulder. Coring through very hard grey till and cobbles as above.																		
12	AUGER																			SAND
13																				
14				147.87																
		Completely weathered, very weak, green SHALE, original structure still visible.		14.33																
15																				
16	HQ CORE	Fresh to slightly weathered, weak to moderately strong, red and green (predominantly red) coloured, massive to finely laminated SHALE.		146.35	15.85															
					1															
17																				
18		Fractures are bedding parallel and tend to be smooth and planar.			2															
19					3															
20																				
		CONTINUED NEXT PAGE																		

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW3

SHEET 3 OF 4

LOCATION: Refer to Plan

DRILLING DATE: July 24 & 25, 2002

DATUM:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION	
									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						
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY													
TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION		10 <sup>-11</sup> K <sub>v</sub> cm/sec	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>										
20		--- CONTINUED FROM PREVIOUS PAGE ---																			
21		Fresh to slightly weathered, not friable, moderately strong to weak, mainly red coloured and massive with some green coloured bands. Thinly laminated.		141.78 20.42	3																BENTONITE SEAL
22		First noted occurrence of gypsum.			4																
23					5																
24					6																
25	HQ CORE	Possible turbidity flow or debris torrent layer from 10.92m to 26.2m.			7																
26					8																SAND
27					9																
28		Red SHALE, fresh to slightly weathered, weak to medium strong, occasional green coloured bands. Massive to thinly laminated.		134.46 27.74	10																
29																					
30		Discontinuities are fractures parallel to																			
		CONTINUED NEXT PAGE																			

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



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:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE F-FAULT			SM-SMOOTH			FL-FLEXURED			BC-BROKEN CORE			NOTES WATER LEVELS INSTRUMENTATION
									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							
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			DIAMETRAL POINT LOAD INDEX (MPa)									
TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION			10 <sup>-11</sup> K <sub>v</sub> cm/sec	10 <sup>-7</sup>	10 <sup>-6</sup>	2	4	8							
30		--- CONTINUED FROM PREVIOUS PAGE --- bedding. They are mainly mechanically induced. Red SHALE, fresh to slightly weathered, weak to medium strong, occasional green coloured bands. Massive to thinly laminated.		10																	
31				11																	
32				12																	SAND
33																					
34																					
35	HQ CORE																				
36				13																	
37																					
38				14																	
39				15																	
40		END OF HOLE				122.65															
						39.55															

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

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

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

MISS. ROCK 021-1228.GPJ GLDR. CAN.GDT. 15/1/04. PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW4

SHEET 2 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 4-9, 2002

DATUM:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH % RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		NOTES WATER LEVELS INSTRUMENTATION
								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				
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		ROCK STRENGTH INDEX		WEATHERING INDEX								
TOTAL CORE %		SOLID CORE %		DIP w.r.t. CORE AXIS		TYPE AND SURFACE DESCRIPTION		R4	R3	R2	R1	W1	W2	W3	W4			
10	Overburden	--- CONTINUED FROM PREVIOUS PAGE --- Inferred top of rock, moist, red-brown (80%) and green (20%), highly weathered, very weak, friable SHALE.		153.80														
11		Red SHALE, very weak R1/R2, friable, moderate to highly weathered (W3-W5)		10.90	1													BENTONITE SEAL
12					2													
13					3													
14					4													
15	RQ Core			149.16														
16		Moderately weathered, weak to medium strong, red shale. All fractures/breaks are bedding parallel.		15.54	5													SAND
17																		
18					6													
19					7													
20																		

CONTINUED NEXT PAGE

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

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:

INCLINATION: -90° AZIMUTH: --

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		NOTES WATER LEVELS INSTRUMENTATION	
									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					
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		ROCK STRENGTH INDEX		WEATHERING INDEX										
TOTAL CORE %	SOLID CORE %					DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	R4	R3	R2	R1	W1	W2	W3	W4					
40		--- CONTINUED FROM PREVIOUS PAGE --- Red-brown, moderately weathered (red) to slightly weathered (green) shale. Medium strong, (R2), friable (especially one day after recovery).																		
41				21									J							
42				22									B,FX B,FX J							
43	RQ Core			23									B							SAND
44													B,FX							
45		Gypsum blebs/nodules at 45.24-45.24m.											B,FX							
46		END OF HOLE		118.68 46.02																

MISS. ROCK 021-1228.GPJ GLDR\_CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:



PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW5

SHEET 2 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
									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					
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY												
TOTAL CORE %		SOLID CORE %				DIP w.r.t. CORE AXIS		TYPE AND SURFACE DESCRIPTION		10 <sup>-11</sup> 10 <sup>-10</sup> 10 <sup>-9</sup> 10 <sup>-8</sup> K, cm/sec										
--- CONTINUED FROM PREVIOUS PAGE ---																				
10		Brown, dense, moist silty coarse gravelly sand to silty gravel TILL. (SM-GM)		158.44 10.06																
11		Brown, dense moist SILT, trace gravel.		149.68 10.82																
12		Wet, dense, grey SAND and GRAVEL, some silt. (TILL) (SG-GM)		148.92 11.58																
13	AUGER	Brown, moist, hard, cobbly, gravelly SILT TILL. (SM)		148.16 12.34																
14		BEDROCK, highly weathered, very weak, friable red shale, easily augered.		146.63 13.87																BENTONITE SEAL
15																				
16	HQ CORE	Red SHALE, finely laminated, weak to moderately strong, slightly weathered.		144.65 15.85	1															
17																				
18		Core is highly discked, reducing RQD.			2															SAND
19					3															
20																				

CONTINUED NEXT PAGE

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW5

SHEET 3 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION	
									CL-CLEAVAGE		J-JOINT		R-ROUGH		UE-UNEVEN		MB-MECH. BREAK				
									SH-SHEAR		P-POLISHED		ST-STEPED		W-WAVY		B-BEDDING				
									VN-VEIN		S-SLICKENSIDED		PL-PLANAR		C-CURVED						
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY													
TOTAL CORE %		SOLID CORE %				TYPE AND SURFACE DESCRIPTION		10 <sup>-11</sup> K, cm/sec													
20		--- CONTINUED FROM PREVIOUS PAGE --- Red SHALE, finely laminated, weak to moderately strong, slightly weathered. Green shale bands are slightly stronger than the red shale bands. (Metalic sound when tapped with geologic hammer)			3																
21					4																
22		Run 5: Core wet at about 22.86m below ground. Slight strength decrease and weathering increase at water table.			5																
23																					
24					6																
25	HQ CORE	Red and green SHALE, moderate to slightly weathered, medium strong, finely laminated, not friable. Rock is up to 10% green coloured.		135.81 24.69	7																
26																					SAND
27		Discontinuities are planar and rough to smooth. (DISCKING)			8																
28					9																
29					10																BENTONITE SEAL
30																					
		CONTINUED NEXT PAGE																			

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:



PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW5

SHEET 4 OF 5

LOCATION: Refer to Plan

DRILLING DATE: July 10-11, 2002

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: ALL TERRAIN DRILLING

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR/FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION					
									CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY				
									SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	B-BEDDING	TOTAL CORE %	SOLID CORE %		DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION			10 <sup>-11</sup> K <sub>v</sub> cm/sec	10 <sup>-10</sup>	10 <sup>-9</sup>	10 <sup>-8</sup>	
									VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED													
30		--- CONTINUED FROM PREVIOUS PAGE --- 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.																							
31																									
32		Red SHALE, moderately strong, cannot be scratched with knife, slightly weathered. Finely laminated. Friable.		128.50 32.00																					
33																					BENTONITE SEAL				
34																									
35	HQ CORE																								
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.																							
37																									
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.																							
40																					SAND				
		CONTINUED NEXT PAGE																							

MISS. ROCK 021-1228.GPJ GLDR CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW5

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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR-FX-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION	
									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						
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY													
TOTAL CORE %		SOLID CORE %				DIP w.r.t. CORE AXIS		TYPE AND SURFACE DESCRIPTION		10 <sup>-11</sup> K, cm/sec											
40		--- CONTINUED FROM PREVIOUS PAGE --- Red SHALE, moderately strong, cannot be scratched with knife, slightly weathered. Finely laminated. Friable.																			
41				17																	
42				18																	SAND
43	HO CORE			19																	
44				20																	
45				114.48 46.02																	
46		END OF HOLE																			
47																					
48																					
49																					
50																					

MISS. ROCK 021-1228.GPJ GLDR\_CAN.GDT 15/1/04 PS

DEPTH SCALE

1 : 50



LOGGED: MR

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:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP W. EL. CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION			
				DEPTH (m)	RUN No.				TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jun	K, cm/sec	10 <sup>0</sup>				10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>
0		GROUND SURFACE		166.05																						
		Loose to compact, dry, brown SILT, some clay (TILL)		0.00																						
1																										
2		Some gravel from 8.44 m to 2.84 m depth																								
3																										
4		Slightly moist, brown SANDY SILT, some clay, cobble/gravel bands (TILL)		162.70																				Cement		
5				3.35																						
6		Wet, brown SAND and GRAVEL		160.27																						
7				5.78																						
8		Silty sand, reddish brown, lens of clay, gravel at 7.32 m depth																						Hole Plug		
9		Reddish brown SILT, trace gravel (TILL)		158.13																				Sand		
10				7.92																						
		SHALE, reddish, slightly porous, slight weathering, some gravel		156.91																				Screen		
				9.14																						
		CONTINUED NEXT PAGE																								

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

DEPTH SCALE

1 : 50



LOGGED: MD

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				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕			Q - ●	U - ○
0		GROUND SURFACE															
0		OVERBURDEN (TILL)															
1																	
2															Hole Plug		
3																	
4																	
5															Sand		
6																	
7																	
8																	
9																	
9.45		SHALE (BEDROCK)		9.45											Sand		
10															Hole Plug		
		CONTINUED NEXT PAGE															

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

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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa	nat V. rem V.	+ ⊕	Q - U	● ○	Wp			W	Wi
10		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
11																	
12																	
13																	
14																	
15														Hole Plug			
16																	
17																	
18																	
19																	
20																	
		CONTINUED NEXT PAGE															

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

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	Q - ●			rem V. ⊕	U - ○
20		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
21															Hole Plug		
22															Sand		
23																	
24																	
25																	
26															Screen		
27																	
28																	
29																	
30															Sand		
		CONTINUED NEXT PAGE															

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

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕			Q - ●	U - ○
30		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
31																	
32																	
33																	
34																	
35		END OF BOREHOLE		34.67													
36		NOTE: 1. Borehole logging and well completion was not supervised by Golder.															
37																	
38																	
39																	
40																	

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

DEPTH SCALE

1 : 50



LOGGED:

CHECKED:

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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	- ⊖	● ○			Wp	W
0		GROUND SURFACE					20	40	60	80							
0		OVERBURDEN (TILL)															
1																Hole Plug	
2																	
3																	
4																	
5																Screen	
6																	
7																	
8																	
9																Sand	
9																Hole Plug	
10																	

CONTINUED NEXT PAGE

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

DEPTH SCALE

1 : 50



LOGGED:

CHECKED:

PROJECT: 021-1228

# RECORD OF BOREHOLE: MW-07


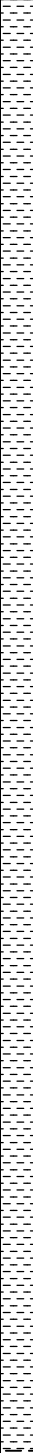
SHEET 2 OF 5

LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa	nat V. rem V.	+ ⊕	Q - U	● ○	Wp			W	Wi
10		--- CONTINUED FROM PREVIOUS PAGE --- OVERBURDEN (TILL)															
		SHALE (BEDROCK)		10.40													
11																	
12																	
13																	
14																	
15															Hole Plug		
16																	
17																	
18																	
19																	
20																	
		CONTINUED NEXT PAGE															

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

DEPTH SCALE

1 : 50



LOGGED:

CHECKED:

PROJECT: 021-1228

# RECORD OF BOREHOLE: MW-07

SHEET 3 OF 5

LOCATION: N 596099.40 ;E 4809348.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT					
								nat V. +	rem V. ⊕	Q - ●	U - ○	Wp			W
20		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)													
21															
22															
23															
24															
25															
26															
27															
28															
29															
30															
		CONTINUED NEXT PAGE													

Hole Plug

Sand

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

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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕			Q - ●	U - ○
30		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
31																	
32																	
33																	
34															Sand		
35																	
36																	
37																	
38																	
39															Screen		
40		CONTINUED NEXT PAGE															

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

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			SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20		40		60		80			10 <sup>-9</sup>
40		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
41																	
42																Screen	
43																	
44																	
45																Sand	
46		END OF BOREHOLE			45.72												
47		NOTE: 1. Borehole logging and well completion was not supervised by Golder. This hole was originally numbered MW-12.															
48																	
49																	
50																	

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

DEPTH SCALE

1 : 50



LOGGED:

CHECKED:

PROJECT: 021-1228

# RECORD OF BOREHOLE: MW-08


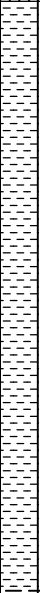
SHEET 1 OF 5

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				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	- ⊙	Wp			W	Wi
0		GROUND SURFACE					20	40	60	80							
0		OVERBURDEN (TILL)															
1																	
2																	
3																	
4																	
5																	
6		SHALE (BEDROCK)		6.10													
7																	
8																	
9																	
10																	

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

DEPTH SCALE

1 : 50



LOGGED:

CHECKED:



PROJECT: 021-1228

# RECORD OF BOREHOLE: MW-08

SHEET 2 OF 5

LOCATION: N 596294.70 ;E 4809190.00

BORING DATE:

DATUM: Geodetic

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕			Q - ●	U - ○
10		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
11															Hole Plug		
12																	
13																	
14																	
15																	
16															Sand		
17																	
18																	
19																	
20																	
		CONTINUED NEXT PAGE															

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

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+ ⊕			- ⊙	Q U
20		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
21															Sand		
22																	
23																	
24															Screen		
25																	
26																	
27																	
28															Sand		
29															Hole Plug		
30		CONTINUED NEXT PAGE															

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

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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕			Q - ●	U - ○
30		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
31																	
32																	
33																	
34																	
35																	
36																	
37																	
38																	
39																	
40																	

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Hole Plug

Sand

Screen

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

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕			Q - ●	U - ○
40		-- CONTINUED FROM PREVIOUS PAGE -- SHALE (BEDROCK)															
41																	
42																	
43																	
44																	
45																	
46																	
47		END OF BOREHOLE		46.20													
48		NOTE: 1. Borehole logging and well completion was not supervised by Golder.															
49																	
50																	

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

DEPTH SCALE

1 : 50



LOGGED:

CHECKED:

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-09

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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR	% RETURN	RECOVERY				R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP w.r.t. CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load Index (MPa)	RMC -Q AVG.	NOTES WATER LEVELS INSTRUMENTATION
										TOTAL CORE %	SOLID CORE %							TYPE AND SURFACE DESCRIPTION			K, cm/sec					
										80	80	80	80					Jr	Ja	Jun	10	10	10			
0		GROUND SURFACE		165.53																						
		Stiff, brown clayey silt till with trace gravel and organics (TOPSOIL)		0.00																						
		Firm, brown SILT with some clay, sand, semirounded gravel and cobbles (TILL)		164.08 1.45																						
		Slightly firm, reddish brown CLAYEY SILT with very fine and very coarse semirounded sand, gravel and cobbles (TILL)		159.75 5.78																						
		Stiff, brown SILTY CLAY with very coarse sand and cobbles (TILL)		157.00 8.53																						
		Stiff, reddish brown SILTY CLAY (Weathered Shale)		155.78 9.75																						
		CONTINUED NEXT PAGE																								

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

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

DRILLING DATE: July 3 to 5, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE (min/m)	FLUSH	RECOVERY		R.Q.D. (%)	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA				HYDRAULIC CONDUCTIVITY			Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION				
				DEPTH (m)	RUN No.			TOTAL CORE %	SOLID CORE %			B Angle	DIP W.Z.L. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jun	K, cm/sec							
								00000000	00000000			00000000	00000000	00000000	00000000	00000000	00000000	00000000				00000000	00000000	00000000	
10		--- CONTINUED FROM PREVIOUS PAGE ---																							
11		Stiff, reddish brown SILTY CLAY (Weathered Shale)																							
12		Stiff, reddish brown SILTY CLAY with some broken shale (Weathered Shale)		153.34 12.19																					
13				151.81																					
14		Slightly weathered, weak, very thinly to thinly bedded, redish brown and green SHALE		13.72	1																				
15					2																				
16					3																				
17					4																				
18					5																				
19					6																				
20		CONTINUED NEXT PAGE																							

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

DEPTH SCALE

1 : 50



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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE (min/m)	FLUSH	COLOUR	% RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA				HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION			
				DEPTH (m)	RUN No.					TOTAL CORE %	SOLID CORE %			B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	K, cm/sec				10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>
20		--- CONTINUED FROM PREVIOUS PAGE --- Slightly weathered, weak, very thinly bedded, reddish brown and green SHALE																								
21																										
22																										
23																										
24																										
25																										
26																										
27																										
28																										
29																										
30		CONTINUED NEXT PAGE																								

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

DEPTH SCALE

1 : 50



LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-09

SHEET 4 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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP w.r.t. CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q AVG.	NOTES WATER LEVELS INSTRUMENTATION		
									TOTAL CORE %	SOLID CORE %					Jr	Ja	Jun	K, cm/sec	10 <sup>0</sup>	10 <sup>1</sup>				10 <sup>2</sup>	
									JOINT	FAULT					BEDDING	FOLIATION	PLANAR	CURVED	PO	K				SLICKENSIDED	BR
30		--- CONTINUED FROM PREVIOUS PAGE --- Slightly weathered, weak, very thinly to thinly bedded, reddish brown and green SHALE																							
31				13																					
32				14																					
33				15																					
34				16																					
35				17																					
36				18																					
37				19																					
38																									
39																									
40		CONTINUED NEXT PAGE																							

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

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

DRILLING DATE: July 3 to 5, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE (min/m)	FLUSH	RECOVERY	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA	HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q AVG.	NOTES WATER LEVELS INSTRUMENTATION				
				DEPTH (m)	RUN No.							TOTAL CORE %	SOLID CORE %	B Angle				DIP w.r.t. CORE AXIS	K, cm/sec	10°	10°
												8000000	8000000	0°				0°	10°	10°	10°
												8000000	8000000	0°				0°	10°	10°	10°
		--- CONTINUED FROM PREVIOUS PAGE ---		125.43	19																
40		Slightly weathered, weak, thinly bedded, redish brown and green SHALE		40.10							.JN,IR,Ro										
41	20							.JN,IR,Ro													
42	21							.JN,PL,SM													
43		Slightly weathered, weak, layered, redish brown and green SHALE		122.43	19						.FR,IR,Ro										
44	22							.JN,IR,Ro													
45	23							.FR,IR,Ro													
46		END OF DRILLHOLE		119.28	19						.JN,IR,Ro										
47				46.25							.FR,IR,SM										
48											.JN,PL,SM										
49																					
50																					

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

DEPTH SCALE

1 : 50



LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-10

SHEET 1 OF 5

LOCATION: N 596045.0 ; E 4809002.0

DRILLING DATE: June 20 to 21, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP W/EL CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q AVG.	NOTES WATER LEVELS INSTRUMENTATION		
				DEPTH (m)	RUN No.				TOTAL CORE %	SOLID CORE %					PL - Planar	CU - Curved	UN - Undulating					ST - Stepped	IR - Irregular
															TYPE AND SURFACE DESCRIPTION	Jr	Ja					Jun	
0		GROUND SURFACE		166.78																			
0.05		Soft, brown clayey silt with organics and trace grey silt and gravel (TOPSOIL) Stiff, brown to grey brown CLAYEY SILT with semiangular gravel (TILL)																					
4		Very soft, reddish brown very fine SANDY SILT with semirounded gravel and cobbles (TILL)		162.72 4.06																			
8.53		Stiff, reddish brown CLAYEY SILT with trace sand and gravel (TILL)		158.25 8.53																			
8.99		Soft, grey brown fine SILTY SAND with gravel (TILL)		157.79 8.99																			
9.60		Stiff, grey brown very fine SANDY SILT with coarse sand, gravel and cobbles (TILL)		157.18 9.60																			
		CONTINUED NEXT PAGE																					

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

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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION					
									TOTAL CORE %	SOLID CORE %			B Angle	DIP w.r.t. CORE AXIS	Type and Surface Description	Jr	Ja	Js				K, cm/sec	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>
									80000000	80000000			80000000	80000000	80000000	80000000	80000000	80000000				80000000	80000000	80000000	80000000	80000000
--- CONTINUED FROM PREVIOUS PAGE ---																										
10		Stiff, reddish brown CLAYEY SILT with semiangular gravel (TILL)	[Symbolic Log]	156.64 10.14																						
11		SHALE	[Symbolic Log]	155.81 10.97																						
15		Slightly to moderately weathered, weak, very thinly to thinly bedded, reddish brown and green SHALE	[Symbolic Log]	152.07 14.71	1																Grout					
16					3																					
17					2																					
18					4																					
19					5																					
20																										
CONTINUED NEXT PAGE																										

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

DEPTH SCALE

1 : 50



LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-10

SHEET 3 OF 5

LOCATION: N 596045.0 ; E 4809002.0

DRILLING DATE: June 20 to 21, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION					
									TOTAL CORE %	SOLID CORE %			B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn				K, cm/sec	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>
									88888888	88888888			88888888	88888888	88888888	88888888	88888888	88888888				88888888	88888888	88888888	88888888	88888888
20		--- CONTINUED FROM PREVIOUS PAGE --- Slightly to moderately weathered, weak, very thinly to thinly bedded, reddish brown and green SHALE		5																						
21		Highly weathered, very weak, thinly bedded, reddish brown and green SHALE		145.48 21.30																						
22		Slightly weathered, weak, reddish brown and green SHALE		143.98 22.80																						
23				8																						
24				9																						
25				10																						
26				11																						
27				12																						
28																										
29																										
30		CONTINUED NEXT PAGE																								

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

DEPTH SCALE

1 : 50



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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PENETRATION RATE (min/m)	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION					
							FLUSH	TOTAL CORE %			SOLID CORE %	B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Ur	Ja				Jn	K, cm/sec	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>
--- CONTINUED FROM PREVIOUS PAGE ---																								
30		Slightly weathered, weak, redish brown and green SHALE		12																				
31				13																				
32				14																				
33				15																Hole Plug				
34				16																				
35				17																				
36				18																				
37				19																				
38				20																				
39				21																				
40				22																				
CONTINUED NEXT PAGE																								

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



PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-10

SHEET 5 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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY			R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP w.r.t. CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION		
									TOTAL CORE %	SOLID CORE %						TYPE AND SURFACE DESCRIPTION	Jr	Ja	Js	K, cm/sec	10 <sup>0</sup>				10 <sup>1</sup>	10 <sup>2</sup>
									80000000	80000000	80000000															
40		--- CONTINUED FROM PREVIOUS PAGE --- Slightly weathered, weak, redish brown and green SHALE																								
41				19																						
42				20																					Screen	
43				21																						
44				22																						
45				23																					Sand	
46		END OF DRILLHOLE		121.11 45.67																						

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

DEPTH SCALE

1 : 50



LOGGED: AK

CHECKED: SW

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-11

SHEET 1 OF 5

LOCATION: N 595870.0 ; E 4808946.0

DRILLING DATE: July 11, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE min/m	RUN No.	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP W/EL CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION	
				DEPTH (m)	ELEV. (m)					TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION	Jr	Ja					Jn
0		GROUND SURFACE		168.31	0.00																		
		Compact, dry, brown SILT, trace clay (TILL)																					Hole P...
		Loose to compact silty clay till from 1.2 m to 2.4 m depth																					
		Damp from 1.8 m to 2.4 m depth																					
				164.04	4.27																		
		Dry, brown to grey SILT, trace gravel/cobbles, angular to subangular gravel (TILL)																					Grout
				161.60	6.71																		
		Damp, brown to grey SANDY SILT with trace subangular rounded gravel, hetero (TILL)																					
				159.47	8.84																		
		Soft, grey to brown silty fine SAND (TILL)																					
		CONTINUED NEXT PAGE																					

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

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

DRILLING DATE: July 11, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PENETRATION RATE (min/m)	FLUSH	RECOVERY	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA	HYDRAULIC CONDUCTIVITY K, cm/sec	Diameter Point Load Index (MPa)	RMC -Q AVG.	NOTES WATER LEVELS INSTRUMENTATION								
				DEPTH (m)	RUN No.											TOTAL CORE %	SOLID CORE %	B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn
				100	200											300	400	500	600	700	800	900	1000
10		--- CONTINUED FROM PREVIOUS PAGE --- Soft, grey to brown silty fine SAND (TILL)																					
15		Slightly to moderately weathered, weak, thinly bedded, reddish brown and green SHALE		153.43 14.88	1										Grout								
16					2																		
17		Moderately to highly weathered, thinly bedded, reddish brown SHALE with some thin greyish green beds		151.55 16.76	3																		
18																							
19					4																		
20				148.31																			
		CONTINUED NEXT PAGE																					

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

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

DRILLING DATE: July 11, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION					
									TOTAL CORE %	SOLID CORE %			B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn				K, cm/sec	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>
									00000000	00000000			000000	000000	000000	000000	000000	000000				000000	000000	000000	000000	000000
20		--- CONTINUED FROM PREVIOUS PAGE ---		20.00																						
21		Slightly weathered, thinly bedded, redish brown SHALE with some thin green beds			5																					
22					6																					
23					7																					
24					8																					
25					9																					
26		Slightly weathered, very thinly to thinly bedded, weak, redish brown and green SHALE		142.10 26.21	10																					
27					11																					
28																										
29																										
30																										
		CONTINUED NEXT PAGE																								

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

DEPTH SCALE

1 : 50



LOGGED: MD & AK

CHECKED: SW

PROJECT: 021-1228

# RECORD OF DRILLHOLE: MW-11

SHEET 4 OF 5

LOCATION: N 595870.0 ; E 4808946.0

DRILLING DATE: July 11, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (min/m)	FLUSH	COLOUR % RETURN	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP w.r.t. CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q AVG.	NOTES WATER LEVELS INSTRUMENTATION		
									TOTAL CORE %	SOLID CORE %					Jr	Ja	Jun	K, cm/sec	10 <sup>0</sup>	10 <sup>1</sup>				10 <sup>2</sup>	
									JOINT	FAULT					SHR	VEIN	CONJUGATE	BEDDING	FOLIATION	CONTACT				ORTHOGONAL	CLEAVAGE
30		--- CONTINUED FROM PREVIOUS PAGE --- Slightly weathered, very thin to thinly bedded, weak, redish brown and green SHALE			11																				
31					12																				Grout
32					13																				
33					14																				
34					15																				
35					16																				Hole Plug
36					17																				
37					18																				
38																									
39																									
40																									
		CONTINUED NEXT PAGE																							

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

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

DRILLING DATE: July 11, 2007

DATUM:

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME - 75 Track Mount

DRILLING CONTRACTOR: All-Terrain Drilling Limited

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		PEN. RATE min/m	FLUSH	RECOVERY		R.Q.D. %	FRACT. INDEX PER 0.3 m	B Angle	DIP w.r.t. CORE AXIS	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY			Diametral Point Load (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION		
				DEPTH (m)	RUN No.			TOTAL CORE %	SOLID CORE %					TYPE AND SURFACE DESCRIPTION	Jr	Ja	Js	K, cm/sec	10 <sup>0</sup>				10 <sup>1</sup>	10 <sup>2</sup>
								88888888	88888888															
40		--- CONTINUED FROM PREVIOUS PAGE --- Slightly weathered, very thin to thin bedded, weak, redish brown and green SHALE																						
41				18																				
42				19																		Screen		
43				20																				
44				21																				
45				22																			Sand	
46		END OF DRILLHOLE			122.39 45.92																			
47																								
48																								
49																								
50																								

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

DEPTH SCALE  
1 : 50



LOGGED: MD & AK  
CHECKED: SW

PROJECT: 021-1228

# RECORD OF BOREHOLE: TW1

SHEET 1 OF 2

LOCATION: N 4808946.0 ; E 595581.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	- ⊖	Q - U			● ○	Wp
0		GROUND SURFACE		167.64													
		Dense, brown, fine grained SILT (TILL) (HALTON TILL)		0.00													
1																	
2																	
3																	
4																	
5	Air Rotary Drilling 152.4 mm Diameter																
6		Dense, brown, fine grained SILT, some gravel, trace clay (TILL) (HALTON TILL)		161.54 6.10													
7																	
8																	
9																	
10																	

Sept. 14/07

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MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	- ⊖	Q - U			● ○	Wp
10	Air Rotary Drilling 152.4 mm Diameter	--- CONTINUED FROM PREVIOUS PAGE ---															
11		Dense, brown, fine grained SILT, some gravel, trace clay (TILL) (HALTON TILL)															
12																	
13																	
14																	
15																	
16		Weathered red SHALE		151.66 15.98													
17																	
18																	
19		END OF BOREHOLE		149.35 18.29													
20																	

Casing ends at 15.98m depth  
Open hole to 18.29m depth

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. + rem V. ⊕ ⊙		Wp				W	
0		GROUND SURFACE		176.33													
		Dense, brown/grey fine grained SILT, trace gravel (TILL) (HALTON TILL)		0.00													
1																	
2																	
3																	
4																	
5	Air Rotary Drilling 152.4 mm Diameter																
6																	
7																	
8																	
9																	
10																	

CONTINUED NEXT PAGE

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. + rem V. ⊕ ⊙		Wp				W	
10	Air Rotary Drilling 152.4 mm Diameter	--- CONTINUED FROM PREVIOUS PAGE --- Dense, brown/grey fine grained SILT, trace gravel (TILL) (HALTON TILL)															
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19		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		
20		CONTINUED NEXT PAGE															

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U -	● ○			Wp	W
20	Air Rotary Drilling 152.4 mm Diameter	--- CONTINUED FROM PREVIOUS PAGE ---															
21		Dense, reddish brown fine grained SILT, some gravel (TILL) (HALTON TILL)															
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	

CONTINUED NEXT PAGE

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



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				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕	Q - U	● ○			Wp	W
30	Air Rotary Drilling 152.4 mm Diameter	--- CONTINUED FROM PREVIOUS PAGE ---															
31		Dense, reddish brown fine grained SILT, some gravel (TILL) (HALTON TILL)															
32		END OF BOREHOLE		144.32 32.01													
33																	
34																	
35																	
36																	
37																	
38																	
39																	
40																	

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.	+ ⊕ - ⊙	Q - U	Wp			W	Wi
0	Air Rotary Drilling 152.4 mm Diameter	GROUND SURFACE		166.85 0.00													
0 to 6		Dense, brown fine grained SILT, trace gravel (TILL) (HALTON TILL)															
6				160.76 6.09													
6 to 10		Dense, brown fine grained SILT, some gravel (TILL) (HALTON TILL)															
10		CONTINUED NEXT PAGE															

MIS-BHS 001 021-1228 (2007).GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



LOGGED: MD

CHECKED: SMD

PROJECT: 021-1228

# RECORD OF BOREHOLE: TW3

SHEET 2 OF 3

LOCATION: N 4810005.0 ; E 596410.0

BORING DATE: August 29, 2007

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. + rem V. ⊕	Q - U - ●	Wp	W			Wi	Wi
10		--- CONTINUED FROM PREVIOUS PAGE ---															
11		Dense, brown fine grained SILT, some gravel (TILL) (HALTON TILL)															
12																	
13		Dense, brownish grey, fine grained SILT, trace gravel, trace weathered shalt throughout (TILL) (HALTON TILL)															
14																	
15	Air Rotary Drilling 152.4 mm Diameter																
16																	
17																	
18																	
19																	
20		Red SHALE															
		CONTINUED NEXT PAGE															

Sept. 14/07

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



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		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. + rem V. ⊕	Q - U - ⊙	Wp	W			Wi	Wi
20	Air Rotary Drilling 152.4 mm Diameter	--- CONTINUED FROM PREVIOUS PAGE --- Red SHALE															
21																	
22																	
23																	
24		END OF BOREHOLE		143.23 23.62											Casing ends at 20.4m depth Open hole to 23.62m depth		
25																	
26																	
27																	
28																	
29																	
30																	

MIS-BHS 001 021-1228 (2007) GPJ GAL-MIS.GDT 25/9/09 DD

DEPTH SCALE

1 : 50



LOGGED: MD

CHECKED: SMD

**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 1/10<sup>th</sup> of a metre.
- Please print clearly in blue or black ink only.

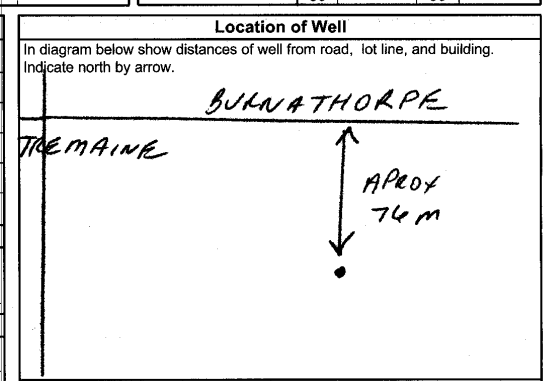
<b>Well Owner's Information and Location of Well Information</b>				<b>Ministry Use Only</b>			
MUN		CON		LOT			
First Name <b>BEKKERS WINCREST</b>		Last Name <b>KENNELS</b>		Mailing Address (Street Number/Name, RR, Lot, Concession) <b>2012 DUNDAS ST WEST</b>			
County/District/Municipality <b>HALTON</b>		Township/City/Town/Village <b>OKVILLE</b>		Province <b>Ontario</b>		Postal Code <b>L6Y 4Z3</b>	
Address of Well Location (County/District/Municipality) <b>HALTON</b>				Township <b>TRAFALGAR</b>		Lot <b>35</b>	
RR#/Street Number/Name <b>3451 TREMAINE RD</b>				City/Town/Village <b>OKVILLE</b>		Site/Compartment/Block/Tract etc. <b>1</b>	
GPS Reading NAD <b>8.3</b>		Zone <b>17</b>		Easting <b>590446</b>		Northing <b>4809920</b>	
Unit Make/Model		Mode of Operation:		<input type="checkbox"/> Undifferentiated		<input type="checkbox"/> Averaged	
				<input type="checkbox"/> Differentiated, specify			

**Log of Overburden and Bedrock Materials (see instructions)**

General Colour	Most common material	Other Materials	General Description	Depth From	Metres To
	<b>BROWN TOP-SOIL</b>			<b>0</b>	<b>0.3</b>
	<b>BROWN CLAY</b>		<b>HARD</b>	<b>0.3</b>	<b>5.18</b>
	<b>GREY CLAY</b>	<b>SILT</b>		<b>5.18</b>	<b>13.71</b>
	<b>GREY CLAY</b>	<b>SAND</b>		<b>13.71</b>	<b>16.76</b>
	<b>GREY CLAY</b>	<b>STONES</b>	<b>HARD</b>	<b>16.76</b>	<b>21.33</b>
	<b>RED SHALE</b>			<b>21.33</b>	<b>22.86</b>
<b>SHALE IN BOTTOM FAR AS COULD BORE</b>					

<b>Hole Diameter</b>			<b>Construction Record</b>				<b>Test of Well Yield</b>					
Depth From	Metres To	Diameter Centimetres	Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Metres To	Pumping test method	Draw Down Time min	Water Level Metres	Recovery Time min	Water Level Metres
<b>0</b>	<b>22.86</b>	<b>121.92</b>						Pump intake set at - (metres)				
			<b>Casing</b>									
			<b>91.44</b>	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	<b>7.62</b>	<b>0</b>	<b>22.86</b>	Pumping rate - (litres/min)	<b>1</b>		<b>1</b>	
							Duration of pumping hrs + min					
							Final water level end of pumping metres					
							Recommended pump type					
							Recommended pump depth <b>21.33</b> metres					
							Recommended pump rate <b>18.92</b> (litres/min)					
							If flowing give rate - (litres/min)					
							If pumping discontinued, give reason <b>DRY HOLE ON COMPLETION</b>					
							60					

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



<b>Method of Construction</b>			
<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Rotary (air)	<input type="checkbox"/> Diamond	<input type="checkbox"/> Digging
<input type="checkbox"/> Rotary (conventional)	<input type="checkbox"/> Air percussion	<input type="checkbox"/> Jetting	<input type="checkbox"/> Other
<input type="checkbox"/> Rotary (reverse)	<input checked="" type="checkbox"/> Boring	<input type="checkbox"/> Driving	
<b>Water Use</b>			
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Other
<input type="checkbox"/> Stock	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used	
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Municipal	<input type="checkbox"/> Cooling & air conditioning	
<b>Final Status of Well</b>			
<input checked="" type="checkbox"/> Water Supply	<input type="checkbox"/> Recharge well	<input type="checkbox"/> Unfinished	<input type="checkbox"/> Abandoned, (Other)
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, insufficient supply	<input type="checkbox"/> Dewatering	
<input type="checkbox"/> Test Hole	<input type="checkbox"/> Abandoned, poor quality	<input type="checkbox"/> Replacement well	

Audit No. <b>Z 40625</b>	Date Well Completed <b>2006 3 7</b>
Was the well owner's information package delivered? <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Delivered

<b>Well Contractor/Technician Information</b>	
Name of Well Contractor <b>JOHNSON &amp; BAETZ</b>	Well Contractor's Licence No. <b>3030</b>
Business Address (street name, number, city etc.) <b>19 MACBRIDE COURT BRANTFORD</b>	
Name of Well Technician (last name, first name) <b>BAETZ JOHN</b>	Well Technician's Licence No.
Signature of Technician/Contractor <i>[Signature]</i>	Date Submitted

<b>Ministry Use Only</b>	
Data Source	Contractor <b>3030</b>
Date Delivered <b>5 2006</b>	Date of Inspection
Remarks	Well Record Number



MINISTRY OF THE ENVIRONMENT  
The Ontario Water Resources Act  
**WATER WELL RECORD**

30 m / 5F Featherstone

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

2804215

MUNICIP. 28.602 CON. DS, N, C 02

COUNTY OR DISTRICT: Whitton TOWNSHIP/BOROUGH/CITY/TOWN/VILLAGE: Burlington Town of Hill (Nelson) CON. BLOCK, TRACT, SURVEY, ETC.: 2 N.D.S LOT: 001

DATE COMPLETED: 07 48-53 DAY: 18 MO: July YR: 73

NO. 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	TO
<u>Brown clay</u>				<u>0</u>	<u>12</u>
<u>Grey silty clay</u>				<u>12</u>	<u>31</u>
<u>Grey clay</u>		<u>gravel</u>		<u>31</u>	<u>53</u>
<u>light blue clay</u>				<u>53</u>	<u>59</u>
<u>red clay</u>				<u>59</u>	<u>66</u>
<u>red shale</u>				<u>66</u>	<u>82</u>

OWRC  
P-9

31 00121605 32 003120504 33 005321011 34 00591305104 35 00671705 36 008217117

**41 WATER RECORD**

WATER FOUND AT - FEET	KIND OF WATER
<u>006.9</u>	<input checked="" type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERAL
<u>007.4</u>	<input checked="" type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERAL
20-23	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERAL
25-28	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERAL
30-33	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERAL

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET
<u>188</u>	<input checked="" type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE	<u>0</u>	<u>006.8</u>
<u>06</u>	<input checked="" type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE	<u>68</u>	<u>82</u>
<u>06</u>	<input checked="" type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE		<u>0082</u>

**SCREEN**

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
	<u>31-33</u>	<u>34-38</u>
MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN
		<u>41-44</u>

**61 PLUGGING & SEALING RECORD**

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

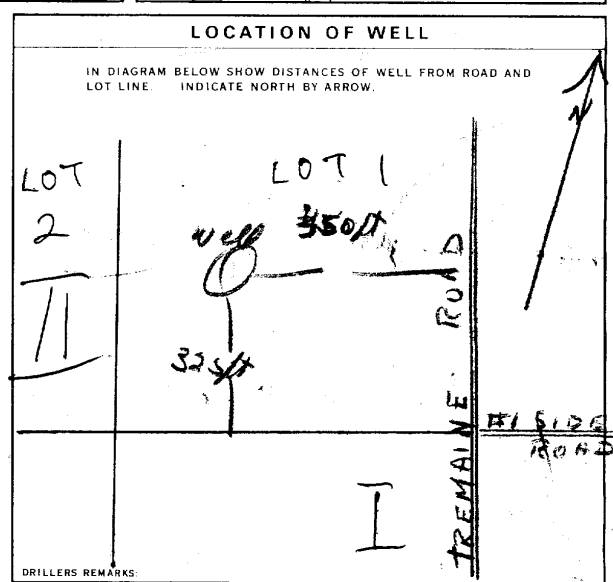
**71 PUMPING TEST**

PUMPING TEST METHOD:  PUMP  BAILER

PUMPING RATE: 1 1/2 0002 01 15-16 30 17-18

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING
<u>024</u> FEET	<u>080</u> FEET	15 MINUTES: <u>080</u> FEET 30 MINUTES: <u>080</u> FEET 45 MINUTES: <u>080</u> FEET 60 MINUTES: <u>080</u> FEET

RECOMMENDED PUMP SETTING: 090 FEET



**FINAL STATUS OF WELL**

WATER SUPPLY  OBSERVATION WELL  TEST HOLE  RECHARGE WELL

ABANDONED, INSUFFICIENT SUPPLY  ABANDONED, POOR QUALITY  UNFINISHED

**WATER USE** 01

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

**CONTRACTOR**

NAME OF WELL CONTRACTOR: Burton Rutlan LICENCE NUMBER: 4602

ADDRESS: Milton R R 2

NAME OF DRILLER OR BORER: same LICENCE NUMBER:

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

**OFFICE USE ONLY**

DATA SOURCE: 1 CONTRACTOR: 4602 DATE RECEIVED: 280773

DATE OF INSPECTION: INSPECTOR:

REMARKS: CSS.S8



Ministry  
of the  
Environment  
Ontario

The Ontario Water Resources Act  
**WATER WELL RECORD**

Finucci

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

11

2807948

MUNICIP 28602

CON. DS. N. 01

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

ADDRESS: **333 Warminster Dr., Oakville, L6L-4N1** DATE COMPLETED: **48-53** DAY: **14** MO: **01** YR: **92**

NORTHING: **21** U: **1** V: **10** W: **12** X: **17** Y: **18** Z: **24** AA: **25** AB: **26** AC: **30** AD: **31** AE: **34** AF: **35** AG: **36** AH: **37** AI: **38** AJ: **39** AK: **40**

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	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		FROM	TO
6 1/2"		.188	+1	39
			39	55

**SCREEN**

SIZE(S) OF OPENING (SLOT NO.): 31-33 DIAMETER: 34-38 LENGTH: 39-40

MATERIAL AND TYPE: DEPTH TO TOP OF SCREEN: 41-44 FEET

**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: 1  PUMP 2  BAILER

PUMPING RATE: **4.5** GPM

DURATION OF PUMPING: 1 15-18 HOURS 0 17-18 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING			
19-21 FEET	22-24 FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
19	50	50	50	50	50

IF FLOWING GIVE RATE: 38-41 GPM

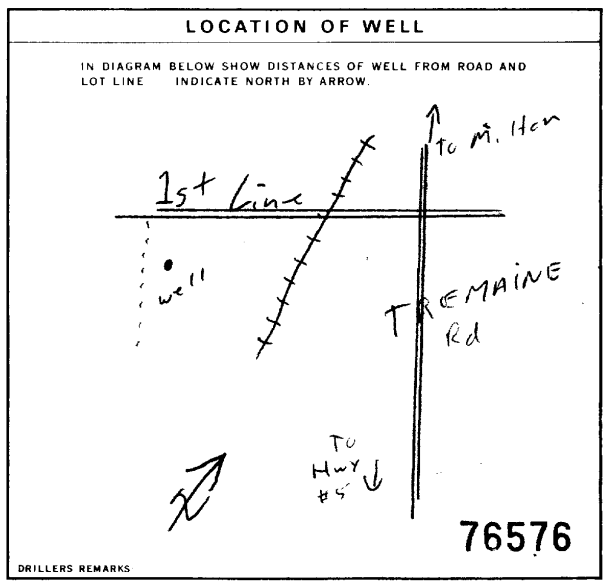
PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 42

RECOMMENDED PUMP TYPE: 1  SHALLOW 2  DEEP

RECOMMENDED PUMP SETTING: FEET

RECOMMENDED PUMPING RATE: 4.0 GPM



**FINAL STATUS OF WELL**

1  WATER SUPPLY 5  ABANDONED, INSUFFICIENT SUPPLY  
2  OBSERVATION WELL 6  ABANDONED, POOR QUALITY  
3  TEST HOLE 7  UNFINISHED  
4  RECHARGE WELL 8  DEWATERING

**WATER USE**

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

**METHOD OF CONSTRUCTION**

1  CABLE TOOL 6  BORING  
2  ROTARY (CONVENTIONAL) 7  DIAMOND  
3  ROTARY (REVERSE) 8  JETTING  
4  ROTARY (AIR) 9  DRIVING  
5  AIR PERCUSSION 10  DIGGING 11  OTHER

**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**

DATE RECEIVED: **JAN 20 1992**

CONTRACTOR: **4005**

DATE OF INSPECTION: INSPECTOR:

REMARKS:

J.B.

1172 ST 9 ST 6 210



# Hendervale House or Hendervale Cottage

DEC 18 1968

ONTARIO WATER RESOURCES COMMISSION

4R 481081630000

2802793

lev. 5TR 05T50 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 NOV. 1968

Address 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'  
~~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

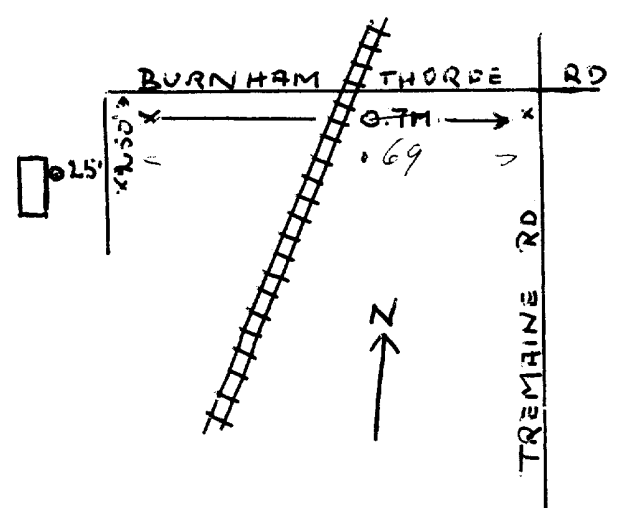
Address SAME AS ABOVE

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.







WELL # 1.

Hendervale ABC Barn or Hendervale XYZ Barn

The Ontario Water Resources Act

WATER WELL RECORD

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

2808537

MUNICIPALITY: 28001 CON: 1011

COUNTY OR DISTRICT: HALTON TOWNSHIP, BOROUGH CITY TOWN VILLAGE: HALTON HILLS CON. BLOCK, TRACT, SURVEY ETC: CON. 1 LOT: 1&2  
OWNER (SURNAME FIRST): HENDERVALE STABLES ADDRESS: #1 SIDE RD MILTON ONT. DATE COMPLETED: DAY 05 NO 07 YR 96

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

GENERAL COLOUR	MCST COMMON MATERIAL	OTHER MATERIALS	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		
95	<input checked="" type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> SULPHUR
	<input type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> MINERALS
	<input type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

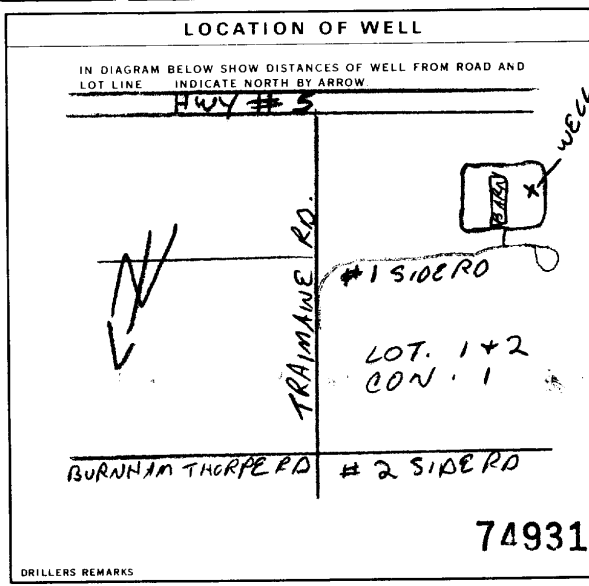
INSIDE DIAM INCHES	MATERIAL	WELL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4	STEEL	.188	+1	49
6 1/4	STEEL	---	49	100

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	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 METHOD: 1 PUMP 2 BAILER  
PUMPING RATE: 12 GPM DURATION OF PUMPING: 2 HOURS  
PUMPING TEST: 1 PUMPING 2 RECOVERY  
STATIC LEVEL: 39 FEET WATER LEVEL END OF PUMPING: 82 FEET  
WATER LEVELS DURING: 15 MINUTES: 64 FEET 30 MINUTES: 75 FEET 45 MINUTES: 82 FEET 60 MINUTES: 82 FEET  
RECOMMENDED PUMP TYPE: SHALLOW DEEP  
RECOMMENDED PUMP SETTING: 95 FEET RECOMMENDED PUMPING RATE: 10 GPM



FINAL STATUS OF WELL: 1 WATER SUPPLY 2 OBSERVATION WELL 3 TEST HOLE 4 RECHARGE WELL 5 ABANDONED INSUFFICIENT SUPPLY 6 ABANDONED POOR QUALITY 7 UNFINISHED 8 DEWATERING  
WATER USE: 1 DOMESTIC 2 STOCK 3 IRRIGATION 4 INDUSTRIAL 5 OTHER 6 COMMERCIAL 7 MUNICIPAL 8 PUBLIC SUPPLY 9 COOLING OR AIR CONDITIONING 10 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 10 DIGGING OTHER

CONTRACTOR NAME OF WELL CONTRACTOR: CORE'S WELL DRILLING WELL CONTRACTOR'S LICENCE NUMBER: 1660  
ADDRESS: 264 BRONTE ST. UNIT #10 MILTON ONT.  
NAME OF WELL TECHNICIAN: ROD CORE WELL TECHNICIAN'S LICENCE NUMBER: TO-479  
SIGNATURE OF TECHNICIAN/CONTRACTOR: [Signature] SUBMISSION DATE: DAY NO YR

OFFICE USE ONLY DATA SOURCE: 1660 CONTRACTOR: 1660 DATE RECEIVED: MAY 08 1997  
DATE OF INSPECTION: INSPECTOR: [Signature]  
REMARKS: CSS. S



Ministry  
of the  
Environment  
Ontario

WELL# 2

Hendervale ABC Barn or Hendervale XYZ Barn

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.

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

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

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

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

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

31      32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
103	1 <input type="checkbox"/> FRESH 2 <input checked="" type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/2	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	+1	47
6 1/2	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	---	47	106

SCREEN

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

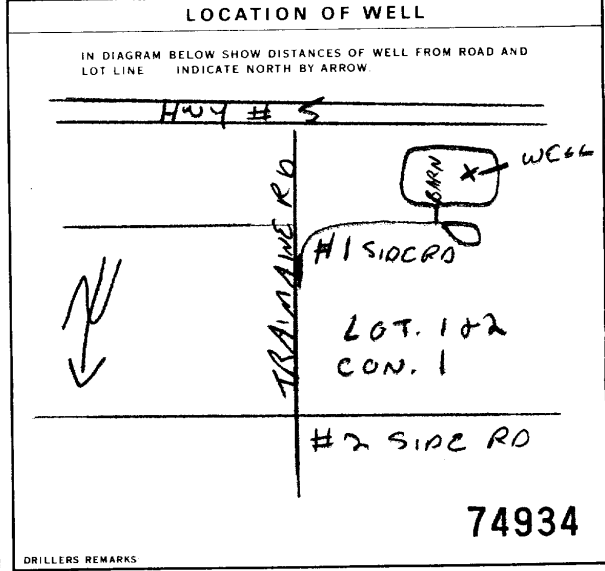
MATERIAL AND TYPE      DEPTH TO TOP OF SCREEN      41-44      10      FEET

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	PUMPING RATE	DURATION OF PUMPING
1 <input type="checkbox"/> PUMP    2 <input checked="" type="checkbox"/> BAILER	8 GPM	1 15-16 HOURS    17-18 MINS
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING
19-21	22-24	15 MINUTES    30 MINUTES    45 MINUTES    60 MINUTES    35-37
44 FEET	95 FEET	60 FEET    78 FEET    95 FEET    95 FEET
IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
38-41	42	1 <input checked="" type="checkbox"/> CLEAR    2 <input type="checkbox"/> CLOUDY
RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP	101 FEET	8 GPM



34 FINAL STATUS OF WELL

35-36 WATER USE

37 METHOD OF CONSTRUCTION

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: *[Signature]*      SUBMISSION DATE: DAY \_\_\_\_ MO \_\_\_\_ YR \_\_\_\_

OFFICE USE ONLY

DATE RECEIVED: MAY 08 1997

CONTRACTOR: 1660

REMARKS: *[Signature]*

CSS. S



Ministry  
of the  
Environment  
Ontario

# Hendervale Main Barn

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

101

COUNTY OR DISTRICT <b>HALTON</b>	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE <b>HALTON HILLS</b>	CON. BLOCK, TRACT, SURVEY, ETC. <b>CON. 1</b>	LOT <b>1&amp;2</b>
OWNER (SURNAME FIRST) <b>HENDERVALE STABLES</b>	ADDRESS <b>5244 #1 SIDE RD MILTON ONT. L9T-2Y1</b>	DATE COMPLETED <b>DAY 10 MO 04 YR 97</b>	

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

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)				
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	DEPTH - FEET	
			FROM	TO
BROWN CLAY			0	4
BROWN CLAY AND STONES			4	18
RED CLAY			18	22
RED SHALE			22	54

31	32	33	34	35	36	37	38	39	40
----	----	----	----	----	----	----	----	----	----

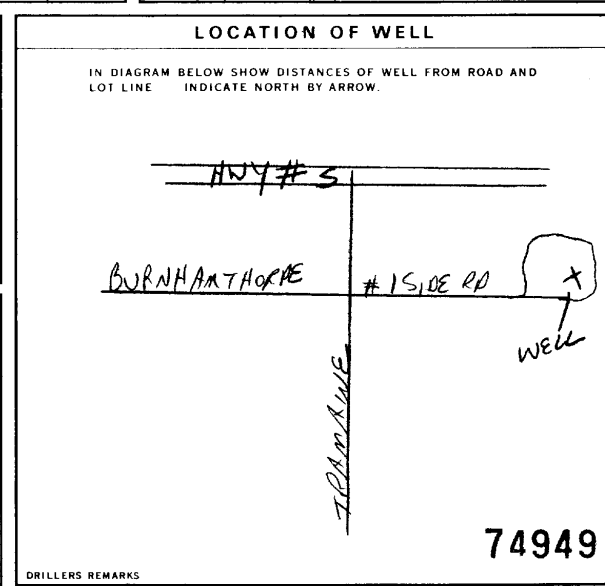
41 WATER RECORD			
WATER FOUND AT - FEET	KIND OF WATER		
50	1 <input checked="" type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	14
15-18	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	19
20-23	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	24
25-28	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	29
30-33	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	34

51 CASING & OPEN HOLE RECORD			
INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET
			FROM TO
6 1/4	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	+1 27
6 1/4	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		27 54

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

61 PLUGGING & SEALING RECORD		
DEPTH SET AT - FEET	MATERIAL AND TYPE	CEMENT GROUT LEAD PACKER, ETC.
10-13		
18-21		
26-29		

71 PUMPING TEST	PUMPING TEST METHOD		PUMPING RATE	DURATION OF PUMPING		
	1 <input type="checkbox"/> PUMP	2 <input checked="" type="checkbox"/> BAILER	7 GPM	15-16 HOURS	17-18 MINS	
	STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING			
	16 FEET	47 FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES



84 FINAL STATUS OF WELL	
1 <input checked="" type="checkbox"/> WATER SUPPLY	5 <input type="checkbox"/> ABANDONED - INSUFFICIENT SUPPLY
2 <input type="checkbox"/> OBSERVATION WELL	6 <input type="checkbox"/> ABANDONED POOR QUALITY
3 <input type="checkbox"/> TEST HOLE	7 <input type="checkbox"/> UNFINISHED
4 <input type="checkbox"/> RECHARGE WELL	<input type="checkbox"/> DEWATERING

85-86 WATER USE	
1 <input checked="" type="checkbox"/> DOMESTIC	5 <input type="checkbox"/> COMMERCIAL
2 <input type="checkbox"/> STOCK	6 <input type="checkbox"/> MUNICIPAL
3 <input type="checkbox"/> IRRIGATION	7 <input type="checkbox"/> PUBLIC SUPPLY
4 <input type="checkbox"/> INDUSTRIAL	8 <input type="checkbox"/> COOLING OR AIR CONDITIONING
<input type="checkbox"/> OTHER	9 <input type="checkbox"/> NOT USED

87 METHOD OF CONSTRUCTION	
1 <input type="checkbox"/> CABLE TOOL	6 <input type="checkbox"/> BORING
2 <input type="checkbox"/> ROTARY (CONVENTIONAL)	7 <input type="checkbox"/> DIAMOND
3 <input type="checkbox"/> ROTARY (REVERSE)	8 <input type="checkbox"/> JETTING
4 <input type="checkbox"/> ROTARY (AIR)	9 <input type="checkbox"/> DRIVING
5 <input type="checkbox"/> AIR PERCUSSION	<input type="checkbox"/> DIGGING <input type="checkbox"/> OTHER

NAME OF WELL CONTRACTOR <b>CORE'S WELL DRILLING</b>	WELL CONTRACTOR'S LICENCE NUMBER <b>1660</b>
ADDRESS <b>264 BRONTE ST. UNIT #10 MILTON ONT.</b>	
NAME OF WELL TECHNICIAN <b>ROD CORN</b>	WELL TECHNICIAN'S LICENCE NUMBER <b>TO-479</b>
SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE

DATA SOURCE	CONTRACTOR	DATE RECEIVED	43-48
	<b>1660</b>	<b>JUN 17 1998</b>	
DATE OF INSPECTION	INSPECTOR	REMARKS	
		<b>CSS. 99</b>	



# The Ontario Water Resources Commission Act WATER WELL RECORD

30m/57.  
Sicard

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: HALTON  
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: BURLINGTON  
CON., BLOCK, TRACT, SURVEY, ETC.: I.H.P.S.  
LOT: 001  
DATE COMPLETED: DAY 04, MO. 09, YR. 72  
RC: 08770, ELEVATION: 4, 0520, BASIN CODE: 6, 24

### LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
	TOPSOIL			0	3
BROWN	CLAY			3	15
RED	CLAY			15	21
RED	SHALE			21	52

31 0003 02 0015045 0001705 0052717  
32

#### 41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0030	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input checked="" type="checkbox"/> MINERAL
0051	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input checked="" type="checkbox"/> MINERAL
	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL

#### 51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET
			FROM TO
06	STEEL	12	0 22
06	GALVANIZED	188	22 52
06	CONCRETE		
06	OPEN HOLE		
06	STEEL	19	
06	GALVANIZED		
06	CONCRETE		
06	OPEN HOLE		
06	STEEL	26	
06	GALVANIZED		
06	CONCRETE		
06	OPEN HOLE		

#### SCREEN

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

#### 61 PLUGGING & SEALING RECORD

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

#### 71 PUMPING TEST

PUMPING TEST METHOD:  PUMP  BAILER

PUMPING RATE: 0002 GPM

DURATION OF PUMPING: 02 HOURS 00 MINS.

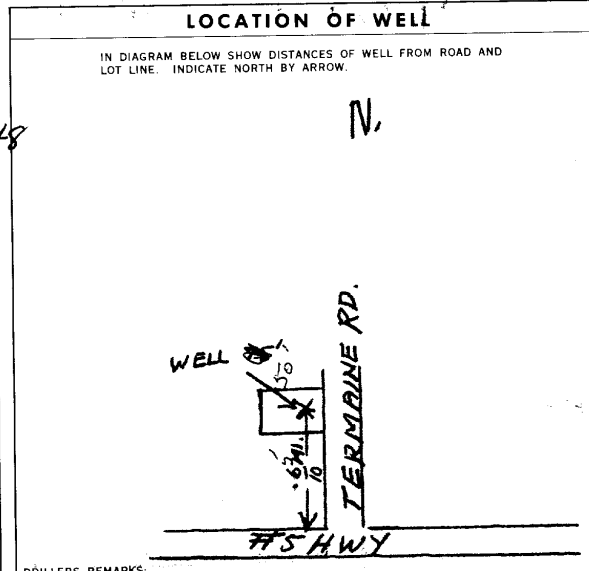
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING
044 FEET	048 FEET	15-22: 048 FEET, 26-28: 048 FEET, 29-31: 048 FEET, 35-37: 048 FEET

RECOMMENDED PUMP TYPE:  SHALLOW  DEEP

RECOMMENDED PUMP SETTING: 049 FEET

RECOMMENDED PUMPING RATE: 0002 GPM

50-53 0005 GPM./FT. SPECIFIC CAPACITY



#### FINAL STATUS OF WELL

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

#### WATER USE

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

#### METHOD OF DRILLING

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

#### CONTRACTOR

NAME OF WELL CONTRACTOR: Peter Spitzer Well Drilling  
ADDRESS: 2442 Marginal Ct, Burlington  
LICENCE NUMBER: 1815  
NAME OF DRILLER OR BAILER: Ed Boyle  
SIGNATURE OF CONTRACTOR: Ed Boyle  
SUBMISSION DATE: 1915

#### OFFICE USE ONLY

DATA SOURCE: 1  
CONTRACTOR: 1815  
DATE RECEIVED: 110972  
DATE OF INSPECTION: 1815  
INSPECTOR: [Signature]  
REMARKS: CSS.S8  
P  
WI



Ontario

# WATER WELL RECORD

30 M 5F

Simms

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

2804679

28602

DS-N-C 02

COUNTY OR DISTRICT <b>HALTON</b>	TOWNSHIP, BURGOUGH, CITY, TOWN, VILLAGE <b>Town of Milton</b>	CON., BLOCK, TRACT, SURVEY, ETC. <b># NDS</b>	LOT <b>001</b>
OWNER (SURNAME FIRST) <b>HAVILLE FARMS</b>	ADDRESS <b>RR 6 MILTON</b>	DATE COMPLETED DAY <b>8</b> MO. <b>NOV</b> YR. <b>74</b>	
<b>2804679 17</b>	<b>595308</b>	<b>4809884</b>	<b>4 590 4 24</b>
<b>NOV 07, 1975</b>			

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)					
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	TOPSOIL			0	1
"	CLAY		HARD PACKED	1	22
Grey	"	BLUE CLAY SANDSTONES	HARD	22	63
Brown	SAND	STONES	HARD PACKED	63	74
Red	SHALE	GREEN SHALE	HARD	74	90

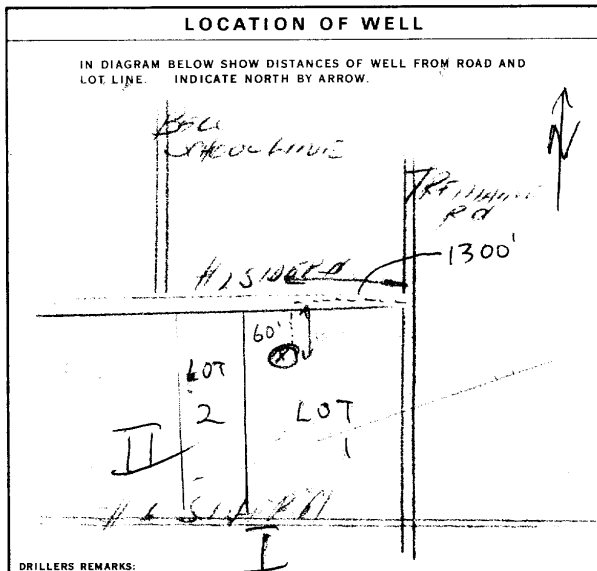
WATER RECORD	
WATER FOUND AT - FEET	KIND OF WATER
63	<input checked="" type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
75	<input checked="" type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL

CASING & OPEN HOLE RECORD				
INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
30	<input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> GALVANIZED <input type="checkbox"/> STEEL <input type="checkbox"/> OPEN HOLE	2 1/2	0	67 1/2
21	<input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> GALVANIZED <input type="checkbox"/> STEEL <input type="checkbox"/> OPEN HOLE	16 9/16	66	90

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

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

PUMPING TEST	PUMPING TEST METHOD		PUMPING RATE		DURATION OF PUMPING	
	<input type="checkbox"/> PUMP	<input checked="" type="checkbox"/> BAILER	GPM	HOURS	MIN.	
	STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING			
	FEET	FEET	15 MINUTES	30 MINUTES	RECOVER	RECOVER
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST				
GPM	FEET	<input type="checkbox"/> CLEAR <input checked="" type="checkbox"/> CLOUDY				
RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE				
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP	86 FEET	2 GPM				



<b>FINAL STATUS OF WELL</b>	<input checked="" type="checkbox"/> WATER SUPPLY <input type="checkbox"/> OBSERVATION WELL <input type="checkbox"/> TEST HOLE <input type="checkbox"/> RECHARGE WELL	<input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY <input type="checkbox"/> ABANDONED, POOR QUALITY <input type="checkbox"/> UNFINISHED
<b>WATER USE</b>	<input checked="" type="checkbox"/> DOMESTIC <input type="checkbox"/> STOCK <input type="checkbox"/> IRRIGATION <input type="checkbox"/> INDUSTRIAL <input type="checkbox"/> OTHER	<input type="checkbox"/> COMMERCIAL <input type="checkbox"/> MUNICIPAL <input type="checkbox"/> PUBLIC SUPPLY <input type="checkbox"/> COOLING OR AIR CONDITIONING <input type="checkbox"/> NOT USED
<b>METHOD OF DRILLING</b>	<input type="checkbox"/> CABLE TOOL <input type="checkbox"/> ROTARY (CONVENTIONAL) <input type="checkbox"/> ROTARY (REVERSE) <input type="checkbox"/> ROTARY (AIR) <input type="checkbox"/> AIR PERCUSSION	<input checked="" type="checkbox"/> BORING <input type="checkbox"/> DIAMOND <input type="checkbox"/> JETTING <input type="checkbox"/> DRIVING

<b>CONTRACTOR</b>	NAME OF WELL CONTRACTOR <b>Milton Well Drilling</b>	LICENCE NUMBER <b>3637</b>
	ADDRESS <b>10751 WALKERS LANE RR 2 MILTON</b>	
	NAME OF DRILLER OR BORER <b>MANUEL PEUTER</b>	LICENCE NUMBER <b>3637</b>
	SIGNATURE OF CONTRACTOR <i>[Signature]</i>	SUBMISSION DATE DAY <b>13</b> MO. <b>NOV</b> YR. <b>74</b>

<b>OFFICE USE ONLY</b>	<b>110275</b>
	<b>J.R.</b>
	<b>JP</b>
	<b>CSS.S8</b>



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

11 2807647 MUNICIPAL DISTRICT 28605 DS N 101

COUNTY OR DISTRICT <b>HALTON</b>	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE <b>TOWN OF OAKVILLE</b>	CON. BLOCK TRACT SURVEY ETC. <b>CON.1 N.D.S.</b>	LOT <b>35</b>
OWNER (SURNAME FIRST) <b>FUJI MACHINE SHOP</b>	ADDRESS <b>811 MAC PHEARSON RD. OAKVILLE, ONT. L6J 4Z3</b>	DATE COMPLETED DAY <b>31</b> MO <b>8</b> YR <b>90</b>	

21	U	1	2	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	12.5
RED	CLAY		LOOSE	12.5	18.0
RED	SHALE		HARD	18.0	50

31	10	14	15	21	32	43	54	65	75	80
----	----	----	----	----	----	----	----	----	----	----

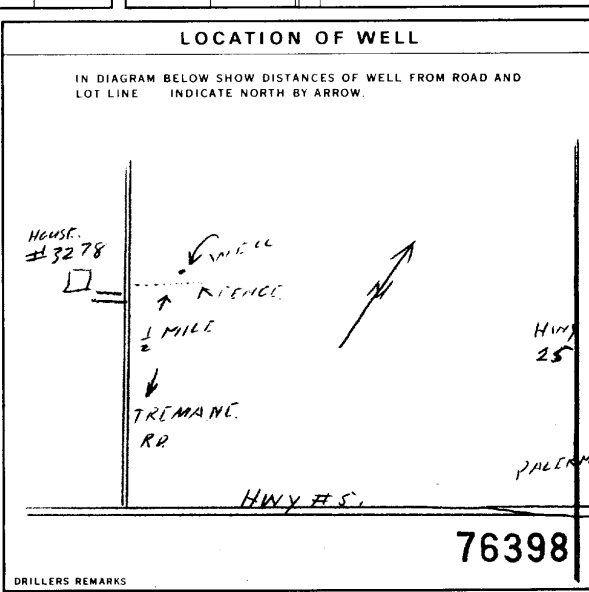
41 WATER RECORD			
WATER FOUND AT - FEET	KIND OF WATER		
10-13 <b>48</b>	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	4 <input type="checkbox"/> MINERALS
	2 <input checked="" type="checkbox"/> SALTY	6 <input type="checkbox"/> GAS	

51 CASING & OPEN HOLE RECORD			
INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET
10-11 <b>6 1/2</b>	1 <input checked="" type="checkbox"/> STEEL	<b>.188</b>	<b>1</b> TO <b>25</b>

SCREEN	SIZE OF OPENING (SLOT NO)	DIAMETER	LENGTH

61 PLUGGING & SEALING RECORD		
DEPTH SET AT - FEET	MATERIAL AND TYPE	CEMENT GROUT LEAD PACKER ETC.
10-13 TO 14-17		

71 PUMPING TEST			
1 <input type="checkbox"/> PUMP	2 <input checked="" type="checkbox"/> BAILER	PUMPING RATE <b>2</b> GPM	DURATION OF PUMPING <b>1</b> 15-16 HOURS
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	
17	46	15 MINUTES <b>46-28</b>	30 MINUTES <b>46-31</b>



84 FINAL STATUS OF WELL	
1 <input checked="" type="checkbox"/> WATER SUPPLY	5 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY
2 <input type="checkbox"/> OBSERVATION WELL	6 <input type="checkbox"/> ABANDONED POOR QUALITY
3 <input type="checkbox"/> TEST HOLE	7 <input type="checkbox"/> UNFINISHED
4 <input type="checkbox"/> RECHARGE WELL	<input type="checkbox"/> DEWATERING
85-86 WATER USE	
1 <input checked="" type="checkbox"/> DOMESTIC	5 <input type="checkbox"/> COMMERCIAL
2 <input type="checkbox"/> STOCK	6 <input type="checkbox"/> MUNICIPAL
3 <input type="checkbox"/> IRRIGATION	7 <input type="checkbox"/> PUBLIC SUPPLY
4 <input type="checkbox"/> INDUSTRIAL	8 <input type="checkbox"/> COOLING OR AIR CONDITIONING
<input type="checkbox"/> OTHER	9 <input type="checkbox"/> NOT USED
87 METHOD OF CONSTRUCTION	
1 <input checked="" type="checkbox"/> CABLE TOOL	6 <input type="checkbox"/> BORING
2 <input type="checkbox"/> ROTARY (CONVENTIONAL)	7 <input type="checkbox"/> DIAMOND
3 <input type="checkbox"/> ROTARY (REVERSE)	8 <input type="checkbox"/> JETTING
4 <input type="checkbox"/> ROTARY (AIR)	9 <input type="checkbox"/> DRIVING
5 <input type="checkbox"/> AIR PERCUSSION	<input type="checkbox"/> DIGGING <input type="checkbox"/> OTHER

CONTRACTOR	NAME OF WELL CONTRACTOR <b>OCONNOR WELL DRILLING LTD.</b>	WELL CONTRACTOR'S LICENCE NUMBER <b>4005</b>
	ADDRESS <b>RR # 1 MILLGROVE, ONT. L0R 1V0</b>	
	NAME OF WELL TECHNICIAN <b>W. HOWE</b>	WELL TECHNICIAN'S LICENCE NUMBER <b>T-0518</b>

OFFICE USE ONLY	DATA SOURCE <b>4005</b>	CONTRACTOR <b>4005</b>	DATE RECEIVED <b>SEP 12 1990</b>
	DATE OF INSPECTION	INSPECTOR	REMARKS



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11

2807684

MUNICIPALITY 28602

CON.

D.S. N.

102

COUNTY OR DISTRICT: [REDACTED] TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: CITY OF BURLINGTON CON. BLOCK, TRACT, SURVEY ETC: CON. 2 N.D.S. LOT: 2

5364 #2 SIDE RD.  
[REDACTED] TON, ONT. L9T 2Y1

DATE COMPLETED: DAY 12 MO 10 YR 90

INC: [REDACTED] RC: [REDACTED] ELEVATION: [REDACTED] RC: [REDACTED] BASIN CODE: [REDACTED] II: [REDACTED] III: [REDACTED] IV: [REDACTED]

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	8
BROWN	SAND		LOOSE	8	15
BROWN	CLAY	SAND	LOOSE	15	43
RED	CLAY		LOOSE	43	45
RED	SHALE		HARD	45	60

31 [REDACTED] 32 [REDACTED]

**41 WATER RECORD**

WATER FOUND AT - FEET	KIND OF WATER
57	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	+1	45
	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		45	60

**SCREEN**

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

MATERIAL AND TYPE: [REDACTED] DEPTH TO TOP OF SCREEN: 41-44 FEET

**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

**71 PUMPING TEST**

PUMPING TEST METHOD: 1  PUMP 2  BAILER

PUMPING RATE: 2 GPM

DURATION OF PUMPING: 1 15-16 HOURS 30 17-18 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING			
19-21 FEET	22-24 FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
18	57	57	57	57	57

IF FLOWING, GIVE RATE: [REDACTED] GPM

PUMP INTAKE SET AT: [REDACTED] FEET

WATER AT END OF TEST: 1  CLEAR 2  CLOUDY

RECOMMENDED PUMP TYPE:  SHALLOW  DEEP

RECOMMENDED PUMP SETTING: [REDACTED] FEET

RECOMMENDED PUMPING RATE: [REDACTED] GPM

**LOCATION OF WELL**

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

76418

DRILLERS REMARKS:

**FINAL STATUS OF WELL**

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

**WATER USE**

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

**METHOD OF CONSTRUCTION**

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

**CONTRACTOR**

NAME OF WELL CONTRACTOR: OCONNOR WELL DRILLING LTD. WELL CONTRACTOR'S LICENCE NUMBER: 4005

ADDRESS: RR # 1 MILLGROVE, ONT. L0R 1V0

NAME OF WELL TECHNICIAN: W. HOWE WELL TECHNICIAN'S LICENCE NUMBER: T-0513

SIGNATURE OF TECHNICIAN/CONTRACTOR: [Signature] SUBMISSION DATE: DAY \_\_\_\_ MO \_\_\_\_ YR \_\_\_\_

**OFFICE USE ONLY**

DATA SOURCE: 58 CONTRACTOR: 4005 59-61 DATE RECEIVED: NOV 08 1990 63-68

DATE OF INSPECTION: [REDACTED] INSPECTOR: [REDACTED]

REMARKS:



# WATER WELL RECORD

30m/57

Water management in Ontario 1. PRINT ONLY IN SPACES PROVIDED  
 2. CHECK  CORRECT BOX WHERE APPLICABLE

11 2803806 28602 DS N C 02  
 COUNTY OR DISTRICT: Halton TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Burlington CON., BLOCK, TRACT, SURVEY, ETC.: R N.D.S. LOT: 001  
 OWNER (SURNAME FIRST): [REDACTED] ADDRESS: Grave Park, Burlington DATE COMPLETED: 24 Jan 72  
 RC: 09380 ELEVATION: 0555 BASIN CODE: 24

### LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Clay			0	10
Grey	Clay			10	50
Red	Shale			50	62

31 000000 000000 000000  
 32 10 14 15 21 32 43 54 65 75 80

**41 WATER RECORD**

WATER FOUND AT - FEET	KIND OF WATER			
10-13	<input checked="" type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> SULPHUR	<input type="checkbox"/> MINERAL
15-18	<input type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> SULPHUR	<input type="checkbox"/> MINERAL
20-23	<input type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> SULPHUR	<input type="checkbox"/> MINERAL
25-28	<input type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> SULPHUR	<input type="checkbox"/> MINERAL
30-33	<input type="checkbox"/> FRESH	<input type="checkbox"/> SALTY	<input type="checkbox"/> SULPHUR	<input type="checkbox"/> MINERAL

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4	STEEL	1/88	0	53
17-18	STEEL		53	62
24-25	STEEL			

**61 PLUGGING & SEALING RECORD**

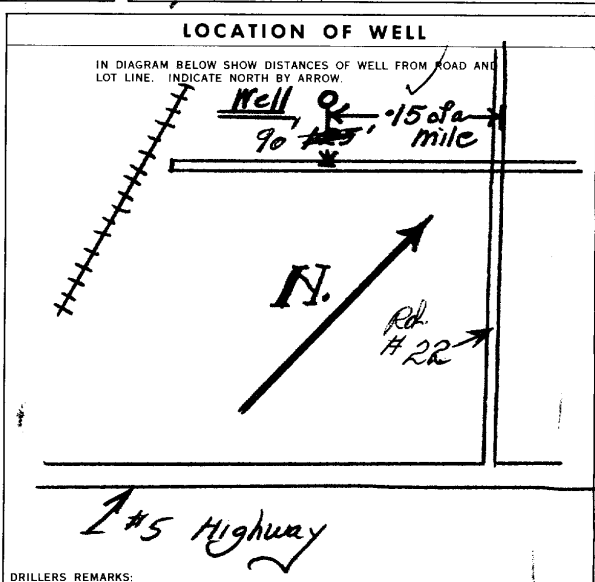
DEPTH SET AT - FEET		MATERIAL AND TYPE
FROM	TO	(CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

**71 PUMPING TEST**

PUMPING TEST METHOD:  PUMP  BAILER  
 PUMPING RATE: 0011 GPM  
 DURATION OF PUMPING: 01 HOURS 30 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING PUMPING			
025	049	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
		049	049	049	049

PUMP INTAKE SET AT: 050 FEET  
 WATER AT END OF TEST: 0005 FEET  
 RECOMMENDED PUMP TYPE:  SHALLOW  DEEP  
 RECOMMENDED PUMP SETTING: 050 FEET  
 RECOMMENDED PUMPING RATE: 0005 GPM



**FINAL STATUS OF WELL**

WATER SUPPLY  
 OBSERVATION WELL  
 TEST HOLE  
 RECHARGE WELL

**WATER USE**

DOMESTIC  
 STOCK  
 IRRIGATION  
 INDUSTRIAL  
 OTHER

**METHOD OF DRILLING**

CABLE TOOL  
 ROTARY (CONVENTIONAL)  
 ROTARY (REVERSE)  
 ROTARY (AIR)  
 AIR PERCUSSION

**CONTRACTOR**

NAME OF WELL CONTRACTOR: G.J. Wallis LICENCE NUMBER: 5417  
 ADDRESS: RR #2 Stoney Creek  
 NAME OF DRIVER OR BORER: Same LICENCE NUMBER:  
 SIGNATURE OF CONTRACTOR: George J. Wallis SUBMISSION DATE: DAY 18 MO 4 YR 72

**OFFICE USE ONLY**

DATA SOURCE: 1 CONTRACTOR: 5417 DATE RECEIVED: 240472  
 DATE OF INSPECTION: INSPECTOR: P  
 REMARKS: CSS.S8 WI





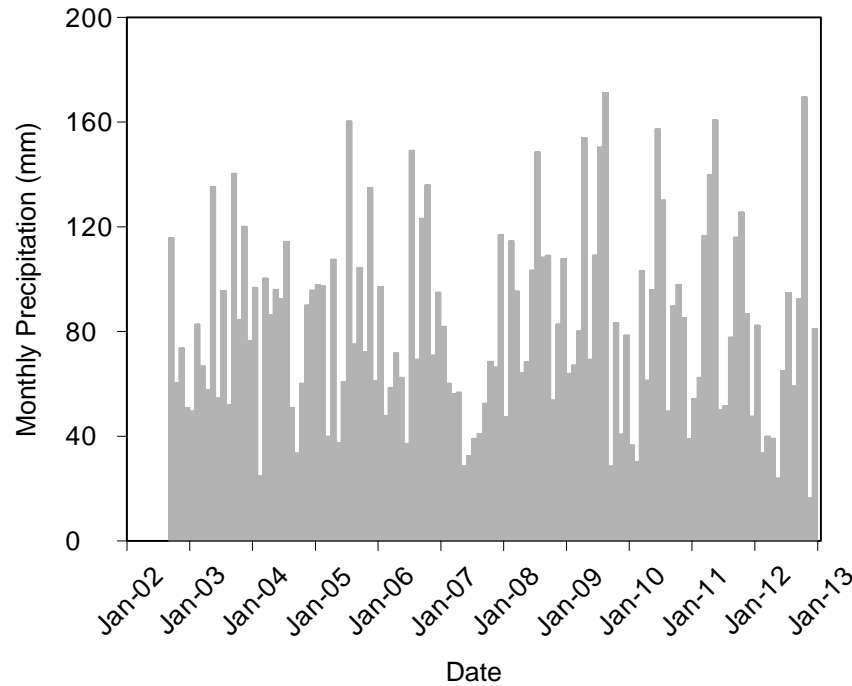
# **APPENDIX C**

## **Groundwater Level Hydrographs**

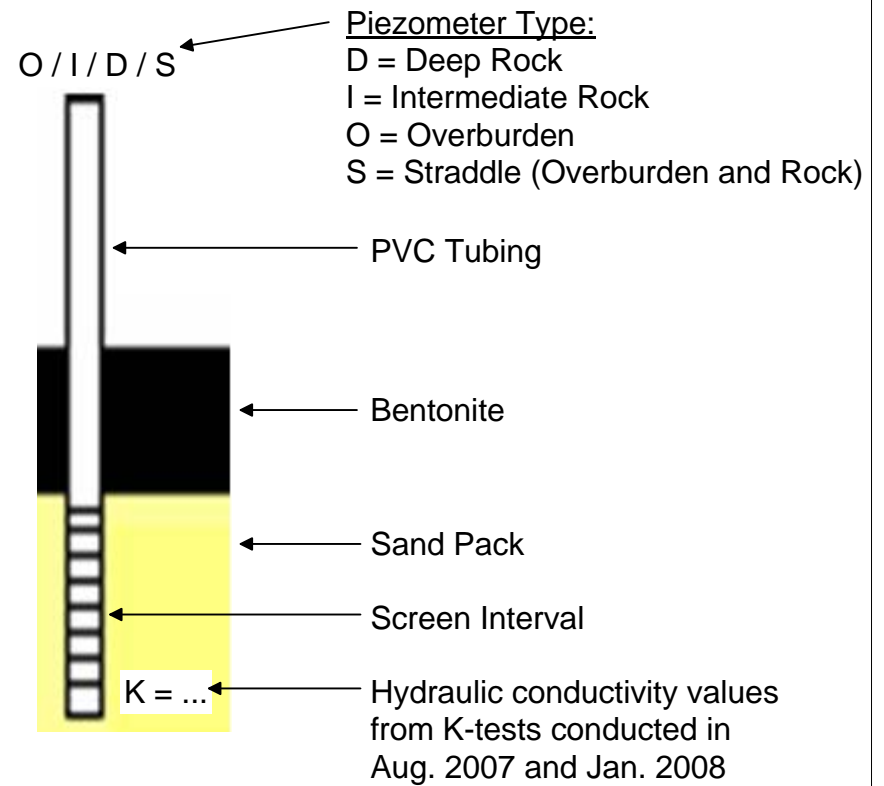
### Appendix C Hydrograph Details Tansley Quarry - Hanson Brick Ltd.

#### Rainfall Data

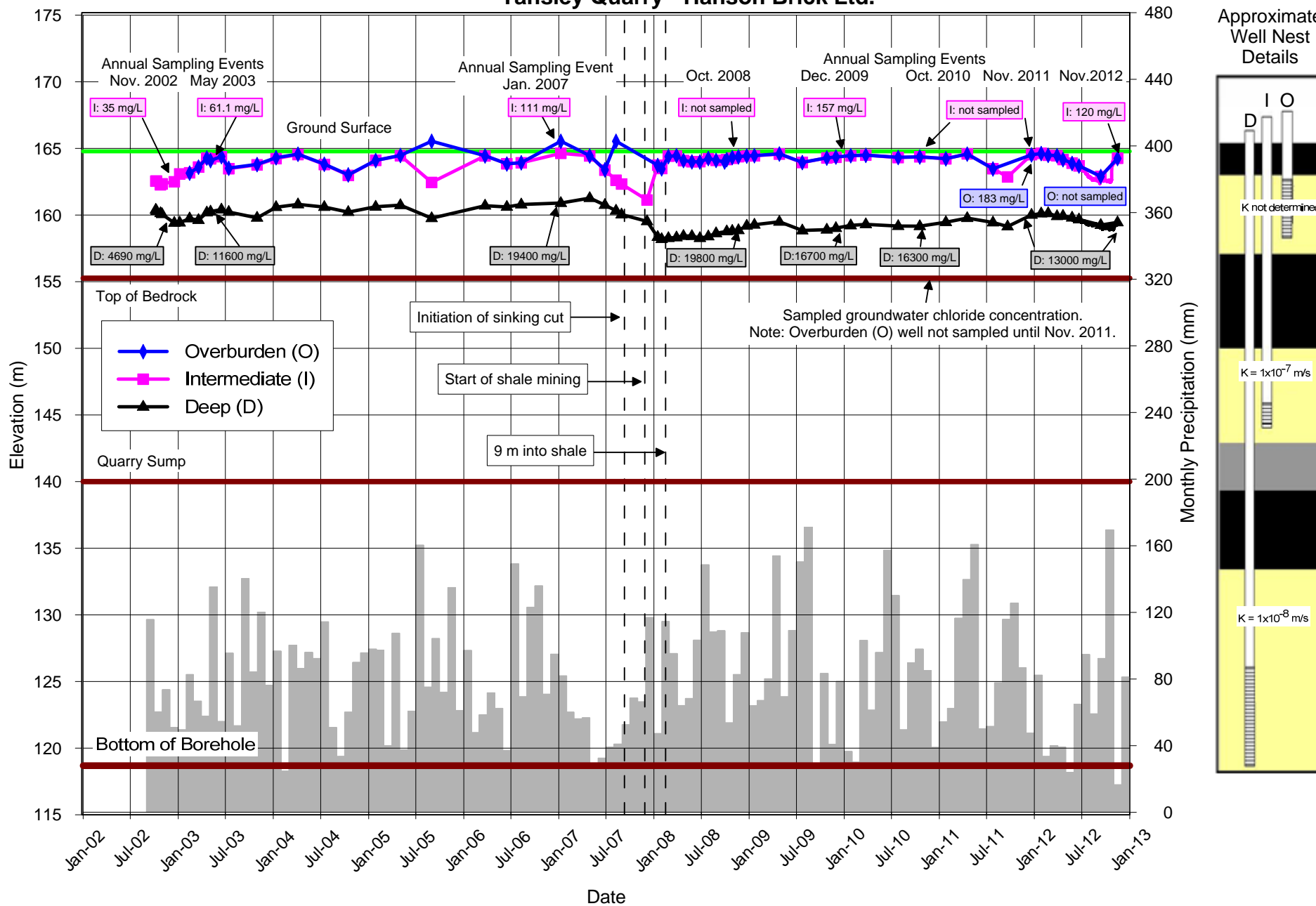
Rainfall data from September 2002 to April 2006 obtained from the Millgrove Station (now discontinued). Data from May 2006 to December 2012 is from Hamilton Airport (now discontinued).



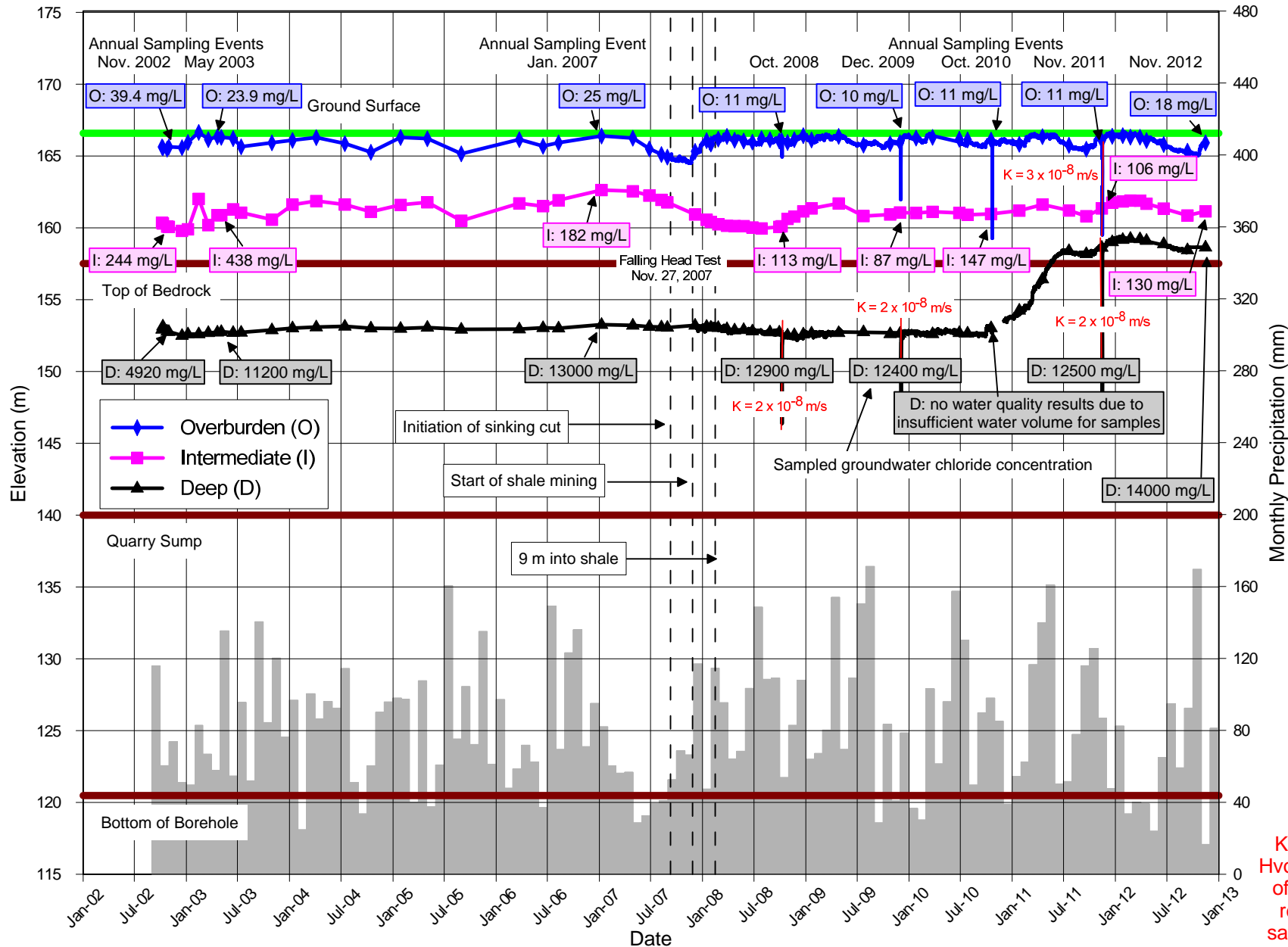
#### Well Completion Legend



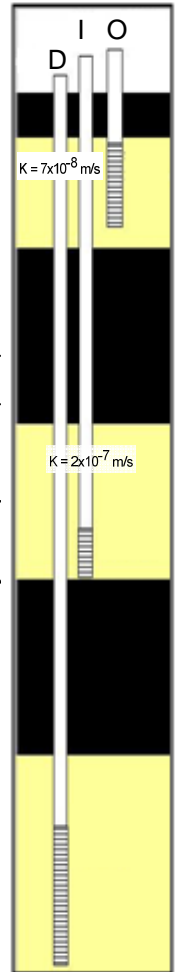
**Figure C.1: Monitoring Well MW-01 Hydrograph  
Tansley Quarry - Hanson Brick Ltd.**



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

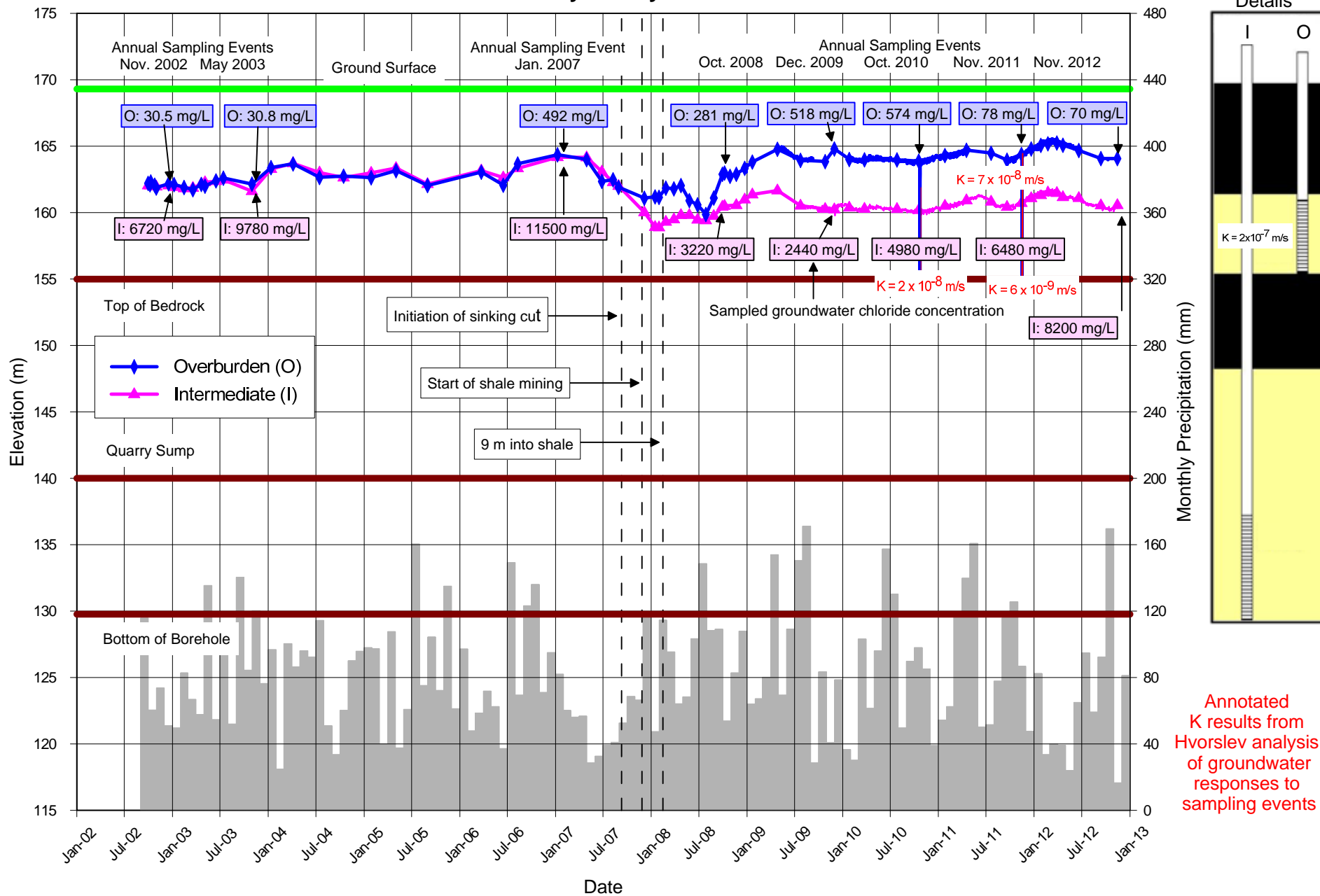


Approximate Well Nest Details



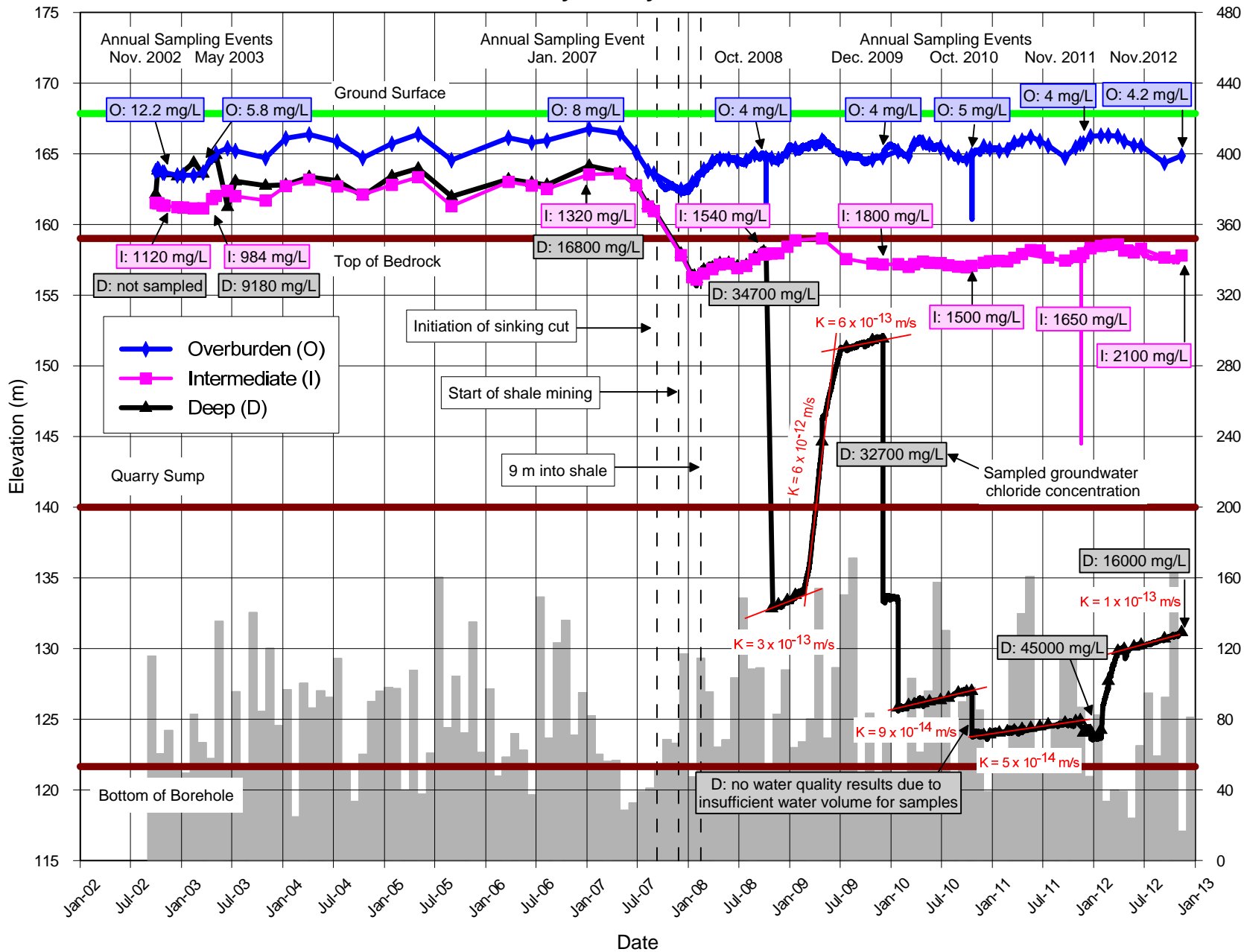
Annotated K results from Hvorslev analysis of groundwater responses to sampling events

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

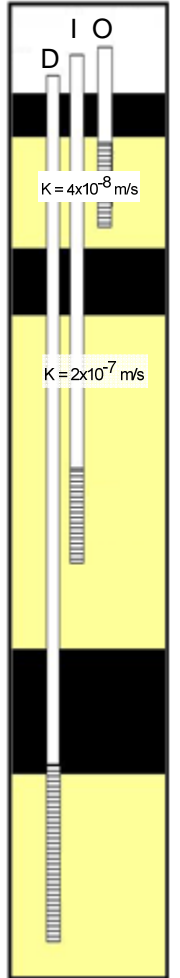


Annotated K results from Hvorslev analysis of groundwater responses to sampling events

### C.4: Monitoring Well MW-04 Hydrograph Tansley Quarry - Hanson Brick Ltd.

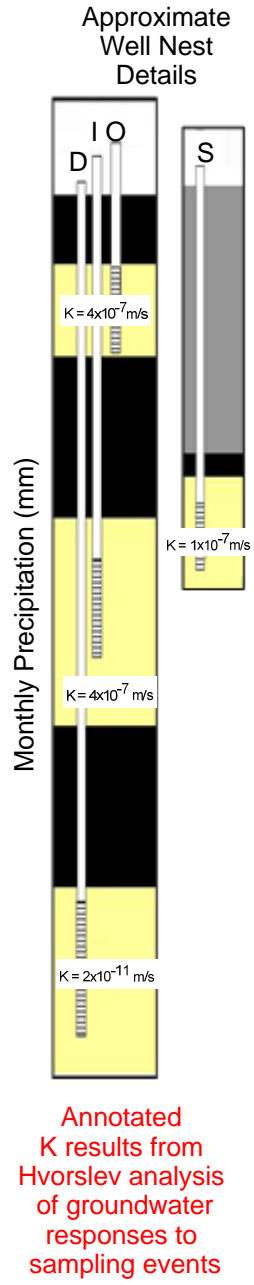
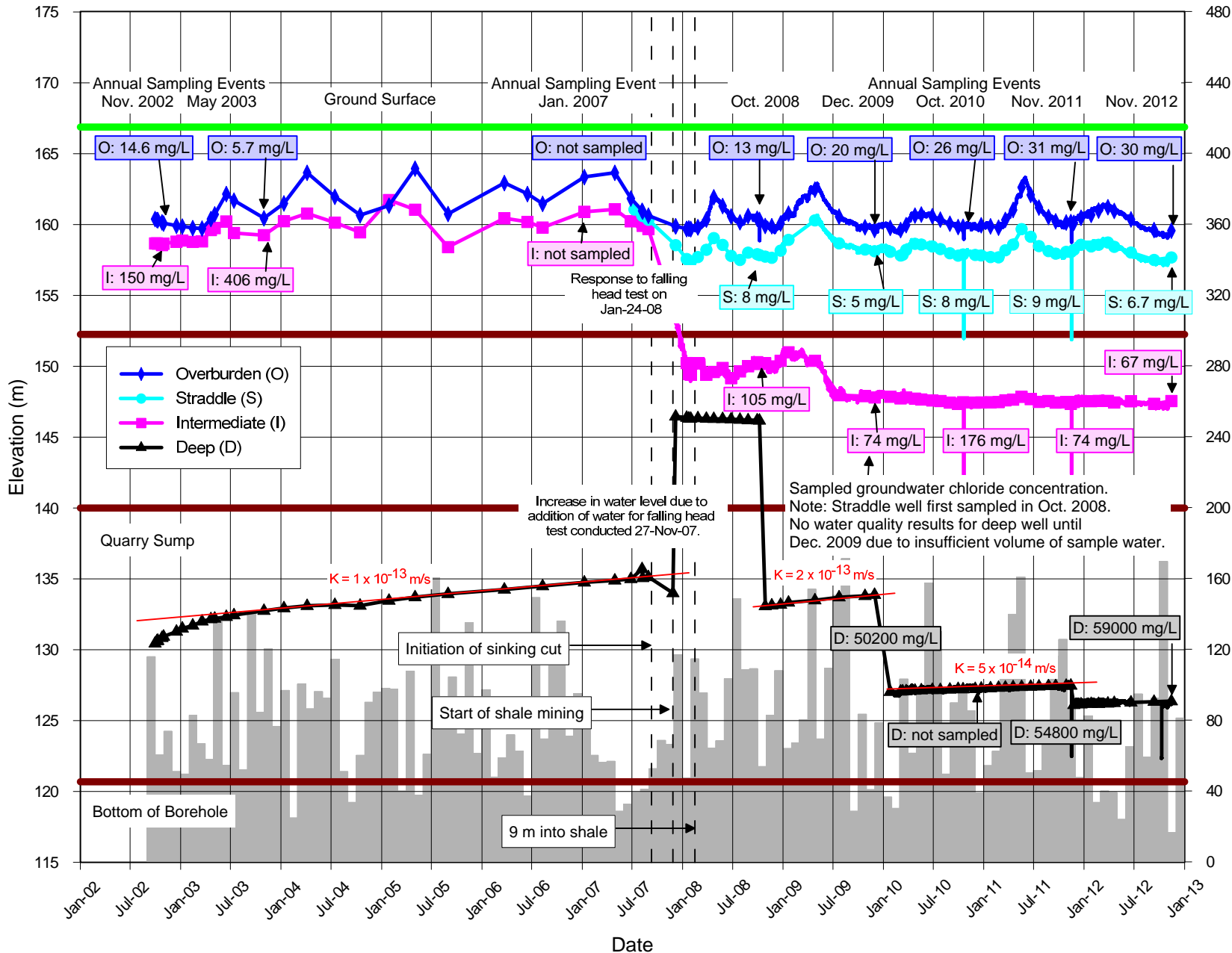


#### Approximate Well Nest Details

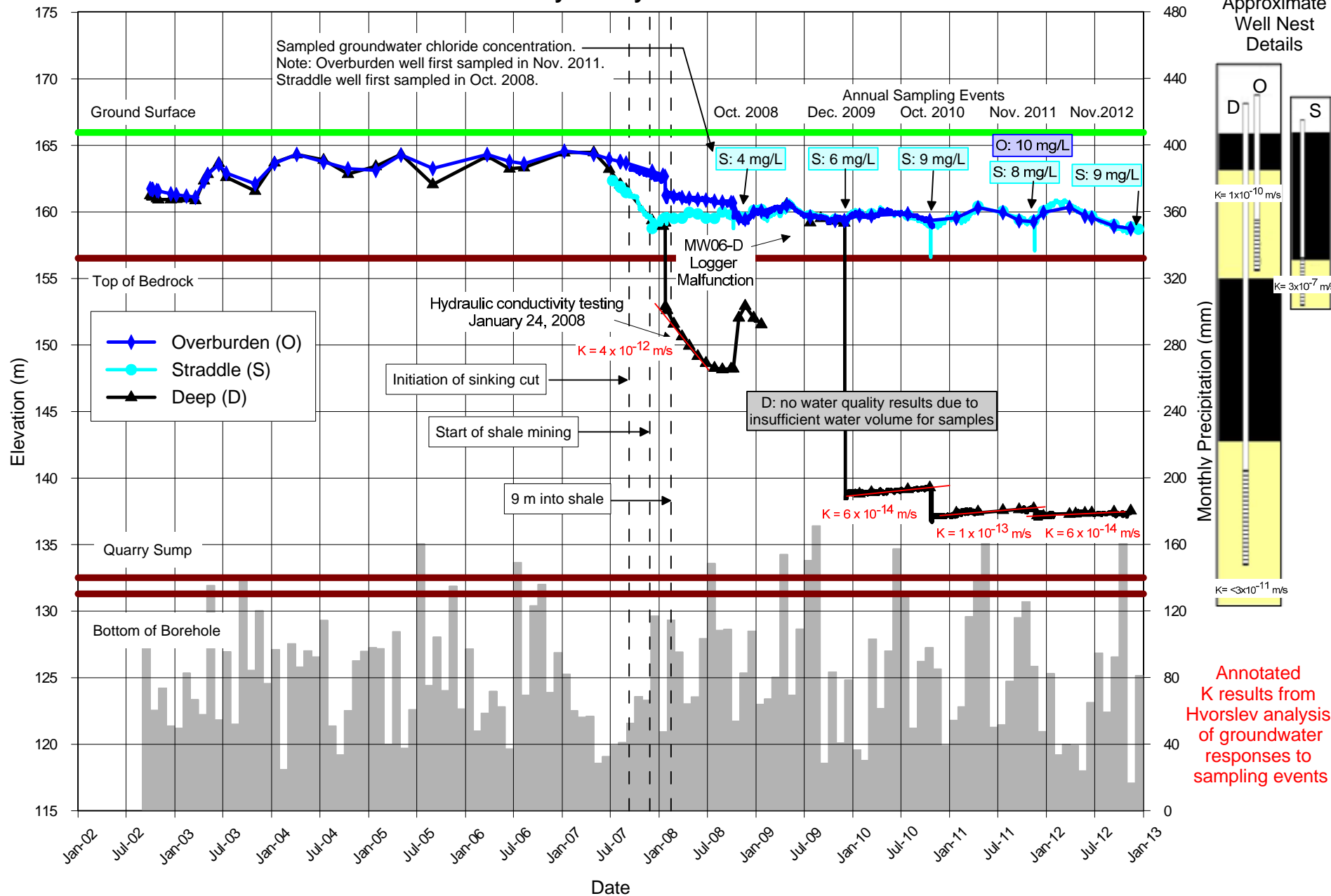


Annotated K results from Hvorslev analysis of groundwater responses to sampling events

### C.5: Monitoring Well MW-05 Hydrograph Tansley Quarry - Hanson Brick Ltd.

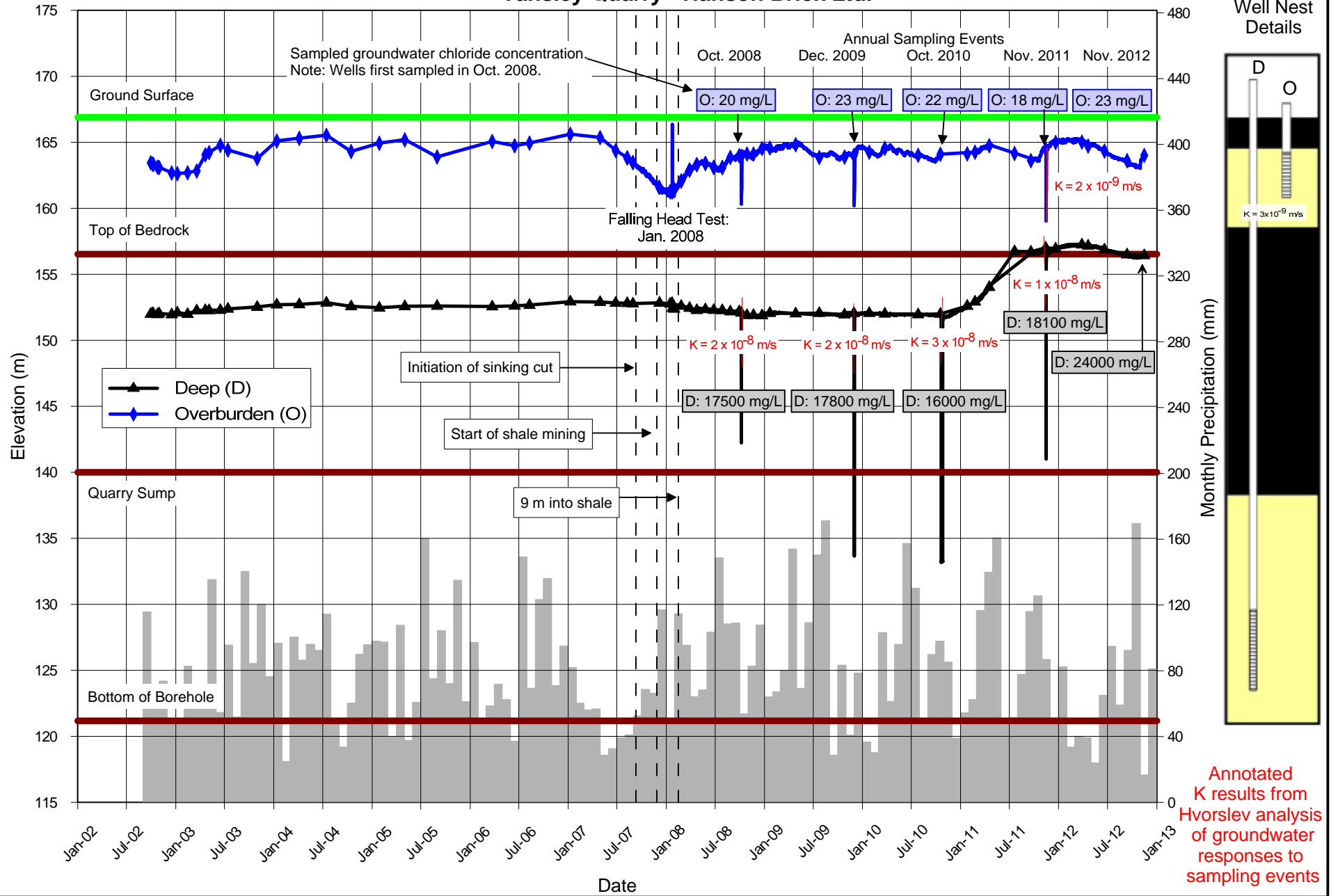


### C.6: Monitoring Well MW-06 Hydrograph Tansley Quarry - Hanson Brick Ltd.



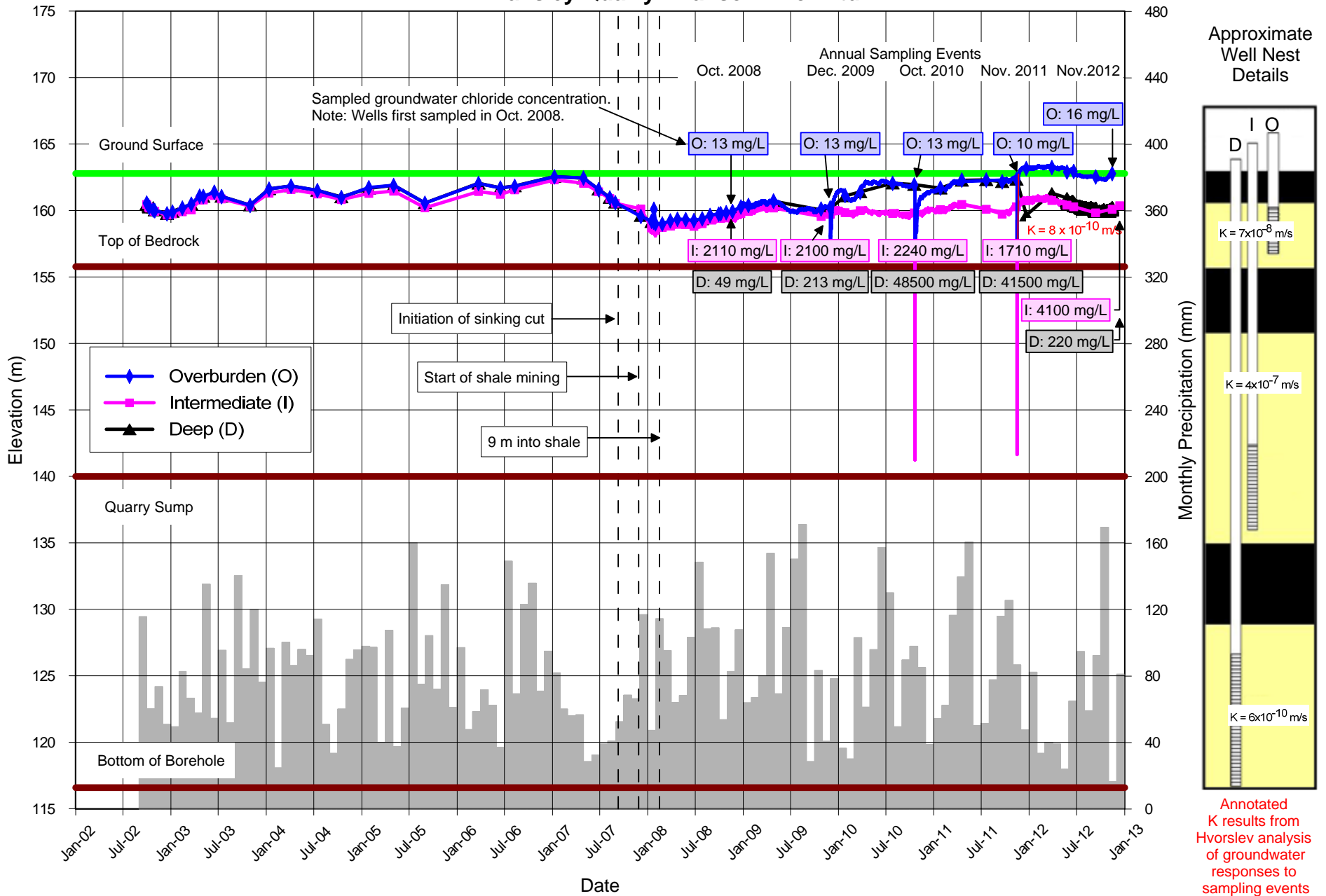


**Figure C.7: Monitoring Well MW-07 Hydrograph  
Tansley Quarry - Hanson Brick Ltd.**

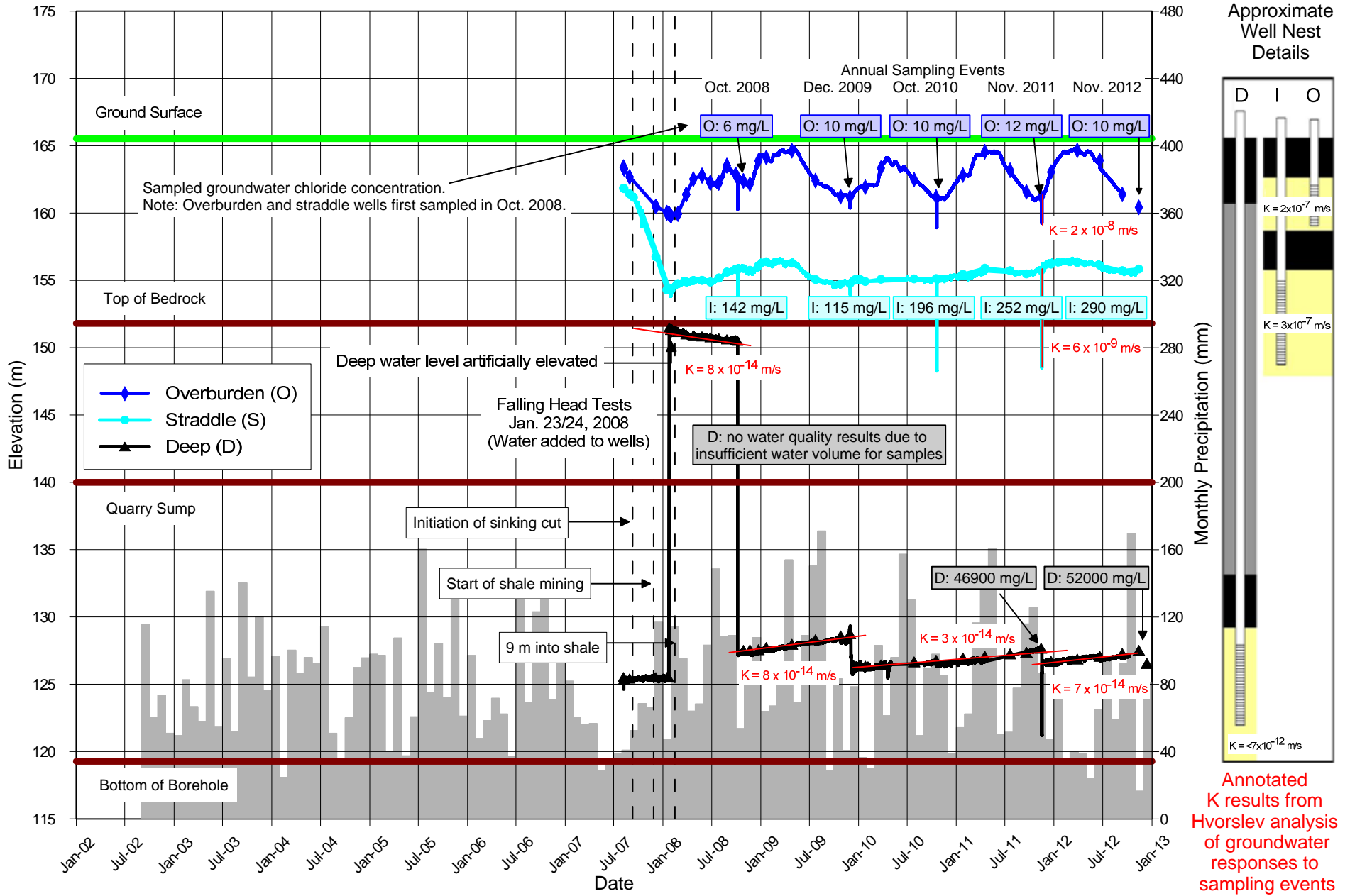


Annotated K results from Hvorslev analysis of groundwater responses to sampling events

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

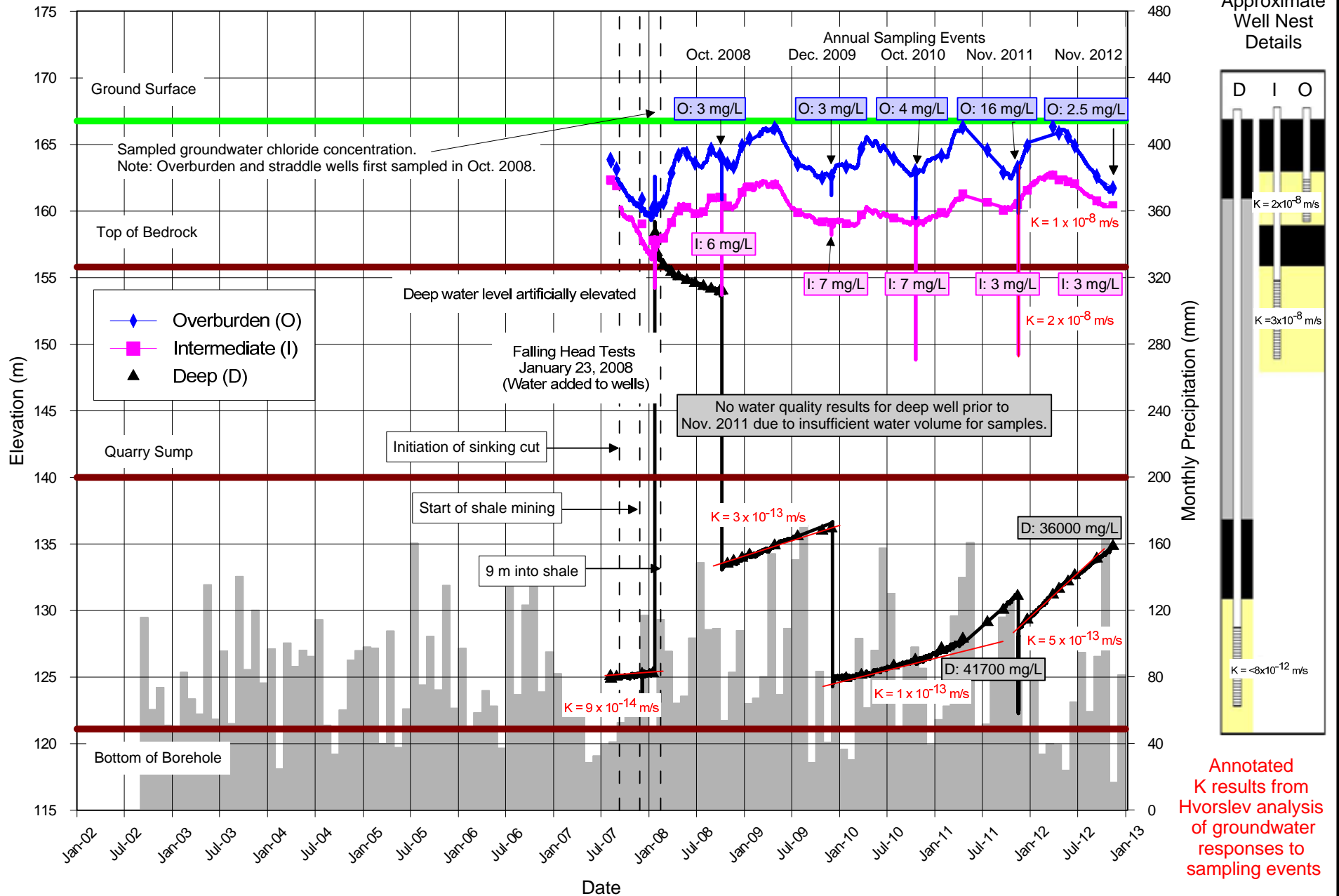


**Figure C.9: Monitoring Well MW-09 Hydrograph  
Tansley Quarry - Hanson Brick Ltd.**

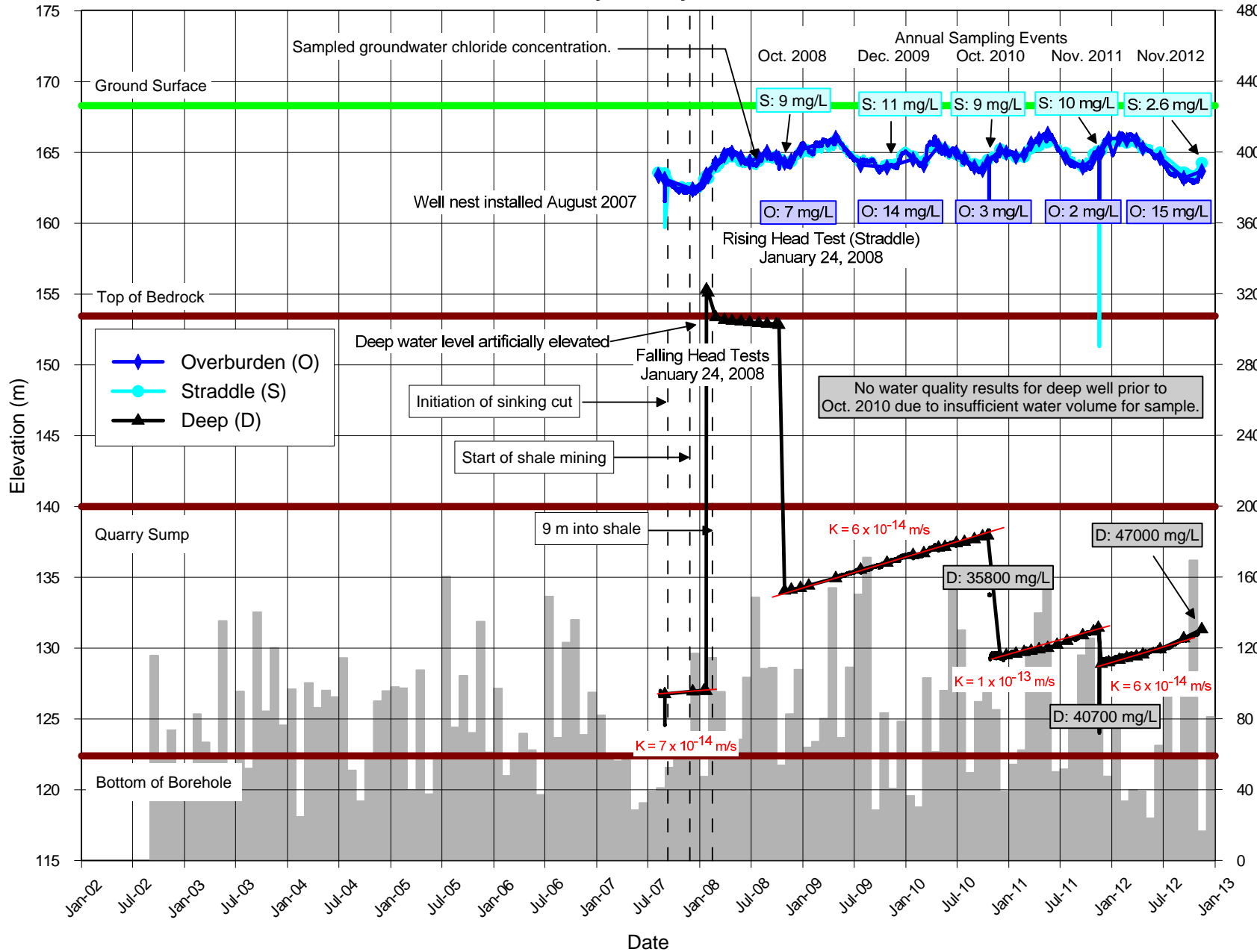


Annotated K results from Hvorslev analysis of groundwater responses to sampling events

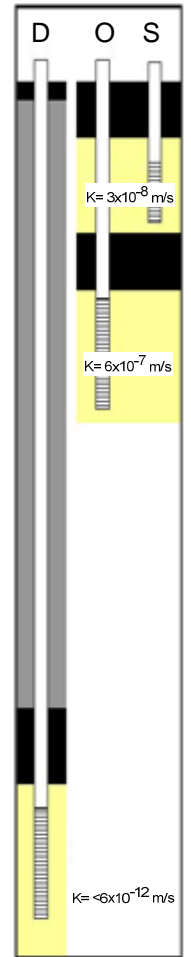
**Figure C.10: Monitoring Well MW-10 Hydrograph  
Tansley Quarry - Hanson Brick Ltd.**



### C.11: Monitoring Well MW-11 Hydrograph Tansley Quarry - Hanson Brick Ltd.

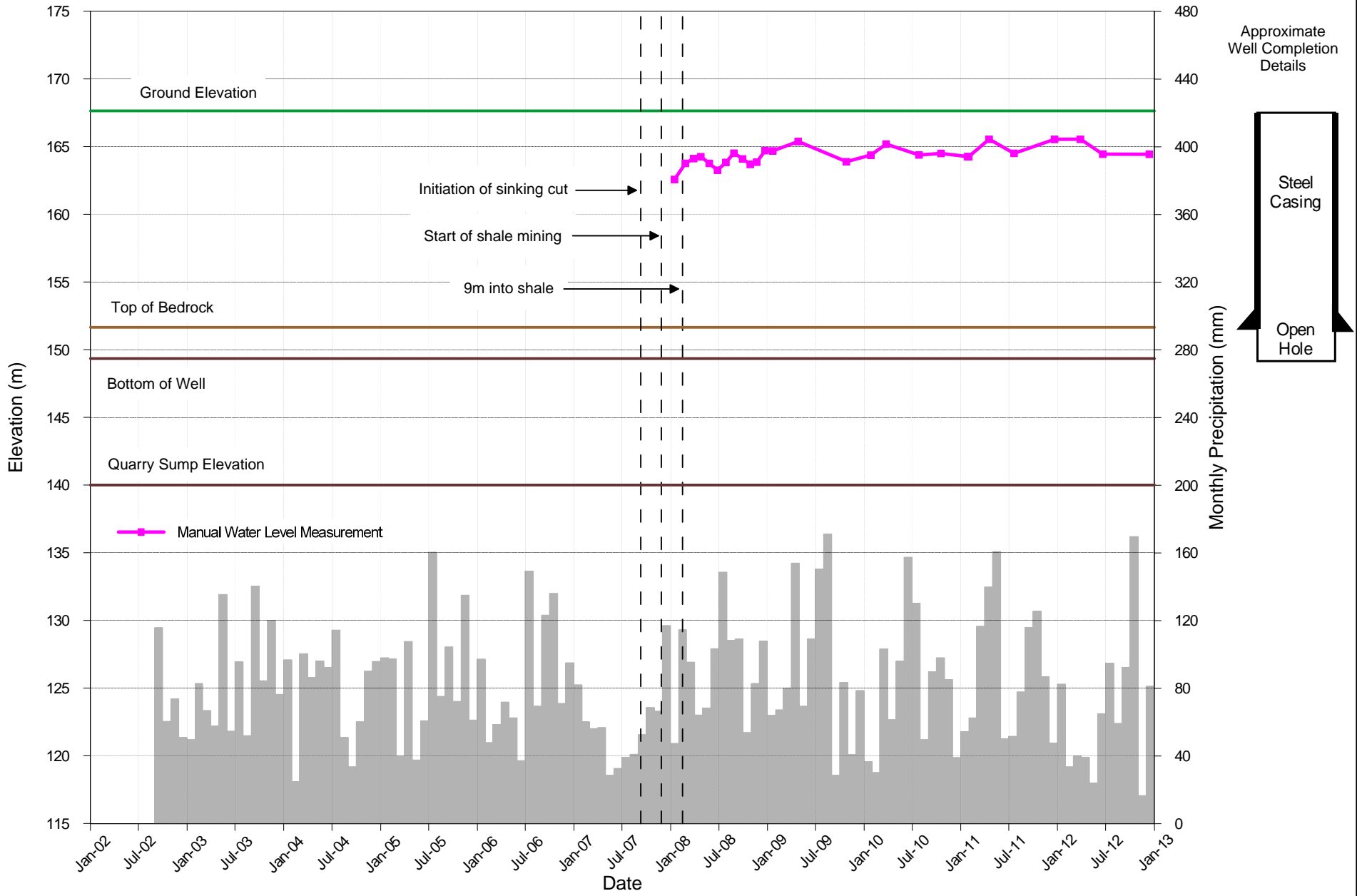


#### Approximate Well Nest Details

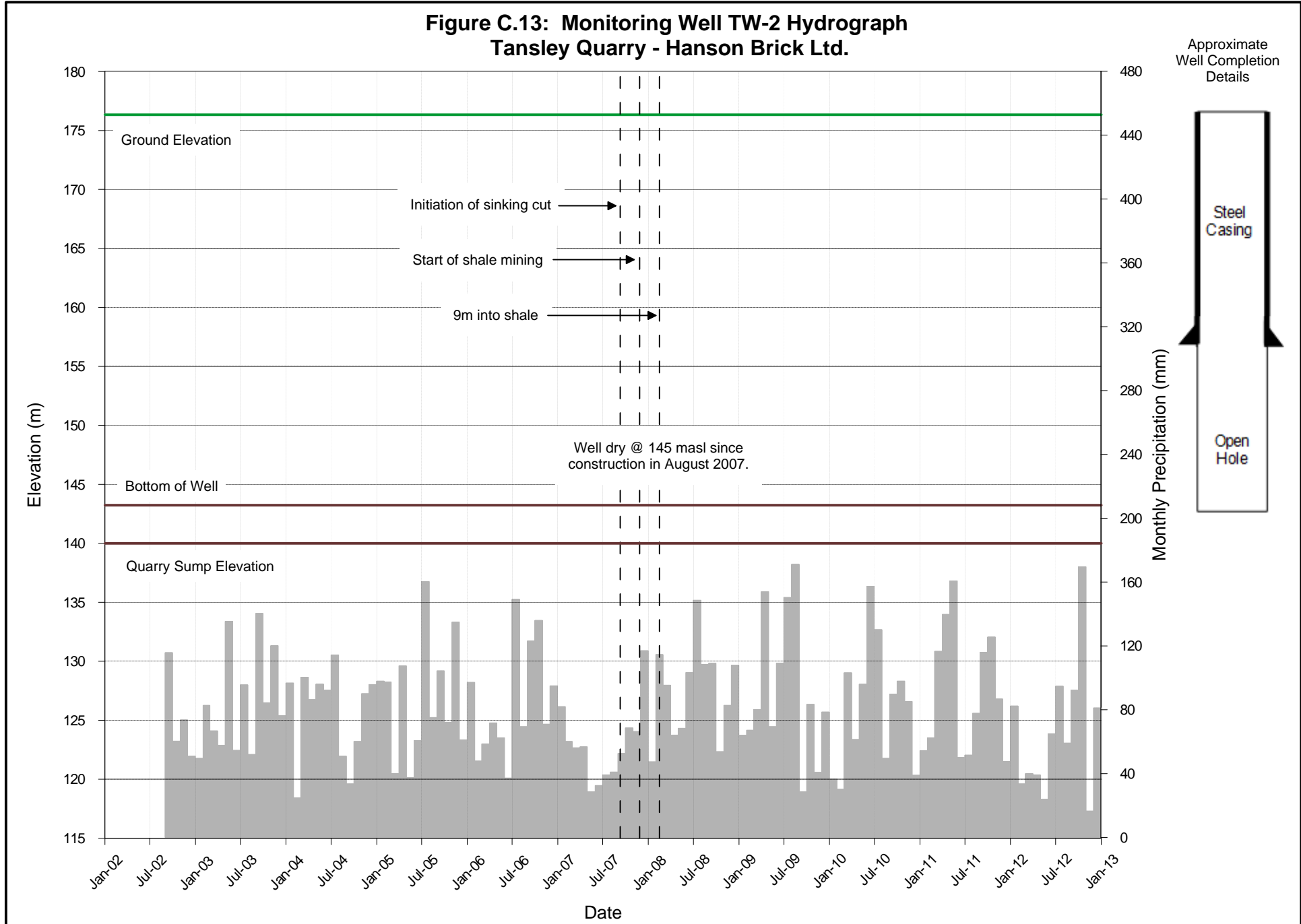


Annotated K results from Hvorslev analysis of groundwater responses to sampling events

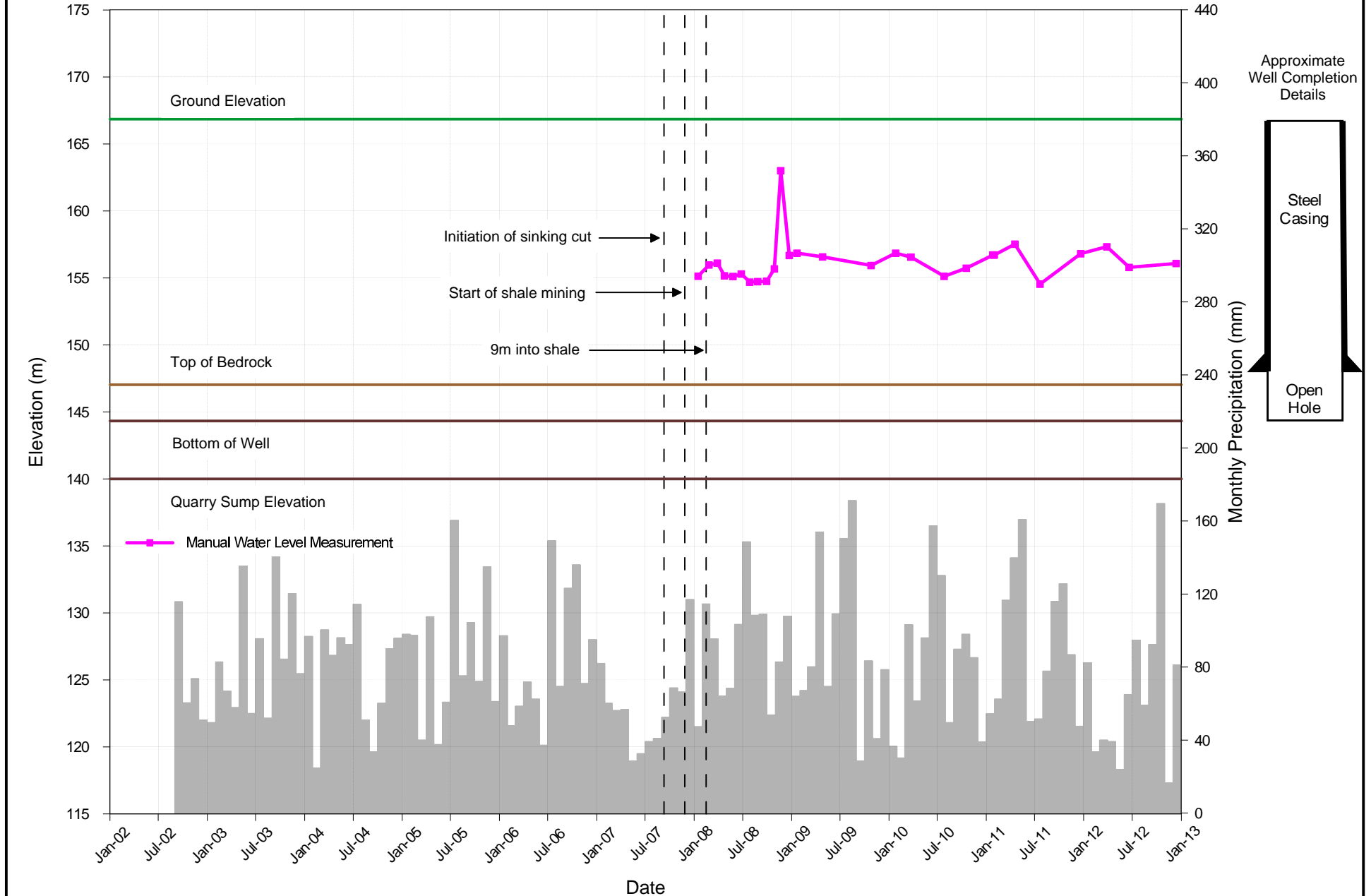
### Figure C.12: Monitoring Well TW-1 Hydrograph Tansley Quarry - Hanson Brick Ltd.



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

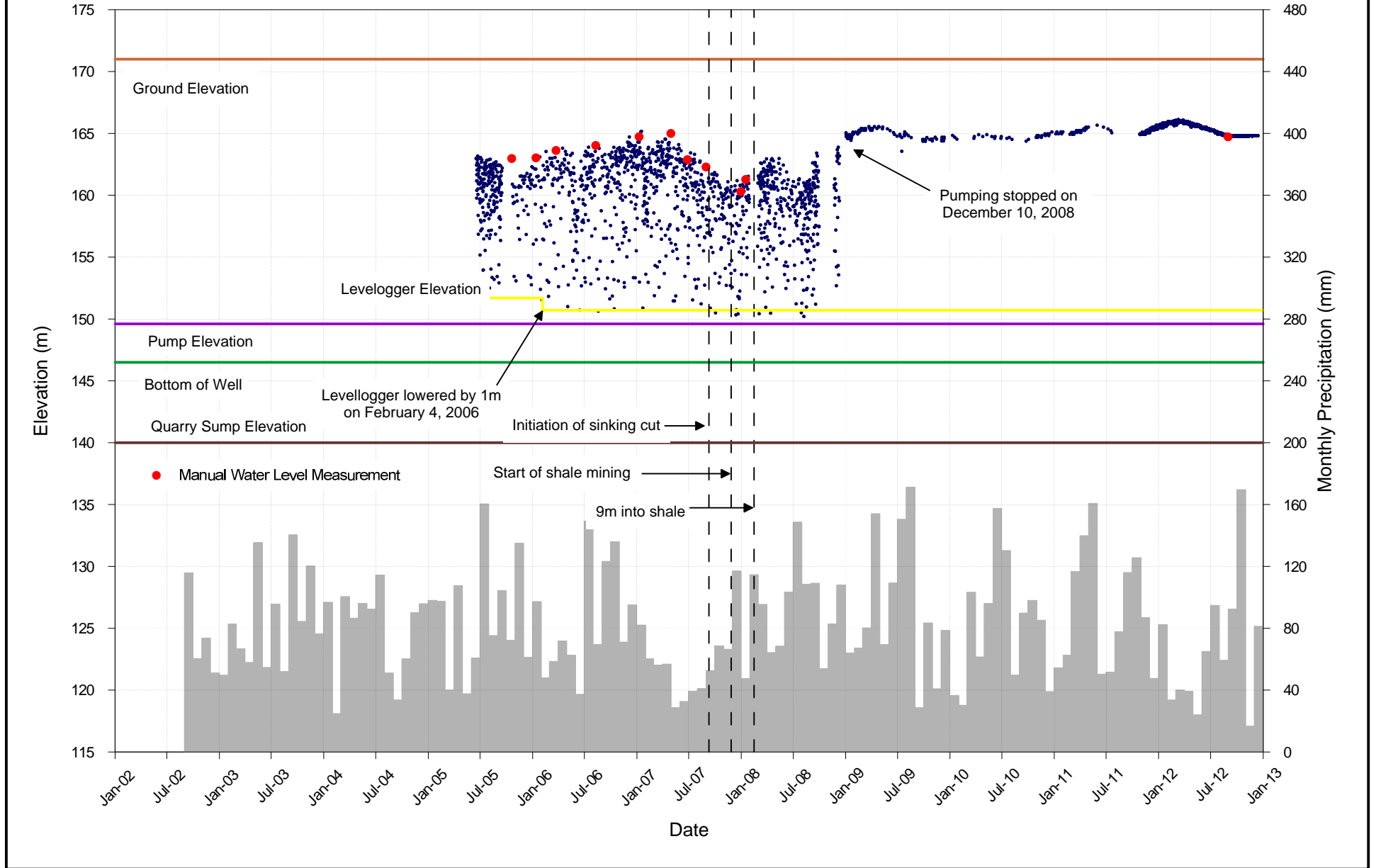


### Figure C.14: Monitoring Well TW-3 Hydrograph Tansley Quarry - Hanson Brick Ltd.

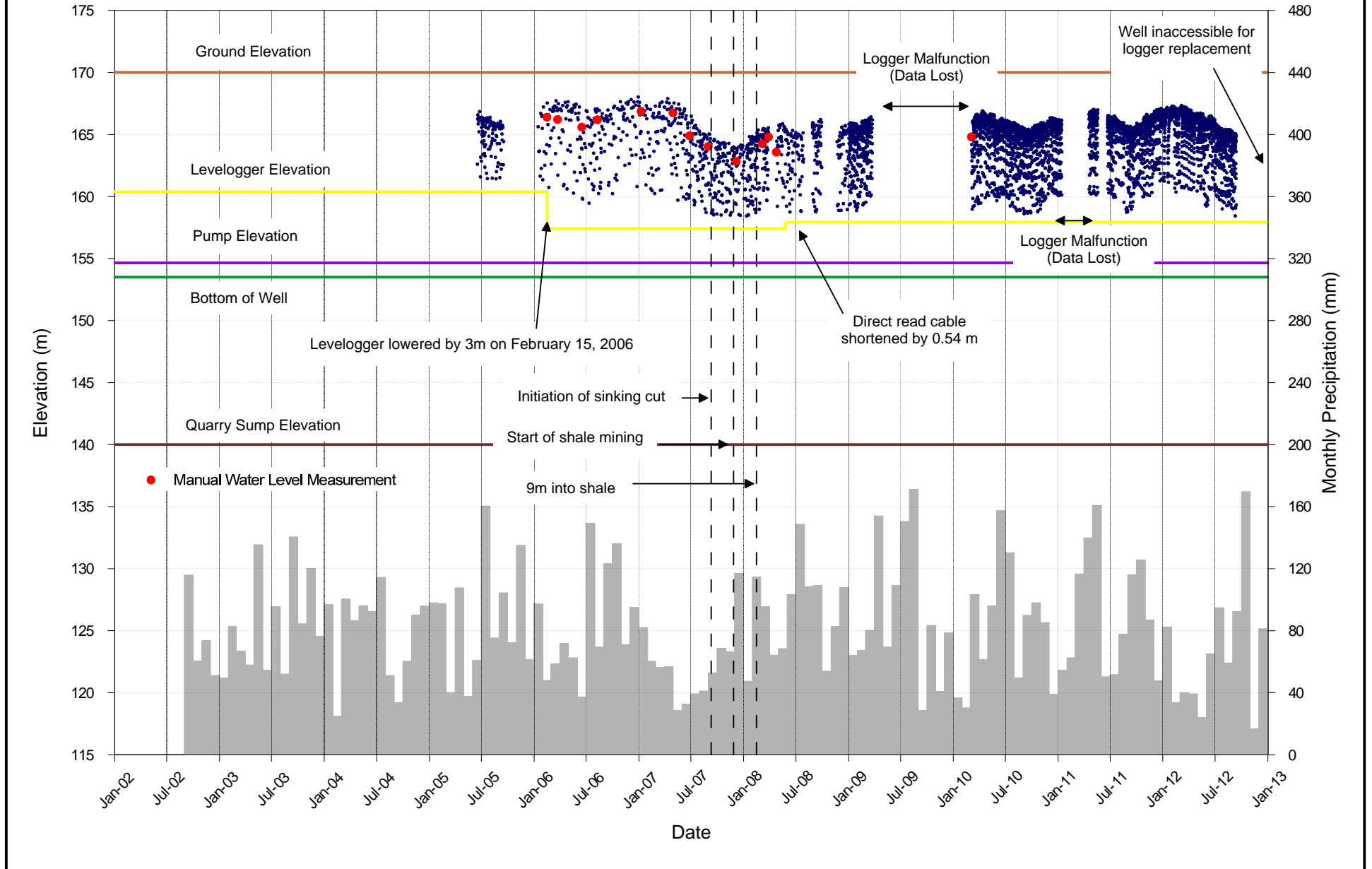




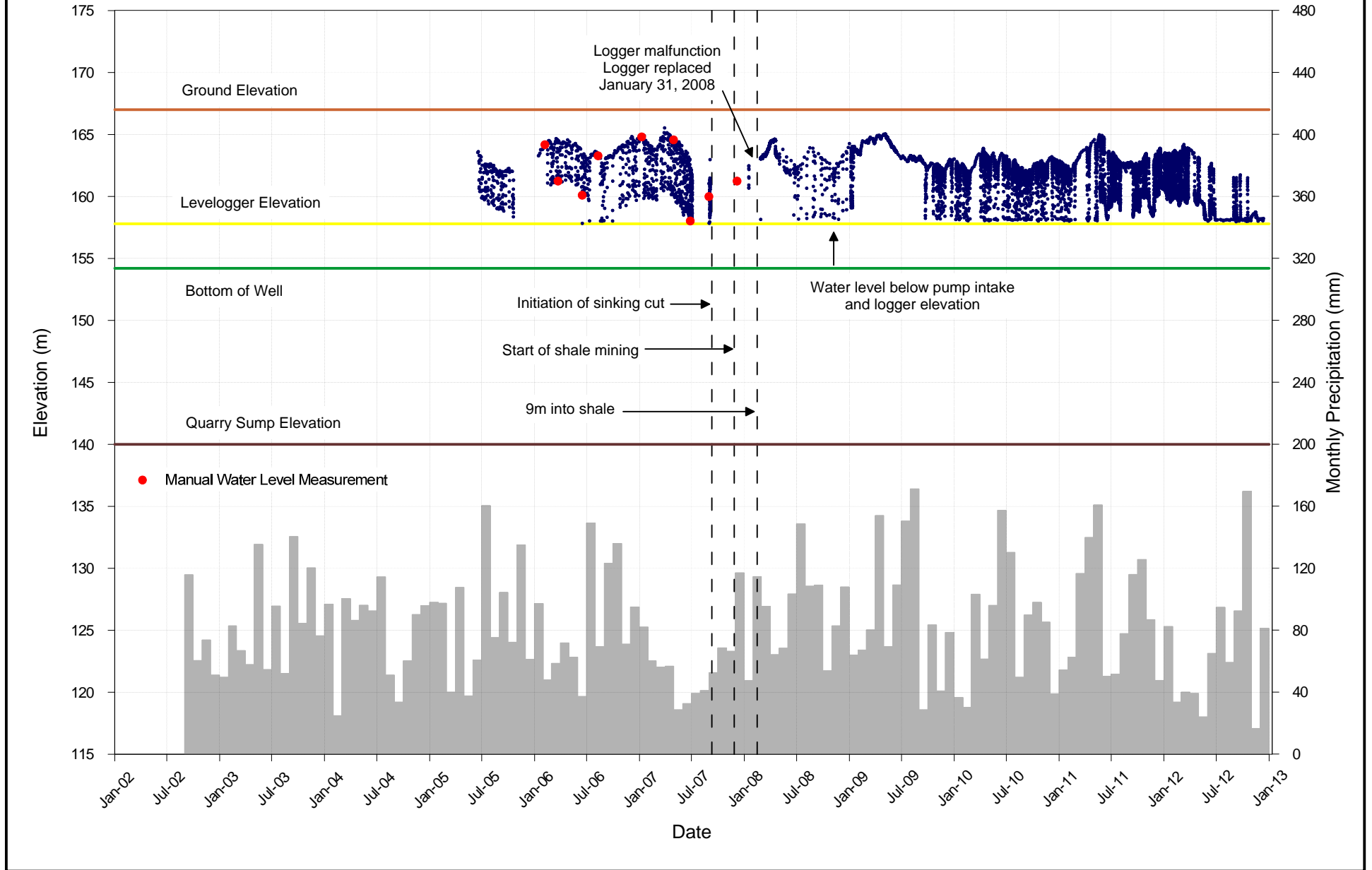
### Figure C.15: Featherstone Well Tansley Quarry - Hanson Brick Ltd.



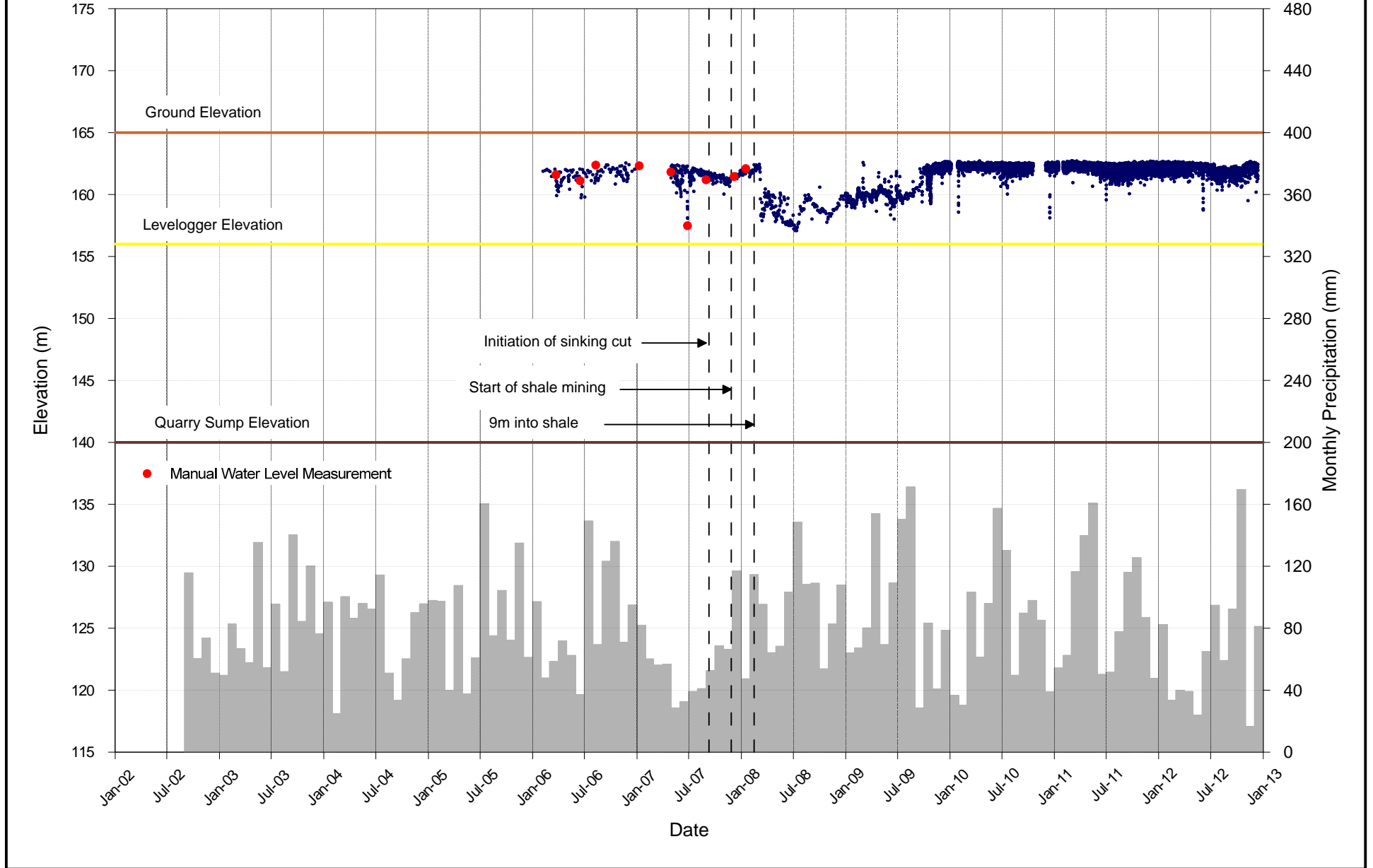
### Figure C.16: Finucci Well Tansley Quarry - Hanson Brick Ltd.



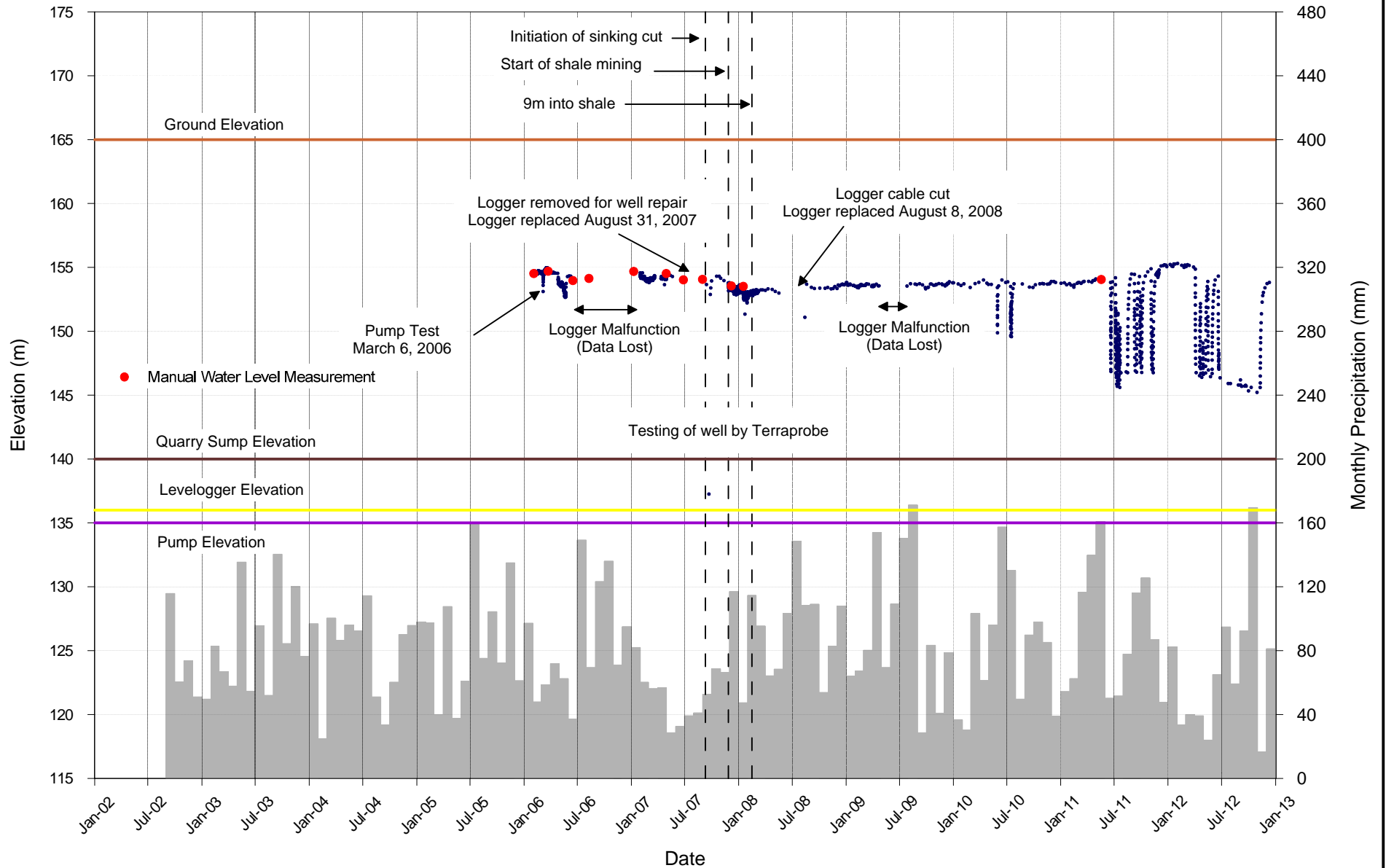
### Figure C.17: Hendervale Main Barn Well Tansley Quarry - Hanson Brick Ltd.



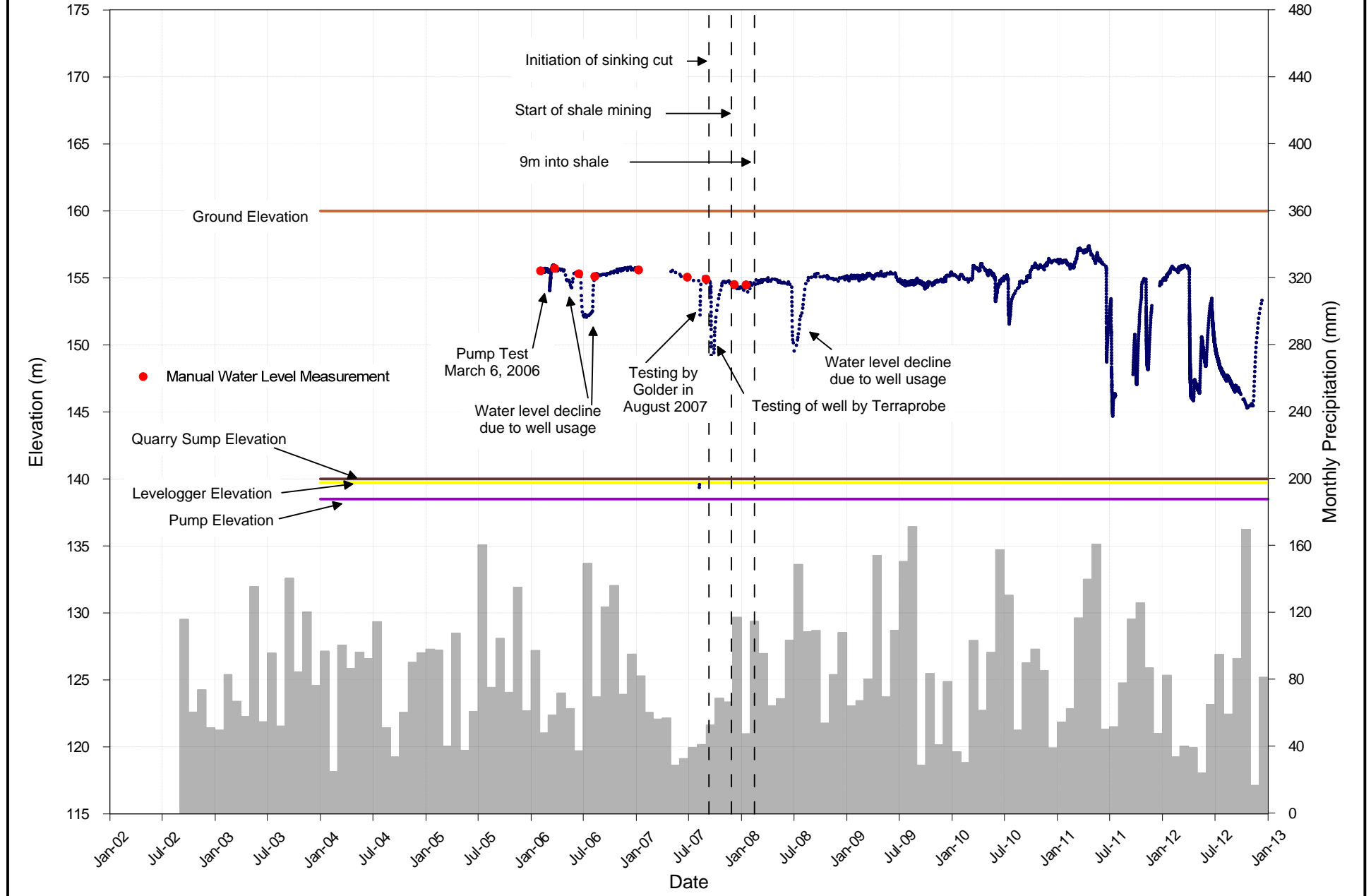
**Figure C.18: Hendervale Cottage Well  
Tansley Quarry - Hanson Brick Ltd.**



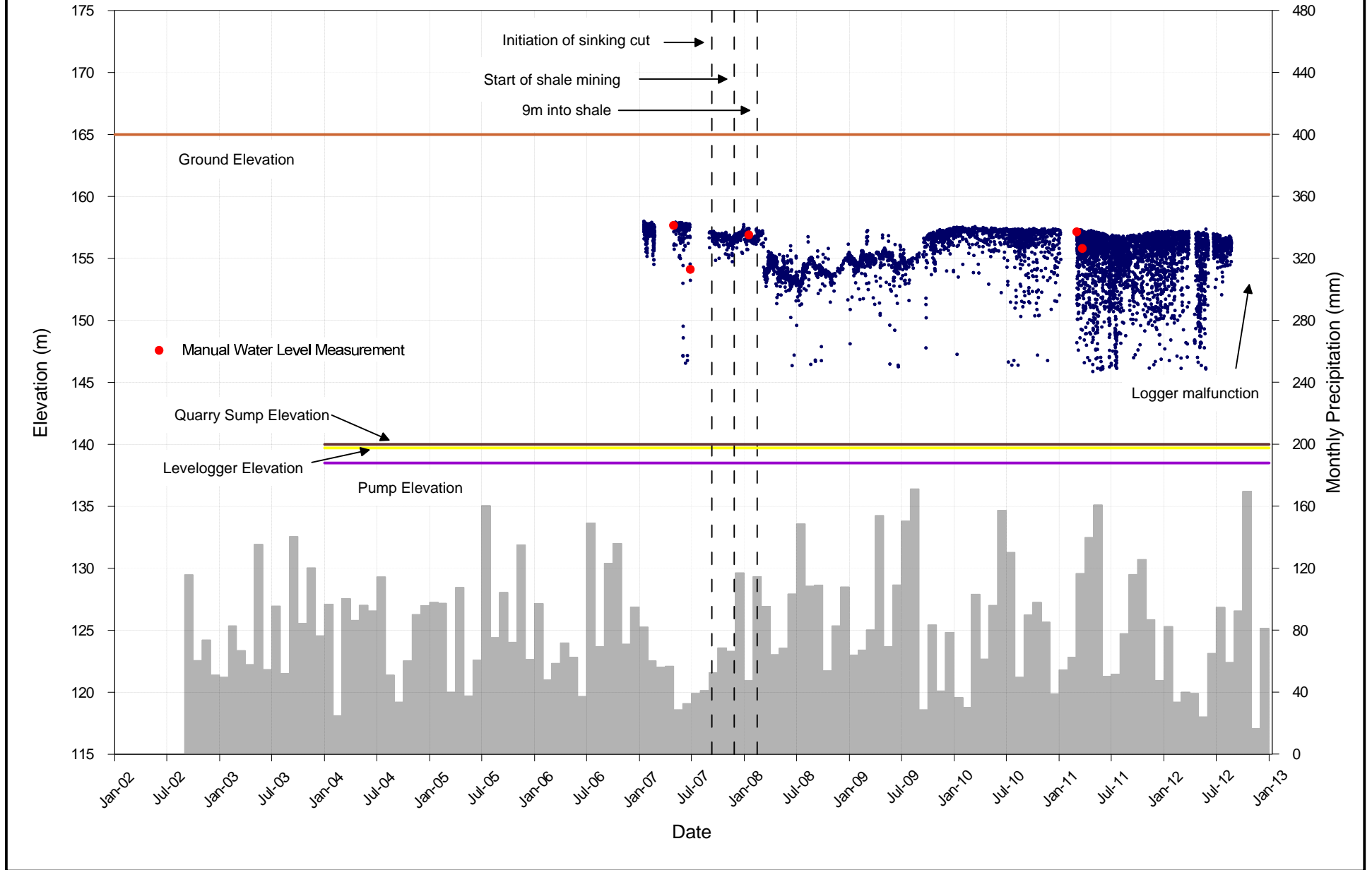
**Figure C.19: Hendervale ABC Barn Well  
Tansley Quarry - Hanson Brick Ltd.**



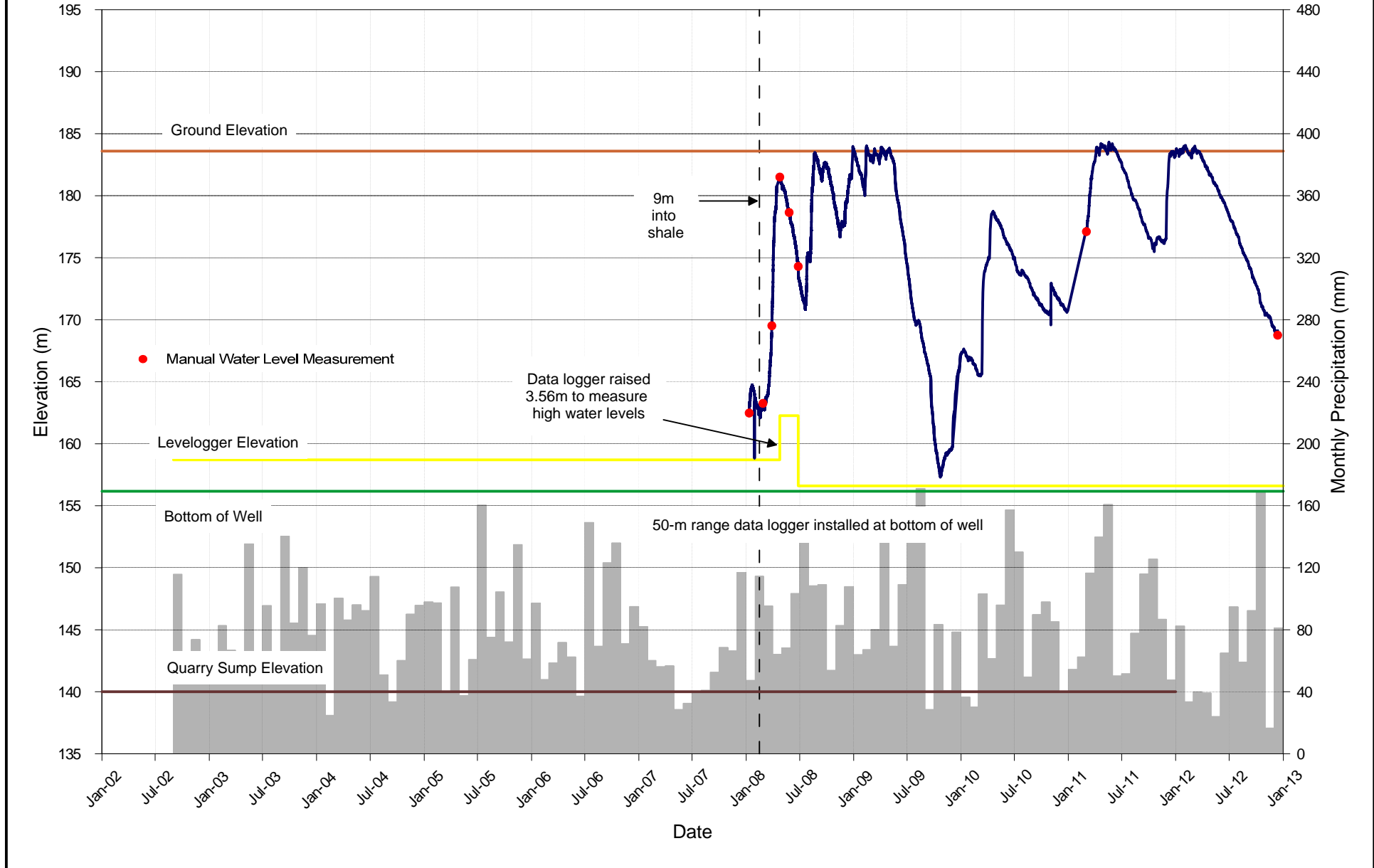
**Figure C.20: Hendervale XYZ Barn Well  
Tansley Quarry - Hanson Brick Ltd.**



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

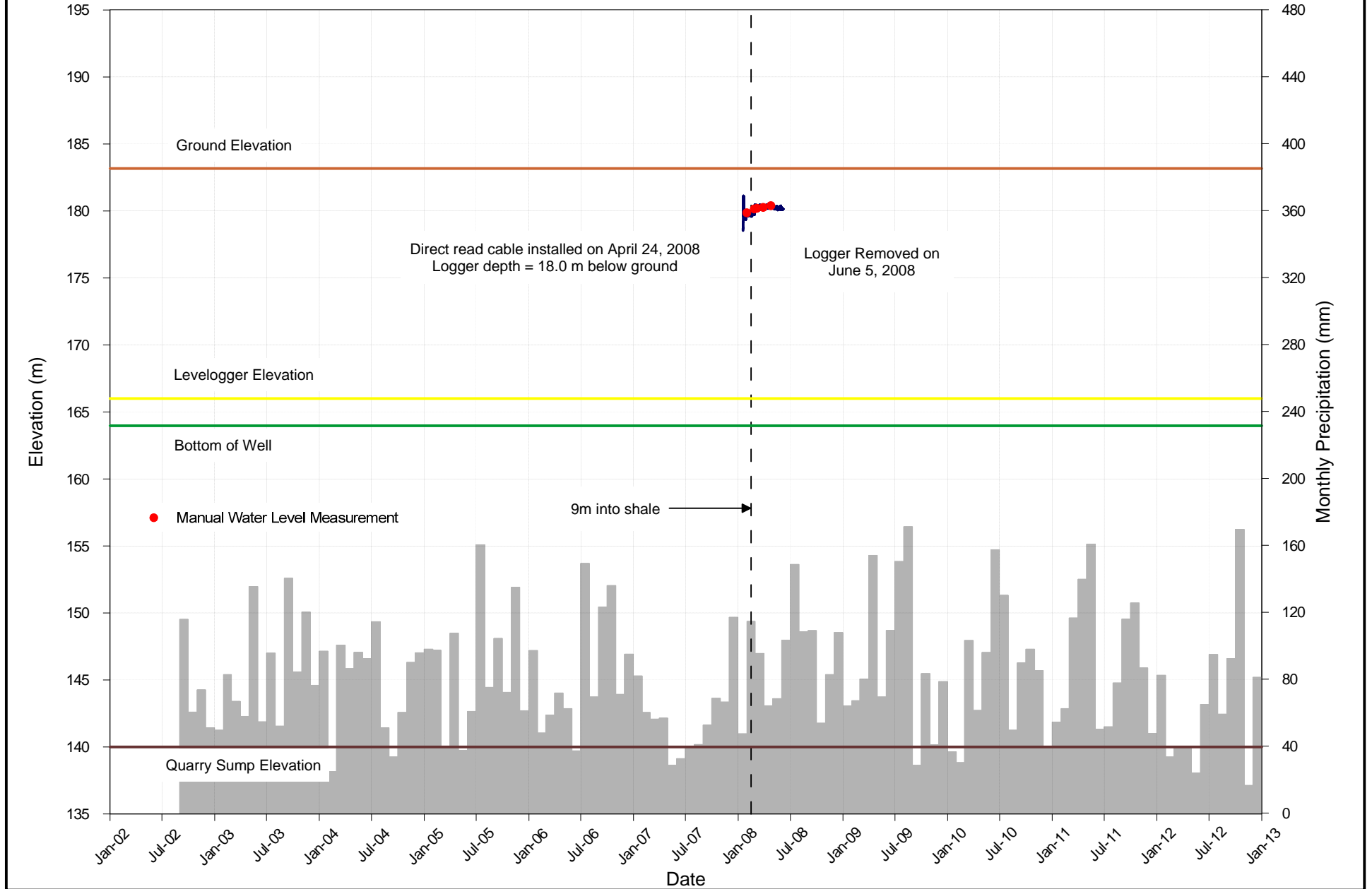


**Figure C.22: Simms Well  
Tansley Quarry - Hanson Brick Ltd.**

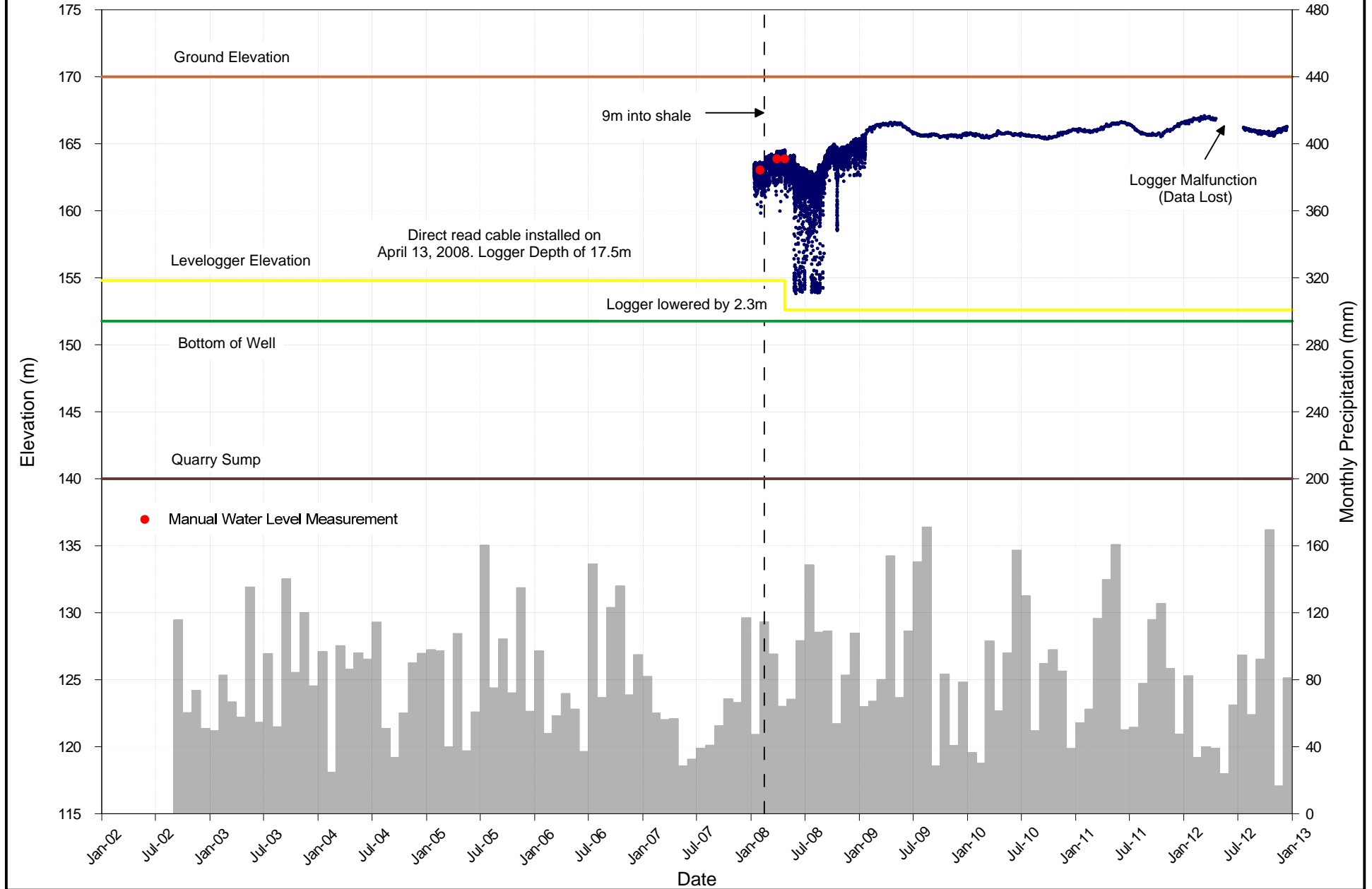




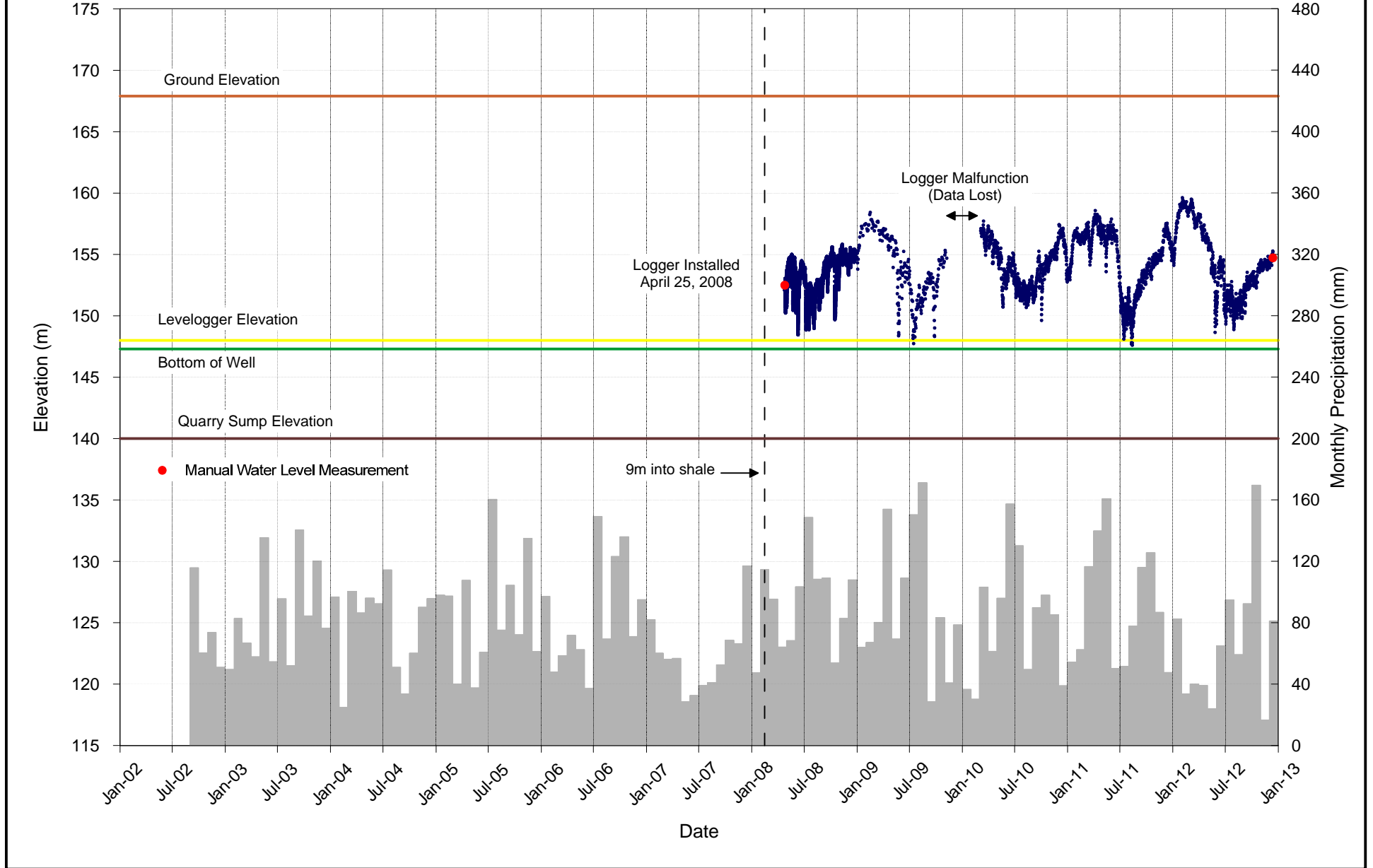
**Figure C.23: Wettlaufer Well  
Tansley Quarry - Hanson Brick Ltd.**



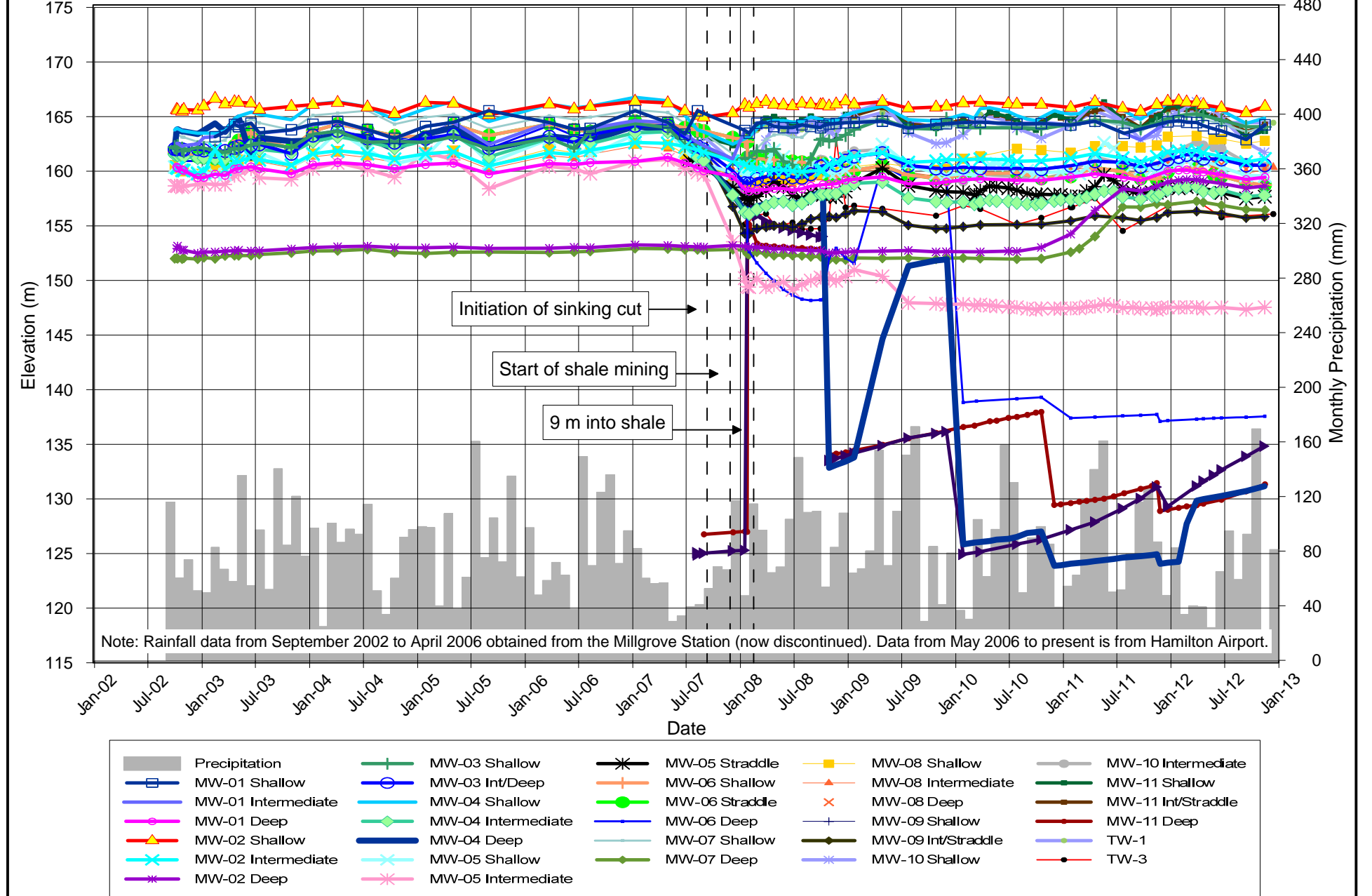
### Figure C.24: Wiggins Well Tansley Quarry - Hanson Brick Ltd.



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



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





# **APPENDIX D**

## **Groundwater Quality Results**

TABLE D.1  
Summary of Groundwater Quality in On-Site Monitoring Wells  
Tansley Quarry, Burlington, Ontario

Table with columns for Parameter, Units, ODWS (June 2006), PWQO (July 1994), and monitoring wells (MW-01 shallow, MW-01 intermediate, MW-01 deep, MW-02 shallow) with data points for various parameters like aluminum, arsenic, barium, etc., across multiple dates.

NOTES:  
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.  
Bolted 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 > 8.5 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								MW-02 deep						MW-03 shallow						Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12			
				Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Nov-11	Nov-12	Nov-02	May-03	Jan-07	Oct-08	Dec-09									Oct-10	Nov-11	Nov-12
				aluminum	mg/L	0.1	[0.075] a	0.1	0.026	0.28	0.19	0.27	0.15	0.006	0.053	0.056	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	0.019	0.456									0.15	0.14	0.032
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	225	118	133	139	141	129	140	160	111	36	36	32	51	35	47	133	104	140	114	110	109	175	170	40	29	56					
ammonia as N	mg/L	-	-	1.86	2.82	2.09	1.5	1.6	1.5	1.5	1.7	7.28	13	16	17	18	16	16	0.81	0.055	1.36	1.20	1.8	1.2	0.89	1.1	9.2	11.3	13.5					
antimony	mg/L	-	[0.02]	0.0008	< 0.0005	< 0.001	< 0.0005	< 0.0005	0.0009	< 0.0005	< 0.0005	< 0.01	< 0.01	< 0.05	< 0.03	< 0.05	< 0.05	< 0.05	< 0.0005	< 0.0005	< 0.001	0.0026	< 0.0005	0.0006	< 0.0005	0.00068	< 0.005	< 0.005	< 0.01					
arsenic	mg/L	0.025	[0.005]	< 0.002	< 0.002	0.003	0.003	0.003	0.003	0.001	0.0031	< 0.02	< 0.02	< 0.05	< 0.05	< 0.1	< 0.05	< 0.02	0.004	0.004	0.003	0.015	0.004	0.003	0.002	0.0039	< 0.02	< 0.02	< 0.01					
barium	mg/L	1	-	0.042	0.021	0.009	0.008	0.009	0.007	0.007	0.0072	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.1	0.025	0.038	0.031	0.012	0.011	0.010	0.014	0.008	0.009	< 0.05	< 0.05	< 0.05					
beryllium	mg/L	-	1.1	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.01	< 0.01	< 0.03	< 0.03	< 0.05	< 0.05	< 0.03	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.01	< 0.01	< 0.05					
bismuth	mg/L	-	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.01	< 0.05	< 0.05	< 0.1	< 0.05	< 0.03	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.01	< 0.01	< 0.01					
boron	mg/L	5	0.2	2.4	2.9	1.9	1.8	1.8	2	1.8	2	3.34	5.23	5.6	7.1	6	5.5	5.6	0.778	0.911	1.2	1.2	1.2	1.3	0.98	1.1	8.17	5.68	3.8					
bromide	mg/L	-	-	2.2	4.9	3	1	1	2	10	< 10	56	124	134	153	6	5.5	5.6	0.778	0.911	1.2	1.2	1.2	1.3	0.98	1.1	8.17	5.68	3.8					
cadmium	mg/L	0.005	0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.01	< 0.005	< 0.001	< 0.0001	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.001	< 0.001				
calcium	mg/L	-	-	110	272	230	190	200	180	190	200	824	1620	2000	2000	2000	1900	1800	125	142	180	190	220	140	150	1220	1590	1400	1400	1400				
chloride	mg/L	250	-	244	438	182	113	87	147	106	130	4920	11200	13000	12900	12400	12600	14000	30.5	30.8	492	281	518	574	78	70	6720	9780	11500					
chromium	mg/L	0.05	-	0.001	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.3	< 0.3	< 0.5	< 0.3	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05					
cobalt	mg/L	-	0.0009	0.0029	0.001	0.0093	0.022	0.01	< 0.0005	< 0.0005	< 0.0005	< 0.005	< 0.001	< 0.03	< 0.03	< 0.05	< 0.03	< 0.005	0.0004	0.0002	0.015	0.021	0.0051	0.0023	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.005				
copper	mg/L	1	[0.005] b	0.0065	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.05	< 0.05	< 0.1	< 0.05	< 0.01	< 0.0005	0.0009	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01				
fluoride	mg/L	1.5 - 2.4	-	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.27	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2				
free cyanide	mg/L	0.2	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002				
hardness	mg CaCO <sub>3</sub> /L	80-100	-	424	1122	1100	990	940	980	1000	2780	5831	940	980	1000	7100	6500	6400	577	760.5	1100	950	880	4370	5870	5870	5870	5870	5870	5870				
iron	mg/L	0.3	0.3	0.15	1.68	0.85	0.8	1.1	0.8	0.1	1.2	2.16	6.59	6.9	6.8	< 10	< 5	4.1	0.67	1.96	0.54	< 0.1	0.7	1.1	< 0.1	0.38	3.65	4.46	4.7					
lead	mg/L	0.01	[0.005] c	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.005	< 0.005	< 0.03	< 0.03	< 0.03	< 0.03	< 0.005	0.0008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005				
magnesium	mg/L	0.05	-	36	106	130	130	130	120	120	130	176	427	430	510	520	450	440	63.8	98.2	150	120	130	120	120	130	317	460	380					
manganese	mg/L	0.05	-	0.228	0.199	0.18	0.17	0.16	0.13	0.13	0.14	0.575	1.03	1	1.2	0.98	0.98	0.189	0.156	0.15	0.13	0.14	0.14	0.1	0.12	0.575	0.735	0.62	0.62					
mercury	mg/L	0.001	0.0002	< 0.00005	< 0.00005	< 0.0001	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.00005	0.00008	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.00005	0.00006	< 0.0001	< 0.00015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.00005	< 0.00005	< 0.0001				
molybdenum	mg/L	-	0.04	0.048	0.021	0.012	0.009	0.009	0.009	0.0085	0.024	0.015	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.0057	0.048	0.02	0.008	0.012	0.006	0.0063	0.013	0.012	0.006	0.0063	0.013	0.012				
nickel	mg/L	-	0.025	0.003	< 0.001	0.003	0.002	0.004	< 0.001	< 0.001	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	0.016	0.02	< 0.001	0.003	0.002	0.003	< 0.001	< 0.001	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01				
nitrate as N	mg/L	10	-	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1				
nitrite as N	mg/L	1	-	< 2	< 0.2	< 0.1	< 0.01	0.03	< 0.01	0.03	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
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	7.77	7.23	7.2	7.4	7.2	7.16	6.66	7.76	7.93	7.90	8.00	7.7	7.76	7.78	7.44	7.58	7.44	7.28	7.30				
phenol	mg/L	-	0.005	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.011	< 0.001	< 0.001	0.005	0.001	< 0.0010	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.023				
phosphate	mg/L	-	-	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01				
phosphorous	mg/L	-	-	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05				
total phosphorous	mg/L	-	0.01	2.95	2.04	2.7	1.5	5.7	0.142	0.089	0.077	0.15	0.82	< 2	1.30	0.176	10.2	8.4	6.4	30.0	6.4	6.4	30.0	2.78	0.076	0.21	0.21	0.21	0.21	0.21				
potassium	mg/L	-	-	17.3	26.2	21	19	18	17	17	19	60.4	101	120	130	120	110	110	15.5	12.9	14	13	12	16	9.4	9								

**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 Deep								MW-04 shallow								MW-04 intermediate								MW-04 deep							
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 3	Nov-12	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Nov-02	May-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12		
aluminum	mg/L	0.1	[0.075] a	< 0.3	0.074	<b>0.11</b>	< 0.05	< 0.05	0.057	< 0.005	0.068	<b>0.28</b>	<b>0.2</b>	<b>0.32</b>	0.038	<b>1.1</b>	0.068	0.006	<b>0.289</b>	<b>0.1</b>	<b>0.14</b>	<b>0.14</b>	0.031	0.064	<b>0.091</b>	< 0.05	< 0.05	< 0.5	<b>0.5</b>	< 0.3	<0.05				
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	4.7	88	72	56	53	62	385	419	391	413	390	387	384	390	55	56	56	51	50	50	55	65	172	126	34	66	102	150				
ammonia as N	mg/L	-	-	4.7	5.7	7.9	9.6	9.9	10	0.32	0.25	0.16	< 0.05	0.53	< 0.05	< 0.05	0.13	4.86	4.97	8.2	5.9	6.3	6	5.7	6.2	8.7	23.4	25	34	37	19				
antimony	mg/L	-	[0.02]	< 0.03	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005				
arsenic	mg/L	0.025	[0.005]	< 0.05	< 0.005	< 0.01	< 0.01	0.011	-0.01	0.004	<b>0.006</b>	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.0010	< 0.002	< 0.002	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005				
barium	mg/L	-	-	< 0.3	0.017	< 0.05	0.025	0.025	0.023	0.083	0.082	0.06	0.065	0.058	0.096	0.049	0.013	0.010	< 0.03	< 0.05	0.007	0.007	0.008	< 0.01	0.087	0.075	< 0.5	< 0.3	< 0.1	< 0.05					
beryllium	mg/L	-	1	< 0.03	< 0.0005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.001	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0010	< 0.001	< 0.001	< 0.003	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005					
bismuth	mg/L	-	-	< 0.05	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0010	< 0.001	< 0.001	< 0.005	< 0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001					
boron	mg/L	5	0.2	<b>3.6</b>	<b>4.7</b>	<b>4.6</b>	<b>4.6</b>	<b>5.1</b>	<b>4.3</b>	<b>0.353</b>	<b>0.286</b>	0.071	0.12	0.11	0.078	0.06	0.11	<b>6.46</b>	<b>6.99</b>	<b>6</b>	<b>6.9</b>	<b>6.5</b>	<b>6.4</b>	<b>5.9</b>	<b>6.1</b>	<b>2.38</b>	<b>3.3</b>	<b>6.2</b>	<b>5.4</b>	<b>6.3</b>	<b>5.7</b>				
bromide	mg/L	-	-	37	31	62	< 500	< 500	120	< 0.5	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.1	11.5	10.3	14	17	21	16	21	16	21	103	183	398	401	572	200			
cadmium	mg/L	0.005	0.0005	< 0.005	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0002	< 0.0010	< 0.0001	< 0.0005	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001					
calcium	mg/L	-	-	540	470	870	1300	1300	1400	65.2	64.1	88	84	78	77	130	75	433	380	450	530	510	460	480	550	1440	3700	6600	5300	7700	2400				
chloride	mg/L	250	-	<b>3220</b>	<b>2440</b>	<b>4980</b>	<b>6480</b>	<b>6470</b>	<b>8200</b>	12.2	5.8	8.0	4.0	4	4	5	<b>1120</b>	<b>984</b>	<b>1320</b>	<b>1540</b>	<b>1800</b>	<b>1650</b>	<b>1500</b>	<b>2100</b>	<b>9180</b>	<b>16800</b>	<b>34700</b>	<b>32700</b>	<b>45000</b>	<b>16500</b>					
chromium	mg/L	0.05	-	< 0.3	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.03	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.025	< 0.05	< 0.05	< 0.5	< 0.3	< 0.3	< 0.05				
cobalt	mg/L	-	0.0009	< 0.03	<b>0.0037</b>	< 0.005	< 0.005	< 0.005	< 0.005	<b>0.0011</b>	0.0009	<b>0.019</b>	<b>0.022</b>	<b>0.015</b>	<b>0.001</b>	<b>0.0076</b>	<b>0.00092</b>	0.0008	0.0002	<b>0.019</b>	<b>0.021</b>	<b>0.0086</b>	< 0.0005	< 0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005				
copper	mg/L	1	[0.005] b	< 0.05	< 0.001	< 0.01	< 0.02	< 0.01	< 0.01	0.0008	< 0.0005	0.001	< 0.001	< 0.001	0.007	< 0.0010	< 0.005	< 0.005	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<b>0.0124</b>	< 0.01	< 0.1	< 0.05	< 0.1	< 0.1				
fluoride	mg/L	1.5 - 2.4	-	0.3	0.4	0.3	0.3	0.3	0.25	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.6	0.7	0.5	0.6	0.5	0.5	0.6	0.55	0.3	0.2	0.1	0.1	0.1	0.1					
free cyanide	mg/L	0.2	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.0020	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002				
hardness	mg CaCO <sub>3</sub> /L	80-100	-	2200	1800	3300	4900	5100	5500	353	407.7	490	500	480	450	560	460	1800	1405	1602	1900	1900	1700	2000	4915	13000	23000	18000	27000	8400					
iron	mg/L	0.3	0.3	< 5	<b>1.2</b>	<b>2.8</b>	<b>2.3</b>	<b>2.5</b>	<b>4.5</b>	< 0.03	<b>0.52</b>	0.18	0.11	<b>0.50</b>	< 0.1	<b>3.3</b>	< 0.1	<b>0.56</b>	<b>0.71</b>	< 1	<b>0.9</b>	<b>0.75</b>	<b>0.92</b>	<b>0.84</b>	< 0.3	<b>17</b>	<b>29</b>	<b>24</b>	< 5	< 1					
lead	mg/L	0.01	[0.005] c	< 0.03	< 0.0005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005					
magnesium	mg/L	-	-	200	160	280	410	430	470	46.1	60.1	66	71	65	62	61	65	125	110	130	150	140	130	160	316	820	1500	1200	1800	560					
manganese	mg/L	0.05	-	0.27	0.2	0.39	0.52	0.54	0.6	1.01	0.789	0.28	0.38	0.310	0.180	0.55	0.23	0.205	0.17	0.21	0.26	0.22	0.19	0.21	0.23	1.13	2.4	3.7	2.8	5.1	1.6				
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.00005	< 0.00005	< 0.0001	< 0.0015	0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001					
molybdenum	mg/L	-	0.04	< 0.05	< 0.006	< 0.01	0.006	< 0.006	< 0.006	0.024	0.0005	0.007	0.005	0.005	0.0039	0.011	0.008	0.007	< 0.01	0.008	0.007	< 0.01	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008				
nickel	mg/L	-	0.025	< 0.05	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.004	0.001	0.003	0.003	0.004	0.001	0.005	0.011	0.007	< 0.001	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005					
nitrate as N	mg/L	10	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1				
nitrite as N	mg/L	1	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 0.2	< 0.2	0.1	0.01	0.25	0.11	0.02	0.040	< 2.0	< 0.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01				
pH	pH Units	6.5-8.5	6.5-8.5	7.80	7.7	7.45	7.37	7.38	6.96	7.79	7.8	8.2	8.4	8.0	7.8	7.81	7.67	7.64	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8				
phenol	mg/L	-	0.005	< 0.001	< 0.001	< 0.001	0.001	0.001	< 0.0010	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001				
phosphate	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	< 1	< 1	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01				
phosphorous	mg/L	-	-	< 5	< 0.1	< 1	< 1	< 1	< 1	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	0.41	< 0.05	< 0.05	< 0.3	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1					
total phosphorous	mg/L	-	0.01	<b>0.12</b>	<b>0.04</b>	<b>0.10</b>	< 1	< 1	< 0.40	<b>0.13</b>	<b>0.092</b>	<b>12</b>	<b>1.6</b>	<b>1.7</b>	<b>17.0</b>	<b>0.9</b>	<b>0.85</b>	<b>0.15</b>	<b>5.45</b>	<b>0.96</b>	<b>1.4</b>	<b>0.47</b>	< 0.1	<b>0.05</b>	<b>0.14</b>	< 0.5	<b>0.089</b>	<b>0.34</b>	<b>0.37</b>	<b>2.7</b>	< 5				
potassium	mg/L	-	-	46	40	61	86	91	85	6.6	6.2	5	5.7	5.1	4.9	4.5	4.8	39.7	38.5	42	48	43	43	47	76.2	160	260	210	300	130					
selenium	mg/L	0.01	-	< 0.1	0.01	< 0.02	< 0.02	< 0.02																											



TABLE D.1
Summary of Groundwater Quality in On-Site Monitoring Wells
Tansley Quarry, Burlington, Ontario

Table with columns for Parameter, Units, ODWS (June 2006), PWQO (July 1994), and monitoring wells (MW-05 shallow, MW-05 straddle, MW-05 intermediate, MW-05 deep, MW-06 shallow, MW-06 straddle) with data for various parameters like aluminum, ammonia, arsenic, etc.

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.
[ ] indicates 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

Table with columns for Parameter, Units, ODWS (June 2006), PWQO (July 1994), and monitoring wells MW-06 deep, MW-07 shallow, MW-07 deep, MW-08 shallow, MW-08 intermediate, MW-08 deep, and MW-09 shallow. Rows list various chemical parameters like aluminum, ammonia, arsenic, barium, etc.

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 8.0 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 physicians 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

Table with columns for Parameter, Units, ODWS (June 2006), PWQO (July 1994), and monitoring wells categorized by depth (MW-09, MW-10, MW-11) and location (intermediate, shallow, deep). Data points include values for various parameters like aluminum, iron, and lead.

NOTES:
Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.
Bolted areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.
I ] 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, Burlington, Ontario**

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-01 shallow			MW-01 intermediate				MW-01 deep				MW-02 shallow										
				Dec-10	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Oct-10	Oct-10 DUP 3	Nov-11	Nov-12
aluminum	mg/L	0.1	[0.075] a		<b>7.2</b>		<b>180</b>		<b>360</b>	<b>60</b>	<b>66</b>	<b>15</b>	<b>5.9</b>	<b>5.9</b>	<b>6</b>	<b>6.2</b>	<b>3.4</b>	<b>0.29</b>	<b>540</b>	<b>750</b>	<b>85</b>	<b>22</b>	<b>25</b>	<b>43</b>	<b>31</b>
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-		366		-		459	-	443	410	-	-	36	-	35	99	-	-	695	700	700	707	730
ammonia as N	mg/L	-	-		< 0.05		-		-	-	0.13	0.24	-	-	-	-	18	21	-	-	< 0.05	0.06	0.13	0.50	
antimony	mg/L	-	[0.02]		0.0006		< 0.01		< 0.005	< 0.0005	< 0.003	< 0.00050	< 0.05	< 0.005	< 0.01	0.005	< 0.01	< 0.0050	< 0.01	<b>0.088</b>	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.0050
arsenic	mg/L	0.025	[0.005]		0.004		<b>0.093</b>		<b>0.140</b>	<b>0.028</b>	<b>0.034</b>	<b>0.082</b>	< 0.05	<b>0.014</b>	< 0.03	< 0.05	< 0.03	< 0.02	<b>0.22</b>	<b>0.24</b>	<b>0.03</b>	<b>0.01</b>	<b>0.01</b>	<b>0.03</b>	<b>0.016</b>
barium	mg/L	1	-		0.12		1.6		2.8	0.43	0.53	0.16	< 0.3	0.081	< 0.1	0.095	0.053	0.028	6	6.9	0.76	0.18	0.21	0.57	0.34
beryllium	mg/L	-	1.1		0.0006		0.012		0.021	0.0031	0.003	0.0012	< 0.03	< 0.005	< 0.01	< 0.005	< 0.01	< 0.0050	0.038	0.064	< 0.005	0.0013	0.0013	0.0023	0.0020
bismuth	mg/L	-	-		< 0.001		< 0.01		< 0.01	< 0.001	< 0.005	< 0.0010	< 0.05	< 0.01	< 0.03	< 0.01	< 0.03	< 0.01	< 0.01	0.15	< 0.01	0.001	< 0.001	< 0.001	< 0.0010
boron	mg/L	5	0.2		0.059		<b>0.37</b>		<b>0.6</b>	<b>0.19</b>	<b>0.22</b>	<b>0.09</b>	<b>5.7</b>	<b>6.1</b>	<b>5.4</b>	<b>6.4</b>	<b>6.3</b>	<b>6.1</b>	<b>0.77</b>	<b>1.6</b>	<b>0.4</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>
bromide	mg/L	-	-		< 1		-		< 1	-	< 1	< 1.0	-	-	-	192	-	138	140	-	< 1	-	-	< 1	< 1.0
cadmium	mg/L	0.005	0.0005		0.0002		<b>0.002</b>		<b>0.004</b>	<b>0.0006</b>	<b>0.0011</b>	<b>0.00052</b>	< 0.005	0.003	< 0.003	< 0.001	< 0.003	<b>0.002</b>	<b>0.007</b>	<b>0.011</b>	< 0.001	0.0002	0.0003	<b>0.0009</b>	<b>0.0018</b>
calcium	mg/L	-	-		100		1100		2700	520	770	160	3500	2600	2400	2800	2000	2000	4600	5800	880	340	370	830	460
chromium	mg/L	0.05	-		0.01		0.36		0.6	0.11	0.12	0.027	< 0.3	< 0.05	< 0.1	< 0.5	< 0.1	0.073	1.2	1.3	0.2	0.04	0.04	0.08	0.06
cobalt	mg/L	-	0.0009		<b>0.0046</b>		<b>0.16</b>		<b>0.29</b>	<b>0.052</b>	<b>0.073</b>	<b>0.014</b>	< 0.03	< 0.01	< 0.01	< 0.005	< 0.01	< 0.0050	<b>0.59</b>	<b>0.69</b>	<b>0.08</b>	<b>0.02</b>	<b>0.02</b>	<b>0.04</b>	<b>0.03</b>
copper	mg/L	1	[0.005] b		<b>0.016</b>		<b>0.32</b>		<b>0.58</b>	<b>0.095</b>	<b>0.13</b>	<b>0.03</b>	<b>0.066</b>	<b>0.044</b>	<b>0.050</b>	<b>0.048</b>	<b>0.03</b>	<b>0.017</b>	<b>1.2</b>	<b>1.4</b>	<b>0.2</b>	<b>0.04</b>	<b>0.04</b>	<b>0.09</b>	<b>0.06</b>
fluoride	mg/L	1.5 - 2.4	-		0.6		-		-	-	0.3	0.46	-	-	-	-	0.3	0.35	-	-	-	0.2	0.2	0.3	0.33
free cyanide	mg/L	0.2	0.005		< 0.002		-		-	-	< 0.002	< 0.0020	-	-	-	< 0.002	< 0.0020	-	-	-	< 0.002	< 0.002	< 0.002	< 0.0020	
hardness	mg CaCO <sub>3</sub> /L	80-100	-		740		-		-	-	1000	780	-	-	-	-	7200	6100	-	-	-	1900	2000	2100	1900
iron	mg/L	0.3	0.3		<b>12</b>		<b>360</b>		<b>660</b>	<b>120</b>	<b>130</b>	<b>29</b>	<b>27</b>	<b>17</b>	<b>18</b>	<b>20</b>	<b>9.6</b>	<b>1.4</b>	<b>1300</b>	<b>1400</b>	<b>180</b>	<b>40</b>	<b>46</b>	<b>100</b>	<b>72</b>
lead	mg/L	0.01	[0.005] c		<b>0.01</b>		<b>0.16</b>		<b>0.29</b>	<b>0.054</b>	<b>0.064</b>	<b>0.016</b>	< 0.03	0.005	< 0.01	<b>0.009</b>	< 0.01	< 0.0050	<b>0.43</b>	<b>0.55</b>	<b>0.07</b>	<b>0.02</b>	<b>0.02</b>	<b>0.04</b>	<b>0.03</b>
magnesium	mg/L	-	-		150		310		620	270	270	160	800	660	580	720	500	490	790	1300	440	360	360	370	350
manganese	mg/L	0.05	-		0.27		6.7		16	2.7	5	0.65	2.2	1.7	1.6	1.8	1.3	1.1	37	39	5	1	1	4.2	2.4
mercury	mg/L	0.001	0.0002		< 0.0001		< 0.0001		0.0002	< 0.0001	< 0.0001	< 0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.0001	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.00010	
molybdenum	mg/L	-	0.04		0.0021		0.024		0.02	0.005	0.006	0.0034	< 0.05	0.011	< 0.03	0.011	< 0.01	< 0.0050	<b>0.049</b>	< 0.1	< 0.01	0.004	0.004	0.0067	0.0064
nickel	mg/L	-	0.025		0.011		<b>0.37</b>		<b>0.7</b>	<b>0.11</b>	<b>0.13</b>	<b>0.027</b>	< 0.05	< 0.01	< 0.03	< 0.05	< 0.03	<b>0.037</b>	<b>1.4</b>	<b>1.5</b>	<b>0.2</b>	<b>0.042</b>	<b>0.1</b>	<b>0.093</b>	<b>0.067</b>
nitrate as N	mg/L	10	-		1.1		-		0.6	-	0.6	0.82	-	-	< 0.1	-	< 0.1	< 0.10	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10
nitrite as N	mg/L	1	-		< 0.01		-		< 0.01	-	< 0.01	< 0.010	-	< 0.01	-	< 0.05	< 0.010	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	
pH	pH Units	6.5-8.5	6.5-8.5		7.84		-		-	-	7.61	7.91	-	-	-	-	7.12	6.88	-	-	-	7.57	7.56	7.52	7.61
phenol	mg/L	-	-		< 0.001		-		-	-	< 0.001	< 0.0010	-	-	-	-	0.008	0.062	-	-	-	< 0.001	< 0.001	< 0.001	0.0013
phosphate	mg/L	-	-		< 0.01		-		< 0.01	-	< 0.01	< 0.010	-	-	< 0.01	-	< 0.01	0.096	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010
total phosphorous	mg/L	-	0.01		<b>0.4</b>		-		-	<b>3</b>	<b>5.3</b>	<b>0.82</b>	-	-	-	<b>0.15</b>	< 3	< 1	-	-	-	<b>1.1</b>	<b>1.1</b>	<b>4.4</b>	<b>2.1</b>
potassium	mg/L	-	-		4.3		66		100	18	19	7.7	170	150	140	160	130	140	160	200	26	15	15	17	15
selenium	mg/L	0.01	0.1		0.004		< 0.02		< 0.02	0.006	< 0.01	0.0068	< 0.1	< 0.02	< 0.05	< 0.1	< 0.05	< 0.04	0.022	< 0.2	< 0.02	< 0.002	< 0.002	0.004	< 0.0020
silicon	mg/L	-	-		6.8		23		450	77	73	28	12	12	11	7.4	4	39	97	100	40	43	53	48	
silver	mg/L	-	0.0001		< 0.0001		<b>0.001</b>		<b>0.002</b>	<b>0.0004</b>	< 0.0005	<b>0.00014</b>	< 0.005	< 0.001	< 0.003	< 0.001	< 0.003	< 0.0010	<b>0.003</b>	< 0.01	< 0.001	<b>0.0002</b>	<b>0.0002</b>	<b>0.0003</b>	<b>0.00024</b>
sodium	mg/L	200 d	-		41		46		85	59	52	45	8600	7500	6900	7200	6600	6500	82	130	72	68	69	65	66
strontium	mg/L	-	-		1.3		4.2		9.0	3.4	3.9	1.6	69	52	49	61	44	42	14	19	5.7	4.6	4.6	5.5	4.8
sulphide	mg/L	0.05	-		< 0.02		-		-	-	< 0.02	< 0.020	-	-	-	< 0.02	4	-	-	-	< 0.020	< 0.020	< 0.02	0.33	
sulphate	mg/L	500	-		157		-		-	-	385	280	-	-	-	-	1910	1900	-	-	-	-	-	1320	1300
thallium	mg/L	-	0.0003		0.00012		<b>0.0021</b>		<b>0.0041</b>	<b>0.00057</b>	<b>0.0006</b>	0.00022	< 0.003	< 0.0005	< 0.001	< 0.0005	< 0.001	< 0.00050	<b>0.0066</b>	<b>0.014</b>	<b>0.0009</b>	0.0002	0.0003	<b>0.00057</b>	<b>0.00032</b>
tin	mg/L	-	-		< 0.001		< 0.01		< 0.01	< 0.001	< 0.005	< 0.0010	< 0.05	< 0.01	< 0.03	< 0.01	< 0.03	< 0.01	< 0.01	< 0.1	< 0.01	< 0.01	< 0.01	< 0.010	
titanium	mg/L	-	-		0.18		1.9		7.1	1.1	0.84	0.35	< 0.3	0.089	0.1	0.1	< 0.1	< 0.05	4	11	1.5	0.56	0.61	0.97	< 0.5
TSS	mg/L	-	-		620		-		-	-	2900	1600	-	-	-	-	560	120	-	-	-	1700	1600	7600	2600
turbidity	NTU	1	-		250		-		-	-	77	720	-	-	-	-	170	130	-	-	-	3600	3700	460	640
uranium	mg/L	0.02	0.005		<b>0.011</b>		<b>0.032</b>		<b>0.043</b>	<b>0.017</b>	<b>0.017</b>	<b>0.013</b>	< 0.005	< 0.001	< 0.003	0.001	< 0.003	< 0.0010	<b>0.068</b>	<b>0.11</b>	<b>0.027</b>	<b>0.020</b>	<b>0.021</b>	<b>0.020</b>	<b>0.023</b>
vanadium	mg/L	-	0.006		<b>0.012</b>		<b>0.39</b>		<b>0.70</b>	<b>0.12</b>	<b>0.1</b>														

TABLE D.2  
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses  
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-02 intermediate						MW-02 deep					MW-03 shallow					MW-03 deep							
				Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 3	Nov-12
aluminum	mg/L	0.1	[0.075] a	<b>240</b>	<b>30</b>	<b>57</b>	<b>3</b>	<b>5.6</b>	<b>5.3</b>	<b>2.800</b>	<b>0.920</b>	<b>12</b>	<b>3.3</b>	<b>22</b>	<b>120</b>	<b>40</b>	<b>50</b>	<b>88</b>	<b>5.6</b>	<b>10</b>	<b>1.6</b>	<b>1.3</b>	<b>0.59</b>	<b>3.3</b>	<b>4.2</b>	<b>4.5</b>	<b>9.5</b>
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	-	-	141	129	140	160	-	-	51	35	47	-	-	110	109	175	170	-	-	88	72	56	53	62
ammonia as N	mg/L	-	-	-	-	-	1.5	1.5	1.7	-	-	-	16	16	-	-	-	1.2	0.89	1.1	-	-	-	7.9	9.6	9.9	10
antimony	mg/L	-	[0.02]	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.01	< 0.005	< 0.01	< 0.01	< 0.0050	< 0.01	< 0.005	0.003	< 0.005	< 0.0005	< 0.00050	< 0.01	< 0.005	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.0050
arsenic	mg/L	0.025	[0.005]	<b>0.13</b>	<b>0.014</b>	<b>0.03</b>	0.004	<b>0.006</b>	<b>0.0058</b>	< 0.05	< 0.05	< 0.02	< 0.02	<b>0.023</b>	<b>0.067</b>	<b>0.043</b>	<b>0.038</b>	<b>0.051</b>	0.005	<b>0.0092</b>	< 0.05	< 0.01	< 0.01	<b>0.007</b>	< 0.01	< 0.01	< 0.01
barium	mg/L	1	-	3.9	0.35	0.93	0.04	0.12	0.19	0.052	< 0.05	0.3	0.088	0.35	0.85	0.33	0.36	0.69	0.12	0.06	0.053	< 0.05	< 0.05	0.054	0.088	0.1	0.12
beryllium	mg/L	-	1.1	0.017	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.0050	0.008	< 0.005	0.003	< 0.005	< 0.0005	< 0.00050	< 0.005	< 0.005	< 0.005	< 0.0005	< 0.005	< 0.005	< 0.0050
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	< 0.001	< 0.001	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01	< 0.01	< 0.01	0.005	< 0.01	< 0.001	< 0.0010	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01
boron	mg/L	5	0.2	<b>2</b>	<b>1.9</b>	<b>1.7</b>	<b>2.3</b>	<b>1.8</b>	<b>1.8</b>	<b>5.9</b>	<b>5.8</b>	<b>6.1</b>	<b>5.8</b>	<b>5.9</b>	<b>1.2</b>	<b>1.3</b>	<b>1.2</b>	<b>1.6</b>	<b>1.8</b>	<b>1.3</b>	<b>5.4</b>	<b>3.5</b>	<b>4.8</b>	<b>4.8</b>	<b>4.6</b>	<b>4.9</b>	<b>5.3</b>
bromide	mg/L	-	-	-	-	1	-	< 10	< 10	-	-	148	154	200	-	-	6	-	< 1	1.2	-	-	31	-	< 500	< 0.5	120
cadmium	mg/L	0.005	0.0005	<b>0.003</b>	< 0.001	< 0.001	< 0.0001	0.0001	< 0.00010	<b>0.002</b>	< 0.001	< 0.002	< 0.002	< 0.0010	<b>0.002</b>	< 0.001	<b>0.001</b>	<b>0.002</b>	< 0.0001	0.00025	< 0.001	<b>0.002</b>	< 0.001	< 0.0001	< 0.001	< 0.001	<b>0.002</b>
calcium	mg/L	-	-	2200	380	610	230	240	240	2100	1900	1900	2200	2000	1800	790	1100	1400	240	250	2100	630	510	970	1200	1300	1700
chromium	mg/L	0.05	-	0.54	0.054	0.110	0.006	0.012	0.013	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	0.3	0.096	0.110	0.180	0.011	0.018	< 0.05	< 0.05	< 0.05	0.006	< 0.05	< 0.05	< 0.05
cobalt	mg/L	-	0.0009	<b>0.26</b>	<b>0.0280</b>	<b>0.0610</b>	<b>0.0028</b>	<b>0.0059</b>	<b>0.0056</b>	< 0.01	< 0.01	<b>0.0100</b>	< 0.01	<b>0.0250</b>	<b>0.13</b>	<b>0.045</b>	<b>0.049</b>	<b>0.083</b>	<b>0.0057</b>	<b>0.0069</b>	< 0.005	< 0.005	< 0.005	<b>0.0012</b>	< 0.005	< 0.005	< 0.0050
copper	mg/L	1	[0.005] b	<b>0.55</b>	<b>0.059</b>	<b>0.110</b>	0.004	<b>0.012</b>	<b>0.012</b>	<b>0.1</b>	<b>0.019</b>	<b>0.040</b>	<b>0.025</b>	<b>0.085</b>	<b>0.34</b>	<b>0.12</b>	<b>0.14</b>	<b>0.23</b>	<b>0.01</b>	<b>0.02</b>	<b>0.033</b>	< 0.01	< 0.01	<b>0.018</b>	<b>0.016</b>	<b>0.019</b>	
fluoride	mg/L	1.5 - 2.4	-	-	-	-	0.2	0.3	0.27	-	-	< 1	0.34	-	-	0.2	0.2	0.2	0.2	0.19	-	-	0.4	0.3	0.3	0.25	
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	< 0.002	< 0.0020	-	-	< 0.002	< 0.0020	-	-	-	< 0.002	< 0.002	< 0.0020	-	-	-	< 0.002	< 0.002	< 0.002	< 0.0020	
hardness	mg CaCO <sub>3</sub> /L	80-100	-	-	-	-	940	980	1000	-	-	-	6500	6400	-	-	-	1000	870	880	-	-	-	3300	4900	5100	5500
iron	mg/L	0.3	0.3	<b>540</b>	<b>55</b>	<b>120</b>	<b>6</b>	<b>11</b>	<b>11</b>	<b>13</b>	<b>6.4</b>	<b>29.0</b>	<b>11</b>	<b>42</b>	<b>270</b>	<b>89</b>	<b>110</b>	<b>160</b>	<b>11</b>	<b>15</b>	<b>9.8</b>	<b>3.3</b>	<b>2.0</b>	<b>5.4</b>	<b>9.2</b>	<b>15.0</b>	
lead	mg/L	0.01	[0.005] c	<b>0.2</b>	<b>0.024</b>	<b>0.050</b>	0.003	<b>0.0064</b>	<b>0.0054</b>	< 0.005	< 0.005	<b>0.010</b>	< 0.01	<b>0.018</b>	<b>0.12</b>	<b>0.047</b>	<b>0.054</b>	<b>0.087</b>	<b>0.0064</b>	<b>0.0063</b>	< 0.005	< 0.005	< 0.005	0.0016	0.005	0.005	< 0.0050
magnesium	mg/L	-	-	360	150	180	130	120	120	490	490	480	550	480	290	180	210	260	120	150	550	230	180	270	390	400	560
manganese	mg/L	0.05	-	18	2	4	0.34	0.51	0.53	1.3	1.1	1.8	1.4	2.0	14	5.4	7.8	9.5	0.51	0.79	1.1	0.38	0.26	0.51	0.77	0.87	0.93
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.0001	< 0.0015 <sup>(1)</sup>	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010
molybdenum	mg/L	-	0.04	0.038	0.013	0.01	0.01	0.0096	0.011	0.014	< 0.01	< 0.02	< 0.01	<b>0.012</b>	<b>0.015</b>	<b>0.015</b>	<b>0.007</b>	<b>0.016</b>	0.0095	0.0066	< 0.01	0.012	< 0.01	0.007	0.006	0.006	0.0074
nickel	mg/L	-	0.025	<b>0.6</b>	<b>0.058</b>	<b>0.130</b>	0.006	0.012	0.014	< 0.01	< 0.01	<b>0.050</b>	< 0.02	<b>0.068</b>	<b>0.28</b>	<b>0.087</b>	<b>0.100</b>	<b>0.160</b>	0.011	0.015	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	0.012
nitrate as N	mg/L	10	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	-	-	0.3	< 0.1	0.6	< 0.10	-	-	< 0.1	< 0.1	< 0.1	< 0.10	
nitrite as N	mg/L	1	-	-	0.03	< 0.01	0.03	< 0.010	-	-	< 0.01	< 0.1	< 0.10	-	-	0.14	0.02	0.22	0.020	-	-	0.01	< 0.01	< 0.01	< 0.01	< 0.010	
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.74	7.73	7.43	-	-	-	7.16	6.66	-	-	-	7.76	7.78	7.58	-	-	-	7.45	7.37	7.38	6.96
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	< 0.0010	-	-	-	0.001	< 0.0010	-	-	-	< 0.001	< 0.001	< 0.0010	-	-	-	< 0.001	0.001	0.001	< 0.0010	
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.010	-	-	< 0.01	< 0.01	< 0.010	-	-	0.01	< 0.01	< 0.01	< 0.010	-	-	< 0.01	< 0.01	< 0.01	< 0.010	
total phosphorous	mg/L	-	0.01	-	-	-	<b>0.17</b>	<b>0.36</b>	<b>0.35</b>	-	-	-	< 2	<b>1.40</b>	-	-	-	<b>9.1</b>	<b>0.35</b>	<b>0.64</b>	-	-	-	< 0.1	< 1	< 1	< 1
potassium	mg/L	-	-	97	26	28	21	19	19	130	120	110	130	120	49	20	20	43	19	14	110	48	45	65	81	83	100
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.02	< 0.002	< 0.002	< 0.0020	< 0.1	< 0.1	0.060	< 0.04	< 0.04	< 0.02	< 0.02	0.01	< 0.02	< 0.002	< 0.0020	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.04	
silicon	mg/L	-	-	28	48	79	9.7	13	13	8.1	4.9	18	6.9	30	20	55	62	120	13	25	6.4	6.9	4.9	10	10	3.6	22
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.001	< 0.0001	0.0001	< 0.00010	< 0.001	< 0.001	< 0.002	< 0.002	< 0.0010	< 0.001	< 0.001	<b>0.0005</b>	< 0.001	< 0.0001	< 0.00010	< 0.001	<b>0.001</b>	< 0.001	<b>0.0002</b>	< 0.001	< 0.001	< 0.0010
sodium	mg/L	200 d	-	250	190	160	210	170	200	6600	6900	5600	7000	6200	250	190	160	290	170	140	5000	1700	1500	2500	3100	3100	4100
strontium	mg/L	-	-	15	11	12	13	12	12	43	41	40	45	41	13	12	13	15	12	12	46	17	13	23	28	29	41
sulphide	mg/L	0.05	-	-	-	-	< 0.020	< 0.020	< 0.020	-	-	-	< 0.020	< 0.020	-	-	-	< 0.020	< 0.020	< 0.020	-	-	-	< 0.020	< 0.020	< 0.020	< 0.020
sulphate	mg/L	500	-	-	-	-	-	1140	1100	-	-	-	2030	2100	-	-	-	-	900	900	-	-	-	-	1650	1560	1500
thallium	mg/L	-	0.0003	<b>0.003</b>	<b>0.001</b>	<b>0.0007</b>	< 0.0001	0.0001	< 0.00050	< 0.0005	< 0.0005	< 0.001	< 0.001	< 0.00050	<b>0.0013</b>	< 0.0005	<b>0.0004</b>	<b>0.0011</b>	0.0001	< 0.00050	< 0.0005	< 0.0005	< 0.0005	< 5E-05	< 0.0005	< 0.00050	
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	0.001	< 0.0010	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01	< 0.01	< 0.01	0.005	< 0.01	< 0.001	< 0.0010	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	< 0.01	
titanium	mg/L	-	-	2.5	0.6	0.89	0.06	0.14	0.12	< 0.05	< 0.05	0.2	< 0.1	0.42	1.8	0.9	0.86	2.6	0.14	0.33	< 0.05	< 0.05	< 0.05	0.15	0.071	0.16	0.067
TSS	mg/L	-	-	-	-	-	360	920	650	-	-	-	540	2900	-	-	-	21000	5800	1100	-	-	-	190	370	490	450
turbidity	NTU	1	-	-	-	-	320	480	290	-	-	-	290	630	-	-	-	19000									



TABLE D.2  
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses  
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-05 straddle					MW-05 intermediate					MW-05 deep					MW-06 shallow					
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L	0.1	[0.075] a	<b>60</b>	<b>300</b>	<b>19</b>	<b>57</b>	<b>100</b>	<b>2.7</b>	<b>2</b>	<b>0.38</b>	<b>1.10</b>	<b>5.6</b>	<b>14</b>		<b>190</b>	<b>8.1</b>	<b>1800</b>						
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	-	296	294	285	290	-	264	252	285	290	32		36	51	309						
ammonia as N	mg/L	-	-	-	-	0.54	0.75	0.76	-	-	2.1	1.6	1.6	-		39	38	1.1						
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	< 0.0005	< 0.003	< 0.0025	< 0.001	< 0.0005	< 0.0005	< 0.0005	< 0.00050	<b>0.05</b>		< 0.03	< 0.025	< 0.03						
arsenic	mg/L	0.025	[0.005]	<b>0.045</b>	<b>0.230</b>	<b>0.023</b>	<b>0.083</b>	<b>0.110</b>	0.005	<b>0.10</b>	0.004	<b>0.045</b>	<b>0.300</b>	< 0.1		<b>0.14</b>	< 0.1	<b>0.78</b>						
barium	mg/L	1	-	0.7	3.5	0.3	0.6	0.7	0.051	0.10	0.02	0.07	0.19	< 0.5		0.86	0.18	32						
beryllium	mg/L	-	1.1	< 0.005	0.017	0.0011	< 0.003	0.0046	< 0.001	< 0.0005	< 0.0005	< 0.0005	0.00064	< 0.05		< 0.03	< 0.025	0.11						
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.001	< 0.005	< 0.0050	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0010	< 0.1		< 0.05	< 0.05	< 0.05						
boron	mg/L	5	0.2	<b>1.1</b>	<b>2.1</b>	<b>1.2</b>	<b>1.4</b>	<b>1.3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>2.4</b>	<b>5</b>		<b>5.5</b>	<b>5.4</b>	<b>3</b>						
bromide	mg/L	-	-	-	< 1	-	< 1	< 1.0	-	< 1	-	< 1	< 1.0	587		747	850	< 0.001						
cadmium	mg/L	0.005	0.0005	<b>0.002</b>	<b>0.009</b>	0.0004	<b>0.0032</b>	<b>0.0027</b>	< 0.0001	0.0001	< 0.0001	0.0004	<b>0.00066</b>	<b>0.010</b>		<b>0.075</b>	<b>0.007</b>	<b>0.028</b>						
calcium	mg/L	-	-	920	4600	410	1400	2000	80	75	100	91	110	8600		11000	11000	20000						
chromium	mg/L	0.05	-	0.13	0.61	0.03	0.12	0.16	0.005	< 0.005	< 0.005	< 0.005	0.013	< 0.5		0.68	< 0.25	3.8						
cobalt	mg/L	-	0.0009	<b>0.063</b>	<b>0.300</b>	<b>0.020</b>	<b>0.065</b>	<b>0.1</b>	<b>0.0022</b>	<b>0.0014</b>	< 0.0005	<b>0.0012</b>	<b>0.0036</b>	< 0.05		<b>0.081</b>	< 0.025	<b>2</b>						
copper	mg/L	1	[0.005] b	<b>0.16</b>	<b>0.87</b>	<b>0.05</b>	<b>0.19</b>	<b>1</b>	<b>0.01</b>	<b>0.01</b>	0.04	<b>0.009</b>	<b>0.032</b>	<b>0.10</b>		<b>0.80</b>	<b>0.08</b>	<b>4.7</b>						
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.2	0.3	0.28	-	0.5	0.4	0.4	0.42	< 0.1		< 0.1	< 0.10	0.3						
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	< 0.0020	-	-	< 0.002	< 0.002	< 0.0020	-		< 0.002	< 0.0020	< 0.002						
hardness	mg CaCO <sub>3</sub> /L	80-100	-	-	-	300	270	280	-	-	390	320	320	-		35000	34000	320						
iron	mg/L	0.3	0.3	<b>120</b>	<b>590</b>	<b>40</b>	<b>140</b>	<b>230</b>	<b>4.3</b>	<b>5.8</b>	<b>1.1</b>	<b>21</b>	<b>100.0</b>	<b>49.0</b>		<b>170</b>	<b>40</b>	<b>3300</b>						
lead	mg/L	0.01	[0.005] c	<b>0.05</b>	<b>0.25</b>	<b>0.02</b>	<b>0.063</b>	<b>0.15</b>	0.003	0.0029	< 0.0005	0.0028	<b>0.0097</b>	< 0.05		<b>0.17</b>	< 0.025	<b>1.8</b>						
magnesium	mg/L	-	-	110	470	66	140	210	23	24	35	33	36	2000		2500	2600	2400						
manganese	mg/L	0.05	-	7	37	3	11	14	0.18	0.13	0.04	0.1	0.3	5.00		8.50	5.20	190						
mercury	mg/L	0.001	0.0002	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.0001		< 0.0001	< 0.00010	< 0.0001						
molybdenum	mg/L	-	0.04	< 0.01	0.02	0.006	0.009	0.0049	0.009	0.005	0.004	0.0049	0.0063	< 0.1		<b>0.049</b>	< 0.025	<b>0.14</b>						
nickel	mg/L	-	0.025	<b>0.12</b>	<b>0.63</b>	<b>0.04</b>	<b>0.12</b>	<b>0.20</b>	0.004	0.003	< 0.001	0.002	0.0093	< 0.1		<b>0.3</b>	<b>0.054</b>	<b>4.1</b>						
nitrate as N	mg/L	10	-	-	0.3	< 0.1	0.5	0.27	-	0.2	< 0.1	0.6	0.26	< 0.1		< 0.1	< 0.10	< 0.1						
nitrite as N	mg/L	1	-	-	0.16	0.03	0.04	0.022	-	0.22	< 0.01	0.55	0.13	< 0.01		< 0.1	< 0.10	0.12						
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.93	7.9	7.90	-	-	< 7.77	7.81	7.73	-		<b>6.43</b>	<b>6.11</b>	7.94						
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	< 0.0010	-	-	< 0.001	< 0.001	< 0.0010	-		0.11	0.0094	< 0.001						
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	< 0.010	-	< 0.01	< 0.01	< 0.01	< 0.010	< 0.01		< 0.01	< 0.010	< 0.01						
total phosphorous	mg/L	-	0.01	-	-	<b>2.8</b>	<b>9.6</b>	<b>14</b>	-	-	< 0.1	< 0.1	<b>0.46</b>	-		< 5	< 5	<b>180</b>						
potassium	mg/L	-	-	18	83	10	16	23	17	17	20	18	18	280		340	330	340						
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.002	< 0.01	< 0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0020	< 0.2		< 0.2	< 0.1	< 0.1						
silicon	mg/L	-	-	75	390	35	66	96	8.8	8.3	6.9	9.3	25	18		63	14	5.2						
silver	mg/L	-	0.0001	<b>0.001</b>	<b>0.005</b>	<b>0.0002</b>	<b>0.0006</b>	<b>0.00065</b>	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.01		< 0.005	<b>0.0058</b>	<b>0.007</b>						
sodium	mg/L	200 d	-	25	45	24	28	30	170	110	110	78	75	17000		20000	21000	70						
strontium	mg/L	-	-	7.8	21	7.5	9.9	10	6.9	8.3	14	15	14	180		240	220	55						
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	< 0.020	-	-	< 0.020	< 0.02	< 0.020	-		0.040	< 0.020	0.31						
sulphate	mg/L	500	-	-	-	-	52	41	-	-	-	130	120	-		1370	1200	94						
thallium	mg/L	-	0.0003	< 0.0005	<b>0.0033</b>	0.0002	<b>0.0006</b>	<b>0.0006</b>	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.000050	< 0.005		< 0.003	< 0.0025	<b>0.015</b>						
tin	mg/L	-	-	< 0.01	< 0.01	< 0.001	< 0.005	< 0.0050	< 0.001	< 0.001	< 0.001	< 0.001	0.0017	Note: Insufficient water	< 0.1	Note: Insufficient water	< 0.05	< 0.05	Note: Insufficient water	Note: Insufficient water	Note: Insufficient water	Note: Insufficient water	Note: Insufficient water	Note: Insufficient water
titanium	mg/L	-	-	0.76	5.6	0.38	1	1.4	0.056	0.039	0.015	0.028	0.17	< 0.5		0.96	0.91	9.1						
TSS	mg/L	-	-	-	-	3600	14000	12000	-	-	< 10	200	600	-		3800	1400	290000						
turbidity	NTU	1	-	-	-	3400	2700	3500	-	-	15	210	640	-		520	470	32000						
uranium	mg/L	0.02	0.005	0.005	<b>0.020</b>	0.002	0.005	<b>0.0062</b>	0.0008	0.0002	0.0001	0.0006	0.0017	< 0.01		<b>0.009</b>	< 0.0050	<b>0.19</b>						
vanadium	mg/L	-	0.006	<b>0.12</b>	<b>0.57</b>	<b>0.04</b>	<b>0.12</b>	<b>0.17</b>	0.006	0.004	< 0.001	0.0039	<b>0.01</b>	< 0.1		<b>0.19</b>	< 0.05	<b>2.7</b>						
zinc	mg/L	5	0.02	<b>0.47</b>	<b>2.10</b>	<b>0.11</b>	<b>0.38</b>	<b>1.20</b>	<b>0.03</b>	0.013	< 0.005	<b>0.032</b>	<b>0.033</b>	< 0.5		<b>1.6</b>	< 0.25	<b>11</b>						

**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, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-06 straddle					MW-06 deep				MW-07 shallow					MW-07 deep					MW-08 shallow					
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Oct-08	Oct-10	Nov-11	Nov-12	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	
aluminum	mg/L	0.1	[0.075] a	<b>230</b>	<b>330</b>	<b>210</b>	<b>12</b>	<b>19</b>	N O T  S A M P L E D	N O T  S A M P L E D	N O T  S A M P L E D	N O T  S A M P L E D	<b>610</b>	<b>1200</b>	<b>380</b>	<b>170</b>	<b>36</b>	<b>6.7</b>	<b>2.0</b>	<b>0.4</b>	<b>2.4</b>	<b>8.7</b>	<b>1900</b>	<b>1300</b>	<b>140</b>	<b>51</b>	<b>58</b>	
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	-	312	-	320	330					-	559	-	569	570	-	35	32	33	45	-	549	545	553	580	
ammonia as N	mg/L	-	-	-	0.66	-	0.17	0.32					-	-	-	0.32	0.28	-	-	19	19	22	-	-	548	0.09	1.3	
antimony	mg/L	-	[0.02]	< 0.005	< 0.005	0.01	< 0.0005	<0.0005					< 0.05	< 0.03	< 0.005	< 0.005	0.00051	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.025	< 0.05	< 0.03	< 0.005	< 0.0005	<0.00050
arsenic	mg/L	0.025	[0.005]	<b>0.069</b>	<b>0.110</b>	<b>0.051</b>	<b>0.02</b>	<b>0.02</b>					<b>0.24</b>	<b>0.480</b>	<b>0.180</b>	<b>0.081</b>	<b>0.017</b>	< 0.01	< 0.03	<b>0.023</b>	< 0.02	< 0.05	<b>0.64</b>	<b>0.500</b>	<b>0.054</b>	<b>0.03</b>	<b>0.03</b>	
barium	mg/L	1	-	3.2	5.5	2.3	0.27	0.31					5.3	11.0	3.8	1.9	0.31	0.094	< 0.1	< 0.1	0.08	0.22	17	13	1	1	0.57	
beryllium	mg/L	-	1.1	0.014	0.020	0.007	0.001	0.001					< 0.05	0.06	0.019	0.013	0.0023	< 0.005	< 0.01	< 0.01	< 0.01	< 0.025	<b>0.097</b>	0.08	0.008	0.0031	0.0036	
bismuth	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	<0.001					< 0.1	< 0.05	< 0.01	< 0.01	<0.0010	< 0.01	< 0.03	< 0.02	< 0.02	< 0.05	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010	
boron	mg/L	5	0.2	<b>0.52</b>	<b>0.90</b>	<b>0.49</b>	0.1	0.2					<b>3.1</b>	<b>6.9</b>	<b>5.5</b>	<b>5.6</b>	<b>6.4</b>	<b>6.6</b>	<b>6.4</b>	<b>7</b>	<b>6.1</b>	<b>9.4</b>	<b>4.2</b>	<b>3.7</b>	<b>2.0</b>	<b>1.1</b>	<b>1.8</b>	
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0					-	< 1	-	< 1	<1.0	-	203	-	224	320	-	< 1	-	< 1	<5.0	
cadmium	mg/L	0.005	0.0005	<b>0.004</b>	<b>0.005</b>	<b>0.001</b>	0.000	<b>0.001</b>					< 0.01	<b>0.026</b>	<b>0.004</b>	<b>0.002</b>	<b>0.001</b>	< 0.001	<b>0.013</b>	< 0.002	< 0.002	<b>0.009</b>	<b>0.018</b>	<b>0.017</b>	<b>0.001</b>	<b>0.001</b>	<b>0.001</b>	
calcium	mg/L	-	-	1700	2400	740	170	200					3600	8100	2800	1300	270	2700	2900	3300	3400	4000	11000	8000	740	520	470	
chromium	mg/L	0.05	-	0.38	0.48	0.18	0.021	0.030					1	2	0.6	0.28	0.062	< 0.05	< 0.1	< 0.1	< 0.1	< 0.25	3.3	2.1	0.2	0.095	0.100	
cobalt	mg/L	-	0.0009	<b>0.23</b>	<b>0.32</b>	<b>0.13</b>	<b>0.015</b>	<b>0.015</b>					<b>0.54</b>	<b>1.10</b>	<b>0.36</b>	<b>0.16</b>	<b>0.032</b>	<b>0.006</b>	< 0.01	< 0.01	< 0.01	< 0.025	<b>1.9</b>	<b>1.3</b>	<b>0.1</b>	<b>0.056</b>	<b>0.058</b>	
copper	mg/L	1	[0.005] b	<b>0.4</b>	<b>0.5</b>	<b>0.15</b>	<b>0.026</b>	<b>0.037</b>					<b>1.1</b>	<b>2.3</b>	<b>0.74</b>	<b>0.35</b>	<b>0.062</b>	<b>0.028</b>	<b>0.060</b>	< 0.020	< 0.02	<b>0.072</b>	<b>3.6</b>	<b>2.3</b>	<b>0.2</b>	<b>0.093</b>	<b>0.094</b>	
fluoride	mg/L	1.5 - 2.4	-	-	0.2	-	0.1	0.14					-	0.5	-	0.3	0.33	-	0.3	0.2	0.2	0.19	-	0.3	0.2	0.3	0.24	
free cyanide	mg/L	0.2	0.005	-	-	-	< 0.002	<0.0020					-	-	-	< 0.002	<0.0020	-	< 0.002	< 0.002	<0.0020	-	-	< 0.002	< 0.002	<0.0020		
hardness	mg CaCO <sub>3</sub> /L	80-100	-	-	-	-	400	370					-	-	-	630	610	-	-	10000	10000	13000	-	-	990	880	980	
iron	mg/L	0.3	0.3	<b>360</b>	<b>530</b>	<b>210</b>	<b>26</b>	<b>29</b>					<b>1100</b>	<b>2400</b>	<b>750</b>	<b>330</b>	<b>68</b>	<b>17</b>	<b>9</b>	<b>7</b>	<b>6.5</b>	<b>18.0</b>	<b>3500</b>	<b>2500</b>	<b>240</b>	<b>110</b>	<b>110</b>	
lead	mg/L	0.01	[0.005] c	<b>0.14</b>	<b>0.16</b>	<b>0.057</b>	<b>0.0087</b>	<b>0.01</b>					<b>0.55</b>	<b>1.10</b>	<b>0.33</b>	<b>0.16</b>	<b>0.032</b>	<b>0.009</b>	<b>0.01</b>	< 0.01	< 0.01	< 0.025	<b>1.4</b>	<b>1.00</b>	<b>0.10</b>	<b>0.06</b>	<b>0.05</b>	
magnesium	mg/L	-	-	260	350	150	45	60					740	1400	490	290	150	740	730	810	840	1000	2000	1400	270	200	260	
manganese	mg/L	0.05	-	16	22	7.2	0.98	1.1					30	67.0	22	10	1.7	1.6	1.5	1.6	1.7	2.3	110	82.0	6.4	4.1	3.6	
mercury	mg/L	0.001	0.0002	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	<0.00010					<b>0.0017</b> <sup>(2)</sup>	<b>0.0022</b>	< 0.0015	< 0.0001	<0.00010	< 0.0001	< 0.0001	< 0.0001	< 0.00010	<0.00010	<b>0.0036</b> <sup>(1)</sup>	<b>0.0020</b>	0.0001	< 0.0001	<0.00010	
molybdenum	mg/L	-	0.04	0.016	0.02	< 0.01	0.002	0.0027					< 0.1	<b>0.080</b>	0.032	0.018	0.01	< 0.01	< 0.03	< 0.02	< 0.01	< 0.025	< 0.1	<b>0.070</b>	0.014	0.009	0.0090	
nickel	mg/L	-	0.025	<b>0.480</b>	<b>0.730</b>	<b>0.28</b>	<b>0.031</b>	<b>0.034</b>					<b>1.3</b>	<b>2.5</b>	<b>0.81</b>	<b>0.36</b>	<b>0.067</b>	< 0.01	< 0.03	< 0.02	< 0.02	< 0.05	<b>4.2</b>	<b>2.8</b>	<b>0.3</b>	<b>0.12</b>	<b>0.12</b>	
nitrate as N	mg/L	10	-	-	0.4	-	< 0.1	<0.10					-	< 0.1	-	< 0.1	<0.10	-	< 0.1	< 0.1	< 0.1	< 0.10	-	< 0.1	< 0.1	0.3	<0.10	
nitrite as N	mg/L	1	-	-	0.07	-	0.02	0.014					-	0.06	-	0.01	<0.010	-	< 0.01	< 0.01	< 0.1	< 0.10	-	< 0.01	0.02	< 0.01	<0.010	
pH	pH Units	6.5-8.5	6.5-8.5	-	-	-	7.82	7.87					-	-	-	7.7	7.92	-	-	6.97	7.02	6.58	-	-	7.69	7.65	7.81	
phenol	mg/L	-	-	-	-	-	< 0.001	<0.0010					-	-	-	< 0.001	<0.0010	-	< 0.001	0.03	0.0025	-	-	< 0.001	< 0.001	<0.0010		
phosphate	mg/L	-	-	-	< 0.01	-	< 0.01	<0.010					-	< 0.01	-	< 0.01	<0.010	-	< 0.01	< 0.01	< 0.01	< 0.010	-	< 0.01	< 0.01	< 0.01	<0.010	
total phosphorous	mg/L	-	0.01	-	-	<b>6.6</b>	<b>0.89</b>	<b>1</b>	-	-	<b>34</b>	<b>9.9</b>	<b>1.8</b>	-	-	< 2	< 2	< 5	-	-	<b>6.7</b>	<b>3.9</b>	<b>3.8</b>					
potassium	mg/L	-	-	75	100	57	7.7	10	160	230	100	69	17	140	140	160	160	410	250	63	22	28						
selenium	mg/L	0.01	0.1	< 0.02	< 0.02	< 0.02	< 0.002	<0.002	< 0.2	< 0.1	< 0.02	< 0.02	<0.0020	0.021	< 0.05	0.045	< 0.04	< 0.1	< 0.2	< 0.1	< 0.02	0.007	<0.0020					
silicon	mg/L	-	-	85	430	180	25	40	140	970	460	240	62	15	10	6.3	7.3	15	250	940	190	61	73					
silver	mg/L	-	0.0001	< 0.001	< 0.001	< 0.001	< 0.0001	<0.0001	< 0.01	< 0.005	<b>0.002</b>	< 0.001	<b>0.00022</b>	< 0.001	< 0.003	< 0.002	< 0.002	< 0.0050	< 0.01	< 0.005	< 0.001	<b>0.0004</b>	<b>0.00033</b>					
sodium	mg/L	200 d	-	26	31	22	11	21	85	110	110	99	99	6600	6500	7200	7800	9000	140	120	93	76	98					
strontium	mg/L	-	-	10	14	7	2.4	3.5	14	25	11	6.6	3.2	56	60	66	68	81	53	41	14	8.3	12					
sulphide	mg/L	0.05	-	-	-	-	< 0.02	<0.020	-	-	-	0.02	0.027	-	-	< 0.020	< 0.02	< 0.020	-	-	< 0.020	< 0.02	0.48					
sulphate	mg/L	500	-	-	-	-	63	73	-	-	-	182	170	-	-	-	1560	1500	-	-	-	423	560					
thallium	mg/L	-	0.0003	<b>0.0023</b>	<b>0.0031</b>	<b>0.0018</b>	0.00022	0.00012	<b>0.007</b>	<b>0.012</b>	<b>0.0045</b>	<b>0.0026</b>	<b>0.00047</b>	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.0025	<b>0.014</b>	<b>0.010</b>	<b>0.002</b>	<b>0.00046</b>	<b>0.00042</b>					
tin	mg/L	-	-	< 0.01	< 0.01	< 0.01	< 0.001	<0.001	< 0.1	< 0.05	0.012	< 0.01	<0.0010	< 0.01	< 0.03	< 0.02	< 0.02	< 0.05	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010					
titanium	mg/L	-	-	2.3	4.7	2.1	0.22	0.42	4.9	14	7.2	4	0.92	0.12	< 0.1	< 0.1	< 0.1	< 0.25	8.8	12	2.4	0.81	0.82					
TSS	mg/L	-	-	-	-	-	1500	1100	-	-	-	10000	2200	-	-	-	310	2100	-	-	9000	5700	5200					
turbidity	NTU	1	-	-	-	-	670	1100	-	-	-	14000	770	-	-	-	330	210	-	-	14000	710	2500					
uranium	mg/L	0.02	0.005	<b>0.017</b>	<b>0.017</b>	<b>0.007</b>	0.002	0.0025	<b>0.086</b>	<b>0.140</b>	<b>0.047</b>	<b>0.029</b>	<b>0.011</b>	0.002	< 0.003	< 0.002	< 0.002	< 0.0050	<b>0.13</b>	<b>0.08</b>	<b>0.02</b>	<b>0.015</b>	<b>0.014</b>					
vanadium	mg/L	-	0.006	<b></b>																								



**TABLE D.2**  
Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses  
Tansley Quarry, Burlington, Ontario

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-08 intermediate						MW-08 deep					MW-09 shallow					MW-09 intermediate					
				Oct-08	Nov-09	Oct-10	Oct-10 DUP 1	Nov-11	Nov-11 DUP 1	Nov-12	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L	0.1	[0.075] a	2	1	0.29	0.74	0.61	0.55	8.6	0.88	0.41	670	97	4	47	160	4	22	61	180	310	33	22	27
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	-	146	139	145	163	168	150	-	412	59	67	440	-	438	412	398	390	-	305	261	239	220
ammonia as N	mg/L	-	-	-	-	5.6	5	6.1	5.8	5.8	-	-	39	35	0.10	-	-	0.17	0.36	0.39	-	2.5	2.2	1.7	2.6
antimony	mg/L	-	[0.02]	< 0.005	< 0.0005	< 0.0005	< 0.0005	0.004	< 0.003	< 0.0025	< 0.001	< 0.0005	< 0.03	< 0.03	< 0.00050	< 0.001	< 0.005	< 0.0005	< 0.0005	< 0.00050	< 0.005	< 0.005	< 0.0005	< 0.0005	< 0.00050
arsenic	mg/L	0.025	[0.005]	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0057	0.006	< 0.005	0.39	0.093	0.0087	0.021	0.130	0.004	0.013	0.034	0.054	0.10	0.02	0.02	0.05
barium	mg/L	1	-	< 0.05	0.018	0.015	0.016	0.02	0.021	0.26	0.018	0.016	5	1.1	0.041	0.44	2.0	0.1	0.3	0.75	2.1	4	0.48	0.28	0.46
beryllium	mg/L	-	1.1	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.003	< 0.0025	< 0.001	< 0.0005	0.032	< 0.03	< 0.00050	0.003	0.008	< 0.0005	0.0011	0.0035	0.009	0.017	0.0021	0.0012	0.0020
bismuth	mg/L	-	-	< 0.01	< 0.001	< 0.001	< 0.001	0.007	< 0.005	< 0.0050	< 0.001	< 0.001	< 0.05	< 0.05	< 0.0010	< 0.001	< 0.01	< 0.001	< 0.001	< 0.0010	< 0.01	< 0.01	< 0.001	< 0.001	< 0.0010
boron	mg/L	5	0.2	5.9	6.2	6.1	5.9	5.7	5.6	6.2	3.7	4.6	6.8	4.9	4.4	0.54	4.0	0.6	1.8	1.3	3.7	5.2	3.6	3.7	4.7
bromide	mg/L	-	-	-	23	-	-	23	21	60	-	3	-	523	< 5.0	-	< 1	-	< 1	< 1.0	-	1	-	3	< 10
cadmium	mg/L	0.005	0.0005	< 0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	0.001	0.0018	0.0002	0.026	< 0.005	0.0049	0.0008	0.0050	< 0.0001	0.0003	0.001	0.002	0.003	0.0003	0.0002	0.001
calcium	mg/L	-	-	430	470	460	460	580	590	650	150	260	11000	8600	150	280	1200	66	170	440	1300	2200	390	220	520
chromium	mg/L	0.05	-	< 0.05	< 0.005	< 0.005	< 0.005	< 0.03	< 0.03	< 0.025	0.018	< 0.005	1.3	< 0.3	0.093	0.12	0.41	0.01	0.057	0.170	0.36	0.52	0.06	0.043	0.06
cobalt	mg/L	-	0.0009	< 0.005	< 0.0005	< 0.0005	< 0.0005	< 0.003	< 0.003	0.005	0.0007	< 0.0005	0.63	0.1	0.0022	0.049	0.160	0.004	0.022	0.067	0.16	0.26	0.03	0.021	0.030
copper	mg/L	1	[0.005] b	< 0.01	0.001	< 0.001	< 0.001	< 0.005	< 0.005	0.019	0.037	< 0.001	1.1	0.13	0.019	0.054	0.170	0.004	0.022	0.064	0.15	0.20	0.02	0.018	0.027
fluoride	mg/L	1.5 - 2.4	-	-	0.4	0.4	0.4	0.4	0.5	0.42	-	0.3	< 0.1	< 0.1	0.28	-	0.2	0.2	0.2	0.27	-	0.5	0.3	0.4	0.44
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0020	-	-	< 0.002	< 0.002	< 0.0020	-	-	< 0.002	< 0.002	< 0.0020	-	< 0.002	< 0.002	< 0.0020	
hardness	mg CaCO <sub>3</sub> /L	80-100	-	-	-	2000	2000	1700	1700	4100	-	-	18000	27000	660	-	-	410	380	380	-	-	600	760	600
iron	mg/L	0.3	0.3	3	2	1.2	1.5	1.8	2.5	13.0	2.3	1.3	1300	200	6.5	76	290	6	35	110	260	410	45	34	54
lead	mg/L	0.01	[0.005] c	< 0.005	0.0006	< 0.0005	< 0.0005	< 0.003	< 0.003	0.02	0.003	< 0.0005	0.33	0.049	0.0025	0.026	0.090	0.002	0.013	0.038	0.1	0.2	0.02	0.013	0.026
magnesium	mg/L	-	-	120	140	150	150	160	170	200	92	120	2400	1800	130	99	700	64	79	110	190	300	82	58	100
manganese	mg/L	0.05	-	0.22	0.20	0.21	0.21	0.24	0.25	0.70	0.15	0.16	31	9	0.19	2.4	7.1	0.2	1.2	3.9	10	18.0	2.4	1.2	3.4
mercury	mg/L	0.001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.0001	< 0.0001	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.00010	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.00010	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	< 0.00010
molybdenum	mg/L	-	0.04	< 0.010	0.007	0.007	0.007	0.007	0.006	0.0064	0.006	0.006	0.14	< 0.03	0.0077	0.015	0.080	0.008	0.010	0.012	0.035	0.050	0.011	0.012	0.013
nickel	mg/L	-	0.025	< 0.010	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	0.019	0.003	1.4	0.19	0.023	0.1	0.3	0.008	0.044	0.14	0.36	0.6	0.071 <sup>(1)</sup>	0.046	0.065
nitrate as N	mg/L	10	-	-	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.10	-	< 0.1	< 0.1	1.6	-	2.1	0.4	0.2	0.13	-	< 0.1	< 0.1	1.8	0.14	
nitrite as N	mg/L	1	-	< 0.01	0.01	< 0.01	0.03	0.04	0.038	-	0.01	0.05	< 0.1	0.066	-	< 0.01	0.04	0.03	0.012	-	< 0.01	0.02	0.44	0.053	
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.55	7.59	7.64	7.58	7.59	-	-	6.76	6.75	7.89	-	-	7.87	7.85	8.01	-	7.8	7.81	7.77	7.84
phenol	mg/L	-	-	-	-	0.001	< 0.001	0.005	0.004	< 0.0010	-	-	< 0.001	0.26	< 0.0010	-	< -	< 0.001	< 0.001	< 0.0010	-	< 0.001	< 0.001	< 0.0010	
phosphate	mg/L	-	-	< 0.01	0.01	0.01	< 0.01	0.01	0.01	< 0.010	-	< 0.01	< 0.01	< 0.01	< 0.010	-	< 0.01	0.01	< 0.01	< 0.010	-	< 0.01	< 0.01	< 0.010	
total phosphorous	mg/L	-	0.01	-	-	< 0.1	< 0.1	< 0.5	< 0.5	0.57	-	-	26	< 5	< 0.1	-	-	0.14	1.1	3.3	-	-	1.8	1.1	2.6
potassium	mg/L	-	-	43	46	47	47	49	50	52	27	28	450	300	37	30	150	13	17	25	88	130	30	26	33
selenium	mg/L	0.01	0.1	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	< 0.1	< 0.0020	< 0.002	< 0.02	< 0.002	< 0.002	< 0.0020	< 0.02	< 0.002	< 0.002	< 0.0020	
silicon	mg/L	-	-	7.6	5.8	4.6	5.5	4.7	4.2	19	6.8	6.4	700	130	17	70	310	14	39	73	77	420	51	38	46
silver	mg/L	-	0.0001	< 0.001	0.0003	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.00050	< 0.0001	< 0.0001	< 0.005	< 0.005	< 0.00010	0.0003	< 0.001	< 0.0001	0.0002	0.00058	0.003	0.002	0.0002	0.0002	0.00029
sodium	mg/L	200 d	-	1100	1100	1100	1100	1300	1300	1500	210	540	18000	15000	290	36	310	34	37	37	170	200	190	120	250
strontium	mg/L	-	-	12	12	14	14	16	16	17	13	200	170	20	8.9	48	6.6	7	8.9	22	34	18	19	21	
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.020	< 0.02	< 0.020	< 0.020	-	-	0.130	< 0.02	< 0.020	-	-	< 0.02	< 0.02	< 0.020	-	-	< 0.02	< 0.020	
sulphate	mg/L	500	-	-	-	-	-	965	976	1000	-	-	-	1130	430	-	-	59	50	-	-	-	-	468	560
thallium	mg/L	-	0.0003	< 0.0005	< 0.00005	< 0.00005	< 0.00005	< 0.0003	< 0.0003	< 0.00025	< 0.00005	< 0.00005	0.005	< 0.003	< 0.000050	0.00038	0.00150	< 0.00005	0.00018	0.00051	0.0019	0.0026	0.0003	0.0002	0.00026
tin	mg/L	-	-	< 0.01	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.0050	0.001	< 0.001	0.11	< 0.05	0.0012	0.001	< 0.01	< 0.001	< 0.001	0.0011	< 0.01	< 0.01	< 0.001	< 0.001	
titanium	mg/L	-	-	0.058	0.038	0.013	0.03	< 0.03	< 0.03	0.32	0.026	0.034	7.5	1.8	0.2	0.6	2.6	0.063	0.35	0.67	1.7	4.0	0.4	0.3	0.41
TSS	mg/L	-	-	-	-	27	26	32	29	4000	-	-	44000	9100	27	-	-	180	4900	4500	-	16000	3300	3100	2700
turbidity	NTU	1	-	-	-	14	22	30	21	1000	-	-	96000	1900	29	-	-	330	3200	2000	-	-	3400	920	470
uranium	mg/L	0.02	0.005																						

**TABLE D.2**  
**Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses**  
**Tansley Quarry, Burlington, Ontario**

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-09 deep				MW-10 shallow					MW-10 intermediate				MW-10 deep				MW-11 shallow				
				Oct-08	Oct-10	Nov-11	Nov-12	Oct-08	Nov-09	Oct-10	Nov-11	Nov-12	Oct-08	Oct-10	Nov-11	Nov-12	Oct-08	Oct-10	Nov-11	Nov-12	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L	0.1	[0.075] a			<b>0.75</b>	<b>1.3</b>	<b>1000</b>	<b>1800</b>	<b>420</b>	<b>90</b>	<b>870</b>	<b>510</b>	<b>9.3</b>	<b>28</b>	<b>5.2</b>			<b>4.5</b>	<b>0.37</b>	<b>840</b>	<b>880</b>	<b>470</b>	<b>49</b>	<b>49</b>
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-			52	52	-	475	472	485	490	-	400	416	410			40	66	-	321	322	341	340
ammonia as N	mg/L	-	-			40	36	-	-	0.43	0.13	0.42	-	0.92	0.82	0.99			34	28	-	-	0.21	0.18	0.26
antimony	mg/L	-	[0.02]			0.0053	<0.025	< 0.05	< 0.03	0.006	< 0.003	<0.05	< 0.005	< 0.0005	< 0.0005	<0.0005			< 0.0005	<0.005	< 0.05	< 0.03	< 0.005	< 0.0005	<0.00050
arsenic	mg/L	0.025	[0.005]			<b>0.024</b>	<0.05	<b>0.27</b>	<b>0.59</b>	<b>0.12</b>	<b>0.054</b>	<b>0.300</b>	<b>0.11</b>	<b>0.01</b>	<b>0.16</b>	<b>0.032</b>			<b>0.031</b>	<0.05	<b>0.4</b>	<b>0.4</b>	<b>0.2</b>	<b>0.022</b>	<b>0.029</b>
barium	mg/L	1	-			0.15	0.15	13	26	5	2	11	6.9	0.3	0.56	0.14			0.19	0.1	18	18	9	1	1
beryllium	mg/L	-	1.1			0.0016	<0.025	0.057	0.10	0.02	0.01	0.051	0.025	0.0007	0.0019	<0.0005			< 0.0005	<0.005	< 0.05	0.04	0.024	0.0027	0.0030
bismuth	mg/L	-	-			< 0.001	<0.05	< 0.1	< 0.05	< 0.01	< 0.005	<0.1	< 0.01	< 0.001	< 0.001	<0.001			< 0.001	<0.01	< 0.1	< 0.05	< 0.01	< 0.001	<0.0010
boron	mg/L	5	0.2			<b>5.3</b>	<b>5</b>	<b>1.4</b>	<b>3.1</b>	<b>0.8</b>	<b>0.24</b>	<b>2.10</b>	<b>4.3</b>	<b>1.0</b>	<b>0.75</b>	<b>0.63</b>			<b>6</b>	<b>8.1</b>	<b>1.5</b>	<b>1.3</b>	<b>0.8</b>	<b>0.1</b>	<b>0.14</b>
bromide	mg/L	-	-			696	590	-	< 1	-	< 1	<1.0	-	-	< 1	<1.0			538	390	-	< 1	-	< 1	<1.0
cadmium	mg/L	0.005	0.0005			<b>0.0012</b>	<b>0.006</b>	< 0.01	<b>0.0190</b>	<b>0.003</b>	<b>0.0018</b>	<0.01	<b>0.005</b>	0.0001	<b>0.0011</b>	<b>0.00054</b>			<b>0.012</b>	<b>0.0087</b>	< 0.0100	<b>0.0100</b>	<b>0.006</b>	<b>0.0007</b>	<b>0.0011</b>
calcium	mg/L	-	-			8800	9100	7800	17000	2900	1200	6400	2800	120	330	120			5600	5300	7600	7800	3900	400	450
chromium	mg/L	0.05	-			0.035	<0.25	2	4	1	0.14	1.50	0.79	0.01	0.052	0.011			0.62	0.22	3.4	2.9	1.4	0.14	0.15
cobalt	mg/L	-	0.0009			< 0.0005	<0.025	<b>1.1</b>	<b>2.0</b>	<b>0.4</b>	<b>0.092</b>	<b>0.910</b>	<b>0.51</b>	<b>0.01</b>	<b>0.031</b>	<b>0.0039</b>			<b>0.012</b>	<0.01	<b>0.88</b>	<b>0.85</b>	<b>0.42</b>	<b>0.045</b>	<b>0.049</b>
copper	mg/L	1	[0.005] b			<b>0.033</b>	<0.05	<b>1.4</b>	<b>2.5</b>	<b>0.6</b>	<b>0.18</b>	<b>1.30</b>	<b>0.43</b>	<b>0.01</b>	<b>0.031</b>	<b>0.0056</b>			<b>0.051</b>	<b>0.018</b>	<b>2.3</b>	<b>2.3</b>	<b>1.1</b>	<b>0.11</b>	<b>0.14</b>
fluoride	mg/L	1.5 - 2.4	-			< 0.1	<0.10	-	0.3	0.2	0.2	0.20	-	0.2	0.2	0.2			<0.1	0.14	-	0.3	0.2	0.1	0.14
free cyanide	mg/L	0.2	0.005			< 0.002	<0.0020	-	-	< 0.002	< 0.002	<0.0020	-	< 0.002	< 0.002	<0.0020			< 0.002	<0.0020	-	< 0.002	< 0.002	<0.0020	
hardness	mg CaCO <sub>3</sub> /L	80-100	-			28000	29000	-	-	480	500	480	-	370	340	380			25000	17000	-	-	550	390	410
iron	mg/L	0.3	0.3			<b>25</b>	<b>19</b>	<b>1700</b>	<b>3200</b>	<b>660</b>	<b>170</b>	<b>1500</b>	<b>780</b>	<b>15</b>	<b>66</b>	<b>9.7</b>			<b>18</b>	<b>2.8</b>	<b>1700</b>	<b>1600</b>	<b>840</b>	<b>89</b>	<b>100</b>
lead	mg/L	0.01	[0.005] c			0.0041	<0.025	<b>0.65</b>	<b>1</b>	<b>0.21</b>	<b>0.12</b>	<b>0.51</b>	<b>0.21</b>	0.0046	<b>0.018</b>	0.0036			<b>0.011</b>	<b>0.011</b>	<b>0.68</b>	<b>0.66</b>	<b>0.35</b>	<b>0.031</b>	<b>0.042</b>
magnesium	mg/L	-	-			2000	2100	1200	2300	490	220	1000	480	66	94	65			1500	1600	960	960	480	100	93
manganese	mg/L	0.05	-			4.7	4.7	71	150	28	11	61	27	1	2.5	0.62			2.5	2.4	79	82	42	3.6	4.2
mercury	mg/L	0.001	0.0002			< 0.0001	<0.00010	< 0.0015 <sup>(1)</sup>	< 0.0015	< 0.0001	< 0.0001	<0.00010	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	<0.00010			< 0.0001	<0.00010	< 0.0015 <sup>(1)</sup>	<b>0.0003</b>	< 0.0001	< 0.0001	<0.00010
molybdenum	mg/L	-	0.04			0.0089	<0.025	< 0.1	< 0.05	0.02	0.005	<0.05	0.023	0.004	0.0045	0.0032			<b>0.24</b>	<b>0.26</b>	< 0.1	< 0.05	0.029	0.0054	0.0052
nickel	mg/L	-	0.025			0.006	<0.05	<b>2.2</b>	<b>4.1</b>	<b>0.9</b>	<b>0.18</b>	<b>1.90</b>	<b>1</b>	0.019	<b>0.06</b>	0.0087			<b>0.38</b>	<b>0.28</b>	<b>1.8</b>	<b>1.8</b>	<b>0.9</b>	<b>0.1</b>	<b>0.1</b>
nitrate as N	mg/L	10	-			< 0.1	<0.10	-	0.4	< 0.1	< 0.1	0.11	-	< 0.1	0.7	0.36			0.1	<0.10	-	< 0.1	< 0.1	< 0.1	<0.10
nitrite as N	mg/L	1	-			< 0.1	<0.10	-	0.03	0.05	< 0.01	<0.010	-	0.08	0.1	0.14			< 0.1	<0.10	-	0.03	0.02	0.02	<0.010
pH	pH Units	6.5-8.5	6.5-8.5			6.84	<b>6.19</b>	-	-	7.7	7.83	7.98	-	7.8	7.83	7.96			6.6	8.22	-	-	7.88	7.95	8.01
phenol	mg/L	-	-			0.08	0.07	-	-	< 0.001	< 0.001	<0.0010	-	< 0.001	< 0.001	<0.0010			0.05	0.0022	-	-	< 0.001	< 0.001	<0.0010
phosphate	mg/L	-	-			< 0.01	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010	-	< 0.01	< 0.01	<0.010			< 0.01	<0.010	-	< 0.01	< 0.01	< 0.01	<0.010
total phosphorous	mg/L	-	0.01			< 0.1	<5	-	-	<b>26</b>	<b>11</b>	<b>57</b>	-	<b>0.56</b>	<b>2.4</b>	<b>0.56</b>			< 0.1	<1	-	-	<b>28</b>	<b>2.4</b>	<b>2.6</b>
potassium	mg/L	-	-			310	320	270	360	120	30	200	150	15	18	12			240	240	220	190	110	16	15
selenium	mg/L	0.01	0.1			0.053	<0.1	< 0.2	< 0.1	< 0.02	< 0.01	<0.2	< 0.02	< 0.002	< 0.002	<0.002			0.08	<b>0.11</b>	< 0.2	< 0.1	< 0.02	< 0.002	<0.0020
silicon	mg/L	-	-			< 3	6	190	1100	440	83	870	130	22	8.4	17			< 3	<5	86	790	550	67	69
silver	mg/L	-	0.0001			<b>0.0003</b>	<0.005	< 0.01	<b>0.005</b>	<b>0.002</b>	<b>0.0006</b>	<0.01	<b>0.001</b>	< 0.0001	0.0001	<0.0001			<b>0.0002</b>	<0.001	< 0.01	< 0.005	<b>0.003</b>	<b>0.0003</b>	<b>0.00031</b>
sodium	mg/L	200 d	-			18000	19000	74	67	29	26	59	85	35	31	27			16000	16000	60	54	22	15	11
strontium	mg/L	-	-			180	190	24	40	8.9	4.5	18	27	12	13	11			120	120	16	16	8.5	1.8	1.9
sulphide	mg/L	0.05	-			< 0.02	<0.020	-	-	0.230	< 0.02	0.047	-	<0.02	< 0.02	<0.020			< 0.02	<0.020	-	-	0.170	0.06	0.042
sulphate	mg/L	500	-			1470	1300	-	-	58	52	-	-	39	41	-			1360	1700	-	-	-	79	71
thallium	mg/L	-	0.0003			< 0.0005	<0.0025	<b>0.007</b>	<b>0.012</b>	<b>0.004</b>	<b>0.0009</b>	<b>0.0068</b>	<b>0.004</b>	0.00009	0.00027	0.000066			< 0.0005	<0.005	<b>0.009</b>	<b>0.007</b>	<b>0.004</b>	<b>0.00044</b>	<b>0.00049</b>
tin	mg/L	-	-			< 0.001	<0.05	< 0.1	< 0.05	< 0.01	< 0.005	<0.1	< 0.01	< 0.001	< 0.001	<0.001			< 0.001	<0.01	< 0.100	< 0.05	< 0.01	< 0.001	<0.0010
titanium	mg/L	-	-			0.021	<0.25	5.3	12	6.1	1.3	8	3.5	0.14	0.42	0.12			0.099	<0.05	4.8	7.9	5.9	0.57	0.52
TSS	mg/L	-	-			390	260	-	-	91000	10000	27000	-	440	2700	1900			770	150	-	-	88000	2300	7100
turbidity	NTU	1	-			150	38	-	-	94000	1500	1200	-	340	540	500			280	41	-	-	62000	840	1900
uranium	mg/L	0.02	0.005			<b>0.0057</b>	<b>0.011</b>	<b>0.09</b>	<b>0.13</b>	<b>0.03</b>	<b>0.027</b>	<b>0.059</b>	<b>0.03</b>	0.0011	0.002	0.00073			<b>0.022</b>	<b>0.0097</b>	<b>0.093</b>	<b>0.066</b>	<b>0.04</b>	<b>0.0057</b>	<b>0.0069</b>
vanadium	mg/L	-	0.006			<b>0.0074</b>	<0.05	<b>1.80&lt;/</b>																	

**TABLE D.2**  
**Groundwater Quality in On-Site Monitoring Wells - Total Metals Analyses**  
**Tansley Quarry, Burlington, Ontario**

Parameter	Units	ODWS (June 2006)	PWQO (July 1994)	MW-11 intermediate					MW-11 deep			
				Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	Oct-08	Oct-10	Nov-11	Nov-12
aluminum	mg/L	0.1	[0.075] a	12	5	2	13	91	N O T  S A M P L E D	17	17	1.4
alkalinity	mg CaCO <sub>3</sub> /L	30-500	-	-	431	453	450	400		-	50	55
ammonia as N	mg/L	-	-	-	-	1.3	1.5	1.8		-	34	35
antimony	mg/L	-	[0.02]	< 0.001	0.0006	< 0.0005	< 0.0005	<0.0025		< 0.03	< 0.03	<0.025
arsenic	mg/L	0.025	[0.005]	<b>0.019</b>	<b>0.015</b>	<b>0.013</b>	<b>0.02</b>	<b>0.078</b>		<b>0.061</b>	< 0.05	<0.05
barium	mg/L	1	-	0.14	0.085	0.057	0.18	1		< 0.3	0.31	0.15
beryllium	mg/L	-	1.1	0.001	< 0.0005	< 0.0005	0.0006	0.0060		< 0.03	< 0.03	<0.025
bismuth	mg/L	-	-	< 0.001	< 0.001	0.003	< 0.001	<0.0050		< 0.05	< 0.05	<0.05
boron	mg/L	5	0.2	1.4	1.6	1.3	1.4	1.7		4.8	5.1	5
bromide	mg/L	-	-	-	< 1	-	< 1	<1.0		-	< 500	580
cadmium	mg/L	0.005	0.0005	0.0002	< 0.0001	< 0.0001	0.0003	<b>0.0015</b>		<b>0.013</b>	<b>0.014</b>	<b>0.0073</b>
calcium	mg/L	-	-	210	140	99	250	1500		6700	7700	7400
chromium	mg/L	0.05	-	0.025	0.012	0.006	0.026	0.19		< 0.3	0.6	<0.25
cobalt	mg/L	-	0.0009	<b>0.012</b>	<b>0.007</b>	<b>0.002</b>	<b>0.014</b>	<b>0.120</b>		< 0.030	< 0.03	<0.025
copper	mg/L	1	[0.005] b	<b>0.022</b>	<b>0.011</b>	0.005	<b>0.028</b>	<b>0.240</b>		<b>0.096</b>	<b>0.068</b>	<0.05
fluoride	mg/L	1.5 - 2.4	-	-	0.3	0.3	0.3	0.29		0.1	0.1	0.12
free cyanide	mg/L	0.2	0.005	-	-	< 0.002	< 0.002	<0.0020		< 0.002	< 0.002	<0.0020
hardness	mg CaCO <sub>3</sub> /L	80-100	-	-	-	450	490	430		-	26000	27000
iron	mg/L	0.3	0.3	20	11	5	25	210		67	84	16
lead	mg/L	0.01	[0.005] c	<b>0.008</b>	0.0046	0.0017	<b>0.0096</b>	<b>0.081</b>		< 0.03	< 0.03	<0.025
magnesium	mg/L	-	-	87	70	72	86	180		1500	1800	1700
manganese	mg/L	0.05	-	1.3	0.6	0.2	1.6	13.0		4.2	5.1	4
mercury	mg/L	0.001	0.0002	< 0.0015 <sup>(1)</sup>	< 0.0001	< 0.0001	< 0.0001	<0.00010		< 0.0001	< 0.0001	<0.00010
molybdenum	mg/L	-	0.04	0.004	0.004	0.004	0.0039	0.0068		< 0.05	< 0.03	<0.025
nickel	mg/L	-	0.025	0.023	0.012	0.005	<b>0.028</b>	<b>0.24</b>		< 0.05	<b>0.095</b>	<b>0.21</b>
nitrate as N	mg/L	10	-	-	< 0.1	< 0.1	< 0.1	<0.10		-	< 0.1	<0.10
nitrite as N	mg/L	1	-	-	< 0.01	< 0.01	< 0.01	<0.010		-	< 0.01	<0.010
pH	pH Units	6.5-8.5	6.5-8.5	-	-	7.88	7.95	8.00		-	6.69	<b>6.14</b>
phenol	mg/L	-	-	-	-	< 0.001	< 0.001	<0.0010		< 0.001	< 0.017	0.0091
phosphate	mg/L	-	-	-	< 0.01	< 0.01	< 0.01	<0.010		< 0.01	< 0.01	<0.010
total phosphorous	mg/L	-	0.01	-	-	<b>0.19</b>	<b>1.6</b>	<b>10</b>	< 5	< 5	<5	
potassium	mg/L	-	-	21	18	18	22	33	260	280	270	
selenium	mg/L	0.01	0.1	< 0.002	< 0.002	< 0.002	< 0.002	<0.01	< 0.1	< 0.1	<0.1	
silicon	mg/L	-	-	27	17	12	27	91	25	3.1	5.5	
silver	mg/L	-	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	<0.00050	< 0.005	< 0.005	<0.005	
sodium	mg/L	200 d	-	64	64	60	70	63	14000	16000	16000	
strontium	mg/L	-	-	12	11	12	11	14	130	160	160	
sulphide	mg/L	0.05	-	-	-	< 0.020	< 0.02	0.021	0.040	< 0.02	<0.020	
sulphate	mg/L	500	-	-	-	-	147	160	-	1410	1300	
thallium	mg/L	-	0.0003	0.00009	0.00007	< 0.00005	0.00012	<b>0.00051</b>	< 0.003	< 0.003	<0.0025	
tin	mg/L	-	-	< 0.001	< 0.001	0.001	< 0.001	<0.0050	< 0.05	< 0.05	<0.05	
titanium	mg/L	-	-	0.2	0.097	0.038	0.24	1.1	< 0.3	< 0.3	<0.25	
TSS	mg/L	-	-	-	-	240	1900	14000	-	1200	3000	
turbidity	NTU	1	-	-	-	210	410	900	-	140	320	
uranium	mg/L	0.02	0.005	0.0017	0.0009	0.0008	0.0014	<b>0.0094</b>	<b>0.011</b>	<b>0.01</b>	<b>0.015</b>	
vanadium	mg/L	-	0.006	<b>0.025</b>	<b>0.011</b>	0.005	<b>0.025</b>	<b>0.190</b>	<b>0.140</b>	< 0.03	<0.025	
zinc	mg/L	5	0.02	<b>0.06</b>	<b>0.03</b>	0.02	<b>0.069</b>	<b>0.55</b>	<b>0.79</b>	<b>0.37</b>	<0.25	

**NOTES:**  
 Shaded area indicates an exceedance of the MOE Ontario Drinking Water Standard (June 2006) for that specific parameter.  
 Bolded areas indicate an exceedance of the MOE Provincial Water Quality Objectives (July 1994) for that specific parameter.  
 [ ] indicate interim PWQO concentration  
 a = interim PWQO at pH > 6.5 to 9.0 measured in clay-free samples.  
 b = interim PWQO if hardness greater than 20 mg/L.  
 c = interim PWQO if hardness greater than 80 mg/L.  
 d = Local Medical Office of Health should be notified when sodium concentrations exceed 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium reduced diets.  
 (1) Sample bottle contained visible sediment. Results may be biased high due to analyte present in sediment.

Table D.3  
Groundwater Quality - Bekkers Well  
Tansley Quarry - Hanson 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
aluminum	mg/L				0.1	0.038	0.01	0.012	0.015	<0.005	0.0078
alkalinity	mg CaCO <sub>3</sub> /L				30-500	362	435	77	295	172	100
ammonia-N	mg/L					0.31	<0.05	1.0	0.84	0.43	0.94
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
arsenic	mg/L		0.025			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
barium	mg/L	1				0.037	0.022	0.010	0.015	0.022	0.016
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
boron	mg/L		5			0.69	0.46	1.8	1.5	1.5	1.6
bromide	mg/L					<1	<1	3	1	<10	<10
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.00057
calcium	mg/L					140	130	190	190	190	170
chloride	mg/L			250		104	49	<b>264</b>	118	195	<b>270</b>
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
copper	mg/L			1		0.069	0.014	0.006	0.005	0.021	0.031
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.3	0.26
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
hardness	mg CaCO <sub>3</sub> /L				80-100	<b>760</b>	<b>890</b>	<b>740</b>	<b>810</b>	<b>780</b>	<b>720</b>
iron	mg/L			0.3		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1
lead	mg/L	0.01 [c]				0.0063	<0.0005	0.0010	0.0014	0.0023	0.0034
magnesium	mg/L					130	140	79	96	100	71
manganese	mg/L			0.05		0.043	0.011	<b>0.15</b>	<b>0.1</b>	<b>0.071</b>	<b>0.084</b>
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
molybdenum	mg/L					0.007	0.007	0.018	0.016	0.015	0.015
nickel	mg/L					<0.001	<0.001	<0.001	<0.001	0.005	0.032
nitrate as N	mg/L	10.0 [b]				3	2.9	<0.1	2.4	1.3	0.27
nitrite as N	mg/L	1.0 [b]				0.11	<0.01	<0.01	0.06	0.05	<0.01
pH	pH Units				6.5-8.5	8.1	8.2	7.8	7.91	7.96	6.9
phenol	mg/L					<0.001	<0.001	0.001	<0.001	<0.001	<0.001
phosphate	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
total phosphorous	mg/L					0.005	0.01	<0.002	<0.002	0.007	<0.1
potassium	mg/L					13	9.6	17	17	16	15
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
silicon	mg/L					6	6.4	4.3	4.5	5.3	3.7
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
sodium	mg/L			20/200 [f]		120	83	<b>260</b>	<b>260</b>	<b>210</b>	<b>230</b>
strontium	mg/L					6.1	5	12	12	11	12
sulphate	mg/L			500 [d]		<b>563</b>	<b>543</b>	<b>838</b>	<b>617</b>	<b>762</b>	<b>850</b>
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
thallium	mg/L					<0.05	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L					0.001	<0.001	<0.001	<0.001	<0.001	<0.001
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TSS	mg/L					<10	<10	<10	<10	<10	<10
turbidity	NTU			5 [e]		1.4	0.3	0.6	0.3	<0.2	0.4
uranium	mg/L					0.0057	0.0074	0.0004	0.0017	0.003	0.00087
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0009	0.00064
zinc	mg/L			5		0.04	0.032	<0.03	0.017	0.38	2.2

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

**Table D.4  
Groundwater Quality - Eno/Myers Well  
Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				ENO/MEYERS						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L				0.1	0.12	0.036					
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /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	<0.1					
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					
titanium	mg/L					<0.01	<0.005					
TSS	mg/L					2	2					
turbidity	NTU			5 [e]		<0.1	1.6					
uranium	mg/L					0.0042	0.0024					
vanadium	mg/L					<0.002	<0.001					
zinc	mg/L			5		0.4	0.014					

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.  
**bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

**Table D.5**  
**Groundwater Quality - Featherstone Well**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				FEATHERSTONE									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	
aluminum	mg/L				0.1	<0.005	0.007	<0.01	0.029	0.005					
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /L				80-100	<b>724</b>	<b>197</b>	<b>570</b>	<b>480</b>	<b>600</b>					
iron	mg/L			0.3		<b>0.81</b>	<b>0.12</b>	<b>0.41</b>	<b>0.24</b>	<b>0.35</b>					
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		<b>0.06</b>	0.02	0.046	0.026	<b>0.051</b>					
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	<0.1	<0.1					
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]		<b>601</b>	137	<b>560</b>	210	<b>559</b>					
thallium	mg/L					0.00006	<0.00005	<0.00005	<0.00005	<0.00005					
tin	mg/L					<0.001	<0.001	-	<0.001	0.001					
titanium	mg/L					<0.005	<0.005	-	<0.005	<0.005					
TSS	mg/L					3	5	<2	<3	<10					
turbidity	NTU			5 [e]		2.1	3.6	2.0	2	4.1					
uranium	mg/L					<0.0001	<0.0001	<0.0001	0.0005	<0.0001					
vanadium	mg/L					0.0016	0.0009	<0.002	<0.001	<0.001					
zinc	mg/L			5		0.006	0.012	0.007	0.024	0.025					

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**Note:** Cistern installed.  
Well not in use.  
  
**Note:** Cistern installed.  
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**Note:** Cistern installed.  
Well not in use.  
  
**Note:** Cistern installed.  
Well not in use.

- NOTES:**
- ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.
- Bold** values exceed the ODWS June 2006 standard for that parameter
- [a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.
- [b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).
- [c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.
- [d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.
- [e] Applicable for all waters at the point of consumption.
- [f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.
- - Parameter not analysed

**Table D.6**  
**Groundwater Quality - Finucci Well**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				FINUCCI										
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Duplicate Nov-02	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	
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	
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /L				80-100	<b>627</b>	<b>553</b>	<b>597</b>	<b>510</b>	<b>490</b>	<b>510</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>500</b>	
iron	mg/L			0.3		<0.03	<0.03	<0.03	0.03	<b>0.34</b>	<0.1	0.2	<0.1	<0.1	<b>0.74</b>	
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	<b>0.11</b>	
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	
titanium	mg/L					<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
TSS	mg/L					2	2	2	2	<1	<10	<10	<10	<10	<10	
turbidity	NTU			5 [e]		0.2	0.2	1.1	0.5	3.5	0.3	2.0	1.3	<0.2	1.5	
uranium	mg/L					0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003	0.00021	
vanadium	mg/L					0.0023	0.0045	0.0026	<0.002	<0.001	<0.001	<0.001	<0.001	0.0005	0.00077	
zinc	mg/L			5		0.066	0.066	0.013	0.069	0.067	0.16	0.083	0.034	0.34	0.24	

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

**Bold** values exceed the ODWS June 2006 standard for that parameter

- [a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.
- [b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)
- [c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.
- [d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.
- [e] Applicable for all waters at the point of consumption.
- [f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.
- .- Parameter not analysed

Table D.7  
Groundwater Quality - Hendervale House Well  
Tansley Quarry - Hanson Brick Ltd.

Parameter	Units	Criteria				HENDERVALE HOUSE											
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Duplicate Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-11 DUP 2	Nov-12	
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	
alkalinity	mg CaCO <sub>3</sub> /L				30-500	356	357	362	360	380	353	360	356	350	355	360	
ammonia-N	mg/L					0.43	0.5	0.5	0.47	0.63	0.54	0.54	0.36	0.29	0.29	0.71	
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005	<0.002	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
arsenic	mg/L		0.025			0.013	0.013	0.013	0.013	0.01	0.007	0.013	0.008	0.008	0.008	0.01	
barium	mg/L	1				0.028	0.024	0.023	0.024	0.021	0.019	0.025	0.025	0.038	0.035	0.029	
beryllium	mg/L					<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
bismuth	mg/L					<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	
boron	mg/L		5			0.51	0.707	0.705	0.550	0.79	0.82	0.75	0.7	0.95	0.88	0.63	
bromide	mg/L					<0.5	<0.5	<0.5	<0.1	<1	<1	<1	<1	<1	<1	<1	
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
calcium	mg/L					91.3	82.8	81.4	72	93	80	85	94	130	120	92	
chloride	mg/L			250		97.8	63.5	64.4	88	66	69	83	113	117	117	140	
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
cobalt	mg/L					0.0001	0.0002	0.0002	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
copper	mg/L			1		0.0045	0.0014	0.0015	0.002	0.019	0.025	0.018	0.03	0.036	0.03	0.009	
fluoride	mg/L	1.5 [a]				0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.23	
free cyanide	mg/L					<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
hardness	mg CaCO <sub>3</sub> /L				80-100	613	552	549	470	580	500	550	570	580	560	530	
iron	mg/L			0.3		1.81	1.39	1.35	0.74	0.6	0.53	1.3	0.44	0.37	0.34	0.83	
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001	
magnesium	mg/L					93.4	84	84.1	69	90	77	84	90	120	110	83	
manganese	mg/L			0.05		0.052	0.046	0.045	0.029	0.032	0.036	0.042	0.034	0.033	0.03	0.039	
mercury	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
molybdenum	mg/L					0.004	0.005	0.005	<0.005	0.005	0.005	0.005	0.004	0.0063	0.0058	0.0041	
nickel	mg/L					<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	0.0082	
nitrate as N	mg/L	10.0 [b]				<0.2	<0.2	<0.2	0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	
nitrite as N	mg/L	1.0 [b]				<0.2	<0.2	<0.2	0.01	<0.01	<0.01	0.02	<0.01	0.03	0.03	<0.01	
pH	pH Units				6.5-8.5	7.74	7.61	7.57	7.67	8.1	8.2	8.0	7.97	8.03	7.98	7.97	
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
phosphate	mg/L					<1	<1	<1	<0.5	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	
total phosphorous	mg/L					0.003	0.007	0.007	<0.01	<0.002	0.017	<0.002	<0.1	0.005	<0.1	<0.1	
potassium	mg/L					9.1	9.2	9.2	7.5	10	9.9	9.4	10	14	13	9.6	
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
silicon	mg/L					9.92	9.12	9	-	10	8.7	9.2	9.8	13	12	9.4	
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
sodium	mg/L			20/200 [f]		54.9	58.4	58.1	45.0	69	68	64	70	92	85	66	
strontium	mg/L					4.37	4.55	4.59	4.60	5.1	5.3	5.6	6.3	8.1	7.6	5.4	
sulphide	mg/L					0.01	0.01		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
sulphate	mg/L			500 [d]		187	213	215	190	210	229	197	197	190	183	170	
thallium	mg/L					0.00007	<0.00005	0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	
tin	mg/L					<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
titanium	mg/L					<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
TSS	mg/L					4	10	9	2	<1	<10	<10	<10	<10	<10	<10	
turbidity	NTU			5 [e]		2.2	9.7	9.7	12	3.5	2	8	3.6	1.3	1.7	3.3	
uranium	mg/L					0.0015	0.0011	0.0011	0.0012	0.0011	0.0009	0.0012	0.0011	0.0018	0.0018	0.0013	
vanadium	mg/L					0.002	0.0025	0.0017	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.0008	<0.0005	0.00091
zinc	mg/L			5		0.007	0.01	0.01	0.007	0.026	0.009	0.006	0.016	0.019	0.011	0.0089	

NOTES:

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

\*- Parameter not analysed



**Table D.8**  
**Groundwater Quality - Hendervale Cottage Well**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				HENDERVALE COTTAGE					
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L				0.1	0.007	0.005	0.006	0.007	<0.005	<0.005
alkalinity	mg CaCO <sub>3</sub> /L				30-500	385	361	356	360	354	370
ammonia-N	mg/L					0.5	0.39	0.42	0.36	0.31	0.48
antimony	mg/L		0.006			<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
arsenic	mg/L		0.025			0.016	0.014	0.014	0.01	0.014	0.011
barium	mg/L	1				0.032	0.037	0.029	0.03	0.04	0.03
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010
boron	mg/L		5			0.52	0.44	0.48	0.4	0.67	0.5
bromide	mg/L					<1	<1	<1	<1	<1	<1
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
calcium	mg/L					100.0	92	90	100	130	95
chloride	mg/L			250		97	83	131	135	128	150
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
copper	mg/L			1		0.001	0.003	0.006	<0.001	0.002	0.05
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.2	0.2
free cyanide	mg/L					<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
hardness	mg CaCO <sub>3</sub> /L				80-100	<b>610</b>	<b>510</b>	<b>580</b>	<b>560</b>	<b>590</b>	<b>550</b>
iron	mg/L			0.3		<b>1.4</b>	<b>1.1</b>	<b>1.3</b>	<b>1.1</b>	<b>0.46</b>	<b>1.2</b>
lead	mg/L	0.01 [c]				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012
magnesium	mg/L					85	68	78	86	100	80
manganese	mg/L			0.05		0.028	0.032	0.029	0.032	<b>0.051</b>	0.034
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
molybdenum	mg/L					0.003	0.002	0.002	0.002	0.004	0.003
nickel	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
nitrate as N	mg/L	10.0 [b]				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
nitrite as N	mg/L	1.0 [b]				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH	pH Units				6.5-8.5	8.1	8.1	7.9	7.8	7.93	8.03
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
phosphate	mg/L					<0.01	<0.01	<0.01	0.01	<0.01	<0.01
total phosphorous	mg/L					<0.002	0.014	<0.002	<0.1	0.008	<0.1
potassium	mg/L					8.4	7.9	7.4	8	10	8.2
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
silicon	mg/L					11	10	9.6	11	12	9.5
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
sodium	mg/L			20/200 [f]		54.0	45	46	52	66	58
strontium	mg/L					4.20	4.3	4.3	4.6	5.6	4.8
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
sulphate	mg/L			500 [d]		141	104	144	133	154	150
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TSS	mg/L					<3	<10	<10	10	<10	<10
turbidity	NTU			5 [e]		<b>12.7</b>	<b>8.5</b>	<b>17</b>	<b>8.5</b>	<b>2.1</b>	<b>7.6</b>
uranium	mg/L					0.0011	0.0009	0.0013	0.0012	0.0016	0.0013
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0008	0.00071
zinc	mg/L			5		0.008	0.006	0.007	0.009	0.047	0.038

**NOTES:**

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**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

"-" Parameter not analysed

**Table D.9  
Groundwater Quality - Hendervale Main Barn Well  
Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				HENDERVALE MAIN BARN					
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L				0.1	<b>0.48</b>	0.035	<b>4.4</b>	0.07		
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /L				80-100	<b>220</b>	<b>200</b>	<b>260</b>	<b>280</b>		
iron	mg/L			0.3		0.29	<b>0.34</b>	<b>3.6</b>	<b>0.47</b>		
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	<b>0.1</b>	<b>0.074</b>		
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001		
molybdenum	mg/L					<0.001	<0.001	<0.001	<0.001		
nickel	mg/L					<0.001	<0.001	0.004	<0.001		
nitrate as N	mg/L	10.0 [b]				2.5	0.9	0.9	0.6		
nitrite as N	mg/L	1.0 [b]				0.01	<0.01	0.04	0.03		
pH	pH Units				6.5-8.5	8.1	8	7.9	7.78		
phenol	mg/L					<0.001	<0.001	<0.001	<0.001		
phosphate	mg/L					0.01	<0.01	0.16	0.03		
total phosphorous	mg/L					0.014	0.048	0.34	0.14		
potassium	mg/L					2.8	2.7	11	6		
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002		
silicon	mg/L					4.60	4.5	15	7.3		
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001		
sodium	mg/L			20/200 [f]		9.4	8.5	12	13		
strontium	mg/L					0.58	0.84	1.1	1.4		
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02		
sulphate	mg/L			500 [d]		34	29	45	53		
thallium	mg/L					<0.00005	<0.00005	0.00006	<0.00005		
tin	mg/L					<0.001	<0.001	<0.001	<0.001		
titanium	mg/L					0.019	<0.005	0.18	<0.005	<b>Note:</b>	<b>Note:</b>
TSS	mg/L					1	<10	46	10	Well	Well
turbidity	NTU			5 [e]		<b>9.2</b>	2.4	<b>94</b>	<b>130</b>	inaccessible.	inaccessible.
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 - Hanson Brick Ltd.**

Parameter	Units	Criteria				HENDERVALE ABC BARN		
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Oct-10	Nov-11	Nov-12
aluminum	mg/L				0.1	0.083		
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /L				80-100	57		
iron	mg/L			0.3		<0.1		
lead	mg/L	0.01 [c]				<0.0005		
magnesium	mg/L					3.5		
manganese	mg/L			0.05		0.006		
mercury	mg/L					<0.0001		
molybdenum	mg/L					<0.001		
nickel	mg/L					<0.001		
nitrate as N	mg/L	10.0 [b]				0.8		
nitrite as N	mg/L	1.0 [b]				<0.01		
pH	pH Units				6.5-8.5	7.64		
phenol	mg/L					<0.001		
phosphate	mg/L					0.01		
total phosphorous	mg/L					0.018		
potassium	mg/L					1.7		
selenium	mg/L	0.01				<0.002		
silicon	mg/L					0.96		
silver	mg/L					<0.0001		
sodium	mg/L			20/200 [f]		3.3		
strontium	mg/L					0.17		
sulphide	mg/L					<0.02		
sulphate	mg/L			500 [d]		6		
thallium	mg/L					0.00005		
tin	mg/L					<0.001		
titanium	mg/L					<0.005		
TSS	mg/L					<10		
turbidity	NTU			5 [e]		1.6		
uranium	mg/L					0.0001		
vanadium	mg/L					0.001		
zinc	mg/L			5		0.011		

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**Note:**  
Well not in use.

**Note:**  
Well inaccessible.

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

“-” Parameter not analysed

**Table D.11**  
**Groundwater Quality - Hendervale Barn Cistern**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				HENDERVALE BARN CISTERN		
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-11 (Main Barn Tap)	Nov-12 (Main Barn Tap)	Nov-12 (XYZ Barn Tap)
aluminum	mg/L				0.1	<b>0.11</b>	0.022	0.044
alkalinity	mg CaCO <sub>3</sub> /L				30-500	368	75	75
ammonia-N	mg/L					0.27	0.067	0.14
antimony	mg/L		0.006			<0.0005	<0.0005	<0.0005
arsenic	mg/L		0.025			0.013	<0.001	<0.001
barium	mg/L	1				0.046	0.024	0.03
beryllium	mg/L					<0.0005	<0.0005	<0.0005
bismuth	mg/L					<0.001	<0.001	<0.001
boron	mg/L		5			0.33	2.4	2.4
bromide	mg/L					<1	6.6	6.9
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001
calcium	mg/L					110	120	120
chloride	mg/L			250		19	<b>560</b>	<b>590</b>
chromium	mg/L	0.05				<0.005	<0.005	<0.005
cobalt	mg/L					<0.0005	<0.0005	<0.0005
copper	mg/L			1		0.005	0.0032	0.014
fluoride	mg/L	1.5 [a]				0.2	0.23	0.25
free cyanide	mg/L					<0.002	<0.002	<0.002
hardness	mg CaCO <sub>3</sub> /L				80-100	<b>450</b>	<b>420</b>	<b>440</b>
iron	mg/L			0.3		<b>1.6</b>	<0.1	<b>1</b>
lead	mg/L	0.01 [c]				<0.0005	0.00052	0.0022
magnesium	mg/L					58	36	37
manganese	mg/L			0.05		<b>0.051</b>	<b>0.057</b>	<b>0.067</b>
mercury	mg/L					<0.0001	<0.0001	<0.0001
molybdenum	mg/L					0.0012	0.0019	0.0023
nickel	mg/L					<0.001	<0.001	<0.001
nitrate as N	mg/L	10.0 [b]				<0.1	1.9	1.9
nitrite as N	mg/L	1.0 [b]				0.06	<0.01	<0.01
pH	pH Units				6.5-8.5	8.1	6.78	6.71
phenol	mg/L					<0.001	<0.001	<0.001
phosphate	mg/L					<0.01	<0.01	<0.01
total phosphorous	mg/L					0.015	<0.1	<0.002
potassium	mg/L					5.2	14	14
selenium	mg/L	0.01				<0.002	<0.002	<0.002
silicon	mg/L					12	1.8	1.8
silver	mg/L					<0.0001	<0.0001	<0.0001
sodium	mg/L			20/200 [f]		21	<b>320</b>	<b>330</b>
strontium	mg/L					2.6	3.9	4
sulphide	mg/L					<0.02	330	<0.02
sulphate	mg/L			500 [d]		94	<0.02	340
thallium	mg/L					<0.00005	<0.00005	<0.00005
tin	mg/L					<0.001	<0.001	<0.001
titanium	mg/L					<0.005	<0.005	<0.005
TSS	mg/L					12	<10	<10
turbidity	NTU			5 [e]		<b>6.5</b>	1.4	4.2
uranium	mg/L					0.001	0.00019	0.00016
vanadium	mg/L					0.0016	0.00094	0.001
zinc	mg/L			5		0.031	0.066	0.26

**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.

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[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

“-” Parameter not analysed

**Table D.12**  
**Groundwater Quality - Robinson Well**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				ROBINSON									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Jun-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12		
aluminum	mg/L				0.1	<0.005	0.013	0.044							
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /L				80-100	<b>1249</b>	<b>550</b>	<b>320</b>							
iron	mg/L			0.3		<b>0.50</b>	<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		<b>0.771</b>	<b>0.58</b>	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]		<b>720</b>	240	72							
thallium	mg/L					<0.00005	-	<0.00005							
tin	mg/L					<0.001	<0.05	<0.001							
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 - Hanson Brick Ltd.**

Parameter	Units	Criteria				SICARD									Nov-12
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11		
aluminum	mg/L				0.1	<0.005	<0.005	<0.01	<0.03	<0.005	<0.05	0.006	<0.005		
alkalinity	mg CaCO <sub>3</sub> /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			<b>6.7</b>	<b>6.74</b>	4.3	<b>7.2</b>	<b>6.5</b>	<b>6.5</b>	<b>6.9</b>	<b>7.2</b>		
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		<b>1770</b>	<b>1940</b>	<b>1400</b>	<b>1660</b>	<b>1150</b>	<b>1780</b>	<b>955</b>	<b>1070</b>		
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 <sub>3</sub> /L				80-100	<b>1350</b>	<b>1350</b>	<b>950</b>	<b>1400</b>	<b>1000</b>	<b>1300</b>	<b>860</b>	<b>950</b>		
iron	mg/L			0.3		0.07	0.14	0.16	<b>0.37</b>	0.16	<1	<b>1.6</b>	<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		<b>0.126</b>	<b>0.125</b>	<b>0.100</b>	<b>0.12</b>	<b>0.1</b>	<b>0.13</b>	<b>0.07</b>	<b>0.10</b>		
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	<0.1	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]		<b>982</b>	<b>1120</b>	<b>820</b>	<b>1100</b>	<b>850</b>	<b>1200</b>	<b>760</b>	<b>620</b>		
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]		<b>1020</b>	<b>1040</b>	<b>970</b>	<b>995</b>	<b>732</b>	<b>1030</b>	<b>952</b>	<b>999</b>		
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		
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	<b>11</b>	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		

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Note:  
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- 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 - Hanson Brick Ltd.**

Parameter	Units	Criteria				SIMMS					
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Aug-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L				0.1	0.007	0.041	0.019	0.008	0.007	<0.005
alkalinity	mg CaCO <sub>3</sub> /L				30-500	345	316	164	244	313	300
ammonia-N	mg/L					0.09	<0.05	<0.05	<0.05	<0.05	<0.05
antimony	mg/L		0.006			0.0009	0.0008	0.0007	0.0008	0.0015	0.0012
arsenic	mg/L		0.025			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
barium	mg/L	1				0.055	0.052	0.068	0.062	0.072	0.059
beryllium	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
bismuth	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
boron	mg/L		5			0.036	0.045	0.45	0.19	0.069	0.1
bromide	mg/L					<1	<1	<1	<1	<1	<1
cadmium	mg/L	0.005				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
calcium	mg/L					110	98	150	120	120	88
chloride	mg/L			250		7	6	7	6	4	7.3
chromium	mg/L	0.05				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cobalt	mg/L					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
copper	mg/L			1		0.015	0.07	0.008	0.007	0.022	0.013
fluoride	mg/L	1.5 [a]				0.2	0.2	0.2	0.2	0.2	0.22
free cyanide	mg/L					0.002	<0.002	<0.002	<0.002	<0.002	<0.002
hardness	mg CaCO <sub>3</sub> /L				80-100	<b>360</b>	<b>340</b>	<b>650</b>	<b>500</b>	<b>360</b>	<b>340</b>
iron	mg/L			0.3		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1
lead	mg/L	0.01 [c]				0.0007	<b>0.021</b>	0.0006	0.0005	0.0008	0.00079
magnesium	mg/L					34	28	55	55	41	30
manganese	mg/L			0.05		<0.002	0.004	0.003	0.003	<0.002	0.016
mercury	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
molybdenum	mg/L					<0.001	<0.001	0.004	0.003	0.0012	0.0012
nickel	mg/L					<0.001	<0.001	0.002	<0.001	<0.001	<0.001
nitrate as N	mg/L	10.0 [b]				3.8	4.3	0.4	1.7	1.6	1.3
nitrite as N	mg/L	1.0 [b]				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH	pH Units				6.5-8.5	8.2	8.2	7.9	7.95	8.08	8.02
phenol	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
phosphate	mg/L					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
total phosphorous	mg/L					<0.002	0.013	<0.002	<0.1	<0.1	<0.1
potassium	mg/L					2.6	2.4	8.3	6.9	4	3.8
selenium	mg/L	0.01				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
silicon	mg/L					5.3	5.1	3.3	4.1	6	4
silver	mg/L					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
sodium	mg/L			20/200 [f]		12	11	55	37	14	15
strontium	mg/L					0.74	0.63	4.6	3.4	0.98	1.1
sulphate	mg/L			500 [d]		49	38	<b>597</b>	295	52	95
sulphide	mg/L					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
thallium	mg/L					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
tin	mg/L					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
titanium	mg/L					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TSS	mg/L					<10	<10	<10	<10	<10	<10
turbidity	NTU			5 [e]		0.4	0.5	0.6	0.3	<0.2	0.7
uranium	mg/L					0.0027	0.0024	0.0041	0.0033	0.0036	0.0031
vanadium	mg/L					<0.001	<0.001	<0.001	<0.001	0.0008	0.00063
zinc	mg/L			5		2	2.1	1.6	1.4	2.6	1.4

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

“-” Parameter not analysed

**Table D.15  
Groundwater Quality - Stevenson Well  
Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				STEVENSON									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Mar-03	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12		
aluminum	mg/L				0.1	<0.005	0.017	0.03							
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /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							
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							

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Note: Well inaccessible

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Note: Well not in use.

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO aesthetic objective, OG operational guideline.

**bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

“-” Parameter not analysed



**Table D.16**  
**Groundwater Quality - Sugiyama Well**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				SUGIYAMA						
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12
aluminum	mg/L				0.1	<0.01	<0.03	<0.05	<0.005	0.012	<0.005	<0.025
alkalinity	mg CaCO <sub>3</sub> /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	<b>5.3</b>	4.5	5.0	<b>5.3</b>	<b>5.7</b>	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		<b>1600</b>	<b>1590</b>	<b>1660</b>	<b>1620</b>	<b>1780</b>	<b>1810</b>	<b>1800</b>
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 <sub>3</sub> /L				80-100	<b>1300</b>	<b>1500</b>	<b>1300</b>	<b>1400</b>	<b>1400</b>	<b>1500</b>	<b>1300</b>
iron	mg/L			0.3		0.29	<b>0.6</b>	<1	<b>0.4</b>	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		<b>13</b>	<b>0.14</b>	<b>0.11</b>	<b>0.061</b>	<b>0.12</b>	<b>0.17</b>	<b>0.1</b>
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				<b>0.012</b>	<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]		<b>760</b>	<b>920</b>	<b>870</b>	<b>880</b>	<b>960</b>	<b>760</b>	<b>870</b>
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]		<b>820</b>	<b>865</b>	<b>802</b>	<b>907</b>	<b>1010</b>	<b>958</b>	<b>910</b>
thallium	mg/L					<0.0002	<0.0003	<0.0005	<0.00005	<0.00005	<0.00005	<0.00025
tin	mg/L					-	<0.005	<0.01	<0.001	<0.001	<0.001	<0.005
titanium	mg/L					-	<0.030	<0.05	<0.005	<0.005	<0.005	<0.025
TSS	mg/L					2	2	<10	<10	14	14	15
turbidity	NTU			5 [e]		1.1	<b>5.6</b>	2.1	2.7	1.5	1.1	3.9
uranium	mg/L					<0.0002	<0.0005	<0.001	0.0001	<0.0001	0.0002	<0.0005
vanadium	mg/L					<0.002	<0.005	<0.01	<0.005	<0.005	<0.003	<0.0025
zinc	mg/L			5		0.19	0.18	0.053	0.078	0.041	0.02	<0.025

**NOTES:**

ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO = aesthetic objective, OG = operational guideline.

**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed

**Table D.17**  
**Groundwater Quality - Wiggins Well**  
**Tansley Quarry - Hanson Brick Ltd.**

Parameter	Units	Criteria				WIGGINS									
		ODWS MAC	ODWS IMAC	ODWS AO	ODWS OG	Nov-02	Apr-03	Sep-04	Jan-07	Oct-08	Dec-09	Oct-10	Nov-11	Nov-12	
aluminum	mg/L				0.1	<0.005	0.034	0.014	<0.005	0.005					
alkalinity	mg CaCO <sub>3</sub> /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 <sub>3</sub> /L				80-100	<b>679</b>	<b>637</b>	<b>620</b>	<b>670</b>	<b>680</b>					
iron	mg/L			0.3		<b>0.55</b>	<b>0.33</b>	<b>0.59</b>	<b>0.98</b>	<b>0.42</b>					
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		<b>0.088</b>	<b>0.086</b>	<b>0.08</b>	<b>0.086</b>	<b>0.084</b>					
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]		<b>686.0</b>	<b>710</b>	<b>750</b>	<b>684</b>	<b>693</b>					
thallium	mg/L					<0.00005	<0.00005	-	<0.00005	<0.00005					
tin	mg/L					<0.001	<0.001	0.05	<0.001	<0.001					
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	<b>6.2</b>	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					

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**S A M P L E D**

**Note:** Cistern installed. Well not in use.  
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**Note:** Cistern installed. Well not in use.

**NOTES:**  
 ODWS = Ontario Drinking Water Objectives, Standards and Guidelines, dated June 2006. MAC = maximum acceptable concentrations, IMAC = interim maximum acceptable concentrations, AO aesthetic objective, OG operational guideline.  
**Bold** values exceed the ODWS June 2006 standard for that parameter

[a] Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

[b] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen)

[c] This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

[d] When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.

[e] Applicable for all waters at the point of consumption.

[f] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on Sodium restricted diets.

"-" Parameter not analysed



# **APPENDIX E**

## **Maxxam Analytical Certificates**

Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115601, 381156-01-01

**Attention: Sharon Wood**  
 Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

**Report Date: 2012/11/22**

### CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2H8285**  
**Received: 2012/11/13, 16:53**

Sample Matrix: Water  
 # Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	9	N/A	2012/11/16	CAM SOP-00448	SM 2320B
Anions	9	N/A	2012/11/16	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	9	N/A	2012/11/19	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	9	2012/11/15	2012/11/16	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	4	N/A	2012/11/19	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/20	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	9	2012/11/16	2012/11/16	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	5	N/A	2012/11/19	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	3	N/A	2012/11/20	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	1	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	8	N/A	2012/11/16	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	1	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Ammonia-N	9	N/A	2012/11/18	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (1)	9	N/A	2012/11/16	CAM SOP-00440	SM 4500 NO <sub>3</sub> /NO <sub>2</sub> B
pH	9	N/A	2012/11/16	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	4	N/A	2012/11/15	CAM SOP-00444	MOE ROPHEN-E3179
Phenols (4AAP)	5	N/A	2012/11/19	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	9	N/A	2012/11/16	CAM SOP-00461	EPA 365.1
Sulphide	9	N/A	2012/11/16	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	8	2012/11/16	2012/11/19	CAM SOP-00407	SM 4500 P,B,F
Total Phosphorus (Colourimetric)	1	2012/11/20	2012/11/20	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	9	N/A	2012/11/15	CAM SOP-00428	SM 2540D
Turbidity	9	N/A	2012/11/14	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

Site Location: TANSLEY QUARRY  
Your C.O.C. #: 38115601, 381156-01-01

**Attention: Sharon Wood**  
Golder Associates Ltd  
Mississauga - Standing Offer  
2390 Argentia Rd  
Mississauga, ON  
L5N 5Z7

**Report Date: 2012/11/22**

**CERTIFICATE OF ANALYSIS**

-2-

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

(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.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Page 2 of 35

Golder Associates Ltd

 Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP0555			PP0556			PP0557		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	<b>Units</b>	<b>MW-04D</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-04 SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-04I</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	8400	1.0	3035768	460	1.0	3035768	2000	1.0	3035768
<b>Inorganics</b>										
Total Ammonia-N	mg/L	19	0.50	3038546	0.13	0.050	3038546	6.2	0.50	3038546
Fluoride (F <sup>-</sup> )	mg/L	0.18	0.10	3038171	0.23	0.10	3038171	0.55	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	0.019	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220
pH	pH	7.05		3038172	7.91		3038172	7.11		3038172
Phenols-4AAP	mg/L	0.022	0.0050	3036888	<0.0010	0.0010	3036887	0.011	0.0010	3036887
Total Phosphorus	mg/L	0.41	0.10	3039074	0.21	0.040	3039074	0.30	0.10	3039074
Total Suspended Solids	mg/L	290	10	3036675	1300	100	3036675	530	10	3036675
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	0.55	0.020	3038752
Turbidity	NTU	66	0.2	3036346	210	0.4	3036346	120	0.4	3036346
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	150	1.0	3038166	390	1.0	3038166	65	1.0	3038166
Nitrite (N)	mg/L	0.029	0.010	3037941	0.040	0.010	3037941	<0.010	0.010	3037941
Dissolved Chloride (Cl)	mg/L	16000	100	3037957	4.2	1.0	3037957	2100	20	3037957
Nitrate (N)	mg/L	<0.10	0.10	3037941	0.98	0.10	3037941	<0.10	0.10	3037941
Nitrate + Nitrite	mg/L	<0.10	0.10	3037941	1.0	0.10	3037941	<0.10	0.10	3037941
Dissolved Bromide (Br <sup>-</sup> )	mg/L	200	100	3037957	<1.0	1.0	3037957	21	1.0	3037957
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1700	100	3037957	110	1.0	3037957	1800	10	3037957

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP0558			PP0559			PP0560		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	<b>Units</b>	<b>10l</b>	<b>RDL</b>	<b>QC Batch</b>	<b>10-SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-09l</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO3)	mg/L	380	1.0	3035768	480	1.0	3035768	600	1.0	3035768
<b>Inorganics</b>										
Total Ammonia-N	mg/L	0.99	0.050	3038546	0.42	0.050	3038546	2.6	0.050	3038546
Fluoride (F-)	mg/L	0.20	0.10	3038171	0.20	0.10	3038171	0.44	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220
pH	pH	7.96		3038172	7.98		3038172	7.84		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	3036887	<0.0010	0.0010	3036888	<0.0010	0.0010	3036888
Total Phosphorus	mg/L	1.8	0.10	3039074	17	0.20	3039074	1.1	0.10	3039074
Total Suspended Solids	mg/L	1900	50	3036678	27000	200	3036675	2700	50	3036678
Sulphide	mg/L	<0.020	0.020	3037629	0.047	0.020	3037629	<0.020	0.020	3037629
Turbidity	NTU	500	2	3036346	1200	4	3036346	470	2	3036346
Alkalinity (Total as CaCO3)	mg/L	410	1.0	3038166	490	1.0	3038166	220	1.0	3038166
Nitrite (N)	mg/L	0.14	0.010	3037605	<0.010	0.010	3037941	0.053	0.010	3037602
Dissolved Chloride (Cl)	mg/L	3.0	1.0	3037957	2.5	1.0	3037957	290	10	3037957
Nitrate (N)	mg/L	0.36	0.10	3037605	0.11	0.10	3037941	0.14	0.10	3037602
Nitrate + Nitrite	mg/L	0.50	0.10	3037605	0.11	0.10	3037941	0.19	0.10	3037602
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	3037957	<1.0	1.0	3037957	<10	10	3037957
Dissolved Sulphate (SO4)	mg/L	41	1.0	3037957	52	1.0	3037957	560	10	3037957

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP0561			PP0562			PP0563		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	<b>Units</b>	<b>MW-09D</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-09S</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-10D</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	29000	1.0	3035768	380	1.0	3035768	17000	1.0	3035768
<b>Inorganics</b>										
Total Ammonia-N	mg/L	36	0.50	3038546	0.39	0.050	3038546	28	0.50	3038546
Fluoride (F <sup>-</sup> )	mg/L	<0.10	0.10	3038171	0.27	0.10	3038171	0.14	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220
pH	pH	6.19		3038172	8.01		3038172	8.22		3038172
Phenols-4AAP	mg/L	0.070	0.010	3036888	<0.0010	0.0010	3036888	0.0022	0.0010	3036887
Total Phosphorus	mg/L	0.42	0.10	3039074	3.2	0.20	3039074	<0.10 (1)	0.10	3041758
Total Suspended Solids	mg/L	260	10	3036675	4500	100	3036675	150	10	3036675
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	<0.020	0.020	3037629
Turbidity	NTU	38	0.2	3036346	2000	4	3036346	41	0.2	3036346
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	52	1.0	3038166	390	1.0	3038166	66	1.0	3038166
Nitrite (N)	mg/L	<0.10	0.10	3037941	0.012	0.010	3037605	<0.10	0.10	3037605
Dissolved Chloride (Cl)	mg/L	52000	500	3037957	10	1.0	3037957	36000	200	3037957
Nitrate (N)	mg/L	<0.10	0.10	3037941	0.13	0.10	3037605	<0.10	0.10	3037605
Nitrate + Nitrite	mg/L	<0.10	0.10	3037941	0.14	0.10	3037605	<0.10	0.10	3037605
Dissolved Bromide (Br <sup>-</sup> )	mg/L	590	20	3037957	<1.0	1.0	3037957	390	100	3037957
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1300	10	3037957	50	1.0	3037957	1700	10	3037957

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

( 1 ) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.



Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0555			PP0556			PP0557		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	<b>Units</b>	<b>MW-04D</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-04 SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-04I</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486
Dissolved Aluminum (Al)	ug/L	<50	50	3040749	68	5.0	3040888	91	25	3040273
Total Aluminum (Al)	ug/L	650	50	3038696	6500	5.0	3038696	7400	25	3038696
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	3040749	<0.50	0.50	3040888	<2.5	2.5	3040273
Total Antimony (Sb)	ug/L	<5.0	5.0	3038696	<0.50	0.50	3038696	<2.5	2.5	3038696
Dissolved Arsenic (As)	ug/L	<20 (1)	20	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Arsenic (As)	ug/L	<20 (1)	20	3038696	2.3	1.0	3038696	5.0	5.0	3038696
Dissolved Barium (Ba)	ug/L	50	20	3040749	49	2.0	3040888	<10	10	3040273
Total Barium (Ba)	ug/L	59	20	3038696	93	2.0	3038696	110	10	3038696
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	3040749	<0.50	0.50	3040888	<2.5	2.5	3040273
Total Beryllium (Be)	ug/L	<5.0	5.0	3038696	<0.50	0.50	3038696	<2.5	2.5	3038696
Dissolved Bismuth (Bi)	ug/L	<10	10	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Bismuth (Bi)	ug/L	<10	10	3038696	<1.0	1.0	3038696	<5.0	5.0	3038696
Dissolved Boron (B)	ug/L	5700	100	3040749	110	10	3040888	6100	50	3040273
Total Boron (B)	ug/L	6700	100	3038696	92	10	3038696	5900	50	3038696
Dissolved Cadmium (Cd)	ug/L	<1.0	1.0	3040749	<0.10	0.10	3040888	<0.50	0.50	3040273
Total Cadmium (Cd)	ug/L	4.4	1.0	3038696	0.10	0.10	3038696	<0.50	0.50	3038696
Dissolved Calcium (Ca)	ug/L	2400000	4000	3040749	78000	200	3040888	550000	1000	3040273
Total Calcium (Ca)	ug/L	2500000	2000	3038696	91000	200	3038696	560000	1000	3038696
Dissolved Chromium (Cr)	ug/L	<50	50	3040749	<5.0	5.0	3040888	<25	25	3040273
Total Chromium (Cr)	ug/L	<50	50	3038696	7.4	5.0	3038696	<25	25	3038696
Dissolved Cobalt (Co)	ug/L	<5.0	5.0	3040749	0.92	0.50	3040888	<2.5	2.5	3040273
Total Cobalt (Co)	ug/L	<5.0	5.0	3038696	5.1	0.50	3038696	2.9	2.5	3038696
Dissolved Copper (Cu)	ug/L	<10	10	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Copper (Cu)	ug/L	31	10	3038696	6.8	1.0	3038696	7.1	5.0	3038696
Dissolved Iron (Fe)	ug/L	<1000	1000	3040749	<100	100	3040888	840	500	3040273
Total Iron (Fe)	ug/L	1400	1000	3038696	6700	100	3038696	9000	500	3038696
Dissolved Lead (Pb)	ug/L	<5.0	5.0	3040749	<0.50	0.50	3040888	<2.5	2.5	3040273
Total Lead (Pb)	ug/L	<5.0	5.0	3038696	5.0	0.50	3038696	5.7	2.5	3038696
Dissolved Magnesium (Mg)	ug/L	560000	500	3040749	65000	50	3040888	160000	250	3040273
Total Magnesium (Mg)	ug/L	620000	500	3038696	71000	50	3038696	160000	250	3038696

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

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0555			PP0556			PP0557		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	Units	MW-04D	RDL	QC Batch	MW-04 SHALLOW	RDL	QC Batch	MW-04I	RDL	QC Batch
Dissolved Manganese (Mn)	ug/L	1600	20	3040749	230	2.0	3040888	230	10	3040273
Total Manganese (Mn)	ug/L	1600	20	3038696	380	2.0	3038696	490	10	3038696
Dissolved Molybdenum (Mo)	ug/L	14	5.0	3040749	3.9	0.50	3040888	8.3	2.5	3040273
Total Molybdenum (Mo)	ug/L	19	5.0	3038696	4.4	0.50	3038696	9.7	2.5	3038696
Dissolved Nickel (Ni)	ug/L	<10	10	3040749	1.1	1.0	3040888	<5.0	5.0	3040273
Total Nickel (Ni)	ug/L	<10	10	3038696	7.3	1.0	3038696	6.2	5.0	3038696
Dissolved Phosphorus (P)	ug/L	<1000	1000	3040749	<100	100	3040888	<500	500	3040273
Total Phosphorus (P)	ug/L	<1000	1000	3038696	150	100	3038696	<500	500	3038696
Dissolved Potassium (K)	ug/L	130000	2000	3040749	4800	200	3040888	47000	1000	3040273
Total Potassium (K)	ug/L	140000	2000	3038696	7000	200	3038696	51000	1000	3038696
Dissolved Selenium (Se)	ug/L	42	40	3040749	<2.0	2.0	3040888	<10	10	3040273
Dissolved Silicon (Si)	ug/L	4100	500	3040749	6600	50	3040888	3400	250	3040273
Total Silicon (Si)	ug/L	5000	500	3038696	18000	50	3038696	19000	250	3038696
Total Selenium (Se)	ug/L	<40 (1)	40	3038696	<2.0	2.0	3038696	<10	10	3038696
Dissolved Silver (Ag)	ug/L	<1.0	1.0	3040749	<0.10	0.10	3040888	<0.50	0.50	3040273
Total Silver (Ag)	ug/L	<1.0	1.0	3038696	<0.10	0.10	3038696	<0.50	0.50	3038696
Dissolved Sodium (Na)	ug/L	6100000	5000	3040749	24000	100	3040888	1200000	500	3040273
Total Sodium (Na)	ug/L	7100000	10000	3038696	26000	100	3038696	1200000	500	3038696
Dissolved Strontium (Sr)	ug/L	53000	10	3040749	1500	1.0	3040888	14000	5.0	3040273
Total Strontium (Sr)	ug/L	54000	10	3038696	1500	1.0	3038696	14000	5.0	3038696
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	3040749	<0.050	0.050	3040888	<0.25	0.25	3040273
Total Thallium (Tl)	ug/L	<0.50	0.50	3038696	0.066	0.050	3038696	<0.25	0.25	3038696
Dissolved Tin (Sn)	ug/L	<10	10	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Tin (Sn)	ug/L	<10	10	3038696	<1.0	1.0	3038696	<5.0	5.0	3038696
Dissolved Titanium (Ti)	ug/L	<50	50	3040749	8.8	5.0	3040888	<25	25	3040273
Total Titanium (Ti)	ug/L	<50	50	3038696	170	5.0	3038696	310	5.0	3038696
Dissolved Uranium (U)	ug/L	29	1.0	3040749	6.4	0.10	3040888	<0.50	0.50	3040273
Total Uranium (U)	ug/L	32	1.0	3038696	7.5	0.10	3038696	1.6	0.50	3038696
Dissolved Vanadium (V)	ug/L	<20 (1)	20	3040749	<0.50	0.50	3040888	6.3	2.5	3040273
Total Vanadium (V)	ug/L	<10 (1)	10	3038696	10	0.50	3038696	12	2.5	3038696
Dissolved Zinc (Zn)	ug/L	<50	50	3040749	<5.0	5.0	3040888	<25	25	3040273
Total Zinc (Zn)	ug/L	<50	50	3038696	18	5.0	3038696	<25	25	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

( 1 ) Detection Limit was raised due to matrix interferences.

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0558			PP0559			PP0560		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	Units	10I	RDL	QC Batch	10-SHALLOW	RDL	QC Batch	MW-09I	RDL	QC Batch
<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486
Dissolved Aluminum (Al)	ug/L	360	5.0	3040888	45	5.0	3040749	120	5.0	3040273
Total Aluminum (Al)	ug/L	5200	5.0	3038696	870000	500	3038696	27000	50	3038696
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	<0.50	0.50	3040273
Total Antimony (Sb)	ug/L	<0.50	0.50	3038696	<50	50	3038696	<0.50	0.50	3038696
Dissolved Arsenic (As)	ug/L	5.0	1.0	3040888	2.0	1.0	3040749	3.0	1.0	3040273
Total Arsenic (As)	ug/L	32	1.0	3038696	300	100	3038696	49	1.0	3038696
Dissolved Barium (Ba)	ug/L	77	2.0	3040888	65	2.0	3040749	41	2.0	3040273
Total Barium (Ba)	ug/L	140	2.0	3038696	11000	200	3038696	460	2.0	3038696
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	<0.50	0.50	3040273
Total Beryllium (Be)	ug/L	<0.50	0.50	3038696	51	50	3038696	2.0	0.50	3038696
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Bismuth (Bi)	ug/L	<1.0	1.0	3038696	<100	100	3038696	<1.0	1.0	3038696
Dissolved Boron (B)	ug/L	750	10	3040888	130	10	3040749	5100	10	3040273
Total Boron (B)	ug/L	630	10	3038696	2100	1000	3038696	4700	10	3038696
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3040888	<0.10	0.10	3040749	<0.10	0.10	3040273
Total Cadmium (Cd)	ug/L	0.54	0.10	3038696	<10	10	3038696	1.0	0.10	3038696
Dissolved Calcium (Ca)	ug/L	57000	1000	3040888	59000	200	3040749	140000	1000	3040273
Total Calcium (Ca)	ug/L	120000	400	3038696	6400000	20000	3038696	520000	1000	3038696
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3040888	<5.0	5.0	3040749	<5.0	5.0	3040273
Total Chromium (Cr)	ug/L	11	5.0	3038696	1500	500	3038696	61	5.0	3038696
Dissolved Cobalt (Co)	ug/L	0.74	0.50	3040888	0.85	0.50	3040749	2.4	0.50	3040273
Total Cobalt (Co)	ug/L	3.9	0.50	3038696	910	50	3038696	30	1.0	3038696
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Copper (Cu)	ug/L	5.6	1.0	3038696	1300	100	3038696	27	1.0	3038696
Dissolved Iron (Fe)	ug/L	510	100	3040888	640	100	3040749	770	100	3040273
Total Iron (Fe)	ug/L	9700	100	3038696	1500000	10000	3038696	54000	100	3038696
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	<0.50	0.50	3040273
Total Lead (Pb)	ug/L	3.6	0.50	3038696	510	50	3038696	26	0.50	3038696
Dissolved Magnesium (Mg)	ug/L	58000	50	3040888	82000	50	3040749	58000	50	3040273
Total Magnesium (Mg)	ug/L	65000	50	3038696	1000000	5000	3038696	100000	50	3038696
Dissolved Manganese (Mn)	ug/L	22	2.0	3040888	64	2.0	3040749	66	2.0	3040273
RDL = Reportable Detection Limit QC Batch = Quality Control Batch										

Golder Associates Ltd

 Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0558			PP0559			PP0560		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	Units	10I	RDL	QC Batch	10-SHALLOW	RDL	QC Batch	MW-09I	RDL	QC Batch
Total Manganese (Mn)	ug/L	620	2.0	3038696	61000	200	3038696	3400	2.0	3038696
Dissolved Molybdenum (Mo)	ug/L	2.6	0.50	3040888	3.0	0.50	3040749	9.7	0.50	3040273
Total Molybdenum (Mo)	ug/L	3.2	0.50	3038696	<50	50	3038696	13	0.50	3038696
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Nickel (Ni)	ug/L	8.7	1.0	3038696	1900	100	3038696	65	2.0	3038696
Dissolved Phosphorus (P)	ug/L	<100	100	3040888	<100	100	3040749	<100	100	3040273
Total Phosphorus (P)	ug/L	560	100	3038696	57000	10000	3038696	2600	100	3038696
Dissolved Potassium (K)	ug/L	12000	200	3040888	7100	200	3040749	23000	200	3040273
Total Potassium (K)	ug/L	12000	200	3038696	200000	20000	3038696	33000	200	3038696
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3040888	<2.0	2.0	3040749	<2.0	2.0	3040273
Dissolved Silicon (Si)	ug/L	9500	50	3040888	9500	50	3040749	5300	50	3040273
Total Silicon (Si)	ug/L	17000	50	3038696	870000	5000	3038696	46000	50	3038696
Total Selenium (Se)	ug/L	<2.0	2.0	3038696	<200	200	3038696	<2.0	2.0	3038696
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3040888	<0.10	0.10	3040749	<0.10	0.10	3040273
Total Silver (Ag)	ug/L	<0.10	0.10	3038696	<10	10	3038696	0.29	0.10	3038696
Dissolved Sodium (Na)	ug/L	30000	100	3040888	23000	100	3040749	240000	100	3040273
Total Sodium (Na)	ug/L	27000	100	3038696	59000	10000	3038696	250000	100	3038696
Dissolved Strontium (Sr)	ug/L	11000	1.0	3040888	1800	1.0	3040749	18000	1.0	3040273
Total Strontium (Sr)	ug/L	11000	1.0	3038696	18000	100	3038696	21000	1.0	3038696
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3040888	<0.050	0.050	3040749	<0.050	0.050	3040273
Total Thallium (Tl)	ug/L	0.066	0.050	3038696	6.8	5.0	3038696	0.26	0.050	3038696
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Tin (Sn)	ug/L	<1.0	1.0	3038696	<100	100	3038696	1.4	1.0	3038696
Dissolved Titanium (Ti)	ug/L	18	5.0	3040888	<5.0	5.0	3040749	<5.0	5.0	3040273
Total Titanium (Ti)	ug/L	120	5.0	3038696	8000	500	3038696	410	5.0	3038696
Dissolved Uranium (U)	ug/L	0.31	0.10	3040888	1.8	0.10	3040749	0.78	0.10	3040273
Total Uranium (U)	ug/L	0.73	0.10	3038696	59	10	3038696	3.2	0.10	3038696
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	1.0	0.50	3040273
Total Vanadium (V)	ug/L	9.4	0.50	3038696	1500	50	3038696	57	0.50	3038696
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3040888	<5.0	5.0	3040749	5.7	5.0	3040273
Total Zinc (Zn)	ug/L	22	5.0	3038696	4400	500	3038696	150	5.0	3038696

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Golder Associates Ltd

 Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0561			PP0562			PP0563		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	Units	MW-09D	RDL	QC Batch	MW-09S	RDL	QC Batch	MW-10D	RDL	QC Batch
<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3038486	<0.00010	0.00010	3038545	<0.00010	0.00010	3038486
Dissolved Aluminum (Al)	ug/L	<250	250	3043708	64	5.0	3039460	<250	250	3039460
Total Aluminum (Al)	ug/L	1300	250	3043592	61000	50	3038696	370	50	3038696
Dissolved Antimony (Sb)	ug/L	<25	25	3043708	<0.50	0.50	3039460	<25	25	3039460
Total Antimony (Sb)	ug/L	<25	25	3043592	<0.50	0.50	3038696	<5.0	5.0	3038696
Dissolved Arsenic (As)	ug/L	<50	50	3043708	1.7	1.0	3039460	<50	50	3039460
Total Arsenic (As)	ug/L	<50	50	3043592	34	1.0	3038696	<50 (1)	50	3038696
Dissolved Barium (Ba)	ug/L	140	100	3043708	67	2.0	3039460	<100	100	3039460
Total Barium (Ba)	ug/L	150	100	3043592	750	2.0	3038696	100	20	3038696
Dissolved Beryllium (Be)	ug/L	<25	25	3043708	<0.50	0.50	3039460	<25	25	3039460
Total Beryllium (Be)	ug/L	<25	25	3043592	3.5	0.50	3038696	<5.0	5.0	3038696
Dissolved Bismuth (Bi)	ug/L	<50	50	3043708	<1.0	1.0	3039460	<50	50	3039460
Total Bismuth (Bi)	ug/L	<50	50	3043592	<1.0	1.0	3038696	<10	10	3038696
Dissolved Boron (B)	ug/L	4900	500	3043708	1300	10	3039460	7500	500	3039460
Total Boron (B)	ug/L	5000	500	3043592	1300	10	3038696	8100	100	3038696
Dissolved Cadmium (Cd)	ug/L	<5.0	5.0	3043708	<0.10	0.10	3039460	<5.0	5.0	3039460
Total Cadmium (Cd)	ug/L	6.0	5.0	3043592	1.0	0.10	3038696	8.7	1.0	3038696
Dissolved Calcium (Ca)	ug/L	8600000	10000	3043708	51000	400	3039460	4900000	10000	3039460
Total Calcium (Ca)	ug/L	9100000	10000	3043592	440000	400	3038696	5300000	10000	3038696
Dissolved Chromium (Cr)	ug/L	<250	250	3043708	<5.0	5.0	3039460	<250	250	3039460
Total Chromium (Cr)	ug/L	<250	250	3043592	170	5.0	3038696	220	50	3038696
Dissolved Cobalt (Co)	ug/L	<25	25	3043708	1.3	0.50	3039460	<25	25	3039460
Total Cobalt (Co)	ug/L	<25	25	3043592	67	1.0	3038696	<10 (1)	10	3038696
Dissolved Copper (Cu)	ug/L	<50	50	3043708	<1.0	1.0	3039460	<50	50	3039460
Total Copper (Cu)	ug/L	<50	50	3043592	64	1.0	3038696	18	10	3038696
Dissolved Iron (Fe)	ug/L	24000	5000	3043708	<100	100	3039460	<5000	5000	3039460
Total Iron (Fe)	ug/L	19000	5000	3043592	110000	100	3038696	2800	1000	3038696
Dissolved Lead (Pb)	ug/L	<25	25	3043708	<0.50	0.50	3039460	<25	25	3039460
Total Lead (Pb)	ug/L	<25	25	3043592	38	0.50	3038696	11	5.0	3038696
Dissolved Magnesium (Mg)	ug/L	1900000	2500	3043708	61000	50	3039460	1300000	2500	3039460
Total Magnesium (Mg)	ug/L	2100000	2500	3043592	110000	50	3038696	1600000	500	3038696
Dissolved Manganese (Mn)	ug/L	4500	100	3043708	38	2.0	3039460	1900	100	3039460
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ( 1 ) Detection Limit was raised due to matrix interferences.										

Golder Associates Ltd

 Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0561			PP0562			PP0563		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
COC Number		381156-01-01			381156-01-01			381156-01-01		
	Units	MW-09D	RDL	QC Batch	MW-09S	RDL	QC Batch	MW-10D	RDL	QC Batch
Total Manganese (Mn)	ug/L	4700	100	3043592	3900	2.0	3038696	2400	20	3038696
Dissolved Molybdenum (Mo)	ug/L	38	25	3043708	6.7	0.50	3039460	240	25	3039460
Total Molybdenum (Mo)	ug/L	<25	25	3043592	12	0.50	3038696	260	5.0	3038696
Dissolved Nickel (Ni)	ug/L	<50	50	3043708	<1.0	1.0	3039460	120	50	3039460
Total Nickel (Ni)	ug/L	<50	50	3043592	140	2.0	3038696	280	20	3038696
Dissolved Phosphorus (P)	ug/L	<5000	5000	3043708	<100	100	3039460	<5000	5000	3039460
Total Phosphorus (P)	ug/L	<5000	5000	3043592	3300	100	3038696	<1000	1000	3038696
Dissolved Potassium (K)	ug/L	290000	10000	3043708	11000	200	3039460	210000	10000	3039460
Total Potassium (K)	ug/L	320000	10000	3043592	25000	200	3038696	240000	2000	3038696
Dissolved Selenium (Se)	ug/L	<200	200	3043708	<2.0	2.0	3039460	<100	100	3039460
Dissolved Silicon (Si)	ug/L	2500	2500	3043708	9100	50	3039460	<2500	2500	3039460
Total Silicon (Si)	ug/L	6000	2500	3043592	73000	500	3038696	<5000	5000	3038696
Total Selenium (Se)	ug/L	<100	100	3043592	<2.0	2.0	3038696	110	100	3038696
Dissolved Silver (Ag)	ug/L	<5.0	5.0	3043708	<0.10	0.10	3039460	<5.0	5.0	3039460
Total Silver (Ag)	ug/L	<5.0	5.0	3043592	0.58	0.10	3038696	<1.0	1.0	3038696
Dissolved Sodium (Na)	ug/L	18000000	5000	3043708	35000	100	3039460	13000000	5000	3039460
Total Sodium (Na)	ug/L	19000000	5000	3043592	37000	100	3038696	16000000	10000	3038696
Dissolved Strontium (Sr)	ug/L	180000	50	3043708	7000	1.0	3039460	110000	50	3039460
Total Strontium (Sr)	ug/L	190000	50	3043592	8900	1.0	3038696	120000	10	3038696
Dissolved Thallium (Tl)	ug/L	<2.5	2.5	3043708	<0.050	0.050	3039460	<2.5	2.5	3039460
Total Thallium (Tl)	ug/L	<2.5	2.5	3043592	0.51	0.050	3038696	<0.50	0.50	3038696
Dissolved Tin (Sn)	ug/L	<50	50	3043708	<1.0	1.0	3039460	<50	50	3039460
Total Tin (Sn)	ug/L	<50	50	3043592	1.1	1.0	3038696	<10	10	3038696
Dissolved Titanium (Ti)	ug/L	<250	250	3043708	8.9	5.0	3039460	<250	250	3039460
Total Titanium (Ti)	ug/L	<250	250	3043592	670	50	3038696	<50	50	3038696
Dissolved Uranium (U)	ug/L	11	5.0	3043708	2.1	0.10	3039460	<5.0	5.0	3039460
Total Uranium (U)	ug/L	11	5.0	3043592	5.6	0.10	3038696	9.7	1.0	3038696
Dissolved Vanadium (V)	ug/L	<50	50	3043708	1.1	0.50	3039460	36	25	3039460
Total Vanadium (V)	ug/L	<50	50	3043592	110	0.50	3038696	<50 (1)	50	3038696
Dissolved Zinc (Zn)	ug/L	<250	250	3043708	<5.0	5.0	3039460	<250	250	3039460
Total Zinc (Zn)	ug/L	<250	250	3043592	390	5.0	3038696	<50	50	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

( 1 ) Detection Limit was raised due to matrix interferences.

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP0555  
**Sample ID** MW-04D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040749	N/A	2012/11/19	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0556  
**Sample ID** MW-04 SHALLOW  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040888	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0557  
**Sample ID** MW-04I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

Dissolved Metals by ICPMS	ICP/MS	3040273	N/A	2012/11/19	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3038752	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0557 Dup  
**Sample ID** MW-041  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Sulphide	ISE/S	3038752	N/A	2012/11/16	Xuanhong Qiu

**Maxxam ID** PP0558  
**Sample ID** 10I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040888	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037605	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036678	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0559  
**Sample ID** 10-SHALLOW  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040749	N/A	2012/11/20	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis



Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0560  
**Sample ID** MW-09I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040273	N/A	2012/11/19	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037602	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036678	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0560 Dup  
**Sample ID** MW-09I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
pH	PH	3038172	N/A	2012/11/16	Surinder Rai

**Maxxam ID** PP0561  
**Sample ID** MW-09D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Ewa Pranjic
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li

Golder Associates Ltd

 Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**Test Summary**

pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0562  
**Sample ID** MW-09S  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038545	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3039460	N/A	2012/11/19	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH <sub>4</sub>	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3037605	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0563  
**Sample ID** MW-10D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3039460	N/A	2012/11/19	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH <sub>4</sub>	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3037605	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3041758	2012/11/20	2012/11/20	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP0563 Dup  
**Sample ID** MW-10D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

Package 1	6.3°C
Package 2	6.0°C

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

#### GENERAL COMMENTS

Sample PP0555-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP0557-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP0559-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP0560-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP0561-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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

Sample PP0563-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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

**Results relate only to the items tested.**

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

### Quality Assurance Report

Maxxam Job Number: MB2H8285

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3036346 NYS	QC Standard	Turbidity	2012/11/14		97	%	85 - 115
	Method Blank	Turbidity	2012/11/14	<0.2		NTU	
3036675 SUP	RPD	Turbidity	2012/11/14	6.8		%	20
	QC Standard	Total Suspended Solids	2012/11/15		99	%	85 - 115
	Method Blank	Total Suspended Solids	2012/11/15	<10		mg/L	
3036678 SUP	RPD	Total Suspended Solids	2012/11/15	NC		%	25
	QC Standard	Total Suspended Solids	2012/11/15		95	%	85 - 115
	Method Blank	Total Suspended Solids	2012/11/15	<10		mg/L	
3036887 BMO	RPD	Total Suspended Solids	2012/11/15	NC		%	25
	Matrix Spike	Phenols-4AAP	2012/11/15		102	%	80 - 120
	Spiked Blank	Phenols-4AAP	2012/11/15		102	%	85 - 115
3036888 BMO	Method Blank	Phenols-4AAP	2012/11/15	<0.0010		mg/L	
	RPD	Phenols-4AAP	2012/11/15	NC		%	25
	Matrix Spike	Phenols-4AAP	2012/11/19		97	%	80 - 120
3037602 C_H	Spiked Blank	Phenols-4AAP	2012/11/19		98	%	85 - 115
	Method Blank	Phenols-4AAP	2012/11/19	<0.0010		mg/L	
	RPD	Phenols-4AAP	2012/11/19	3.4		%	25
3037605 C_H	Matrix Spike	Nitrite (N)	2012/11/16		106	%	80 - 120
		Nitrate (N)	2012/11/16		100	%	80 - 120
	Spiked Blank	Nitrite (N)	2012/11/16		101	%	85 - 115
		Nitrate (N)	2012/11/16		98	%	85 - 115
	Method Blank	Nitrite (N)	2012/11/16	<0.010		mg/L	
		Nitrate (N)	2012/11/16	<0.10		mg/L	
	RPD	Nitrite (N)	2012/11/16	NC		%	25
		Nitrate (N)	2012/11/16	NC		%	25
	Matrix Spike	Nitrite (N)	2012/11/16		105	%	80 - 120
		Nitrate (N)	2012/11/16		NC	%	80 - 120
3037629 XQI	Spiked Blank	Nitrite (N)	2012/11/16		100	%	85 - 115
		Nitrate (N)	2012/11/16		99	%	85 - 115
	Method Blank	Nitrite (N)	2012/11/16	<0.010		mg/L	
		Nitrate (N)	2012/11/16	<0.10		mg/L	
3037941 C_H	RPD	Nitrite (N)	2012/11/16	NC		%	25
		Nitrate (N)	2012/11/16	2.0		%	25
	Matrix Spike	Sulphide	2012/11/16		95	%	80 - 120
	Spiked Blank	Sulphide	2012/11/16		95	%	80 - 120
3037957 FD	Method Blank	Sulphide	2012/11/16	<0.020		mg/L	
	RPD	Sulphide	2012/11/16	NC		%	20
	Matrix Spike	Nitrite (N)	2012/11/16		103	%	80 - 120
		Nitrate (N)	2012/11/16		NC	%	80 - 120
	Spiked Blank	Nitrite (N)	2012/11/16		100	%	85 - 115
		Nitrate (N)	2012/11/16		92	%	85 - 115
	Method Blank	Nitrite (N)	2012/11/16	<0.010		mg/L	
		Nitrate (N)	2012/11/16	<0.10		mg/L	
	RPD	Nitrite (N)	2012/11/16	NC		%	25
		Nitrate (N)	2012/11/16	1.0		%	25
3037957 FD	Matrix Spike	Dissolved Chloride (Cl)	2012/11/16		97	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/16		101	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/16		98	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2012/11/16		99	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/16		102	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/16		99	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2012/11/16	<1.0		mg/L	
		Dissolved Bromide (Br-)	2012/11/16	<1.0		mg/L	
		Dissolved Sulphate (SO4)	2012/11/16	1.5, RDL=1.0		mg/L	
	RPD	Dissolved Chloride (Cl)	2012/11/16	9.2		%	20

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H8285

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3038166 SAU	QC Standard	Alkalinity (Total as CaCO3)	2012/11/16		98	%	85 - 115
	Method Blank	Alkalinity (Total as CaCO3)	2012/11/16	<1.0		mg/L	
	RPD [PP0560-01]	Alkalinity (Total as CaCO3)	2012/11/16	1.5		%	25
3038171 SAU	Matrix Spike						
	[PP0560-01]	Fluoride (F-)	2012/11/16		103	%	80 - 120
	Spiked Blank	Fluoride (F-)	2012/11/16		104	%	80 - 120
	Method Blank	Fluoride (F-)	2012/11/16	<0.10		mg/L	
	RPD [PP0560-01]	Fluoride (F-)	2012/11/16	NC		%	20
3038220 BIP	Matrix Spike						
	[PP0563-01]	Orthophosphate (P)	2012/11/16		77 (1)	%	75 - 125
	Spiked Blank	Orthophosphate (P)	2012/11/16		102	%	80 - 120
	Method Blank	Orthophosphate (P)	2012/11/16	<0.010		mg/L	
	RPD [PP0563-01]	Orthophosphate (P)	2012/11/16	NC		%	25
3038486 MC	Matrix Spike	Mercury (Hg)	2012/11/16		100	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/16		100	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/16	<0.00010		mg/L	
	RPD	Mercury (Hg)	2012/11/16	NC		%	20
3038545 MC	Matrix Spike	Mercury (Hg)	2012/11/16		100	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/16		100	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/16	<0.00010		mg/L	
	RPD	Mercury (Hg)	2012/11/16	NC		%	20
3038546 L_A	Matrix Spike	Total Ammonia-N	2012/11/18		99	%	80 - 120
	Spiked Blank	Total Ammonia-N	2012/11/18		102	%	85 - 115
	Method Blank	Total Ammonia-N	2012/11/18	<0.050		mg/L	
	RPD	Total Ammonia-N	2012/11/18	NC		%	20
3038696 ADA	Matrix Spike						
	[PP0563-03]	Total Aluminum (Al)	2012/11/16		NC	%	80 - 120
		Total Antimony (Sb)	2012/11/16		112	%	80 - 120
		Total Arsenic (As)	2012/11/16		107	%	80 - 120
		Total Barium (Ba)	2012/11/16		107	%	80 - 120
		Total Beryllium (Be)	2012/11/16		97	%	80 - 120
		Total Bismuth (Bi)	2012/11/16		92	%	80 - 120
		Total Boron (B)	2012/11/16		NC	%	80 - 120
		Total Cadmium (Cd)	2012/11/16		105	%	80 - 120
		Total Calcium (Ca)	2012/11/16		NC	%	80 - 120
		Total Chromium (Cr)	2012/11/16		95	%	80 - 120
		Total Cobalt (Co)	2012/11/16		103	%	80 - 120
		Total Copper (Cu)	2012/11/16		98	%	80 - 120
		Total Iron (Fe)	2012/11/16		104	%	80 - 120
		Total Lead (Pb)	2012/11/16		94	%	80 - 120
		Total Magnesium (Mg)	2012/11/16		NC	%	80 - 120
		Total Manganese (Mn)	2012/11/16		NC	%	80 - 120
		Total Molybdenum (Mo)	2012/11/16		104	%	80 - 120
		Total Nickel (Ni)	2012/11/16		NC	%	80 - 120
		Total Phosphorus (P)	2012/11/16		120	%	80 - 120
		Total Potassium (K)	2012/11/16		NC	%	80 - 120
		Total Silicon (Si)	2012/11/16		101	%	80 - 120
		Total Selenium (Se)	2012/11/16		103	%	80 - 120
		Total Silver (Ag)	2012/11/16		100	%	80 - 120
		Total Sodium (Na)	2012/11/16		NC	%	80 - 120
		Total Strontium (Sr)	2012/11/16		NC	%	80 - 120
		Total Thallium (Tl)	2012/11/16		91	%	80 - 120
		Total Tin (Sn)	2012/11/16		109	%	80 - 120
		Total Titanium (Ti)	2012/11/16		128 (2)	%	80 - 120
		Total Uranium (U)	2012/11/16		97	%	80 - 120

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H8285

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3038696 ADA	Matrix Spike [PP0563-03]	Total Vanadium (V)	2012/11/16		100	%	80 - 120		
		Total Zinc (Zn)	2012/11/16		93	%	80 - 120		
	Spiked Blank	Total Aluminum (Al)	2012/11/16		113	%	80 - 120		
		Total Antimony (Sb)	2012/11/16		108	%	80 - 120		
		Total Arsenic (As)	2012/11/16		105	%	80 - 120		
		Total Barium (Ba)	2012/11/16		105	%	80 - 120		
		Total Beryllium (Be)	2012/11/16		109	%	80 - 120		
		Total Bismuth (Bi)	2012/11/16		101	%	80 - 120		
		Total Boron (B)	2012/11/16		108	%	80 - 120		
		Total Cadmium (Cd)	2012/11/16		103	%	80 - 120		
		Total Calcium (Ca)	2012/11/16		104	%	80 - 120		
		Total Chromium (Cr)	2012/11/16		100	%	80 - 120		
		Total Cobalt (Co)	2012/11/16		104	%	80 - 120		
		Total Copper (Cu)	2012/11/16		102	%	80 - 120		
		Total Iron (Fe)	2012/11/16		102	%	80 - 120		
		Total Lead (Pb)	2012/11/16		101	%	80 - 120		
		Total Magnesium (Mg)	2012/11/16		112	%	80 - 120		
		Total Manganese (Mn)	2012/11/16		101	%	80 - 120		
		Total Molybdenum (Mo)	2012/11/16		104	%	80 - 120		
		Total Nickel (Ni)	2012/11/16		102	%	80 - 120		
		Total Phosphorus (P)	2012/11/16		113	%	80 - 120		
		Total Potassium (K)	2012/11/16		107	%	80 - 120		
		Total Silicon (Si)	2012/11/16		103	%	80 - 120		
		Total Selenium (Se)	2012/11/16		103	%	80 - 120		
		Total Silver (Ag)	2012/11/16		104	%	80 - 120		
		Total Sodium (Na)	2012/11/16		115	%	80 - 120		
		Total Strontium (Sr)	2012/11/16		105	%	80 - 120		
		Total Thallium (Tl)	2012/11/16		101	%	80 - 120		
		Total Tin (Sn)	2012/11/16		106	%	80 - 120		
		Total Titanium (Ti)	2012/11/16		105	%	80 - 120		
		Total Uranium (U)	2012/11/16		99	%	80 - 120		
		Total Vanadium (V)	2012/11/16		102	%	80 - 120		
		Total Zinc (Zn)	2012/11/16		100	%	80 - 120		
		Method Blank	Total Aluminum (Al)	2012/11/16		<5.0		ug/L	
			Total Antimony (Sb)	2012/11/16		<0.50		ug/L	
			Total Arsenic (As)	2012/11/16		<1.0		ug/L	
			Total Barium (Ba)	2012/11/16		<2.0		ug/L	
			Total Beryllium (Be)	2012/11/16		<0.50		ug/L	
			Total Bismuth (Bi)	2012/11/16		<1.0		ug/L	
	Total Boron (B)		2012/11/16		<10		ug/L		
	Total Cadmium (Cd)		2012/11/16		<0.10		ug/L		
	Total Calcium (Ca)		2012/11/16		<200		ug/L		
	Total Chromium (Cr)		2012/11/16		<5.0		ug/L		
Total Cobalt (Co)	2012/11/16			<0.50		ug/L			
Total Copper (Cu)	2012/11/16			<1.0		ug/L			
Total Iron (Fe)	2012/11/16			<100		ug/L			
Total Lead (Pb)	2012/11/16			<0.50		ug/L			
Total Magnesium (Mg)	2012/11/16			<50		ug/L			
Total Manganese (Mn)	2012/11/16			<2.0		ug/L			
Total Molybdenum (Mo)	2012/11/16			<0.50		ug/L			
Total Nickel (Ni)	2012/11/16		<1.0		ug/L				
Total Phosphorus (P)	2012/11/16		<100		ug/L				
Total Potassium (K)	2012/11/16		<200		ug/L				
Total Silicon (Si)	2012/11/16		<50		ug/L				

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H8285

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3038696 ADA	Method Blank	Total Selenium (Se)	2012/11/16	<2.0		ug/L	
		Total Silver (Ag)	2012/11/16	<0.10		ug/L	
		Total Sodium (Na)	2012/11/16	<100		ug/L	
		Total Strontium (Sr)	2012/11/16	<1.0		ug/L	
		Total Thallium (Tl)	2012/11/16	<0.050		ug/L	
		Total Tin (Sn)	2012/11/16	<1.0		ug/L	
		Total Titanium (Ti)	2012/11/16	<5.0		ug/L	
		Total Uranium (U)	2012/11/16	<0.10		ug/L	
		Total Vanadium (V)	2012/11/16	<0.50		ug/L	
		Total Zinc (Zn)	2012/11/16	<5.0		ug/L	
	RPD [PP0563-03]	Total Aluminum (Al)	2012/11/16	2.0		%	20
		Total Antimony (Sb)	2012/11/16	NC		%	20
		Total Arsenic (As)	2012/11/16	NC		%	20
		Total Barium (Ba)	2012/11/16	4.0		%	20
		Total Beryllium (Be)	2012/11/16	NC		%	20
		Total Bismuth (Bi)	2012/11/16	NC		%	20
		Total Boron (B)	2012/11/16	3.4		%	20
		Total Cadmium (Cd)	2012/11/16	7.9		%	20
		Total Calcium (Ca)	2012/11/16	2.1		%	20
		Total Chromium (Cr)	2012/11/16	NC		%	20
		Total Cobalt (Co)	2012/11/16	NC		%	20
		Total Copper (Cu)	2012/11/16	NC		%	20
		Total Iron (Fe)	2012/11/16	NC		%	20
		Total Lead (Pb)	2012/11/16	NC		%	20
		Total Magnesium (Mg)	2012/11/16	3.9		%	20
		Total Manganese (Mn)	2012/11/16	6.5		%	20
		Total Molybdenum (Mo)	2012/11/16	5.5		%	20
		Total Nickel (Ni)	2012/11/16	2.7		%	20
		Total Phosphorus (P)	2012/11/16	NC		%	20
		Total Potassium (K)	2012/11/16	0.09		%	20
		Total Silicon (Si)	2012/11/16	NC		%	20
		Total Selenium (Se)	2012/11/16	NC		%	20
		Total Silver (Ag)	2012/11/16	NC		%	20
		Total Sodium (Na)	2012/11/16	1.4		%	20
		Total Strontium (Sr)	2012/11/16	3.2		%	20
		Total Thallium (Tl)	2012/11/16	NC		%	20
		Total Tin (Sn)	2012/11/16	NC		%	20
		Total Titanium (Ti)	2012/11/16	NC		%	20
		Total Uranium (U)	2012/11/16	5.1		%	20
		Total Vanadium (V)	2012/11/16	NC		%	20
		Total Zinc (Zn)	2012/11/16	NC		%	20
3038752 XQI	Matrix Spike [PP0557-07]	Sulphide	2012/11/16		92	%	80 - 120
	Spiked Blank	Sulphide	2012/11/16		95	%	80 - 120
	Method Blank	Sulphide	2012/11/16	<0.020		mg/L	
	RPD [PP0557-07]	Sulphide	2012/11/16	3.8		%	20
3039074 VRO	Matrix Spike	Total Phosphorus	2012/11/19		102	%	80 - 120
	QC Standard	Total Phosphorus	2012/11/19		109	%	85 - 115
	Spiked Blank	Total Phosphorus	2012/11/19		106	%	85 - 115
	Method Blank	Total Phosphorus	2012/11/19	<0.020		mg/L	
	RPD	Total Phosphorus	2012/11/19	NC		%	20
3039405 BMO	Matrix Spike	Free Cyanide	2012/11/19		92	%	80 - 120
	Spiked Blank	Free Cyanide	2012/11/19		94	%	80 - 120
	Method Blank	Free Cyanide	2012/11/19	<0.0020		mg/L	
	RPD	Free Cyanide	2012/11/19	NC		%	20



Golder Associates Ltd  
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## Quality Assurance Report (Continued)

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3039460 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/19		103	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/19		111	%	80 - 120
		Dissolved Arsenic (As)	2012/11/19		103	%	80 - 120
		Dissolved Barium (Ba)	2012/11/19		103	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/19		106	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/19		102	%	80 - 120
		Dissolved Boron (B)	2012/11/19		106	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/19		109	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/19		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/19		100	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/19		100	%	80 - 120
		Dissolved Copper (Cu)	2012/11/19		96	%	80 - 120
		Dissolved Iron (Fe)	2012/11/19		99	%	80 - 120
		Dissolved Lead (Pb)	2012/11/19		100	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/19		NC	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/19		102	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/19		111	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/19		100	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/19		106	%	80 - 120
		Dissolved Potassium (K)	2012/11/19		102	%	80 - 120
		Dissolved Selenium (Se)	2012/11/19		103	%	80 - 120
		Dissolved Silicon (Si)	2012/11/19		103	%	80 - 120
		Dissolved Silver (Ag)	2012/11/19		101	%	80 - 120
		Dissolved Sodium (Na)	2012/11/19		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/19		106	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/19		99	%	80 - 120
		Dissolved Tin (Sn)	2012/11/19		110	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/19		105	%	80 - 120
		Dissolved Uranium (U)	2012/11/19		107	%	80 - 120
		Dissolved Vanadium (V)	2012/11/19		104	%	80 - 120
Dissolved Zinc (Zn)	2012/11/19		101	%	80 - 120		
Spiked Blank		Dissolved Aluminum (Al)	2012/11/19		98	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/19		104	%	80 - 120
		Dissolved Arsenic (As)	2012/11/19		97	%	80 - 120
		Dissolved Barium (Ba)	2012/11/19		100	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/19		101	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/19		100	%	80 - 120
		Dissolved Boron (B)	2012/11/19		104	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/19		104	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/19		97	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/19		98	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/19		98	%	80 - 120
		Dissolved Copper (Cu)	2012/11/19		95	%	80 - 120
		Dissolved Iron (Fe)	2012/11/19		95	%	80 - 120
		Dissolved Lead (Pb)	2012/11/19		97	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/19		98	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/19		97	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/19		103	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/19		98	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/19		102	%	80 - 120
		Dissolved Potassium (K)	2012/11/19		96	%	80 - 120
Dissolved Selenium (Se)	2012/11/19		99	%	80 - 120		
Dissolved Silicon (Si)	2012/11/19		99	%	80 - 120		
Dissolved Silver (Ag)	2012/11/19		99	%	80 - 120		
Dissolved Sodium (Na)	2012/11/19		96	%	80 - 120		

Golder Associates Ltd  
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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3039460 HRE	Spiked Blank	Dissolved Strontium (Sr)	2012/11/19		95	%	80 - 120		
		Dissolved Thallium (Tl)	2012/11/19		96	%	80 - 120		
		Dissolved Tin (Sn)	2012/11/19		103	%	80 - 120		
		Dissolved Titanium (Ti)	2012/11/19		101	%	80 - 120		
		Dissolved Uranium (U)	2012/11/19		102	%	80 - 120		
		Dissolved Vanadium (V)	2012/11/19		99	%	80 - 120		
Method Blank	Method Blank	Dissolved Zinc (Zn)	2012/11/19		98	%	80 - 120		
		Dissolved Aluminum (Al)	2012/11/19	<5.0		ug/L			
		Dissolved Antimony (Sb)	2012/11/19	<0.50		ug/L			
		Dissolved Arsenic (As)	2012/11/19	<1.0		ug/L			
		Dissolved Barium (Ba)	2012/11/19	<2.0		ug/L			
		Dissolved Beryllium (Be)	2012/11/19	<0.50		ug/L			
		Dissolved Bismuth (Bi)	2012/11/19	<1.0		ug/L			
		Dissolved Boron (B)	2012/11/19	<10		ug/L			
		Dissolved Cadmium (Cd)	2012/11/19	<0.10		ug/L			
		Dissolved Calcium (Ca)	2012/11/19	<200		ug/L			
		Dissolved Chromium (Cr)	2012/11/19	<5.0		ug/L			
		Dissolved Cobalt (Co)	2012/11/19	<0.50		ug/L			
		Dissolved Copper (Cu)	2012/11/19	<1.0		ug/L			
		Dissolved Iron (Fe)	2012/11/19	<100		ug/L			
		Dissolved Lead (Pb)	2012/11/19	<0.50		ug/L			
		Dissolved Magnesium (Mg)	2012/11/19	<50		ug/L			
		Dissolved Manganese (Mn)	2012/11/19	<2.0		ug/L			
		Dissolved Molybdenum (Mo)	2012/11/19	<0.50		ug/L			
		Dissolved Nickel (Ni)	2012/11/19	<1.0		ug/L			
		Dissolved Phosphorus (P)	2012/11/19	<100		ug/L			
		Dissolved Potassium (K)	2012/11/19	<200		ug/L			
		Dissolved Selenium (Se)	2012/11/19	<2.0		ug/L			
		Dissolved Silicon (Si)	2012/11/19	<50		ug/L			
		Dissolved Silver (Ag)	2012/11/19	<0.10		ug/L			
		Dissolved Sodium (Na)	2012/11/19	<100		ug/L			
		Dissolved Strontium (Sr)	2012/11/19	1.8, RDL=1.0		ug/L			
		Dissolved Thallium (Tl)	2012/11/19	<0.050		ug/L			
		Dissolved Tin (Sn)	2012/11/19	<1.0		ug/L			
		Dissolved Titanium (Ti)	2012/11/19	<5.0		ug/L			
		Dissolved Uranium (U)	2012/11/19	<0.10		ug/L			
		Dissolved Vanadium (V)	2012/11/19	<0.50		ug/L			
		RPD	RPD	Dissolved Zinc (Zn)	2012/11/19	<5.0		ug/L	
				Dissolved Antimony (Sb)	2012/11/19	NC		%	20
Dissolved Arsenic (As)	2012/11/19			NC		%	20		
Dissolved Barium (Ba)	2012/11/19			0.1		%	20		
Dissolved Beryllium (Be)	2012/11/19			NC		%	20		
Dissolved Boron (B)	2012/11/19			NC		%	20		
Dissolved Cadmium (Cd)	2012/11/19			NC		%	20		
Dissolved Chromium (Cr)	2012/11/19			NC		%	20		
Dissolved Cobalt (Co)	2012/11/19			NC		%	20		
Dissolved Copper (Cu)	2012/11/19			NC		%	20		
Dissolved Lead (Pb)	2012/11/19			NC		%	20		
Dissolved Molybdenum (Mo)	2012/11/19			NC		%	20		
Dissolved Nickel (Ni)	2012/11/19			NC		%	20		
Dissolved Selenium (Se)	2012/11/19			NC		%	20		
Dissolved Silver (Ag)	2012/11/19			NC		%	20		
Dissolved Sodium (Na)	2012/11/19			2.3		%	20		
Dissolved Thallium (Tl)	2012/11/19			NC		%	20		
Dissolved Uranium (U)	2012/11/19			5.2		%	20		

Golder Associates Ltd  
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### Quality Assurance Report (Continued)

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3039460 HRE	RPD	Dissolved Vanadium (V)	2012/11/19	NC		%	20
		Dissolved Zinc (Zn)	2012/11/19	NC		%	20
3040273 PBA	Matrix Spike	Dissolved Aluminum (Al)	2012/11/19		111	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/19		112	%	80 - 120
		Dissolved Arsenic (As)	2012/11/19		105	%	80 - 120
		Dissolved Barium (Ba)	2012/11/19		97	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/19		111	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/19		98	%	80 - 120
		Dissolved Boron (B)	2012/11/19		NC	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/19		105	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/19		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/19		107	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/19		103	%	80 - 120
		Dissolved Copper (Cu)	2012/11/19		98	%	80 - 120
		Dissolved Iron (Fe)	2012/11/19		105	%	80 - 120
		Dissolved Lead (Pb)	2012/11/19		98	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/19		NC	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/19		NC	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/19		112	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/19		98	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/19		114	%	80 - 120
		Dissolved Potassium (K)	2012/11/19		NC	%	80 - 120
		Dissolved Selenium (Se)	2012/11/19		110	%	80 - 120
		Dissolved Silicon (Si)	2012/11/19		107	%	80 - 120
		Dissolved Silver (Ag)	2012/11/19		97	%	80 - 120
		Dissolved Sodium (Na)	2012/11/19		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/19		NC	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/19		100	%	80 - 120
		Dissolved Tin (Sn)	2012/11/19		110	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/19		108	%	80 - 120
		Dissolved Uranium (U)	2012/11/19		105	%	80 - 120
		Dissolved Vanadium (V)	2012/11/19		112	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/19		105	%	80 - 120
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/19		104	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/19		97	%	80 - 120
		Dissolved Arsenic (As)	2012/11/19		100	%	80 - 120
		Dissolved Barium (Ba)	2012/11/19		95	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/19		102	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/19		95	%	80 - 120
		Dissolved Boron (B)	2012/11/19		102	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/19		97	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/19		104	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/19		101	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/19		99	%	80 - 120
		Dissolved Copper (Cu)	2012/11/19		99	%	80 - 120
		Dissolved Iron (Fe)	2012/11/19		102	%	80 - 120
		Dissolved Lead (Pb)	2012/11/19		98	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/19		105	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/19		101	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/19		103	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/19		100	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/19		106	%	80 - 120
		Dissolved Potassium (K)	2012/11/19		102	%	80 - 120
		Dissolved Selenium (Se)	2012/11/19		101	%	80 - 120
		Dissolved Silicon (Si)	2012/11/19		102	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3040273 PBA	Spiked Blank	Dissolved Silver (Ag)	2012/11/19		97	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/19		106	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/19		106	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/19		99	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/19		100	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/19		102	%	80 - 120	
		Dissolved Uranium (U)	2012/11/19		100	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/19		101	%	80 - 120	
	Dissolved Zinc (Zn)	2012/11/19		102	%	80 - 120		
	Method Blank	Dissolved Aluminum (Al)	2012/11/19	<5.0			ug/L	
		Dissolved Antimony (Sb)	2012/11/19	0.90, RDL=0.50			ug/L	
		Dissolved Arsenic (As)	2012/11/19	<1.0			ug/L	
		Dissolved Barium (Ba)	2012/11/19	<2.0			ug/L	
		Dissolved Beryllium (Be)	2012/11/19	<0.50			ug/L	
		Dissolved Bismuth (Bi)	2012/11/19	<1.0			ug/L	
		Dissolved Boron (B)	2012/11/19	<10			ug/L	
		Dissolved Cadmium (Cd)	2012/11/19	0.10, RDL=0.10			ug/L	
		Dissolved Calcium (Ca)	2012/11/19	<200			ug/L	
		Dissolved Chromium (Cr)	2012/11/19	<5.0			ug/L	
		Dissolved Cobalt (Co)	2012/11/19	<0.50			ug/L	
		Dissolved Copper (Cu)	2012/11/19	<1.0			ug/L	
		Dissolved Iron (Fe)	2012/11/19	<100			ug/L	
		Dissolved Lead (Pb)	2012/11/19	<0.50			ug/L	
		Dissolved Magnesium (Mg)	2012/11/19	<50			ug/L	
		Dissolved Manganese (Mn)	2012/11/19	<2.0			ug/L	
		Dissolved Molybdenum (Mo)	2012/11/19	<0.50			ug/L	
		Dissolved Nickel (Ni)	2012/11/19	<1.0			ug/L	
		Dissolved Phosphorus (P)	2012/11/19	<100			ug/L	
		Dissolved Potassium (K)	2012/11/19	<200			ug/L	
		Dissolved Selenium (Se)	2012/11/19	<2.0			ug/L	
		Dissolved Silicon (Si)	2012/11/19	<50			ug/L	
		Dissolved Silver (Ag)	2012/11/19	<0.10			ug/L	
		Dissolved Sodium (Na)	2012/11/19	<100			ug/L	
Dissolved Strontium (Sr)		2012/11/19	<1.0			ug/L		
Dissolved Thallium (Tl)	2012/11/19	<0.050			ug/L			
Dissolved Tin (Sn)	2012/11/19	<1.0			ug/L			
Dissolved Titanium (Ti)	2012/11/19	<5.0			ug/L			
Dissolved Uranium (U)	2012/11/19	0.10, RDL=0.10			ug/L			
Dissolved Vanadium (V)	2012/11/19	<0.50			ug/L			
Dissolved Zinc (Zn)	2012/11/19	<5.0			ug/L			
RPD	Dissolved Antimony (Sb)	2012/11/19	NC			%	20	
	Dissolved Arsenic (As)	2012/11/19	NC			%	20	
	Dissolved Barium (Ba)	2012/11/19	5.2			%	20	
	Dissolved Beryllium (Be)	2012/11/19	NC			%	20	
	Dissolved Boron (B)	2012/11/19	4.9			%	20	
	Dissolved Cadmium (Cd)	2012/11/19	NC			%	20	
	Dissolved Chromium (Cr)	2012/11/19	NC			%	20	
	Dissolved Cobalt (Co)	2012/11/19	3.0			%	20	
	Dissolved Copper (Cu)	2012/11/19	NC			%	20	
	Dissolved Lead (Pb)	2012/11/19	NC			%	20	
	Dissolved Molybdenum (Mo)	2012/11/19	NC			%	20	
	Dissolved Nickel (Ni)	2012/11/19	NC			%	20	
	Dissolved Selenium (Se)	2012/11/19	NC			%	20	
	Dissolved Silver (Ag)	2012/11/19	NC			%	20	
	Dissolved Sodium (Na)	2012/11/19	2.1			%	20	

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3040273 PBA	RPD	Dissolved Thallium (Tl)	2012/11/19	NC		%	20	
		Dissolved Uranium (U)	2012/11/19	5.6		%	20	
		Dissolved Vanadium (V)	2012/11/19	NC		%	20	
		Dissolved Zinc (Zn)	2012/11/19	NC		%	20	
3040749 ADA	Matrix Spike	Dissolved Aluminum (Al)	2012/11/19		100	%	80 - 120	
		Dissolved Antimony (Sb)	2012/11/19		106	%	80 - 120	
		Dissolved Arsenic (As)	2012/11/19		104	%	80 - 120	
		Dissolved Barium (Ba)	2012/11/19		NC	%	80 - 120	
		Dissolved Beryllium (Be)	2012/11/19		97	%	80 - 120	
		Dissolved Bismuth (Bi)	2012/11/19		95	%	80 - 120	
		Dissolved Boron (B)	2012/11/19		93	%	80 - 120	
		Dissolved Cadmium (Cd)	2012/11/19		99	%	80 - 120	
		Dissolved Calcium (Ca)	2012/11/19		NC	%	80 - 120	
		Dissolved Chromium (Cr)	2012/11/19		99	%	80 - 120	
		Dissolved Cobalt (Co)	2012/11/19		99	%	80 - 120	
		Dissolved Copper (Cu)	2012/11/19		94	%	80 - 120	
		Dissolved Iron (Fe)	2012/11/19		102	%	80 - 120	
		Dissolved Lead (Pb)	2012/11/19		94	%	80 - 120	
		Dissolved Magnesium (Mg)	2012/11/19		NC	%	80 - 120	
		Dissolved Manganese (Mn)	2012/11/19		NC	%	80 - 120	
		Dissolved Molybdenum (Mo)	2012/11/19		106	%	80 - 120	
		Dissolved Nickel (Ni)	2012/11/19		95	%	80 - 120	
		Dissolved Phosphorus (P)	2012/11/19		111	%	80 - 120	
		Dissolved Potassium (K)	2012/11/19		106	%	80 - 120	
		Dissolved Selenium (Se)	2012/11/19		102	%	80 - 120	
		Dissolved Silicon (Si)	2012/11/19		106	%	80 - 120	
		Dissolved Silver (Ag)	2012/11/19		95	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/19		NC	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/19		NC	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/19		94	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/19		105	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/19		105	%	80 - 120	
		Dissolved Uranium (U)	2012/11/19		101	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/19		NC	%	80 - 120	
		Dissolved Zinc (Zn)	2012/11/19		94	%	80 - 120	
		Spiked Blank	Dissolved Aluminum (Al)	2012/11/19		100	%	80 - 120
			Dissolved Antimony (Sb)	2012/11/19		97	%	80 - 120
			Dissolved Arsenic (As)	2012/11/19		96	%	80 - 120
Dissolved Barium (Ba)	2012/11/19			98	%	80 - 120		
Dissolved Beryllium (Be)	2012/11/19			98	%	80 - 120		
Dissolved Bismuth (Bi)	2012/11/19			100	%	80 - 120		
Dissolved Boron (B)	2012/11/19			98	%	80 - 120		
Dissolved Cadmium (Cd)	2012/11/19			96	%	80 - 120		
Dissolved Calcium (Ca)	2012/11/19			102	%	80 - 120		
Dissolved Chromium (Cr)	2012/11/19			99	%	80 - 120		
Dissolved Cobalt (Co)	2012/11/19			98	%	80 - 120		
Dissolved Copper (Cu)	2012/11/19			97	%	80 - 120		
Dissolved Iron (Fe)	2012/11/19			98	%	80 - 120		
Dissolved Lead (Pb)	2012/11/19			98	%	80 - 120		
Dissolved Magnesium (Mg)	2012/11/19			99	%	80 - 120		
Dissolved Manganese (Mn)	2012/11/19			100	%	80 - 120		
Dissolved Molybdenum (Mo)	2012/11/19			97	%	80 - 120		
Dissolved Nickel (Ni)	2012/11/19			97	%	80 - 120		
Dissolved Phosphorus (P)	2012/11/19			95	%	80 - 120		
Dissolved Potassium (K)	2012/11/19			103	%	80 - 120		

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## Quality Assurance Report (Continued)

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3040749 ADA	Spiked Blank	Dissolved Selenium (Se)	2012/11/19		96	%	80 - 120		
		Dissolved Silicon (Si)	2012/11/19		100	%	80 - 120		
		Dissolved Silver (Ag)	2012/11/19		97	%	80 - 120		
		Dissolved Sodium (Na)	2012/11/19		103	%	80 - 120		
		Dissolved Strontium (Sr)	2012/11/19		100	%	80 - 120		
		Dissolved Thallium (Tl)	2012/11/19		98	%	80 - 120		
		Dissolved Tin (Sn)	2012/11/19		96	%	80 - 120		
		Dissolved Titanium (Ti)	2012/11/19		101	%	80 - 120		
		Dissolved Uranium (U)	2012/11/19		100	%	80 - 120		
		Dissolved Vanadium (V)	2012/11/19		98	%	80 - 120		
		Dissolved Zinc (Zn)	2012/11/19		99	%	80 - 120		
		Method Blank	Dissolved Aluminum (Al)	2012/11/19		<5.0		ug/L	
			Dissolved Antimony (Sb)	2012/11/19		<0.50		ug/L	
			Dissolved Arsenic (As)	2012/11/19		<1.0		ug/L	
			Dissolved Barium (Ba)	2012/11/19		<2.0		ug/L	
	Dissolved Beryllium (Be)		2012/11/19		<0.50		ug/L		
	Dissolved Bismuth (Bi)		2012/11/19		<1.0		ug/L		
	Dissolved Boron (B)		2012/11/19		<10		ug/L		
	Dissolved Cadmium (Cd)		2012/11/19		<0.10		ug/L		
	Dissolved Calcium (Ca)		2012/11/19		<200		ug/L		
	Dissolved Chromium (Cr)		2012/11/19		<5.0		ug/L		
	Dissolved Cobalt (Co)		2012/11/19		<0.50		ug/L		
	Dissolved Copper (Cu)		2012/11/19		<1.0		ug/L		
	Dissolved Iron (Fe)		2012/11/19		<100		ug/L		
	Dissolved Lead (Pb)		2012/11/19		<0.50		ug/L		
	Dissolved Magnesium (Mg)		2012/11/19		<50		ug/L		
	Dissolved Manganese (Mn)		2012/11/19		<2.0		ug/L		
	Dissolved Molybdenum (Mo)		2012/11/19		<0.50		ug/L		
	Dissolved Nickel (Ni)		2012/11/19		<1.0		ug/L		
	Dissolved Phosphorus (P)		2012/11/19		<100		ug/L		
	Dissolved Potassium (K)		2012/11/19		<200		ug/L		
	Dissolved Selenium (Se)	2012/11/19		<2.0		ug/L			
	Dissolved Silicon (Si)	2012/11/19		<50		ug/L			
	Dissolved Silver (Ag)	2012/11/19		<0.10		ug/L			
	Dissolved Sodium (Na)	2012/11/19		<100		ug/L			
Dissolved Strontium (Sr)	2012/11/19		<1.0		ug/L				
Dissolved Thallium (Tl)	2012/11/19		<0.050		ug/L				
Dissolved Tin (Sn)	2012/11/19		<1.0		ug/L				
Dissolved Titanium (Ti)	2012/11/19		<5.0		ug/L				
Dissolved Uranium (U)	2012/11/19		<0.10		ug/L				
Dissolved Vanadium (V)	2012/11/19		<0.50		ug/L				
Dissolved Zinc (Zn)	2012/11/19		<5.0		ug/L				
RPD		Dissolved Lead (Pb)	2012/11/19		NC	%	20		
3040888 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/20		98	%	80 - 120		
		Dissolved Antimony (Sb)	2012/11/20		104	%	80 - 120		
		Dissolved Arsenic (As)	2012/11/20		100	%	80 - 120		
		Dissolved Barium (Ba)	2012/11/20		96	%	80 - 120		
		Dissolved Beryllium (Be)	2012/11/20		96	%	80 - 120		
		Dissolved Bismuth (Bi)	2012/11/20		93	%	80 - 120		
		Dissolved Boron (B)	2012/11/20		NC	%	80 - 120		
		Dissolved Cadmium (Cd)	2012/11/20		99	%	80 - 120		
		Dissolved Calcium (Ca)	2012/11/20		NC	%	80 - 120		
		Dissolved Chromium (Cr)	2012/11/20		94	%	80 - 120		
		Dissolved Cobalt (Co)	2012/11/20		94	%	80 - 120		
		Dissolved Copper (Cu)	2012/11/20		89	%	80 - 120		

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3040888 HRE	Matrix Spike	Dissolved Iron (Fe)	2012/11/20		98	%	80 - 120	
		Dissolved Lead (Pb)	2012/11/20		93	%	80 - 120	
		Dissolved Magnesium (Mg)	2012/11/20		NC	%	80 - 120	
		Dissolved Manganese (Mn)	2012/11/20		94	%	80 - 120	
		Dissolved Molybdenum (Mo)	2012/11/20		103	%	80 - 120	
		Dissolved Nickel (Ni)	2012/11/20		91	%	80 - 120	
		Dissolved Phosphorus (P)	2012/11/20		108	%	80 - 120	
		Dissolved Potassium (K)	2012/11/20		NC	%	80 - 120	
		Dissolved Selenium (Se)	2012/11/20		96	%	80 - 120	
		Dissolved Silicon (Si)	2012/11/20		101	%	80 - 120	
		Dissolved Silver (Ag)	2012/11/20		83	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/20		NC	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/20		NC	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/20		97	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/20		103	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/20		102	%	80 - 120	
		Dissolved Uranium (U)	2012/11/20		99	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/20		97	%	80 - 120	
		Dissolved Zinc (Zn)	2012/11/20		90	%	80 - 120	
		Spiked Blank	Dissolved Aluminum (Al)	2012/11/20		104	%	80 - 120
			Dissolved Antimony (Sb)	2012/11/20		101	%	80 - 120
			Dissolved Arsenic (As)	2012/11/20		100	%	80 - 120
			Dissolved Barium (Ba)	2012/11/20		96	%	80 - 120
			Dissolved Beryllium (Be)	2012/11/20		100	%	80 - 120
			Dissolved Bismuth (Bi)	2012/11/20		96	%	80 - 120
			Dissolved Boron (B)	2012/11/20		105	%	80 - 120
			Dissolved Cadmium (Cd)	2012/11/20		99	%	80 - 120
			Dissolved Calcium (Ca)	2012/11/20		101	%	80 - 120
			Dissolved Chromium (Cr)	2012/11/20		99	%	80 - 120
			Dissolved Cobalt (Co)	2012/11/20		98	%	80 - 120
			Dissolved Copper (Cu)	2012/11/20		96	%	80 - 120
			Dissolved Iron (Fe)	2012/11/20		102	%	80 - 120
			Dissolved Lead (Pb)	2012/11/20		96	%	80 - 120
			Dissolved Magnesium (Mg)	2012/11/20		107	%	80 - 120
			Dissolved Manganese (Mn)	2012/11/20		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/11/20		99	%	80 - 120
			Dissolved Nickel (Ni)	2012/11/20		97	%	80 - 120
			Dissolved Phosphorus (P)	2012/11/20		111	%	80 - 120
			Dissolved Potassium (K)	2012/11/20		105	%	80 - 120
			Dissolved Selenium (Se)	2012/11/20		99	%	80 - 120
Dissolved Silicon (Si)	2012/11/20			105	%	80 - 120		
Dissolved Silver (Ag)	2012/11/20			96	%	80 - 120		
Dissolved Sodium (Na)	2012/11/20			107	%	80 - 120		
Dissolved Strontium (Sr)	2012/11/20			97	%	80 - 120		
Dissolved Thallium (Tl)	2012/11/20			99	%	80 - 120		
Dissolved Tin (Sn)	2012/11/20			101	%	80 - 120		
Dissolved Titanium (Ti)	2012/11/20			106	%	80 - 120		
Dissolved Uranium (U)	2012/11/20			98	%	80 - 120		
Dissolved Vanadium (V)	2012/11/20			99	%	80 - 120		
Dissolved Zinc (Zn)	2012/11/20			97	%	80 - 120		
Method Blank	Dissolved Aluminum (Al)		2012/11/19		<5.0		ug/L	
	Dissolved Antimony (Sb)		2012/11/19		<0.50		ug/L	
	Dissolved Arsenic (As)		2012/11/19		<1.0		ug/L	
	Dissolved Barium (Ba)		2012/11/19		<2.0		ug/L	
	Dissolved Beryllium (Be)		2012/11/19		<0.50		ug/L	

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3040888 HRE	Method Blank	Dissolved Bismuth (Bi)	2012/11/19	<1.0		ug/L	
		Dissolved Boron (B)	2012/11/19	<10		ug/L	
		Dissolved Cadmium (Cd)	2012/11/19	<0.10		ug/L	
		Dissolved Calcium (Ca)	2012/11/19	<200		ug/L	
		Dissolved Chromium (Cr)	2012/11/19	<5.0		ug/L	
		Dissolved Cobalt (Co)	2012/11/19	<0.50		ug/L	
		Dissolved Copper (Cu)	2012/11/19	<1.0		ug/L	
		Dissolved Iron (Fe)	2012/11/19	<100		ug/L	
		Dissolved Lead (Pb)	2012/11/19	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/19	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/19	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/19	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/19	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/19	<100		ug/L	
		Dissolved Potassium (K)	2012/11/19	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/19	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/19	<50		ug/L	
		Dissolved Silver (Ag)	2012/11/19	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/19	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/19	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/19	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/19	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/19	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/19	<0.10		ug/L	
		Dissolved Vanadium (V)	2012/11/19	<0.50		ug/L	
		Dissolved Zinc (Zn)	2012/11/19	<5.0		ug/L	
	RPD	Dissolved Aluminum (Al)	2012/11/20	NC		%	20
		Dissolved Antimony (Sb)	2012/11/20	NC		%	20
		Dissolved Arsenic (As)	2012/11/20	NC		%	20
		Dissolved Barium (Ba)	2012/11/20	NC		%	20
		Dissolved Beryllium (Be)	2012/11/20	NC		%	20
		Dissolved Bismuth (Bi)	2012/11/20	NC		%	20
		Dissolved Boron (B)	2012/11/20	0.1		%	20
		Dissolved Cadmium (Cd)	2012/11/20	NC		%	20
		Dissolved Calcium (Ca)	2012/11/20	0.1		%	20
		Dissolved Chromium (Cr)	2012/11/20	NC		%	20
		Dissolved Cobalt (Co)	2012/11/20	NC		%	20
		Dissolved Copper (Cu)	2012/11/20	NC		%	20
		Dissolved Iron (Fe)	2012/11/20	NC		%	20
		Dissolved Lead (Pb)	2012/11/20	NC		%	20
		Dissolved Magnesium (Mg)	2012/11/20	1.1		%	20
		Dissolved Manganese (Mn)	2012/11/20	1.8		%	20
		Dissolved Molybdenum (Mo)	2012/11/20	0.02		%	20
		Dissolved Nickel (Ni)	2012/11/20	1.3		%	20
		Dissolved Phosphorus (P)	2012/11/20	NC		%	20
		Dissolved Potassium (K)	2012/11/20	0.8		%	20
		Dissolved Selenium (Se)	2012/11/20	NC		%	20
		Dissolved Silicon (Si)	2012/11/20	0.09		%	20
		Dissolved Silver (Ag)	2012/11/20	NC		%	20
		Dissolved Sodium (Na)	2012/11/20	1.6		%	20
		Dissolved Strontium (Sr)	2012/11/20	0.5		%	20
		Dissolved Thallium (Tl)	2012/11/20	NC		%	20
		Dissolved Tin (Sn)	2012/11/20	NC		%	20
		Dissolved Titanium (Ti)	2012/11/20	NC		%	20
		Dissolved Uranium (U)	2012/11/20	1.2		%	20



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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3040888 HRE	RPD	Dissolved Vanadium (V)	2012/11/20	NC		%	20
		Dissolved Zinc (Zn)	2012/11/20	NC		%	20
3041758 VRO	Matrix Spike	Total Phosphorus	2012/11/20		99	%	80 - 120
	QC Standard	Total Phosphorus	2012/11/20		102	%	85 - 115
	Spiked Blank	Total Phosphorus	2012/11/20		98	%	85 - 115
	Method Blank	Total Phosphorus	2012/11/20	<0.020		mg/L	
	RPD	Total Phosphorus	2012/11/20	NC		%	20
3043592 HRE	Matrix Spike	Total Aluminum (Al)	2012/11/21		103	%	80 - 120
		Total Antimony (Sb)	2012/11/21		109	%	80 - 120
		Total Arsenic (As)	2012/11/21		106	%	80 - 120
		Total Barium (Ba)	2012/11/21		105	%	80 - 120
		Total Beryllium (Be)	2012/11/21		105	%	80 - 120
		Total Bismuth (Bi)	2012/11/21		103	%	80 - 120
		Total Boron (B)	2012/11/21		105	%	80 - 120
		Total Cadmium (Cd)	2012/11/21		107	%	80 - 120
		Total Calcium (Ca)	2012/11/21		NC	%	80 - 120
		Total Chromium (Cr)	2012/11/21		101	%	80 - 120
		Total Cobalt (Co)	2012/11/21		102	%	80 - 120
		Total Copper (Cu)	2012/11/21		99	%	80 - 120
		Total Iron (Fe)	2012/11/21		103	%	80 - 120
		Total Lead (Pb)	2012/11/21		101	%	80 - 120
		Total Magnesium (Mg)	2012/11/21		NC	%	80 - 120
		Total Manganese (Mn)	2012/11/21		101	%	80 - 120
		Total Molybdenum (Mo)	2012/11/21		110	%	80 - 120
		Total Nickel (Ni)	2012/11/21		100	%	80 - 120
		Total Phosphorus (P)	2012/11/21		107	%	80 - 120
		Total Potassium (K)	2012/11/21		107	%	80 - 120
		Total Silicon (Si)	2012/11/21		102	%	80 - 120
		Total Selenium (Se)	2012/11/21		104	%	80 - 120
		Total Silver (Ag)	2012/11/21		101	%	80 - 120
		Total Sodium (Na)	2012/11/21		NC	%	80 - 120
		Total Strontium (Sr)	2012/11/21		105	%	80 - 120
		Total Thallium (Tl)	2012/11/21		107	%	80 - 120
		Total Tin (Sn)	2012/11/21		108	%	80 - 120
		Total Titanium (Ti)	2012/11/21		109	%	80 - 120
		Total Uranium (U)	2012/11/21		107	%	80 - 120
		Total Vanadium (V)	2012/11/21		104	%	80 - 120
		Total Zinc (Zn)	2012/11/21		101	%	80 - 120
	Spiked Blank	Total Aluminum (Al)	2012/11/21		103	%	80 - 120
		Total Antimony (Sb)	2012/11/21		108	%	80 - 120
		Total Arsenic (As)	2012/11/21		105	%	80 - 120
		Total Barium (Ba)	2012/11/21		105	%	80 - 120
		Total Beryllium (Be)	2012/11/21		102	%	80 - 120
		Total Bismuth (Bi)	2012/11/21		102	%	80 - 120
		Total Boron (B)	2012/11/21		103	%	80 - 120
		Total Cadmium (Cd)	2012/11/21		104	%	80 - 120
		Total Calcium (Ca)	2012/11/21		107	%	80 - 120
		Total Chromium (Cr)	2012/11/21		101	%	80 - 120
		Total Cobalt (Co)	2012/11/21		102	%	80 - 120
		Total Copper (Cu)	2012/11/21		101	%	80 - 120
		Total Iron (Fe)	2012/11/21		102	%	80 - 120
		Total Lead (Pb)	2012/11/21		101	%	80 - 120
		Total Magnesium (Mg)	2012/11/21		107	%	80 - 120
		Total Manganese (Mn)	2012/11/21		100	%	80 - 120
		Total Molybdenum (Mo)	2012/11/21		106	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3043592 HRE	Spiked Blank	Total Nickel (Ni)	2012/11/21		101	%	80 - 120		
		Total Phosphorus (P)	2012/11/21		104	%	80 - 120		
		Total Potassium (K)	2012/11/21		105	%	80 - 120		
		Total Silicon (Si)	2012/11/21		103	%	80 - 120		
		Total Selenium (Se)	2012/11/21		104	%	80 - 120		
		Total Silver (Ag)	2012/11/21		99	%	80 - 120		
		Total Sodium (Na)	2012/11/21		110	%	80 - 120		
		Total Strontium (Sr)	2012/11/21		101	%	80 - 120		
		Total Thallium (Tl)	2012/11/21		106	%	80 - 120		
		Total Tin (Sn)	2012/11/21		106	%	80 - 120		
		Total Titanium (Ti)	2012/11/21		105	%	80 - 120		
		Total Uranium (U)	2012/11/21		105	%	80 - 120		
		Total Vanadium (V)	2012/11/21		101	%	80 - 120		
		Total Zinc (Zn)	2012/11/21		103	%	80 - 120		
		Method Blank		Total Aluminum (Al)	2012/11/21	<5.0		ug/L	
Total Antimony (Sb)	2012/11/21			<0.50		ug/L			
Total Arsenic (As)	2012/11/21			<1.0		ug/L			
Total Barium (Ba)	2012/11/21			<2.0		ug/L			
Total Beryllium (Be)	2012/11/21			<0.50		ug/L			
Total Bismuth (Bi)	2012/11/21			<1.0		ug/L			
Total Boron (B)	2012/11/21			<10		ug/L			
Total Cadmium (Cd)	2012/11/21			<0.10		ug/L			
Total Calcium (Ca)	2012/11/21			<200		ug/L			
Total Chromium (Cr)	2012/11/21			<5.0		ug/L			
Total Cobalt (Co)	2012/11/21			<0.50		ug/L			
Total Copper (Cu)	2012/11/21			<1.0		ug/L			
Total Iron (Fe)	2012/11/21			<100		ug/L			
Total Lead (Pb)	2012/11/21			<0.50		ug/L			
Total Magnesium (Mg)	2012/11/21			<50		ug/L			
Total Manganese (Mn)	2012/11/21			<2.0		ug/L			
Total Molybdenum (Mo)	2012/11/21			<0.50		ug/L			
Total Nickel (Ni)	2012/11/21			<1.0		ug/L			
Total Phosphorus (P)	2012/11/21			<100		ug/L			
Total Potassium (K)	2012/11/21			<200		ug/L			
Total Silicon (Si)	2012/11/21			<50		ug/L			
Total Selenium (Se)	2012/11/21			<2.0		ug/L			
Total Silver (Ag)	2012/11/21			<0.10		ug/L			
Total Sodium (Na)	2012/11/21			<100		ug/L			
Total Strontium (Sr)	2012/11/21			<1.0		ug/L			
Total Thallium (Tl)	2012/11/21			<0.050		ug/L			
Total Tin (Sn)	2012/11/21			<1.0		ug/L			
Total Titanium (Ti)	2012/11/21			<5.0		ug/L			
Total Uranium (U)	2012/11/21			<0.10		ug/L			
Total Vanadium (V)	2012/11/21			<0.50		ug/L			
Total Zinc (Zn)	2012/11/21			<5.0		ug/L			
RPD				Total Aluminum (Al)	2012/11/21	NC		%	20
				Total Barium (Ba)	2012/11/21	1.9		%	20
				Total Beryllium (Be)	2012/11/21	NC		%	20
				Total Bismuth (Bi)	2012/11/21	NC		%	20
		Total Cadmium (Cd)	2012/11/21	NC		%	20		
		Total Calcium (Ca)	2012/11/21	4.2		%	20		
		Total Chromium (Cr)	2012/11/21	NC		%	20		
		Total Cobalt (Co)	2012/11/21	NC		%	20		
		Total Copper (Cu)	2012/11/21	NC		%	20		
		Total Iron (Fe)	2012/11/21	NC		%	20		

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H8285

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3043592 HRE	RPD	Total Lead (Pb)	2012/11/21	NC		%	20
		Total Magnesium (Mg)	2012/11/21	5.5		%	20
		Total Manganese (Mn)	2012/11/21	4.1		%	20
		Total Molybdenum (Mo)	2012/11/21	NC		%	20
		Total Nickel (Ni)	2012/11/21	NC		%	20
		Total Phosphorus (P)	2012/11/21	NC		%	20
		Total Potassium (K)	2012/11/21	2.7		%	20
		Total Silver (Ag)	2012/11/21	NC		%	20
		Total Sodium (Na)	2012/11/21	7.4		%	20
		Total Vanadium (V)	2012/11/21	NC		%	20
		Total Zinc (Zn)	2012/11/21	NC		%	20
3043708 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/21		102	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		112	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		108	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		105	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		107	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		102	%	80 - 120
		Dissolved Boron (B)	2012/11/21		106	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		108	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/21		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/21		103	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/21		101	%	80 - 120
		Dissolved Copper (Cu)	2012/11/21		100	%	80 - 120
		Dissolved Iron (Fe)	2012/11/21		102	%	80 - 120
		Dissolved Lead (Pb)	2012/11/21		101	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/21		NC	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/21		103	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/21		111	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/21		100	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/21		107	%	80 - 120
		Dissolved Potassium (K)	2012/11/21		106	%	80 - 120
		Dissolved Selenium (Se)	2012/11/21		108	%	80 - 120
		Dissolved Silicon (Si)	2012/11/21		106	%	80 - 120
		Dissolved Silver (Ag)	2012/11/21		103	%	80 - 120
		Dissolved Sodium (Na)	2012/11/21		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/21		NC	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/21		104	%	80 - 120
		Dissolved Tin (Sn)	2012/11/21		110	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/21		108	%	80 - 120
		Dissolved Uranium (U)	2012/11/21		109	%	80 - 120
		Dissolved Vanadium (V)	2012/11/21		106	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/21		104	%	80 - 120
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/21		99	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		103	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		100	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		101	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		101	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		99	%	80 - 120
		Dissolved Boron (B)	2012/11/21		102	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		102	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/21		101	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/21		100	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/21		98	%	80 - 120
		Dissolved Copper (Cu)	2012/11/21		96	%	80 - 120
		Dissolved Iron (Fe)	2012/11/21		99	%	80 - 120

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H8285

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3043708 HRE	Spiked Blank	Dissolved Lead (Pb)	2012/11/21		98	%	80 - 120		
		Dissolved Magnesium (Mg)	2012/11/21		100	%	80 - 120		
		Dissolved Manganese (Mn)	2012/11/21		99	%	80 - 120		
		Dissolved Molybdenum (Mo)	2012/11/21		103	%	80 - 120		
		Dissolved Nickel (Ni)	2012/11/21		99	%	80 - 120		
		Dissolved Phosphorus (P)	2012/11/21		103	%	80 - 120		
		Dissolved Potassium (K)	2012/11/21		101	%	80 - 120		
		Dissolved Selenium (Se)	2012/11/21		101	%	80 - 120		
		Dissolved Silicon (Si)	2012/11/21		100	%	80 - 120		
		Dissolved Silver (Ag)	2012/11/21		99	%	80 - 120		
		Dissolved Sodium (Na)	2012/11/21		102	%	80 - 120		
		Dissolved Strontium (Sr)	2012/11/21		100	%	80 - 120		
		Dissolved Thallium (Tl)	2012/11/21		102	%	80 - 120		
		Dissolved Tin (Sn)	2012/11/21		104	%	80 - 120		
		Dissolved Titanium (Ti)	2012/11/21		103	%	80 - 120		
		Dissolved Uranium (U)	2012/11/21		103	%	80 - 120		
		Dissolved Vanadium (V)	2012/11/21		101	%	80 - 120		
		Dissolved Zinc (Zn)	2012/11/21		100	%	80 - 120		
		Method Blank	Method Blank	Dissolved Aluminum (Al)	2012/11/21	<5.0		ug/L	
				Dissolved Antimony (Sb)	2012/11/21	<0.50		ug/L	
Dissolved Arsenic (As)	2012/11/21			<1.0		ug/L			
Dissolved Barium (Ba)	2012/11/21			<2.0		ug/L			
Dissolved Beryllium (Be)	2012/11/21			<0.50		ug/L			
Dissolved Bismuth (Bi)	2012/11/21			<1.0		ug/L			
Dissolved Boron (B)	2012/11/21			<10		ug/L			
Dissolved Cadmium (Cd)	2012/11/21			<0.10		ug/L			
Dissolved Calcium (Ca)	2012/11/21			<200		ug/L			
Dissolved Chromium (Cr)	2012/11/21			<5.0		ug/L			
Dissolved Cobalt (Co)	2012/11/21			<0.50		ug/L			
Dissolved Copper (Cu)	2012/11/21			<1.0		ug/L			
Dissolved Iron (Fe)	2012/11/21			<100		ug/L			
Dissolved Lead (Pb)	2012/11/21			<0.50		ug/L			
Dissolved Magnesium (Mg)	2012/11/21			<50		ug/L			
Dissolved Manganese (Mn)	2012/11/21			<2.0		ug/L			
Dissolved Molybdenum (Mo)	2012/11/21			<0.50		ug/L			
Dissolved Nickel (Ni)	2012/11/21			<1.0		ug/L			
Dissolved Phosphorus (P)	2012/11/21			<100		ug/L			
Dissolved Potassium (K)	2012/11/21			<200		ug/L			
Dissolved Selenium (Se)	2012/11/21	<2.0		ug/L					
Dissolved Silicon (Si)	2012/11/21	<50		ug/L					
Dissolved Silver (Ag)	2012/11/21	<0.10		ug/L					
Dissolved Sodium (Na)	2012/11/21	<100		ug/L					
Dissolved Strontium (Sr)	2012/11/21	<1.0		ug/L					
Dissolved Thallium (Tl)	2012/11/21	<0.050		ug/L					
Dissolved Tin (Sn)	2012/11/21	<1.0		ug/L					
Dissolved Titanium (Ti)	2012/11/21	<5.0		ug/L					
Dissolved Uranium (U)	2012/11/21	<0.10		ug/L					
Dissolved Vanadium (V)	2012/11/21	<0.50		ug/L					
Dissolved Zinc (Zn)	2012/11/21	<5.0		ug/L					
RPD		Dissolved Lead (Pb)	2012/11/21	NC		%	20		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.  
 Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.  
 QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.  
 Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method

Golder Associates Ltd  
Attention: Sharon Wood  
Client Project #:  
P.O. #:  
Site Location: TANSLEY QUARRY

### Quality Assurance Report (Continued)

Maxxam Job Number: MB2H8285

accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

( 1 ) The recoveries for (cis & trans-1,3-dichloropropene and/or bromomethane) in the matrix spike were below the lower control limits. This may represent a low bias in some results for these specific analytes. It was noted that the matrix spike was preserved with sodium thiosulphate. Sodium thiosulphate is known to degrade these compounds.

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

**Validation Signature Page**

**Maxxam Job #: B2H8285**

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

---

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.

Site Location: TANSLEY QUARRY  
Your C.O.C. #: 38115601, 381156-01-01

**Attention: Sharon Wood**

Golder Associates Ltd  
Mississauga - Standing Offer  
2390 Argentia Rd  
Mississauga, ON  
L5N 5Z7

Report Date: 2012/11/22

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H8285**

Received: 2012/11/13, 16:53

Sample Matrix: Water  
# Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	9	N/A	2012/11/16	CAM SOP-00448	SM 2320B
Anions	9	N/A	2012/11/16	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	9	N/A	2012/11/19	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	9	2012/11/15	2012/11/16	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	4	N/A	2012/11/19	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/20	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	9	2012/11/16	2012/11/16	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	5	N/A	2012/11/19	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	3	N/A	2012/11/20	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	1	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	8	N/A	2012/11/16	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	1	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Ammonia-N	9	N/A	2012/11/18	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (1)	9	N/A	2012/11/16	CAM SOP-00440	SM 4500 NO3/NO2B
pH	9	N/A	2012/11/16	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	4	N/A	2012/11/15	CAM SOP-00444	MOE ROPHEN-E3179
Phenols (4AAP)	5	N/A	2012/11/19	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	9	N/A	2012/11/16	CAM SOP-00461	EPA 365.1
Sulphide	9	N/A	2012/11/16	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	8	2012/11/16	2012/11/19	CAM SOP-00407	SM 4500 P,B,F
Total Phosphorus (Colourimetric)	1	2012/11/20	2012/11/20	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	9	N/A	2012/11/15	CAM SOP-00428	SM 2540D
Turbidity	9	N/A	2012/11/14	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

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Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2



Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP0555			PP0556			PP0557	PP0557		
Sampling Date		2012/11/13			2012/11/13			2012/11/13	2012/11/13		
	Units	MW-04D	RDL	QC Batch	MW-04 SHALLOW	RDL	QC Batch	MW-04I	MW-04I Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>											
Hardness (CaCO <sub>3</sub> )	mg/L	8400	1.0	3035768	460	1.0	3035768	2000		1.0	3035768
<b>Inorganics</b>											
Total Ammonia-N	mg/L	19	0.50	3038546	0.13	0.050	3038546	6.2		0.50	3038546
Fluoride (F <sup>-</sup> )	mg/L	0.18	0.10	3038171	0.23	0.10	3038171	0.55		0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020		0.0020	3039405
Orthophosphate (P)	mg/L	0.019	0.010	3038220	<0.010	0.010	3038220	<0.010		0.010	3038220
pH	pH	7.05		3038172	7.91		3038172	7.11			3038172
Phenols-4AAP	mg/L	0.022	0.0050	3036888	<0.0010	0.0010	3036887	0.011		0.0010	3036887
Total Phosphorus	mg/L	0.41	0.10	3039074	0.21	0.040	3039074	0.30		0.10	3039074
Total Suspended Solids	mg/L	290	10	3036675	1300	100	3036675	530		10	3036675
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	0.55	0.58	0.020	3038752
Turbidity	NTU	66	0.2	3036346	210	0.4	3036346	120		0.4	3036346
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	150	1.0	3038166	390	1.0	3038166	65		1.0	3038166
Nitrite (N)	mg/L	0.029	0.010	3037941	0.040	0.010	3037941	<0.010		0.010	3037941
Dissolved Chloride (Cl)	mg/L	16000	100	3037957	4.2	1.0	3037957	2100		20	3037957
Nitrate (N)	mg/L	<0.10	0.10	3037941	0.98	0.10	3037941	<0.10		0.10	3037941
Nitrate + Nitrite	mg/L	<0.10	0.10	3037941	1.0	0.10	3037941	<0.10		0.10	3037941
Dissolved Bromide (Br <sup>-</sup> )	mg/L	200	100	3037957	<1.0	1.0	3037957	21		1.0	3037957
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1700	100	3037957	110	1.0	3037957	1800		10	3037957

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP0558			PP0559			PP0560	PP0560		
Sampling Date		2012/11/13			2012/11/13			2012/11/13	2012/11/13		
	Units	10I	RDL	QC Batch	10-SHALLOW	RDL	QC Batch	MW-09I	MW-09I Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>											
Hardness (CaCO <sub>3</sub> )	mg/L	380	1.0	3035768	480	1.0	3035768	600		1.0	3035768
<b>Inorganics</b>											
Total Ammonia-N	mg/L	0.99	0.050	3038546	0.42	0.050	3038546	2.6		0.050	3038546
Fluoride (F-)	mg/L	0.20	0.10	3038171	0.20	0.10	3038171	0.44	0.44	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020		0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010		0.010	3038220
pH	pH	7.96		3038172	7.98		3038172	7.84	7.87		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	3036887	<0.0010	0.0010	3036888	<0.0010		0.0010	3036888
Total Phosphorus	mg/L	1.8	0.10	3039074	17	0.20	3039074	1.1		0.10	3039074
Total Suspended Solids	mg/L	1900	50	3036678	27000	200	3036675	2700		50	3036678
Sulphide	mg/L	<0.020	0.020	3037629	0.047	0.020	3037629	<0.020		0.020	3037629
Turbidity	NTU	500	2	3036346	1200	4	3036346	470		2	3036346
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	410	1.0	3038166	490	1.0	3038166	220	220	1.0	3038166
Nitrite (N)	mg/L	0.14	0.010	3037605	<0.010	0.010	3037941	0.053		0.010	3037602
Dissolved Chloride (Cl)	mg/L	3.0	1.0	3037957	2.5	1.0	3037957	290		10	3037957
Nitrate (N)	mg/L	0.36	0.10	3037605	0.11	0.10	3037941	0.14		0.10	3037602
Nitrate + Nitrite	mg/L	0.50	0.10	3037605	0.11	0.10	3037941	0.19		0.10	3037602
Dissolved Bromide (Br-)	mg/L	<1.0	1.0	3037957	<1.0	1.0	3037957	<10		10	3037957
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	41	1.0	3037957	52	1.0	3037957	560		10	3037957

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP0561			PP0562			PP0563	PP0563		
Sampling Date		2012/11/13			2012/11/13			2012/11/13	2012/11/13		
	Units	MW-09D	RDL	QC Batch	MW-09S	RDL	QC Batch	MW-10D	MW-10D Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>											
Hardness (CaCO <sub>3</sub> )	mg/L	29000	1.0	3035768	380	1.0	3035768	17000		1.0	3035768
<b>Inorganics</b>											
Total Ammonia-N	mg/L	36	0.50	3038546	0.39	0.050	3038546	28		0.50	3038546
Fluoride (F <sup>-</sup> )	mg/L	<0.10	0.10	3038171	0.27	0.10	3038171	0.14		0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020		0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	<0.010	0.010	3038220
pH	pH	6.19		3038172	8.01		3038172	8.22			3038172
Phenols-4AAP	mg/L	0.070	0.010	3036888	<0.0010	0.0010	3036888	0.0022		0.0010	3036887
Total Phosphorus	mg/L	0.42	0.10	3039074	3.2	0.20	3039074	<0.10 <sup>(1)</sup>		0.10	3041758
Total Suspended Solids	mg/L	260	10	3036675	4500	100	3036675	150		10	3036675
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	<0.020		0.020	3037629
Turbidity	NTU	38	0.2	3036346	2000	4	3036346	41		0.2	3036346
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	52	1.0	3038166	390	1.0	3038166	66		1.0	3038166
Nitrite (N)	mg/L	<0.10	0.10	3037941	0.012	0.010	3037605	<0.10		0.10	3037605
Dissolved Chloride (Cl)	mg/L	52000	500	3037957	10	1.0	3037957	36000		200	3037957
Nitrate (N)	mg/L	<0.10	0.10	3037941	0.13	0.10	3037605	<0.10		0.10	3037605
Nitrate + Nitrite	mg/L	<0.10	0.10	3037941	0.14	0.10	3037605	<0.10		0.10	3037605
Dissolved Bromide (Br <sup>-</sup> )	mg/L	590	20	3037957	<1.0	1.0	3037957	390		100	3037957
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1300	10	3037957	50	1.0	3037957	1700		10	3037957

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0555			PP0556			PP0557		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
	Units	MW-04D	RDL	QC Batch	MW-04 SHALLOW	RDL	QC Batch	MW-04I	RDL	QC Batch
<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486
Dissolved Aluminum (Al)	ug/L	<50	50	3040749	68	5.0	3040888	91	25	3040273
Total Aluminum (Al)	ug/L	650	50	3038696	6500	5.0	3038696	7400	25	3038696
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	3040749	<0.50	0.50	3040888	<2.5	2.5	3040273
Total Antimony (Sb)	ug/L	<5.0	5.0	3038696	<0.50	0.50	3038696	<2.5	2.5	3038696
Dissolved Arsenic (As)	ug/L	<20 <sup>(1)</sup>	20	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Arsenic (As)	ug/L	<20 <sup>(1)</sup>	20	3038696	2.3	1.0	3038696	5.0	5.0	3038696
Dissolved Barium (Ba)	ug/L	50	20	3040749	49	2.0	3040888	<10	10	3040273
Total Barium (Ba)	ug/L	59	20	3038696	93	2.0	3038696	110	10	3038696
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	3040749	<0.50	0.50	3040888	<2.5	2.5	3040273
Total Beryllium (Be)	ug/L	<5.0	5.0	3038696	<0.50	0.50	3038696	<2.5	2.5	3038696
Dissolved Bismuth (Bi)	ug/L	<10	10	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Bismuth (Bi)	ug/L	<10	10	3038696	<1.0	1.0	3038696	<5.0	5.0	3038696
Dissolved Boron (B)	ug/L	5700	100	3040749	110	10	3040888	6100	50	3040273
Total Boron (B)	ug/L	6700	100	3038696	92	10	3038696	5900	50	3038696
Dissolved Cadmium (Cd)	ug/L	<1.0	1.0	3040749	<0.10	0.10	3040888	<0.50	0.50	3040273
Total Cadmium (Cd)	ug/L	4.4	1.0	3038696	0.10	0.10	3038696	<0.50	0.50	3038696
Dissolved Calcium (Ca)	ug/L	2400000	4000	3040749	78000	200	3040888	550000	1000	3040273
Total Calcium (Ca)	ug/L	2500000	2000	3038696	91000	200	3038696	560000	1000	3038696
Dissolved Chromium (Cr)	ug/L	<50	50	3040749	<5.0	5.0	3040888	<25	25	3040273
Total Chromium (Cr)	ug/L	<50	50	3038696	7.4	5.0	3038696	<25	25	3038696
Dissolved Cobalt (Co)	ug/L	<5.0	5.0	3040749	0.92	0.50	3040888	<2.5	2.5	3040273
Total Cobalt (Co)	ug/L	<5.0	5.0	3038696	5.1	0.50	3038696	2.9	2.5	3038696
Dissolved Copper (Cu)	ug/L	<10	10	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Copper (Cu)	ug/L	31	10	3038696	6.8	1.0	3038696	7.1	5.0	3038696
Dissolved Iron (Fe)	ug/L	<1000	1000	3040749	<100	100	3040888	840	500	3040273
Total Iron (Fe)	ug/L	1400	1000	3038696	6700	100	3038696	9000	500	3038696
Dissolved Lead (Pb)	ug/L	<5.0	5.0	3040749	<0.50	0.50	3040888	<2.5	2.5	3040273
Total Lead (Pb)	ug/L	<5.0	5.0	3038696	5.0	0.50	3038696	5.7	2.5	3038696
Dissolved Magnesium (Mg)	ug/L	560000	500	3040749	65000	50	3040888	160000	250	3040273
Total Magnesium (Mg)	ug/L	620000	500	3038696	71000	50	3038696	160000	250	3038696
Dissolved Manganese (Mn)	ug/L	1600	20	3040749	230	2.0	3040888	230	10	3040273
Total Manganese (Mn)	ug/L	1600	20	3038696	380	2.0	3038696	490	10	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0555			PP0556			PP0557		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
	Units	MW-04D	RDL	QC Batch	MW-04 SHALLOW	RDL	QC Batch	MW-04I	RDL	QC Batch
Dissolved Molybdenum (Mo)	ug/L	14	5.0	3040749	3.9	0.50	3040888	8.3	2.5	3040273
Total Molybdenum (Mo)	ug/L	19	5.0	3038696	4.4	0.50	3038696	9.7	2.5	3038696
Dissolved Nickel (Ni)	ug/L	<10	10	3040749	1.1	1.0	3040888	<5.0	5.0	3040273
Total Nickel (Ni)	ug/L	<10	10	3038696	7.3	1.0	3038696	6.2	5.0	3038696
Dissolved Phosphorus (P)	ug/L	<1000	1000	3040749	<100	100	3040888	<500	500	3040273
Total Phosphorus (P)	ug/L	<1000	1000	3038696	150	100	3038696	<500	500	3038696
Dissolved Potassium (K)	ug/L	130000	2000	3040749	4800	200	3040888	47000	1000	3040273
Total Potassium (K)	ug/L	140000	2000	3038696	7000	200	3038696	51000	1000	3038696
Dissolved Selenium (Se)	ug/L	42	40	3040749	<2.0	2.0	3040888	<10	10	3040273
Dissolved Silicon (Si)	ug/L	4100	500	3040749	6600	50	3040888	3400	250	3040273
Total Silicon (Si)	ug/L	5000	500	3038696	18000	50	3038696	19000	250	3038696
Total Selenium (Se)	ug/L	<40(1)	40	3038696	<2.0	2.0	3038696	<10	10	3038696
Dissolved Silver (Ag)	ug/L	<1.0	1.0	3040749	<0.10	0.10	3040888	<0.50	0.50	3040273
Total Silver (Ag)	ug/L	<1.0	1.0	3038696	<0.10	0.10	3038696	<0.50	0.50	3038696
Dissolved Sodium (Na)	ug/L	6100000	5000	3040749	24000	100	3040888	1200000	500	3040273
Total Sodium (Na)	ug/L	7100000	10000	3038696	26000	100	3038696	1200000	500	3038696
Dissolved Strontium (Sr)	ug/L	53000	10	3040749	1500	1.0	3040888	14000	5.0	3040273
Total Strontium (Sr)	ug/L	54000	10	3038696	1500	1.0	3038696	14000	5.0	3038696
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	3040749	<0.050	0.050	3040888	<0.25	0.25	3040273
Total Thallium (Tl)	ug/L	<0.50	0.50	3038696	0.066	0.050	3038696	<0.25	0.25	3038696
Dissolved Tin (Sn)	ug/L	<10	10	3040749	<1.0	1.0	3040888	<5.0	5.0	3040273
Total Tin (Sn)	ug/L	<10	10	3038696	<1.0	1.0	3038696	<5.0	5.0	3038696
Dissolved Titanium (Ti)	ug/L	<50	50	3040749	8.8	5.0	3040888	<25	25	3040273
Total Titanium (Ti)	ug/L	<50	50	3038696	170	5.0	3038696	310	5.0	3038696
Dissolved Uranium (U)	ug/L	29	1.0	3040749	6.4	0.10	3040888	<0.50	0.50	3040273
Total Uranium (U)	ug/L	32	1.0	3038696	7.5	0.10	3038696	1.6	0.50	3038696
Dissolved Vanadium (V)	ug/L	<20(1)	20	3040749	<0.50	0.50	3040888	6.3	2.5	3040273
Total Vanadium (V)	ug/L	<10(1)	10	3038696	10	0.50	3038696	12	2.5	3038696
Dissolved Zinc (Zn)	ug/L	<50	50	3040749	<5.0	5.0	3040888	<25	25	3040273
Total Zinc (Zn)	ug/L	<50	50	3038696	18	5.0	3038696	<25	25	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0558			PP0559			PP0560		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
	Units	10I	RDL	QC Batch	10-SHALLOW	RDL	QC Batch	MW-09I	RDL	QC Batch
<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486	<0.00010	0.00010	3038486
Dissolved Aluminum (Al)	ug/L	360	5.0	3040888	45	5.0	3040749	120	5.0	3040273
Total Aluminum (Al)	ug/L	5200	5.0	3038696	870000	500	3038696	27000	50	3038696
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	<0.50	0.50	3040273
Total Antimony (Sb)	ug/L	<0.50	0.50	3038696	<50	50	3038696	<0.50	0.50	3038696
Dissolved Arsenic (As)	ug/L	5.0	1.0	3040888	2.0	1.0	3040749	3.0	1.0	3040273
Total Arsenic (As)	ug/L	32	1.0	3038696	300	100	3038696	49	1.0	3038696
Dissolved Barium (Ba)	ug/L	77	2.0	3040888	65	2.0	3040749	41	2.0	3040273
Total Barium (Ba)	ug/L	140	2.0	3038696	11000	200	3038696	460	2.0	3038696
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	<0.50	0.50	3040273
Total Beryllium (Be)	ug/L	<0.50	0.50	3038696	51	50	3038696	2.0	0.50	3038696
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Bismuth (Bi)	ug/L	<1.0	1.0	3038696	<100	100	3038696	<1.0	1.0	3038696
Dissolved Boron (B)	ug/L	750	10	3040888	130	10	3040749	5100	10	3040273
Total Boron (B)	ug/L	630	10	3038696	2100	1000	3038696	4700	10	3038696
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3040888	<0.10	0.10	3040749	<0.10	0.10	3040273
Total Cadmium (Cd)	ug/L	0.54	0.10	3038696	<10	10	3038696	1.0	0.10	3038696
Dissolved Calcium (Ca)	ug/L	57000	1000	3040888	59000	200	3040749	140000	1000	3040273
Total Calcium (Ca)	ug/L	120000	400	3038696	6400000	20000	3038696	520000	1000	3038696
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3040888	<5.0	5.0	3040749	<5.0	5.0	3040273
Total Chromium (Cr)	ug/L	11	5.0	3038696	1500	500	3038696	61	5.0	3038696
Dissolved Cobalt (Co)	ug/L	0.74	0.50	3040888	0.85	0.50	3040749	2.4	0.50	3040273
Total Cobalt (Co)	ug/L	3.9	0.50	3038696	910	50	3038696	30	1.0	3038696
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Copper (Cu)	ug/L	5.6	1.0	3038696	1300	100	3038696	27	1.0	3038696
Dissolved Iron (Fe)	ug/L	510	100	3040888	640	100	3040749	770	100	3040273
Total Iron (Fe)	ug/L	9700	100	3038696	1500000	10000	3038696	54000	100	3038696
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	<0.50	0.50	3040273
Total Lead (Pb)	ug/L	3.6	0.50	3038696	510	50	3038696	26	0.50	3038696
Dissolved Magnesium (Mg)	ug/L	58000	50	3040888	82000	50	3040749	58000	50	3040273
Total Magnesium (Mg)	ug/L	65000	50	3038696	1000000	5000	3038696	100000	50	3038696
Dissolved Manganese (Mn)	ug/L	22	2.0	3040888	64	2.0	3040749	66	2.0	3040273
Total Manganese (Mn)	ug/L	620	2.0	3038696	61000	200	3038696	3400	2.0	3038696
Dissolved Molybdenum (Mo)	ug/L	2.6	0.50	3040888	3.0	0.50	3040749	9.7	0.50	3040273
Total Molybdenum (Mo)	ug/L	3.2	0.50	3038696	<50	50	3038696	13	0.50	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0558			PP0559			PP0560		
Sampling Date		2012/11/13			2012/11/13			2012/11/13		
	Units	10I	RDL	QC Batch	10-SHALLOW	RDL	QC Batch	MW-09I	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Nickel (Ni)	ug/L	8.7	1.0	3038696	1900	100	3038696	65	2.0	3038696
Dissolved Phosphorus (P)	ug/L	<100	100	3040888	<100	100	3040749	<100	100	3040273
Total Phosphorus (P)	ug/L	560	100	3038696	57000	10000	3038696	2600	100	3038696
Dissolved Potassium (K)	ug/L	12000	200	3040888	7100	200	3040749	23000	200	3040273
Total Potassium (K)	ug/L	12000	200	3038696	200000	20000	3038696	33000	200	3038696
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3040888	<2.0	2.0	3040749	<2.0	2.0	3040273
Dissolved Silicon (Si)	ug/L	9500	50	3040888	9500	50	3040749	5300	50	3040273
Total Silicon (Si)	ug/L	17000	50	3038696	870000	5000	3038696	46000	50	3038696
Total Selenium (Se)	ug/L	<2.0	2.0	3038696	<200	200	3038696	<2.0	2.0	3038696
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3040888	<0.10	0.10	3040749	<0.10	0.10	3040273
Total Silver (Ag)	ug/L	<0.10	0.10	3038696	<10	10	3038696	0.29	0.10	3038696
Dissolved Sodium (Na)	ug/L	30000	100	3040888	23000	100	3040749	240000	100	3040273
Total Sodium (Na)	ug/L	27000	100	3038696	59000	10000	3038696	250000	100	3038696
Dissolved Strontium (Sr)	ug/L	11000	1.0	3040888	1800	1.0	3040749	18000	1.0	3040273
Total Strontium (Sr)	ug/L	11000	1.0	3038696	18000	100	3038696	21000	1.0	3038696
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3040888	<0.050	0.050	3040749	<0.050	0.050	3040273
Total Thallium (Tl)	ug/L	0.066	0.050	3038696	6.8	5.0	3038696	0.26	0.050	3038696
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3040888	<1.0	1.0	3040749	<1.0	1.0	3040273
Total Tin (Sn)	ug/L	<1.0	1.0	3038696	<100	100	3038696	1.4	1.0	3038696
Dissolved Titanium (Ti)	ug/L	18	5.0	3040888	<5.0	5.0	3040749	<5.0	5.0	3040273
Total Titanium (Ti)	ug/L	120	5.0	3038696	8000	500	3038696	410	5.0	3038696
Dissolved Uranium (U)	ug/L	0.31	0.10	3040888	1.8	0.10	3040749	0.78	0.10	3040273
Total Uranium (U)	ug/L	0.73	0.10	3038696	59	10	3038696	3.2	0.10	3038696
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3040888	<0.50	0.50	3040749	1.0	0.50	3040273
Total Vanadium (V)	ug/L	9.4	0.50	3038696	1500	50	3038696	57	0.50	3038696
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3040888	<5.0	5.0	3040749	5.7	5.0	3040273
Total Zinc (Zn)	ug/L	22	5.0	3038696	4400	500	3038696	150	5.0	3038696

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0561			PP0562			PP0563	PP0563		
Sampling Date		2012/11/13			2012/11/13			2012/11/13	2012/11/13		
	Units	MW-09D	RDL	QC Batch	MW-09S	RDL	QC Batch	MW-10D	MW-10D Lab-Dup	RDL	QC Batch
<b>Metals</b>											
Mercury (Hg)	mg/L	<0.00010	0.00010	3038486	<0.00010	0.00010	3038545	<0.00010		0.00010	3038486
Dissolved Aluminum (Al)	ug/L	<250	250	3043708	64	5.0	3039460	<250		250	3039460
Total Aluminum (Al)	ug/L	1300	250	3043592	61000	50	3038696	370	360	50	3038696
Dissolved Antimony (Sb)	ug/L	<25	25	3043708	<0.50	0.50	3039460	<25		25	3039460
Total Antimony (Sb)	ug/L	<25	25	3043592	<0.50	0.50	3038696	<5.0	<5.0	5.0	3038696
Dissolved Arsenic (As)	ug/L	<50	50	3043708	1.7	1.0	3039460	<50		50	3039460
Total Arsenic (As)	ug/L	<50	50	3043592	34	1.0	3038696	<50 <sup>(1)</sup>	53	50	3038696
Dissolved Barium (Ba)	ug/L	140	100	3043708	67	2.0	3039460	<100		100	3039460
Total Barium (Ba)	ug/L	150	100	3043592	750	2.0	3038696	100	110	20	3038696
Dissolved Beryllium (Be)	ug/L	<25	25	3043708	<0.50	0.50	3039460	<25		25	3039460
Total Beryllium (Be)	ug/L	<25	25	3043592	3.5	0.50	3038696	<5.0	<5.0	5.0	3038696
Dissolved Bismuth (Bi)	ug/L	<50	50	3043708	<1.0	1.0	3039460	<50		50	3039460
Total Bismuth (Bi)	ug/L	<50	50	3043592	<1.0	1.0	3038696	<10	<10	10	3038696
Dissolved Boron (B)	ug/L	4900	500	3043708	1300	10	3039460	7500		500	3039460
Total Boron (B)	ug/L	5000	500	3043592	1300	10	3038696	8100	8400	100	3038696
Dissolved Cadmium (Cd)	ug/L	<5.0	5.0	3043708	<0.10	0.10	3039460	<5.0		5.0	3039460
Total Cadmium (Cd)	ug/L	6.0	5.0	3043592	1.0	0.10	3038696	8.7	9.4	1.0	3038696
Dissolved Calcium (Ca)	ug/L	8600000	10000	3043708	51000	400	3039460	4900000		10000	3039460
Total Calcium (Ca)	ug/L	9100000	10000	3043592	440000	400	3038696	5300000	5200000	10000	3038696
Dissolved Chromium (Cr)	ug/L	<250	250	3043708	<5.0	5.0	3039460	<250		250	3039460
Total Chromium (Cr)	ug/L	<250	250	3043592	170	5.0	3038696	220	230	50	3038696
Dissolved Cobalt (Co)	ug/L	<25	25	3043708	1.3	0.50	3039460	<25		25	3039460
Total Cobalt (Co)	ug/L	<25	25	3043592	67	1.0	3038696	<10 <sup>(1)</sup>	<10	10	3038696
Dissolved Copper (Cu)	ug/L	<50	50	3043708	<1.0	1.0	3039460	<50		50	3039460
Total Copper (Cu)	ug/L	<50	50	3043592	64	1.0	3038696	18	25	10	3038696
Dissolved Iron (Fe)	ug/L	24000	5000	3043708	<100	100	3039460	<5000		5000	3039460
Total Iron (Fe)	ug/L	19000	5000	3043592	110000	100	3038696	2800	2800	1000	3038696
Dissolved Lead (Pb)	ug/L	<25	25	3043708	<0.50	0.50	3039460	<25		25	3039460
Total Lead (Pb)	ug/L	<25	25	3043592	38	0.50	3038696	11	12	5.0	3038696
Dissolved Magnesium (Mg)	ug/L	1900000	2500	3043708	61000	50	3039460	1300000		2500	3039460
Total Magnesium (Mg)	ug/L	2100000	2500	3043592	110000	50	3038696	1600000	1600000	500	3038696
Dissolved Manganese (Mn)	ug/L	4500	100	3043708	38	2.0	3039460	1900		100	3039460
Total Manganese (Mn)	ug/L	4700	100	3043592	3900	2.0	3038696	2400	2200	20	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Detection Limit was raised due to matrix interferences.



Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP0561			PP0562			PP0563		PP0563	
Sampling Date		2012/11/13			2012/11/13			2012/11/13		2012/11/13	
	Units	MW-09D	RDL	QC Batch	MW-09S	RDL	QC Batch	MW-10D	MW-10D Lab-Dup	RDL	QC Batch
Dissolved Molybdenum (Mo)	ug/L	38	25	3043708	6.7	0.50	3039460	240		25	3039460
Total Molybdenum (Mo)	ug/L	<25	25	3043592	12	0.50	3038696	260	240	5.0	3038696
Dissolved Nickel (Ni)	ug/L	<50	50	3043708	<1.0	1.0	3039460	120		50	3039460
Total Nickel (Ni)	ug/L	<50	50	3043592	140	2.0	3038696	280	270	20	3038696
Dissolved Phosphorus (P)	ug/L	<5000	5000	3043708	<100	100	3039460	<5000		5000	3039460
Total Phosphorus (P)	ug/L	<5000	5000	3043592	3300	100	3038696	<1000	<1000	1000	3038696
Dissolved Potassium (K)	ug/L	290000	10000	3043708	11000	200	3039460	210000		10000	3039460
Total Potassium (K)	ug/L	320000	10000	3043592	25000	200	3038696	240000	240000	2000	3038696
Dissolved Selenium (Se)	ug/L	<200	200	3043708	<2.0	2.0	3039460	<100		100	3039460
Dissolved Silicon (Si)	ug/L	2500	2500	3043708	9100	50	3039460	<2500		2500	3039460
Total Silicon (Si)	ug/L	6000	2500	3043592	73000	500	3038696	<5000	<5000	5000	3038696
Total Selenium (Se)	ug/L	<100	100	3043592	<2.0	2.0	3038696	110	150	100	3038696
Dissolved Silver (Ag)	ug/L	<5.0	5.0	3043708	<0.10	0.10	3039460	<5.0		5.0	3039460
Total Silver (Ag)	ug/L	<5.0	5.0	3043592	0.58	0.10	3038696	<1.0	<1.0	1.0	3038696
Dissolved Sodium (Na)	ug/L	18000000	5000	3043708	35000	100	3039460	13000000		5000	3039460
Total Sodium (Na)	ug/L	19000000	5000	3043592	37000	100	3038696	16000000	15000000	10000	3038696
Dissolved Strontium (Sr)	ug/L	180000	50	3043708	7000	1.0	3039460	110000		50	3039460
Total Strontium (Sr)	ug/L	190000	50	3043592	8900	1.0	3038696	120000	120000	10	3038696
Dissolved Thallium (Tl)	ug/L	<2.5	2.5	3043708	<0.050	0.050	3039460	<2.5		2.5	3039460
Total Thallium (Tl)	ug/L	<2.5	2.5	3043592	0.51	0.050	3038696	<0.50	<0.50	0.50	3038696
Dissolved Tin (Sn)	ug/L	<50	50	3043708	<1.0	1.0	3039460	<50		50	3039460
Total Tin (Sn)	ug/L	<50	50	3043592	1.1	1.0	3038696	<10	<10	10	3038696
Dissolved Titanium (Ti)	ug/L	<250	250	3043708	8.9	5.0	3039460	<250		250	3039460
Total Titanium (Ti)	ug/L	<250	250	3043592	670	50	3038696	<50	71	50	3038696
Dissolved Uranium (U)	ug/L	11	5.0	3043708	2.1	0.10	3039460	<5.0		5.0	3039460
Total Uranium (U)	ug/L	11	5.0	3043592	5.6	0.10	3038696	9.7	9.2	1.0	3038696
Dissolved Vanadium (V)	ug/L	<50	50	3043708	1.1	0.50	3039460	36		25	3039460
Total Vanadium (V)	ug/L	<50	50	3043592	110	0.50	3038696	<50 <sup>(1)</sup>	<50	50	3038696
Dissolved Zinc (Zn)	ug/L	<250	250	3043708	<5.0	5.0	3039460	<250		250	3039460
Total Zinc (Zn)	ug/L	<250	250	3043592	390	5.0	3038696	<50	<50	50	3038696

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP0555  
**Sample ID** MW-04D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040749	N/A	2012/11/19	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0556  
**Sample ID** MW-04 SHALLOW  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040888	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0557  
**Sample ID** MW-04I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040273	N/A	2012/11/19	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3038752	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

### Test Summary

**Maxxam ID** PP0557 Dup  
**Sample ID** MW-04I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Sulphide	ISE/S	3038752	N/A	2012/11/16	Xuanhong Qiu

**Maxxam ID** PP0558  
**Sample ID** 10I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040888	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037605	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036678	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

Maxxam Job #: B2H8285  
Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP0559  
**Sample ID** 10-SHALLOW  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040749	N/A	2012/11/20	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0560  
**Sample ID** MW-09I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3040273	N/A	2012/11/19	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037602	N/A	2012/11/16	Chris Li

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

### Test Summary

pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036678	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0560 Dup  
**Sample ID** MW-09I  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
pH	PH	3038172	N/A	2012/11/16	Surinder Rai

**Maxxam ID** PP0561  
**Sample ID** MW-09D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3035768	N/A	2012/11/20	Ewa Pranjic
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3037941	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru

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Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0562  
**Sample ID** MW-09S  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038545	2012/11/16	2012/11/16	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3039460	N/A	2012/11/19	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH <sub>4</sub>	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3037605	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036888	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3039074	2012/11/16	2012/11/19	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0563  
**Sample ID** MW-10D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3037957	N/A	2012/11/16	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3035768	N/A	2012/11/19	Automated Statchk
Mercury in Water by CVAA	CVAA	3038486	2012/11/16	2012/11/16	Magdalena Carlos

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### Test Summary

Dissolved Metals by ICPMS	ICP/MS	3039460	N/A	2012/11/19	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Total Ammonia-N	LACH/NH4	3038546	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3037605	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3036887	N/A	2012/11/15	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3041758	2012/11/20	2012/11/20	Viorica Rotaru
Total Suspended Solids	SLDS	3036675	N/A	2012/11/15	Subhashchandra Patel
Turbidity	TURB	3036346	N/A	2012/11/14	Neil Dassanayake

**Maxxam ID** PP0563 Dup  
**Sample ID** MW-10D  
**Matrix** Water

**Collected** 2012/11/13  
**Shipped**  
**Received** 2012/11/13

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	3038696	N/A	2012/11/16	Arefa Dabhad
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel



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#### GENERAL COMMENTS

Sample PP0555-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP0557-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP0559-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP0560-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP0561-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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

Sample PP0563-01: Metal Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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

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Golder Associates Ltd

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3036346	Turbidity	2012/11/14					<0.2	NTU	6.8	20	97	85 - 115
3036675	Total Suspended Solids	2012/11/15					<10	mg/L	NC	25	99	85 - 115
3036678	Total Suspended Solids	2012/11/15					<10	mg/L	NC	25	95	85 - 115
3036887	Phenols-4AAP	2012/11/15	102	80 - 120	102	85 - 115	<0.0010	mg/L	NC	25		
3036888	Phenols-4AAP	2012/11/19	97	80 - 120	98	85 - 115	<0.0010	mg/L	3.4	25		
3037602	Nitrite (N)	2012/11/16	106	80 - 120	101	85 - 115	<0.010	mg/L	NC	25		
3037602	Nitrate (N)	2012/11/16	100	80 - 120	98	85 - 115	<0.10	mg/L	NC	25		
3037605	Nitrite (N)	2012/11/16	105	80 - 120	100	85 - 115	<0.010	mg/L	NC	25		
3037605	Nitrate (N)	2012/11/16	NC	80 - 120	99	85 - 115	<0.10	mg/L	2.0	25		
3037629	Sulphide	2012/11/16	95	80 - 120	95	80 - 120	<0.020	mg/L	NC	20		
3037941	Nitrite (N)	2012/11/16	103	80 - 120	100	85 - 115	<0.010	mg/L	NC	25		
3037941	Nitrate (N)	2012/11/16	NC	80 - 120	92	85 - 115	<0.10	mg/L	1.0	25		
3037957	Dissolved Chloride (Cl)	2012/11/16	97	80 - 120	99	80 - 120	<1.0	mg/L	9.2	20		
3037957	Dissolved Bromide (Br-)	2012/11/16	101	80 - 120	102	80 - 120	<1.0	mg/L				
3037957	Dissolved Sulphate (SO4)	2012/11/16	98	80 - 120	99	80 - 120	1.5, RDL=1.0	mg/L				
3038166	Alkalinity (Total as CaCO3)	2012/11/16					<1.0	mg/L	1.5	25	98	85 - 115
3038171	Fluoride (F-)	2012/11/16	103	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3038220	Orthophosphate (P)	2012/11/16	77 <sub>(t)</sub>	75 - 125	102	80 - 120	<0.010	mg/L	NC	25		
3038486	Mercury (Hg)	2012/11/16	100	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
3038545	Mercury (Hg)	2012/11/16	100	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20		
3038546	Total Ammonia-N	2012/11/18	99	80 - 120	102	85 - 115	<0.050	mg/L	NC	20		
3038696	Total Aluminum (Al)	2012/11/16	NC	80 - 120	113	80 - 120	<5.0	ug/L	2.0	20		
3038696	Total Antimony (Sb)	2012/11/16	112	80 - 120	108	80 - 120	<0.50	ug/L	NC	20		
3038696	Total Arsenic (As)	2012/11/16	107	80 - 120	105	80 - 120	<1.0	ug/L	NC	20		
3038696	Total Barium (Ba)	2012/11/16	107	80 - 120	105	80 - 120	<2.0	ug/L	4.0	20		
3038696	Total Beryllium (Be)	2012/11/16	97	80 - 120	109	80 - 120	<0.50	ug/L	NC	20		
3038696	Total Bismuth (Bi)	2012/11/16	92	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3038696	Total Boron (B)	2012/11/16	NC	80 - 120	108	80 - 120	<10	ug/L	3.4	20		
3038696	Total Cadmium (Cd)	2012/11/16	105	80 - 120	103	80 - 120	<0.10	ug/L	7.9	20		
3038696	Total Calcium (Ca)	2012/11/16	NC	80 - 120	104	80 - 120	<200	ug/L	2.1	20		
3038696	Total Chromium (Cr)	2012/11/16	95	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
3038696	Total Cobalt (Co)	2012/11/16	103	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
3038696	Total Copper (Cu)	2012/11/16	98	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
3038696	Total Iron (Fe)	2012/11/16	104	80 - 120	102	80 - 120	<100	ug/L	NC	20		
3038696	Total Lead (Pb)	2012/11/16	94	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3038696	Total Magnesium (Mg)	2012/11/16	NC	80 - 120	112	80 - 120	<50	ug/L	3.9	20		
3038696	Total Manganese (Mn)	2012/11/16	NC	80 - 120	101	80 - 120	<2.0	ug/L	6.5	20		
3038696	Total Molybdenum (Mo)	2012/11/16	104	80 - 120	104	80 - 120	<0.50	ug/L	5.5	20		
3038696	Total Nickel (Ni)	2012/11/16	NC	80 - 120	102	80 - 120	<1.0	ug/L	2.7	20		
3038696	Total Phosphorus (P)	2012/11/16	120	80 - 120	113	80 - 120	<100	ug/L	NC	20		

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3038696	Total Potassium (K)	2012/11/16	NC	80 - 120	107	80 - 120	<200	ug/L	0.09	20		
3038696	Total Silicon (Si)	2012/11/16	101	80 - 120	103	80 - 120	<50	ug/L	NC	20		
3038696	Total Selenium (Se)	2012/11/16	103	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		
3038696	Total Silver (Ag)	2012/11/16	100	80 - 120	104	80 - 120	<0.10	ug/L	NC	20		
3038696	Total Sodium (Na)	2012/11/16	NC	80 - 120	115	80 - 120	<100	ug/L	1.4	20		
3038696	Total Strontium (Sr)	2012/11/16	NC	80 - 120	105	80 - 120	<1.0	ug/L	3.2	20		
3038696	Total Thallium (Tl)	2012/11/16	91	80 - 120	101	80 - 120	<0.050	ug/L	NC	20		
3038696	Total Tin (Sn)	2012/11/16	109	80 - 120	106	80 - 120	<1.0	ug/L	NC	20		
3038696	Total Titanium (Ti)	2012/11/16	128 <sup>(2)</sup>	80 - 120	105	80 - 120	<5.0	ug/L	NC	20		
3038696	Total Uranium (U)	2012/11/16	97	80 - 120	99	80 - 120	<0.10	ug/L	5.1	20		
3038696	Total Vanadium (V)	2012/11/16	100	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3038696	Total Zinc (Zn)	2012/11/16	93	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
3038752	Sulphide	2012/11/16	92	80 - 120	95	80 - 120	<0.020	mg/L	3.8	20		
3039074	Total Phosphorus	2012/11/19	102	80 - 120	106	85 - 115	<0.020	mg/L	NC	20	109	85 - 115
3039405	Free Cyanide	2012/11/19	92	80 - 120	94	80 - 120	<0.0020	mg/L	NC	20		
3039460	Dissolved Aluminum (Al)	2012/11/19	103	80 - 120	98	80 - 120	<5.0	ug/L				
3039460	Dissolved Antimony (Sb)	2012/11/19	111	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
3039460	Dissolved Arsenic (As)	2012/11/19	103	80 - 120	97	80 - 120	<1.0	ug/L	NC	20		
3039460	Dissolved Barium (Ba)	2012/11/19	103	80 - 120	100	80 - 120	<2.0	ug/L	0.1	20		
3039460	Dissolved Beryllium (Be)	2012/11/19	106	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3039460	Dissolved Bismuth (Bi)	2012/11/19	102	80 - 120	100	80 - 120	<1.0	ug/L				
3039460	Dissolved Boron (B)	2012/11/19	106	80 - 120	104	80 - 120	<10	ug/L	NC	20		
3039460	Dissolved Cadmium (Cd)	2012/11/19	109	80 - 120	104	80 - 120	<0.10	ug/L	NC	20		
3039460	Dissolved Calcium (Ca)	2012/11/19	NC	80 - 120	97	80 - 120	<200	ug/L				
3039460	Dissolved Chromium (Cr)	2012/11/19	100	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
3039460	Dissolved Cobalt (Co)	2012/11/19	100	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3039460	Dissolved Copper (Cu)	2012/11/19	96	80 - 120	95	80 - 120	<1.0	ug/L	NC	20		
3039460	Dissolved Iron (Fe)	2012/11/19	99	80 - 120	95	80 - 120	<100	ug/L				
3039460	Dissolved Lead (Pb)	2012/11/19	100	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
3039460	Dissolved Magnesium (Mg)	2012/11/19	NC	80 - 120	98	80 - 120	<50	ug/L				
3039460	Dissolved Manganese (Mn)	2012/11/19	102	80 - 120	97	80 - 120	<2.0	ug/L				
3039460	Dissolved Molybdenum (Mo)	2012/11/19	111	80 - 120	103	80 - 120	<0.50	ug/L	NC	20		
3039460	Dissolved Nickel (Ni)	2012/11/19	100	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
3039460	Dissolved Phosphorus (P)	2012/11/19	106	80 - 120	102	80 - 120	<100	ug/L				
3039460	Dissolved Potassium (K)	2012/11/19	102	80 - 120	96	80 - 120	<200	ug/L				
3039460	Dissolved Selenium (Se)	2012/11/19	103	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
3039460	Dissolved Silicon (Si)	2012/11/19	103	80 - 120	99	80 - 120	<50	ug/L				
3039460	Dissolved Silver (Ag)	2012/11/19	101	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
3039460	Dissolved Sodium (Na)	2012/11/19	NC	80 - 120	96	80 - 120	<100	ug/L	2.3	20		
3039460	Dissolved Strontium (Sr)	2012/11/19	106	80 - 120	95	80 - 120	1.8, RDL=1.0	ug/L				

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3039460	Dissolved Thallium (Tl)	2012/11/19	99	80 - 120	96	80 - 120	<0.050	ug/L	NC	20		
3039460	Dissolved Tin (Sn)	2012/11/19	110	80 - 120	103	80 - 120	<1.0	ug/L				
3039460	Dissolved Titanium (Ti)	2012/11/19	105	80 - 120	101	80 - 120	<5.0	ug/L				
3039460	Dissolved Uranium (U)	2012/11/19	107	80 - 120	102	80 - 120	<0.10	ug/L	5.2	20		
3039460	Dissolved Vanadium (V)	2012/11/19	104	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3039460	Dissolved Zinc (Zn)	2012/11/19	101	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
3040273	Dissolved Aluminum (Al)	2012/11/19	111	80 - 120	104	80 - 120	<5.0	ug/L				
3040273	Dissolved Antimony (Sb)	2012/11/19	112	80 - 120	97	80 - 120	0.90, RDL=0.50	ug/L	NC	20		
3040273	Dissolved Arsenic (As)	2012/11/19	105	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3040273	Dissolved Barium (Ba)	2012/11/19	97	80 - 120	95	80 - 120	<2.0	ug/L	5.2	20		
3040273	Dissolved Beryllium (Be)	2012/11/19	111	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3040273	Dissolved Bismuth (Bi)	2012/11/19	98	80 - 120	95	80 - 120	<1.0	ug/L				
3040273	Dissolved Boron (B)	2012/11/19	NC	80 - 120	102	80 - 120	<10	ug/L	4.9	20		
3040273	Dissolved Cadmium (Cd)	2012/11/19	105	80 - 120	97	80 - 120	0.10, RDL=0.10	ug/L	NC	20		
3040273	Dissolved Calcium (Ca)	2012/11/19	NC	80 - 120	104	80 - 120	<200	ug/L				
3040273	Dissolved Chromium (Cr)	2012/11/19	107	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		
3040273	Dissolved Cobalt (Co)	2012/11/19	103	80 - 120	99	80 - 120	<0.50	ug/L	3.0	20		
3040273	Dissolved Copper (Cu)	2012/11/19	98	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
3040273	Dissolved Iron (Fe)	2012/11/19	105	80 - 120	102	80 - 120	<100	ug/L				
3040273	Dissolved Lead (Pb)	2012/11/19	98	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3040273	Dissolved Magnesium (Mg)	2012/11/19	NC	80 - 120	105	80 - 120	<50	ug/L				
3040273	Dissolved Manganese (Mn)	2012/11/19	NC	80 - 120	101	80 - 120	<2.0	ug/L				
3040273	Dissolved Molybdenum (Mo)	2012/11/19	112	80 - 120	103	80 - 120	<0.50	ug/L	NC	20		
3040273	Dissolved Nickel (Ni)	2012/11/19	98	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3040273	Dissolved Phosphorus (P)	2012/11/19	114	80 - 120	106	80 - 120	<100	ug/L				
3040273	Dissolved Potassium (K)	2012/11/19	NC	80 - 120	102	80 - 120	<200	ug/L				
3040273	Dissolved Selenium (Se)	2012/11/19	110	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
3040273	Dissolved Silicon (Si)	2012/11/19	107	80 - 120	102	80 - 120	<50	ug/L				
3040273	Dissolved Silver (Ag)	2012/11/19	97	80 - 120	97	80 - 120	<0.10	ug/L	NC	20		
3040273	Dissolved Sodium (Na)	2012/11/19	NC	80 - 120	106	80 - 120	<100	ug/L	2.1	20		
3040273	Dissolved Strontium (Sr)	2012/11/19	NC	80 - 120	106	80 - 120	<1.0	ug/L				
3040273	Dissolved Thallium (Tl)	2012/11/19	100	80 - 120	99	80 - 120	<0.050	ug/L	NC	20		
3040273	Dissolved Tin (Sn)	2012/11/19	110	80 - 120	100	80 - 120	<1.0	ug/L				
3040273	Dissolved Titanium (Ti)	2012/11/19	108	80 - 120	102	80 - 120	<5.0	ug/L				
3040273	Dissolved Uranium (U)	2012/11/19	105	80 - 120	100	80 - 120	0.10, RDL=0.10	ug/L	5.6	20		
3040273	Dissolved Vanadium (V)	2012/11/19	112	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3040273	Dissolved Zinc (Zn)	2012/11/19	105	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
3040749	Dissolved Aluminum (Al)	2012/11/19	100	80 - 120	100	80 - 120	<5.0	ug/L				
3040749	Dissolved Antimony (Sb)	2012/11/19	106	80 - 120	97	80 - 120	<0.50	ug/L				
3040749	Dissolved Arsenic (As)	2012/11/19	104	80 - 120	96	80 - 120	<1.0	ug/L				

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3040749	Dissolved Barium (Ba)	2012/11/19	NC	80 - 120	98	80 - 120	<2.0	ug/L				
3040749	Dissolved Beryllium (Be)	2012/11/19	97	80 - 120	98	80 - 120	<0.50	ug/L				
3040749	Dissolved Bismuth (Bi)	2012/11/19	95	80 - 120	100	80 - 120	<1.0	ug/L				
3040749	Dissolved Boron (B)	2012/11/19	93	80 - 120	98	80 - 120	<10	ug/L				
3040749	Dissolved Cadmium (Cd)	2012/11/19	99	80 - 120	96	80 - 120	<0.10	ug/L				
3040749	Dissolved Calcium (Ca)	2012/11/19	NC	80 - 120	102	80 - 120	<200	ug/L				
3040749	Dissolved Chromium (Cr)	2012/11/19	99	80 - 120	99	80 - 120	<5.0	ug/L				
3040749	Dissolved Cobalt (Co)	2012/11/19	99	80 - 120	98	80 - 120	<0.50	ug/L				
3040749	Dissolved Copper (Cu)	2012/11/19	94	80 - 120	97	80 - 120	<1.0	ug/L				
3040749	Dissolved Iron (Fe)	2012/11/19	102	80 - 120	98	80 - 120	<100	ug/L				
3040749	Dissolved Lead (Pb)	2012/11/19	94	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3040749	Dissolved Magnesium (Mg)	2012/11/19	NC	80 - 120	99	80 - 120	<50	ug/L				
3040749	Dissolved Manganese (Mn)	2012/11/19	NC	80 - 120	100	80 - 120	<2.0	ug/L				
3040749	Dissolved Molybdenum (Mo)	2012/11/19	106	80 - 120	97	80 - 120	<0.50	ug/L				
3040749	Dissolved Nickel (Ni)	2012/11/19	95	80 - 120	97	80 - 120	<1.0	ug/L				
3040749	Dissolved Phosphorus (P)	2012/11/19	111	80 - 120	95	80 - 120	<100	ug/L				
3040749	Dissolved Potassium (K)	2012/11/19	106	80 - 120	103	80 - 120	<200	ug/L				
3040749	Dissolved Selenium (Se)	2012/11/19	102	80 - 120	96	80 - 120	<2.0	ug/L				
3040749	Dissolved Silicon (Si)	2012/11/19	106	80 - 120	100	80 - 120	<50	ug/L				
3040749	Dissolved Silver (Ag)	2012/11/19	95	80 - 120	97	80 - 120	<0.10	ug/L				
3040749	Dissolved Sodium (Na)	2012/11/19	NC	80 - 120	103	80 - 120	<100	ug/L				
3040749	Dissolved Strontium (Sr)	2012/11/19	NC	80 - 120	100	80 - 120	<1.0	ug/L				
3040749	Dissolved Thallium (Tl)	2012/11/19	94	80 - 120	98	80 - 120	<0.050	ug/L				
3040749	Dissolved Tin (Sn)	2012/11/19	105	80 - 120	96	80 - 120	<1.0	ug/L				
3040749	Dissolved Titanium (Ti)	2012/11/19	105	80 - 120	101	80 - 120	<5.0	ug/L				
3040749	Dissolved Uranium (U)	2012/11/19	101	80 - 120	100	80 - 120	<0.10	ug/L				
3040749	Dissolved Vanadium (V)	2012/11/19	NC	80 - 120	98	80 - 120	<0.50	ug/L				
3040749	Dissolved Zinc (Zn)	2012/11/19	94	80 - 120	99	80 - 120	<5.0	ug/L				
3040888	Dissolved Aluminum (Al)	2012/11/20	98	80 - 120	104	80 - 120	<5.0	ug/L	NC	20		
3040888	Dissolved Antimony (Sb)	2012/11/20	104	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3040888	Dissolved Arsenic (As)	2012/11/20	100	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3040888	Dissolved Barium (Ba)	2012/11/20	96	80 - 120	96	80 - 120	<2.0	ug/L	NC	20		
3040888	Dissolved Beryllium (Be)	2012/11/20	96	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
3040888	Dissolved Bismuth (Bi)	2012/11/20	93	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		
3040888	Dissolved Boron (B)	2012/11/20	NC	80 - 120	105	80 - 120	<10	ug/L	0.1	20		
3040888	Dissolved Cadmium (Cd)	2012/11/20	99	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
3040888	Dissolved Calcium (Ca)	2012/11/20	NC	80 - 120	101	80 - 120	<200	ug/L	0.1	20		
3040888	Dissolved Chromium (Cr)	2012/11/20	94	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
3040888	Dissolved Cobalt (Co)	2012/11/20	94	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3040888	Dissolved Copper (Cu)	2012/11/20	89	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3040888	Dissolved Iron (Fe)	2012/11/20	98	80 - 120	102	80 - 120	<100	ug/L	NC	20		
3040888	Dissolved Lead (Pb)	2012/11/20	93	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3040888	Dissolved Magnesium (Mg)	2012/11/20	NC	80 - 120	107	80 - 120	<50	ug/L	1.1	20		
3040888	Dissolved Manganese (Mn)	2012/11/20	94	80 - 120	97	80 - 120	<2.0	ug/L	1.8	20		
3040888	Dissolved Molybdenum (Mo)	2012/11/20	103	80 - 120	99	80 - 120	<0.50	ug/L	0.02	20		
3040888	Dissolved Nickel (Ni)	2012/11/20	91	80 - 120	97	80 - 120	<1.0	ug/L	1.3	20		
3040888	Dissolved Phosphorus (P)	2012/11/20	108	80 - 120	111	80 - 120	<100	ug/L	NC	20		
3040888	Dissolved Potassium (K)	2012/11/20	NC	80 - 120	105	80 - 120	<200	ug/L	0.8	20		
3040888	Dissolved Selenium (Se)	2012/11/20	96	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
3040888	Dissolved Silicon (Si)	2012/11/20	101	80 - 120	105	80 - 120	<50	ug/L	0.09	20		
3040888	Dissolved Silver (Ag)	2012/11/20	83	80 - 120	96	80 - 120	<0.10	ug/L	NC	20		
3040888	Dissolved Sodium (Na)	2012/11/20	NC	80 - 120	107	80 - 120	<100	ug/L	1.6	20		
3040888	Dissolved Strontium (Sr)	2012/11/20	NC	80 - 120	97	80 - 120	<1.0	ug/L	0.5	20		
3040888	Dissolved Thallium (Tl)	2012/11/20	97	80 - 120	99	80 - 120	<0.050	ug/L	NC	20		
3040888	Dissolved Tin (Sn)	2012/11/20	103	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3040888	Dissolved Titanium (Ti)	2012/11/20	102	80 - 120	106	80 - 120	<5.0	ug/L	NC	20		
3040888	Dissolved Uranium (U)	2012/11/20	99	80 - 120	98	80 - 120	<0.10	ug/L	1.2	20		
3040888	Dissolved Vanadium (V)	2012/11/20	97	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3040888	Dissolved Zinc (Zn)	2012/11/20	90	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
3041758	Total Phosphorus	2012/11/20	99	80 - 120	98	85 - 115	<0.020	mg/L	NC	20	102	85 - 115
3043592	Total Aluminum (Al)	2012/11/21	103	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3043592	Total Antimony (Sb)	2012/11/21	109	80 - 120	108	80 - 120	<0.50	ug/L				
3043592	Total Arsenic (As)	2012/11/21	106	80 - 120	105	80 - 120	<1.0	ug/L				
3043592	Total Barium (Ba)	2012/11/21	105	80 - 120	105	80 - 120	<2.0	ug/L	1.9	20		
3043592	Total Beryllium (Be)	2012/11/21	105	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Bismuth (Bi)	2012/11/21	103	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
3043592	Total Boron (B)	2012/11/21	105	80 - 120	103	80 - 120	<10	ug/L				
3043592	Total Cadmium (Cd)	2012/11/21	107	80 - 120	104	80 - 120	<0.10	ug/L	NC	20		
3043592	Total Calcium (Ca)	2012/11/21	NC	80 - 120	107	80 - 120	<200	ug/L	4.2	20		
3043592	Total Chromium (Cr)	2012/11/21	101	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		
3043592	Total Cobalt (Co)	2012/11/21	102	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Copper (Cu)	2012/11/21	99	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3043592	Total Iron (Fe)	2012/11/21	103	80 - 120	102	80 - 120	<100	ug/L	NC	20		
3043592	Total Lead (Pb)	2012/11/21	101	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Magnesium (Mg)	2012/11/21	NC	80 - 120	107	80 - 120	<50	ug/L	5.5	20		
3043592	Total Manganese (Mn)	2012/11/21	101	80 - 120	100	80 - 120	<2.0	ug/L	4.1	20		
3043592	Total Molybdenum (Mo)	2012/11/21	110	80 - 120	106	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Nickel (Ni)	2012/11/21	100	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3043592	Total Phosphorus (P)	2012/11/21	107	80 - 120	104	80 - 120	<100	ug/L	NC	20		
3043592	Total Potassium (K)	2012/11/21	107	80 - 120	105	80 - 120	<200	ug/L	2.7	20		

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3043592	Total Silicon (Si)	2012/11/21	102	80 - 120	103	80 - 120	<50	ug/L				
3043592	Total Selenium (Se)	2012/11/21	104	80 - 120	104	80 - 120	<2.0	ug/L				
3043592	Total Silver (Ag)	2012/11/21	101	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
3043592	Total Sodium (Na)	2012/11/21	NC	80 - 120	110	80 - 120	<100	ug/L	7.4	20		
3043592	Total Strontium (Sr)	2012/11/21	105	80 - 120	101	80 - 120	<1.0	ug/L				
3043592	Total Thallium (Tl)	2012/11/21	107	80 - 120	106	80 - 120	<0.050	ug/L				
3043592	Total Tin (Sn)	2012/11/21	108	80 - 120	106	80 - 120	<1.0	ug/L				
3043592	Total Titanium (Ti)	2012/11/21	109	80 - 120	105	80 - 120	<5.0	ug/L				
3043592	Total Uranium (U)	2012/11/21	107	80 - 120	105	80 - 120	<0.10	ug/L				
3043592	Total Vanadium (V)	2012/11/21	104	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Zinc (Zn)	2012/11/21	101	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3043708	Dissolved Aluminum (Al)	2012/11/21	102	80 - 120	99	80 - 120	<5.0	ug/L				
3043708	Dissolved Antimony (Sb)	2012/11/21	112	80 - 120	103	80 - 120	<0.50	ug/L				
3043708	Dissolved Arsenic (As)	2012/11/21	108	80 - 120	100	80 - 120	<1.0	ug/L				
3043708	Dissolved Barium (Ba)	2012/11/21	105	80 - 120	101	80 - 120	<2.0	ug/L				
3043708	Dissolved Beryllium (Be)	2012/11/21	107	80 - 120	101	80 - 120	<0.50	ug/L				
3043708	Dissolved Bismuth (Bi)	2012/11/21	102	80 - 120	99	80 - 120	<1.0	ug/L				
3043708	Dissolved Boron (B)	2012/11/21	106	80 - 120	102	80 - 120	<10	ug/L				
3043708	Dissolved Cadmium (Cd)	2012/11/21	108	80 - 120	102	80 - 120	<0.10	ug/L				
3043708	Dissolved Calcium (Ca)	2012/11/21	NC	80 - 120	101	80 - 120	<200	ug/L				
3043708	Dissolved Chromium (Cr)	2012/11/21	103	80 - 120	100	80 - 120	<5.0	ug/L				
3043708	Dissolved Cobalt (Co)	2012/11/21	101	80 - 120	98	80 - 120	<0.50	ug/L				
3043708	Dissolved Copper (Cu)	2012/11/21	100	80 - 120	96	80 - 120	<1.0	ug/L				
3043708	Dissolved Iron (Fe)	2012/11/21	102	80 - 120	99	80 - 120	<100	ug/L				
3043708	Dissolved Lead (Pb)	2012/11/21	101	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3043708	Dissolved Magnesium (Mg)	2012/11/21	NC	80 - 120	100	80 - 120	<50	ug/L				
3043708	Dissolved Manganese (Mn)	2012/11/21	103	80 - 120	99	80 - 120	<2.0	ug/L				
3043708	Dissolved Molybdenum (Mo)	2012/11/21	111	80 - 120	103	80 - 120	<0.50	ug/L				
3043708	Dissolved Nickel (Ni)	2012/11/21	100	80 - 120	99	80 - 120	<1.0	ug/L				
3043708	Dissolved Phosphorus (P)	2012/11/21	107	80 - 120	103	80 - 120	<100	ug/L				
3043708	Dissolved Potassium (K)	2012/11/21	106	80 - 120	101	80 - 120	<200	ug/L				
3043708	Dissolved Selenium (Se)	2012/11/21	108	80 - 120	101	80 - 120	<2.0	ug/L				
3043708	Dissolved Silicon (Si)	2012/11/21	106	80 - 120	100	80 - 120	<50	ug/L				
3043708	Dissolved Silver (Ag)	2012/11/21	103	80 - 120	99	80 - 120	<0.10	ug/L				
3043708	Dissolved Sodium (Na)	2012/11/21	NC	80 - 120	102	80 - 120	<100	ug/L				
3043708	Dissolved Strontium (Sr)	2012/11/21	NC	80 - 120	100	80 - 120	<1.0	ug/L				
3043708	Dissolved Thallium (Tl)	2012/11/21	104	80 - 120	102	80 - 120	<0.050	ug/L				
3043708	Dissolved Tin (Sn)	2012/11/21	110	80 - 120	104	80 - 120	<1.0	ug/L				
3043708	Dissolved Titanium (Ti)	2012/11/21	108	80 - 120	103	80 - 120	<5.0	ug/L				
3043708	Dissolved Uranium (U)	2012/11/21	109	80 - 120	103	80 - 120	<0.10	ug/L				

Maxxam Job #: B2H8285  
 Report Date: 2012/11/22

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3043708	Dissolved Vanadium (V)	2012/11/21	106	80 - 120	101	80 - 120	<0.50	ug/L				
3043708	Dissolved Zinc (Zn)	2012/11/21	104	80 - 120	100	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - The recoveries for (cis & trans-1,3-dichloropropene and/or bromomethane) in the matrix spike were below the lower control limits. This may represent a low bias in some results for these specific analytes. It was noted that the matrix spike was preserved with sodium thiosulphate. Sodium thiosulphate is known to degrade these compounds.

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





Validation Signature Page

Maxxam Job #: B2H8285

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

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Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: ##-####-####  
 Site#: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115602, 381156-02-01

**Attention: Sharon Wood**  
 Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

**Report Date: 2012/11/22**

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2H9228**

**Received: 2012/11/14, 18:30**

Sample Matrix: Water  
 # Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	11	N/A	2012/11/16	CAM SOP-00448	SM 2320B
Anions	11	N/A	2012/11/19	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	9	N/A	2012/11/19	CAM SOP-00457	Ontario MOE CN-E3015
Free (WAD) Cyanide	2	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	11	2012/11/15	2012/11/16	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	3	N/A	2012/11/20	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/21	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	3	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	11	2012/11/20	2012/11/20	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	3	N/A	2012/11/20	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	8	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	11	N/A	2012/11/20	CAM SOP-00447	EPA 6020
Total Ammonia-N	11	N/A	2012/11/18	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	10	N/A	2012/11/16	CAM SOP-00440	SM 4500 NO <sub>3</sub> /NO <sub>2</sub> B
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/19	CAM SOP-00440	SM 4500 NO <sub>3</sub> /NO <sub>2</sub> B
pH	11	N/A	2012/11/16	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	11	N/A	2012/11/19	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	11	N/A	2012/11/16	CAM SOP-00461	EPA 365.1
Sulphide	11	N/A	2012/11/16	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	11	2012/11/20	2012/11/21	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	11	N/A	2012/11/15	CAM SOP-00428	SM 2540D
Turbidity	3	N/A	2012/11/15	CAM SOP-00417	APHA 2130B
Turbidity	8	N/A	2012/11/16	CAM SOP-00417	APHA 2130B

### Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

Your Project #: ##-####-####  
Site#: ##-####-####  
Site Location: TANSLEY QUARRY  
Your C.O.C. #: 38115602, 381156-02-01

**Attention: Sharon Wood**

Golder Associates Ltd  
Mississauga - Standing Offer  
2390 Argentia Rd  
Mississauga, ON  
L5N 5Z7

**Report Date: 2012/11/22**

**CERTIFICATE OF ANALYSIS**

-2-

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

(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.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

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Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP4871			PP4872			PP4873		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01			381156-02-01		
	<b>Units</b>	<b>MW5-INT</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-05 SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW5-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>

Calculated Parameters										
Hardness (CaCO <sub>3</sub> )	mg/L	320	1.0	3035768	430	1.0	3035768	34000	1.0	3035768
<b>Inorganics</b>										
Total Ammonia-N	mg/L	1.6	0.050	3039380	0.096	0.050	3039380	38	0.50	3039380
Fluoride (F <sup>-</sup> )	mg/L	0.42	0.10	3038171	0.11	0.10	3038171	<0.10	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220
pH	pH	7.73		3038172	7.71		3038172	6.11		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	3038637	<0.0010	0.0010	3038637	0.0094	0.0010	3038637
Total Phosphorus	mg/L	0.47	0.10	3042540	3.7	0.10	3042540	0.42	0.10	3042540
Total Suspended Solids	mg/L	600	20	3037427	5700	50	3037427	1400	20	3037442
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	<0.020	0.020	3037629
Turbidity	NTU	640	1	3038173	1600	2	3038173	470	1	3038173
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	290	1.0	3038166	300	1.0	3038166	51	1.0	3038166
Nitrite (N)	mg/L	0.13	0.010	3038446	<0.010	0.010	3038446	<0.10	0.10	3038446
Dissolved Chloride (Cl)	mg/L	67	1.0	3038993	30	1.0	3038993	59000	500	3038993
Nitrate (N)	mg/L	0.26	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446
Nitrate + Nitrite	mg/L	0.40	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	1.0	3038993	<1.0	1.0	3038993	850	100	3038993
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	120	1.0	3038993	95	1.0	3038993	1200	100	3038993

RDL = Reportable Detection Limit  
QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP4874			PP4875			PP4876		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01			381156-02-01		
	<b>Units</b>	<b>MW-03 SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW3-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>	<b>DUP-1</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	880	1.0	3035768	5500	1.0	3035768	380	1.0	3036822
<b>Inorganics</b>										
Total Ammonia-N	mg/L	1.1	0.050	3039380	10	0.50	3039380	0.27	0.050	3039380
Fluoride (F <sup>-</sup> )	mg/L	0.19	0.10	3038171	0.25	0.10	3038171	0.14	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220
pH	pH	7.58		3038172	6.96		3038172	7.87		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	3038637	<0.0010	0.0010	3038637	<0.0010	0.0010	3038637
Total Phosphorus	mg/L	2.8	0.10	3042540	0.13	0.10	3042540	0.65	0.10	3042540
Total Suspended Solids	mg/L	1100	50	3037427	450	20	3037442	1300	20	3037442
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	<0.020	0.020	3037629
Turbidity	NTU	590	1	3038173	250	0.4	3038173	1200	2	3038173
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	170	1.0	3038166	62	1.0	3038166	320	1.0	3038166
Nitrite (N)	mg/L	0.020	0.010	3038446	<0.010	0.010	3038446	0.014	0.010	3038446
Dissolved Chloride (Cl)	mg/L	70	1.0	3038993	8200	100	3038993	9.2	1.0	3038993
Nitrate (N)	mg/L	<0.10	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446
Nitrate + Nitrite	mg/L	<0.10	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446
Dissolved Bromide (Br <sup>-</sup> )	mg/L	1.2	1.0	3038993	120	100	3038993	<1.0	1.0	3038993
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	900	5.0	3038993	1500	100	3038993	76	1.0	3038993

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP4877		PP4878		PP4879		PP4880		
Sampling Date		2012/11/14		2012/11/14		2012/11/14		2012/11/14		
COC Number		381156-02-01		381156-02-01		381156-02-01		381156-02-01		
	<b>Units</b>	<b>MW-06I</b>	<b>RDL</b>	<b>MW5-STRADDLE</b>	<b>RDL</b>	<b>MW-08I</b>	<b>RDL</b>	<b>MW-08S</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	370	1.0	280	1.0	4100	1.0	980	1.0	3036822
<b>Inorganics</b>										
Total Ammonia-N	mg/L	0.32	0.050	0.76	0.050	5.8	0.50	1.3	0.050	3039380
Fluoride (F <sup>-</sup> )	mg/L	0.14	0.10	0.28	0.10	0.42	0.10	0.24	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	<0.0020	0.0020	<0.0020	0.0020	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	3038220
pH	pH	7.87		7.90		7.59		7.81		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	3038637
Total Phosphorus	mg/L	0.89	0.10	10	0.10	0.60	0.10	7.7	0.10	3042540
Total Suspended Solids	mg/L	1100	20	12000	200	4000	100	5200	100	3037442
Sulphide	mg/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	0.48	0.020	3037629
Turbidity	NTU	1100	2	3500	4	1000	2	2500	4	3038173
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	330	1.0	290	1.0	150	1.0	580	1.0	3038166
Nitrite (N)	mg/L	0.014	0.010	0.022	0.010	0.038	0.010	<0.010	0.010	3038446
Dissolved Chloride (Cl)	mg/L	9.2	1.0	6.7	1.0	4100	50	16	5.0	3038993
Nitrate (N)	mg/L	<0.10	0.10	0.27	0.10	<0.10	0.10	<0.10	0.10	3038446
Nitrate + Nitrite	mg/L	<0.10	0.10	0.29	0.10	0.13	0.10	<0.10	0.10	3038446
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	1.0	<1.0	1.0	60	50	<5.0	5.0	3038993
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	73	1.0	41	1.0	1000	50	560	5.0	3038993

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
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Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP4881		
Sampling Date		2012/11/14		
COC Number		381156-02-01		
	<b>Units</b>	<b>MW-08D</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>				
Hardness (CaCO <sub>3</sub> )	mg/L	660	1.0	3036822
<b>Inorganics</b>				
Total Ammonia-N	mg/L	0.10	0.050	3039380
Fluoride (F <sup>-</sup> )	mg/L	0.28	0.10	3038431
Free Cyanide	mg/L	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220
pH	pH	7.89		3038432
Phenols-4AAP	mg/L	<0.0010	0.0010	3038637
Total Phosphorus	mg/L	0.035	0.020	3042540
Total Suspended Solids	mg/L	27	10	3037442
Sulphide	mg/L	<0.020	0.020	3037629
Turbidity	NTU	29	0.2	3038173
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	440	1.0	3038429
Nitrite (N)	mg/L	0.066	0.010	3038948
Dissolved Chloride (Cl)	mg/L	220	5.0	3038993
Nitrate (N)	mg/L	1.6	0.10	3038948
Nitrate + Nitrite	mg/L	1.7	0.10	3038948
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<5.0	5.0	3038993
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	430	5.0	3038993
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4871			PP4872			PP4873		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01			381156-02-01		
	<b>Units</b>	<b>MW5-INT</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-05 SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW5-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	0.00010	3041932	<0.00010	0.00010	3041932
Dissolved Aluminum (Al)	ug/L	32	5.0	3042040	94	5.0	3041530	<250	250	3042040
Total Aluminum (Al)	ug/L	5600	5.0	3042136	43000	50	3042136	8100	250	3042136
Dissolved Antimony (Sb)	ug/L	1.5	0.50	3042040	<0.50	0.50	3041530	39	25	3042040
Total Antimony (Sb)	ug/L	<0.50	0.50	3042136	<0.50	0.50	3042136	<25	25	3042136
Dissolved Arsenic (As)	ug/L	1.1	1.0	3042040	<1.0	1.0	3041530	<100	100	3042040
Total Arsenic (As)	ug/L	300	1.0	3042136	27	1.0	3042136	<100	100	3042136
Dissolved Barium (Ba)	ug/L	20	2.0	3042040	61	2.0	3041530	140	100	3042040
Total Barium (Ba)	ug/L	190	2.0	3042136	950	2.0	3042136	180	100	3042136
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3042040	<0.50	0.50	3041530	<25	25	3042040
Total Beryllium (Be)	ug/L	0.64	0.50	3042136	2.3	0.50	3042136	<25	25	3042136
Dissolved Bismuth (Bi)	ug/L	1.0	1.0	3042040	<1.0	1.0	3041530	57	50	3042040
Total Bismuth (Bi)	ug/L	<1.0	1.0	3042136	<1.0	1.0	3042136	<50	50	3042136
Dissolved Boron (B)	ug/L	2100	10	3042040	13	10	3041530	5300	500	3042040
Total Boron (B)	ug/L	2400	10	3042136	64	10	3042136	5400	500	3042136
Dissolved Cadmium (Cd)	ug/L	0.12	0.10	3042040	<0.10	0.10	3041530	<5.0	5.0	3042040
Total Cadmium (Cd)	ug/L	0.66	0.10	3042136	1.1	0.10	3042136	7.2	5.0	3042136
Dissolved Calcium (Ca)	ug/L	79000	1000	3042040	120000	200	3041530	9900000	10000	3042040
Total Calcium (Ca)	ug/L	110000	1000	3042136	600000	2000	3042136	11000000	10000	3042136
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3042040	<5.0	5.0	3041530	<250	250	3042040
Total Chromium (Cr)	ug/L	13	5.0	3042136	95	5.0	3042136	<250	250	3042136
Dissolved Cobalt (Co)	ug/L	2.4	0.50	3042040	2.2	0.50	3041530	<25	25	3042040
Total Cobalt (Co)	ug/L	3.6	0.50	3042136	52	1.0	3042136	<25	25	3042136
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3042040	1.6	1.0	3041530	<50	50	3042040
Total Copper (Cu)	ug/L	32	1.0	3042136	230	1.0	3042136	81	50	3042136
Dissolved Iron (Fe)	ug/L	<100	100	3042040	120	100	3041530	14000	5000	3042040
Total Iron (Fe)	ug/L	100000	100	3042136	93000	100	3042136	40000	5000	3042136
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3042040	<0.50	0.50	3041530	<25	25	3042040
Total Lead (Pb)	ug/L	9.7	0.50	3042136	65	0.50	3042136	<25	25	3042136
Dissolved Magnesium (Mg)	ug/L	30000	50	3042040	33000	50	3041530	2400000	2500	3042040
Total Magnesium (Mg)	ug/L	36000	50	3042136	84000	50	3042136	2600000	2500	3042136
Dissolved Manganese (Mn)	ug/L	33	2.0	3042040	9.3	2.0	3041530	5300	100	3042040

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B2H9228  
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 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4871			PP4872			PP4873		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01			381156-02-01		
	Units	MW5-INT	RDL	QC Batch	MW-05 SHALLOW	RDL	QC Batch	MW5-DEEP	RDL	QC Batch

Total Manganese (Mn)	ug/L	270	2.0	3042136	9600	2.0	3042136	5200	100	3042136
Dissolved Molybdenum (Mo)	ug/L	3.9	0.50	3042040	<0.50	0.50	3041530	<25	25	3042040
Total Molybdenum (Mo)	ug/L	6.3	0.50	3042136	5.3	0.50	3042136	<25	25	3042136
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3042040	<1.0	1.0	3041530	<50	50	3042040
Total Nickel (Ni)	ug/L	9.3	1.0	3042136	92	2.0	3042136	54	50	3042136
Dissolved Phosphorus (P)	ug/L	<100	100	3042040	<100	100	3041530	<5000	5000	3042040
Total Phosphorus (P)	ug/L	460	100	3042136	3700	100	3042136	<5000	5000	3042136
Dissolved Potassium (K)	ug/L	17000	200	3042040	730	200	3041530	300000	10000	3042040
Total Potassium (K)	ug/L	18000	200	3042136	10000	200	3042136	330000	10000	3042136
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3042040	<2.0	2.0	3041530	<200	200	3042040
Dissolved Silicon (Si)	ug/L	6000	50	3042040	5300	50	3041530	2900	2500	3042040
Total Silicon (Si)	ug/L	25000	50	3042136	60000	500	3042136	14000	2500	3042136
Total Selenium (Se)	ug/L	<2.0	2.0	3042136	<2.0	2.0	3042136	<100	100	3042136
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3042040	<0.10	0.10	3041530	9.5	5.0	3042040
Total Silver (Ag)	ug/L	<0.10	0.10	3042136	0.35	0.10	3042136	5.8	5.0	3042136
Dissolved Sodium (Na)	ug/L	74000	100	3042040	6400	100	3041530	2000000	5000	3042040
Total Sodium (Na)	ug/L	75000	100	3042136	8500	100	3042136	2100000	5000	3042136
Dissolved Strontium (Sr)	ug/L	13000	1.0	3042040	190	1.0	3041530	210000	50	3042040
Total Strontium (Sr)	ug/L	14000	1.0	3042136	960	1.0	3042136	220000	50	3042136
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3042040	<0.050	0.050	3041530	<2.5	2.5	3042040
Total Thallium (Tl)	ug/L	<0.050	0.050	3042136	0.45	0.050	3042136	<2.5	2.5	3042136
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3042040	<1.0	1.0	3041530	<50	50	3042040
Total Tin (Sn)	ug/L	1.7	1.0	3042136	<1.0	1.0	3042136	<50	50	3042136
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3042040	<5.0	5.0	3041530	<250	250	3042040
Total Titanium (Ti)	ug/L	170	5.0	3042136	830	50	3042136	910	250	3042136
Dissolved Uranium (U)	ug/L	0.47	0.10	3042040	1.8	0.10	3041530	8.9	5.0	3042040
Total Uranium (U)	ug/L	1.7	0.10	3042136	4.6	0.10	3042136	<5.0	5.0	3042136
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3042040	0.65	0.50	3041530	<250	250	3042040
Total Vanadium (V)	ug/L	13	0.50	3042136	81	0.50	3042136	<50	50	3042136
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3042040	<5.0	5.0	3041530	<250	250	3042040
Total Zinc (Zn)	ug/L	33	5.0	3042136	250	5.0	3042136	<250	250	3042136

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4874			PP4875			PP4876		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01			381156-02-01		
	Units	MW-03 SHALLOW	RDL	QC Batch	MW3-DEEP	RDL	QC Batch	DUP-1	RDL	QC Batch

<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	0.00010	3041932	<0.00010	0.00010	3041932
Dissolved Aluminum (Al)	ug/L	58	5.0	3042040	57	50	3042009	25	5.0	3041530
Total Aluminum (Al)	ug/L	10000	5.0	3042136	9500	50	3042136	22000	5.0	3042136
Dissolved Antimony (Sb)	ug/L	0.68	0.50	3042040	<5.0	5.0	3042009	<0.50	0.50	3041530
Total Antimony (Sb)	ug/L	<0.50	0.50	3042136	<5.0	5.0	3042136	<0.50	0.50	3042136
Dissolved Arsenic (As)	ug/L	3.9	1.0	3042040	<10	10	3042009	6.6	1.0	3041530
Total Arsenic (As)	ug/L	9.2	1.0	3042136	<10	10	3042136	16	1.0	3042136
Dissolved Barium (Ba)	ug/L	9.1	2.0	3042040	23	20	3042009	55	2.0	3041530
Total Barium (Ba)	ug/L	60	2.0	3042136	120	20	3042136	310	2.0	3042136
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3042040	<5.0	5.0	3042009	<0.50	0.50	3041530
Total Beryllium (Be)	ug/L	<0.50	0.50	3042136	<5.0	5.0	3042136	1.1	0.50	3042136
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3042040	<10	10	3042009	<1.0	1.0	3041530
Total Bismuth (Bi)	ug/L	<1.0	1.0	3042136	<10	10	3042136	<1.0	1.0	3042136
Dissolved Boron (B)	ug/L	1100	10	3042040	4300	100	3042009	110	10	3041530
Total Boron (B)	ug/L	1300	10	3042136	5300	100	3042136	160	10	3042136
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3042040	<1.0	1.0	3042009	<0.10	0.10	3041530
Total Cadmium (Cd)	ug/L	0.25	0.10	3042136	1.8	1.0	3042136	0.71	0.10	3042136
Dissolved Calcium (Ca)	ug/L	150000	1000	3042040	1400000	2000	3042009	86000	200	3041530
Total Calcium (Ca)	ug/L	250000	1000	3042136	1700000	2000	3042136	200000	200	3042136
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3042040	<50	50	3042009	<5.0	5.0	3041530
Total Chromium (Cr)	ug/L	18	5.0	3042136	<50	50	3042136	31	5.0	3042136
Dissolved Cobalt (Co)	ug/L	2.3	0.50	3042040	<5.0	5.0	3042009	1.4	0.50	3041530
Total Cobalt (Co)	ug/L	6.9	0.50	3042136	<5.0	5.0	3042136	16	0.50	3042136
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3042040	<10	10	3042009	<1.0	1.0	3041530
Total Copper (Cu)	ug/L	21	1.0	3042136	19	10	3042136	37	1.0	3042136
Dissolved Iron (Fe)	ug/L	380	100	3042040	4500	1000	3042009	470	100	3041530
Total Iron (Fe)	ug/L	15000	100	3042136	15000	1000	3042136	31000	100	3042136
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3042040	<5.0	5.0	3042009	<0.50	0.50	3041530
Total Lead (Pb)	ug/L	6.3	0.50	3042136	<5.0	5.0	3042136	10	0.50	3042136
Dissolved Magnesium (Mg)	ug/L	130000	50	3042040	470000	500	3042009	41000	50	3041530
Total Magnesium (Mg)	ug/L	150000	50	3042136	560000	500	3042136	60000	50	3042136
Dissolved Manganese (Mn)	ug/L	120	2.0	3042040	600	20	3042009	39	2.0	3041530

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4874			PP4875			PP4876		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01			381156-02-01		
	Units	MW-03 SHALLOW	RDL	QC Batch	MW3-DEEP	RDL	QC Batch	DUP-1	RDL	QC Batch

Total Manganese (Mn)	ug/L	790	2.0	3042136	930	20	3042136	1100	2.0	3042136
Dissolved Molybdenum (Mo)	ug/L	6.3	0.50	3042040	<5.0	5.0	3042009	1.8	0.50	3041530
Total Molybdenum (Mo)	ug/L	6.6	0.50	3042136	7.4	5.0	3042136	2.6	0.50	3042136
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3042040	<10	10	3042009	<1.0	1.0	3041530
Total Nickel (Ni)	ug/L	15	1.0	3042136	12	10	3042136	34	1.0	3042136
Dissolved Phosphorus (P)	ug/L	<100	100	3042040	<1000	1000	3042009	<100	100	3041530
Total Phosphorus (P)	ug/L	640	100	3042136	<1000	1000	3042136	990	100	3042136
Dissolved Potassium (K)	ug/L	9000	200	3042040	85000	2000	3042009	4100	200	3041530
Total Potassium (K)	ug/L	14000	200	3042136	100000	2000	3042136	12000	200	3042136
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3042040	<40	40	3042009	<2.0	2.0	3041530
Dissolved Silicon (Si)	ug/L	5900	50	3042040	4000	500	3042009	9500	50	3041530
Total Silicon (Si)	ug/L	25000	50	3042136	22000	500	3042136	45000	50	3042136
Total Selenium (Se)	ug/L	<2.0	2.0	3042136	<40	40	3042136	<2.0	2.0	3042136
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3042040	<1.0	1.0	3042009	<0.10	0.10	3041530
Total Silver (Ag)	ug/L	<0.10	0.10	3042136	<1.0	1.0	3042136	<0.10	0.10	3042136
Dissolved Sodium (Na)	ug/L	120000	100	3042040	3400000	1000	3042009	20000	100	3041530
Total Sodium (Na)	ug/L	140000	100	3042136	4100000	1000	3042136	21000	100	3042136
Dissolved Strontium (Sr)	ug/L	11000	1.0	3042040	35000	10	3042009	2800	1.0	3041530
Total Strontium (Sr)	ug/L	12000	1.0	3042136	41000	10	3042136	3400	1.0	3042136
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3042040	<0.50	0.50	3042009	<0.050	0.050	3041530
Total Thallium (Tl)	ug/L	<0.050	0.050	3042136	<0.50	0.50	3042136	0.16	0.050	3042136
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3042040	<10	10	3042009	<1.0	1.0	3041530
Total Tin (Sn)	ug/L	<1.0	1.0	3042136	<10	10	3042136	<1.0	1.0	3042136
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3042040	<50	50	3042009	5.7	5.0	3041530
Total Titanium (Ti)	ug/L	330	5.0	3042136	67	50	3042136	500	5.0	3042136
Dissolved Uranium (U)	ug/L	0.49	0.10	3042040	<1.0	1.0	3042009	1.1	0.10	3041530
Total Uranium (U)	ug/L	0.87	0.10	3042136	<1.0	1.0	3042136	2.4	0.10	3042136
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3042040	<10	10	3042009	0.60	0.50	3041530
Total Vanadium (V)	ug/L	19	0.50	3042136	10	10	3042136	35	0.50	3042136
Dissolved Zinc (Zn)	ug/L	13	5.0	3042040	<50	50	3042009	<5.0	5.0	3041530
Total Zinc (Zn)	ug/L	59	5.0	3042136	200	50	3042136	85	5.0	3042136

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4877			PP4878		
Sampling Date		2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01		
	Units	MW-06I	RDL	QC Batch	MW5-STRADDLE	RDL	QC Batch
<b>Metals</b>							
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	0.00010	3041961
Dissolved Aluminum (Al)	ug/L	35	5.0	3042009	170	5.0	3041530
Total Aluminum (Al)	ug/L	19000	5.0	3042136	100000	25	3042136
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3042009	<0.50	0.50	3041530
Total Antimony (Sb)	ug/L	<0.50	0.50	3042136	<2.5	2.5	3042136
Dissolved Arsenic (As)	ug/L	6.0	1.0	3042009	11	1.0	3041530
Total Arsenic (As)	ug/L	17	1.0	3042136	110	5.0	3042136
Dissolved Barium (Ba)	ug/L	54	2.0	3042009	61	2.0	3041530
Total Barium (Ba)	ug/L	310	2.0	3042136	700	10	3042136
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3042009	<0.50	0.50	3041530
Total Beryllium (Be)	ug/L	0.96	0.50	3042136	4.6	2.5	3042136
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3042009	<1.0	1.0	3041530
Total Bismuth (Bi)	ug/L	<1.0	1.0	3042136	<5.0	5.0	3042136
Dissolved Boron (B)	ug/L	110	10	3042009	1200	10	3041530
Total Boron (B)	ug/L	160	10	3042136	1300	50	3042136
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3042009	<0.10	0.10	3041530
Total Cadmium (Cd)	ug/L	0.68	0.10	3042136	2.7	0.50	3042136
Dissolved Calcium (Ca)	ug/L	82000	200	3042009	61000	400	3041530
Total Calcium (Ca)	ug/L	200000	200	3042136	2000000	1000	3042136
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3042009	<5.0	5.0	3041530
Total Chromium (Cr)	ug/L	30	5.0	3042136	160	25	3042136
Dissolved Cobalt (Co)	ug/L	0.96	0.50	3042009	2.7	0.50	3041530
Total Cobalt (Co)	ug/L	15	0.50	3042136	100	5.0	3042136
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3042009	1.9	1.0	3041530
Total Copper (Cu)	ug/L	37	1.0	3042136	1000	5.0	3042136
Dissolved Iron (Fe)	ug/L	540	100	3042009	500	100	3041530
Total Iron (Fe)	ug/L	29000	100	3042136	230000	500	3042136
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3042009	<0.50	0.50	3041530
Total Lead (Pb)	ug/L	10	0.50	3042136	150	2.5	3042136
Dissolved Magnesium (Mg)	ug/L	41000	50	3042009	32000	50	3041530
Total Magnesium (Mg)	ug/L	60000	50	3042136	210000	250	3042136
Dissolved Manganese (Mn)	ug/L	36	2.0	3042009	38	2.0	3041530
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PP4877			PP4878		
Sampling Date		2012/11/14			2012/11/14		
COC Number		381156-02-01			381156-02-01		
	Units	MW-06I	RDL	QC Batch	MW5-STRADDLE	RDL	QC Batch
Total Manganese (Mn)	ug/L	1100	2.0	3042136	14000	10	3042136
Dissolved Molybdenum (Mo)	ug/L	1.8	0.50	3042009	4.7	0.50	3041530
Total Molybdenum (Mo)	ug/L	2.7	0.50	3042136	4.9	2.5	3042136
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3042009	<1.0	1.0	3041530
Total Nickel (Ni)	ug/L	34	1.0	3042136	200	10	3042136
Dissolved Phosphorus (P)	ug/L	<100	100	3042009	<100	100	3041530
Total Phosphorus (P)	ug/L	1000	100	3042136	14000	500	3042136
Dissolved Potassium (K)	ug/L	3900	200	3042009	6700	200	3041530
Total Potassium (K)	ug/L	10000	200	3042136	23000	1000	3042136
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3042009	<2.0	2.0	3041530
Dissolved Silicon (Si)	ug/L	9300	50	3042009	10000	50	3041530
Total Silicon (Si)	ug/L	40000	50	3042136	96000	250	3042136
Total Selenium (Se)	ug/L	<2.0	2.0	3042136	<10	10	3042136
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3042009	<0.10	0.10	3041530
Total Silver (Ag)	ug/L	<0.10	0.10	3042136	0.65	0.50	3042136
Dissolved Sodium (Na)	ug/L	19000	100	3042009	27000	100	3041530
Total Sodium (Na)	ug/L	21000	100	3042136	30000	500	3042136
Dissolved Strontium (Sr)	ug/L	2800	1.0	3042009	6600	1.0	3041530
Total Strontium (Sr)	ug/L	3500	1.0	3042136	10000	5.0	3042136
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3042009	<0.050	0.050	3041530
Total Thallium (Tl)	ug/L	0.12	0.050	3042136	0.57	0.25	3042136
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3042009	<1.0	1.0	3041530
Total Tin (Sn)	ug/L	<1.0	1.0	3042136	<5.0	5.0	3042136
Dissolved Titanium (Ti)	ug/L	8.4	5.0	3042009	8.9	5.0	3041530
Total Titanium (Ti)	ug/L	420	5.0	3042136	1400	25	3042136
Dissolved Uranium (U)	ug/L	0.99	0.10	3042009	0.21	0.10	3041530
Total Uranium (U)	ug/L	2.5	0.10	3042136	6.2	0.50	3042136
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3042009	0.64	0.50	3041530
Total Vanadium (V)	ug/L	32	0.50	3042136	170	2.5	3042136
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3042009	<5.0	5.0	3041530
Total Zinc (Zn)	ug/L	83	5.0	3042136	1200	25	3042136

RDL = Reportable Detection Limit  
QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4879			PP4880		PP4881		
Sampling Date		2012/11/14			2012/11/14		2012/11/14		
COC Number		381156-02-01			381156-02-01		381156-02-01		
	<b>Units</b>	<b>MW-08I</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW-08S</b>	<b>RDL</b>	<b>MW-08D</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Metals</b>									
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	0.00010	<0.00010	0.00010	3041932
Dissolved Aluminum (Al)	ug/L	57	25	3042009	150	5.0	<5.0	5.0	3042094
Total Aluminum (Al)	ug/L	8600	25	3042136	58000	50	4300	5.0	3042136
Dissolved Antimony (Sb)	ug/L	<2.5	2.5	3042009	<0.50	0.50	<0.50	0.50	3042094
Total Antimony (Sb)	ug/L	<2.5	2.5	3042136	<0.50	0.50	<0.50	0.50	3042136
Dissolved Arsenic (As)	ug/L	<10	10	3042009	1.9	1.0	<1.0	1.0	3042094
Total Arsenic (As)	ug/L	5.7	5.0	3042136	26	1.0	8.7	1.0	3042136
Dissolved Barium (Ba)	ug/L	23	10	3042009	51	2.0	15	2.0	3042094
Total Barium (Ba)	ug/L	260	10	3042136	570	2.0	41	2.0	3042136
Dissolved Beryllium (Be)	ug/L	<2.5	2.5	3042009	<0.50	0.50	<0.50	0.50	3042094
Total Beryllium (Be)	ug/L	<2.5	2.5	3042136	3.6	0.50	<0.50	0.50	3042136
Dissolved Bismuth (Bi)	ug/L	<5.0	5.0	3042009	<1.0	1.0	<1.0	1.0	3042094
Total Bismuth (Bi)	ug/L	<5.0	5.0	3042136	<1.0	1.0	<1.0	1.0	3042136
Dissolved Boron (B)	ug/L	6300	50	3042009	1400	10	3400	10	3042094
Total Boron (B)	ug/L	6200	50	3042136	1800	10	4400	10	3042136
Dissolved Cadmium (Cd)	ug/L	<0.50	0.50	3042009	<0.10	0.10	2.1	0.10	3042094
Total Cadmium (Cd)	ug/L	1.1	0.50	3042136	1.4	0.10	4.9	0.10	3042136
Dissolved Calcium (Ca)	ug/L	1100000	2000	3042009	110000	400	110000	1000	3042094
Total Calcium (Ca)	ug/L	650000	1000	3042136	470000	1000	150000	1000	3042136
Dissolved Chromium (Cr)	ug/L	<25	25	3042009	<5.0	5.0	<5.0	5.0	3042094
Total Chromium (Cr)	ug/L	<25	25	3042136	100	5.0	93	5.0	3042136
Dissolved Cobalt (Co)	ug/L	<2.5	2.5	3042009	2.1	0.50	1.7	0.50	3042094
Total Cobalt (Co)	ug/L	5.0	2.5	3042136	58	1.0	2.2	0.50	3042136
Dissolved Copper (Cu)	ug/L	6.2	5.0	3042009	<1.0	1.0	1.4	1.0	3042094
Total Copper (Cu)	ug/L	19	5.0	3042136	94	1.0	19	1.0	3042136
Dissolved Iron (Fe)	ug/L	2700	500	3042009	1300	100	<100	100	3042094
Total Iron (Fe)	ug/L	13000	500	3042136	110000	1000	6500	100	3042136
Dissolved Lead (Pb)	ug/L	<2.5	2.5	3042009	<0.50	0.50	<0.50	0.50	3042094
Total Lead (Pb)	ug/L	22	2.5	3042136	46	0.50	2.5	0.50	3042136
Dissolved Magnesium (Mg)	ug/L	320000	250	3042009	170000	50	96000	50	3042094
Total Magnesium (Mg)	ug/L	200000	250	3042136	260000	50	130000	50	3042136
Dissolved Manganese (Mn)	ug/L	560	10	3042009	220	2.0	63	2.0	3042094

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4879			PP4880		PP4881		
Sampling Date		2012/11/14			2012/11/14		2012/11/14		
COC Number		381156-02-01			381156-02-01		381156-02-01		
	Units	MW-08I	RDL	QC Batch	MW-08S	RDL	MW-08D	RDL	QC Batch
Total Manganese (Mn)	ug/L	700	10	3042136	3600	2.0	190	2.0	3042136
Dissolved Molybdenum (Mo)	ug/L	5.6	2.5	3042009	3.8	0.50	4.8	0.50	3042094
Total Molybdenum (Mo)	ug/L	6.4	2.5	3042136	9.0	0.50	7.7	0.50	3042136
Dissolved Nickel (Ni)	ug/L	<5.0	5.0	3042009	2.1	1.0	9.9	1.0	3042094
Total Nickel (Ni)	ug/L	13	5.0	3042136	120	2.0	23	1.0	3042136
Dissolved Phosphorus (P)	ug/L	<500	500	3042009	<100	100	<100	100	3042094
Total Phosphorus (P)	ug/L	570	500	3042136	3800	100	<100	100	3042136
Dissolved Potassium (K)	ug/L	62000	1000	3042009	15000	200	28000	200	3042094
Total Potassium (K)	ug/L	52000	1000	3042136	28000	200	37000	200	3042136
Dissolved Selenium (Se)	ug/L	<20	20	3042009	<2.0	2.0	<2.0	2.0	3042094
Dissolved Silicon (Si)	ug/L	5000	250	3042009	7700	50	6000	50	3042094
Total Silicon (Si)	ug/L	19000	250	3042136	73000	500	17000	50	3042136
Total Selenium (Se)	ug/L	<10	10	3042136	<2.0	2.0	<2.0	2.0	3042136
Dissolved Silver (Ag)	ug/L	<0.50	0.50	3042009	<0.10	0.10	<0.10	0.10	3042094
Total Silver (Ag)	ug/L	<0.50	0.50	3042136	0.33	0.10	<0.10	0.10	3042136
Dissolved Sodium (Na)	ug/L	2500000	500	3042009	84000	100	220000	100	3042094
Total Sodium (Na)	ug/L	1500000	500	3042136	98000	100	290000	100	3042136
Dissolved Strontium (Sr)	ug/L	26000	5.0	3042009	9400	1.0	16000	1.0	3042094
Total Strontium (Sr)	ug/L	16000	5.0	3042136	12000	1.0	20000	1.0	3042136
Dissolved Thallium (Tl)	ug/L	<0.25	0.25	3042009	<0.050	0.050	<0.050	0.050	3042094
Total Thallium (Tl)	ug/L	<0.25	0.25	3042136	0.42	0.050	<0.050	0.050	3042136
Dissolved Tin (Sn)	ug/L	<5.0	5.0	3042009	<1.0	1.0	<1.0	1.0	3042094
Total Tin (Sn)	ug/L	<5.0	5.0	3042136	<1.0	1.0	1.2	1.0	3042136
Dissolved Titanium (Ti)	ug/L	<25	25	3042009	6.5	5.0	<5.0	5.0	3042094
Total Titanium (Ti)	ug/L	320	25	3042136	820	50	200	5.0	3042136
Dissolved Uranium (U)	ug/L	1.1	0.50	3042009	9.5	0.10	0.76	0.10	3042094
Total Uranium (U)	ug/L	5.7	0.50	3042136	14	0.10	1.3	0.10	3042136
Dissolved Vanadium (V)	ug/L	<5.0	5.0	3042009	0.59	0.50	<0.50	0.50	3042094
Total Vanadium (V)	ug/L	8.3	2.5	3042136	120	0.50	7.0	0.50	3042136
Dissolved Zinc (Zn)	ug/L	<25	25	3042009	<5.0	5.0	20	5.0	3042094
Total Zinc (Zn)	ug/L	61	25	3042136	300	5.0	44	5.0	3042136

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP4871  
**Sample ID** MW5-INT  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042040	N/A	2012/11/21	John Bowman
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037427	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/15	Neil Dassanayake

**Maxxam ID** PP4872  
**Sample ID** MW-05 SHALLOW  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3041530	N/A	2012/11/21	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037427	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/15	Neil Dassanayake

**Maxxam ID** PP4873  
**Sample ID** MW5-DEEP  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung



Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

Dissolved Metals by ICPMS	ICP/MS	3042040	N/A	2012/11/21	John Bowman
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4874  
**Sample ID** MW-03 SHALLOW  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042040	N/A	2012/11/21	John Bowman
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037427	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4875  
**Sample ID** MW3-DEEP  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042009	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP4876  
**Sample ID** DUP-1  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3041530	N/A	2012/11/21	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4877  
**Sample ID** MW-061  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042009	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4878  
**Sample ID** MW5-STRADDLE  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041961	2012/11/20	2012/11/20	Lawrence Cheung

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

Dissolved Metals by ICPMS	ICP/MS	3041530	N/A	2012/11/21	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

Maxxam ID PP4879  
Sample ID MW-08I  
Matrix Water

Collected 2012/11/14  
Shipped  
Received 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042009	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

Maxxam ID PP4880  
Sample ID MW-08S  
Matrix Water

Collected 2012/11/14  
Shipped  
Received 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042094	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP4881  
**Sample ID** MW-08D  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038429	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038431	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042094	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038948	N/A	2012/11/19	Chris Li
pH	PH	3038432	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/15	Neil Dassanayake

**Maxxam ID** PP4881 Dup  
**Sample ID** MW-08D  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038948	N/A	2012/11/19	Chris Li
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

Package 1	4.3°C
Package 2	6.3°C
Package 3	5.0°C

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

#### GENERAL COMMENTS

Sample PP4873-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP4875-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP4878-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP4879-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP4880-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP4881-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

**Results relate only to the items tested.**

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #: ##-####-####  
 P.O. #:  
 Site Location: TANSLEY QUARRY

### Quality Assurance Report

Maxxam Job Number: MB2H9228

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3037427 RAY	QC Standard	Total Suspended Solids	2012/11/15		98	%	85 - 115
	Method Blank	Total Suspended Solids	2012/11/15	<10		mg/L	
	RPD	Total Suspended Solids	2012/11/15	3.4		%	25
3037442 RAY	QC Standard	Total Suspended Solids	2012/11/15		99	%	85 - 115
	Method Blank	Total Suspended Solids	2012/11/15	<10		mg/L	
	RPD	Total Suspended Solids	2012/11/15	NC		%	25
3037629 XQI	Matrix Spike [PP4881-07]	Sulphide	2012/11/16		95	%	80 - 120
	Spiked Blank	Sulphide	2012/11/16		95	%	80 - 120
	Method Blank	Sulphide	2012/11/16	<0.020		mg/L	
	RPD [PP4881-07]	Sulphide	2012/11/16	NC		%	20
3038166 SAU	QC Standard	Alkalinity (Total as CaCO3)	2012/11/16		98	%	85 - 115
	Method Blank	Alkalinity (Total as CaCO3)	2012/11/16	<1.0		mg/L	
	RPD	Alkalinity (Total as CaCO3)	2012/11/16	1.5		%	25
3038171 SAU	Matrix Spike	Fluoride (F-)	2012/11/16		103	%	80 - 120
	Spiked Blank	Fluoride (F-)	2012/11/16		104	%	80 - 120
	Method Blank	Fluoride (F-)	2012/11/16	<0.10		mg/L	
	RPD	Fluoride (F-)	2012/11/16	NC		%	20
3038173 NYS	QC Standard	Turbidity	2012/11/16		99	%	85 - 115
	Method Blank	Turbidity	2012/11/16	0.3, RDL=0.2		NTU	
	RPD	Turbidity	2012/11/15	2.0		%	20
3038220 BIP	Matrix Spike	Orthophosphate (P)	2012/11/16		77 (1)	%	75 - 125
	Spiked Blank	Orthophosphate (P)	2012/11/16		102	%	80 - 120
	Method Blank	Orthophosphate (P)	2012/11/16	<0.010		mg/L	
	RPD	Orthophosphate (P)	2012/11/16	NC		%	25
3038429 SAU	QC Standard	Alkalinity (Total as CaCO3)	2012/11/16		97	%	85 - 115
	Method Blank	Alkalinity (Total as CaCO3)	2012/11/16	<1.0		mg/L	
	RPD	Alkalinity (Total as CaCO3)	2012/11/16	2.0		%	25
3038431 SAU	Matrix Spike	Fluoride (F-)	2012/11/16		104	%	80 - 120
	Spiked Blank	Fluoride (F-)	2012/11/16		103	%	80 - 120
	Method Blank	Fluoride (F-)	2012/11/16	<0.10		mg/L	
	RPD	Fluoride (F-)	2012/11/16	NC		%	20
3038446 C_H	Matrix Spike	Nitrite (N)	2012/11/16		105	%	80 - 120
		Nitrate (N)	2012/11/16		101	%	80 - 120
	Spiked Blank	Nitrite (N)	2012/11/16		102	%	85 - 115
		Nitrate (N)	2012/11/16		98	%	85 - 115
	Method Blank	Nitrite (N)	2012/11/16	<0.010		mg/L	
		Nitrate (N)	2012/11/16	<0.10		mg/L	
	RPD	Nitrite (N)	2012/11/16	NC		%	25
		Nitrate (N)	2012/11/16	0.8		%	25
3038637 BMO	Matrix Spike	Phenols-4AAP	2012/11/19		104	%	80 - 120
	Spiked Blank	Phenols-4AAP	2012/11/19		105	%	85 - 115
	Method Blank	Phenols-4AAP	2012/11/19	<0.0010		mg/L	
	RPD	Phenols-4AAP	2012/11/19	NC		%	25
3038948 C_H	Matrix Spike [PP4881-01]	Nitrite (N)	2012/11/19		96	%	80 - 120
		Nitrate (N)	2012/11/19		95	%	80 - 120
	Spiked Blank	Nitrite (N)	2012/11/19		99	%	85 - 115
		Nitrate (N)	2012/11/19		98	%	85 - 115
	Method Blank	Nitrite (N)	2012/11/19	<0.010		mg/L	
		Nitrate (N)	2012/11/19	<0.10		mg/L	
	RPD [PP4881-01]	Nitrite (N)	2012/11/19	2.5		%	25
		Nitrate (N)	2012/11/19	0.5		%	25
3038993 FD	Matrix Spike	Dissolved Chloride (Cl)	2012/11/19		98	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2012/11/19		98	%	80 - 120

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3038993 FD	Spiked Blank	Dissolved Bromide (Br-)	2012/11/19		98	%	80 - 120	
		Dissolved Sulphate (SO4)	2012/11/19		96	%	80 - 120	
	Method Blank	Dissolved Chloride (Cl)	2012/11/19	<1.0			mg/L	
		Dissolved Bromide (Br-)	2012/11/19	<1.0			mg/L	
		Dissolved Sulphate (SO4)	2012/11/19	1.1, RDL=1.0			mg/L	
3039380 L_A	RPD	Dissolved Chloride (Cl)	2012/11/19	NC		%	20	
	Matrix Spike	Total Ammonia-N	2012/11/18		102	%	80 - 120	
	Spiked Blank	Total Ammonia-N	2012/11/18		101	%	85 - 115	
	Method Blank	Total Ammonia-N	2012/11/18	<0.050			mg/L	
	RPD	Total Ammonia-N	2012/11/18	NC		%	20	
3039405 BMO	Matrix Spike							
	[PP4881-06]	Free Cyanide	2012/11/19		92	%	80 - 120	
	Spiked Blank	Free Cyanide	2012/11/19		94	%	80 - 120	
	Method Blank	Free Cyanide	2012/11/19	<0.0020			mg/L	
3041530 ADA	Matrix Spike	Free Cyanide	2012/11/19	NC		%	20	
		Dissolved Aluminum (Al)	2012/11/20		112	%	80 - 120	
		Dissolved Antimony (Sb)	2012/11/20		107	%	80 - 120	
		Dissolved Arsenic (As)	2012/11/20		103	%	80 - 120	
		Dissolved Barium (Ba)	2012/11/20		95	%	80 - 120	
		Dissolved Beryllium (Be)	2012/11/20		98	%	80 - 120	
		Dissolved Bismuth (Bi)	2012/11/20		98	%	80 - 120	
		Dissolved Boron (B)	2012/11/20		95	%	80 - 120	
		Dissolved Cadmium (Cd)	2012/11/20		102	%	80 - 120	
		Dissolved Calcium (Ca)	2012/11/20		NC	%	80 - 120	
		Dissolved Chromium (Cr)	2012/11/20		110	%	80 - 120	
		Dissolved Cobalt (Co)	2012/11/20		103	%	80 - 120	
		Dissolved Copper (Cu)	2012/11/20		100	%	80 - 120	
		Dissolved Iron (Fe)	2012/11/20		105	%	80 - 120	
		Dissolved Lead (Pb)	2012/11/20		99	%	80 - 120	
		Dissolved Magnesium (Mg)	2012/11/20		NC	%	80 - 120	
		Dissolved Manganese (Mn)	2012/11/20		NC	%	80 - 120	
		Dissolved Molybdenum (Mo)	2012/11/20		108	%	80 - 120	
		Dissolved Nickel (Ni)	2012/11/20		101	%	80 - 120	
		Dissolved Phosphorus (P)	2012/11/20		117	%	80 - 120	
		Dissolved Potassium (K)	2012/11/20		NC	%	80 - 120	
		Dissolved Selenium (Se)	2012/11/20		103	%	80 - 120	
		Dissolved Silicon (Si)	2012/11/20		NC	%	80 - 120	
		Dissolved Silver (Ag)	2012/11/20		98	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/20		NC	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/20		NC	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/20		100	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/20		106	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/20		116	%	80 - 120	
		Dissolved Uranium (U)	2012/11/20		105	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/20		112	%	80 - 120	
		Dissolved Zinc (Zn)	2012/11/20		101	%	80 - 120	
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/20		107	%	80 - 120	
Dissolved Antimony (Sb)		2012/11/20		102	%	80 - 120		
Dissolved Arsenic (As)		2012/11/20		99	%	80 - 120		
Dissolved Barium (Ba)		2012/11/20		93	%	80 - 120		
Dissolved Beryllium (Be)		2012/11/20		96	%	80 - 120		
Dissolved Bismuth (Bi)		2012/11/20		97	%	80 - 120		
Dissolved Boron (B)		2012/11/20		95	%	80 - 120		
Dissolved Cadmium (Cd)		2012/11/20		99	%	80 - 120		
		Dissolved Calcium (Ca)	2012/11/20		107	%	80 - 120	

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3041530 ADA	Spiked Blank	Dissolved Chromium (Cr)	2012/11/20		108	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/20		102	%	80 - 120
		Dissolved Copper (Cu)	2012/11/20		100	%	80 - 120
		Dissolved Iron (Fe)	2012/11/20		108	%	80 - 120
		Dissolved Lead (Pb)	2012/11/20		98	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/20		101	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/20		102	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/20		102	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/20		101	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/20		109	%	80 - 120
		Dissolved Potassium (K)	2012/11/20		106	%	80 - 120
		Dissolved Selenium (Se)	2012/11/20		98	%	80 - 120
		Dissolved Silicon (Si)	2012/11/20		111	%	80 - 120
		Dissolved Silver (Ag)	2012/11/20		96	%	80 - 120
		Dissolved Sodium (Na)	2012/11/20		102	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/20		93	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/20		98	%	80 - 120
		Dissolved Tin (Sn)	2012/11/20		101	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/20		111	%	80 - 120
		Dissolved Uranium (U)	2012/11/20		102	%	80 - 120
		Dissolved Vanadium (V)	2012/11/20		108	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/20		103	%	80 - 120
	Method Blank	Dissolved Aluminum (Al)	2012/11/20	<5.0		ug/L	
		Dissolved Antimony (Sb)	2012/11/20	<0.50		ug/L	
		Dissolved Arsenic (As)	2012/11/20	<1.0		ug/L	
		Dissolved Barium (Ba)	2012/11/20	<2.0		ug/L	
		Dissolved Beryllium (Be)	2012/11/20	<0.50		ug/L	
		Dissolved Bismuth (Bi)	2012/11/20	<1.0		ug/L	
		Dissolved Boron (B)	2012/11/20	<10		ug/L	
		Dissolved Cadmium (Cd)	2012/11/20	<0.10		ug/L	
		Dissolved Calcium (Ca)	2012/11/20	<200		ug/L	
		Dissolved Chromium (Cr)	2012/11/20	<5.0		ug/L	
		Dissolved Cobalt (Co)	2012/11/20	<0.50		ug/L	
		Dissolved Copper (Cu)	2012/11/20	<1.0		ug/L	
		Dissolved Iron (Fe)	2012/11/20	<100		ug/L	
		Dissolved Lead (Pb)	2012/11/20	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/20	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/20	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/20	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/20	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/20	<100		ug/L	
		Dissolved Potassium (K)	2012/11/20	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/20	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/20	51, RDL=50		ug/L	
		Dissolved Silver (Ag)	2012/11/20	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/20	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/20	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/20	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/20	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/20	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/20	<0.10		ug/L	
		Dissolved Vanadium (V)	2012/11/20	<0.50		ug/L	
		Dissolved Zinc (Zn)	2012/11/20	<5.0		ug/L	
	RPD	Dissolved Antimony (Sb)	2012/11/20	NC		%	20
		Dissolved Arsenic (As)	2012/11/20	NC		%	20



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3041530 ADA	RPD	Dissolved Barium (Ba)	2012/11/20	1.9		%	20
		Dissolved Beryllium (Be)	2012/11/20	NC		%	20
		Dissolved Boron (B)	2012/11/20	1.8		%	20
		Dissolved Cadmium (Cd)	2012/11/20	NC		%	20
		Dissolved Chromium (Cr)	2012/11/20	NC		%	20
		Dissolved Cobalt (Co)	2012/11/20	NC		%	20
		Dissolved Copper (Cu)	2012/11/20	NC		%	20
		Dissolved Lead (Pb)	2012/11/20	NC		%	20
		Dissolved Molybdenum (Mo)	2012/11/20	NC		%	20
		Dissolved Nickel (Ni)	2012/11/20	NC		%	20
		Dissolved Selenium (Se)	2012/11/20	NC		%	20
		Dissolved Silver (Ag)	2012/11/20	NC		%	20
		Dissolved Sodium (Na)	2012/11/20	7.3		%	20
		Dissolved Thallium (Tl)	2012/11/20	NC		%	20
		Dissolved Uranium (U)	2012/11/20	1.1		%	20
		Dissolved Vanadium (V)	2012/11/20	NC		%	20
		Dissolved Zinc (Zn)	2012/11/20	NC		%	20
3041932 LCH	Matrix Spike [PP4881-09]	Mercury (Hg)	2012/11/20		106	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/20		102	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/20	<0.00010		mg/L	
	RPD [PP4881-09]	Mercury (Hg)	2012/11/20	NC		%	20
3041961 LCH	Matrix Spike	Mercury (Hg)	2012/11/20		107	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/20		105	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/20	<0.00010		mg/L	
	RPD	Mercury (Hg)	2012/11/20	NC		%	20
3042009 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/20		102	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/20		106	%	80 - 120
		Dissolved Arsenic (As)	2012/11/20		103	%	80 - 120
		Dissolved Barium (Ba)	2012/11/20		100	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/20		101	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/20		93	%	80 - 120
		Dissolved Boron (B)	2012/11/20		NC	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/20		101	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/20		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/20		96	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/20		96	%	80 - 120
		Dissolved Copper (Cu)	2012/11/20		92	%	80 - 120
		Dissolved Iron (Fe)	2012/11/20		99	%	80 - 120
		Dissolved Lead (Pb)	2012/11/20		93	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/20		NC	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/20		95	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/20		103	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/20		95	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/20		108	%	80 - 120
		Dissolved Potassium (K)	2012/11/20		100	%	80 - 120
		Dissolved Selenium (Se)	2012/11/20		100	%	80 - 120
		Dissolved Silicon (Si)	2012/11/20		107	%	80 - 120
		Dissolved Silver (Ag)	2012/11/20		96	%	80 - 120
		Dissolved Sodium (Na)	2012/11/20		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/20		NC	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/20		97	%	80 - 120
		Dissolved Tin (Sn)	2012/11/20		105	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/20		105	%	80 - 120
		Dissolved Uranium (U)	2012/11/20		95	%	80 - 120

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3042009 HRE	Matrix Spike	Dissolved Vanadium (V)	2012/11/20		100	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/20		94	%	80 - 120
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/20		102	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/20		102	%	80 - 120
		Dissolved Arsenic (As)	2012/11/20		99	%	80 - 120
		Dissolved Barium (Ba)	2012/11/20		100	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/20		100	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/20		96	%	80 - 120
		Dissolved Boron (B)	2012/11/20		106	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/20		101	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/20		101	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/20		97	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/20		96	%	80 - 120
		Dissolved Copper (Cu)	2012/11/20		94	%	80 - 120
		Dissolved Iron (Fe)	2012/11/20		99	%	80 - 120
		Dissolved Lead (Pb)	2012/11/20		94	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/20		103	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/20		94	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/20		99	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/20		97	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/20		108	%	80 - 120
		Dissolved Potassium (K)	2012/11/20		102	%	80 - 120
		Dissolved Selenium (Se)	2012/11/20		97	%	80 - 120
		Dissolved Silicon (Si)	2012/11/20		103	%	80 - 120
		Dissolved Silver (Ag)	2012/11/20		97	%	80 - 120
		Dissolved Sodium (Na)	2012/11/20		104	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/20		98	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/20		98	%	80 - 120
		Dissolved Tin (Sn)	2012/11/20		102	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/20		105	%	80 - 120
		Dissolved Uranium (U)	2012/11/20		95	%	80 - 120
		Dissolved Vanadium (V)	2012/11/20		98	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/20		96	%	80 - 120
	Method Blank	Dissolved Aluminum (Al)	2012/11/20	<5.0		ug/L	
		Dissolved Antimony (Sb)	2012/11/20	<0.50		ug/L	
		Dissolved Arsenic (As)	2012/11/20	<1.0		ug/L	
		Dissolved Barium (Ba)	2012/11/20	<2.0		ug/L	
		Dissolved Beryllium (Be)	2012/11/20	<0.50		ug/L	
		Dissolved Bismuth (Bi)	2012/11/20	<1.0		ug/L	
		Dissolved Boron (B)	2012/11/20	<10		ug/L	
		Dissolved Cadmium (Cd)	2012/11/20	<0.10		ug/L	
		Dissolved Calcium (Ca)	2012/11/20	<200		ug/L	
		Dissolved Chromium (Cr)	2012/11/20	<5.0		ug/L	
		Dissolved Cobalt (Co)	2012/11/20	<0.50		ug/L	
		Dissolved Copper (Cu)	2012/11/20	<1.0		ug/L	
		Dissolved Iron (Fe)	2012/11/20	<100		ug/L	
		Dissolved Lead (Pb)	2012/11/20	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/20	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/20	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/20	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/20	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/20	<100		ug/L	
		Dissolved Potassium (K)	2012/11/20	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/20	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/20	<50		ug/L	

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3042009 HRE	Method Blank	Dissolved Silver (Ag)	2012/11/20	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/20	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/20	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/20	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/20	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/20	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/20	<0.10		ug/L	
		Dissolved Vanadium (V)	2012/11/20	<0.50		ug/L	
		Dissolved Zinc (Zn)	2012/11/20	<5.0		ug/L	
	RPD	Dissolved Aluminum (Al)	2012/11/20	NC		%	20
3042040 JBW	Matrix Spike	Dissolved Aluminum (Al)	2012/11/21		103	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		109	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		103	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		100	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		101	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		100	%	80 - 120
		Dissolved Boron (B)	2012/11/21		102	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		104	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/21		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/21		100	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/21		101	%	80 - 120
		Dissolved Copper (Cu)	2012/11/21		99	%	80 - 120
		Dissolved Iron (Fe)	2012/11/21		101	%	80 - 120
		Dissolved Lead (Pb)	2012/11/21		100	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/21		102	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/21		101	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/21		107	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/21		99	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/21		102	%	80 - 120
		Dissolved Potassium (K)	2012/11/21		101	%	80 - 120
		Dissolved Selenium (Se)	2012/11/21		101	%	80 - 120
		Dissolved Silicon (Si)	2012/11/21		103	%	80 - 120
		Dissolved Silver (Ag)	2012/11/21		85	%	80 - 120
		Dissolved Sodium (Na)	2012/11/21		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/21		NC	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/21		101	%	80 - 120
		Dissolved Tin (Sn)	2012/11/21		108	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/21		103	%	80 - 120
		Dissolved Uranium (U)	2012/11/21		102	%	80 - 120
		Dissolved Vanadium (V)	2012/11/21		103	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/21		100	%	80 - 120
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/21		102	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		102	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		97	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		98	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		98	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		98	%	80 - 120
		Dissolved Boron (B)	2012/11/21		98	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		101	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/21		98	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/21		98	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/21		98	%	80 - 120
		Dissolved Copper (Cu)	2012/11/21		96	%	80 - 120
		Dissolved Iron (Fe)	2012/11/21		98	%	80 - 120
		Dissolved Lead (Pb)	2012/11/21		100	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3042040 JBW	Spiked Blank	Dissolved Magnesium (Mg)	2012/11/21		101	%	80 - 120		
		Dissolved Manganese (Mn)	2012/11/21		99	%	80 - 120		
		Dissolved Molybdenum (Mo)	2012/11/21		102	%	80 - 120		
		Dissolved Nickel (Ni)	2012/11/21		97	%	80 - 120		
		Dissolved Phosphorus (P)	2012/11/21		106	%	80 - 120		
		Dissolved Potassium (K)	2012/11/21		99	%	80 - 120		
		Dissolved Selenium (Se)	2012/11/21		98	%	80 - 120		
		Dissolved Silicon (Si)	2012/11/21		101	%	80 - 120		
		Dissolved Silver (Ag)	2012/11/21		101	%	80 - 120		
		Dissolved Sodium (Na)	2012/11/21		102	%	80 - 120		
		Dissolved Strontium (Sr)	2012/11/21		99	%	80 - 120		
		Dissolved Thallium (Tl)	2012/11/21		101	%	80 - 120		
		Dissolved Tin (Sn)	2012/11/21		104	%	80 - 120		
		Dissolved Titanium (Ti)	2012/11/21		99	%	80 - 120		
		Dissolved Uranium (U)	2012/11/21		100	%	80 - 120		
		Dissolved Vanadium (V)	2012/11/21		99	%	80 - 120		
		Dissolved Zinc (Zn)	2012/11/21		98	%	80 - 120		
		Method Blank		Dissolved Aluminum (Al)	2012/11/21	<5.0		ug/L	
				Dissolved Antimony (Sb)	2012/11/21	<0.50		ug/L	
				Dissolved Arsenic (As)	2012/11/21	<1.0		ug/L	
Dissolved Barium (Ba)	2012/11/21			<2.0		ug/L			
Dissolved Beryllium (Be)	2012/11/21			<0.50		ug/L			
Dissolved Bismuth (Bi)	2012/11/21			<1.0		ug/L			
Dissolved Boron (B)	2012/11/21			<10		ug/L			
Dissolved Cadmium (Cd)	2012/11/21			<0.10		ug/L			
Dissolved Calcium (Ca)	2012/11/21			<200		ug/L			
Dissolved Chromium (Cr)	2012/11/21			<5.0		ug/L			
Dissolved Cobalt (Co)	2012/11/21			<0.50		ug/L			
Dissolved Copper (Cu)	2012/11/21			<1.0		ug/L			
Dissolved Iron (Fe)	2012/11/21			<100		ug/L			
Dissolved Lead (Pb)	2012/11/21			<0.50		ug/L			
Dissolved Magnesium (Mg)	2012/11/21			<50		ug/L			
Dissolved Manganese (Mn)	2012/11/21			<2.0		ug/L			
Dissolved Molybdenum (Mo)	2012/11/21			<0.50		ug/L			
Dissolved Nickel (Ni)	2012/11/21			<1.0		ug/L			
Dissolved Phosphorus (P)	2012/11/21			<100		ug/L			
Dissolved Potassium (K)	2012/11/21			<200		ug/L			
Dissolved Selenium (Se)	2012/11/21			<2.0		ug/L			
Dissolved Silicon (Si)	2012/11/21			<50		ug/L			
Dissolved Silver (Ag)	2012/11/21			<0.10		ug/L			
Dissolved Sodium (Na)	2012/11/21			<100		ug/L			
Dissolved Strontium (Sr)	2012/11/21			1.0, RDL=1.0		ug/L			
Dissolved Thallium (Tl)	2012/11/21			<0.050		ug/L			
Dissolved Tin (Sn)	2012/11/21			<1.0		ug/L			
Dissolved Titanium (Ti)	2012/11/21			<5.0		ug/L			
Dissolved Uranium (U)	2012/11/21			<0.10		ug/L			
Dissolved Vanadium (V)	2012/11/21			<0.50		ug/L			
Dissolved Zinc (Zn)	2012/11/21	<5.0		ug/L					
RPD		Dissolved Lead (Pb)	2012/11/21	NC		%	20		
3042094 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/21		99	%	80 - 120		
		Dissolved Antimony (Sb)	2012/11/21		104	%	80 - 120		
		Dissolved Arsenic (As)	2012/11/21		103	%	80 - 120		
		Dissolved Barium (Ba)	2012/11/21		99	%	80 - 120		
		Dissolved Beryllium (Be)	2012/11/21		101	%	80 - 120		
		Dissolved Bismuth (Bi)	2012/11/21		96	%	80 - 120		

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3042094 HRE	Matrix Spike	Dissolved Boron (B)	2012/11/21		101	%	80 - 120		
		Dissolved Cadmium (Cd)	2012/11/21		101	%	80 - 120		
		Dissolved Calcium (Ca)	2012/11/21		NC	%	80 - 120		
		Dissolved Chromium (Cr)	2012/11/21		96	%	80 - 120		
		Dissolved Cobalt (Co)	2012/11/21		98	%	80 - 120		
		Dissolved Copper (Cu)	2012/11/21		95	%	80 - 120		
		Dissolved Iron (Fe)	2012/11/21		100	%	80 - 120		
		Dissolved Lead (Pb)	2012/11/21		96	%	80 - 120		
		Dissolved Magnesium (Mg)	2012/11/21		NC	%	80 - 120		
		Dissolved Manganese (Mn)	2012/11/21		97	%	80 - 120		
		Dissolved Molybdenum (Mo)	2012/11/21		103	%	80 - 120		
		Dissolved Nickel (Ni)	2012/11/21		96	%	80 - 120		
		Dissolved Phosphorus (P)	2012/11/21		102	%	80 - 120		
		Dissolved Potassium (K)	2012/11/21		102	%	80 - 120		
		Dissolved Selenium (Se)	2012/11/21		102	%	80 - 120		
		Dissolved Silicon (Si)	2012/11/21		102	%	80 - 120		
		Dissolved Silver (Ag)	2012/11/21		98	%	80 - 120		
		Dissolved Sodium (Na)	2012/11/21		104	%	80 - 120		
		Dissolved Strontium (Sr)	2012/11/21		100	%	80 - 120		
		Dissolved Thallium (Tl)	2012/11/21		102	%	80 - 120		
		Dissolved Tin (Sn)	2012/11/21		104	%	80 - 120		
		Dissolved Titanium (Ti)	2012/11/21		104	%	80 - 120		
		Dissolved Uranium (U)	2012/11/21		101	%	80 - 120		
		Dissolved Vanadium (V)	2012/11/21		100	%	80 - 120		
		Dissolved Zinc (Zn)	2012/11/21		98	%	80 - 120		
		Spiked Blank	Spiked Blank	Dissolved Aluminum (Al)	2012/11/21		97	%	80 - 120
				Dissolved Antimony (Sb)	2012/11/21		99	%	80 - 120
Dissolved Arsenic (As)	2012/11/21				98	%	80 - 120		
Dissolved Barium (Ba)	2012/11/21				97	%	80 - 120		
Dissolved Beryllium (Be)	2012/11/21				99	%	80 - 120		
Dissolved Bismuth (Bi)	2012/11/21				96	%	80 - 120		
Dissolved Boron (B)	2012/11/21				100	%	80 - 120		
Dissolved Cadmium (Cd)	2012/11/21				99	%	80 - 120		
Dissolved Calcium (Ca)	2012/11/21				98	%	80 - 120		
Dissolved Chromium (Cr)	2012/11/21				96	%	80 - 120		
Dissolved Cobalt (Co)	2012/11/21				96	%	80 - 120		
Dissolved Copper (Cu)	2012/11/21				94	%	80 - 120		
Dissolved Iron (Fe)	2012/11/21				97	%	80 - 120		
Dissolved Lead (Pb)	2012/11/21				96	%	80 - 120		
Dissolved Magnesium (Mg)	2012/11/21				99	%	80 - 120		
Dissolved Manganese (Mn)	2012/11/21				94	%	80 - 120		
Dissolved Molybdenum (Mo)	2012/11/21				99	%	80 - 120		
Dissolved Nickel (Ni)	2012/11/21				94	%	80 - 120		
Dissolved Phosphorus (P)	2012/11/21				100	%	80 - 120		
Dissolved Potassium (K)	2012/11/21				99	%	80 - 120		
Dissolved Selenium (Se)	2012/11/21				97	%	80 - 120		
Dissolved Silicon (Si)	2012/11/21				99	%	80 - 120		
Dissolved Silver (Ag)	2012/11/21				96	%	80 - 120		
Dissolved Sodium (Na)	2012/11/21				101	%	80 - 120		
Dissolved Strontium (Sr)	2012/11/21				95	%	80 - 120		
Dissolved Thallium (Tl)	2012/11/21				101	%	80 - 120		
Dissolved Tin (Sn)	2012/11/21				100	%	80 - 120		
Dissolved Titanium (Ti)	2012/11/21		100	%	80 - 120				
Dissolved Uranium (U)	2012/11/21		101	%	80 - 120				
Dissolved Vanadium (V)	2012/11/21		96	%	80 - 120				

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QA/QC Batch	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits	
Num Init			yyyy/mm/dd					
3042094 HRE	Spiked Blank	Dissolved Zinc (Zn)	2012/11/21		98	%	80 - 120	
	Method Blank	Dissolved Aluminum (Al)	2012/11/21	<5.0		ug/L		
		Dissolved Antimony (Sb)	2012/11/21	<0.50		ug/L		
		Dissolved Arsenic (As)	2012/11/21	<1.0		ug/L		
		Dissolved Barium (Ba)	2012/11/21	<2.0		ug/L		
		Dissolved Beryllium (Be)	2012/11/21	<0.50		ug/L		
		Dissolved Bismuth (Bi)	2012/11/21	<1.0		ug/L		
		Dissolved Boron (B)	2012/11/21	<10		ug/L		
		Dissolved Cadmium (Cd)	2012/11/21	<0.10		ug/L		
		Dissolved Calcium (Ca)	2012/11/21	<200		ug/L		
		Dissolved Chromium (Cr)	2012/11/21	<5.0		ug/L		
		Dissolved Cobalt (Co)	2012/11/21	<0.50		ug/L		
		Dissolved Copper (Cu)	2012/11/21	<1.0		ug/L		
		Dissolved Iron (Fe)	2012/11/21	<100		ug/L		
		Dissolved Lead (Pb)	2012/11/21	<0.50		ug/L		
		Dissolved Magnesium (Mg)	2012/11/21	<50		ug/L		
		Dissolved Manganese (Mn)	2012/11/21	<2.0		ug/L		
		Dissolved Molybdenum (Mo)	2012/11/21	<0.50		ug/L		
		Dissolved Nickel (Ni)	2012/11/21	<1.0		ug/L		
		Dissolved Phosphorus (P)	2012/11/21	<100		ug/L		
		Dissolved Potassium (K)	2012/11/21	<200		ug/L		
		Dissolved Selenium (Se)	2012/11/21	<2.0		ug/L		
		Dissolved Silicon (Si)	2012/11/21	<50		ug/L		
		Dissolved Silver (Ag)	2012/11/21	<0.10		ug/L		
		Dissolved Sodium (Na)	2012/11/21	<100		ug/L		
		Dissolved Strontium (Sr)	2012/11/21	<1.0		ug/L		
		Dissolved Thallium (Tl)	2012/11/21	<0.050		ug/L		
		Dissolved Tin (Sn)	2012/11/21	<1.0		ug/L		
		Dissolved Titanium (Ti)	2012/11/21	<5.0		ug/L		
		Dissolved Uranium (U)	2012/11/21	<0.10		ug/L		
		Dissolved Vanadium (V)	2012/11/21	<0.50		ug/L		
		Dissolved Zinc (Zn)	2012/11/21	<5.0		ug/L		
		RPD	Dissolved Aluminum (Al)	2012/11/21	NC		%	20
			Dissolved Antimony (Sb)	2012/11/21	NC		%	20
	Dissolved Arsenic (As)		2012/11/21	NC		%	20	
	Dissolved Barium (Ba)		2012/11/21	0.9		%	20	
	Dissolved Beryllium (Be)		2012/11/21	NC		%	20	
	Dissolved Bismuth (Bi)		2012/11/21	NC		%	20	
	Dissolved Boron (B)		2012/11/21	NC		%	20	
	Dissolved Cadmium (Cd)		2012/11/21	NC		%	20	
	Dissolved Calcium (Ca)		2012/11/21	0.4		%	20	
	Dissolved Chromium (Cr)		2012/11/21	NC		%	20	
	Dissolved Cobalt (Co)		2012/11/21	NC		%	20	
	Dissolved Copper (Cu)		2012/11/21	NC		%	20	
	Dissolved Iron (Fe)		2012/11/21	NC		%	20	
	Dissolved Lead (Pb)		2012/11/21	NC		%	20	
	Dissolved Magnesium (Mg)	2012/11/21	3.6		%	20		
Dissolved Manganese (Mn)	2012/11/21	NC		%	20			
Dissolved Molybdenum (Mo)	2012/11/21	NC		%	20			
Dissolved Nickel (Ni)	2012/11/21	NC		%	20			
Dissolved Phosphorus (P)	2012/11/21	NC		%	20			
Dissolved Potassium (K)	2012/11/21	NC		%	20			
Dissolved Selenium (Se)	2012/11/21	NC		%	20			
Dissolved Silicon (Si)	2012/11/21	2.8		%	20			
Dissolved Silver (Ag)	2012/11/21	NC		%	20			

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3042094 HRE	RPD	Dissolved Sodium (Na)	2012/11/21	0.7		%	20
		Dissolved Strontium (Sr)	2012/11/21	0.07		%	20
		Dissolved Thallium (Tl)	2012/11/21	NC		%	20
		Dissolved Tin (Sn)	2012/11/21	NC		%	20
		Dissolved Titanium (Ti)	2012/11/21	NC		%	20
		Dissolved Uranium (U)	2012/11/21	0.6		%	20
		Dissolved Vanadium (V)	2012/11/21	NC		%	20
		Dissolved Zinc (Zn)	2012/11/21	NC		%	20
3042136 HRE	Matrix Spike	Total Aluminum (Al)	2012/11/20		107	%	80 - 120
		Total Antimony (Sb)	2012/11/20		109	%	80 - 120
		Total Arsenic (As)	2012/11/20		104	%	80 - 120
		Total Barium (Ba)	2012/11/20		106	%	80 - 120
		Total Beryllium (Be)	2012/11/20		105	%	80 - 120
		Total Bismuth (Bi)	2012/11/20		100	%	80 - 120
		Total Boron (B)	2012/11/20		112	%	80 - 120
		Total Cadmium (Cd)	2012/11/20		105	%	80 - 120
		Total Calcium (Ca)	2012/11/20		NC	%	80 - 120
		Total Chromium (Cr)	2012/11/20		99	%	80 - 120
		Total Cobalt (Co)	2012/11/20		101	%	80 - 120
		Total Copper (Cu)	2012/11/20		99	%	80 - 120
		Total Iron (Fe)	2012/11/20		103	%	80 - 120
		Total Lead (Pb)	2012/11/20		98	%	80 - 120
		Total Magnesium (Mg)	2012/11/20		NC	%	80 - 120
		Total Manganese (Mn)	2012/11/20		98	%	80 - 120
		Total Molybdenum (Mo)	2012/11/20		107	%	80 - 120
		Total Nickel (Ni)	2012/11/20		99	%	80 - 120
		Total Phosphorus (P)	2012/11/20		107	%	80 - 120
		Total Potassium (K)	2012/11/20		NC	%	80 - 120
		Total Silicon (Si)	2012/11/20		106	%	80 - 120
		Total Selenium (Se)	2012/11/20		100	%	80 - 120
		Total Silver (Ag)	2012/11/20		99	%	80 - 120
		Total Sodium (Na)	2012/11/20		NC	%	80 - 120
		Total Strontium (Sr)	2012/11/20		104	%	80 - 120
		Total Thallium (Tl)	2012/11/20		103	%	80 - 120
		Total Tin (Sn)	2012/11/20		107	%	80 - 120
		Total Titanium (Ti)	2012/11/20		108	%	80 - 120
		Total Uranium (U)	2012/11/20		99	%	80 - 120
		Total Vanadium (V)	2012/11/20		102	%	80 - 120
		Total Zinc (Zn)	2012/11/20		99	%	80 - 120
	Spiked Blank	Total Aluminum (Al)	2012/11/20		107	%	80 - 120
		Total Antimony (Sb)	2012/11/20		108	%	80 - 120
		Total Arsenic (As)	2012/11/20		104	%	80 - 120
		Total Barium (Ba)	2012/11/20		106	%	80 - 120
		Total Beryllium (Be)	2012/11/20		104	%	80 - 120
		Total Bismuth (Bi)	2012/11/20		100	%	80 - 120
		Total Boron (B)	2012/11/20		110	%	80 - 120
		Total Cadmium (Cd)	2012/11/20		105	%	80 - 120
		Total Calcium (Ca)	2012/11/20		106	%	80 - 120
		Total Chromium (Cr)	2012/11/20		100	%	80 - 120
		Total Cobalt (Co)	2012/11/20		101	%	80 - 120
		Total Copper (Cu)	2012/11/20		100	%	80 - 120
		Total Iron (Fe)	2012/11/20		104	%	80 - 120
		Total Lead (Pb)	2012/11/20		99	%	80 - 120
		Total Magnesium (Mg)	2012/11/20		111	%	80 - 120
		Total Manganese (Mn)	2012/11/20		98	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3042136 HRE	Spiked Blank	Total Molybdenum (Mo)	2012/11/20		106	%	80 - 120	
		Total Nickel (Ni)	2012/11/20		100	%	80 - 120	
		Total Phosphorus (P)	2012/11/20		110	%	80 - 120	
		Total Potassium (K)	2012/11/20		106	%	80 - 120	
		Total Silicon (Si)	2012/11/20		108	%	80 - 120	
		Total Selenium (Se)	2012/11/20		102	%	80 - 120	
		Total Silver (Ag)	2012/11/20		99	%	80 - 120	
		Total Sodium (Na)	2012/11/20		109	%	80 - 120	
		Total Strontium (Sr)	2012/11/20		104	%	80 - 120	
		Total Thallium (Tl)	2012/11/20		104	%	80 - 120	
		Total Tin (Sn)	2012/11/20		107	%	80 - 120	
		Total Titanium (Ti)	2012/11/20		109	%	80 - 120	
		Total Uranium (U)	2012/11/20		99	%	80 - 120	
		Total Vanadium (V)	2012/11/20		103	%	80 - 120	
		Total Zinc (Zn)	2012/11/20		100	%	80 - 120	
	Method Blank	Total Aluminum (Al)	2012/11/20	<5.0			ug/L	
		Total Antimony (Sb)	2012/11/20	<0.50			ug/L	
		Total Arsenic (As)	2012/11/20	<1.0			ug/L	
		Total Barium (Ba)	2012/11/20	<2.0			ug/L	
		Total Beryllium (Be)	2012/11/20	<0.50			ug/L	
		Total Bismuth (Bi)	2012/11/20	<1.0			ug/L	
		Total Boron (B)	2012/11/20	<10			ug/L	
		Total Cadmium (Cd)	2012/11/20	<0.10			ug/L	
		Total Calcium (Ca)	2012/11/20	<200			ug/L	
		Total Chromium (Cr)	2012/11/20	<5.0			ug/L	
		Total Cobalt (Co)	2012/11/20	<0.50			ug/L	
		Total Copper (Cu)	2012/11/20	<1.0			ug/L	
		Total Iron (Fe)	2012/11/20	<100			ug/L	
		Total Lead (Pb)	2012/11/20	<0.50			ug/L	
		Total Magnesium (Mg)	2012/11/20	<50			ug/L	
		Total Manganese (Mn)	2012/11/20	<2.0			ug/L	
		Total Molybdenum (Mo)	2012/11/20	<0.50			ug/L	
		Total Nickel (Ni)	2012/11/20	<1.0			ug/L	
		Total Phosphorus (P)	2012/11/20	<100			ug/L	
		Total Potassium (K)	2012/11/20	<200			ug/L	
		Total Silicon (Si)	2012/11/20	<50			ug/L	
		Total Selenium (Se)	2012/11/20	<2.0			ug/L	
		Total Silver (Ag)	2012/11/20	<0.10			ug/L	
		Total Sodium (Na)	2012/11/20	130, RDL=100			ug/L	
		Total Strontium (Sr)	2012/11/20	<1.0			ug/L	
Total Thallium (Tl)		2012/11/20	<0.050			ug/L		
Total Tin (Sn)		2012/11/20	<1.0			ug/L		
Total Titanium (Ti)		2012/11/20	<5.0			ug/L		
Total Uranium (U)		2012/11/20	<0.10			ug/L		
Total Vanadium (V)		2012/11/20	<0.50			ug/L		
Total Zinc (Zn)		2012/11/20	<5.0			ug/L		
RPD		Total Barium (Ba)	2012/11/20	4.8			%	20
		Total Boron (B)	2012/11/20	4.4			%	20
		Total Manganese (Mn)	2012/11/20	2.8			%	20
		Total Sodium (Na)	2012/11/20	3.5			%	20
	Total Zinc (Zn)	2012/11/20	NC			%	20	
3042540 VRO	Matrix Spike	Total Phosphorus	2012/11/21		99	%	80 - 120	
	QC Standard	Total Phosphorus	2012/11/21		106	%	85 - 115	
	Spiked Blank	Total Phosphorus	2012/11/21		103	%	85 - 115	
	Method Blank	Total Phosphorus	2012/11/21	<0.020		mg/L		



Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #: ##-####-####  
 P.O. #:  
 Site Location: TANSLEY QUARRY

### Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9228

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3042540 VRO	RPD	Total Phosphorus	2012/11/21	NC		%	20
3043123 LHA	Matrix Spike	Free Cyanide	2012/11/21		95	%	80 - 120
	Spiked Blank	Free Cyanide	2012/11/21		102	%	80 - 120
	Method Blank	Free Cyanide	2012/11/21	<0.0020		mg/L	
	RPD	Free Cyanide	2012/11/21	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

( 1 ) The recoveries for (cis & trans-1,3-dichloropropene and/or bromomethane) in the matrix spike were below the lower control limits. This may represent a low bias in some results for these specific analytes. It was noted that the matrix spike was preserved with sodium thiosulphate. Sodium thiosulphate is known to degrade these compounds.

**Validation Signature Page**

**Maxxam Job #: B2H9228**

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



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Brad Newman, Scientific Specialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: ##-####-####  
 Site#: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115602, 381156-02-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/22

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2H9228**

Received: 2012/11/14, 18:30

Sample Matrix: Water  
 # Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	11	N/A	2012/11/16	CAM SOP-00448	SM 2320B
Anions	11	N/A	2012/11/19	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	9	N/A	2012/11/19	CAM SOP-00457	Ontario MOE CN-E3015
Free (WAD) Cyanide	2	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	11	2012/11/15	2012/11/16	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	3	N/A	2012/11/20	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/21	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	3	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	11	2012/11/20	2012/11/20	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	3	N/A	2012/11/20	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	8	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	11	N/A	2012/11/20	CAM SOP-00447	EPA 6020
Total Ammonia-N	11	N/A	2012/11/18	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	10	N/A	2012/11/16	CAM SOP-00440	SM 4500 NO3/NO2B
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/19	CAM SOP-00440	SM 4500 NO3/NO2B
pH	11	N/A	2012/11/16	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	11	N/A	2012/11/19	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	11	N/A	2012/11/16	CAM SOP-00461	EPA 365.1
Sulphide	11	N/A	2012/11/16	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	11	2012/11/20	2012/11/21	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	11	N/A	2012/11/15	CAM SOP-00428	SM 2540D
Turbidity	3	N/A	2012/11/15	CAM SOP-00417	APHA 2130B
Turbidity	8	N/A	2012/11/16	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

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Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP4871			PP4872			PP4873			PP4874		
Sampling Date		2012/11/14			2012/11/14			2012/11/14			2012/11/14		
	Units	MW5-INT	RDL	QC Batch	MW-05 SHALLOW	RDL	QC Batch	MW5-DEEP	RDL	QC Batch	MW-03 SHALLOW	RDL	QC Batch
<b>Calculated Parameters</b>													
Hardness (CaCO <sub>3</sub> )	mg/L	320	1.0	3035768	430	1.0	3035768	34000	1.0	3035768	880	1.0	3035768
<b>Inorganics</b>													
Total Ammonia-N	mg/L	1.6	0.050	3039380	0.096	0.050	3039380	38	0.50	3039380	1.1	0.050	3039380
Fluoride (F <sup>-</sup> )	mg/L	0.42	0.10	3038171	0.11	0.10	3038171	<0.10	0.10	3038171	0.19	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220	<0.010	0.010	3038220
pH	pH	7.73		3038172	7.71		3038172	6.11		3038172	7.58		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	3038637	<0.0010	0.0010	3038637	0.0094	0.0010	3038637	<0.0010	0.0010	3038637
Total Phosphorus	mg/L	0.47	0.10	3042540	3.7	0.10	3042540	0.42	0.10	3042540	2.8	0.10	3042540
Total Suspended Solids	mg/L	600	20	3037427	5700	50	3037427	1400	20	3037442	1100	50	3037427
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	0.020	3037629	<0.020	0.020	3037629	<0.020	0.020	3037629
Turbidity	NTU	640	1	3038173	1600	2	3038173	470	1	3038173	590	1	3038173
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	290	1.0	3038166	300	1.0	3038166	51	1.0	3038166	170	1.0	3038166
Nitrite (N)	mg/L	0.13	0.010	3038446	<0.010	0.010	3038446	<0.10	0.10	3038446	0.020	0.010	3038446
Dissolved Chloride (Cl)	mg/L	67	1.0	3038993	30	1.0	3038993	59000	500	3038993	70	1.0	3038993
Nitrate (N)	mg/L	0.26	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446
Nitrate + Nitrite	mg/L	0.40	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446	<0.10	0.10	3038446
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	1.0	3038993	<1.0	1.0	3038993	850	100	3038993	1.2	1.0	3038993
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	120	1.0	3038993	95	1.0	3038993	1200	100	3038993	900	5.0	3038993

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP4875			PP4876	PP4877		PP4878		
Sampling Date		2012/11/14			2012/11/14	2012/11/14		2012/11/14		
	Units	MW3-DEEP	RDL	QC Batch	DUP-1	MW-06I	RDL	MW5-STRADDLE	RDL	QC Batch
<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	5500	1.0	3035768	380	370	1.0	280	1.0	3036822
<b>Inorganics</b>										
Total Ammonia-N	mg/L	10	0.50	3039380	0.27	0.32	0.050	0.76	0.050	3039380
Fluoride (F <sup>-</sup> )	mg/L	0.25	0.10	3038171	0.14	0.14	0.10	0.28	0.10	3038171
Free Cyanide	mg/L	<0.0020	0.0020	3039405	<0.0020	<0.0020	0.0020	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	3038220	<0.010	<0.010	0.010	<0.010	0.010	3038220
pH	pH	6.96		3038172	7.87	7.87		7.90		3038172
Phenols-4AAP	mg/L	<0.0010	0.0010	3038637	<0.0010	<0.0010	0.0010	<0.0010	0.0010	3038637
Total Phosphorus	mg/L	0.13	0.10	3042540	0.65	0.89	0.10	10	0.10	3042540
Total Suspended Solids	mg/L	450	20	3037442	1300	1100	20	12000	200	3037442
Sulphide	mg/L	<0.020	0.020	3037629	<0.020	<0.020	0.020	<0.020	0.020	3037629
Turbidity	NTU	250	0.4	3038173	1200	1100	2	3500	4	3038173
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	62	1.0	3038166	320	330	1.0	290	1.0	3038166
Nitrite (N)	mg/L	<0.010	0.010	3038446	0.014	0.014	0.010	0.022	0.010	3038446
Dissolved Chloride (Cl)	mg/L	8200	100	3038993	9.2	9.2	1.0	6.7	1.0	3038993
Nitrate (N)	mg/L	<0.10	0.10	3038446	<0.10	<0.10	0.10	0.27	0.10	3038446
Nitrate + Nitrite	mg/L	<0.10	0.10	3038446	<0.10	<0.10	0.10	0.29	0.10	3038446
Dissolved Bromide (Br <sup>-</sup> )	mg/L	120	100	3038993	<1.0	<1.0	1.0	<1.0	1.0	3038993
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1500	100	3038993	76	73	1.0	41	1.0	3038993

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP4879		PP4880			PP4881	PP4881		
Sampling Date		2012/11/14		2012/11/14			2012/11/14	2012/11/14		
	Units	MW-08I	RDL	MW-08S	RDL	QC Batch	MW-08D	MW-08D Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>										
Hardness (CaCO3)	mg/L	4100	1.0	980	1.0	3036822	660		1.0	3036822
<b>Inorganics</b>										
Total Ammonia-N	mg/L	5.8	0.50	1.3	0.050	3039380	0.10		0.050	3039380
Fluoride (F-)	mg/L	0.42	0.10	0.24	0.10	3038171	0.28		0.10	3038431
Free Cyanide	mg/L	<0.0020	0.0020	<0.0020	0.0020	3039405	<0.0020	<0.0020	0.0020	3039405
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	3038220	<0.010		0.010	3038220
pH	pH	7.59		7.81		3038172	7.89			3038432
Phenols-4AAP	mg/L	<0.0010	0.0010	<0.0010	0.0010	3038637	<0.0010		0.0010	3038637
Total Phosphorus	mg/L	0.60	0.10	7.7	0.10	3042540	0.035		0.020	3042540
Total Suspended Solids	mg/L	4000	100	5200	100	3037442	27		10	3037442
Sulphide	mg/L	<0.020	0.020	0.48	0.020	3037629	<0.020	<0.020	0.020	3037629
Turbidity	NTU	1000	2	2500	4	3038173	29		0.2	3038173
Alkalinity (Total as CaCO3)	mg/L	150	1.0	580	1.0	3038166	440		1.0	3038429
Nitrite (N)	mg/L	0.038	0.010	<0.010	0.010	3038446	0.066	0.064	0.010	3038948
Dissolved Chloride (Cl)	mg/L	4100	50	16	5.0	3038993	220		5.0	3038993
Nitrate (N)	mg/L	<0.10	0.10	<0.10	0.10	3038446	1.6	1.6	0.10	3038948
Nitrate + Nitrite	mg/L	0.13	0.10	<0.10	0.10	3038446	1.7	1.7	0.10	3038948
Dissolved Bromide (Br-)	mg/L	60	50	<5.0	5.0	3038993	<5.0		5.0	3038993
Dissolved Sulphate (SO4)	mg/L	1000	50	560	5.0	3038993	430		5.0	3038993

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4871			PP4872			PP4873		PP4874		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		2012/11/14		
	Units	MW5-INT	RDL	QC Batch	MW-05 SHALLOW	RDL	QC Batch	MW5-DEEP	RDL	MW-03 SHALLOW	RDL	QC Batch
<b>Metals</b>												
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	0.00010	3041932	<0.00010	0.00010	<0.00010	0.00010	3041932
Dissolved Aluminum (Al)	ug/L	32	5.0	3042040	94	5.0	3041530	<250	250	58	5.0	3042040
Total Aluminum (Al)	ug/L	5600	5.0	3042136	43000	50	3042136	8100	250	10000	5.0	3042136
Dissolved Antimony (Sb)	ug/L	1.5	0.50	3042040	<0.50	0.50	3041530	39	25	0.68	0.50	3042040
Total Antimony (Sb)	ug/L	<0.50	0.50	3042136	<0.50	0.50	3042136	<25	25	<0.50	0.50	3042136
Dissolved Arsenic (As)	ug/L	1.1	1.0	3042040	<1.0	1.0	3041530	<100	100	3.9	1.0	3042040
Total Arsenic (As)	ug/L	300	1.0	3042136	27	1.0	3042136	<100	100	9.2	1.0	3042136
Dissolved Barium (Ba)	ug/L	20	2.0	3042040	61	2.0	3041530	140	100	9.1	2.0	3042040
Total Barium (Ba)	ug/L	190	2.0	3042136	950	2.0	3042136	180	100	60	2.0	3042136
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3042040	<0.50	0.50	3041530	<25	25	<0.50	0.50	3042040
Total Beryllium (Be)	ug/L	0.64	0.50	3042136	2.3	0.50	3042136	<25	25	<0.50	0.50	3042136
Dissolved Bismuth (Bi)	ug/L	1.0	1.0	3042040	<1.0	1.0	3041530	57	50	<1.0	1.0	3042040
Total Bismuth (Bi)	ug/L	<1.0	1.0	3042136	<1.0	1.0	3042136	<50	50	<1.0	1.0	3042136
Dissolved Boron (B)	ug/L	2100	10	3042040	13	10	3041530	5300	500	1100	10	3042040
Total Boron (B)	ug/L	2400	10	3042136	64	10	3042136	5400	500	1300	10	3042136
Dissolved Cadmium (Cd)	ug/L	0.12	0.10	3042040	<0.10	0.10	3041530	<5.0	5.0	<0.10	0.10	3042040
Total Cadmium (Cd)	ug/L	0.66	0.10	3042136	1.1	0.10	3042136	7.2	5.0	0.25	0.10	3042136
Dissolved Calcium (Ca)	ug/L	79000	1000	3042040	120000	200	3041530	9900000	10000	150000	1000	3042040
Total Calcium (Ca)	ug/L	110000	1000	3042136	600000	2000	3042136	11000000	10000	250000	1000	3042136
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3042040	<5.0	5.0	3041530	<250	250	<5.0	5.0	3042040
Total Chromium (Cr)	ug/L	13	5.0	3042136	95	5.0	3042136	<250	250	18	5.0	3042136
Dissolved Cobalt (Co)	ug/L	2.4	0.50	3042040	2.2	0.50	3041530	<25	25	2.3	0.50	3042040
Total Cobalt (Co)	ug/L	3.6	0.50	3042136	52	1.0	3042136	<25	25	6.9	0.50	3042136
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3042040	1.6	1.0	3041530	<50	50	<1.0	1.0	3042040
Total Copper (Cu)	ug/L	32	1.0	3042136	230	1.0	3042136	81	50	21	1.0	3042136
Dissolved Iron (Fe)	ug/L	<100	100	3042040	120	100	3041530	14000	5000	380	100	3042040
Total Iron (Fe)	ug/L	100000	100	3042136	93000	100	3042136	40000	5000	15000	100	3042136
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3042040	<0.50	0.50	3041530	<25	25	<0.50	0.50	3042040
Total Lead (Pb)	ug/L	9.7	0.50	3042136	65	0.50	3042136	<25	25	6.3	0.50	3042136
Dissolved Magnesium (Mg)	ug/L	30000	50	3042040	33000	50	3041530	2400000	2500	130000	50	3042040
Total Magnesium (Mg)	ug/L	36000	50	3042136	84000	50	3042136	2600000	2500	150000	50	3042136
Dissolved Manganese (Mn)	ug/L	33	2.0	3042040	9.3	2.0	3041530	5300	100	120	2.0	3042040
Total Manganese (Mn)	ug/L	270	2.0	3042136	9600	2.0	3042136	5200	100	790	2.0	3042136
Dissolved Molybdenum (Mo)	ug/L	3.9	0.50	3042040	<0.50	0.50	3041530	<25	25	6.3	0.50	3042040

 RDL = Reportable Detection Limit  
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Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4871			PP4872			PP4873		PP4874		
Sampling Date		2012/11/14			2012/11/14			2012/11/14		2012/11/14		
	Units	MW5-INT	RDL	QC Batch	MW-05 SHALLOW	RDL	QC Batch	MW5-DEEP	RDL	MW-03 SHALLOW	RDL	QC Batch
Total Molybdenum (Mo)	ug/L	6.3	0.50	3042136	5.3	0.50	3042136	<25	25	6.6	0.50	3042136
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	3042040	<1.0	1.0	3041530	<50	50	<1.0	1.0	3042040
Total Nickel (Ni)	ug/L	9.3	1.0	3042136	92	2.0	3042136	54	50	15	1.0	3042136
Dissolved Phosphorus (P)	ug/L	<100	100	3042040	<100	100	3041530	<5000	5000	<100	100	3042040
Total Phosphorus (P)	ug/L	460	100	3042136	3700	100	3042136	<5000	5000	640	100	3042136
Dissolved Potassium (K)	ug/L	17000	200	3042040	730	200	3041530	300000	10000	9000	200	3042040
Total Potassium (K)	ug/L	18000	200	3042136	10000	200	3042136	330000	10000	14000	200	3042136
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3042040	<2.0	2.0	3041530	<200	200	<2.0	2.0	3042040
Dissolved Silicon (Si)	ug/L	6000	50	3042040	5300	50	3041530	2900	2500	5900	50	3042040
Total Silicon (Si)	ug/L	25000	50	3042136	60000	500	3042136	14000	2500	25000	50	3042136
Total Selenium (Se)	ug/L	<2.0	2.0	3042136	<2.0	2.0	3042136	<100	100	<2.0	2.0	3042136
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3042040	<0.10	0.10	3041530	9.5	5.0	<0.10	0.10	3042040
Total Silver (Ag)	ug/L	<0.10	0.10	3042136	0.35	0.10	3042136	5.8	5.0	<0.10	0.10	3042136
Dissolved Sodium (Na)	ug/L	74000	100	3042040	6400	100	3041530	2000000	5000	120000	100	3042040
Total Sodium (Na)	ug/L	75000	100	3042136	8500	100	3042136	21000000	5000	140000	100	3042136
Dissolved Strontium (Sr)	ug/L	13000	1.0	3042040	190	1.0	3041530	210000	50	11000	1.0	3042040
Total Strontium (Sr)	ug/L	14000	1.0	3042136	960	1.0	3042136	220000	50	12000	1.0	3042136
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3042040	<0.050	0.050	3041530	<2.5	2.5	<0.050	0.050	3042040
Total Thallium (Tl)	ug/L	<0.050	0.050	3042136	0.45	0.050	3042136	<2.5	2.5	<0.050	0.050	3042136
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3042040	<1.0	1.0	3041530	<50	50	<1.0	1.0	3042040
Total Tin (Sn)	ug/L	1.7	1.0	3042136	<1.0	1.0	3042136	<50	50	<1.0	1.0	3042136
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3042040	<5.0	5.0	3041530	<250	250	<5.0	5.0	3042040
Total Titanium (Ti)	ug/L	170	5.0	3042136	830	50	3042136	910	250	330	5.0	3042136
Dissolved Uranium (U)	ug/L	0.47	0.10	3042040	1.8	0.10	3041530	8.9	5.0	0.49	0.10	3042040
Total Uranium (U)	ug/L	1.7	0.10	3042136	4.6	0.10	3042136	<5.0	5.0	0.87	0.10	3042136
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3042040	0.65	0.50	3041530	<250	250	<0.50	0.50	3042040
Total Vanadium (V)	ug/L	13	0.50	3042136	81	0.50	3042136	<50	50	19	0.50	3042136
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	3042040	<5.0	5.0	3041530	<250	250	13	5.0	3042040
Total Zinc (Zn)	ug/L	33	5.0	3042136	250	5.0	3042136	<250	250	59	5.0	3042136

 RDL = Reportable Detection Limit  
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Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4875			PP4876			PP4877			PP4878		
Sampling Date		2012/11/14			2012/11/14			2012/11/14			2012/11/14		
	Units	MW3-DEEP	RDL	QC Batch	DUP-1	QC Batch	MW-06I	RDL	QC Batch	MW5-STRADDLE	RDL	QC Batch	
<b>Metals</b>													
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	3041932	<0.00010	0.00010	3041932	<0.00010	0.00010	3041961	
Dissolved Aluminum (Al)	ug/L	57	50	3042009	25	3041530	35	5.0	3042009	170	5.0	3041530	
Total Aluminum (Al)	ug/L	9500	50	3042136	22000	3042136	19000	5.0	3042136	100000	25	3042136	
Dissolved Antimony (Sb)	ug/L	<5.0	5.0	3042009	<0.50	3041530	<0.50	0.50	3042009	<0.50	0.50	3041530	
Total Antimony (Sb)	ug/L	<5.0	5.0	3042136	<0.50	3042136	<0.50	0.50	3042136	<2.5	2.5	3042136	
Dissolved Arsenic (As)	ug/L	<10	10	3042009	6.6	3041530	6.0	1.0	3042009	11	1.0	3041530	
Total Arsenic (As)	ug/L	<10	10	3042136	16	3042136	17	1.0	3042136	110	5.0	3042136	
Dissolved Barium (Ba)	ug/L	23	20	3042009	55	3041530	54	2.0	3042009	61	2.0	3041530	
Total Barium (Ba)	ug/L	120	20	3042136	310	3042136	310	2.0	3042136	700	10	3042136	
Dissolved Beryllium (Be)	ug/L	<5.0	5.0	3042009	<0.50	3041530	<0.50	0.50	3042009	<0.50	0.50	3041530	
Total Beryllium (Be)	ug/L	<5.0	5.0	3042136	1.1	3042136	0.96	0.50	3042136	4.6	2.5	3042136	
Dissolved Bismuth (Bi)	ug/L	<10	10	3042009	<1.0	3041530	<1.0	1.0	3042009	<1.0	1.0	3041530	
Total Bismuth (Bi)	ug/L	<10	10	3042136	<1.0	3042136	<1.0	1.0	3042136	<5.0	5.0	3042136	
Dissolved Boron (B)	ug/L	4300	100	3042009	110	3041530	110	10	3042009	1200	10	3041530	
Total Boron (B)	ug/L	5300	100	3042136	160	3042136	160	10	3042136	1300	50	3042136	
Dissolved Cadmium (Cd)	ug/L	<1.0	1.0	3042009	<0.10	3041530	<0.10	0.10	3042009	<0.10	0.10	3041530	
Total Cadmium (Cd)	ug/L	1.8	1.0	3042136	0.71	3042136	0.68	0.10	3042136	2.7	0.50	3042136	
Dissolved Calcium (Ca)	ug/L	1400000	2000	3042009	86000	3041530	82000	200	3042009	61000	400	3041530	
Total Calcium (Ca)	ug/L	1700000	2000	3042136	200000	3042136	200000	200	3042136	2000000	1000	3042136	
Dissolved Chromium (Cr)	ug/L	<50	50	3042009	<5.0	3041530	<5.0	5.0	3042009	<5.0	5.0	3041530	
Total Chromium (Cr)	ug/L	<50	50	3042136	31	3042136	30	5.0	3042136	160	25	3042136	
Dissolved Cobalt (Co)	ug/L	<5.0	5.0	3042009	1.4	3041530	0.96	0.50	3042009	2.7	0.50	3041530	
Total Cobalt (Co)	ug/L	<5.0	5.0	3042136	16	3042136	15	0.50	3042136	100	5.0	3042136	
Dissolved Copper (Cu)	ug/L	<10	10	3042009	<1.0	3041530	<1.0	1.0	3042009	1.9	1.0	3041530	
Total Copper (Cu)	ug/L	19	10	3042136	37	3042136	37	1.0	3042136	1000	5.0	3042136	
Dissolved Iron (Fe)	ug/L	4500	1000	3042009	470	3041530	540	100	3042009	500	100	3041530	
Total Iron (Fe)	ug/L	15000	1000	3042136	31000	3042136	29000	100	3042136	230000	500	3042136	
Dissolved Lead (Pb)	ug/L	<5.0	5.0	3042009	<0.50	3041530	<0.50	0.50	3042009	<0.50	0.50	3041530	
Total Lead (Pb)	ug/L	<5.0	5.0	3042136	10	3042136	10	0.50	3042136	150	2.5	3042136	
Dissolved Magnesium (Mg)	ug/L	470000	500	3042009	41000	3041530	41000	50	3042009	32000	50	3041530	
Total Magnesium (Mg)	ug/L	560000	500	3042136	60000	3042136	60000	50	3042136	210000	250	3042136	
Dissolved Manganese (Mn)	ug/L	600	20	3042009	39	3041530	36	2.0	3042009	38	2.0	3041530	
Total Manganese (Mn)	ug/L	930	20	3042136	1100	3042136	1100	2.0	3042136	14000	10	3042136	
Dissolved Molybdenum (Mo)	ug/L	<5.0	5.0	3042009	1.8	3041530	1.8	0.50	3042009	4.7	0.50	3041530	
Total Molybdenum (Mo)	ug/L	7.4	5.0	3042136	2.6	3042136	2.7	0.50	3042136	4.9	2.5	3042136	

 RDL = Reportable Detection Limit  
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Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4875			PP4876			PP4877			PP4878		
Sampling Date		2012/11/14			2012/11/14			2012/11/14			2012/11/14		
	Units	MW3-DEEP	RDL	QC Batch	DUP-1	QC Batch	MW-06I	RDL	QC Batch	MW5-STRADDLE	RDL	QC Batch	
Dissolved Nickel (Ni)	ug/L	<10	10	3042009	<1.0	3041530	<1.0	1.0	3042009	<1.0	1.0	3041530	
Total Nickel (Ni)	ug/L	12	10	3042136	34	3042136	34	1.0	3042136	200	10	3042136	
Dissolved Phosphorus (P)	ug/L	<1000	1000	3042009	<100	3041530	<100	100	3042009	<100	100	3041530	
Total Phosphorus (P)	ug/L	<1000	1000	3042136	990	3042136	1000	100	3042136	14000	500	3042136	
Dissolved Potassium (K)	ug/L	85000	2000	3042009	4100	3041530	3900	200	3042009	6700	200	3041530	
Total Potassium (K)	ug/L	100000	2000	3042136	12000	3042136	10000	200	3042136	23000	1000	3042136	
Dissolved Selenium (Se)	ug/L	<40	40	3042009	<2.0	3041530	<2.0	2.0	3042009	<2.0	2.0	3041530	
Dissolved Silicon (Si)	ug/L	4000	500	3042009	9500	3041530	9300	50	3042009	10000	50	3041530	
Total Silicon (Si)	ug/L	22000	500	3042136	45000	3042136	40000	50	3042136	96000	250	3042136	
Total Selenium (Se)	ug/L	<40	40	3042136	<2.0	3042136	<2.0	2.0	3042136	<10	10	3042136	
Dissolved Silver (Ag)	ug/L	<1.0	1.0	3042009	<0.10	3041530	<0.10	0.10	3042009	<0.10	0.10	3041530	
Total Silver (Ag)	ug/L	<1.0	1.0	3042136	<0.10	3042136	<0.10	0.10	3042136	0.65	0.50	3042136	
Dissolved Sodium (Na)	ug/L	3400000	1000	3042009	20000	3041530	19000	100	3042009	27000	100	3041530	
Total Sodium (Na)	ug/L	4100000	1000	3042136	21000	3042136	21000	100	3042136	30000	500	3042136	
Dissolved Strontium (Sr)	ug/L	35000	10	3042009	2800	3041530	2800	1.0	3042009	6600	1.0	3041530	
Total Strontium (Sr)	ug/L	41000	10	3042136	3400	3042136	3500	1.0	3042136	10000	5.0	3042136	
Dissolved Thallium (Tl)	ug/L	<0.50	0.50	3042009	<0.050	3041530	<0.050	0.050	3042009	<0.050	0.050	3041530	
Total Thallium (Tl)	ug/L	<0.50	0.50	3042136	0.16	3042136	0.12	0.050	3042136	0.57	0.25	3042136	
Dissolved Tin (Sn)	ug/L	<10	10	3042009	<1.0	3041530	<1.0	1.0	3042009	<1.0	1.0	3041530	
Total Tin (Sn)	ug/L	<10	10	3042136	<1.0	3042136	<1.0	1.0	3042136	<5.0	5.0	3042136	
Dissolved Titanium (Ti)	ug/L	<50	50	3042009	5.7	3041530	8.4	5.0	3042009	8.9	5.0	3041530	
Total Titanium (Ti)	ug/L	67	50	3042136	500	3042136	420	5.0	3042136	1400	25	3042136	
Dissolved Uranium (U)	ug/L	<1.0	1.0	3042009	1.1	3041530	0.99	0.10	3042009	0.21	0.10	3041530	
Total Uranium (U)	ug/L	<1.0	1.0	3042136	2.4	3042136	2.5	0.10	3042136	6.2	0.50	3042136	
Dissolved Vanadium (V)	ug/L	<10	10	3042009	0.60	3041530	<0.50	0.50	3042009	0.64	0.50	3041530	
Total Vanadium (V)	ug/L	10	10	3042136	35	3042136	32	0.50	3042136	170	2.5	3042136	
Dissolved Zinc (Zn)	ug/L	<50	50	3042009	<5.0	3041530	<5.0	5.0	3042009	<5.0	5.0	3041530	
Total Zinc (Zn)	ug/L	200	50	3042136	85	3042136	83	5.0	3042136	1200	25	3042136	

 RDL = Reportable Detection Limit  
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Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4879			PP4880		PP4881	PP4881		
Sampling Date		2012/11/14			2012/11/14		2012/11/14	2012/11/14		
	Units	MW-08I	RDL	QC Batch	MW-08S	RDL	MW-08D	MW-08D Lab-Dup	RDL	QC Batch
<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3041932	<0.00010	0.00010	<0.00010	<0.00010	0.00010	3041932
Dissolved Aluminum (Al)	ug/L	57	25	3042009	150	5.0	<5.0		5.0	3042094
Total Aluminum (Al)	ug/L	8600	25	3042136	58000	50	4300		5.0	3042136
Dissolved Antimony (Sb)	ug/L	<2.5	2.5	3042009	<0.50	0.50	<0.50		0.50	3042094
Total Antimony (Sb)	ug/L	<2.5	2.5	3042136	<0.50	0.50	<0.50		0.50	3042136
Dissolved Arsenic (As)	ug/L	<10	10	3042009	1.9	1.0	<1.0		1.0	3042094
Total Arsenic (As)	ug/L	5.7	5.0	3042136	26	1.0	8.7		1.0	3042136
Dissolved Barium (Ba)	ug/L	23	10	3042009	51	2.0	15		2.0	3042094
Total Barium (Ba)	ug/L	260	10	3042136	570	2.0	41		2.0	3042136
Dissolved Beryllium (Be)	ug/L	<2.5	2.5	3042009	<0.50	0.50	<0.50		0.50	3042094
Total Beryllium (Be)	ug/L	<2.5	2.5	3042136	3.6	0.50	<0.50		0.50	3042136
Dissolved Bismuth (Bi)	ug/L	<5.0	5.0	3042009	<1.0	1.0	<1.0		1.0	3042094
Total Bismuth (Bi)	ug/L	<5.0	5.0	3042136	<1.0	1.0	<1.0		1.0	3042136
Dissolved Boron (B)	ug/L	6300	50	3042009	1400	10	3400		10	3042094
Total Boron (B)	ug/L	6200	50	3042136	1800	10	4400		10	3042136
Dissolved Cadmium (Cd)	ug/L	<0.50	0.50	3042009	<0.10	0.10	2.1		0.10	3042094
Total Cadmium (Cd)	ug/L	1.1	0.50	3042136	1.4	0.10	4.9		0.10	3042136
Dissolved Calcium (Ca)	ug/L	1100000	2000	3042009	110000	400	110000		1000	3042094
Total Calcium (Ca)	ug/L	650000	1000	3042136	470000	1000	150000		1000	3042136
Dissolved Chromium (Cr)	ug/L	<25	25	3042009	<5.0	5.0	<5.0		5.0	3042094
Total Chromium (Cr)	ug/L	<25	25	3042136	100	5.0	93		5.0	3042136
Dissolved Cobalt (Co)	ug/L	<2.5	2.5	3042009	2.1	0.50	1.7		0.50	3042094
Total Cobalt (Co)	ug/L	5.0	2.5	3042136	58	1.0	2.2		0.50	3042136
Dissolved Copper (Cu)	ug/L	6.2	5.0	3042009	<1.0	1.0	1.4		1.0	3042094
Total Copper (Cu)	ug/L	19	5.0	3042136	94	1.0	19		1.0	3042136
Dissolved Iron (Fe)	ug/L	2700	500	3042009	1300	100	<100		100	3042094
Total Iron (Fe)	ug/L	13000	500	3042136	110000	1000	6500		100	3042136
Dissolved Lead (Pb)	ug/L	<2.5	2.5	3042009	<0.50	0.50	<0.50		0.50	3042094
Total Lead (Pb)	ug/L	22	2.5	3042136	46	0.50	2.5		0.50	3042136
Dissolved Magnesium (Mg)	ug/L	320000	250	3042009	170000	50	96000		50	3042094
Total Magnesium (Mg)	ug/L	200000	250	3042136	260000	50	130000		50	3042136
Dissolved Manganese (Mn)	ug/L	560	10	3042009	220	2.0	63		2.0	3042094
Total Manganese (Mn)	ug/L	700	10	3042136	3600	2.0	190		2.0	3042136
Dissolved Molybdenum (Mo)	ug/L	5.6	2.5	3042009	3.8	0.50	4.8		0.50	3042094

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP4879			PP4880		PP4881	PP4881		
Sampling Date		2012/11/14			2012/11/14		2012/11/14	2012/11/14		
	Units	MW-08I	RDL	QC Batch	MW-08S	RDL	MW-08D	MW-08D Lab-Dup	RDL	QC Batch
Total Molybdenum (Mo)	ug/L	6.4	2.5	3042136	9.0	0.50	7.7		0.50	3042136
Dissolved Nickel (Ni)	ug/L	<5.0	5.0	3042009	2.1	1.0	9.9		1.0	3042094
Total Nickel (Ni)	ug/L	13	5.0	3042136	120	2.0	23		1.0	3042136
Dissolved Phosphorus (P)	ug/L	<500	500	3042009	<100	100	<100		100	3042094
Total Phosphorus (P)	ug/L	570	500	3042136	3800	100	<100		100	3042136
Dissolved Potassium (K)	ug/L	62000	1000	3042009	15000	200	28000		200	3042094
Total Potassium (K)	ug/L	52000	1000	3042136	28000	200	37000		200	3042136
Dissolved Selenium (Se)	ug/L	<20	20	3042009	<2.0	2.0	<2.0		2.0	3042094
Dissolved Silicon (Si)	ug/L	5000	250	3042009	7700	50	6000		50	3042094
Total Silicon (Si)	ug/L	19000	250	3042136	73000	500	17000		50	3042136
Total Selenium (Se)	ug/L	<10	10	3042136	<2.0	2.0	<2.0		2.0	3042136
Dissolved Silver (Ag)	ug/L	<0.50	0.50	3042009	<0.10	0.10	<0.10		0.10	3042094
Total Silver (Ag)	ug/L	<0.50	0.50	3042136	0.33	0.10	<0.10		0.10	3042136
Dissolved Sodium (Na)	ug/L	2500000	500	3042009	84000	100	220000		100	3042094
Total Sodium (Na)	ug/L	1500000	500	3042136	98000	100	290000		100	3042136
Dissolved Strontium (Sr)	ug/L	26000	5.0	3042009	9400	1.0	16000		1.0	3042094
Total Strontium (Sr)	ug/L	16000	5.0	3042136	12000	1.0	20000		1.0	3042136
Dissolved Thallium (Tl)	ug/L	<0.25	0.25	3042009	<0.050	0.050	<0.050		0.050	3042094
Total Thallium (Tl)	ug/L	<0.25	0.25	3042136	0.42	0.050	<0.050		0.050	3042136
Dissolved Tin (Sn)	ug/L	<5.0	5.0	3042009	<1.0	1.0	<1.0		1.0	3042094
Total Tin (Sn)	ug/L	<5.0	5.0	3042136	<1.0	1.0	1.2		1.0	3042136
Dissolved Titanium (Ti)	ug/L	<25	25	3042009	6.5	5.0	<5.0		5.0	3042094
Total Titanium (Ti)	ug/L	320	25	3042136	820	50	200		5.0	3042136
Dissolved Uranium (U)	ug/L	1.1	0.50	3042009	9.5	0.10	0.76		0.10	3042094
Total Uranium (U)	ug/L	5.7	0.50	3042136	14	0.10	1.3		0.10	3042136
Dissolved Vanadium (V)	ug/L	<5.0	5.0	3042009	0.59	0.50	<0.50		0.50	3042094
Total Vanadium (V)	ug/L	8.3	2.5	3042136	120	0.50	7.0		0.50	3042136
Dissolved Zinc (Zn)	ug/L	<25	25	3042009	<5.0	5.0	20		5.0	3042094
Total Zinc (Zn)	ug/L	61	25	3042136	300	5.0	44		5.0	3042136

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

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### Test Summary

**Maxxam ID** PP4871  
**Sample ID** MW5-INT  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042040	N/A	2012/11/21	John Bowman
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037427	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/15	Neil Dassanayake

**Maxxam ID** PP4872  
**Sample ID** MW-05 SHALLOW  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3041530	N/A	2012/11/21	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li

Maxxam Job #: B2H9228  
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### Test Summary

pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037427	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/15	Neil Dassanayake

**Maxxam ID** PP4873  
**Sample ID** MW5-DEEP  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042040	N/A	2012/11/21	John Bowman
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

Maxxam Job #: B2H9228  
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### Test Summary

**Maxxam ID** PP4874  
**Sample ID** MW-03 SHALLOW  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042040	N/A	2012/11/21	John Bowman
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037427	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4875  
**Sample ID** MW3-DEEP  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3035768	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042009	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li



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### Test Summary

pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4876  
**Sample ID** DUP-1  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3041530	N/A	2012/11/21	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

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Report Date: 2012/11/22

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### Test Summary

**Maxxam ID** PP4877  
**Sample ID** MW-06I  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042009	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4878  
**Sample ID** MW5-STRADDLE  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041961	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3041530	N/A	2012/11/21	Arefa Dabhad
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li

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### Test Summary

pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4879  
**Sample ID** MW-08I  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/20	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042009	N/A	2012/11/20	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

Maxxam Job #: B2H9228  
Report Date: 2012/11/22

Golder Associates Ltd  
Client Project #: ##-####-####  
Site Location: TANSLEY QUARRY  
Sampler Initials: LB

### Test Summary

**Maxxam ID** PP4880  
**Sample ID** MW-08S  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038166	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038171	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042094	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038446	N/A	2012/11/16	Chris Li
pH	PH	3038172	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/16	Neil Dassanayake

**Maxxam ID** PP4881  
**Sample ID** MW-08D  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3038429	N/A	2012/11/16	Surinder Rai
Anions	IC	3038993	N/A	2012/11/19	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Fluoride	F	3038431	2012/11/15	2012/11/16	Surinder Rai
Hardness (calculated as CaCO3)		3036822	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3042094	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3042136	N/A	2012/11/20	Hua Ren
Total Ammonia-N	LACH/NH4	3039380	N/A	2012/11/18	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038948	N/A	2012/11/19	Chris Li

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### Test Summary

pH	PH	3038432	N/A	2012/11/16	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3038637	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3038220	N/A	2012/11/16	Birenkumar Patel
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3042540	2012/11/20	2012/11/21	Viorica Rotaru
Total Suspended Solids	SLDS	3037442	N/A	2012/11/15	Bansari Ray
Turbidity	TURB	3038173	N/A	2012/11/15	Neil Dassanayake

**Maxxam ID** PP4881 Dup  
**Sample ID** MW-08D  
**Matrix** Water

**Collected** 2012/11/14  
**Shipped**  
**Received** 2012/11/14

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Free (WAD) Cyanide	TECH/CN	3039405	N/A	2012/11/19	Bramdeo Motiram
Mercury in Water by CVAA	CVAA	3041932	2012/11/20	2012/11/20	Lawrence Cheung
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3038948	N/A	2012/11/19	Chris Li
Sulphide	ISE/S	3037629	N/A	2012/11/16	Xuanhong Qiu

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#### GENERAL COMMENTS

Sample PP4873-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP4875-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP4878-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP4879-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP4880-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP4881-01: Anions Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3037427	Total Suspended Solids	2012/11/15					<10	mg/L	3.4	25	98	85 - 115
3037442	Total Suspended Solids	2012/11/15					<10	mg/L	NC	25	99	85 - 115
3037629	Sulphide	2012/11/16	95	80 - 120	95	80 - 120	<0.020	mg/L	NC	20		
3038166	Alkalinity (Total as CaCO3)	2012/11/16					<1.0	mg/L	1.5	25	98	85 - 115
3038171	Fluoride (F-)	2012/11/16	103	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3038173	Turbidity	2012/11/15					0.3, RDL=0.2	NTU	2.0	20	99	85 - 115
3038220	Orthophosphate (P)	2012/11/16	77 (1)	75 - 125	102	80 - 120	<0.010	mg/L	NC	25		
3038429	Alkalinity (Total as CaCO3)	2012/11/16					<1.0	mg/L	2.0	25	97	85 - 115
3038431	Fluoride (F-)	2012/11/16	104	80 - 120	103	80 - 120	<0.10	mg/L	NC	20		
3038446	Nitrite (N)	2012/11/16	105	80 - 120	102	85 - 115	<0.010	mg/L	NC	25		
3038446	Nitrate (N)	2012/11/16	101	80 - 120	98	85 - 115	<0.10	mg/L	0.8	25		
3038637	Phenols-4AAP	2012/11/19	104	80 - 120	105	85 - 115	<0.0010	mg/L	NC	25		
3038948	Nitrite (N)	2012/11/19	96	80 - 120	99	85 - 115	<0.010	mg/L	2.5	25		
3038948	Nitrate (N)	2012/11/19	95	80 - 120	98	85 - 115	<0.10	mg/L	0.5	25		
3038993	Dissolved Chloride (Cl)	2012/11/19	98	80 - 120	98	80 - 120	<1.0	mg/L	NC	20		
3038993	Dissolved Bromide (Br-)	2012/11/19			98	80 - 120	<1.0	mg/L				
3038993	Dissolved Sulphate (SO4)	2012/11/19			96	80 - 120	1.1, RDL=1.0	mg/L				
3039380	Total Ammonia-N	2012/11/18	102	80 - 120	101	85 - 115	<0.050	mg/L	NC	20		
3039405	Free Cyanide	2012/11/19	92	80 - 120	94	80 - 120	<0.0020	mg/L	NC	20		
3041530	Dissolved Aluminum (Al)	2012/11/20	112	80 - 120	107	80 - 120	<5.0	ug/L				
3041530	Dissolved Antimony (Sb)	2012/11/20	107	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3041530	Dissolved Arsenic (As)	2012/11/20	103	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
3041530	Dissolved Barium (Ba)	2012/11/20	95	80 - 120	93	80 - 120	<2.0	ug/L	1.9	20		
3041530	Dissolved Beryllium (Be)	2012/11/20	98	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3041530	Dissolved Bismuth (Bi)	2012/11/20	98	80 - 120	97	80 - 120	<1.0	ug/L				
3041530	Dissolved Boron (B)	2012/11/20	95	80 - 120	95	80 - 120	<10	ug/L	1.8	20		
3041530	Dissolved Cadmium (Cd)	2012/11/20	102	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
3041530	Dissolved Calcium (Ca)	2012/11/20	NC	80 - 120	107	80 - 120	<200	ug/L				
3041530	Dissolved Chromium (Cr)	2012/11/20	110	80 - 120	108	80 - 120	<5.0	ug/L	NC	20		
3041530	Dissolved Cobalt (Co)	2012/11/20	103	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3041530	Dissolved Copper (Cu)	2012/11/20	100	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3041530	Dissolved Iron (Fe)	2012/11/20	105	80 - 120	108	80 - 120	<100	ug/L				
3041530	Dissolved Lead (Pb)	2012/11/20	99	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3041530	Dissolved Magnesium (Mg)	2012/11/20	NC	80 - 120	101	80 - 120	<50	ug/L				
3041530	Dissolved Manganese (Mn)	2012/11/20	NC	80 - 120	102	80 - 120	<2.0	ug/L				
3041530	Dissolved Molybdenum (Mo)	2012/11/20	108	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3041530	Dissolved Nickel (Ni)	2012/11/20	101	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3041530	Dissolved Phosphorus (P)	2012/11/20	117	80 - 120	109	80 - 120	<100	ug/L				
3041530	Dissolved Potassium (K)	2012/11/20	NC	80 - 120	106	80 - 120	<200	ug/L				
3041530	Dissolved Selenium (Se)	2012/11/20	103	80 - 120	98	80 - 120	<2.0	ug/L	NC	20		

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041530	Dissolved Silicon (Si)	2012/11/20	NC	80 - 120	111	80 - 120	51, RDL=50	ug/L				
3041530	Dissolved Silver (Ag)	2012/11/20	98	80 - 120	96	80 - 120	<0.10	ug/L	NC	20		
3041530	Dissolved Sodium (Na)	2012/11/20	NC	80 - 120	102	80 - 120	<100	ug/L	7.3	20		
3041530	Dissolved Strontium (Sr)	2012/11/20	NC	80 - 120	93	80 - 120	<1.0	ug/L				
3041530	Dissolved Thallium (Tl)	2012/11/20	100	80 - 120	98	80 - 120	<0.050	ug/L	NC	20		
3041530	Dissolved Tin (Sn)	2012/11/20	106	80 - 120	101	80 - 120	<1.0	ug/L				
3041530	Dissolved Titanium (Ti)	2012/11/20	116	80 - 120	111	80 - 120	<5.0	ug/L				
3041530	Dissolved Uranium (U)	2012/11/20	105	80 - 120	102	80 - 120	<0.10	ug/L	1.1	20		
3041530	Dissolved Vanadium (V)	2012/11/20	112	80 - 120	108	80 - 120	<0.50	ug/L	NC	20		
3041530	Dissolved Zinc (Zn)	2012/11/20	101	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3041932	Mercury (Hg)	2012/11/20	106	80 - 120	102	80 - 120	<0.00010	mg/L	NC	20		
3041961	Mercury (Hg)	2012/11/20	107	80 - 120	105	80 - 120	<0.00010	mg/L	NC	20		
3042009	Dissolved Aluminum (Al)	2012/11/20	102	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
3042009	Dissolved Antimony (Sb)	2012/11/20	106	80 - 120	102	80 - 120	<0.50	ug/L				
3042009	Dissolved Arsenic (As)	2012/11/20	103	80 - 120	99	80 - 120	<1.0	ug/L				
3042009	Dissolved Barium (Ba)	2012/11/20	100	80 - 120	100	80 - 120	<2.0	ug/L				
3042009	Dissolved Beryllium (Be)	2012/11/20	101	80 - 120	100	80 - 120	<0.50	ug/L				
3042009	Dissolved Bismuth (Bi)	2012/11/20	93	80 - 120	96	80 - 120	<1.0	ug/L				
3042009	Dissolved Boron (B)	2012/11/20	NC	80 - 120	106	80 - 120	<10	ug/L				
3042009	Dissolved Cadmium (Cd)	2012/11/20	101	80 - 120	101	80 - 120	<0.10	ug/L				
3042009	Dissolved Calcium (Ca)	2012/11/20	NC	80 - 120	101	80 - 120	<200	ug/L				
3042009	Dissolved Chromium (Cr)	2012/11/20	96	80 - 120	97	80 - 120	<5.0	ug/L				
3042009	Dissolved Cobalt (Co)	2012/11/20	96	80 - 120	96	80 - 120	<0.50	ug/L				
3042009	Dissolved Copper (Cu)	2012/11/20	92	80 - 120	94	80 - 120	<1.0	ug/L				
3042009	Dissolved Iron (Fe)	2012/11/20	99	80 - 120	99	80 - 120	<100	ug/L				
3042009	Dissolved Lead (Pb)	2012/11/20	93	80 - 120	94	80 - 120	<0.50	ug/L				
3042009	Dissolved Magnesium (Mg)	2012/11/20	NC	80 - 120	103	80 - 120	<50	ug/L				
3042009	Dissolved Manganese (Mn)	2012/11/20	95	80 - 120	94	80 - 120	<2.0	ug/L				
3042009	Dissolved Molybdenum (Mo)	2012/11/20	103	80 - 120	99	80 - 120	<0.50	ug/L				
3042009	Dissolved Nickel (Ni)	2012/11/20	95	80 - 120	97	80 - 120	<1.0	ug/L				
3042009	Dissolved Phosphorus (P)	2012/11/20	108	80 - 120	108	80 - 120	<100	ug/L				
3042009	Dissolved Potassium (K)	2012/11/20	100	80 - 120	102	80 - 120	<200	ug/L				
3042009	Dissolved Selenium (Se)	2012/11/20	100	80 - 120	97	80 - 120	<2.0	ug/L				
3042009	Dissolved Silicon (Si)	2012/11/20	107	80 - 120	103	80 - 120	<50	ug/L				
3042009	Dissolved Silver (Ag)	2012/11/20	96	80 - 120	97	80 - 120	<0.10	ug/L				
3042009	Dissolved Sodium (Na)	2012/11/20	NC	80 - 120	104	80 - 120	<100	ug/L				
3042009	Dissolved Strontium (Sr)	2012/11/20	NC	80 - 120	98	80 - 120	<1.0	ug/L				
3042009	Dissolved Thallium (Tl)	2012/11/20	97	80 - 120	98	80 - 120	<0.050	ug/L				
3042009	Dissolved Tin (Sn)	2012/11/20	105	80 - 120	102	80 - 120	<1.0	ug/L				
3042009	Dissolved Titanium (Ti)	2012/11/20	105	80 - 120	105	80 - 120	<5.0	ug/L				



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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3042009	Dissolved Uranium (U)	2012/11/20	95	80 - 120	95	80 - 120	<0.10	ug/L				
3042009	Dissolved Vanadium (V)	2012/11/20	100	80 - 120	98	80 - 120	<0.50	ug/L				
3042009	Dissolved Zinc (Zn)	2012/11/20	94	80 - 120	96	80 - 120	<5.0	ug/L				
3042040	Dissolved Aluminum (Al)	2012/11/21	103	80 - 120	102	80 - 120	<5.0	ug/L				
3042040	Dissolved Antimony (Sb)	2012/11/21	109	80 - 120	102	80 - 120	<0.50	ug/L				
3042040	Dissolved Arsenic (As)	2012/11/21	103	80 - 120	97	80 - 120	<1.0	ug/L				
3042040	Dissolved Barium (Ba)	2012/11/21	100	80 - 120	98	80 - 120	<2.0	ug/L				
3042040	Dissolved Beryllium (Be)	2012/11/21	101	80 - 120	98	80 - 120	<0.50	ug/L				
3042040	Dissolved Bismuth (Bi)	2012/11/21	100	80 - 120	98	80 - 120	<1.0	ug/L				
3042040	Dissolved Boron (B)	2012/11/21	102	80 - 120	98	80 - 120	<10	ug/L				
3042040	Dissolved Cadmium (Cd)	2012/11/21	104	80 - 120	101	80 - 120	<0.10	ug/L				
3042040	Dissolved Calcium (Ca)	2012/11/21	NC	80 - 120	98	80 - 120	<200	ug/L				
3042040	Dissolved Chromium (Cr)	2012/11/21	100	80 - 120	98	80 - 120	<5.0	ug/L				
3042040	Dissolved Cobalt (Co)	2012/11/21	101	80 - 120	98	80 - 120	<0.50	ug/L				
3042040	Dissolved Copper (Cu)	2012/11/21	99	80 - 120	96	80 - 120	<1.0	ug/L				
3042040	Dissolved Iron (Fe)	2012/11/21	101	80 - 120	98	80 - 120	<100	ug/L				
3042040	Dissolved Lead (Pb)	2012/11/21	100	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
3042040	Dissolved Magnesium (Mg)	2012/11/21	102	80 - 120	101	80 - 120	<50	ug/L				
3042040	Dissolved Manganese (Mn)	2012/11/21	101	80 - 120	99	80 - 120	<2.0	ug/L				
3042040	Dissolved Molybdenum (Mo)	2012/11/21	107	80 - 120	102	80 - 120	<0.50	ug/L				
3042040	Dissolved Nickel (Ni)	2012/11/21	99	80 - 120	97	80 - 120	<1.0	ug/L				
3042040	Dissolved Phosphorus (P)	2012/11/21	102	80 - 120	106	80 - 120	<100	ug/L				
3042040	Dissolved Potassium (K)	2012/11/21	101	80 - 120	99	80 - 120	<200	ug/L				
3042040	Dissolved Selenium (Se)	2012/11/21	101	80 - 120	98	80 - 120	<2.0	ug/L				
3042040	Dissolved Silicon (Si)	2012/11/21	103	80 - 120	101	80 - 120	<50	ug/L				
3042040	Dissolved Silver (Ag)	2012/11/21	85	80 - 120	101	80 - 120	<0.10	ug/L				
3042040	Dissolved Sodium (Na)	2012/11/21	NC	80 - 120	102	80 - 120	<100	ug/L				
3042040	Dissolved Strontium (Sr)	2012/11/21	NC	80 - 120	99	80 - 120	1.0, RDL=1.0	ug/L				
3042040	Dissolved Thallium (Tl)	2012/11/21	101	80 - 120	101	80 - 120	<0.050	ug/L				
3042040	Dissolved Tin (Sn)	2012/11/21	108	80 - 120	104	80 - 120	<1.0	ug/L				
3042040	Dissolved Titanium (Ti)	2012/11/21	103	80 - 120	99	80 - 120	<5.0	ug/L				
3042040	Dissolved Uranium (U)	2012/11/21	102	80 - 120	100	80 - 120	<0.10	ug/L				
3042040	Dissolved Vanadium (V)	2012/11/21	103	80 - 120	99	80 - 120	<0.50	ug/L				
3042040	Dissolved Zinc (Zn)	2012/11/21	100	80 - 120	98	80 - 120	<5.0	ug/L				
3042094	Dissolved Aluminum (Al)	2012/11/21	99	80 - 120	97	80 - 120	<5.0	ug/L	NC	20		
3042094	Dissolved Antimony (Sb)	2012/11/21	104	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3042094	Dissolved Arsenic (As)	2012/11/21	103	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
3042094	Dissolved Barium (Ba)	2012/11/21	99	80 - 120	97	80 - 120	<2.0	ug/L	0.9	20		
3042094	Dissolved Beryllium (Be)	2012/11/21	101	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3042094	Dissolved Bismuth (Bi)	2012/11/21	96	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3042094	Dissolved Boron (B)	2012/11/21	101	80 - 120	100	80 - 120	<10	ug/L	NC	20		
3042094	Dissolved Cadmium (Cd)	2012/11/21	101	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
3042094	Dissolved Calcium (Ca)	2012/11/21	NC	80 - 120	98	80 - 120	<200	ug/L	0.4	20		
3042094	Dissolved Chromium (Cr)	2012/11/21	96	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
3042094	Dissolved Cobalt (Co)	2012/11/21	98	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3042094	Dissolved Copper (Cu)	2012/11/21	95	80 - 120	94	80 - 120	<1.0	ug/L	NC	20		
3042094	Dissolved Iron (Fe)	2012/11/21	100	80 - 120	97	80 - 120	<100	ug/L	NC	20		
3042094	Dissolved Lead (Pb)	2012/11/21	96	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3042094	Dissolved Magnesium (Mg)	2012/11/21	NC	80 - 120	99	80 - 120	<50	ug/L	3.6	20		
3042094	Dissolved Manganese (Mn)	2012/11/21	97	80 - 120	94	80 - 120	<2.0	ug/L	NC	20		
3042094	Dissolved Molybdenum (Mo)	2012/11/21	103	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3042094	Dissolved Nickel (Ni)	2012/11/21	96	80 - 120	94	80 - 120	<1.0	ug/L	NC	20		
3042094	Dissolved Phosphorus (P)	2012/11/21	102	80 - 120	100	80 - 120	<100	ug/L	NC	20		
3042094	Dissolved Potassium (K)	2012/11/21	102	80 - 120	99	80 - 120	<200	ug/L	NC	20		
3042094	Dissolved Selenium (Se)	2012/11/21	102	80 - 120	97	80 - 120	<2.0	ug/L	NC	20		
3042094	Dissolved Silicon (Si)	2012/11/21	102	80 - 120	99	80 - 120	<50	ug/L	2.8	20		
3042094	Dissolved Silver (Ag)	2012/11/21	98	80 - 120	96	80 - 120	<0.10	ug/L	NC	20		
3042094	Dissolved Sodium (Na)	2012/11/21	104	80 - 120	101	80 - 120	<100	ug/L	0.7	20		
3042094	Dissolved Strontium (Sr)	2012/11/21	100	80 - 120	95	80 - 120	<1.0	ug/L	0.07	20		
3042094	Dissolved Thallium (Tl)	2012/11/21	102	80 - 120	101	80 - 120	<0.050	ug/L	NC	20		
3042094	Dissolved Tin (Sn)	2012/11/21	104	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3042094	Dissolved Titanium (Ti)	2012/11/21	104	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
3042094	Dissolved Uranium (U)	2012/11/21	101	80 - 120	101	80 - 120	<0.10	ug/L	0.6	20		
3042094	Dissolved Vanadium (V)	2012/11/21	100	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3042094	Dissolved Zinc (Zn)	2012/11/21	98	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
3042136	Total Aluminum (Al)	2012/11/20	107	80 - 120	107	80 - 120	<5.0	ug/L				
3042136	Total Antimony (Sb)	2012/11/20	109	80 - 120	108	80 - 120	<0.50	ug/L				
3042136	Total Arsenic (As)	2012/11/20	104	80 - 120	104	80 - 120	<1.0	ug/L				
3042136	Total Barium (Ba)	2012/11/20	106	80 - 120	106	80 - 120	<2.0	ug/L	4.8	20		
3042136	Total Beryllium (Be)	2012/11/20	105	80 - 120	104	80 - 120	<0.50	ug/L				
3042136	Total Bismuth (Bi)	2012/11/20	100	80 - 120	100	80 - 120	<1.0	ug/L				
3042136	Total Boron (B)	2012/11/20	112	80 - 120	110	80 - 120	<10	ug/L	4.4	20		
3042136	Total Cadmium (Cd)	2012/11/20	105	80 - 120	105	80 - 120	<0.10	ug/L				
3042136	Total Calcium (Ca)	2012/11/20	NC	80 - 120	106	80 - 120	<200	ug/L				
3042136	Total Chromium (Cr)	2012/11/20	99	80 - 120	100	80 - 120	<5.0	ug/L				
3042136	Total Cobalt (Co)	2012/11/20	101	80 - 120	101	80 - 120	<0.50	ug/L				
3042136	Total Copper (Cu)	2012/11/20	99	80 - 120	100	80 - 120	<1.0	ug/L				
3042136	Total Iron (Fe)	2012/11/20	103	80 - 120	104	80 - 120	<100	ug/L				
3042136	Total Lead (Pb)	2012/11/20	98	80 - 120	99	80 - 120	<0.50	ug/L				
3042136	Total Magnesium (Mg)	2012/11/20	NC	80 - 120	111	80 - 120	<50	ug/L				

Maxxam Job #: B2H9228  
 Report Date: 2012/11/22

 Golder Associates Ltd  
 Client Project #: ##-####-####  
 Site Location: TANSLEY QUARRY  
 Sampler Initials: LB

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3042136	Total Manganese (Mn)	2012/11/20	98	80 - 120	98	80 - 120	<2.0	ug/L	2.8	20		
3042136	Total Molybdenum (Mo)	2012/11/20	107	80 - 120	106	80 - 120	<0.50	ug/L				
3042136	Total Nickel (Ni)	2012/11/20	99	80 - 120	100	80 - 120	<1.0	ug/L				
3042136	Total Phosphorus (P)	2012/11/20	107	80 - 120	110	80 - 120	<100	ug/L				
3042136	Total Potassium (K)	2012/11/20	NC	80 - 120	106	80 - 120	<200	ug/L				
3042136	Total Silicon (Si)	2012/11/20	106	80 - 120	108	80 - 120	<50	ug/L				
3042136	Total Selenium (Se)	2012/11/20	100	80 - 120	102	80 - 120	<2.0	ug/L				
3042136	Total Silver (Ag)	2012/11/20	99	80 - 120	99	80 - 120	<0.10	ug/L				
3042136	Total Sodium (Na)	2012/11/20	NC	80 - 120	109	80 - 120	130, RDL=100	ug/L	3.5	20		
3042136	Total Strontium (Sr)	2012/11/20	104	80 - 120	104	80 - 120	<1.0	ug/L				
3042136	Total Thallium (Tl)	2012/11/20	103	80 - 120	104	80 - 120	<0.050	ug/L				
3042136	Total Tin (Sn)	2012/11/20	107	80 - 120	107	80 - 120	<1.0	ug/L				
3042136	Total Titanium (Ti)	2012/11/20	108	80 - 120	109	80 - 120	<5.0	ug/L				
3042136	Total Uranium (U)	2012/11/20	99	80 - 120	99	80 - 120	<0.10	ug/L				
3042136	Total Vanadium (V)	2012/11/20	102	80 - 120	103	80 - 120	<0.50	ug/L				
3042136	Total Zinc (Zn)	2012/11/20	99	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
3042540	Total Phosphorus	2012/11/21	99	80 - 120	103	85 - 115	<0.020	mg/L	NC	20	106	85 - 115
3043123	Free Cyanide	2012/11/21	95	80 - 120	102	80 - 120	<0.0020	mg/L	NC	20		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

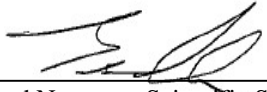
(1) - The recoveries for (cis & trans-1,3-dichloropropene and/or bromomethane) in the matrix spike were below the lower control limits. This may represent a low bias in some results for these specific analytes. It was noted that the matrix spike was preserved with sodium thiosulphate. Sodium thiosulphate is known to degrade these compounds.

**Validation Signature Page**

**Maxxam Job #: B2H9228**

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



Brad Newman, Scientific Specialist

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**  
 Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

**Report Date: 2012/11/26**

### CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2H9928**  
**Received: 2012/11/15, 15:35**

Sample Matrix: Water  
 # Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	14	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	14	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Free (WAD) Cyanide	13	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	14	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	8	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/23	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/26	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	14	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	5	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	1	N/A	2012/11/26	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	14	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	14	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (1)	14	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO <sub>3</sub> /NO <sub>2</sub> B
pH	14	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	14	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	14	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	14	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	8	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Phosphorus (Colourimetric)	6	2012/11/21	2012/11/22	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	14	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	14	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

Your Project #: 021-1228  
Site Location: TANSLEY QUARRY  
Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
Mississauga - Standing Offer  
2390 Argentia Rd  
Mississauga, ON  
L5N 5Z7

**Report Date: 2012/11/26**

**CERTIFICATE OF ANALYSIS**

-2-

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

(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.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Page 2 of 30

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8804		PP8805		PP8806		
Sampling Date		2012/11/15		2012/11/15		2012/11/15		
COC Number		381156-05-01		381156-05-01		381156-05-01		
	<b>Units</b>	<b>MW2-SHALLOW</b>	<b>RDL</b>	<b>MW2-INT</b>	<b>RDL</b>	<b>MW11-D</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>								
Hardness (CaCO <sub>3</sub> )	mg/L	1900	1.0	1000	1.0	27000	1.0	3041014
<b>Inorganics</b>								
Total Ammonia-N	mg/L	0.50	0.050	1.7	0.050	35	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.33	0.10	0.27	0.10	0.12	0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	<0.0020	0.0020	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	3042705
pH	pH	7.61		7.43		6.14		3042434
Phenols-4AAP	mg/L	0.0013	0.0010	<0.0010	0.0010	0.0091	0.0010	3043330
Total Phosphorus	mg/L	2.4	0.40	0.47	0.10	<0.20 (1)	0.20	3044187
Total Suspended Solids	mg/L	2600	100	650	50	3000	100	3041872
Sulphide	mg/L	0.33	0.020	<0.020	0.020	<0.020	0.020	3042157
Turbidity	NTU	640	2	290	1	320	1	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	730	1.0	160	1.0	55	1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	<0.10	0.10	3042878
Dissolved Chloride (Cl)	mg/L	18	10	130	10	47000	500	3042686
Nitrate (N)	mg/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	3042878
Nitrate + Nitrite	mg/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<10	10	<10	10	580	500	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1300	10	1100	10	1300	500	3042686

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

( 1 ) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP8807			PP8808		PP8809		
Sampling Date		2012/11/15			2012/11/15		2012/11/15		
COC Number		381156-05-01			381156-05-01		381156-05-01		
	<b>Units</b>	<b>XYZ</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MAIN HOUSE</b>	<b>QC Batch</b>	<b>COTTAGE</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>									
Hardness (CaCO <sub>3</sub> )	mg/L	440	1.0	3041014	530	3041014	550	1.0	3041014
<b>Inorganics</b>									
Total Ammonia-N	mg/L	0.14	0.050	3042347	0.71	3042338	0.48	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.25	0.10	3042449	0.23	3042449	0.20	0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	3045136	<0.0020	3045136	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	0.010	3042705	<0.010	3042705	<0.010	0.010	3042705
pH	pH	6.71		3042434	7.97	3042434	8.03		3042434
Phenols-4AAP	mg/L	<0.0010	0.0010	3043330	<0.0010	3043330	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002	0.002	3045083	<0.002	3045083	<0.002	0.002	3045083
Total Suspended Solids	mg/L	<10	10	3041751	<10	3041751	<10	10	3041751
Sulphide	mg/L	<0.020	0.020	3042157	<0.020	3042157	<0.020	0.020	3042041
Turbidity	NTU	4.2	0.2	3042483	3.3	3042483	7.6	0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	75	1.0	3042447	360	3042447	370	1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	3042878	<0.010	3042878	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	590	5.0	3042686	140	3042686	150	1.0	3042686
Nitrate (N)	mg/L	1.9	0.10	3042878	<0.10	3042878	<0.10	0.10	3042878
Nitrate + Nitrite	mg/L	1.9	0.10	3042878	<0.10	3042878	<0.10	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	6.9	5.0	3042686	<1.0	3042686	<1.0	1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	340	5.0	3042686	170	3042686	150	1.0	3042686
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									



Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8810			PP8811		PP8812		
Sampling Date		2012/11/15			2012/11/15		2012/11/15		
COC Number		381156-05-01			381156-05-01		381156-05-01		
	<b>Units</b>	<b>MAIN BARN</b>	<b>RDL</b>	<b>QC Batch</b>	<b>FINNUCCI</b>	<b>RDL</b>	<b>SUGIYAMA</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>									
Hardness (CaCO <sub>3</sub> )	mg/L	420	1.0	3041014	500	1.0	1300	1.0	3041014
<b>Inorganics</b>									
Total Ammonia-N	mg/L	0.067	0.050	3042338	0.13	0.050	2.2	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.23	0.10	3042449	0.35	0.10	0.43	0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	3043123	<0.0020	0.0020	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	0.010	3042705	<0.010	0.010	<0.010	0.010	3042705
pH	pH	6.78		3042434	7.99		7.62		3042434
Phenols-4AAP	mg/L	<0.0010	0.0010	3043330	<0.0010	0.0010	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002	0.002	3045083	<0.002	0.002	<0.002	0.002	3045083
Total Suspended Solids	mg/L	<10	10	3041751	<10	10	15	10	3041751
Sulphide	mg/L	<0.020	0.020	3042041	<0.020	0.020	<0.020	0.020	3042041
Turbidity	NTU	1.4	0.2	3042483	1.5	0.2	3.9	0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	75	1.0	3042447	410	1.0	180	1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	3042878	<0.010	0.010	0.048	0.010	3042878
Dissolved Chloride (Cl)	mg/L	560	5.0	3042686	22	1.0	1800	10	3042686
Nitrate (N)	mg/L	1.9	0.10	3042878	0.81	0.10	1.6	0.10	3042878
Nitrate + Nitrite	mg/L	1.9	0.10	3042878	0.81	0.10	1.6	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	6.6	5.0	3042686	<1.0	1.0	22	10	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	330	5.0	3042686	360	1.0	910	10	3042686

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8813			PP8814			PP8815		
Sampling Date		2012/11/15			2012/11/15			2012/11/15		
COC Number		381156-05-01			381156-05-01			381156-05-01		
	<b>Units</b>	<b>SIMMS</b>	<b>RDL</b>	<b>QC Batch</b>	<b>BEKKERS</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW11-INT</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	340	1.0	3041014	720	1.0	3041014	430	1.0	3041014
<b>Inorganics</b>										
Total Ammonia-N	mg/L	<0.050	0.050	3042338	0.94	0.050	3042338	1.8	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.22	0.10	3042449	0.26	0.10	3042449	0.29	0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	3045136	<0.0020	0.0020	3045136	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	0.010	3042705	<0.010	0.010	3042705	<0.010	0.010	3042705
pH	pH	8.02		3042434	6.90		3042434	8.00		3042434
Phenols-4AAP	mg/L	<0.0010	0.0010	3043330	<0.0010	0.0010	3043330	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	0.006	0.002	3045083	<0.002	0.002	3045083	11	0.40	3044187
Total Suspended Solids	mg/L	<10	10	3041751	<10	10	3041751	14000	200	3041872
Sulphide	mg/L	<0.020	0.020	3042157	<0.020	0.020	3042041	0.021	0.020	3042041
Turbidity	NTU	0.7	0.2	3042483	0.4	0.2	3042483	900	2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	300	1.0	3042447	100	1.0	3042447	400	1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	3042878	<0.010	0.010	3042878	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	7.3	1.0	3042686	270	10	3042686	15	1.0	3042686
Nitrate (N)	mg/L	1.3	0.10	3042878	0.27	0.10	3042878	<0.10	0.10	3042878
Nitrate + Nitrite	mg/L	1.3	0.10	3042878	0.27	0.10	3042878	<0.10	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	1.0	3042686	<10	10	3042686	<1.0	1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	95	1.0	3042686	850	10	3042686	160	1.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP8816	PP8817		
Sampling Date		2012/11/15	2012/11/15		
COC Number		381156-05-01	381156-05-01		
	<b>Units</b>	<b>MW11-SHALLOW</b>	<b>DUP #2</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	410	430	1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	0.26	1.8	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.14	0.30	0.10	3042449
Free Cyanide	mg/L	<0.0020	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	<0.010	0.010	3042705
pH	pH	8.01	7.98		3042434
Phenols-4AAP	mg/L	<0.0010	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	5.9	11	0.40	3044187
Total Suspended Solids	mg/L	7100	9200	200	3041872
Sulphide	mg/L	0.042	<0.020	0.020	3042041
Turbidity	NTU	1900	1900	4	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	340	410	1.0	3042447
Nitrite (N)	mg/L	<0.010	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	2.6	15	1.0	3042686
Nitrate (N)	mg/L	<0.10	<0.10	0.10	3042878
Nitrate + Nitrite	mg/L	<0.10	<0.10	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	<1.0	1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	71	170	1.0	3042686

RDL = Reportable Detection Limit  
QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8804			PP8805			PP8806		
Sampling Date		2012/11/15			2012/11/15			2012/11/15		
COC Number		381156-05-01			381156-05-01			381156-05-01		
	<b>Units</b>	<b>MW2-SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW2-INT</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW11-D</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315	<0.00010	0.00010	3043382	<0.00010	0.00010	3043315
Dissolved Aluminum (Al)	ug/L	28	5.0	3045726	53	5.0	3045726	<250	250	3046868
Total Aluminum (Al)	ug/L	31000	500	3045889	5300	5.0	3045889	1400	250	3045889
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3045726	<0.50	0.50	3045726	<25	25	3046868
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889	<0.50	0.50	3045889	<25	25	3045889
Dissolved Arsenic (As)	ug/L	1.7	1.0	3045726	3.1	1.0	3045726	<50	50	3046868
Total Arsenic (As)	ug/L	16	1.0	3045889	5.8	1.0	3045889	<50	50	3045889
Dissolved Barium (Ba)	ug/L	16	2.0	3045726	7.2	2.0	3045726	170	100	3046868
Total Barium (Ba)	ug/L	340	2.0	3045889	190	2.0	3045889	150	100	3045889
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3045726	<0.50	0.50	3045726	<25	25	3046868
Total Beryllium (Be)	ug/L	2.0	0.50	3045889	<0.50	0.50	3045889	<25	25	3045889
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3045726	<1.0	1.0	3045726	<50	50	3046868
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889	<1.0	1.0	3045889	<50	50	3045889
Dissolved Boron (B)	ug/L	330	10	3045726	2000	10	3045726	5600	500	3046868
Total Boron (B)	ug/L	320	10	3045889	1800	10	3045889	5000	500	3045889
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3045726	<0.10	0.10	3045726	11	5.0	3046868
Total Cadmium (Cd)	ug/L	1.8	0.10	3045889	<0.10	0.10	3045889	7.3	5.0	3045889
Dissolved Calcium (Ca)	ug/L	170000	200	3045726	200000	1000	3045726	7800000	10000	3046868
Total Calcium (Ca)	ug/L	460000	200	3045889	240000	1000	3045889	7400000	10000	3045889
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3045726	<5.0	5.0	3045726	<250	250	3046868
Total Chromium (Cr)	ug/L	62	5.0	3045889	13	5.0	3045889	<250	250	3045889
Dissolved Cobalt (Co)	ug/L	0.70	0.50	3045726	<0.50	0.50	3045726	<25	25	3046868
Total Cobalt (Co)	ug/L	30	1.0	3045889	5.6	0.50	3045889	<25	25	3045889
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3045726	<1.0	1.0	3045726	<50	50	3046868
Total Copper (Cu)	ug/L	57	1.0	3045889	12	1.0	3045889	<50	50	3045889
Dissolved Iron (Fe)	ug/L	1700	100	3045726	1200	100	3045726	12000	5000	3046868
Total Iron (Fe)	ug/L	72000	100	3045889	11000	100	3045889	16000	5000	3045889
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3045726	<0.50	0.50	3045726	<25	25	3046868
Total Lead (Pb)	ug/L	28	0.50	3045889	5.4	0.50	3045889	<25	25	3045889
Dissolved Magnesium (Mg)	ug/L	350000	50	3045726	130000	50	3045726	1900000	2500	3046868
Total Magnesium (Mg)	ug/L	350000	50	3045889	120000	50	3045889	1700000	2500	3045889
Dissolved Manganese (Mn)	ug/L	760	2.0	3045726	140	2.0	3045726	4000	100	3046868

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8804			PP8805			PP8806		
Sampling Date		2012/11/15			2012/11/15			2012/11/15		
COC Number		381156-05-01			381156-05-01			381156-05-01		
	Units	MW2-SHALLOW	RDL	QC Batch	MW2-INT	RDL	QC Batch	MW11-D	RDL	QC Batch
Total Manganese (Mn)	ug/L	2400	2.0	3045889	530	2.0	3045889	4000	100	3045889
Dissolved Molybdenum (Mo)	ug/L	4.4	0.50	3045726	9.5	0.50	3045726	57	25	3046868
Total Molybdenum (Mo)	ug/L	6.4	0.50	3045889	11	0.50	3045889	<25	25	3045889
Dissolved Nickel (Ni)	ug/L	2.1	1.0	3045726	<1.0	1.0	3045726	200	50	3046868
Total Nickel (Ni)	ug/L	67	2.0	3045889	14	1.0	3045889	210	50	3045889
Dissolved Phosphorus (P)	ug/L	<100	100	3045726	<100	100	3045726	<5000	5000	3046868
Total Phosphorus (P)	ug/L	2100	100	3045889	350	100	3045889	<5000	5000	3045889
Dissolved Potassium (K)	ug/L	7300	200	3045726	19000	200	3045726	290000	10000	3046868
Total Potassium (K)	ug/L	15000	200	3045889	19000	200	3045889	270000	10000	3045889
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3045726	<2.0	2.0	3045726	<200	200	3046868
Dissolved Silicon (Si)	ug/L	10000	50	3045726	5400	50	3045726	<2500	2500	3046868
Total Silicon (Si)	ug/L	48000	50	3045889	13000	50	3045889	5500	2500	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889	<2.0	2.0	3045889	<100	100	3045889
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3045726	<0.10	0.10	3045726	<5.0	5.0	3046868
Total Silver (Ag)	ug/L	0.24	0.10	3045889	<0.10	0.10	3045889	<5.0	5.0	3045889
Dissolved Sodium (Na)	ug/L	74000	100	3045726	240000	100	3045726	17000000	5000	3046868
Total Sodium (Na)	ug/L	66000	100	3045889	200000	100	3045889	16000000	5000	3045889
Dissolved Strontium (Sr)	ug/L	3400	1.0	3045726	11000	1.0	3045726	160000	50	3046868
Total Strontium (Sr)	ug/L	4800	1.0	3045889	12000	1.0	3045889	160000	50	3045889
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	3045726	<0.050	0.050	3045726	<2.5	2.5	3046868
Total Thallium (Tl)	ug/L	0.32	0.050	3045889	<0.050	0.050	3045889	<2.5	2.5	3045889
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3045726	<1.0	1.0	3045726	<50	50	3046868
Total Tin (Sn)	ug/L	<1.0	1.0	3045889	<1.0	1.0	3045889	<50	50	3045889
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3045726	<5.0	5.0	3045726	<250	250	3046868
Total Titanium (Ti)	ug/L	<500	500	3045889	120	5.0	3045889	<250	250	3045889
Dissolved Uranium (U)	ug/L	19	0.10	3045726	0.52	0.10	3045726	19	5.0	3046868
Total Uranium (U)	ug/L	23	0.10	3045889	1.3	0.10	3045889	15	5.0	3045889
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3045726	<0.50	0.50	3045726	<50	50	3046868
Total Vanadium (V)	ug/L	69	0.50	3045889	12	0.50	3045889	<25	25	3045889
Dissolved Zinc (Zn)	ug/L	<10 (1)	10	3045726	<10 (1)	10	3045726	<250	250	3046868
Total Zinc (Zn)	ug/L	190	10	3045889	33	10	3045889	<250	250	3045889

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

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8807	PP8808	PP8809	PP8810		PP8811		
Sampling Date		2012/11/15	2012/11/15	2012/11/15	2012/11/15		2012/11/15		
COC Number		381156-05-01	381156-05-01	381156-05-01	381156-05-01		381156-05-01		
	Units	XYZ	MAIN HOUSE	COTTAGE	MAIN BARN	RDL	FINNUCCI	RDL	QC Batch

Metals									
Mercury (Hg)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	44	5.5	<5.0	22	5.0	<5.0	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	<1.0	10	11	<1.0	1.0	1.6	1.0	3045889
Total Barium (Ba)	ug/L	30	29	30	24	2.0	16	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	1.0	3045889
Total Boron (B)	ug/L	2400	630	500	2400	10	2900	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	120000	92000	95000	120000	200	92000	1000	3045889
Total Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	14	9.0	50	3.2	1.0	23	1.0	3045889
Total Iron (Fe)	ug/L	1000	830	1200	<100	100	740	100	3045889
Total Lead (Pb)	ug/L	2.2	1.0	1.2	0.52	0.50	6.3	0.50	3045889
Total Magnesium (Mg)	ug/L	37000	83000	80000	36000	50	69000	50	3045889
Total Manganese (Mn)	ug/L	67	39	34	57	2.0	110	2.0	3045889
Total Molybdenum (Mo)	ug/L	2.3	4.1	3.0	1.9	0.50	1.8	0.50	3045889
Total Nickel (Ni)	ug/L	<1.0	8.2	<1.0	<1.0	1.0	3.1	1.0	3045889
Total Phosphorus (P)	ug/L	<100	<100	<100	<100	100	<100	100	3045889
Total Potassium (K)	ug/L	14000	9600	8200	14000	200	24000	200	3045889
Total Silicon (Si)	ug/L	1800	9400	9500	1800	50	5300	50	3045889
Total Selenium (Se)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	330000	66000	58000	320000	100	100000	100	3045889
Total Strontium (Sr)	ug/L	4000	5400	4800	3900	1.0	15000	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.16	1.3	1.3	0.19	0.10	0.21	0.10	3045889
Total Vanadium (V)	ug/L	1.0	0.91	0.71	0.94	0.50	0.77	0.50	3045889
Total Zinc (Zn)	ug/L	260	8.9	38	66	5.0	240	5.0	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8812		PP8813		PP8814		
Sampling Date		2012/11/15		2012/11/15		2012/11/15		
COC Number		381156-05-01		381156-05-01		381156-05-01		
	Units	SUGIYAMA	RDL	SIMMS	RDL	BEKKERS	RDL	QC Batch
<b>Metals</b>								
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	<25	25	<5.0	5.0	7.8	5.0	3045889
Total Antimony (Sb)	ug/L	<2.5	2.5	1.2	0.50	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	3045889
Total Barium (Ba)	ug/L	12	10	59	2.0	16	2.0	3045889
Total Beryllium (Be)	ug/L	<2.5	2.5	<0.50	0.50	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	3045889
Total Boron (B)	ug/L	4900	50	100	10	1600	10	3045889
Total Cadmium (Cd)	ug/L	<0.50	0.50	<0.10	0.10	0.57	0.10	3045889
Total Calcium (Ca)	ug/L	350000	1000	88000	200	170000	1000	3045889
Total Chromium (Cr)	ug/L	<25	25	<5.0	5.0	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<2.5	2.5	<0.50	0.50	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	36	5.0	13	1.0	31	1.0	3045889
Total Iron (Fe)	ug/L	<500	500	<100	100	<100	100	3045889
Total Lead (Pb)	ug/L	<2.5	2.5	0.79	0.50	3.4	0.50	3045889
Total Magnesium (Mg)	ug/L	120000	250	30000	50	71000	50	3045889
Total Manganese (Mn)	ug/L	100	10	16	2.0	84	2.0	3045889
Total Molybdenum (Mo)	ug/L	4.5	2.5	1.2	0.50	15	0.50	3045889
Total Nickel (Ni)	ug/L	<5.0	5.0	<1.0	1.0	32	1.0	3045889
Total Phosphorus (P)	ug/L	<500	500	<100	100	<100	100	3045889
Total Potassium (K)	ug/L	38000	1000	3800	200	15000	200	3045889
Total Silicon (Si)	ug/L	3900	250	4000	50	3700	50	3045889
Total Selenium (Se)	ug/L	<10	10	<2.0	2.0	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.50	0.50	<0.10	0.10	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	870000	500	15000	100	230000	100	3045889
Total Strontium (Sr)	ug/L	22000	5.0	1100	1.0	12000	1.0	3045889
Total Thallium (Tl)	ug/L	<0.25	0.25	<0.050	0.050	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<5.0	5.0	<1.0	1.0	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<25	25	<5.0	5.0	<5.0	5.0	3045889
Total Uranium (U)	ug/L	<0.50	0.50	3.1	0.10	0.87	0.10	3045889
Total Vanadium (V)	ug/L	<2.5	2.5	0.63	0.50	0.64	0.50	3045889
Total Zinc (Zn)	ug/L	<25	25	1400	5.0	2200	5.0	3045889
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

 Golder Associates Ltd  
 Client Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
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**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8815		PP8816		PP8817		
Sampling Date		2012/11/15		2012/11/15		2012/11/15		
COC Number		381156-05-01		381156-05-01		381156-05-01		
	Units	MW11-INT	RDL	MW11-SHALLOW	RDL	DUP #2	RDL	QC Batch
<b>Metals</b>								
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	3043315
Dissolved Aluminum (Al)	ug/L	250	5.0	68	5.0	720	5.0	3045726
Total Aluminum (Al)	ug/L	91000	25	49000	500	58000	500	3045889
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	0.50	0.50	<0.50	0.50	3045726
Total Antimony (Sb)	ug/L	<2.5	2.5	<0.50	0.50	<1.0	1.0	3045889
Dissolved Arsenic (As)	ug/L	8.7	1.0	2.1	1.0	8.7	1.0	3045726
Total Arsenic (As)	ug/L	78	5.0	29	1.0	51	2.0	3045889
Dissolved Barium (Ba)	ug/L	21	2.0	52	2.0	22	2.0	3045726
Total Barium (Ba)	ug/L	1400	10	1000	2.0	610	4.0	3045889
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	3045726
Total Beryllium (Be)	ug/L	6.0	2.5	3.0	0.50	3.7	1.0	3045889
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	3045726
Total Bismuth (Bi)	ug/L	<5.0	5.0	<1.0	1.0	<2.0	2.0	3045889
Dissolved Boron (B)	ug/L	1600	10	97	10	1700	10	3045726
Total Boron (B)	ug/L	1700	50	140	10	1700	20	3045889
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	3045726
Total Cadmium (Cd)	ug/L	1.5	0.50	1.1	0.10	1.2	0.20	3045889
Dissolved Calcium (Ca)	ug/L	72000	1000	61000	200	72000	1000	3045726
Total Calcium (Ca)	ug/L	1500000	1000	450000	200	980000	800	3045889
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	3045726
Total Chromium (Cr)	ug/L	190	25	150	5.0	110	10	3045889
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	2.8	0.50	1.2	0.50	3045726
Total Cobalt (Co)	ug/L	120	2.5	49	1.0	69	2.0	3045889
Dissolved Copper (Cu)	ug/L	<1.0	1.0	<1.0	1.0	1.1	1.0	3045726
Total Copper (Cu)	ug/L	240	5.0	140	1.0	150	2.0	3045889
Dissolved Iron (Fe)	ug/L	840	100	420	100	1200	100	3045726
Total Iron (Fe)	ug/L	210000	500	100000	100	130000	200	3045889
Dissolved Lead (Pb)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	3045726
Total Lead (Pb)	ug/L	81	2.5	42	0.50	50	1.0	3045889
Dissolved Magnesium (Mg)	ug/L	61000	50	62000	50	61000	50	3045726
Total Magnesium (Mg)	ug/L	180000	250	93000	50	130000	100	3045889
Dissolved Manganese (Mn)	ug/L	33	2.0	74	2.0	37	2.0	3045726
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								



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**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8815		PP8816		PP8817		
Sampling Date		2012/11/15		2012/11/15		2012/11/15		
COC Number		381156-05-01		381156-05-01		381156-05-01		
	Units	MW11-INT	RDL	MW11-SHALLOW	RDL	DUP #2	RDL	QC Batch
Total Manganese (Mn)	ug/L	13000	10	4200	2.0	7900	4.0	3045889
Dissolved Molybdenum (Mo)	ug/L	3.1	0.50	2.7	0.50	3.0	0.50	3045726
Total Molybdenum (Mo)	ug/L	6.8	2.5	5.2	0.50	5.6	1.0	3045889
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	1.1	1.0	<1.0	1.0	3045726
Total Nickel (Ni)	ug/L	240	5.0	100	2.0	140	4.0	3045889
Dissolved Phosphorus (P)	ug/L	<100	100	<100	100	<100	100	3045726
Total Phosphorus (P)	ug/L	10000	500	2600	100	5800	200	3045889
Dissolved Potassium (K)	ug/L	18000	200	4200	200	18000	200	3045726
Total Potassium (K)	ug/L	33000	1000	15000	200	28000	400	3045889
Dissolved Selenium (Se)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	3045726
Dissolved Silicon (Si)	ug/L	8800	50	9400	50	9700	50	3045726
Total Silicon (Si)	ug/L	91000	250	69000	5000	76000	100	3045889
Total Selenium (Se)	ug/L	<10	10	<2.0	2.0	<4.0	4.0	3045889
Dissolved Silver (Ag)	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	3045726
Total Silver (Ag)	ug/L	<0.50	0.50	0.31	0.10	0.36	0.20	3045889
Dissolved Sodium (Na)	ug/L	71000	100	13000	100	71000	100	3045726
Total Sodium (Na)	ug/L	63000	500	11000	100	67000	200	3045889
Dissolved Strontium (Sr)	ug/L	10000	1.0	1100	1.0	10000	1.0	3045726
Total Strontium (Sr)	ug/L	14000	5.0	1900	1.0	13000	2.0	3045889
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	3045726
Total Thallium (Tl)	ug/L	0.51	0.25	0.49	0.050	0.41	0.10	3045889
Dissolved Tin (Sn)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	3045726
Total Tin (Sn)	ug/L	<5.0	5.0	<1.0	1.0	<2.0	2.0	3045889
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	<5.0	5.0	14	5.0	3045726
Total Titanium (Ti)	ug/L	1100	25	520	500	930	10	3045889
Dissolved Uranium (U)	ug/L	0.32	0.10	2.8	0.10	0.32	0.10	3045726
Total Uranium (U)	ug/L	9.4	0.50	6.9	0.10	5.7	0.20	3045889
Dissolved Vanadium (V)	ug/L	0.53	0.50	<0.50	0.50	1.2	0.50	3045726
Total Vanadium (V)	ug/L	190	2.5	96	0.50	120	1.0	3045889
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	<5.0	5.0	11	5.0	3045726
Total Zinc (Zn)	ug/L	550	25	360	5.0	330	10	3045889
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam Job #: B2H9928  
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### Test Summary

**Maxxam ID** PP8804  
**Sample ID** MW2-SHALLOW  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8805  
**Sample ID** MW2-INT  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043382	2012/11/21	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8805 Dup  
**Sample ID** MW2-INT  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury in Water by CVAA	CVAA	3043382	2012/11/21	2012/11/21	Magdalena Carlos

Maxxam Job #: B2H9928  
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### Test Summary

**Maxxam ID** PP8806  
**Sample ID** MW11-D  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3046868	N/A	2012/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8807  
**Sample ID** XYZ  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042347	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8807 Dup  
**Sample ID** XYZ  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Ammonia-N	LACH/NH4	3042347	N/A	2012/11/22	Lemeneh Addis

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### Test Summary

**Maxxam ID** PP8808  
**Sample ID** MAIN HOUSE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8809  
**Sample ID** COTTAGE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8809 Dup  
**Sample ID** COTTAGE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel

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### Test Summary

**Maxxam ID** PP8810  
**Sample ID** MAIN BARN  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8811  
**Sample ID** FINNUCCI  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8811 Dup  
**Sample ID** FINNUCCI  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi

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### Test Summary

**Maxxam ID** PP8812  
**Sample ID** SUGIYAMA  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8812 Dup  
**Sample ID** SUGIYAMA  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu

**Maxxam ID** PP8813  
**Sample ID** SIMMS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

**Maxxam ID** PP8813 Dup  
**Sample ID** SIMMS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram

**Maxxam ID** PP8814  
**Sample ID** BEKKERS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8814 Dup  
**Sample ID** BEKKERS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel

**Maxxam ID** PP8815  
**Sample ID** MW11-INT  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8816  
**Sample ID** MW11-SHALLOW  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8817  
**Sample ID** DUP #2  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake



Maxxam Job #: B2H9928  
Report Date: 2012/11/26

Golder Associates Ltd  
Client Project #: 021-1228  
Site Location: TANSLEY QUARRY  
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Package 1	5.0°C
Package 2	7.3°C
Package 3	7.0°C
Package 4	7.7°C

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

#### GENERAL COMMENTS

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

Sample PP8806-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP8812-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP8815-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP8817-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

**Results relate only to the items tested.**

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #: 021-1228  
 P.O. #:  
 Site Location: TANSLEY QUARRY

### Quality Assurance Report

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3041751 SUP	QC Standard	Total Suspended Solids	2012/11/20		101	%	85 - 115
	Method Blank	Total Suspended Solids	2012/11/20	<10		mg/L	
	RPD [PP8814-02]	Total Suspended Solids	2012/11/20	NC		%	25
3041872 GKR	QC Standard	Total Suspended Solids	2012/11/20		97	%	85 - 115
	Method Blank	Total Suspended Solids	2012/11/20	<10		mg/L	
	RPD	Total Suspended Solids	2012/11/20	0.5		%	25
3042041 XQI	Matrix Spike [PP8812-06]	Sulphide	2012/11/20		83	%	80 - 120
	Spiked Blank	Sulphide	2012/11/20		93	%	80 - 120
	Method Blank	Sulphide	2012/11/20	<0.020		mg/L	
	RPD [PP8812-06]	Sulphide	2012/11/20	NC		%	20
3042157 XQI	Matrix Spike	Sulphide	2012/11/20		NC (1)	%	80 - 120
	Spiked Blank	Sulphide	2012/11/20		86	%	80 - 120
	Method Blank	Sulphide	2012/11/20	<0.020		mg/L	
	RPD	Sulphide	2012/11/20	0		%	20
3042338 L_A	Matrix Spike	Total Ammonia-N	2012/11/22		99	%	80 - 120
	Spiked Blank	Total Ammonia-N	2012/11/22		100	%	85 - 115
	Method Blank	Total Ammonia-N	2012/11/22	<0.050		mg/L	
	RPD	Total Ammonia-N	2012/11/22	8.9		%	20
3042347 L_A	Matrix Spike [PP8807-04]	Total Ammonia-N	2012/11/22		98	%	80 - 120
	Spiked Blank	Total Ammonia-N	2012/11/22		99	%	85 - 115
	Method Blank	Total Ammonia-N	2012/11/22	<0.050		mg/L	
	RPD [PP8807-04]	Total Ammonia-N	2012/11/22	NC		%	20
3042447 YPA	QC Standard	Alkalinity (Total as CaCO3)	2012/11/21		98	%	85 - 115
	Method Blank	Alkalinity (Total as CaCO3)	2012/11/21	<1.0		mg/L	
	RPD	Alkalinity (Total as CaCO3)	2012/11/21	NC		%	25
3042449 YPA	Matrix Spike	Fluoride (F-)	2012/11/21		96	%	80 - 120
	Spiked Blank	Fluoride (F-)	2012/11/21		104	%	80 - 120
	Method Blank	Fluoride (F-)	2012/11/21	<0.10		mg/L	
	RPD	Fluoride (F-)	2012/11/21	NC		%	20
3042483 NYS	QC Standard	Turbidity	2012/11/21		104	%	85 - 115
	Method Blank	Turbidity	2012/11/21	0.3, RDL=0.2		NTU	
	RPD	Turbidity	2012/11/21	11.0		%	20
3042686 FD	Matrix Spike [PP8811-01]	Dissolved Chloride (Cl)	2012/11/21		111	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/21		110	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/21		NC	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2012/11/21		98	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/21		97	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/21		96	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2012/11/21	<1.0		mg/L	
		Dissolved Bromide (Br-)	2012/11/21	<1.0		mg/L	
		Dissolved Sulphate (SO4)	2012/11/21	<1.0		mg/L	
	RPD [PP8811-01]	Dissolved Chloride (Cl)	2012/11/21	1.1		%	20
		Dissolved Bromide (Br-)	2012/11/21	NC		%	20
		Dissolved Sulphate (SO4)	2012/11/21	0.6		%	20
3042705 BIP	Matrix Spike [PP8809-01]	Orthophosphate (P)	2012/11/21		108	%	75 - 125
	Spiked Blank	Orthophosphate (P)	2012/11/21		100	%	80 - 120
	Method Blank	Orthophosphate (P)	2012/11/21	<0.010		mg/L	
	RPD [PP8809-01]	Orthophosphate (P)	2012/11/21	NC		%	25
3042878 C_H	Matrix Spike	Nitrite (N)	2012/11/21		103	%	80 - 120
		Nitrate (N)	2012/11/21		102	%	80 - 120
	Spiked Blank	Nitrite (N)	2012/11/21		97	%	85 - 115

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #: 021-1228  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3042878 C_H	Spiked Blank	Nitrate (N)	2012/11/21		99	%	85 - 115
	Method Blank	Nitrite (N)	2012/11/21	<0.010		mg/L	
	RPD	Nitrate (N)	2012/11/21	<0.10		mg/L	
		Nitrite (N)	2012/11/21	NC		%	25
3043123 LHA	Spiked Blank	Nitrate (N)	2012/11/21	NC		%	25
	Matrix Spike	Free Cyanide	2012/11/21		95	%	80 - 120
	Method Blank	Free Cyanide	2012/11/21		102	%	80 - 120
	RPD	Free Cyanide	2012/11/21	<0.0020		mg/L	
3043315 LCH	Matrix Spike	Free Cyanide	2012/11/21	NC		%	20
	[PP8809-07]	Mercury (Hg)	2012/11/21		116	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/21		108	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/21	<0.00010		mg/L	
3043330 BMO	RPD [PP8809-07]	Mercury (Hg)	2012/11/21	NC		%	20
	Matrix Spike	Phenols-4AAP	2012/11/21		99	%	80 - 120
	[PP8813-08]	Phenols-4AAP	2012/11/21		102	%	85 - 115
	Spiked Blank	Phenols-4AAP	2012/11/21	<0.0010		mg/L	
3043382 MC	Method Blank	Phenols-4AAP	2012/11/21	NC		%	25
	RPD [PP8813-08]	Phenols-4AAP	2012/11/21	NC		%	25
	Matrix Spike	Mercury (Hg)	2012/11/21		93	%	80 - 120
	[PP8805-07]	Mercury (Hg)	2012/11/21		93	%	80 - 120
3044187 VRO	Spiked Blank	Mercury (Hg)	2012/11/21	<0.00010		mg/L	
	Method Blank	Mercury (Hg)	2012/11/21			%	20
	RPD [PP8805-07]	Mercury (Hg)	2012/11/21	NC		%	20
	Matrix Spike	Total Phosphorus	2012/11/22		105	%	80 - 120
3045083 AHA	QC Standard	Total Phosphorus	2012/11/22		104	%	85 - 115
	Spiked Blank	Total Phosphorus	2012/11/22		102	%	85 - 115
	Method Blank	Total Phosphorus	2012/11/22	<0.020		mg/L	
	RPD	Total Phosphorus	2012/11/22	NC		%	20
3045136 LHA	Matrix Spike	Total Phosphorus	2012/11/23		98	%	80 - 120
	QC Standard	Total Phosphorus	2012/11/23		110	%	85 - 115
	Spiked Blank	Total Phosphorus	2012/11/23		103	%	85 - 115
	Method Blank	Total Phosphorus	2012/11/23	<0.002		mg/L	
3045726 PBA	RPD	Total Phosphorus	2012/11/23	NC		%	20
	Matrix Spike	Free Cyanide	2012/11/22		103	%	80 - 120
	[PP8814-05]	Free Cyanide	2012/11/22		109	%	80 - 120
	Spiked Blank	Free Cyanide	2012/11/22	<0.0020		mg/L	
3045726 PBA	Method Blank	Free Cyanide	2012/11/22			%	20
	RPD [PP8814-05]	Free Cyanide	2012/11/22	NC		%	20
	Matrix Spike	Dissolved Aluminum (Al)	2012/11/23		105	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/23		109	%	80 - 120
		Dissolved Arsenic (As)	2012/11/23		101	%	80 - 120
		Dissolved Barium (Ba)	2012/11/23		98	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/23		105	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/23		99	%	80 - 120
		Dissolved Boron (B)	2012/11/23		104	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/23		107	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/23		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/23		102	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/23		102	%	80 - 120
		Dissolved Copper (Cu)	2012/11/23		99	%	80 - 120
		Dissolved Iron (Fe)	2012/11/23		104	%	80 - 120
		Dissolved Lead (Pb)	2012/11/23		100	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/23		NC	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/23		105	%	80 - 120

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #: 021-1228  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3045726 PBA	Matrix Spike	Dissolved Molybdenum (Mo)	2012/11/23		107	%	80 - 120	
		Dissolved Nickel (Ni)	2012/11/23		99	%	80 - 120	
		Dissolved Phosphorus (P)	2012/11/23		105	%	80 - 120	
		Dissolved Potassium (K)	2012/11/23		104	%	80 - 120	
		Dissolved Selenium (Se)	2012/11/23		103	%	80 - 120	
		Dissolved Silicon (Si)	2012/11/23		107	%	80 - 120	
		Dissolved Silver (Ag)	2012/11/23		102	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/23		NC	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/23		NC	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/23		100	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/23		109	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/23		105	%	80 - 120	
		Dissolved Uranium (U)	2012/11/23		105	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/23		104	%	80 - 120	
		Dissolved Zinc (Zn)	2012/11/23		103	%	80 - 120	
		Spiked Blank	Dissolved Aluminum (Al)	2012/11/23		105	%	80 - 120
			Dissolved Antimony (Sb)	2012/11/23		101	%	80 - 120
			Dissolved Arsenic (As)	2012/11/23		98	%	80 - 120
			Dissolved Barium (Ba)	2012/11/23		97	%	80 - 120
			Dissolved Beryllium (Be)	2012/11/23		105	%	80 - 120
			Dissolved Bismuth (Bi)	2012/11/23		97	%	80 - 120
			Dissolved Boron (B)	2012/11/23		103	%	80 - 120
			Dissolved Cadmium (Cd)	2012/11/23		102	%	80 - 120
			Dissolved Calcium (Ca)	2012/11/23		99	%	80 - 120
			Dissolved Chromium (Cr)	2012/11/23		101	%	80 - 120
			Dissolved Cobalt (Co)	2012/11/23		100	%	80 - 120
			Dissolved Copper (Cu)	2012/11/23		96	%	80 - 120
			Dissolved Iron (Fe)	2012/11/23		101	%	80 - 120
			Dissolved Lead (Pb)	2012/11/23		99	%	80 - 120
			Dissolved Magnesium (Mg)	2012/11/23		106	%	80 - 120
			Dissolved Manganese (Mn)	2012/11/23		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/11/23		102	%	80 - 120
			Dissolved Nickel (Ni)	2012/11/23		98	%	80 - 120
Dissolved Phosphorus (P)	2012/11/23			102	%	80 - 120		
Dissolved Potassium (K)	2012/11/23			101	%	80 - 120		
Dissolved Selenium (Se)	2012/11/23			100	%	80 - 120		
Dissolved Silicon (Si)	2012/11/23			104	%	80 - 120		
Dissolved Silver (Ag)	2012/11/23			99	%	80 - 120		
Dissolved Sodium (Na)	2012/11/23			107	%	80 - 120		
Dissolved Strontium (Sr)	2012/11/23			102	%	80 - 120		
Dissolved Thallium (Tl)	2012/11/23			99	%	80 - 120		
Dissolved Tin (Sn)	2012/11/23			104	%	80 - 120		
Dissolved Titanium (Ti)	2012/11/23			99	%	80 - 120		
Dissolved Uranium (U)	2012/11/23			104	%	80 - 120		
Dissolved Vanadium (V)	2012/11/23			101	%	80 - 120		
Dissolved Zinc (Zn)	2012/11/23			101	%	80 - 120		
Method Blank	Dissolved Aluminum (Al)		2012/11/23		<5.0		ug/L	
	Dissolved Antimony (Sb)		2012/11/23		<0.50		ug/L	
	Dissolved Arsenic (As)	2012/11/23		<1.0		ug/L		
	Dissolved Barium (Ba)	2012/11/23		<2.0		ug/L		
	Dissolved Beryllium (Be)	2012/11/23		<0.50		ug/L		
	Dissolved Bismuth (Bi)	2012/11/23		<1.0		ug/L		
	Dissolved Boron (B)	2012/11/23		<10		ug/L		
	Dissolved Cadmium (Cd)	2012/11/23		<0.10		ug/L		
	Dissolved Calcium (Ca)	2012/11/23		<200		ug/L		

Golder Associates Ltd  
 Attention: Sharon Wood  
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 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3045726 PBA	Method Blank	Dissolved Chromium (Cr)	2012/11/23	<5.0		ug/L			
		Dissolved Cobalt (Co)	2012/11/23	<0.50		ug/L			
		Dissolved Copper (Cu)	2012/11/23	<1.0		ug/L			
		Dissolved Iron (Fe)	2012/11/23	<100		ug/L			
		Dissolved Lead (Pb)	2012/11/23	<0.50		ug/L			
		Dissolved Magnesium (Mg)	2012/11/23	<50		ug/L			
		Dissolved Manganese (Mn)	2012/11/23	<2.0		ug/L			
		Dissolved Molybdenum (Mo)	2012/11/23	<0.50		ug/L			
		Dissolved Nickel (Ni)	2012/11/23	<1.0		ug/L			
		Dissolved Phosphorus (P)	2012/11/23	<100		ug/L			
		Dissolved Potassium (K)	2012/11/23	<200		ug/L			
		Dissolved Selenium (Se)	2012/11/23	<2.0		ug/L			
		Dissolved Silicon (Si)	2012/11/23	<50		ug/L			
		Dissolved Silver (Ag)	2012/11/23	<0.10		ug/L			
		Dissolved Sodium (Na)	2012/11/23	<100		ug/L			
		Dissolved Strontium (Sr)	2012/11/23	<1.0		ug/L			
		Dissolved Thallium (Tl)	2012/11/23	<0.050		ug/L			
		Dissolved Tin (Sn)	2012/11/23	<1.0		ug/L			
		3045889 HRE	RPD Matrix Spike [PP8812-03]	Dissolved Titanium (Ti)	2012/11/23	<5.0		ug/L	
				Dissolved Uranium (U)	2012/11/23	<0.10		ug/L	
Dissolved Vanadium (V)	2012/11/23			<0.50		ug/L			
Dissolved Zinc (Zn)	2012/11/23			<5.0		ug/L			
Dissolved Lead (Pb)	2012/11/23			NC		%	20		
Total Aluminum (Al)	2012/11/23				88	%	80 - 120		
Total Antimony (Sb)	2012/11/23				112	%	80 - 120		
Total Arsenic (As)	2012/11/23				106	%	80 - 120		
Total Barium (Ba)	2012/11/23				99	%	80 - 120		
Total Beryllium (Be)	2012/11/23				100	%	80 - 120		
Total Bismuth (Bi)	2012/11/23				96	%	80 - 120		
Total Boron (B)	2012/11/23				NC	%	80 - 120		
Total Cadmium (Cd)	2012/11/23				101	%	80 - 120		
Total Calcium (Ca)	2012/11/23				NC	%	80 - 120		
Total Chromium (Cr)	2012/11/23				95	%	80 - 120		
Total Cobalt (Co)	2012/11/23				96	%	80 - 120		
Total Copper (Cu)	2012/11/23				89	%	80 - 120		
Total Iron (Fe)	2012/11/23				101	%	80 - 120		
Total Lead (Pb)	2012/11/23				95	%	80 - 120		
Total Magnesium (Mg)	2012/11/23				NC	%	80 - 120		
Total Manganese (Mn)	2012/11/23		96	%	80 - 120				
Total Molybdenum (Mo)	2012/11/23		112	%	80 - 120				
Total Nickel (Ni)	2012/11/23		93	%	80 - 120				
Total Phosphorus (P)	2012/11/23		119	%	80 - 120				
Total Potassium (K)	2012/11/23		NC	%	80 - 120				
Total Silicon (Si)	2012/11/23		94	%	80 - 120				
Total Selenium (Se)	2012/11/23		98	%	80 - 120				
Total Silver (Ag)	2012/11/23		94	%	80 - 120				
Total Sodium (Na)	2012/11/23		NC	%	80 - 120				
Total Strontium (Sr)	2012/11/23		NC	%	80 - 120				
Total Thallium (Tl)	2012/11/23		96	%	80 - 120				
Total Tin (Sn)	2012/11/23		107	%	80 - 120				
Total Titanium (Ti)	2012/11/23		101	%	80 - 120				
Total Uranium (U)	2012/11/23		105	%	80 - 120				
Total Vanadium (V)	2012/11/23		98	%	80 - 120				
Total Zinc (Zn)	2012/11/23		91	%	80 - 120				

Golder Associates Ltd  
 Attention: Sharon Wood  
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## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch			Date Analyzed				
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units	QC Limits
3045889 HRE	Spiked Blank	Total Aluminum (Al)	2012/11/23		93	%	80 - 120
		Total Antimony (Sb)	2012/11/23		113	%	80 - 120
		Total Arsenic (As)	2012/11/23		106	%	80 - 120
		Total Barium (Ba)	2012/11/23		104	%	80 - 120
		Total Beryllium (Be)	2012/11/23		105	%	80 - 120
		Total Bismuth (Bi)	2012/11/23		104	%	80 - 120
		Total Boron (B)	2012/11/23		104	%	80 - 120
		Total Cadmium (Cd)	2012/11/23		107	%	80 - 120
		Total Calcium (Ca)	2012/11/23		100	%	80 - 120
		Total Chromium (Cr)	2012/11/23		96	%	80 - 120
		Total Cobalt (Co)	2012/11/23		99	%	80 - 120
		Total Copper (Cu)	2012/11/23		99	%	80 - 120
		Total Iron (Fe)	2012/11/23		102	%	80 - 120
		Total Lead (Pb)	2012/11/23		104	%	80 - 120
		Total Magnesium (Mg)	2012/11/23		97	%	80 - 120
		Total Manganese (Mn)	2012/11/23		98	%	80 - 120
		Total Molybdenum (Mo)	2012/11/23		110	%	80 - 120
		Total Nickel (Ni)	2012/11/23		98	%	80 - 120
		Total Phosphorus (P)	2012/11/23		96	%	80 - 120
		Total Potassium (K)	2012/11/23		100	%	80 - 120
		Total Silicon (Si)	2012/11/23		96	%	80 - 120
		Total Selenium (Se)	2012/11/23		101	%	80 - 120
		Total Silver (Ag)	2012/11/23		102	%	80 - 120
		Total Sodium (Na)	2012/11/23		100	%	80 - 120
		Total Strontium (Sr)	2012/11/23		102	%	80 - 120
		Total Thallium (Tl)	2012/11/23		106	%	80 - 120
		Total Tin (Sn)	2012/11/23		109	%	80 - 120
		Total Titanium (Ti)	2012/11/23		100	%	80 - 120
		Total Uranium (U)	2012/11/23		108	%	80 - 120
		Total Vanadium (V)	2012/11/23		99	%	80 - 120
		Total Zinc (Zn)	2012/11/23		101	%	80 - 120
	Method Blank	Total Aluminum (Al)	2012/11/23	<5.0		ug/L	
		Total Antimony (Sb)	2012/11/23	<0.50		ug/L	
		Total Arsenic (As)	2012/11/23	<1.0		ug/L	
		Total Barium (Ba)	2012/11/23	<2.0		ug/L	
		Total Beryllium (Be)	2012/11/23	<0.50		ug/L	
		Total Bismuth (Bi)	2012/11/23	<1.0		ug/L	
		Total Boron (B)	2012/11/23	<10		ug/L	
		Total Cadmium (Cd)	2012/11/23	<0.10		ug/L	
		Total Calcium (Ca)	2012/11/23	<200		ug/L	
		Total Chromium (Cr)	2012/11/23	<5.0		ug/L	
		Total Cobalt (Co)	2012/11/23	<0.50		ug/L	
		Total Copper (Cu)	2012/11/23	<1.0		ug/L	
		Total Iron (Fe)	2012/11/23	<100		ug/L	
		Total Lead (Pb)	2012/11/23	<0.50		ug/L	
		Total Magnesium (Mg)	2012/11/23	<50		ug/L	
		Total Manganese (Mn)	2012/11/23	<2.0		ug/L	
		Total Molybdenum (Mo)	2012/11/23	<0.50		ug/L	
		Total Nickel (Ni)	2012/11/23	<1.0		ug/L	
		Total Phosphorus (P)	2012/11/23	<100		ug/L	
		Total Potassium (K)	2012/11/23	<200		ug/L	
		Total Silicon (Si)	2012/11/23	<50		ug/L	
		Total Selenium (Se)	2012/11/23	<2.0		ug/L	
		Total Silver (Ag)	2012/11/23	<0.10		ug/L	
		Total Sodium (Na)	2012/11/23	<100		ug/L	

Golder Associates Ltd  
 Attention: Sharon Wood  
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## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3045889 HRE	Method Blank	Total Strontium (Sr)	2012/11/23	<1.0		ug/L	
		Total Thallium (Tl)	2012/11/23	<0.050		ug/L	
		Total Tin (Sn)	2012/11/23	<1.0		ug/L	
		Total Titanium (Ti)	2012/11/23	<5.0		ug/L	
		Total Uranium (U)	2012/11/23	<0.10		ug/L	
		Total Vanadium (V)	2012/11/23	<0.50		ug/L	
		Total Zinc (Zn)	2012/11/23	<5.0		ug/L	
	RPD [PP8812-03]	Total Aluminum (Al)	2012/11/23	NC		%	20
		Total Antimony (Sb)	2012/11/23	NC		%	20
		Total Arsenic (As)	2012/11/23	NC		%	20
		Total Barium (Ba)	2012/11/23	NC		%	20
		Total Beryllium (Be)	2012/11/23	NC		%	20
		Total Bismuth (Bi)	2012/11/23	NC		%	20
		Total Boron (B)	2012/11/23	0.3		%	20
		Total Cadmium (Cd)	2012/11/23	NC		%	20
		Total Calcium (Ca)	2012/11/23	0.4		%	20
		Total Chromium (Cr)	2012/11/23	NC		%	20
		Total Cobalt (Co)	2012/11/23	NC		%	20
		Total Copper (Cu)	2012/11/23	5.1		%	20
		Total Iron (Fe)	2012/11/23	NC		%	20
		Total Lead (Pb)	2012/11/23	NC		%	20
		Total Magnesium (Mg)	2012/11/23	0.7		%	20
		Total Manganese (Mn)	2012/11/23	2.7		%	20
		Total Molybdenum (Mo)	2012/11/23	NC		%	20
		Total Nickel (Ni)	2012/11/23	NC		%	20
		Total Phosphorus (P)	2012/11/23	NC		%	20
		Total Potassium (K)	2012/11/23	1.9		%	20
		Total Silicon (Si)	2012/11/23	2.8		%	20
		Total Selenium (Se)	2012/11/23	NC		%	20
		Total Silver (Ag)	2012/11/23	NC		%	20
		Total Sodium (Na)	2012/11/23	2.9		%	20
		Total Strontium (Sr)	2012/11/23	0.8		%	20
		Total Thallium (Tl)	2012/11/23	NC		%	20
		Total Tin (Sn)	2012/11/23	NC		%	20
		Total Titanium (Ti)	2012/11/23	NC		%	20
		Total Uranium (U)	2012/11/23	NC		%	20
		Total Vanadium (V)	2012/11/23	NC		%	20
		Total Zinc (Zn)	2012/11/23	NC		%	20
3046868 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/26		90	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/26		106	%	80 - 120
		Dissolved Arsenic (As)	2012/11/26		100	%	80 - 120
		Dissolved Barium (Ba)	2012/11/26		NC	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/26		100	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/26		101	%	80 - 120
		Dissolved Boron (B)	2012/11/26		NC	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/26		104	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/26		96	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/26		94	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/26		97	%	80 - 120
		Dissolved Copper (Cu)	2012/11/26		NC	%	80 - 120
		Dissolved Iron (Fe)	2012/11/26		99	%	80 - 120
		Dissolved Lead (Pb)	2012/11/26		100	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/26		99	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/26		NC	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/26		105	%	80 - 120

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #: 021-1228  
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## Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3046868 HRE	Matrix Spike	Dissolved Nickel (Ni)	2012/11/26		NC	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/26		96	%	80 - 120
		Dissolved Potassium (K)	2012/11/26		97	%	80 - 120
		Dissolved Selenium (Se)	2012/11/26		96	%	80 - 120
		Dissolved Silicon (Si)	2012/11/26		99	%	80 - 120
		Dissolved Silver (Ag)	2012/11/26		NC	%	80 - 120
		Dissolved Sodium (Na)	2012/11/26		99	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/26		97	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/26		100	%	80 - 120
		Dissolved Tin (Sn)	2012/11/26		106	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/26		101	%	80 - 120
		Dissolved Uranium (U)	2012/11/26		104	%	80 - 120
		Dissolved Vanadium (V)	2012/11/26		NC	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/26		NC	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2012/11/26		89	%
	Dissolved Antimony (Sb)		2012/11/26		99	%	80 - 120
	Dissolved Arsenic (As)		2012/11/26		95	%	80 - 120
	Dissolved Barium (Ba)		2012/11/26		95	%	80 - 120
	Dissolved Beryllium (Be)		2012/11/26		97	%	80 - 120
	Dissolved Bismuth (Bi)		2012/11/26		96	%	80 - 120
	Dissolved Boron (B)		2012/11/26		98	%	80 - 120
	Dissolved Cadmium (Cd)		2012/11/26		96	%	80 - 120
	Dissolved Calcium (Ca)		2012/11/26		95	%	80 - 120
	Dissolved Chromium (Cr)		2012/11/26		93	%	80 - 120
	Dissolved Cobalt (Co)		2012/11/26		92	%	80 - 120
	Dissolved Copper (Cu)		2012/11/26		92	%	80 - 120
	Dissolved Iron (Fe)		2012/11/26		94	%	80 - 120
	Dissolved Lead (Pb)		2012/11/26		96	%	80 - 120
	Dissolved Magnesium (Mg)		2012/11/26		95	%	80 - 120
	Dissolved Manganese (Mn)		2012/11/26		93	%	80 - 120
	Dissolved Molybdenum (Mo)		2012/11/26		99	%	80 - 120
	Dissolved Nickel (Ni)		2012/11/26		92	%	80 - 120
	Dissolved Phosphorus (P)		2012/11/26		93	%	80 - 120
	Dissolved Potassium (K)		2012/11/26		94	%	80 - 120
	Dissolved Selenium (Se)		2012/11/26		92	%	80 - 120
	Dissolved Silicon (Si)		2012/11/26		94	%	80 - 120
	Dissolved Silver (Ag)		2012/11/26		94	%	80 - 120
	Dissolved Sodium (Na)		2012/11/26		95	%	80 - 120
	Dissolved Strontium (Sr)	2012/11/26		94	%	80 - 120	
Dissolved Thallium (Tl)	2012/11/26		96	%	80 - 120		
Dissolved Tin (Sn)	2012/11/26		98	%	80 - 120		
Dissolved Titanium (Ti)	2012/11/26		96	%	80 - 120		
Dissolved Uranium (U)	2012/11/26		99	%	80 - 120		
Dissolved Vanadium (V)	2012/11/26		93	%	80 - 120		
Dissolved Zinc (Zn)	2012/11/26		96	%	80 - 120		
Method Blank	Dissolved Aluminum (Al)	2012/11/26		<5.0		ug/L	
	Dissolved Antimony (Sb)	2012/11/26		<0.50		ug/L	
	Dissolved Arsenic (As)	2012/11/26		<1.0		ug/L	
	Dissolved Barium (Ba)	2012/11/26		<2.0		ug/L	
	Dissolved Beryllium (Be)	2012/11/26		<0.50		ug/L	
	Dissolved Bismuth (Bi)	2012/11/26		<1.0		ug/L	
	Dissolved Boron (B)	2012/11/26		<10		ug/L	
	Dissolved Cadmium (Cd)	2012/11/26		<0.10		ug/L	
	Dissolved Calcium (Ca)	2012/11/26		<200		ug/L	
Dissolved Chromium (Cr)	2012/11/26		<5.0		ug/L		



Golder Associates Ltd  
 Attention: Sharon Wood  
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### Quality Assurance Report (Continued)

Maxxam Job Number: MB2H9928

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3046868 HRE	Method Blank	Dissolved Cobalt (Co)	2012/11/26	<0.50		ug/L	
		Dissolved Copper (Cu)	2012/11/26	<1.0		ug/L	
		Dissolved Iron (Fe)	2012/11/26	<100		ug/L	
		Dissolved Lead (Pb)	2012/11/26	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/26	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/26	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/26	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/26	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/26	<100		ug/L	
		Dissolved Potassium (K)	2012/11/26	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/26	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/26	<50		ug/L	
		Dissolved Silver (Ag)	2012/11/26	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/26	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/26	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/26	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/26	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/26	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/26	<0.10		ug/L	
		Dissolved Vanadium (V)	2012/11/26	0.65, RDL=0.50		ug/L	
		Dissolved Zinc (Zn)	2012/11/26	<5.0		ug/L	
	RPD	Dissolved Aluminum (Al)	2012/11/26	4.0		%	20
		Dissolved Antimony (Sb)	2012/11/26	3.3		%	20
		Dissolved Arsenic (As)	2012/11/26	6.1		%	20
		Dissolved Barium (Ba)	2012/11/26	3.1		%	20
		Dissolved Beryllium (Be)	2012/11/26	3.2		%	20
		Dissolved Boron (B)	2012/11/26	6.0		%	20
		Dissolved Cadmium (Cd)	2012/11/26	3.1		%	20
		Dissolved Chromium (Cr)	2012/11/26	3.2		%	20
		Dissolved Copper (Cu)	2012/11/26	4.0		%	20
		Dissolved Iron (Fe)	2012/11/26	3.7		%	20
		Dissolved Lead (Pb)	2012/11/26	2.6		%	20
		Dissolved Manganese (Mn)	2012/11/26	2.8		%	20
		Dissolved Molybdenum (Mo)	2012/11/26	3.5		%	20
		Dissolved Nickel (Ni)	2012/11/26	3.5		%	20
		Dissolved Selenium (Se)	2012/11/26	4.9		%	20
		Dissolved Silver (Ag)	2012/11/26	2.5		%	20
		Dissolved Thallium (Tl)	2012/11/26	2.1		%	20
		Dissolved Vanadium (V)	2012/11/26	3.8		%	20
		Dissolved Zinc (Zn)	2012/11/26	1.7		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

( 1 ) The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

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


\_\_\_\_\_  
Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist



\_\_\_\_\_  
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.

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/26

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water

# Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	14	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	14	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Free (WAD) Cyanide	13	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	14	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	8	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/23	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/26	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	14	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	5	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	1	N/A	2012/11/26	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	14	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	14	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (1)	14	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	14	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	14	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	14	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	14	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	8	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Phosphorus (Colourimetric)	6	2012/11/21	2012/11/22	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	14	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	14	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

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in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8804		PP8805		PP8806			PP8807	PP8807		
Sampling Date		2012/11/15		2012/11/15		2012/11/15			2012/11/15	2012/11/15		
	Units	MW2-SHALLOW	RDL	MW2-INT	RDL	MW11-D	RDL	QC Batch	XYZ	XYZ Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>												
Hardness (CaCO <sub>3</sub> )	mg/L	1900	1.0	1000	1.0	27000	1.0	3041014	440		1.0	3041014
<b>Inorganics</b>												
Total Ammonia-N	mg/L	0.50	0.050	1.7	0.050	35	0.050	3042338	0.14	0.087	0.050	3042347
Fluoride (F <sup>-</sup> )	mg/L	0.33	0.10	0.27	0.10	0.12	0.10	3042449	0.25		0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	<0.0020	0.0020	<0.0020	0.0020	3045136	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	3042705	<0.010		0.010	3042705
pH	pH	7.61		7.43		6.14		3042434	6.71			3042434
Phenols-4AAP	mg/L	0.0013	0.0010	<0.0010	0.0010	0.0091	0.0010	3043330	<0.0010		0.0010	3043330
Total Phosphorus	mg/L	2.4	0.40	0.47	0.10	<0.20 <sup>(1)</sup>	0.20	3044187	<0.002		0.002	3045083
Total Suspended Solids	mg/L	2600	100	650	50	3000	100	3041872	<10		10	3041751
Sulphide	mg/L	0.33	0.020	<0.020	0.020	<0.020	0.020	3042157	<0.020		0.020	3042157
Turbidity	NTU	640	2	290	1	320	1	3042483	4.2		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	730	1.0	160	1.0	55	1.0	3042447	75		1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	<0.010	0.010	<0.10	0.10	3042878	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	18	10	130	10	47000	500	3042686	590		5.0	3042686
Nitrate (N)	mg/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	3042878	1.9		0.10	3042878
Nitrate + Nitrite	mg/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	3042878	1.9		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<10	10	<10	10	580	500	3042686	6.9		5.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1300	10	1100	10	1300	500	3042686	340		5.0	3042686

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B2H9928  
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 Golder Associates Ltd  
 Client Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
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**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8808		PP8809	PP8809			PP8810		
Sampling Date		2012/11/15		2012/11/15	2012/11/15			2012/11/15		
	Units	MAIN HOUSE	QC Batch	COTTAGE	COTTAGE Lab-Dup	RDL	QC Batch	MAIN BARN	RDL	QC Batch
<b>Calculated Parameters</b>										
Hardness (CaCO3)	mg/L	530	3041014	550		1.0	3041014	420	1.0	3041014
<b>Inorganics</b>										
Total Ammonia-N	mg/L	0.71	3042338	0.48		0.050	3042338	0.067	0.050	3042338
Fluoride (F-)	mg/L	0.23	3042449	0.20		0.10	3042449	0.23	0.10	3042449
Free Cyanide	mg/L	<0.0020	3045136	<0.0020		0.0020	3045136	<0.0020	0.0020	3043123
Orthophosphate (P)	mg/L	<0.010	3042705	<0.010	<0.010	0.010	3042705	<0.010	0.010	3042705
pH	pH	7.97	3042434	8.03			3042434	6.78		3042434
Phenols-4AAP	mg/L	<0.0010	3043330	<0.0010		0.0010	3043330	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002	3045083	<0.002		0.002	3045083	<0.002	0.002	3045083
Total Suspended Solids	mg/L	<10	3041751	<10		10	3041751	<10	10	3041751
Sulphide	mg/L	<0.020	3042157	<0.020		0.020	3042041	<0.020	0.020	3042041
Turbidity	NTU	3.3	3042483	7.6		0.2	3042483	1.4	0.2	3042483
Alkalinity (Total as CaCO3)	mg/L	360	3042447	370		1.0	3042447	75	1.0	3042447
Nitrite (N)	mg/L	<0.010	3042878	<0.010		0.010	3042878	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	140	3042686	150		1.0	3042686	560	5.0	3042686
Nitrate (N)	mg/L	<0.10	3042878	<0.10		0.10	3042878	1.9	0.10	3042878
Nitrate + Nitrite	mg/L	<0.10	3042878	<0.10		0.10	3042878	1.9	0.10	3042878
Dissolved Bromide (Br-)	mg/L	<1.0	3042686	<1.0		1.0	3042686	6.6	5.0	3042686
Dissolved Sulphate (SO4)	mg/L	170	3042686	150		1.0	3042686	330	5.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8811	PP8811		PP8812	PP8812			PP8813	PP8813		
Sampling Date		2012/11/15	2012/11/15		2012/11/15	2012/11/15			2012/11/15	2012/11/15		
	Units	FINNUCCI	FINNUCCI Lab-Dup	RDL	SUGIYAMA	SUGIYAMA Lab-Dup	RDL	QC Batch	SIMMS	SIMMS Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>												
Hardness (CaCO <sub>3</sub> )	mg/L	500		1.0	1300		1.0	3041014	340		1.0	3041014
<b>Inorganics</b>												
Total Ammonia-N	mg/L	0.13		0.050	2.2		0.050	3042338	<0.050		0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.35		0.10	0.43		0.10	3042449	0.22		0.10	3042449
Free Cyanide	mg/L	<0.0020		0.0020	<0.0020		0.0020	3045136	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	<0.010		0.010	3042705	<0.010		0.010	3042705
pH	pH	7.99			7.62			3042434	8.02			3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	<0.0010		0.0010	3043330	<0.0010	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	<0.002		0.002	3045083	0.006		0.002	3045083
Total Suspended Solids	mg/L	<10		10	15		10	3041751	<10		10	3041751
Sulphide	mg/L	<0.020		0.020	<0.020	<0.020	0.020	3042041	<0.020		0.020	3042157
Turbidity	NTU	1.5		0.2	3.9		0.2	3042483	0.7		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	410		1.0	180		1.0	3042447	300		1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	0.048		0.010	3042878	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	22	22	1.0	1800		10	3042686	7.3		1.0	3042686
Nitrate (N)	mg/L	0.81		0.10	1.6		0.10	3042878	1.3		0.10	3042878
Nitrate + Nitrite	mg/L	0.81		0.10	1.6		0.10	3042878	1.3		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	<1.0	1.0	22		10	3042686	<1.0		1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	360	360	1.0	910		10	3042686	95		1.0	3042686

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8814	PP8814			PP8815		PP8816	PP8817		
Sampling Date		2012/11/15	2012/11/15			2012/11/15		2012/11/15	2012/11/15		
	Units	BEKKERS	BEKKERS Lab-Dup	RDL	QC Batch	MW11-INT	RDL	MW11-SHALLOW	DUP #2	RDL	QC Batch
<b>Calculated Parameters</b>											
Hardness (CaCO3)	mg/L	720		1.0	3041014	430	1.0	410	430	1.0	3041014
<b>Inorganics</b>											
Total Ammonia-N	mg/L	0.94		0.050	3042338	1.8	0.050	0.26	1.8	0.050	3042338
Fluoride (F-)	mg/L	0.26		0.10	3042449	0.29	0.10	0.14	0.30	0.10	3042449
Free Cyanide	mg/L	<0.0020	<0.0020	0.0020	3045136	<0.0020	0.0020	<0.0020	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	3042705	<0.010	0.010	<0.010	<0.010	0.010	3042705
pH	pH	6.90			3042434	8.00		8.01	7.98		3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	3043330	<0.0010	0.0010	<0.0010	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	3045083	11	0.40	5.9	11	0.40	3044187
Total Suspended Solids	mg/L	<10	<10	10	3041751	14000	200	7100	9200	200	3041872
Sulphide	mg/L	<0.020		0.020	3042041	0.021	0.020	0.042	<0.020	0.020	3042041
Turbidity	NTU	0.4		0.2	3042483	900	2	1900	1900	4	3042483
Alkalinity (Total as CaCO3)	mg/L	100		1.0	3042447	400	1.0	340	410	1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	3042878	<0.010	0.010	<0.010	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	270		10	3042686	15	1.0	2.6	15	1.0	3042686
Nitrate (N)	mg/L	0.27		0.10	3042878	<0.10	0.10	<0.10	<0.10	0.10	3042878
Nitrate + Nitrite	mg/L	0.27		0.10	3042878	<0.10	0.10	<0.10	<0.10	0.10	3042878
Dissolved Bromide (Br-)	mg/L	<10		10	3042686	<1.0	1.0	<1.0	<1.0	1.0	3042686
Dissolved Sulphate (SO4)	mg/L	850		10	3042686	160	1.0	71	170	1.0	3042686

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8804			PP8805	PP8805			PP8806		
Sampling Date		2012/11/15			2012/11/15	2012/11/15			2012/11/15		
	Units	MW2-SHALLOW	RDL	QC Batch	MW2-INT	MW2-INT Lab-Dup	RDL	QC Batch	MW11-D	RDL	QC Batch
<b>Metals</b>											
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315	<0.00010	<0.00010	0.00010	3043382	<0.00010	0.00010	3043315
Dissolved Aluminum (Al)	ug/L	28	5.0	3045726	53		5.0	3045726	<250	250	3046868
Total Aluminum (Al)	ug/L	31000	500	3045889	5300		5.0	3045889	1400	250	3045889
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	3045726	<0.50		0.50	3045726	<25	25	3046868
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889	<0.50		0.50	3045889	<25	25	3045889
Dissolved Arsenic (As)	ug/L	1.7	1.0	3045726	3.1		1.0	3045726	<50	50	3046868
Total Arsenic (As)	ug/L	16	1.0	3045889	5.8		1.0	3045889	<50	50	3045889
Dissolved Barium (Ba)	ug/L	16	2.0	3045726	7.2		2.0	3045726	170	100	3046868
Total Barium (Ba)	ug/L	340	2.0	3045889	190		2.0	3045889	150	100	3045889
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	3045726	<0.50		0.50	3045726	<25	25	3046868
Total Beryllium (Be)	ug/L	2.0	0.50	3045889	<0.50		0.50	3045889	<25	25	3045889
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	3045726	<1.0		1.0	3045726	<50	50	3046868
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889	<1.0		1.0	3045889	<50	50	3045889
Dissolved Boron (B)	ug/L	330	10	3045726	2000		10	3045726	5600	500	3046868
Total Boron (B)	ug/L	320	10	3045889	1800		10	3045889	5000	500	3045889
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	3045726	<0.10		0.10	3045726	11	5.0	3046868
Total Cadmium (Cd)	ug/L	1.8	0.10	3045889	<0.10		0.10	3045889	7.3	5.0	3045889
Dissolved Calcium (Ca)	ug/L	170000	200	3045726	200000		1000	3045726	7800000	10000	3046868
Total Calcium (Ca)	ug/L	460000	200	3045889	240000		1000	3045889	7400000	10000	3045889
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	3045726	<5.0		5.0	3045726	<250	250	3046868
Total Chromium (Cr)	ug/L	62	5.0	3045889	13		5.0	3045889	<250	250	3045889
Dissolved Cobalt (Co)	ug/L	0.70	0.50	3045726	<0.50		0.50	3045726	<25	25	3046868
Total Cobalt (Co)	ug/L	30	1.0	3045889	5.6		0.50	3045889	<25	25	3045889
Dissolved Copper (Cu)	ug/L	<1.0	1.0	3045726	<1.0		1.0	3045726	<50	50	3046868
Total Copper (Cu)	ug/L	57	1.0	3045889	12		1.0	3045889	<50	50	3045889
Dissolved Iron (Fe)	ug/L	1700	100	3045726	1200		100	3045726	12000	5000	3046868
Total Iron (Fe)	ug/L	72000	100	3045889	11000		100	3045889	16000	5000	3045889
Dissolved Lead (Pb)	ug/L	<0.50	0.50	3045726	<0.50		0.50	3045726	<25	25	3046868
Total Lead (Pb)	ug/L	28	0.50	3045889	5.4		0.50	3045889	<25	25	3045889
Dissolved Magnesium (Mg)	ug/L	350000	50	3045726	130000		50	3045726	1900000	2500	3046868
Total Magnesium (Mg)	ug/L	350000	50	3045889	120000		50	3045889	1700000	2500	3045889
Dissolved Manganese (Mn)	ug/L	760	2.0	3045726	140		2.0	3045726	4000	100	3046868
Total Manganese (Mn)	ug/L	2400	2.0	3045889	530		2.0	3045889	4000	100	3045889
Dissolved Molybdenum (Mo)	ug/L	4.4	0.50	3045726	9.5		0.50	3045726	57	25	3046868

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8804			PP8805			PP8806			
Sampling Date		2012/11/15			2012/11/15			2012/11/15			
	Units	MW2-SHALLOW	RDL	QC Batch	MW2-INT	MW2-INT Lab-Dup	RDL	QC Batch	MW11-D	RDL	QC Batch
Total Molybdenum (Mo)	ug/L	6.4	0.50	3045889	11		0.50	3045889	<25	25	3045889
Dissolved Nickel (Ni)	ug/L	2.1	1.0	3045726	<1.0		1.0	3045726	200	50	3046868
Total Nickel (Ni)	ug/L	67	2.0	3045889	14		1.0	3045889	210	50	3045889
Dissolved Phosphorus (P)	ug/L	<100	100	3045726	<100		100	3045726	<5000	5000	3046868
Total Phosphorus (P)	ug/L	2100	100	3045889	350		100	3045889	<5000	5000	3045889
Dissolved Potassium (K)	ug/L	7300	200	3045726	19000		200	3045726	290000	10000	3046868
Total Potassium (K)	ug/L	15000	200	3045889	19000		200	3045889	270000	10000	3045889
Dissolved Selenium (Se)	ug/L	<2.0	2.0	3045726	<2.0		2.0	3045726	<200	200	3046868
Dissolved Silicon (Si)	ug/L	10000	50	3045726	5400		50	3045726	<2500	2500	3046868
Total Silicon (Si)	ug/L	48000	50	3045889	13000		50	3045889	5500	2500	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889	<2.0		2.0	3045889	<100	100	3045889
Dissolved Silver (Ag)	ug/L	<0.10	0.10	3045726	<0.10		0.10	3045726	<5.0	5.0	3046868
Total Silver (Ag)	ug/L	0.24	0.10	3045889	<0.10		0.10	3045889	<5.0	5.0	3045889
Dissolved Sodium (Na)	ug/L	74000	100	3045726	240000		100	3045726	17000000	5000	3046868
Total Sodium (Na)	ug/L	66000	100	3045889	200000		100	3045889	16000000	5000	3045889
Dissolved Strontium (Sr)	ug/L	3400	1.0	3045726	11000		1.0	3045726	160000	50	3046868
Total Strontium (Sr)	ug/L	4800	1.0	3045889	12000		1.0	3045889	160000	50	3045889
Dissolved Thallium (TI)	ug/L	<0.050	0.050	3045726	<0.050		0.050	3045726	<2.5	2.5	3046868
Total Thallium (TI)	ug/L	0.32	0.050	3045889	<0.050		0.050	3045889	<2.5	2.5	3045889
Dissolved Tin (Sn)	ug/L	<1.0	1.0	3045726	<1.0		1.0	3045726	<50	50	3046868
Total Tin (Sn)	ug/L	<1.0	1.0	3045889	<1.0		1.0	3045889	<50	50	3045889
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	3045726	<5.0		5.0	3045726	<250	250	3046868
Total Titanium (Ti)	ug/L	<500	500	3045889	120		5.0	3045889	<250	250	3045889
Dissolved Uranium (U)	ug/L	19	0.10	3045726	0.52		0.10	3045726	19	5.0	3046868
Total Uranium (U)	ug/L	23	0.10	3045889	1.3		0.10	3045889	15	5.0	3045889
Dissolved Vanadium (V)	ug/L	<0.50	0.50	3045726	<0.50		0.50	3045726	<50	50	3046868
Total Vanadium (V)	ug/L	69	0.50	3045889	12		0.50	3045889	<25	25	3045889
Dissolved Zinc (Zn)	ug/L	<10 <sup>(1)</sup>	10	3045726	<10 <sup>(1)</sup>		10	3045726	<250	250	3046868
Total Zinc (Zn)	ug/L	190	10	3045889	33		10	3045889	<250	250	3045889

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) - Detection Limit was raised due to matrix interferences.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8807	PP8808	PP8809	PP8809	PP8810		
Sampling Date		2012/11/15	2012/11/15	2012/11/15	2012/11/15	2012/11/15		
	Units	XYZ	MAIN HOUSE	COTTAGE	COTTAGE Lab-Dup	MAIN BARN	RDL	QC Batch
<b>Metals</b>								
Mercury (Hg)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	44	5.5	<5.0		22	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	<0.50	<0.50		<0.50	0.50	3045889
Total Arsenic (As)	ug/L	<1.0	10	11		<1.0	1.0	3045889
Total Barium (Ba)	ug/L	30	29	30		24	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	<0.50	<0.50		<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0		<1.0	1.0	3045889
Total Boron (B)	ug/L	2400	630	500		2400	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10		<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	120000	92000	95000		120000	200	3045889
Total Chromium (Cr)	ug/L	<5.0	<5.0	<5.0		<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	<0.50	<0.50		<0.50	0.50	3045889
Total Copper (Cu)	ug/L	14	9.0	50		3.2	1.0	3045889
Total Iron (Fe)	ug/L	1000	830	1200		<100	100	3045889
Total Lead (Pb)	ug/L	2.2	1.0	1.2		0.52	0.50	3045889
Total Magnesium (Mg)	ug/L	37000	83000	80000		36000	50	3045889
Total Manganese (Mn)	ug/L	67	39	34		57	2.0	3045889
Total Molybdenum (Mo)	ug/L	2.3	4.1	3.0		1.9	0.50	3045889
Total Nickel (Ni)	ug/L	<1.0	8.2	<1.0		<1.0	1.0	3045889
Total Phosphorus (P)	ug/L	<100	<100	<100		<100	100	3045889
Total Potassium (K)	ug/L	14000	9600	8200		14000	200	3045889
Total Silicon (Si)	ug/L	1800	9400	9500		1800	50	3045889
Total Selenium (Se)	ug/L	<2.0	<2.0	<2.0		<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10		<0.10	0.10	3045889
Total Sodium (Na)	ug/L	330000	66000	58000		320000	100	3045889
Total Strontium (Sr)	ug/L	4000	5400	4800		3900	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	<0.050	<0.050		<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	<1.0	<1.0		<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	<5.0	<5.0		<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.16	1.3	1.3		0.19	0.10	3045889
Total Vanadium (V)	ug/L	1.0	0.91	0.71		0.94	0.50	3045889
Total Zinc (Zn)	ug/L	260	8.9	38		66	5.0	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8811		PP8812	PP8812		PP8813		
Sampling Date		2012/11/15		2012/11/15	2012/11/15		2012/11/15		
	Units	FINNUCCI	RDL	SUGIYAMA	SUGIYAMA Lab-Dup	RDL	SIMMS	RDL	QC Batch
<b>Metals</b>									
Mercury (Hg)	mg/L	<0.00010	0.00010	<0.00010		0.00010	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	<5.0	5.0	<25	<25	25	<5.0	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	0.50	<2.5	<2.5	2.5	1.2	0.50	3045889
Total Arsenic (As)	ug/L	1.6	1.0	<5.0	<5.0	5.0	<1.0	1.0	3045889
Total Barium (Ba)	ug/L	16	2.0	12	11	10	59	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	<2.5	<2.5	2.5	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	<5.0	<5.0	5.0	<1.0	1.0	3045889
Total Boron (B)	ug/L	2900	10	4900	4900	50	100	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	0.10	<0.50	<0.50	0.50	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	92000	1000	350000	350000	1000	88000	200	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	<25	<25	25	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	<2.5	<2.5	2.5	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	23	1.0	36	34	5.0	13	1.0	3045889
Total Iron (Fe)	ug/L	740	100	<500	<500	500	<100	100	3045889
Total Lead (Pb)	ug/L	6.3	0.50	<2.5	<2.5	2.5	0.79	0.50	3045889
Total Magnesium (Mg)	ug/L	69000	50	120000	120000	250	30000	50	3045889
Total Manganese (Mn)	ug/L	110	2.0	100	99	10	16	2.0	3045889
Total Molybdenum (Mo)	ug/L	1.8	0.50	4.5	4.6	2.5	1.2	0.50	3045889
Total Nickel (Ni)	ug/L	3.1	1.0	<5.0	<5.0	5.0	<1.0	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	<500	<500	500	<100	100	3045889
Total Potassium (K)	ug/L	24000	200	38000	37000	1000	3800	200	3045889
Total Silicon (Si)	ug/L	5300	50	3900	3800	250	4000	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	<10	<10	10	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	<0.50	<0.50	0.50	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	100000	100	870000	840000	500	15000	100	3045889
Total Strontium (Sr)	ug/L	15000	1.0	22000	21000	5.0	1100	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	<0.25	<0.25	0.25	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	<5.0	<5.0	5.0	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	<25	<25	25	<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.21	0.10	<0.50	<0.50	0.50	3.1	0.10	3045889
Total Vanadium (V)	ug/L	0.77	0.50	<2.5	<2.5	2.5	0.63	0.50	3045889
Total Zinc (Zn)	ug/L	240	5.0	<25	<25	25	1400	5.0	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8814			PP8815		PP8816		PP8817		
Sampling Date		2012/11/15			2012/11/15		2012/11/15		2012/11/15		
	Units	BEKKERS	RDL	QC Batch	MW11-INT	RDL	MW11-SHALLOW	RDL	DUP #2	RDL	QC Batch
<b>Metals</b>											
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	3043315
Dissolved Aluminum (Al)	ug/L			3046868	250	5.0	68	5.0	720	5.0	3045726
Total Aluminum (Al)	ug/L	7.8	5.0	3045889	91000	25	49000	500	58000	500	3045889
Dissolved Antimony (Sb)	ug/L			3046868	<0.50	0.50	0.50	0.50	<0.50	0.50	3045726
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889	<2.5	2.5	<0.50	0.50	<1.0	1.0	3045889
Dissolved Arsenic (As)	ug/L			3046868	8.7	1.0	2.1	1.0	8.7	1.0	3045726
Total Arsenic (As)	ug/L	<1.0	1.0	3045889	78	5.0	29	1.0	51	2.0	3045889
Dissolved Barium (Ba)	ug/L			3046868	21	2.0	52	2.0	22	2.0	3045726
Total Barium (Ba)	ug/L	16	2.0	3045889	1400	10	1000	2.0	610	4.0	3045889
Dissolved Beryllium (Be)	ug/L			3046868	<0.50	0.50	<0.50	0.50	<0.50	0.50	3045726
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889	6.0	2.5	3.0	0.50	3.7	1.0	3045889
Dissolved Bismuth (Bi)	ug/L			3046868	<1.0	1.0	<1.0	1.0	<1.0	1.0	3045726
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889	<5.0	5.0	<1.0	1.0	<2.0	2.0	3045889
Dissolved Boron (B)	ug/L			3046868	1600	10	97	10	1700	10	3045726
Total Boron (B)	ug/L	1600	10	3045889	1700	50	140	10	1700	20	3045889
Dissolved Cadmium (Cd)	ug/L			3046868	<0.10	0.10	<0.10	0.10	<0.10	0.10	3045726
Total Cadmium (Cd)	ug/L	0.57	0.10	3045889	1.5	0.50	1.1	0.10	1.2	0.20	3045889
Dissolved Calcium (Ca)	ug/L			3046868	72000	1000	61000	200	72000	1000	3045726
Total Calcium (Ca)	ug/L	170000	1000	3045889	1500000	1000	450000	200	980000	800	3045889
Dissolved Chromium (Cr)	ug/L			3046868	<5.0	5.0	<5.0	5.0	<5.0	5.0	3045726
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889	190	25	150	5.0	110	10	3045889
Dissolved Cobalt (Co)	ug/L			3046868	<0.50	0.50	2.8	0.50	1.2	0.50	3045726
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889	120	2.5	49	1.0	69	2.0	3045889
Dissolved Copper (Cu)	ug/L			3046868	<1.0	1.0	<1.0	1.0	1.1	1.0	3045726
Total Copper (Cu)	ug/L	31	1.0	3045889	240	5.0	140	1.0	150	2.0	3045889
Dissolved Iron (Fe)	ug/L			3046868	840	100	420	100	1200	100	3045726
Total Iron (Fe)	ug/L	<100	100	3045889	210000	500	100000	100	130000	200	3045889
Dissolved Lead (Pb)	ug/L			3046868	<0.50	0.50	<0.50	0.50	<0.50	0.50	3045726
Total Lead (Pb)	ug/L	3.4	0.50	3045889	81	2.5	42	0.50	50	1.0	3045889
Dissolved Magnesium (Mg)	ug/L			3046868	61000	50	62000	50	61000	50	3045726
Total Magnesium (Mg)	ug/L	71000	50	3045889	180000	250	93000	50	130000	100	3045889
Dissolved Manganese (Mn)	ug/L			3046868	33	2.0	74	2.0	37	2.0	3045726
Total Manganese (Mn)	ug/L	84	2.0	3045889	13000	10	4200	2.0	7900	4.0	3045889
Dissolved Molybdenum (Mo)	ug/L			3046868	3.1	0.50	2.7	0.50	3.0	0.50	3045726
Total Molybdenum (Mo)	ug/L	15	0.50	3045889	6.8	2.5	5.2	0.50	5.6	1.0	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/26

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8814			PP8815		PP8816		PP8817		
Sampling Date		2012/11/15			2012/11/15		2012/11/15		2012/11/15		
	Units	BEKKERS	RDL	QC Batch	MW11-INT	RDL	MW11-SHALLOW	RDL	DUP #2	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L			3046868	<1.0	1.0	1.1	1.0	<1.0	1.0	3045726
Total Nickel (Ni)	ug/L	32	1.0	3045889	240	5.0	100	2.0	140	4.0	3045889
Dissolved Phosphorus (P)	ug/L			3046868	<100	100	<100	100	<100	100	3045726
Total Phosphorus (P)	ug/L	<100	100	3045889	10000	500	2600	100	5800	200	3045889
Dissolved Potassium (K)	ug/L			3046868	18000	200	4200	200	18000	200	3045726
Total Potassium (K)	ug/L	15000	200	3045889	33000	1000	15000	200	28000	400	3045889
Dissolved Selenium (Se)	ug/L			3046868	<2.0	2.0	<2.0	2.0	<2.0	2.0	3045726
Dissolved Silicon (Si)	ug/L			3046868	8800	50	9400	50	9700	50	3045726
Total Silicon (Si)	ug/L	3700	50	3045889	91000	250	69000	5000	76000	100	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889	<10	10	<2.0	2.0	<4.0	4.0	3045889
Dissolved Silver (Ag)	ug/L			3046868	<0.10	0.10	<0.10	0.10	<0.10	0.10	3045726
Total Silver (Ag)	ug/L	<0.10	0.10	3045889	<0.50	0.50	0.31	0.10	0.36	0.20	3045889
Dissolved Sodium (Na)	ug/L			3046868	71000	100	13000	100	71000	100	3045726
Total Sodium (Na)	ug/L	230000	100	3045889	63000	500	11000	100	67000	200	3045889
Dissolved Strontium (Sr)	ug/L			3046868	10000	1.0	1100	1.0	10000	1.0	3045726
Total Strontium (Sr)	ug/L	12000	1.0	3045889	14000	5.0	1900	1.0	13000	2.0	3045889
Dissolved Thallium (Tl)	ug/L			3046868	<0.050	0.050	<0.050	0.050	<0.050	0.050	3045726
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889	0.51	0.25	0.49	0.050	0.41	0.10	3045889
Dissolved Tin (Sn)	ug/L			3046868	<1.0	1.0	<1.0	1.0	<1.0	1.0	3045726
Total Tin (Sn)	ug/L	<1.0	1.0	3045889	<5.0	5.0	<1.0	1.0	<2.0	2.0	3045889
Dissolved Titanium (Ti)	ug/L			3046868	<5.0	5.0	<5.0	5.0	14	5.0	3045726
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889	1100	25	520	500	930	10	3045889
Dissolved Uranium (U)	ug/L			3046868	0.32	0.10	2.8	0.10	0.32	0.10	3045726
Total Uranium (U)	ug/L	0.87	0.10	3045889	9.4	0.50	6.9	0.10	5.7	0.20	3045889
Dissolved Vanadium (V)	ug/L			3046868	0.53	0.50	<0.50	0.50	1.2	0.50	3045726
Total Vanadium (V)	ug/L	0.64	0.50	3045889	190	2.5	96	0.50	120	1.0	3045889
Dissolved Zinc (Zn)	ug/L			3046868	<5.0	5.0	<5.0	5.0	11	5.0	3045726
Total Zinc (Zn)	ug/L	2200	5.0	3045889	550	25	360	5.0	330	10	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

**Maxxam ID** PP8804  
**Sample ID** MW2-SHALLOW  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8805  
**Sample ID** MW2-INT  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043382	2012/11/21	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li

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pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8805 Dup  
**Sample ID** MW2-INT  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury in Water by CVAA	CVAA	3043382	2012/11/21	2012/11/21	Magdalena Carlos

**Maxxam ID** PP8806  
**Sample ID** MW11-D  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/26	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3046868	N/A	2012/11/26	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake



Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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### Test Summary

**Maxxam ID** PP8807  
**Sample ID** XYZ  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042347	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8807 Dup  
**Sample ID** XYZ  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Ammonia-N	LACH/NH4	3042347	N/A	2012/11/22	Lemeneh Addis

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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Client Project #: 021-1228  
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### Test Summary

**Maxxam ID** PP8808  
**Sample ID** MAIN HOUSE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8809  
**Sample ID** COTTAGE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram

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Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8809 Dup  
**Sample ID** COTTAGE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel

**Maxxam ID** PP8810  
**Sample ID** MAIN BARN  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

**Maxxam ID** PP8811  
**Sample ID** FINNUCCI  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8811 Dup  
**Sample ID** FINNUCCI  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

**Maxxam ID** PP8812  
**Sample ID** SUGIYAMA  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8812 Dup  
**Sample ID** SUGIYAMA  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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Client Project #: 021-1228  
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### Test Summary

**Maxxam ID** PP8813  
**Sample ID** SIMMS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8813 Dup  
**Sample ID** SIMMS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

**Maxxam ID** PP8814  
**Sample ID** BEKKERS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8814 Dup  
**Sample ID** BEKKERS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel

Maxxam Job #: B2H9928  
Report Date: 2012/11/26

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

### Test Summary

**Maxxam ID** PP8815  
**Sample ID** MW11-INT  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8816  
**Sample ID** MW11-SHALLOW  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li



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### Test Summary

pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8817  
**Sample ID** DUP #2  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO <sub>3</sub> )		3041014	N/A	2012/11/23	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3045726	N/A	2012/11/23	Prempal Bhatti
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3044187	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3041872	N/A	2012/11/20	Gurpreet Kaur
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

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#### GENERAL COMMENTS

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

Sample PP8806-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PP8812-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP8815-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PP8817-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L	NC	25	101	85 - 115
3041872	Total Suspended Solids	2012/11/20					<10	mg/L	0.5	25	97	85 - 115
3042041	Sulphide	2012/11/20	83	80 - 120	93	80 - 120	<0.020	mg/L	NC	20		
3042157	Sulphide	2012/11/20	NC <sup>(1)</sup>	80 - 120	86	80 - 120	<0.020	mg/L	0	20		
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042347	Total Ammonia-N	2012/11/22	98	80 - 120	99	85 - 115	<0.050	mg/L	NC	20		
3042447	Alkalinity (Total as CaCO <sub>3</sub> )	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F <sup>-</sup> )	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L	1.1	20		
3042686	Dissolved Bromide (Br <sup>-</sup> )	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L	NC	20		
3042686	Dissolved Sulphate (SO <sub>4</sub> )	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L	0.6	20		
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L	NC	25		
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043123	Free Cyanide	2012/11/21	95	80 - 120	102	80 - 120	<0.0020	mg/L	NC	20		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L	NC	20		
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L	NC	25		
3043382	Mercury (Hg)	2012/11/21	93	80 - 120	93	80 - 120	<0.00010	mg/L	NC	20		
3044187	Total Phosphorus	2012/11/22	105	80 - 120	102	85 - 115	<0.020	mg/L	NC	20	104	85 - 115
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L	NC	20		
3045726	Dissolved Aluminum (Al)	2012/11/23	105	80 - 120	105	80 - 120	<5.0	ug/L				
3045726	Dissolved Antimony (Sb)	2012/11/23	109	80 - 120	101	80 - 120	<0.50	ug/L				
3045726	Dissolved Arsenic (As)	2012/11/23	101	80 - 120	98	80 - 120	<1.0	ug/L				
3045726	Dissolved Barium (Ba)	2012/11/23	98	80 - 120	97	80 - 120	<2.0	ug/L				
3045726	Dissolved Beryllium (Be)	2012/11/23	105	80 - 120	105	80 - 120	<0.50	ug/L				
3045726	Dissolved Bismuth (Bi)	2012/11/23	99	80 - 120	97	80 - 120	<1.0	ug/L				
3045726	Dissolved Boron (B)	2012/11/23	104	80 - 120	103	80 - 120	<10	ug/L				
3045726	Dissolved Cadmium (Cd)	2012/11/23	107	80 - 120	102	80 - 120	<0.10	ug/L				
3045726	Dissolved Calcium (Ca)	2012/11/23	NC	80 - 120	99	80 - 120	<200	ug/L				
3045726	Dissolved Chromium (Cr)	2012/11/23	102	80 - 120	101	80 - 120	<5.0	ug/L				
3045726	Dissolved Cobalt (Co)	2012/11/23	102	80 - 120	100	80 - 120	<0.50	ug/L				
3045726	Dissolved Copper (Cu)	2012/11/23	99	80 - 120	96	80 - 120	<1.0	ug/L				
3045726	Dissolved Iron (Fe)	2012/11/23	104	80 - 120	101	80 - 120	<100	ug/L				
3045726	Dissolved Lead (Pb)	2012/11/23	100	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3045726	Dissolved Magnesium (Mg)	2012/11/23	NC	80 - 120	106	80 - 120	<50	ug/L				
3045726	Dissolved Manganese (Mn)	2012/11/23	105	80 - 120	101	80 - 120	<2.0	ug/L				
3045726	Dissolved Molybdenum (Mo)	2012/11/23	107	80 - 120	102	80 - 120	<0.50	ug/L				
3045726	Dissolved Nickel (Ni)	2012/11/23	99	80 - 120	98	80 - 120	<1.0	ug/L				

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 Site Location: TANSLEY QUARRY  
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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045726	Dissolved Phosphorus (P)	2012/11/23	105	80 - 120	102	80 - 120	<100	ug/L				
3045726	Dissolved Potassium (K)	2012/11/23	104	80 - 120	101	80 - 120	<200	ug/L				
3045726	Dissolved Selenium (Se)	2012/11/23	103	80 - 120	100	80 - 120	<2.0	ug/L				
3045726	Dissolved Silicon (Si)	2012/11/23	107	80 - 120	104	80 - 120	<50	ug/L				
3045726	Dissolved Silver (Ag)	2012/11/23	102	80 - 120	99	80 - 120	<0.10	ug/L				
3045726	Dissolved Sodium (Na)	2012/11/23	NC	80 - 120	107	80 - 120	<100	ug/L				
3045726	Dissolved Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045726	Dissolved Thallium (Tl)	2012/11/23	100	80 - 120	99	80 - 120	<0.050	ug/L				
3045726	Dissolved Tin (Sn)	2012/11/23	109	80 - 120	104	80 - 120	<1.0	ug/L				
3045726	Dissolved Titanium (Ti)	2012/11/23	105	80 - 120	99	80 - 120	<5.0	ug/L				
3045726	Dissolved Uranium (U)	2012/11/23	105	80 - 120	104	80 - 120	<0.10	ug/L				
3045726	Dissolved Vanadium (V)	2012/11/23	104	80 - 120	101	80 - 120	<0.50	ug/L				
3045726	Dissolved Zinc (Zn)	2012/11/23	103	80 - 120	101	80 - 120	<5.0	ug/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L	NC	20		
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L	0.3	20		
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L	NC	20		
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L	0.4	20		
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L	5.1	20		
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L	NC	20		
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L	0.7	20		
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L	2.7	20		
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L	NC	20		
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L	1.9	20		
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L	2.8	20		
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L	2.9	20		
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.8	20		
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L	NC	20		
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L	NC	20		

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L	NC	20		
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		
3046868	Dissolved Aluminum (Al)	2012/11/26	90	80 - 120	89	80 - 120	<5.0	ug/L	4.0	20		
3046868	Dissolved Antimony (Sb)	2012/11/26	106	80 - 120	99	80 - 120	<0.50	ug/L	3.3	20		
3046868	Dissolved Arsenic (As)	2012/11/26	100	80 - 120	95	80 - 120	<1.0	ug/L	6.1	20		
3046868	Dissolved Barium (Ba)	2012/11/26	NC	80 - 120	95	80 - 120	<2.0	ug/L	3.1	20		
3046868	Dissolved Beryllium (Be)	2012/11/26	100	80 - 120	97	80 - 120	<0.50	ug/L	3.2	20		
3046868	Dissolved Bismuth (Bi)	2012/11/26	101	80 - 120	96	80 - 120	<1.0	ug/L				
3046868	Dissolved Boron (B)	2012/11/26	NC	80 - 120	98	80 - 120	<10	ug/L	6.0	20		
3046868	Dissolved Cadmium (Cd)	2012/11/26	104	80 - 120	96	80 - 120	<0.10	ug/L	3.1	20		
3046868	Dissolved Calcium (Ca)	2012/11/26	96	80 - 120	95	80 - 120	<200	ug/L				
3046868	Dissolved Chromium (Cr)	2012/11/26	94	80 - 120	93	80 - 120	<5.0	ug/L	3.2	20		
3046868	Dissolved Cobalt (Co)	2012/11/26	97	80 - 120	92	80 - 120	<0.50	ug/L				
3046868	Dissolved Copper (Cu)	2012/11/26	NC	80 - 120	92	80 - 120	<1.0	ug/L	4.0	20		
3046868	Dissolved Iron (Fe)	2012/11/26	99	80 - 120	94	80 - 120	<100	ug/L	3.7	20		
3046868	Dissolved Lead (Pb)	2012/11/26	100	80 - 120	96	80 - 120	<0.50	ug/L	2.6	20		
3046868	Dissolved Magnesium (Mg)	2012/11/26	99	80 - 120	95	80 - 120	<50	ug/L				
3046868	Dissolved Manganese (Mn)	2012/11/26	NC	80 - 120	93	80 - 120	<2.0	ug/L	2.8	20		
3046868	Dissolved Molybdenum (Mo)	2012/11/26	105	80 - 120	99	80 - 120	<0.50	ug/L	3.5	20		
3046868	Dissolved Nickel (Ni)	2012/11/26	NC	80 - 120	92	80 - 120	<1.0	ug/L	3.5	20		
3046868	Dissolved Phosphorus (P)	2012/11/26	96	80 - 120	93	80 - 120	<100	ug/L				
3046868	Dissolved Potassium (K)	2012/11/26	97	80 - 120	94	80 - 120	<200	ug/L				
3046868	Dissolved Selenium (Se)	2012/11/26	96	80 - 120	92	80 - 120	<2.0	ug/L	4.9	20		
3046868	Dissolved Silicon (Si)	2012/11/26	99	80 - 120	94	80 - 120	<50	ug/L				
3046868	Dissolved Silver (Ag)	2012/11/26	NC	80 - 120	94	80 - 120	<0.10	ug/L	2.5	20		
3046868	Dissolved Sodium (Na)	2012/11/26	99	80 - 120	95	80 - 120	<100	ug/L				
3046868	Dissolved Strontium (Sr)	2012/11/26	97	80 - 120	94	80 - 120	<1.0	ug/L				
3046868	Dissolved Thallium (Tl)	2012/11/26	100	80 - 120	96	80 - 120	<0.050	ug/L	2.1	20		
3046868	Dissolved Tin (Sn)	2012/11/26	106	80 - 120	98	80 - 120	<1.0	ug/L				
3046868	Dissolved Titanium (Ti)	2012/11/26	101	80 - 120	96	80 - 120	<5.0	ug/L				
3046868	Dissolved Uranium (U)	2012/11/26	104	80 - 120	99	80 - 120	<0.10	ug/L				

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### QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3046868	Dissolved Vanadium (V)	2012/11/26	NC	80 - 120	93	80 - 120	0.65, RDL=0.50	ug/L	3.8	20		
3046868	Dissolved Zinc (Zn)	2012/11/26	NC	80 - 120	96	80 - 120	<5.0	ug/L	1.7	20		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.



(1) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B2H9928

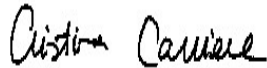
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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

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Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist



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Cristina Carriere, Scientific Services

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115607, 381156-07-01

**Attention: Sharon Wood**  
 Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

**Report Date: 2012/11/23**

### CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2I0878**  
**Received: 2012/11/16, 14:09**

Sample Matrix: Water  
 # Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	6	N/A	2012/11/19	CAM SOP-00448	SM 2320B
Anions	6	N/A	2012/11/20	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	6	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	6	2012/11/17	2012/11/19	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/21	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/20	2012/11/20	CAM SOP-00453	SW-846 7470A
Mercury in Water by CVAA	5	2012/11/20	2012/11/21	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	3	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	3	N/A	2012/11/22	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	5	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	1	N/A	2012/11/22	CAM SOP-00447	EPA 6020
Total Ammonia-N	6	N/A	2012/11/21	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (1)	6	N/A	2012/11/19	CAM SOP-00440	SM 4500 NO <sub>3</sub> /NO <sub>2</sub> B
pH	6	N/A	2012/11/19	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	3	N/A	2012/11/19	CAM SOP-00444	MOE ROPHEN-E3179
Phenols (4AAP)	3	N/A	2012/11/20	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	6	N/A	2012/11/19	CAM SOP-00461	EPA 365.1
Sulphide	6	N/A	2012/11/19	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	6	2012/11/21	2012/11/22	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	6	N/A	2012/11/17	CAM SOP-00428	SM 2540D
Turbidity	6	N/A	2012/11/18	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.



Site Location: TANSLEY QUARRY  
Your C.O.C. #: 38115607, 381156-07-01

**Attention: Sharon Wood**  
Golder Associates Ltd  
Mississauga - Standing Offer  
2390 Argentia Rd  
Mississauga, ON  
L5N 5Z7

**Report Date: 2012/11/23**

### **CERTIFICATE OF ANALYSIS**

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The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

(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.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

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Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PQ4138			PQ4139			PQ4140		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
COC Number		381156-07-01			381156-07-01			381156-07-01		
	<b>Units</b>	<b>MW1-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW2-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW1-INT</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	6100	1.0	3039453	6400	1.0	3039453	780	1.0	3039453
<b>Inorganics</b>										
Total Ammonia-N	mg/L	21	0.50	3043422	16	0.50	3043422	0.24	0.050	3043422
Fluoride (F <sup>-</sup> )	mg/L	0.35	0.10	3040239	0.34	0.10	3040239	0.46	0.10	3040239
Free Cyanide	mg/L	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123
Orthophosphate (P)	mg/L	0.096	0.010	3040226	<0.010	0.010	3040933	<0.010	0.010	3040226
pH	pH	6.88		3040240	6.66		3040240	7.91		3040240
Phenols-4AAP	mg/L	0.062	0.0010	3040135	<0.0010	0.0010	3040135	<0.0010	0.0010	3040111
Total Phosphorus	mg/L	0.31	0.10	3043767	1.3	0.40	3043767	0.50	0.20	3043767
Total Suspended Solids	mg/L	120	10	3040173	2900	100	3040173	1600	100	3040173
Sulphide	mg/L	4.0	0.020	3040303	<0.020	0.020	3040081	<0.020	0.020	3040081
Turbidity	NTU	130	0.2	3040107	630	2	3040107	720	2	3040107
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	99	1.0	3040238	47	1.0	3040238	410	1.0	3040238
Nitrite (N)	mg/L	<0.10	0.10	3040142	<0.10	0.10	3040142	<0.010	0.010	3040142
Dissolved Chloride (Cl)	mg/L	13000	100	3040143	14000	100	3040143	120	1.0	3040143
Nitrate (N)	mg/L	<0.10	0.10	3040142	<0.10	0.10	3040142	0.82	0.10	3040142
Nitrate + Nitrite	mg/L	<0.10	0.10	3040142	<0.10	0.10	3040142	0.82	0.10	3040142
Dissolved Bromide (Br <sup>-</sup> )	mg/L	140	100	3040143	200	100	3040143	<1.0	1.0	3040143
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1900	100	3040143	2100	100	3040143	280	1.0	3040143

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Golder Associates Ltd

 Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PQ4141			PQ4142			PQ4143		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
COC Number		381156-07-01			381156-07-01			381156-07-01		
	<b>Units</b>	<b>MW7-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW7-SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>DUP#3</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	13000	1.0	3039453	610	1.0	3039453	6900	1.0	3039453
<b>Inorganics</b>										
Total Ammonia-N	mg/L	22	0.50	3043422	0.28	0.050	3043422	16	0.50	3043422
Fluoride (F <sup>-</sup> )	mg/L	0.19	0.10	3040239	0.33	0.10	3040239	0.34	0.10	3040239
Free Cyanide	mg/L	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123
Orthophosphate (P)	mg/L	<0.010	0.010	3040933	<0.010	0.010	3040933	<0.010	0.010	3040226
pH	pH	6.58		3040240	7.92		3040240	6.78		3040240
Phenols-4AAP	mg/L	0.0025	0.0010	3040111	<0.0010	0.0010	3040111	<0.0010	0.0010	3040135
Total Phosphorus	mg/L	0.37	0.20	3043767	1.8	0.20	3043767	0.54	0.40	3043767
Total Suspended Solids	mg/L	2100	100	3040173	2200	100	3040173	4500	200	3040173
Sulphide	mg/L	<0.020	0.020	3040303	0.027	0.020	3040303	<0.020	0.020	3040081
Turbidity	NTU	210	0.4	3040107	770	2	3040107	380	2	3040107
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	45	1.0	3040238	570	1.0	3040238	48	1.0	3040238
Nitrite (N)	mg/L	<0.10	0.10	3040139	<0.010	0.010	3040142	<0.10	0.10	3040139
Dissolved Chloride (Cl)	mg/L	24000	200	3040276	23	1.0	3040296	14000	200	3040143
Nitrate (N)	mg/L	<0.10	0.10	3040139	<0.10	0.10	3040142	<0.10	0.10	3040139
Nitrate + Nitrite	mg/L	<0.10	0.10	3040139	<0.10	0.10	3040142	<0.10	0.10	3040139
Dissolved Bromide (Br <sup>-</sup> )	mg/L	320	100	3040276	<1.0	1.0	3040296	<200	200	3040143
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1500	100	3040276	170	1.0	3040296	2000	200	3040143

 RDL = Reportable Detection Limit  
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Golder Associates Ltd

 Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4138	PQ4139			PQ4140		
Sampling Date		2012/11/16	2012/11/16			2012/11/16		
COC Number		381156-07-01	381156-07-01			381156-07-01		
	Units	MW1-DEEP	MW2-DEEP	RDL	QC Batch	MW1-INT	RDL	QC Batch
<b>Metals</b>								
Mercury (Hg)	mg/L	<0.00010	<0.00010	0.00010	3042274	<0.00010	0.00010	3042274
Dissolved Aluminum (Al)	ug/L	<50	300	50	3043708	53	5.0	3045285
Total Aluminum (Al)	ug/L	290	22000	50	3043592	15000	5.0	3043592
Dissolved Antimony (Sb)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Antimony (Sb)	ug/L	<5.0	<5.0	5.0	3043592	<0.50	0.50	3043592
Dissolved Arsenic (As)	ug/L	<20	<20	20	3043708	<1.0	1.0	3045285
Total Arsenic (As)	ug/L	<20	23	20	3043592	8.2	1.0	3043592
Dissolved Barium (Ba)	ug/L	23	25	20	3043708	26	2.0	3045285
Total Barium (Ba)	ug/L	28	350	20	3043592	160	2.0	3043592
Dissolved Beryllium (Be)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Beryllium (Be)	ug/L	<5.0	<5.0	5.0	3043592	1.2	0.50	3043592
Dissolved Bismuth (Bi)	ug/L	<10	<10	10	3043708	<1.0	1.0	3045285
Total Bismuth (Bi)	ug/L	<10	<10	10	3043592	<1.0	1.0	3043592
Dissolved Boron (B)	ug/L	5600	5600	100	3043708	60	10	3045285
Total Boron (B)	ug/L	6100	5900	100	3043592	90	10	3043592
Dissolved Cadmium (Cd)	ug/L	<1.0	<1.0	1.0	3043708	<0.10	0.10	3045285
Total Cadmium (Cd)	ug/L	2.0	<1.0	1.0	3043592	0.52	0.10	3043592
Dissolved Calcium (Ca)	ug/L	1700000	1800000	2000	3043708	71000	200	3045285
Total Calcium (Ca)	ug/L	2000000	2000000	2000	3043592	160000	200	3043592
Dissolved Chromium (Cr)	ug/L	<50	<50	50	3043708	<5.0	5.0	3045285
Total Chromium (Cr)	ug/L	73	<50	50	3043592	27	5.0	3043592
Dissolved Cobalt (Co)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Cobalt (Co)	ug/L	<5.0	25	5.0	3043592	14	0.50	3043592
Dissolved Copper (Cu)	ug/L	<10	<10	10	3043708	<1.0	1.0	3045285
Total Copper (Cu)	ug/L	17	85	10	3043592	30	1.0	3043592
Dissolved Iron (Fe)	ug/L	<1000	4100	1000	3043708	<100	100	3045285
Total Iron (Fe)	ug/L	1400	42000	1000	3043592	29000	100	3043592
Dissolved Lead (Pb)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Lead (Pb)	ug/L	<5.0	18	5.0	3043592	16	0.50	3043592
Dissolved Magnesium (Mg)	ug/L	420000	440000	500	3043708	150000	50	3045285
Total Magnesium (Mg)	ug/L	490000	480000	500	3043592	160000	50	3043592
Dissolved Manganese (Mn)	ug/L	960	980	20	3043708	6.8	2.0	3045285
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Golder Associates Ltd

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**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4138	PQ4139			PQ4140		
Sampling Date		2012/11/16	2012/11/16			2012/11/16		
COC Number		381156-07-01	381156-07-01			381156-07-01		
	Units	MW1-DEEP	MW2-DEEP	RDL	QC Batch	MW1-INT	RDL	QC Batch
Total Manganese (Mn)	ug/L	1100	2000	20	3043592	650	2.0	3043592
Dissolved Molybdenum (Mo)	ug/L	<5.0	5.7	5.0	3043708	1.8	0.50	3045285
Total Molybdenum (Mo)	ug/L	<5.0	12	5.0	3043592	3.4	0.50	3043592
Dissolved Nickel (Ni)	ug/L	<10	16	10	3043708	1.8	1.0	3045285
Total Nickel (Ni)	ug/L	37	68	10	3043592	27	1.0	3043592
Dissolved Phosphorus (P)	ug/L	<1000	<1000	1000	3043708	<100	100	3045285
Total Phosphorus (P)	ug/L	<1000	1400	1000	3043592	820	100	3043592
Dissolved Potassium (K)	ug/L	120000	110000	2000	3043708	2800	200	3045285
Total Potassium (K)	ug/L	140000	120000	2000	3043592	7700	200	3043592
Dissolved Selenium (Se)	ug/L	<40	<40	40	3043708	6.7	2.0	3045285
Dissolved Silicon (Si)	ug/L	2900	3400	500	3043708	7200	50	3045285
Total Silicon (Si)	ug/L	4000	30000	500	3043592	28000	50	3043592
Total Selenium (Se)	ug/L	<40	<40	40	3043592	6.8	2.0	3043592
Dissolved Silver (Ag)	ug/L	<1.0	<1.0	1.0	3043708	<0.10	0.10	3045285
Total Silver (Ag)	ug/L	<1.0	<1.0	1.0	3043592	0.14	0.10	3043592
Dissolved Sodium (Na)	ug/L	5600000	5700000	1000	3043708	46000	100	3045285
Total Sodium (Na)	ug/L	6500000	6200000	1000	3043592	45000	100	3043592
Dissolved Strontium (Sr)	ug/L	38000	39000	10	3043708	1200	1.0	3045285
Total Strontium (Sr)	ug/L	42000	41000	10	3043592	1600	1.0	3043592
Dissolved Thallium (Tl)	ug/L	<0.50	<0.50	0.50	3043708	<0.050	0.050	3045285
Total Thallium (Tl)	ug/L	<0.50	<0.50	0.50	3043592	0.22	0.050	3043592
Dissolved Tin (Sn)	ug/L	<10	<10	10	3043708	<1.0	1.0	3045285
Total Tin (Sn)	ug/L	<10	<10	10	3043592	<1.0	1.0	3043592
Dissolved Titanium (Ti)	ug/L	<50	<50	50	3043708	<5.0	5.0	3045285
Total Titanium (Ti)	ug/L	<50	420	50	3043592	350	5.0	3043592
Dissolved Uranium (U)	ug/L	<1.0	<1.0	1.0	3043708	11	0.10	3045285
Total Uranium (U)	ug/L	<1.0	1.7	1.0	3043592	13	0.10	3043592
Dissolved Vanadium (V)	ug/L	<10	<10	10	3043708	0.91	0.50	3045285
Total Vanadium (V)	ug/L	<10	54	10	3043592	30	0.50	3043592
Dissolved Zinc (Zn)	ug/L	<50	<50	50	3043708	<5.0	5.0	3045285
Total Zinc (Zn)	ug/L	<50	210	50	3043592	89	5.0	3043592
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Golder Associates Ltd

 Maxxam Job #: B2I0878  
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 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4141			PQ4142			PQ4143		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
COC Number		381156-07-01			381156-07-01			381156-07-01		
	<b>Units</b>	<b>MW7-DEEP</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW7-SHALLOW</b>	<b>RDL</b>	<b>QC Batch</b>	<b>DUP#3</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3041961	<0.00010	0.00010	3042274	<0.00010	0.00010	3042274
Dissolved Aluminum (Al)	ug/L	130	100	3043708	120	5.0	3043441	490	50	3045285
Total Aluminum (Al)	ug/L	8700	250	3043592	36000	50	3043592	19000	50	3044217
Dissolved Antimony (Sb)	ug/L	<10	10	3043708	<0.50	0.50	3043441	<5.0	5.0	3045285
Total Antimony (Sb)	ug/L	<25	25	3043592	0.51	0.50	3043592	<5.0	5.0	3044217
Dissolved Arsenic (As)	ug/L	<40	40	3043708	<1.0	1.0	3043441	<20	20	3045285
Total Arsenic (As)	ug/L	<50	50	3043592	17	1.0	3043592	22	20	3044217
Dissolved Barium (Ba)	ug/L	55	40	3043708	34	2.0	3043441	26	20	3045285
Total Barium (Ba)	ug/L	220	100	3043592	310	2.0	3043592	240	20	3044217
Dissolved Beryllium (Be)	ug/L	<10	10	3043708	<0.50	0.50	3043441	<5.0	5.0	3045285
Total Beryllium (Be)	ug/L	<25	25	3043592	2.3	0.50	3043592	<5.0	5.0	3044217
Dissolved Bismuth (Bi)	ug/L	<20	20	3043708	<1.0	1.0	3043441	<10	10	3045285
Total Bismuth (Bi)	ug/L	<50	50	3043592	<1.0	1.0	3043592	<10	10	3044217
Dissolved Boron (B)	ug/L	6600	200	3043708	5800	10	3043441	5300	100	3045285
Total Boron (B)	ug/L	9400	500	3043592	6400	10	3043592	6400	100	3044217
Dissolved Cadmium (Cd)	ug/L	<2.0	2.0	3043708	<0.10	0.10	3043441	<1.0	1.0	3045285
Total Cadmium (Cd)	ug/L	8.9	5.0	3043592	0.85	0.10	3043592	<1.0	1.0	3044217
Dissolved Calcium (Ca)	ug/L	3700000	4000	3043708	66000	200	3043441	2000000	2000	3045285
Total Calcium (Ca)	ug/L	4000000	10000	3043592	270000	200	3043592	2100000	2000	3044217
Dissolved Chromium (Cr)	ug/L	<100	100	3043708	<5.0	5.0	3043441	<50	50	3045285
Total Chromium (Cr)	ug/L	<250	250	3043592	62	5.0	3043592	<50	50	3044217
Dissolved Cobalt (Co)	ug/L	<10	10	3043708	3.7	0.50	3043441	<5.0	5.0	3045285
Total Cobalt (Co)	ug/L	<25	25	3043592	32	0.50	3043592	19	5.0	3044217
Dissolved Copper (Cu)	ug/L	<20	20	3043708	<1.0	1.0	3043441	<10	10	3045285
Total Copper (Cu)	ug/L	72	50	3043592	62	1.0	3043592	60	10	3044217
Dissolved Iron (Fe)	ug/L	5100	2000	3043708	110	100	3043441	4300	1000	3045285
Total Iron (Fe)	ug/L	18000	5000	3043592	68000	100	3043592	36000	1000	3044217
Dissolved Lead (Pb)	ug/L	<10	10	3043708	<0.50	0.50	3043441	<5.0	5.0	3045285
Total Lead (Pb)	ug/L	<25	25	3043592	32	0.50	3043592	15	5.0	3044217
Dissolved Magnesium (Mg)	ug/L	940000	1000	3043708	110000	50	3043441	490000	500	3045285
Total Magnesium (Mg)	ug/L	1000000	2500	3043592	150000	50	3043592	550000	500	3044217
Dissolved Manganese (Mn)	ug/L	1700	40	3043708	92	2.0	3043441	1000	20	3045285

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Golder Associates Ltd

 Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4141			PQ4142			PQ4143		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
COC Number		381156-07-01			381156-07-01			381156-07-01		
	Units	MW7-DEEP	RDL	QC Batch	MW7-SHALLOW	RDL	QC Batch	DUP#3	RDL	QC Batch
Total Manganese (Mn)	ug/L	2300	100	3043592	1700	2.0	3043592	1900	20	3044217
Dissolved Molybdenum (Mo)	ug/L	18	10	3043708	6.2	0.50	3043441	6.3	5.0	3045285
Total Molybdenum (Mo)	ug/L	<25	25	3043592	10	0.50	3043592	13	5.0	3044217
Dissolved Nickel (Ni)	ug/L	27	20	3043708	1.6	1.0	3043441	16	10	3045285
Total Nickel (Ni)	ug/L	<50	50	3043592	67	1.0	3043592	40	10	3044217
Dissolved Phosphorus (P)	ug/L	<2000	2000	3043708	<100	100	3043441	<1000	1000	3045285
Total Phosphorus (P)	ug/L	<5000	5000	3043592	1800	100	3043592	<1000	1000	3044217
Dissolved Potassium (K)	ug/L	170000	4000	3043708	6500	200	3043441	120000	2000	3045285
Total Potassium (K)	ug/L	180000	10000	3043592	17000	200	3043592	140000	2000	3044217
Dissolved Selenium (Se)	ug/L	<80	80	3043708	<2.0	2.0	3043441	<40	40	3045285
Dissolved Silicon (Si)	ug/L	4600	1000	3043708	9300	100	3043441	3900	500	3045285
Total Silicon (Si)	ug/L	15000	2500	3043592	62000	500	3043592	29000	500	3044217
Total Selenium (Se)	ug/L	<100	100	3043592	<2.0	2.0	3043592	<40	40	3044217
Dissolved Silver (Ag)	ug/L	<2.0	2.0	3043708	<0.10	0.10	3043441	<1.0	1.0	3045285
Total Silver (Ag)	ug/L	<5.0	5.0	3043592	0.22	0.10	3043592	<1.0	1.0	3044217
Dissolved Sodium (Na)	ug/L	8500000	2000	3043708	90000	100	3043441	6500000	5000	3045285
Total Sodium (Na)	ug/L	9000000	5000	3043592	99000	100	3043592	6300000	1000	3044217
Dissolved Strontium (Sr)	ug/L	80000	20	3043708	2600	1.0	3043441	39000	10	3045285
Total Strontium (Sr)	ug/L	81000	50	3043592	3200	1.0	3043592	44000	10	3044217
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	3043708	<0.050	0.050	3043441	<0.50	0.50	3045285
Total Thallium (Tl)	ug/L	<2.5	2.5	3043592	0.47	0.050	3043592	<0.50	0.50	3044217
Dissolved Tin (Sn)	ug/L	<20	20	3043708	<1.0	1.0	3043441	<10	10	3045285
Total Tin (Sn)	ug/L	<50	50	3043592	<1.0	1.0	3043592	<10	10	3044217
Dissolved Titanium (Ti)	ug/L	<100	100	3043708	13	5.0	3043441	<50	50	3045285
Total Titanium (Ti)	ug/L	<250	250	3043592	920	50	3043592	350	50	3044217
Dissolved Uranium (U)	ug/L	4.9	2.0	3043708	6.3	0.10	3043441	<1.0	1.0	3045285
Total Uranium (U)	ug/L	<5.0	5.0	3043592	11	0.10	3043592	1.6	1.0	3044217
Dissolved Vanadium (V)	ug/L	<20	20	3043708	0.59	0.50	3043441	<10	10	3045285
Total Vanadium (V)	ug/L	32	25	3043592	77	0.50	3043592	22	10	3044217
Dissolved Zinc (Zn)	ug/L	<100	100	3043708	<5.0	5.0	3043441	<50	50	3045285
Total Zinc (Zn)	ug/L	<250	250	3043592	170	5.0	3043592	160	50	3044217

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2I0878  
Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: DB

### Test Summary

**Maxxam ID** PQ4138  
**Sample ID** MW1-DEEP  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040135	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3040226	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040303	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4139  
**Sample ID** MW2-DEEP  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040135	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3040933	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040081	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4140  
**Sample ID** MW1-INT  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos



Maxxam Job #: B2I0878  
Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: DB

### Test Summary

Dissolved Metals by ICPMS	ICP/MS	3045285	N/A	2012/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040111	N/A	2012/11/20	Bramdeo Motiram
Orthophosphate	AC	3040226	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040081	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4140 Dup  
**Sample ID** MW1-INT  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
pH	PH	3040240	N/A	2012/11/19	Surinder Rai

**Maxxam ID** PQ4141  
**Sample ID** MW7-DEEP  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040276	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041961	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040139	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040111	N/A	2012/11/20	Bramdeo Motiram
Orthophosphate	AC	3040933	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040303	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4142  
**Sample ID** MW7-SHALLOW  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040296	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043441	N/A	2012/11/21	Hua Ren

Golder Associates Ltd

 Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

### Test Summary

Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040111	N/A	2012/11/20	Bramdeo Motiram
Orthophosphate	AC	3040933	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040303	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4143  
**Sample ID** DUP#3  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3045285	N/A	2012/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3044217	N/A	2012/11/22	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040139	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040135	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3040226	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040081	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

Maxxam Job #: B2I0878  
Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: DB

Package 1	6.7°C
Package 2	3.0°C

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

#### GENERAL COMMENTS

Anions Analysis: Based on historically high results, sample was diluted prior to analysis. Detection limits were adjusted accordingly.

Sample PQ4138-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PQ4139-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PQ4141-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PQ4143-01: Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

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

**Results relate only to the items tested.**

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

### Quality Assurance Report

Maxxam Job Number: MB2I0878

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3040081 XQI	Matrix Spike	Sulphide	2012/11/19		97	%	80 - 120	
	Spiked Blank	Sulphide	2012/11/19		97	%	80 - 120	
	Method Blank	Sulphide	2012/11/19	<0.020		mg/L		
	RPD	Sulphide	2012/11/19	NC		%	20	
3040107 NYS	QC Standard	Turbidity	2012/11/18		102	%	85 - 115	
	Method Blank	Turbidity	2012/11/18	0.3, RDL=0.2		NTU		
	RPD	Turbidity	2012/11/18	0.3		%	20	
3040111 BMO	Matrix Spike	Phenols-4AAP	2012/11/20		98	%	80 - 120	
	Spiked Blank	Phenols-4AAP	2012/11/20		101	%	85 - 115	
	Method Blank	Phenols-4AAP	2012/11/20	<0.0010		mg/L		
	RPD	Phenols-4AAP	2012/11/20	NC		%	25	
3040135 BMO	Matrix Spike	Phenols-4AAP	2012/11/19		107	%	80 - 120	
	Spiked Blank	Phenols-4AAP	2012/11/19		103	%	85 - 115	
	Method Blank	Phenols-4AAP	2012/11/19	<0.0010		mg/L		
	RPD	Phenols-4AAP	2012/11/19	NC		%	25	
3040139 C_H	Matrix Spike	Nitrite (N)	2012/11/19		98	%	80 - 120	
		Nitrate (N)	2012/11/19		NC	%	80 - 120	
	Spiked Blank	Nitrite (N)	2012/11/19		98	%	85 - 115	
		Nitrate (N)	2012/11/19		96	%	85 - 115	
	Method Blank	Nitrite (N)	2012/11/19	<0.010		mg/L		
		Nitrate (N)	2012/11/19	<0.10		mg/L		
	RPD	Nitrite (N)	2012/11/19	NC		%	25	
		Nitrate (N)	2012/11/19	0.5		%	25	
3040142 C_H	Matrix Spike	Nitrite (N)	2012/11/19		99	%	80 - 120	
		Nitrate (N)	2012/11/19		NC (1)	%	80 - 120	
	Spiked Blank	Nitrite (N)	2012/11/19		98	%	85 - 115	
		Nitrate (N)	2012/11/19		95	%	85 - 115	
	Method Blank	Nitrite (N)	2012/11/19	<0.010		mg/L		
		Nitrate (N)	2012/11/19	<0.10		mg/L		
	RPD	Nitrite (N)	2012/11/19	NC		%	25	
		Nitrate (N)	2012/11/19	4.6		%	25	
3040143 FD	Matrix Spike	Dissolved Chloride (Cl)	2012/11/20		NC	%	80 - 120	
		Dissolved Bromide (Br-)	2012/11/20		100	%	80 - 120	
		Dissolved Sulphate (SO4)	2012/11/20		103	%	80 - 120	
	Spiked Blank	Dissolved Chloride (Cl)	2012/11/20		99	%	80 - 120	
		Dissolved Bromide (Br-)	2012/11/20		99	%	80 - 120	
		Dissolved Sulphate (SO4)	2012/11/20		98	%	80 - 120	
	Method Blank	Dissolved Chloride (Cl)	2012/11/20	<1.0		mg/L		
		Dissolved Bromide (Br-)	2012/11/20	<1.0		mg/L		
		Dissolved Sulphate (SO4)	2012/11/20	<1.0		mg/L		
		RPD	Dissolved Chloride (Cl)	2012/11/20	0.1		%	20
			Dissolved Bromide (Br-)	2012/11/20	NC		%	20
			Dissolved Sulphate (SO4)	2012/11/20	0.5		%	20
3040173 GKR	QC Standard	Total Suspended Solids	2012/11/17		98	%	85 - 115	
	Method Blank	Total Suspended Solids	2012/11/17	<10		mg/L		
	RPD	Total Suspended Solids	2012/11/17	NC		%	25	
3040226 BIP	Matrix Spike	Orthophosphate (P)	2012/11/19		107	%	75 - 125	
	Spiked Blank	Orthophosphate (P)	2012/11/19		101	%	80 - 120	
	Method Blank	Orthophosphate (P)	2012/11/19	<0.010		mg/L		
	RPD	Orthophosphate (P)	2012/11/19	NC		%	25	
3040238 SAU	QC Standard	Alkalinity (Total as CaCO3)	2012/11/20		99	%	85 - 115	
	Method Blank	Alkalinity (Total as CaCO3)	2012/11/20	<1.0		mg/L		
	RPD [PQ4140-01]	Alkalinity (Total as CaCO3)	2012/11/19	0.5		%	25	
3040239 SAU	Matrix Spike [PQ4140-01]	Fluoride (F-)	2012/11/19		96	%	80 - 120	

Golder Associates Ltd  
 Attention: Sharon Wood  
 Client Project #:  
 P.O. #:  
 Site Location: TANSLEY QUARRY

## Quality Assurance Report (Continued)

Maxxam Job Number: MB2I0878

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3040239 SAU	Spiked Blank	Fluoride (F-)	2012/11/20		98	%	80 - 120
	Method Blank	Fluoride (F-)	2012/11/20	<0.10		mg/L	
	RPD [PQ4140-01]	Fluoride (F-)	2012/11/19	NC		%	20
3040276 FD	Matrix Spike	Dissolved Chloride (Cl)	2012/11/20		102	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/20		102	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/20		101	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2012/11/20		100	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/20		100	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/20		98	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2012/11/20	<1.0		mg/L	
		Dissolved Bromide (Br-)	2012/11/20	<1.0		mg/L	
		Dissolved Sulphate (SO4)	2012/11/20	1.1, RDL=1.0		mg/L	
	RPD	Dissolved Chloride (Cl)	2012/11/20	NC		%	20
		Dissolved Sulphate (SO4)	2012/11/20	NC		%	20
3040296 FD	Matrix Spike	Dissolved Bromide (Br-)	2012/11/20		97	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/20		99	%	80 - 120
	Spiked Blank	Dissolved Chloride (Cl)	2012/11/20		101	%	80 - 120
		Dissolved Bromide (Br-)	2012/11/20		104	%	80 - 120
		Dissolved Sulphate (SO4)	2012/11/20		99	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2012/11/20	<1.0		mg/L	
		Dissolved Bromide (Br-)	2012/11/20	<1.0		mg/L	
		Dissolved Sulphate (SO4)	2012/11/20	<1.0		mg/L	
	RPD	Dissolved Sulphate (SO4)	2012/11/20	0.3		%	20
3040303 XQI	Matrix Spike	Sulphide	2012/11/19		90	%	80 - 120
	Spiked Blank	Sulphide	2012/11/19		93	%	80 - 120
	Method Blank	Sulphide	2012/11/19	<0.020		mg/L	
	RPD	Sulphide	2012/11/19	NC		%	20
3040933 BIP	Matrix Spike	Orthophosphate (P)	2012/11/19		107	%	75 - 125
	Spiked Blank	Orthophosphate (P)	2012/11/19		102	%	80 - 120
	Method Blank	Orthophosphate (P)	2012/11/19	<0.010		mg/L	
	RPD	Orthophosphate (P)	2012/11/19	NC		%	25
3041961 LCH	Matrix Spike	Mercury (Hg)	2012/11/20		107	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/20		105	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/20	<0.00010		mg/L	
	RPD	Mercury (Hg)	2012/11/20	NC		%	20
3042274 MC	Matrix Spike	Mercury (Hg)	2012/11/21		99	%	80 - 120
	Spiked Blank	Mercury (Hg)	2012/11/21		113	%	80 - 120
	Method Blank	Mercury (Hg)	2012/11/21	<0.00010		mg/L	
	RPD	Mercury (Hg)	2012/11/21	NC		%	20
3043123 LHA	Matrix Spike	Free Cyanide	2012/11/21		95	%	80 - 120
	Spiked Blank	Free Cyanide	2012/11/21		102	%	80 - 120
	Method Blank	Free Cyanide	2012/11/21	<0.0020		mg/L	
	RPD	Free Cyanide	2012/11/21	NC		%	20
3043422 L_A	Matrix Spike	Total Ammonia-N	2012/11/21		103	%	80 - 120
	Spiked Blank	Total Ammonia-N	2012/11/21		102	%	85 - 115
	Method Blank	Total Ammonia-N	2012/11/21	<0.050		mg/L	
	RPD	Total Ammonia-N	2012/11/21	NC		%	20
3043441 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/21		97	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		106	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		105	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		102	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		103	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		99	%	80 - 120
		Dissolved Boron (B)	2012/11/21		105	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		104	%	80 - 120

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QA/QC Batch			Date Analyzed					
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3043441 HRE	Matrix Spike	Dissolved Calcium (Ca)	2012/11/21		NC	%	80 - 120	
		Dissolved Chromium (Cr)	2012/11/21		97	%	80 - 120	
		Dissolved Cobalt (Co)	2012/11/21		99	%	80 - 120	
		Dissolved Copper (Cu)	2012/11/21		96	%	80 - 120	
		Dissolved Iron (Fe)	2012/11/21		101	%	80 - 120	
		Dissolved Lead (Pb)	2012/11/21		99	%	80 - 120	
		Dissolved Magnesium (Mg)	2012/11/21		102	%	80 - 120	
		Dissolved Manganese (Mn)	2012/11/21		98	%	80 - 120	
		Dissolved Molybdenum (Mo)	2012/11/21		105	%	80 - 120	
		Dissolved Nickel (Ni)	2012/11/21		98	%	80 - 120	
		Dissolved Phosphorus (P)	2012/11/21		104	%	80 - 120	
		Dissolved Potassium (K)	2012/11/21		101	%	80 - 120	
		Dissolved Selenium (Se)	2012/11/21		103	%	80 - 120	
		Dissolved Silicon (Si)	2012/11/21		103	%	80 - 120	
		Dissolved Silver (Ag)	2012/11/21		98	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/21		NC	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/21		102	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/21		104	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/21		106	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/21		105	%	80 - 120	
		Dissolved Uranium (U)	2012/11/21		105	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/21		98	%	80 - 120	
		Dissolved Zinc (Zn)	2012/11/21		98	%	80 - 120	
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/21		94	%	80 - 120	
		Dissolved Antimony (Sb)	2012/11/21		100	%	80 - 120	
		Dissolved Arsenic (As)	2012/11/21		98	%	80 - 120	
		Dissolved Barium (Ba)	2012/11/21		99	%	80 - 120	
		Dissolved Beryllium (Be)	2012/11/21		99	%	80 - 120	
		Dissolved Bismuth (Bi)	2012/11/21		96	%	80 - 120	
		Dissolved Boron (B)	2012/11/21		99	%	80 - 120	
		Dissolved Cadmium (Cd)	2012/11/21		99	%	80 - 120	
		Dissolved Calcium (Ca)	2012/11/21		99	%	80 - 120	
		Dissolved Chromium (Cr)	2012/11/21		98	%	80 - 120	
		Dissolved Cobalt (Co)	2012/11/21		97	%	80 - 120	
		Dissolved Copper (Cu)	2012/11/21		95	%	80 - 120	
		Dissolved Iron (Fe)	2012/11/21		98	%	80 - 120	
		Dissolved Lead (Pb)	2012/11/21		96	%	80 - 120	
		Dissolved Magnesium (Mg)	2012/11/21		98	%	80 - 120	
		Dissolved Manganese (Mn)	2012/11/21		95	%	80 - 120	
		Dissolved Molybdenum (Mo)	2012/11/21		100	%	80 - 120	
		Dissolved Nickel (Ni)	2012/11/21		96	%	80 - 120	
		Dissolved Phosphorus (P)	2012/11/21		101	%	80 - 120	
		Dissolved Potassium (K)	2012/11/21		100	%	80 - 120	
		Dissolved Selenium (Se)	2012/11/21		101	%	80 - 120	
		Dissolved Silicon (Si)	2012/11/21		98	%	80 - 120	
		Dissolved Silver (Ag)	2012/11/21		95	%	80 - 120	
		Dissolved Sodium (Na)	2012/11/21		99	%	80 - 120	
		Dissolved Strontium (Sr)	2012/11/21		96	%	80 - 120	
		Dissolved Thallium (Tl)	2012/11/21		101	%	80 - 120	
		Dissolved Tin (Sn)	2012/11/21		102	%	80 - 120	
		Dissolved Titanium (Ti)	2012/11/21		102	%	80 - 120	
		Dissolved Uranium (U)	2012/11/21		100	%	80 - 120	
		Dissolved Vanadium (V)	2012/11/21		98	%	80 - 120	
		Dissolved Zinc (Zn)	2012/11/21		98	%	80 - 120	
	Method Blank	Dissolved Aluminum (Al)	2012/11/21	<5.0		ug/L		

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3043441 HRE	Method Blank	Dissolved Antimony (Sb)	2012/11/21	<0.50		ug/L	
		Dissolved Arsenic (As)	2012/11/21	<1.0		ug/L	
		Dissolved Barium (Ba)	2012/11/21	<2.0		ug/L	
		Dissolved Beryllium (Be)	2012/11/21	<0.50		ug/L	
		Dissolved Bismuth (Bi)	2012/11/21	<1.0		ug/L	
		Dissolved Boron (B)	2012/11/21	<10		ug/L	
		Dissolved Cadmium (Cd)	2012/11/21	<0.10		ug/L	
		Dissolved Calcium (Ca)	2012/11/21	<200		ug/L	
		Dissolved Chromium (Cr)	2012/11/21	<5.0		ug/L	
		Dissolved Cobalt (Co)	2012/11/21	<0.50		ug/L	
		Dissolved Copper (Cu)	2012/11/21	<1.0		ug/L	
		Dissolved Iron (Fe)	2012/11/21	<100		ug/L	
		Dissolved Lead (Pb)	2012/11/21	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/21	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/21	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/21	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/21	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/21	<100		ug/L	
		Dissolved Potassium (K)	2012/11/21	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/21	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/21	<50		ug/L	
		Dissolved Silver (Ag)	2012/11/21	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/21	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/21	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/21	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/21	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/21	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/21	<0.10		ug/L	
		Dissolved Vanadium (V)	2012/11/21	<0.50		ug/L	
		Dissolved Zinc (Zn)	2012/11/21	<5.0		ug/L	
3043592 HRE	RPD Matrix Spike	Dissolved Lead (Pb)	2012/11/21	NC		%	20
		Total Aluminum (Al)	2012/11/21		103	%	80 - 120
		Total Antimony (Sb)	2012/11/21		109	%	80 - 120
		Total Arsenic (As)	2012/11/21		106	%	80 - 120
		Total Barium (Ba)	2012/11/21		105	%	80 - 120
		Total Beryllium (Be)	2012/11/21		105	%	80 - 120
		Total Bismuth (Bi)	2012/11/21		103	%	80 - 120
		Total Boron (B)	2012/11/21		105	%	80 - 120
		Total Cadmium (Cd)	2012/11/21		107	%	80 - 120
		Total Calcium (Ca)	2012/11/21		NC	%	80 - 120
		Total Chromium (Cr)	2012/11/21		101	%	80 - 120
		Total Cobalt (Co)	2012/11/21		102	%	80 - 120
		Total Copper (Cu)	2012/11/21		99	%	80 - 120
		Total Iron (Fe)	2012/11/21		103	%	80 - 120
		Total Lead (Pb)	2012/11/21		101	%	80 - 120
		Total Magnesium (Mg)	2012/11/21		NC	%	80 - 120
		Total Manganese (Mn)	2012/11/21		101	%	80 - 120
		Total Molybdenum (Mo)	2012/11/21		110	%	80 - 120
		Total Nickel (Ni)	2012/11/21		100	%	80 - 120
		Total Phosphorus (P)	2012/11/21		107	%	80 - 120
		Total Potassium (K)	2012/11/21		107	%	80 - 120
		Total Silicon (Si)	2012/11/21		102	%	80 - 120
		Total Selenium (Se)	2012/11/21		104	%	80 - 120
		Total Silver (Ag)	2012/11/21		101	%	80 - 120
		Total Sodium (Na)	2012/11/21		NC	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3043592 HRE	Matrix Spike	Total Strontium (Sr)	2012/11/21		105	%	80 - 120
		Total Thallium (Tl)	2012/11/21		107	%	80 - 120
		Total Tin (Sn)	2012/11/21		108	%	80 - 120
		Total Titanium (Ti)	2012/11/21		109	%	80 - 120
		Total Uranium (U)	2012/11/21		107	%	80 - 120
		Total Vanadium (V)	2012/11/21		104	%	80 - 120
		Total Zinc (Zn)	2012/11/21		101	%	80 - 120
	Spiked Blank	Total Aluminum (Al)	2012/11/21		103	%	80 - 120
		Total Antimony (Sb)	2012/11/21		108	%	80 - 120
		Total Arsenic (As)	2012/11/21		105	%	80 - 120
		Total Barium (Ba)	2012/11/21		105	%	80 - 120
		Total Beryllium (Be)	2012/11/21		102	%	80 - 120
		Total Bismuth (Bi)	2012/11/21		102	%	80 - 120
		Total Boron (B)	2012/11/21		103	%	80 - 120
		Total Cadmium (Cd)	2012/11/21		104	%	80 - 120
		Total Calcium (Ca)	2012/11/21		107	%	80 - 120
		Total Chromium (Cr)	2012/11/21		101	%	80 - 120
		Total Cobalt (Co)	2012/11/21		102	%	80 - 120
		Total Copper (Cu)	2012/11/21		101	%	80 - 120
		Total Iron (Fe)	2012/11/21		102	%	80 - 120
		Total Lead (Pb)	2012/11/21		101	%	80 - 120
		Total Magnesium (Mg)	2012/11/21		107	%	80 - 120
		Total Manganese (Mn)	2012/11/21		100	%	80 - 120
		Total Molybdenum (Mo)	2012/11/21		106	%	80 - 120
		Total Nickel (Ni)	2012/11/21		101	%	80 - 120
		Total Phosphorus (P)	2012/11/21		104	%	80 - 120
		Total Potassium (K)	2012/11/21		105	%	80 - 120
		Total Silicon (Si)	2012/11/21		103	%	80 - 120
		Total Selenium (Se)	2012/11/21		104	%	80 - 120
		Total Silver (Ag)	2012/11/21		99	%	80 - 120
		Total Sodium (Na)	2012/11/21		110	%	80 - 120
		Total Strontium (Sr)	2012/11/21		101	%	80 - 120
		Total Thallium (Tl)	2012/11/21		106	%	80 - 120
		Total Tin (Sn)	2012/11/21		106	%	80 - 120
		Total Titanium (Ti)	2012/11/21		105	%	80 - 120
		Total Uranium (U)	2012/11/21		105	%	80 - 120
		Total Vanadium (V)	2012/11/21		101	%	80 - 120
		Total Zinc (Zn)	2012/11/21		103	%	80 - 120
	Method Blank	Total Aluminum (Al)	2012/11/21	<5.0		ug/L	
		Total Antimony (Sb)	2012/11/21	<0.50		ug/L	
		Total Arsenic (As)	2012/11/21	<1.0		ug/L	
		Total Barium (Ba)	2012/11/21	<2.0		ug/L	
		Total Beryllium (Be)	2012/11/21	<0.50		ug/L	
		Total Bismuth (Bi)	2012/11/21	<1.0		ug/L	
		Total Boron (B)	2012/11/21	<10		ug/L	
		Total Cadmium (Cd)	2012/11/21	<0.10		ug/L	
		Total Calcium (Ca)	2012/11/21	<200		ug/L	
		Total Chromium (Cr)	2012/11/21	<5.0		ug/L	
		Total Cobalt (Co)	2012/11/21	<0.50		ug/L	
		Total Copper (Cu)	2012/11/21	<1.0		ug/L	
		Total Iron (Fe)	2012/11/21	<100		ug/L	
		Total Lead (Pb)	2012/11/21	<0.50		ug/L	
		Total Magnesium (Mg)	2012/11/21	<50		ug/L	
		Total Manganese (Mn)	2012/11/21	<2.0		ug/L	
		Total Molybdenum (Mo)	2012/11/21	<0.50		ug/L	



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3043592 HRE	Method Blank	Total Nickel (Ni)	2012/11/21	<1.0		ug/L	
		Total Phosphorus (P)	2012/11/21	<100		ug/L	
		Total Potassium (K)	2012/11/21	<200		ug/L	
		Total Silicon (Si)	2012/11/21	<50		ug/L	
		Total Selenium (Se)	2012/11/21	<2.0		ug/L	
		Total Silver (Ag)	2012/11/21	<0.10		ug/L	
		Total Sodium (Na)	2012/11/21	<100		ug/L	
		Total Strontium (Sr)	2012/11/21	<1.0		ug/L	
		Total Thallium (Tl)	2012/11/21	<0.050		ug/L	
		Total Tin (Sn)	2012/11/21	<1.0		ug/L	
		Total Titanium (Ti)	2012/11/21	<5.0		ug/L	
		Total Uranium (U)	2012/11/21	<0.10		ug/L	
		Total Vanadium (V)	2012/11/21	<0.50		ug/L	
		Total Zinc (Zn)	2012/11/21	<5.0		ug/L	
	RPD	Total Aluminum (Al)	2012/11/21	NC		%	20
		Total Barium (Ba)	2012/11/21	1.9		%	20
		Total Beryllium (Be)	2012/11/21	NC		%	20
		Total Bismuth (Bi)	2012/11/21	NC		%	20
		Total Cadmium (Cd)	2012/11/21	NC		%	20
		Total Calcium (Ca)	2012/11/21	4.2		%	20
		Total Chromium (Cr)	2012/11/21	NC		%	20
		Total Cobalt (Co)	2012/11/21	NC		%	20
		Total Copper (Cu)	2012/11/21	NC		%	20
		Total Iron (Fe)	2012/11/21	NC		%	20
		Total Lead (Pb)	2012/11/21	NC		%	20
		Total Magnesium (Mg)	2012/11/21	5.5		%	20
		Total Manganese (Mn)	2012/11/21	4.1		%	20
		Total Molybdenum (Mo)	2012/11/21	NC		%	20
		Total Nickel (Ni)	2012/11/21	NC		%	20
		Total Phosphorus (P)	2012/11/21	NC		%	20
		Total Potassium (K)	2012/11/21	2.7		%	20
		Total Silver (Ag)	2012/11/21	NC		%	20
		Total Sodium (Na)	2012/11/21	7.4		%	20
		Total Vanadium (V)	2012/11/21	NC		%	20
		Total Zinc (Zn)	2012/11/21	NC		%	20
3043708 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/21		102	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		112	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		108	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		105	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		107	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		102	%	80 - 120
		Dissolved Boron (B)	2012/11/21		106	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		108	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/21		NC	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/21		103	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/21		101	%	80 - 120
		Dissolved Copper (Cu)	2012/11/21		100	%	80 - 120
		Dissolved Iron (Fe)	2012/11/21		102	%	80 - 120
		Dissolved Lead (Pb)	2012/11/21		101	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/21		NC	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/21		103	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/21		111	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/21		100	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/21		107	%	80 - 120
		Dissolved Potassium (K)	2012/11/21		106	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3043708 HRE	Matrix Spike	Dissolved Selenium (Se)	2012/11/21		108	%	80 - 120
		Dissolved Silicon (Si)	2012/11/21		106	%	80 - 120
		Dissolved Silver (Ag)	2012/11/21		103	%	80 - 120
		Dissolved Sodium (Na)	2012/11/21		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/21		NC	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/21		104	%	80 - 120
		Dissolved Tin (Sn)	2012/11/21		110	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/21		108	%	80 - 120
		Dissolved Uranium (U)	2012/11/21		109	%	80 - 120
		Dissolved Vanadium (V)	2012/11/21		106	%	80 - 120
	Dissolved Zinc (Zn)	2012/11/21		104	%	80 - 120	
	Spiked Blank	Dissolved Aluminum (Al)	2012/11/21		99	%	80 - 120
		Dissolved Antimony (Sb)	2012/11/21		103	%	80 - 120
		Dissolved Arsenic (As)	2012/11/21		100	%	80 - 120
		Dissolved Barium (Ba)	2012/11/21		101	%	80 - 120
		Dissolved Beryllium (Be)	2012/11/21		101	%	80 - 120
		Dissolved Bismuth (Bi)	2012/11/21		99	%	80 - 120
		Dissolved Boron (B)	2012/11/21		102	%	80 - 120
		Dissolved Cadmium (Cd)	2012/11/21		102	%	80 - 120
		Dissolved Calcium (Ca)	2012/11/21		101	%	80 - 120
		Dissolved Chromium (Cr)	2012/11/21		100	%	80 - 120
		Dissolved Cobalt (Co)	2012/11/21		98	%	80 - 120
		Dissolved Copper (Cu)	2012/11/21		96	%	80 - 120
		Dissolved Iron (Fe)	2012/11/21		99	%	80 - 120
		Dissolved Lead (Pb)	2012/11/21		98	%	80 - 120
		Dissolved Magnesium (Mg)	2012/11/21		100	%	80 - 120
		Dissolved Manganese (Mn)	2012/11/21		99	%	80 - 120
		Dissolved Molybdenum (Mo)	2012/11/21		103	%	80 - 120
		Dissolved Nickel (Ni)	2012/11/21		99	%	80 - 120
		Dissolved Phosphorus (P)	2012/11/21		103	%	80 - 120
		Dissolved Potassium (K)	2012/11/21		101	%	80 - 120
		Dissolved Selenium (Se)	2012/11/21		101	%	80 - 120
		Dissolved Silicon (Si)	2012/11/21		100	%	80 - 120
Dissolved Silver (Ag)	2012/11/21		99	%	80 - 120		
Dissolved Sodium (Na)	2012/11/21		102	%	80 - 120		
Dissolved Strontium (Sr)	2012/11/21		100	%	80 - 120		
Dissolved Thallium (Tl)	2012/11/21		102	%	80 - 120		
Dissolved Tin (Sn)	2012/11/21		104	%	80 - 120		
Dissolved Titanium (Ti)	2012/11/21		103	%	80 - 120		
Dissolved Uranium (U)	2012/11/21		103	%	80 - 120		
Dissolved Vanadium (V)	2012/11/21		101	%	80 - 120		
Dissolved Zinc (Zn)	2012/11/21		100	%	80 - 120		
Method Blank	Dissolved Aluminum (Al)	2012/11/21		<5.0		ug/L	
	Dissolved Antimony (Sb)	2012/11/21		<0.50		ug/L	
	Dissolved Arsenic (As)	2012/11/21		<1.0		ug/L	
	Dissolved Barium (Ba)	2012/11/21		<2.0		ug/L	
	Dissolved Beryllium (Be)	2012/11/21		<0.50		ug/L	
	Dissolved Bismuth (Bi)	2012/11/21		<1.0		ug/L	
	Dissolved Boron (B)	2012/11/21		<10		ug/L	
	Dissolved Cadmium (Cd)	2012/11/21		<0.10		ug/L	
	Dissolved Calcium (Ca)	2012/11/21		<200		ug/L	
	Dissolved Chromium (Cr)	2012/11/21		<5.0		ug/L	
Dissolved Cobalt (Co)	2012/11/21		<0.50		ug/L		
Dissolved Copper (Cu)	2012/11/21		<1.0		ug/L		
Dissolved Iron (Fe)	2012/11/21		<100		ug/L		

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3043708 HRE	Method Blank	Dissolved Lead (Pb)	2012/11/21	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/21	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/21	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/21	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/21	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/21	<100		ug/L	
		Dissolved Potassium (K)	2012/11/21	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/21	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/21	<50		ug/L	
		Dissolved Silver (Ag)	2012/11/21	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/21	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/21	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/21	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/21	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/21	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/21	<0.10		ug/L	
Dissolved Vanadium (V)	2012/11/21	<0.50		ug/L			
Dissolved Zinc (Zn)	2012/11/21	<5.0		ug/L			
3043767 VRO	RPD	Dissolved Lead (Pb)	2012/11/21	NC		%	20
	Matrix Spike	Total Phosphorus	2012/11/22		99	%	80 - 120
	QC Standard	Total Phosphorus	2012/11/22		102	%	85 - 115
	Spiked Blank	Total Phosphorus	2012/11/22		101	%	85 - 115
3044217 PBA	Method Blank	Total Phosphorus	2012/11/22	<0.020		mg/L	
	RPD	Total Phosphorus	2012/11/22	3.4		%	20
3044217 PBA	Matrix Spike	Total Aluminum (Al)	2012/11/22		104	%	80 - 120
		Total Antimony (Sb)	2012/11/22		113	%	80 - 120
		Total Arsenic (As)	2012/11/22		103	%	80 - 120
		Total Barium (Ba)	2012/11/22		99	%	80 - 120
		Total Beryllium (Be)	2012/11/22		103	%	80 - 120
		Total Bismuth (Bi)	2012/11/22		96	%	80 - 120
		Total Boron (B)	2012/11/22		102	%	80 - 120
		Total Cadmium (Cd)	2012/11/22		104	%	80 - 120
		Total Calcium (Ca)	2012/11/22		NC	%	80 - 120
		Total Chromium (Cr)	2012/11/22		98	%	80 - 120
		Total Cobalt (Co)	2012/11/22		100	%	80 - 120
		Total Copper (Cu)	2012/11/22		96	%	80 - 120
		Total Iron (Fe)	2012/11/22		105	%	80 - 120
		Total Lead (Pb)	2012/11/22		97	%	80 - 120
		Total Magnesium (Mg)	2012/11/22		NC	%	80 - 120
		Total Manganese (Mn)	2012/11/22		103	%	80 - 120
		Total Molybdenum (Mo)	2012/11/22		110	%	80 - 120
		Total Nickel (Ni)	2012/11/22		97	%	80 - 120
		Total Phosphorus (P)	2012/11/22		107	%	80 - 120
		Total Potassium (K)	2012/11/22		104	%	80 - 120
		Total Silicon (Si)	2012/11/22		104	%	80 - 120
		Total Selenium (Se)	2012/11/22		102	%	80 - 120
		Total Silver (Ag)	2012/11/22		97	%	80 - 120
		Total Sodium (Na)	2012/11/22		NC	%	80 - 120
		Total Strontium (Sr)	2012/11/22		NC	%	80 - 120
		Total Thallium (Tl)	2012/11/22		97	%	80 - 120
		Total Tin (Sn)	2012/11/22		110	%	80 - 120
		Total Titanium (Ti)	2012/11/22		104	%	80 - 120
		Total Uranium (U)	2012/11/22		NC	%	80 - 120
		Total Vanadium (V)	2012/11/22		103	%	80 - 120
		Total Zinc (Zn)	2012/11/22		99	%	80 - 120

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
3044217 PBA	Spiked Blank	Total Aluminum (Al)	2012/11/22		108	%	80 - 120		
		Total Antimony (Sb)	2012/11/22		112	%	80 - 120		
		Total Arsenic (As)	2012/11/22		104	%	80 - 120		
		Total Barium (Ba)	2012/11/22		102	%	80 - 120		
		Total Beryllium (Be)	2012/11/22		102	%	80 - 120		
		Total Bismuth (Bi)	2012/11/22		99	%	80 - 120		
		Total Boron (B)	2012/11/22		100	%	80 - 120		
		Total Cadmium (Cd)	2012/11/22		105	%	80 - 120		
		Total Calcium (Ca)	2012/11/22		106	%	80 - 120		
		Total Chromium (Cr)	2012/11/22		102	%	80 - 120		
		Total Cobalt (Co)	2012/11/22		103	%	80 - 120		
		Total Copper (Cu)	2012/11/22		100	%	80 - 120		
		Total Iron (Fe)	2012/11/22		106	%	80 - 120		
		Total Lead (Pb)	2012/11/22		101	%	80 - 120		
		Total Magnesium (Mg)	2012/11/22		110	%	80 - 120		
		Total Manganese (Mn)	2012/11/22		106	%	80 - 120		
		Total Molybdenum (Mo)	2012/11/22		108	%	80 - 120		
		Total Nickel (Ni)	2012/11/22		101	%	80 - 120		
		Total Phosphorus (P)	2012/11/22		111	%	80 - 120		
		Total Potassium (K)	2012/11/22		106	%	80 - 120		
		Total Silicon (Si)	2012/11/22		105	%	80 - 120		
		Total Selenium (Se)	2012/11/22		104	%	80 - 120		
		Total Silver (Ag)	2012/11/22		100	%	80 - 120		
		Total Sodium (Na)	2012/11/22		111	%	80 - 120		
		Total Strontium (Sr)	2012/11/22		106	%	80 - 120		
		Total Thallium (Tl)	2012/11/22		102	%	80 - 120		
		Total Tin (Sn)	2012/11/22		107	%	80 - 120		
		Total Titanium (Ti)	2012/11/22		107	%	80 - 120		
		Total Uranium (U)	2012/11/22		105	%	80 - 120		
		Total Vanadium (V)	2012/11/22		103	%	80 - 120		
		Total Zinc (Zn)	2012/11/22		104	%	80 - 120		
		Method Blank		Total Aluminum (Al)	2012/11/22	<5.0		ug/L	
				Total Antimony (Sb)	2012/11/22	0.58, RDL=0.50		ug/L	
Total Arsenic (As)	2012/11/22			<1.0		ug/L			
Total Barium (Ba)	2012/11/22			<2.0		ug/L			
Total Beryllium (Be)	2012/11/22			<0.50		ug/L			
Total Bismuth (Bi)	2012/11/22			<1.0		ug/L			
Total Boron (B)	2012/11/22			<10		ug/L			
Total Cadmium (Cd)	2012/11/22			<0.10		ug/L			
Total Calcium (Ca)	2012/11/22			<200		ug/L			
Total Chromium (Cr)	2012/11/22			<5.0		ug/L			
Total Cobalt (Co)	2012/11/22			<0.50		ug/L			
Total Copper (Cu)	2012/11/22			<1.0		ug/L			
Total Iron (Fe)	2012/11/22			<100		ug/L			
Total Lead (Pb)	2012/11/22			<0.50		ug/L			
Total Magnesium (Mg)	2012/11/22			53, RDL=50		ug/L			
Total Manganese (Mn)	2012/11/22			<2.0		ug/L			
Total Molybdenum (Mo)	2012/11/22			<0.50		ug/L			
Total Nickel (Ni)	2012/11/22			<1.0		ug/L			
Total Phosphorus (P)	2012/11/22			<100		ug/L			
Total Potassium (K)	2012/11/22			<200		ug/L			
Total Silicon (Si)	2012/11/22			<50		ug/L			
Total Selenium (Se)	2012/11/22	<2.0		ug/L					
Total Silver (Ag)	2012/11/22	<0.10		ug/L					
Total Sodium (Na)	2012/11/22	<100		ug/L					

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
3044217 PBA	Method Blank	Total Strontium (Sr)	2012/11/22	<1.0		ug/L		
		Total Thallium (Tl)	2012/11/22	<0.050		ug/L		
		Total Tin (Sn)	2012/11/22	<1.0		ug/L		
		Total Titanium (Ti)	2012/11/22	<5.0		ug/L		
		Total Uranium (U)	2012/11/22	<0.10		ug/L		
		Total Vanadium (V)	2012/11/22	<0.50		ug/L		
		Total Zinc (Zn)	2012/11/22	<5.0		ug/L		
		RPD	Total Aluminum (Al)	2012/11/22	NC		%	20
			Total Antimony (Sb)	2012/11/22	NC		%	20
			Total Arsenic (As)	2012/11/22	NC		%	20
			Total Barium (Ba)	2012/11/22	2.8		%	20
			Total Beryllium (Be)	2012/11/22	NC		%	20
			Total Bismuth (Bi)	2012/11/22	NC		%	20
			Total Boron (B)	2012/11/22	NC		%	20
			Total Cadmium (Cd)	2012/11/22	NC		%	20
			Total Calcium (Ca)	2012/11/22	0.9		%	20
			Total Chromium (Cr)	2012/11/22	NC		%	20
			Total Cobalt (Co)	2012/11/22	0.2		%	20
			Total Copper (Cu)	2012/11/22	NC		%	20
			Total Iron (Fe)	2012/11/22	NC		%	20
			Total Lead (Pb)	2012/11/22	NC		%	20
			Total Magnesium (Mg)	2012/11/22	0.4		%	20
			Total Manganese (Mn)	2012/11/22	1.1		%	20
			Total Molybdenum (Mo)	2012/11/22	0.9		%	20
			Total Nickel (Ni)	2012/11/22	NC		%	20
			Total Potassium (K)	2012/11/22	0.7		%	20
			Total Silicon (Si)	2012/11/22	1.4		%	20
			Total Selenium (Se)	2012/11/22	NC		%	20
			Total Silver (Ag)	2012/11/22	NC		%	20
			Total Sodium (Na)	2012/11/22	0.5		%	20
			Total Strontium (Sr)	2012/11/22	0.01		%	20
			Total Thallium (Tl)	2012/11/22	NC		%	20
			Total Tin (Sn)	2012/11/22	NC		%	20
			Total Titanium (Ti)	2012/11/22	NC		%	20
Total Uranium (U)	2012/11/22	1.9		%	20			
Total Vanadium (V)	2012/11/22	9.1		%	20			
Total Zinc (Zn)	2012/11/22	NC		%	20			
3045285 HRE	Matrix Spike	Dissolved Aluminum (Al)	2012/11/22		102	%	80 - 120	
		Dissolved Antimony (Sb)	2012/11/22		108	%	80 - 120	
		Dissolved Arsenic (As)	2012/11/22		105	%	80 - 120	
		Dissolved Barium (Ba)	2012/11/22		103	%	80 - 120	
		Dissolved Beryllium (Be)	2012/11/22		103	%	80 - 120	
		Dissolved Bismuth (Bi)	2012/11/22		101	%	80 - 120	
		Dissolved Boron (B)	2012/11/22		107	%	80 - 120	
		Dissolved Cadmium (Cd)	2012/11/22		105	%	80 - 120	
		Dissolved Calcium (Ca)	2012/11/22		NC	%	80 - 120	
		Dissolved Chromium (Cr)	2012/11/22		101	%	80 - 120	
		Dissolved Cobalt (Co)	2012/11/22		103	%	80 - 120	
		Dissolved Copper (Cu)	2012/11/22		99	%	80 - 120	
		Dissolved Iron (Fe)	2012/11/22		103	%	80 - 120	
		Dissolved Lead (Pb)	2012/11/22		100	%	80 - 120	
		Dissolved Magnesium (Mg)	2012/11/22		105	%	80 - 120	
		Dissolved Manganese (Mn)	2012/11/22		101	%	80 - 120	
		Dissolved Molybdenum (Mo)	2012/11/22		109	%	80 - 120	
Dissolved Nickel (Ni)	2012/11/22		100	%	80 - 120			

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3045285 HRE	Matrix Spike	Dissolved Phosphorus (P)	2012/11/22		109	%	80 - 120
		Dissolved Potassium (K)	2012/11/22		105	%	80 - 120
		Dissolved Selenium (Se)	2012/11/22		104	%	80 - 120
		Dissolved Silicon (Si)	2012/11/22		105	%	80 - 120
		Dissolved Silver (Ag)	2012/11/22		101	%	80 - 120
		Dissolved Sodium (Na)	2012/11/22		NC	%	80 - 120
		Dissolved Strontium (Sr)	2012/11/22		104	%	80 - 120
		Dissolved Thallium (Tl)	2012/11/22		103	%	80 - 120
		Dissolved Tin (Sn)	2012/11/22		108	%	80 - 120
		Dissolved Titanium (Ti)	2012/11/22		104	%	80 - 120
		Dissolved Uranium (U)	2012/11/22		106	%	80 - 120
		Dissolved Vanadium (V)	2012/11/22		103	%	80 - 120
		Dissolved Zinc (Zn)	2012/11/22		102	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2012/11/22		102	%
	Dissolved Antimony (Sb)		2012/11/22		103	%	80 - 120
	Dissolved Arsenic (As)		2012/11/22		100	%	80 - 120
	Dissolved Barium (Ba)		2012/11/22		98	%	80 - 120
	Dissolved Beryllium (Be)		2012/11/22		99	%	80 - 120
	Dissolved Bismuth (Bi)		2012/11/22		101	%	80 - 120
	Dissolved Boron (B)		2012/11/22		100	%	80 - 120
	Dissolved Cadmium (Cd)		2012/11/22		101	%	80 - 120
	Dissolved Calcium (Ca)		2012/11/22		103	%	80 - 120
	Dissolved Chromium (Cr)		2012/11/22		100	%	80 - 120
	Dissolved Cobalt (Co)		2012/11/22		101	%	80 - 120
	Dissolved Copper (Cu)		2012/11/22		97	%	80 - 120
	Dissolved Iron (Fe)		2012/11/22		101	%	80 - 120
	Dissolved Lead (Pb)		2012/11/22		99	%	80 - 120
	Dissolved Magnesium (Mg)		2012/11/22		105	%	80 - 120
	Dissolved Manganese (Mn)		2012/11/22		98	%	80 - 120
	Dissolved Molybdenum (Mo)		2012/11/22		103	%	80 - 120
	Dissolved Nickel (Ni)		2012/11/22		100	%	80 - 120
	Dissolved Phosphorus (P)		2012/11/22		103	%	80 - 120
	Dissolved Potassium (K)		2012/11/22		104	%	80 - 120
	Dissolved Selenium (Se)	2012/11/22		101	%	80 - 120	
Dissolved Silicon (Si)	2012/11/22		103	%	80 - 120		
Dissolved Silver (Ag)	2012/11/22		98	%	80 - 120		
Dissolved Sodium (Na)	2012/11/22		106	%	80 - 120		
Dissolved Strontium (Sr)	2012/11/22		97	%	80 - 120		
Dissolved Thallium (Tl)	2012/11/22		102	%	80 - 120		
Dissolved Tin (Sn)	2012/11/22		103	%	80 - 120		
Dissolved Titanium (Ti)	2012/11/22		101	%	80 - 120		
Dissolved Uranium (U)	2012/11/22		105	%	80 - 120		
Dissolved Vanadium (V)	2012/11/22		101	%	80 - 120		
Dissolved Zinc (Zn)	2012/11/22		100	%	80 - 120		
Method Blank	Dissolved Aluminum (Al)	2012/11/22		<5.0		ug/L	
	Dissolved Antimony (Sb)	2012/11/22		<0.50		ug/L	
	Dissolved Arsenic (As)	2012/11/22		<1.0		ug/L	
	Dissolved Barium (Ba)	2012/11/22		<2.0		ug/L	
	Dissolved Beryllium (Be)	2012/11/22		<0.50		ug/L	
	Dissolved Bismuth (Bi)	2012/11/22		<1.0		ug/L	
	Dissolved Boron (B)	2012/11/22		<10		ug/L	
	Dissolved Cadmium (Cd)	2012/11/22		<0.10		ug/L	
	Dissolved Calcium (Ca)	2012/11/22		<200		ug/L	
	Dissolved Chromium (Cr)	2012/11/22		<5.0		ug/L	
Dissolved Cobalt (Co)	2012/11/22		<0.50		ug/L		

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3045285 HRE	Method Blank	Dissolved Copper (Cu)	2012/11/22	<1.0		ug/L	
		Dissolved Iron (Fe)	2012/11/22	<100		ug/L	
		Dissolved Lead (Pb)	2012/11/22	<0.50		ug/L	
		Dissolved Magnesium (Mg)	2012/11/22	<50		ug/L	
		Dissolved Manganese (Mn)	2012/11/22	<2.0		ug/L	
		Dissolved Molybdenum (Mo)	2012/11/22	<0.50		ug/L	
		Dissolved Nickel (Ni)	2012/11/22	<1.0		ug/L	
		Dissolved Phosphorus (P)	2012/11/22	<100		ug/L	
		Dissolved Potassium (K)	2012/11/22	<200		ug/L	
		Dissolved Selenium (Se)	2012/11/22	<2.0		ug/L	
		Dissolved Silicon (Si)	2012/11/22	<50		ug/L	
		Dissolved Silver (Ag)	2012/11/22	<0.10		ug/L	
		Dissolved Sodium (Na)	2012/11/22	<100		ug/L	
		Dissolved Strontium (Sr)	2012/11/22	<1.0		ug/L	
		Dissolved Thallium (Tl)	2012/11/22	<0.050		ug/L	
		Dissolved Tin (Sn)	2012/11/22	<1.0		ug/L	
		Dissolved Titanium (Ti)	2012/11/22	<5.0		ug/L	
		Dissolved Uranium (U)	2012/11/22	<0.10		ug/L	
		Dissolved Vanadium (V)	2012/11/22	<0.50		ug/L	
		Dissolved Zinc (Zn)	2012/11/22	<5.0		ug/L	
	RPD	Dissolved Lead (Pb)	2012/11/22	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

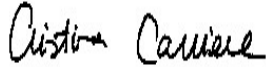
( 1 ) The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

## Validation Signature Page

Maxxam Job #: B2I0878

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

A handwritten signature in black ink that reads "Cristina Carriere". The signature is written in a cursive, flowing style.

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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.



Site Location: TANSLEY QUARRY  
Your C.O.C. #: 38115607, 381156-07-01

**Attention: Sharon Wood**

Golder Associates Ltd  
Mississauga - Standing Offer  
2390 Argentia Rd  
Mississauga, ON  
L5N 5Z7

Report Date: 2012/11/23

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B210878**

**Received: 2012/11/16, 14:09**

Sample Matrix: Water  
# Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	6	N/A	2012/11/19	CAM SOP-00448	SM 2320B
Anions	6	N/A	2012/11/20	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	6	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	6	2012/11/17	2012/11/19	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/21	CAM SOP 00102	SM 2340 B
Hardness (calculated as CaCO <sub>3</sub> )	5	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/20	2012/11/20	CAM SOP-00453	SW-846 7470A
Mercury in Water by CVAA	5	2012/11/20	2012/11/21	CAM SOP-00453	SW-846 7470A
Dissolved Metals by ICPMS	3	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Dissolved Metals by ICPMS	3	N/A	2012/11/22	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	5	N/A	2012/11/21	CAM SOP-00447	EPA 6020
Total Metals Analysis by ICPMS	1	N/A	2012/11/22	CAM SOP-00447	EPA 6020
Total Ammonia-N	6	N/A	2012/11/21	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (1)	6	N/A	2012/11/19	CAM SOP-00440	SM 4500 NO3/NO2B
pH	6	N/A	2012/11/19	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	3	N/A	2012/11/19	CAM SOP-00444	MOE ROPHEN-E3179
Phenols (4AAP)	3	N/A	2012/11/20	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	6	N/A	2012/11/19	CAM SOP-00461	EPA 365.1
Sulphide	6	N/A	2012/11/19	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	6	2012/11/21	2012/11/22	CAM SOP-00407	SM 4500 P,B,F
Total Suspended Solids	6	N/A	2012/11/17	CAM SOP-00428	SM 2540D
Turbidity	6	N/A	2012/11/18	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited

Maxxam Job #: B2I0878  
Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: DB

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in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

#### Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B210878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PQ4138			PQ4139			PQ4140	PQ4140		
Sampling Date		2012/11/16			2012/11/16			2012/11/16	2012/11/16		
	Units	MW1-DEEP	RDL	QC Batch	MW2-DEEP	RDL	QC Batch	MW1-INT	MW1-INT Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>											
Hardness (CaCO <sub>3</sub> )	mg/L	6100	1.0	3039453	6400	1.0	3039453	780		1.0	3039453
<b>Inorganics</b>											
Total Ammonia-N	mg/L	21	0.50	3043422	16	0.50	3043422	0.24		0.050	3043422
Fluoride (F <sup>-</sup> )	mg/L	0.35	0.10	3040239	0.34	0.10	3040239	0.46	0.45	0.10	3040239
Free Cyanide	mg/L	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123	<0.0020		0.0020	3043123
Orthophosphate (P)	mg/L	0.096	0.010	3040226	<0.010	0.010	3040933	<0.010		0.010	3040226
pH	pH	6.88		3040240	6.66		3040240	7.91	7.90		3040240
Phenols-4AAP	mg/L	0.062	0.0010	3040135	<0.0010	0.0010	3040135	<0.0010		0.0010	3040111
Total Phosphorus	mg/L	0.31	0.10	3043767	1.3	0.40	3043767	0.50		0.20	3043767
Total Suspended Solids	mg/L	120	10	3040173	2900	100	3040173	1600		100	3040173
Sulphide	mg/L	4.0	0.020	3040303	<0.020	0.020	3040081	<0.020		0.020	3040081
Turbidity	NTU	130	0.2	3040107	630	2	3040107	720		2	3040107
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	99	1.0	3040238	47	1.0	3040238	410	410	1.0	3040238
Nitrite (N)	mg/L	<0.10	0.10	3040142	<0.10	0.10	3040142	<0.010		0.010	3040142
Dissolved Chloride (Cl)	mg/L	13000	100	3040143	14000	100	3040143	120		1.0	3040143
Nitrate (N)	mg/L	<0.10	0.10	3040142	<0.10	0.10	3040142	0.82		0.10	3040142
Nitrate + Nitrite	mg/L	<0.10	0.10	3040142	<0.10	0.10	3040142	0.82		0.10	3040142
Dissolved Bromide (Br <sup>-</sup> )	mg/L	140	100	3040143	200	100	3040143	<1.0		1.0	3040143
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1900	100	3040143	2100	100	3040143	280		1.0	3040143

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PQ4141			PQ4142			PQ4143		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
	Units	MW7-DEEP	RDL	QC Batch	MW7-SHALLOW	RDL	QC Batch	DUP#3	RDL	QC Batch
<b>Calculated Parameters</b>										
Hardness (CaCO <sub>3</sub> )	mg/L	13000	1.0	3039453	610	1.0	3039453	6900	1.0	3039453
<b>Inorganics</b>										
Total Ammonia-N	mg/L	22	0.50	3043422	0.28	0.050	3043422	16	0.50	3043422
Fluoride (F <sup>-</sup> )	mg/L	0.19	0.10	3040239	0.33	0.10	3040239	0.34	0.10	3040239
Free Cyanide	mg/L	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123	<0.0020	0.0020	3043123
Orthophosphate (P)	mg/L	<0.010	0.010	3040933	<0.010	0.010	3040933	<0.010	0.010	3040226
pH	pH	6.58		3040240	7.92		3040240	6.78		3040240
Phenols-4AAP	mg/L	0.0025	0.0010	3040111	<0.0010	0.0010	3040111	<0.0010	0.0010	3040135
Total Phosphorus	mg/L	0.37	0.20	3043767	1.8	0.20	3043767	0.54	0.40	3043767
Total Suspended Solids	mg/L	2100	100	3040173	2200	100	3040173	4500	200	3040173
Sulphide	mg/L	<0.020	0.020	3040303	0.027	0.020	3040303	<0.020	0.020	3040081
Turbidity	NTU	210	0.4	3040107	770	2	3040107	380	2	3040107
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	45	1.0	3040238	570	1.0	3040238	48	1.0	3040238
Nitrite (N)	mg/L	<0.10	0.10	3040139	<0.010	0.010	3040142	<0.10	0.10	3040139
Dissolved Chloride (Cl)	mg/L	24000	200	3040276	23	1.0	3040296	14000	200	3040143
Nitrate (N)	mg/L	<0.10	0.10	3040139	<0.10	0.10	3040142	<0.10	0.10	3040139
Nitrate + Nitrite	mg/L	<0.10	0.10	3040139	<0.10	0.10	3040142	<0.10	0.10	3040139
Dissolved Bromide (Br <sup>-</sup> )	mg/L	320	100	3040276	<1.0	1.0	3040296	<200	200	3040143
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	1500	100	3040276	170	1.0	3040296	2000	200	3040143

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4138	PQ4139			PQ4140		
Sampling Date		2012/11/16	2012/11/16			2012/11/16		
	Units	MW1-DEEP	MW2-DEEP	RDL	QC Batch	MW1-INT	RDL	QC Batch
<b>Metals</b>								
Mercury (Hg)	mg/L	<0.00010	<0.00010	0.00010	3042274	<0.00010	0.00010	3042274
Dissolved Aluminum (Al)	ug/L	<50	300	50	3043708	53	5.0	3045285
Total Aluminum (Al)	ug/L	290	22000	50	3043592	15000	5.0	3043592
Dissolved Antimony (Sb)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Antimony (Sb)	ug/L	<5.0	<5.0	5.0	3043592	<0.50	0.50	3043592
Dissolved Arsenic (As)	ug/L	<20	<20	20	3043708	<1.0	1.0	3045285
Total Arsenic (As)	ug/L	<20	23	20	3043592	8.2	1.0	3043592
Dissolved Barium (Ba)	ug/L	23	25	20	3043708	26	2.0	3045285
Total Barium (Ba)	ug/L	28	350	20	3043592	160	2.0	3043592
Dissolved Beryllium (Be)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Beryllium (Be)	ug/L	<5.0	<5.0	5.0	3043592	1.2	0.50	3043592
Dissolved Bismuth (Bi)	ug/L	<10	<10	10	3043708	<1.0	1.0	3045285
Total Bismuth (Bi)	ug/L	<10	<10	10	3043592	<1.0	1.0	3043592
Dissolved Boron (B)	ug/L	5600	5600	100	3043708	60	10	3045285
Total Boron (B)	ug/L	6100	5900	100	3043592	90	10	3043592
Dissolved Cadmium (Cd)	ug/L	<1.0	<1.0	1.0	3043708	<0.10	0.10	3045285
Total Cadmium (Cd)	ug/L	2.0	<1.0	1.0	3043592	0.52	0.10	3043592
Dissolved Calcium (Ca)	ug/L	1700000	1800000	2000	3043708	71000	200	3045285
Total Calcium (Ca)	ug/L	2000000	2000000	2000	3043592	160000	200	3043592
Dissolved Chromium (Cr)	ug/L	<50	<50	50	3043708	<5.0	5.0	3045285
Total Chromium (Cr)	ug/L	73	<50	50	3043592	27	5.0	3043592
Dissolved Cobalt (Co)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Cobalt (Co)	ug/L	<5.0	25	5.0	3043592	14	0.50	3043592
Dissolved Copper (Cu)	ug/L	<10	<10	10	3043708	<1.0	1.0	3045285
Total Copper (Cu)	ug/L	17	85	10	3043592	30	1.0	3043592
Dissolved Iron (Fe)	ug/L	<1000	4100	1000	3043708	<100	100	3045285
Total Iron (Fe)	ug/L	1400	42000	1000	3043592	29000	100	3043592
Dissolved Lead (Pb)	ug/L	<5.0	<5.0	5.0	3043708	<0.50	0.50	3045285
Total Lead (Pb)	ug/L	<5.0	18	5.0	3043592	16	0.50	3043592
Dissolved Magnesium (Mg)	ug/L	420000	440000	500	3043708	150000	50	3045285
Total Magnesium (Mg)	ug/L	490000	480000	500	3043592	160000	50	3043592
Dissolved Manganese (Mn)	ug/L	960	980	20	3043708	6.8	2.0	3045285
Total Manganese (Mn)	ug/L	1100	2000	20	3043592	650	2.0	3043592
Dissolved Molybdenum (Mo)	ug/L	<5.0	5.7	5.0	3043708	1.8	0.50	3045285
Total Molybdenum (Mo)	ug/L	<5.0	12	5.0	3043592	3.4	0.50	3043592

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B210878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4138	PQ4139			PQ4140		
Sampling Date		2012/11/16	2012/11/16			2012/11/16		
	Units	MW1-DEEP	MW2-DEEP	RDL	QC Batch	MW1-INT	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L	<10	16	10	3043708	1.8	1.0	3045285
Total Nickel (Ni)	ug/L	37	68	10	3043592	27	1.0	3043592
Dissolved Phosphorus (P)	ug/L	<1000	<1000	1000	3043708	<100	100	3045285
Total Phosphorus (P)	ug/L	<1000	1400	1000	3043592	820	100	3043592
Dissolved Potassium (K)	ug/L	120000	110000	2000	3043708	2800	200	3045285
Total Potassium (K)	ug/L	140000	120000	2000	3043592	7700	200	3043592
Dissolved Selenium (Se)	ug/L	<40	<40	40	3043708	6.7	2.0	3045285
Dissolved Silicon (Si)	ug/L	2900	3400	500	3043708	7200	50	3045285
Total Silicon (Si)	ug/L	4000	30000	500	3043592	28000	50	3043592
Total Selenium (Se)	ug/L	<40	<40	40	3043592	6.8	2.0	3043592
Dissolved Silver (Ag)	ug/L	<1.0	<1.0	1.0	3043708	<0.10	0.10	3045285
Total Silver (Ag)	ug/L	<1.0	<1.0	1.0	3043592	0.14	0.10	3043592
Dissolved Sodium (Na)	ug/L	5600000	5700000	1000	3043708	46000	100	3045285
Total Sodium (Na)	ug/L	6500000	6200000	1000	3043592	45000	100	3043592
Dissolved Strontium (Sr)	ug/L	38000	39000	10	3043708	1200	1.0	3045285
Total Strontium (Sr)	ug/L	42000	41000	10	3043592	1600	1.0	3043592
Dissolved Thallium (Tl)	ug/L	<0.50	<0.50	0.50	3043708	<0.050	0.050	3045285
Total Thallium (Tl)	ug/L	<0.50	<0.50	0.50	3043592	0.22	0.050	3043592
Dissolved Tin (Sn)	ug/L	<10	<10	10	3043708	<1.0	1.0	3045285
Total Tin (Sn)	ug/L	<10	<10	10	3043592	<1.0	1.0	3043592
Dissolved Titanium (Ti)	ug/L	<50	<50	50	3043708	<5.0	5.0	3045285
Total Titanium (Ti)	ug/L	<50	420	50	3043592	350	5.0	3043592
Dissolved Uranium (U)	ug/L	<1.0	<1.0	1.0	3043708	11	0.10	3045285
Total Uranium (U)	ug/L	<1.0	1.7	1.0	3043592	13	0.10	3043592
Dissolved Vanadium (V)	ug/L	<10	<10	10	3043708	0.91	0.50	3045285
Total Vanadium (V)	ug/L	<10	54	10	3043592	30	0.50	3043592
Dissolved Zinc (Zn)	ug/L	<50	<50	50	3043708	<5.0	5.0	3045285
Total Zinc (Zn)	ug/L	<50	210	50	3043592	89	5.0	3043592

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4141			PQ4142			PQ4143		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
	Units	MW7-DEEP	RDL	QC Batch	MW7-SHALLOW	RDL	QC Batch	DUP#3	RDL	QC Batch
<b>Metals</b>										
Mercury (Hg)	mg/L	<0.00010	0.00010	3041961	<0.00010	0.00010	3042274	<0.00010	0.00010	3042274
Dissolved Aluminum (Al)	ug/L	130	100	3043708	120	5.0	3043441	490	50	3045285
Total Aluminum (Al)	ug/L	8700	250	3043592	36000	50	3043592	19000	50	3044217
Dissolved Antimony (Sb)	ug/L	<10	10	3043708	<0.50	0.50	3043441	<5.0	5.0	3045285
Total Antimony (Sb)	ug/L	<25	25	3043592	0.51	0.50	3043592	<5.0	5.0	3044217
Dissolved Arsenic (As)	ug/L	<40	40	3043708	<1.0	1.0	3043441	<20	20	3045285
Total Arsenic (As)	ug/L	<50	50	3043592	17	1.0	3043592	22	20	3044217
Dissolved Barium (Ba)	ug/L	55	40	3043708	34	2.0	3043441	26	20	3045285
Total Barium (Ba)	ug/L	220	100	3043592	310	2.0	3043592	240	20	3044217
Dissolved Beryllium (Be)	ug/L	<10	10	3043708	<0.50	0.50	3043441	<5.0	5.0	3045285
Total Beryllium (Be)	ug/L	<25	25	3043592	2.3	0.50	3043592	<5.0	5.0	3044217
Dissolved Bismuth (Bi)	ug/L	<20	20	3043708	<1.0	1.0	3043441	<10	10	3045285
Total Bismuth (Bi)	ug/L	<50	50	3043592	<1.0	1.0	3043592	<10	10	3044217
Dissolved Boron (B)	ug/L	6600	200	3043708	5800	10	3043441	5300	100	3045285
Total Boron (B)	ug/L	9400	500	3043592	6400	10	3043592	6400	100	3044217
Dissolved Cadmium (Cd)	ug/L	<2.0	2.0	3043708	<0.10	0.10	3043441	<1.0	1.0	3045285
Total Cadmium (Cd)	ug/L	8.9	5.0	3043592	0.85	0.10	3043592	<1.0	1.0	3044217
Dissolved Calcium (Ca)	ug/L	3700000	4000	3043708	66000	200	3043441	2000000	2000	3045285
Total Calcium (Ca)	ug/L	4000000	10000	3043592	270000	200	3043592	2100000	2000	3044217
Dissolved Chromium (Cr)	ug/L	<100	100	3043708	<5.0	5.0	3043441	<50	50	3045285
Total Chromium (Cr)	ug/L	<250	250	3043592	62	5.0	3043592	<50	50	3044217
Dissolved Cobalt (Co)	ug/L	<10	10	3043708	3.7	0.50	3043441	<5.0	5.0	3045285
Total Cobalt (Co)	ug/L	<25	25	3043592	32	0.50	3043592	19	5.0	3044217
Dissolved Copper (Cu)	ug/L	<20	20	3043708	<1.0	1.0	3043441	<10	10	3045285
Total Copper (Cu)	ug/L	72	50	3043592	62	1.0	3043592	60	10	3044217
Dissolved Iron (Fe)	ug/L	5100	2000	3043708	110	100	3043441	4300	1000	3045285
Total Iron (Fe)	ug/L	18000	5000	3043592	68000	100	3043592	36000	1000	3044217
Dissolved Lead (Pb)	ug/L	<10	10	3043708	<0.50	0.50	3043441	<5.0	5.0	3045285
Total Lead (Pb)	ug/L	<25	25	3043592	32	0.50	3043592	15	5.0	3044217
Dissolved Magnesium (Mg)	ug/L	940000	1000	3043708	110000	50	3043441	490000	500	3045285
Total Magnesium (Mg)	ug/L	1000000	2500	3043592	150000	50	3043592	550000	500	3044217
Dissolved Manganese (Mn)	ug/L	1700	40	3043708	92	2.0	3043441	1000	20	3045285
Total Manganese (Mn)	ug/L	2300	100	3043592	1700	2.0	3043592	1900	20	3044217
Dissolved Molybdenum (Mo)	ug/L	18	10	3043708	6.2	0.50	3043441	6.3	5.0	3045285
Total Molybdenum (Mo)	ug/L	<25	25	3043592	10	0.50	3043592	13	5.0	3044217

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B210878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PQ4141			PQ4142			PQ4143		
Sampling Date		2012/11/16			2012/11/16			2012/11/16		
	Units	MW7-DEEP	RDL	QC Batch	MW7-SHALLOW	RDL	QC Batch	DUP#3	RDL	QC Batch
Dissolved Nickel (Ni)	ug/L	27	20	3043708	1.6	1.0	3043441	16	10	3045285
Total Nickel (Ni)	ug/L	<50	50	3043592	67	1.0	3043592	40	10	3044217
Dissolved Phosphorus (P)	ug/L	<2000	2000	3043708	<100	100	3043441	<1000	1000	3045285
Total Phosphorus (P)	ug/L	<5000	5000	3043592	1800	100	3043592	<1000	1000	3044217
Dissolved Potassium (K)	ug/L	170000	4000	3043708	6500	200	3043441	120000	2000	3045285
Total Potassium (K)	ug/L	180000	10000	3043592	17000	200	3043592	140000	2000	3044217
Dissolved Selenium (Se)	ug/L	<80	80	3043708	<2.0	2.0	3043441	<40	40	3045285
Dissolved Silicon (Si)	ug/L	4600	1000	3043708	9300	100	3043441	3900	500	3045285
Total Silicon (Si)	ug/L	15000	2500	3043592	62000	500	3043592	29000	500	3044217
Total Selenium (Se)	ug/L	<100	100	3043592	<2.0	2.0	3043592	<40	40	3044217
Dissolved Silver (Ag)	ug/L	<2.0	2.0	3043708	<0.10	0.10	3043441	<1.0	1.0	3045285
Total Silver (Ag)	ug/L	<5.0	5.0	3043592	0.22	0.10	3043592	<1.0	1.0	3044217
Dissolved Sodium (Na)	ug/L	8500000	2000	3043708	90000	100	3043441	6500000	5000	3045285
Total Sodium (Na)	ug/L	9000000	5000	3043592	99000	100	3043592	6300000	1000	3044217
Dissolved Strontium (Sr)	ug/L	80000	20	3043708	2600	1.0	3043441	39000	10	3045285
Total Strontium (Sr)	ug/L	81000	50	3043592	3200	1.0	3043592	44000	10	3044217
Dissolved Thallium (Tl)	ug/L	<1.0	1.0	3043708	<0.050	0.050	3043441	<0.50	0.50	3045285
Total Thallium (Tl)	ug/L	<2.5	2.5	3043592	0.47	0.050	3043592	<0.50	0.50	3044217
Dissolved Tin (Sn)	ug/L	<20	20	3043708	<1.0	1.0	3043441	<10	10	3045285
Total Tin (Sn)	ug/L	<50	50	3043592	<1.0	1.0	3043592	<10	10	3044217
Dissolved Titanium (Ti)	ug/L	<100	100	3043708	13	5.0	3043441	<50	50	3045285
Total Titanium (Ti)	ug/L	<250	250	3043592	920	50	3043592	350	50	3044217
Dissolved Uranium (U)	ug/L	4.9	2.0	3043708	6.3	0.10	3043441	<1.0	1.0	3045285
Total Uranium (U)	ug/L	<5.0	5.0	3043592	11	0.10	3043592	1.6	1.0	3044217
Dissolved Vanadium (V)	ug/L	<20	20	3043708	0.59	0.50	3043441	<10	10	3045285
Total Vanadium (V)	ug/L	32	25	3043592	77	0.50	3043592	22	10	3044217
Dissolved Zinc (Zn)	ug/L	<100	100	3043708	<5.0	5.0	3043441	<50	50	3045285
Total Zinc (Zn)	ug/L	<250	250	3043592	170	5.0	3043592	160	50	3044217

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

### Test Summary

**Maxxam ID** PQ4138  
**Sample ID** MW1-DEEP  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040135	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3040226	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040303	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4139  
**Sample ID** MW2-DEEP  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040142	N/A	2012/11/19	Chris Li

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

### Test Summary

pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040135	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3040933	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040081	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4140  
**Sample ID** MW1-INT  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3045285	N/A	2012/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040111	N/A	2012/11/20	Bramdeo Motiram
Orthophosphate	AC	3040226	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040081	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

### Test Summary

**Maxxam ID** PQ4140 Dup  
**Sample ID** MW1-INT  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
pH	PH	3040240	N/A	2012/11/19	Surinder Rai

**Maxxam ID** PQ4141  
**Sample ID** MW7-DEEP  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040276	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO <sub>3</sub> )		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3041961	2012/11/20	2012/11/20	Lawrence Cheung
Dissolved Metals by ICPMS	ICP/MS	3043708	N/A	2012/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH <sub>4</sub>	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	3040139	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040111	N/A	2012/11/20	Bramdeo Motiram
Orthophosphate	AC	3040933	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040303	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

### Test Summary

**Maxxam ID** PQ4142  
**Sample ID** MW7-SHALLOW  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040296	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/21	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3043441	N/A	2012/11/21	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3043592	N/A	2012/11/21	Hua Ren
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040142	N/A	2012/11/19	Chris Li
pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040111	N/A	2012/11/20	Bramdeo Motiram
Orthophosphate	AC	3040933	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040303	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

**Maxxam ID** PQ4143  
**Sample ID** DUP#3  
**Matrix** Water

**Collected** 2012/11/16  
**Shipped**  
**Received** 2012/11/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3040238	N/A	2012/11/19	Surinder Rai
Anions	IC	3040143	N/A	2012/11/20	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3040239	2012/11/17	2012/11/19	Surinder Rai
Hardness (calculated as CaCO3)		3039453	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3042274	2012/11/20	2012/11/21	Magdalena Carlos
Dissolved Metals by ICPMS	ICP/MS	3045285	N/A	2012/11/22	Hua Ren
Total Metals Analysis by ICPMS	ICP/MS	3044217	N/A	2012/11/22	Prempal Bhatti
Total Ammonia-N	LACH/NH4	3043422	N/A	2012/11/21	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3040139	N/A	2012/11/19	Chris Li

Maxxam Job #: B2I0878  
 Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**Test Summary**

pH	PH	3040240	N/A	2012/11/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3040135	N/A	2012/11/19	Bramdeo Motiram
Orthophosphate	AC	3040226	N/A	2012/11/19	Birenkumar Patel
Sulphide	ISE/S	3040081	N/A	2012/11/19	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3043767	2012/11/21	2012/11/22	Viorica Rotaru
Total Suspended Solids	SLDS	3040173	N/A	2012/11/17	Gurpreet Kaur
Turbidity	TURB	3040107	N/A	2012/11/18	Neil Dassanayake

Maxxam Job #: B210878  
Report Date: 2012/11/23

Golder Associates Ltd

Site Location: TANSLEY QUARRY  
Sampler Initials: DB

#### GENERAL COMMENTS

Anions Analysis: Based on historically high results, sample was diluted prior to analysis. Detection limits were adjusted accordingly.

Sample PQ4138-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PQ4139-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PQ4141-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.  
Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample PQ4143-01: Nitrite/Nitrate: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

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

Maxxam Job #: B210878  
 Report Date: 2012/11/23

Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3040081	Sulphide	2012/11/19	97	80 - 120	97	80 - 120	<0.020	mg/L	NC	20		
3040107	Turbidity	2012/11/18					0.3, RDL=0.2	NTU	0.3	20	102	85 - 115
3040111	Phenols-4AAP	2012/11/20	98	80 - 120	101	85 - 115	<0.0010	mg/L	NC	25		
3040135	Phenols-4AAP	2012/11/19	107	80 - 120	103	85 - 115	<0.0010	mg/L	NC	25		
3040139	Nitrite (N)	2012/11/19	98	80 - 120	98	85 - 115	<0.010	mg/L	NC	25		
3040139	Nitrate (N)	2012/11/19	NC	80 - 120	96	85 - 115	<0.10	mg/L	0.5	25		
3040142	Nitrite (N)	2012/11/19	99	80 - 120	98	85 - 115	<0.010	mg/L	NC	25		
3040142	Nitrate (N)	2012/11/19	NC <sup>(1)</sup>	80 - 120	95	85 - 115	<0.10	mg/L	4.6	25		
3040143	Dissolved Chloride (Cl)	2012/11/20	NC	80 - 120	99	80 - 120	<1.0	mg/L	0.1	20		
3040143	Dissolved Bromide (Br-)	2012/11/20	100	80 - 120	99	80 - 120	<1.0	mg/L	NC	20		
3040143	Dissolved Sulphate (SO4)	2012/11/20	103	80 - 120	98	80 - 120	<1.0	mg/L	0.5	20		
3040173	Total Suspended Solids	2012/11/17					<10	mg/L	NC	25	98	85 - 115
3040226	Orthophosphate (P)	2012/11/19	107	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
3040238	Alkalinity (Total as CaCO3)	2012/11/19					<1.0	mg/L	0.5	25	99	85 - 115
3040239	Fluoride (F-)	2012/11/19	96	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
3040276	Dissolved Chloride (Cl)	2012/11/20	102	80 - 120	100	80 - 120	<1.0	mg/L	NC	20		
3040276	Dissolved Bromide (Br-)	2012/11/20	102	80 - 120	100	80 - 120	<1.0	mg/L				
3040276	Dissolved Sulphate (SO4)	2012/11/20	101	80 - 120	98	80 - 120	1.1, RDL=1.0	mg/L	NC	20		
3040296	Dissolved Bromide (Br-)	2012/11/20	97	80 - 120	104	80 - 120	<1.0	mg/L				
3040296	Dissolved Sulphate (SO4)	2012/11/20	99	80 - 120	99	80 - 120	<1.0	mg/L	0.3	20		
3040296	Dissolved Chloride (Cl)	2012/11/20			101	80 - 120	<1.0	mg/L				
3040303	Sulphide	2012/11/19	90	80 - 120	93	80 - 120	<0.020	mg/L	NC	20		
3040933	Orthophosphate (P)	2012/11/19	107	75 - 125	102	80 - 120	<0.010	mg/L	NC	25		
3041961	Mercury (Hg)	2012/11/20	107	80 - 120	105	80 - 120	<0.00010	mg/L	NC	20		
3042274	Mercury (Hg)	2012/11/21	99	80 - 120	113	80 - 120	<0.00010	mg/L	NC	20		
3043123	Free Cyanide	2012/11/21	95	80 - 120	102	80 - 120	<0.0020	mg/L	NC	20		
3043422	Total Ammonia-N	2012/11/21	103	80 - 120	102	85 - 115	<0.050	mg/L	NC	20		
3043441	Dissolved Aluminum (Al)	2012/11/21	97	80 - 120	94	80 - 120	<5.0	ug/L				
3043441	Dissolved Antimony (Sb)	2012/11/21	106	80 - 120	100	80 - 120	<0.50	ug/L				
3043441	Dissolved Arsenic (As)	2012/11/21	105	80 - 120	98	80 - 120	<1.0	ug/L				
3043441	Dissolved Barium (Ba)	2012/11/21	102	80 - 120	99	80 - 120	<2.0	ug/L				
3043441	Dissolved Beryllium (Be)	2012/11/21	103	80 - 120	99	80 - 120	<0.50	ug/L				
3043441	Dissolved Bismuth (Bi)	2012/11/21	99	80 - 120	96	80 - 120	<1.0	ug/L				
3043441	Dissolved Boron (B)	2012/11/21	105	80 - 120	99	80 - 120	<10	ug/L				
3043441	Dissolved Cadmium (Cd)	2012/11/21	104	80 - 120	99	80 - 120	<0.10	ug/L				
3043441	Dissolved Calcium (Ca)	2012/11/21	NC	80 - 120	99	80 - 120	<200	ug/L				
3043441	Dissolved Chromium (Cr)	2012/11/21	97	80 - 120	98	80 - 120	<5.0	ug/L				
3043441	Dissolved Cobalt (Co)	2012/11/21	99	80 - 120	97	80 - 120	<0.50	ug/L				
3043441	Dissolved Copper (Cu)	2012/11/21	96	80 - 120	95	80 - 120	<1.0	ug/L				
3043441	Dissolved Iron (Fe)	2012/11/21	101	80 - 120	98	80 - 120	<100	ug/L				

Maxxam Job #: B210878  
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Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3043441	Dissolved Lead (Pb)	2012/11/21	99	80 - 120	96	80 - 120	<0.50	ug/L	NC	20		
3043441	Dissolved Magnesium (Mg)	2012/11/21	102	80 - 120	98	80 - 120	<50	ug/L				
3043441	Dissolved Manganese (Mn)	2012/11/21	98	80 - 120	95	80 - 120	<2.0	ug/L				
3043441	Dissolved Molybdenum (Mo)	2012/11/21	105	80 - 120	100	80 - 120	<0.50	ug/L				
3043441	Dissolved Nickel (Ni)	2012/11/21	98	80 - 120	96	80 - 120	<1.0	ug/L				
3043441	Dissolved Phosphorus (P)	2012/11/21	104	80 - 120	101	80 - 120	<100	ug/L				
3043441	Dissolved Potassium (K)	2012/11/21	101	80 - 120	100	80 - 120	<200	ug/L				
3043441	Dissolved Selenium (Se)	2012/11/21	103	80 - 120	101	80 - 120	<2.0	ug/L				
3043441	Dissolved Silicon (Si)	2012/11/21	103	80 - 120	98	80 - 120	<50	ug/L				
3043441	Dissolved Silver (Ag)	2012/11/21	98	80 - 120	95	80 - 120	<0.10	ug/L				
3043441	Dissolved Sodium (Na)	2012/11/21	NC	80 - 120	99	80 - 120	<100	ug/L				
3043441	Dissolved Strontium (Sr)	2012/11/21	102	80 - 120	96	80 - 120	<1.0	ug/L				
3043441	Dissolved Thallium (Tl)	2012/11/21	104	80 - 120	101	80 - 120	<0.050	ug/L				
3043441	Dissolved Tin (Sn)	2012/11/21	106	80 - 120	102	80 - 120	<1.0	ug/L				
3043441	Dissolved Titanium (Ti)	2012/11/21	105	80 - 120	102	80 - 120	<5.0	ug/L				
3043441	Dissolved Uranium (U)	2012/11/21	105	80 - 120	100	80 - 120	<0.10	ug/L				
3043441	Dissolved Vanadium (V)	2012/11/21	98	80 - 120	98	80 - 120	<0.50	ug/L				
3043441	Dissolved Zinc (Zn)	2012/11/21	98	80 - 120	98	80 - 120	<5.0	ug/L				
3043592	Total Aluminum (Al)	2012/11/21	103	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3043592	Total Antimony (Sb)	2012/11/21	109	80 - 120	108	80 - 120	<0.50	ug/L				
3043592	Total Arsenic (As)	2012/11/21	106	80 - 120	105	80 - 120	<1.0	ug/L				
3043592	Total Barium (Ba)	2012/11/21	105	80 - 120	105	80 - 120	<2.0	ug/L	1.9	20		
3043592	Total Beryllium (Be)	2012/11/21	105	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Bismuth (Bi)	2012/11/21	103	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
3043592	Total Boron (B)	2012/11/21	105	80 - 120	103	80 - 120	<10	ug/L				
3043592	Total Cadmium (Cd)	2012/11/21	107	80 - 120	104	80 - 120	<0.10	ug/L	NC	20		
3043592	Total Calcium (Ca)	2012/11/21	NC	80 - 120	107	80 - 120	<200	ug/L	4.2	20		
3043592	Total Chromium (Cr)	2012/11/21	101	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		
3043592	Total Cobalt (Co)	2012/11/21	102	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Copper (Cu)	2012/11/21	99	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3043592	Total Iron (Fe)	2012/11/21	103	80 - 120	102	80 - 120	<100	ug/L	NC	20		
3043592	Total Lead (Pb)	2012/11/21	101	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Magnesium (Mg)	2012/11/21	NC	80 - 120	107	80 - 120	<50	ug/L	5.5	20		
3043592	Total Manganese (Mn)	2012/11/21	101	80 - 120	100	80 - 120	<2.0	ug/L	4.1	20		
3043592	Total Molybdenum (Mo)	2012/11/21	110	80 - 120	106	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Nickel (Ni)	2012/11/21	100	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3043592	Total Phosphorus (P)	2012/11/21	107	80 - 120	104	80 - 120	<100	ug/L	NC	20		
3043592	Total Potassium (K)	2012/11/21	107	80 - 120	105	80 - 120	<200	ug/L	2.7	20		
3043592	Total Silicon (Si)	2012/11/21	102	80 - 120	103	80 - 120	<50	ug/L				
3043592	Total Selenium (Se)	2012/11/21	104	80 - 120	104	80 - 120	<2.0	ug/L				



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Golder Associates Ltd

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3043592	Total Silver (Ag)	2012/11/21	101	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
3043592	Total Sodium (Na)	2012/11/21	NC	80 - 120	110	80 - 120	<100	ug/L	7.4	20		
3043592	Total Strontium (Sr)	2012/11/21	105	80 - 120	101	80 - 120	<1.0	ug/L				
3043592	Total Thallium (Tl)	2012/11/21	107	80 - 120	106	80 - 120	<0.050	ug/L				
3043592	Total Tin (Sn)	2012/11/21	108	80 - 120	106	80 - 120	<1.0	ug/L				
3043592	Total Titanium (Ti)	2012/11/21	109	80 - 120	105	80 - 120	<5.0	ug/L				
3043592	Total Uranium (U)	2012/11/21	107	80 - 120	105	80 - 120	<0.10	ug/L				
3043592	Total Vanadium (V)	2012/11/21	104	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3043592	Total Zinc (Zn)	2012/11/21	101	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3043708	Dissolved Aluminum (Al)	2012/11/21	102	80 - 120	99	80 - 120	<5.0	ug/L				
3043708	Dissolved Antimony (Sb)	2012/11/21	112	80 - 120	103	80 - 120	<0.50	ug/L				
3043708	Dissolved Arsenic (As)	2012/11/21	108	80 - 120	100	80 - 120	<1.0	ug/L				
3043708	Dissolved Barium (Ba)	2012/11/21	105	80 - 120	101	80 - 120	<2.0	ug/L				
3043708	Dissolved Beryllium (Be)	2012/11/21	107	80 - 120	101	80 - 120	<0.50	ug/L				
3043708	Dissolved Bismuth (Bi)	2012/11/21	102	80 - 120	99	80 - 120	<1.0	ug/L				
3043708	Dissolved Boron (B)	2012/11/21	106	80 - 120	102	80 - 120	<10	ug/L				
3043708	Dissolved Cadmium (Cd)	2012/11/21	108	80 - 120	102	80 - 120	<0.10	ug/L				
3043708	Dissolved Calcium (Ca)	2012/11/21	NC	80 - 120	101	80 - 120	<200	ug/L				
3043708	Dissolved Chromium (Cr)	2012/11/21	103	80 - 120	100	80 - 120	<5.0	ug/L				
3043708	Dissolved Cobalt (Co)	2012/11/21	101	80 - 120	98	80 - 120	<0.50	ug/L				
3043708	Dissolved Copper (Cu)	2012/11/21	100	80 - 120	96	80 - 120	<1.0	ug/L				
3043708	Dissolved Iron (Fe)	2012/11/21	102	80 - 120	99	80 - 120	<100	ug/L				
3043708	Dissolved Lead (Pb)	2012/11/21	101	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
3043708	Dissolved Magnesium (Mg)	2012/11/21	NC	80 - 120	100	80 - 120	<50	ug/L				
3043708	Dissolved Manganese (Mn)	2012/11/21	103	80 - 120	99	80 - 120	<2.0	ug/L				
3043708	Dissolved Molybdenum (Mo)	2012/11/21	111	80 - 120	103	80 - 120	<0.50	ug/L				
3043708	Dissolved Nickel (Ni)	2012/11/21	100	80 - 120	99	80 - 120	<1.0	ug/L				
3043708	Dissolved Phosphorus (P)	2012/11/21	107	80 - 120	103	80 - 120	<100	ug/L				
3043708	Dissolved Potassium (K)	2012/11/21	106	80 - 120	101	80 - 120	<200	ug/L				
3043708	Dissolved Selenium (Se)	2012/11/21	108	80 - 120	101	80 - 120	<2.0	ug/L				
3043708	Dissolved Silicon (Si)	2012/11/21	106	80 - 120	100	80 - 120	<50	ug/L				
3043708	Dissolved Silver (Ag)	2012/11/21	103	80 - 120	99	80 - 120	<0.10	ug/L				
3043708	Dissolved Sodium (Na)	2012/11/21	NC	80 - 120	102	80 - 120	<100	ug/L				
3043708	Dissolved Strontium (Sr)	2012/11/21	NC	80 - 120	100	80 - 120	<1.0	ug/L				
3043708	Dissolved Thallium (Tl)	2012/11/21	104	80 - 120	102	80 - 120	<0.050	ug/L				
3043708	Dissolved Tin (Sn)	2012/11/21	110	80 - 120	104	80 - 120	<1.0	ug/L				
3043708	Dissolved Titanium (Ti)	2012/11/21	108	80 - 120	103	80 - 120	<5.0	ug/L				
3043708	Dissolved Uranium (U)	2012/11/21	109	80 - 120	103	80 - 120	<0.10	ug/L				
3043708	Dissolved Vanadium (V)	2012/11/21	106	80 - 120	101	80 - 120	<0.50	ug/L				
3043708	Dissolved Zinc (Zn)	2012/11/21	104	80 - 120	100	80 - 120	<5.0	ug/L				

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Golder Associates Ltd

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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3043767	Total Phosphorus	2012/11/22	99	80 - 120	101	85 - 115	<0.020	mg/L	3.4	20	102	85 - 115
3044217	Total Aluminum (Al)	2012/11/22	104	80 - 120	108	80 - 120	<5.0	ug/L	NC	20		
3044217	Total Antimony (Sb)	2012/11/22	113	80 - 120	112	80 - 120	0.58, RDL=0.50	ug/L	NC	20		
3044217	Total Arsenic (As)	2012/11/22	103	80 - 120	104	80 - 120	<1.0	ug/L	NC	20		
3044217	Total Barium (Ba)	2012/11/22	99	80 - 120	102	80 - 120	<2.0	ug/L	2.8	20		
3044217	Total Beryllium (Be)	2012/11/22	103	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3044217	Total Bismuth (Bi)	2012/11/22	96	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
3044217	Total Boron (B)	2012/11/22	102	80 - 120	100	80 - 120	<10	ug/L	NC	20		
3044217	Total Cadmium (Cd)	2012/11/22	104	80 - 120	105	80 - 120	<0.10	ug/L	NC	20		
3044217	Total Calcium (Ca)	2012/11/22	NC	80 - 120	106	80 - 120	<200	ug/L	0.9	20		
3044217	Total Chromium (Cr)	2012/11/22	98	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
3044217	Total Cobalt (Co)	2012/11/22	100	80 - 120	103	80 - 120	<0.50	ug/L	0.2	20		
3044217	Total Copper (Cu)	2012/11/22	96	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3044217	Total Iron (Fe)	2012/11/22	105	80 - 120	106	80 - 120	<100	ug/L	NC	20		
3044217	Total Lead (Pb)	2012/11/22	97	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
3044217	Total Magnesium (Mg)	2012/11/22	NC	80 - 120	110	80 - 120	53, RDL=50	ug/L	0.4	20		
3044217	Total Manganese (Mn)	2012/11/22	103	80 - 120	106	80 - 120	<2.0	ug/L	1.1	20		
3044217	Total Molybdenum (Mo)	2012/11/22	110	80 - 120	108	80 - 120	<0.50	ug/L	0.9	20		
3044217	Total Nickel (Ni)	2012/11/22	97	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
3044217	Total Phosphorus (P)	2012/11/22	107	80 - 120	111	80 - 120	<100	ug/L				
3044217	Total Potassium (K)	2012/11/22	104	80 - 120	106	80 - 120	<200	ug/L	0.7	20		
3044217	Total Silicon (Si)	2012/11/22	104	80 - 120	105	80 - 120	<50	ug/L	1.4	20		
3044217	Total Selenium (Se)	2012/11/22	102	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
3044217	Total Silver (Ag)	2012/11/22	97	80 - 120	100	80 - 120	<0.10	ug/L	NC	20		
3044217	Total Sodium (Na)	2012/11/22	NC	80 - 120	111	80 - 120	<100	ug/L	0.5	20		
3044217	Total Strontium (Sr)	2012/11/22	NC	80 - 120	106	80 - 120	<1.0	ug/L	0.01	20		
3044217	Total Thallium (Tl)	2012/11/22	97	80 - 120	102	80 - 120	<0.050	ug/L	NC	20		
3044217	Total Tin (Sn)	2012/11/22	110	80 - 120	107	80 - 120	<1.0	ug/L	NC	20		
3044217	Total Titanium (Ti)	2012/11/22	104	80 - 120	107	80 - 120	<5.0	ug/L	NC	20		
3044217	Total Uranium (U)	2012/11/22	NC	80 - 120	105	80 - 120	<0.10	ug/L	1.9	20		
3044217	Total Vanadium (V)	2012/11/22	103	80 - 120	103	80 - 120	<0.50	ug/L	9.1	20		
3044217	Total Zinc (Zn)	2012/11/22	99	80 - 120	104	80 - 120	<5.0	ug/L	NC	20		
3045285	Dissolved Aluminum (Al)	2012/11/22	102	80 - 120	102	80 - 120	<5.0	ug/L				
3045285	Dissolved Antimony (Sb)	2012/11/22	108	80 - 120	103	80 - 120	<0.50	ug/L				
3045285	Dissolved Arsenic (As)	2012/11/22	105	80 - 120	100	80 - 120	<1.0	ug/L				
3045285	Dissolved Barium (Ba)	2012/11/22	103	80 - 120	98	80 - 120	<2.0	ug/L				
3045285	Dissolved Beryllium (Be)	2012/11/22	103	80 - 120	99	80 - 120	<0.50	ug/L				
3045285	Dissolved Bismuth (Bi)	2012/11/22	101	80 - 120	101	80 - 120	<1.0	ug/L				
3045285	Dissolved Boron (B)	2012/11/22	107	80 - 120	100	80 - 120	<10	ug/L				
3045285	Dissolved Cadmium (Cd)	2012/11/22	105	80 - 120	101	80 - 120	<0.10	ug/L				

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Golder Associates Ltd

 Site Location: TANSLEY QUARRY  
 Sampler Initials: DB

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045285	Dissolved Calcium (Ca)	2012/11/22	NC	80 - 120	103	80 - 120	<200	ug/L				
3045285	Dissolved Chromium (Cr)	2012/11/22	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045285	Dissolved Cobalt (Co)	2012/11/22	103	80 - 120	101	80 - 120	<0.50	ug/L				
3045285	Dissolved Copper (Cu)	2012/11/22	99	80 - 120	97	80 - 120	<1.0	ug/L				
3045285	Dissolved Iron (Fe)	2012/11/22	103	80 - 120	101	80 - 120	<100	ug/L				
3045285	Dissolved Lead (Pb)	2012/11/22	100	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3045285	Dissolved Magnesium (Mg)	2012/11/22	105	80 - 120	105	80 - 120	<5.0	ug/L				
3045285	Dissolved Manganese (Mn)	2012/11/22	101	80 - 120	98	80 - 120	<2.0	ug/L				
3045285	Dissolved Molybdenum (Mo)	2012/11/22	109	80 - 120	103	80 - 120	<0.50	ug/L				
3045285	Dissolved Nickel (Ni)	2012/11/22	100	80 - 120	100	80 - 120	<1.0	ug/L				
3045285	Dissolved Phosphorus (P)	2012/11/22	109	80 - 120	103	80 - 120	<100	ug/L				
3045285	Dissolved Potassium (K)	2012/11/22	105	80 - 120	104	80 - 120	<200	ug/L				
3045285	Dissolved Selenium (Se)	2012/11/22	104	80 - 120	101	80 - 120	<2.0	ug/L				
3045285	Dissolved Silicon (Si)	2012/11/22	105	80 - 120	103	80 - 120	<5.0	ug/L				
3045285	Dissolved Silver (Ag)	2012/11/22	101	80 - 120	98	80 - 120	<0.10	ug/L				
3045285	Dissolved Sodium (Na)	2012/11/22	NC	80 - 120	106	80 - 120	<100	ug/L				
3045285	Dissolved Strontium (Sr)	2012/11/22	104	80 - 120	97	80 - 120	<1.0	ug/L				
3045285	Dissolved Thallium (Tl)	2012/11/22	103	80 - 120	102	80 - 120	<0.050	ug/L				
3045285	Dissolved Tin (Sn)	2012/11/22	108	80 - 120	103	80 - 120	<1.0	ug/L				
3045285	Dissolved Titanium (Ti)	2012/11/22	104	80 - 120	101	80 - 120	<5.0	ug/L				
3045285	Dissolved Uranium (U)	2012/11/22	106	80 - 120	105	80 - 120	<0.10	ug/L				
3045285	Dissolved Vanadium (V)	2012/11/22	103	80 - 120	101	80 - 120	<0.50	ug/L				
3045285	Dissolved Zinc (Zn)	2012/11/22	102	80 - 120	100	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

## Validation Signature Page

**Maxxam Job #: B2I0878**

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

A handwritten signature in black ink that reads "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.



## **BEKKERS**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

\* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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: 1

Page 2 of 9

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8814	PP8814		
Sampling Date		2012/11/15	2012/11/15		
	Units	BEKKERS	BEKKERS Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	720		1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	0.94		0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.26		0.10	3042449
Free Cyanide	mg/L	<0.0020	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	3042705
pH	pH	6.90			3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	3045083
Total Suspended Solids	mg/L	<10	<10	10	3041751
Sulphide	mg/L	<0.020		0.020	3042041
Turbidity	NTU	0.4		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	100		1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	270		10	3042686
Nitrate (N)	mg/L	0.27		0.10	3042878
Nitrate + Nitrite	mg/L	0.27		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<10		10	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	850		10	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PP8814		
Sampling Date		2012/11/15		
	Units	BEKKERS	RDL	QC Batch
<b>Metals</b>				
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	7.8	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	<1.0	1.0	3045889
Total Barium (Ba)	ug/L	16	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889
Total Boron (B)	ug/L	1600	10	3045889
Total Cadmium (Cd)	ug/L	0.57	0.10	3045889
Total Calcium (Ca)	ug/L	170000	1000	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	31	1.0	3045889
Total Iron (Fe)	ug/L	<100	100	3045889
Total Lead (Pb)	ug/L	3.4	0.50	3045889
Total Magnesium (Mg)	ug/L	71000	50	3045889
Total Manganese (Mn)	ug/L	84	2.0	3045889
Total Molybdenum (Mo)	ug/L	15	0.50	3045889
Total Nickel (Ni)	ug/L	32	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	3045889
Total Potassium (K)	ug/L	15000	200	3045889
Total Silicon (Si)	ug/L	3700	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	230000	100	3045889
Total Strontium (Sr)	ug/L	12000	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.87	0.10	3045889
Total Vanadium (V)	ug/L	0.64	0.50	3045889
Total Zinc (Zn)	ug/L	2200	5.0	3045889

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8814  
**Sample ID** BEKKERS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8814 Dup  
**Sample ID** BEKKERS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L	NC	25	101	85 - 115
3042041	Sulphide	2012/11/20	83	80 - 120	93	80 - 120	<0.020	mg/L				
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO3)	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F-)	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br-)	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO4)	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L	NC	20		
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.



NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

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

---

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.



**2012 ANNUAL MONITORING REPORT  
HANSON BRICK TANSLEY QUARRY**

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**FINUCCI**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO3)	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

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Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.



(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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Total cover pages: 1

Page 2 of 9

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP8811	PP8811		
Sampling Date		2012/11/15	2012/11/15		
	Units	FINNUCCI	FINNUCCI Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	500		1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	0.13		0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.35		0.10	3042449
Free Cyanide	mg/L	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	3042705
pH	pH	7.99			3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	3045083
Total Suspended Solids	mg/L	<10		10	3041751
Sulphide	mg/L	<0.020		0.020	3042041
Turbidity	NTU	1.5		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	410		1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	22	22	1.0	3042686
Nitrate (N)	mg/L	0.81		0.10	3042878
Nitrate + Nitrite	mg/L	0.81		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	<1.0	1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	360	360	1.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8811		
Sampling Date		2012/11/15		
	<b>Units</b>	<b>FINNUCCI</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Metals</b>				
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	<5.0	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	1.6	1.0	3045889
Total Barium (Ba)	ug/L	16	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889
Total Boron (B)	ug/L	2900	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	92000	1000	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	23	1.0	3045889
Total Iron (Fe)	ug/L	740	100	3045889
Total Lead (Pb)	ug/L	6.3	0.50	3045889
Total Magnesium (Mg)	ug/L	69000	50	3045889
Total Manganese (Mn)	ug/L	110	2.0	3045889
Total Molybdenum (Mo)	ug/L	1.8	0.50	3045889
Total Nickel (Ni)	ug/L	3.1	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	3045889
Total Potassium (K)	ug/L	24000	200	3045889
Total Silicon (Si)	ug/L	5300	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	100000	100	3045889
Total Strontium (Sr)	ug/L	15000	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.21	0.10	3045889
Total Vanadium (V)	ug/L	0.77	0.50	3045889
Total Zinc (Zn)	ug/L	240	5.0	3045889

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8811  
**Sample ID** FINNUCCI  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8811 Dup  
**Sample ID** FINNUCCI  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042041	Sulphide	2012/11/20	83	80 - 120	93	80 - 120	<0.020	mg/L				
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO3)	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F-)	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L	1.1	20		
3042686	Dissolved Bromide (Br-)	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L	NC	20		
3042686	Dissolved Sulphate (SO4)	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L	0.6	20		
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.



NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

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

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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.





## **HENDERVALE COTTAGE**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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: 1

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8809	PP8809		
Sampling Date		2012/11/15	2012/11/15		
	Units	COTTAGE	COTTAGE Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	550		1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	0.48		0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.20		0.10	3042449
Free Cyanide	mg/L	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	<0.010	0.010	3042705
pH	pH	8.03			3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	3045083
Total Suspended Solids	mg/L	<10		10	3041751
Sulphide	mg/L	<0.020		0.020	3042041
Turbidity	NTU	7.6		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	370		1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	150		1.0	3042686
Nitrate (N)	mg/L	<0.10		0.10	3042878
Nitrate + Nitrite	mg/L	<0.10		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0		1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	150		1.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8809	PP8809		
Sampling Date		2012/11/15	2012/11/15		
	Units	COTTAGE	COTTAGE Lab-Dup	RDL	QC Batch
<b>Metals</b>					
Mercury (Hg)	mg/L	<0.00010	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	<5.0		5.0	3045889
Total Antimony (Sb)	ug/L	<0.50		0.50	3045889
Total Arsenic (As)	ug/L	11		1.0	3045889
Total Barium (Ba)	ug/L	30		2.0	3045889
Total Beryllium (Be)	ug/L	<0.50		0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0		1.0	3045889
Total Boron (B)	ug/L	500		10	3045889
Total Cadmium (Cd)	ug/L	<0.10		0.10	3045889
Total Calcium (Ca)	ug/L	95000		200	3045889
Total Chromium (Cr)	ug/L	<5.0		5.0	3045889
Total Cobalt (Co)	ug/L	<0.50		0.50	3045889
Total Copper (Cu)	ug/L	50		1.0	3045889
Total Iron (Fe)	ug/L	1200		100	3045889
Total Lead (Pb)	ug/L	1.2		0.50	3045889
Total Magnesium (Mg)	ug/L	80000		50	3045889
Total Manganese (Mn)	ug/L	34		2.0	3045889
Total Molybdenum (Mo)	ug/L	3.0		0.50	3045889
Total Nickel (Ni)	ug/L	<1.0		1.0	3045889
Total Phosphorus (P)	ug/L	<100		100	3045889
Total Potassium (K)	ug/L	8200		200	3045889
Total Silicon (Si)	ug/L	9500		50	3045889
Total Selenium (Se)	ug/L	<2.0		2.0	3045889
Total Silver (Ag)	ug/L	<0.10		0.10	3045889
Total Sodium (Na)	ug/L	58000		100	3045889
Total Strontium (Sr)	ug/L	4800		1.0	3045889
Total Thallium (Tl)	ug/L	<0.050		0.050	3045889
Total Tin (Sn)	ug/L	<1.0		1.0	3045889
Total Titanium (Ti)	ug/L	<5.0		5.0	3045889
Total Uranium (U)	ug/L	1.3		0.10	3045889
Total Vanadium (V)	ug/L	0.71		0.50	3045889
Total Zinc (Zn)	ug/L	38		5.0	3045889

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8809  
**Sample ID** COTTAGE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8809 Dup  
**Sample ID** COTTAGE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042041	Sulphide	2012/11/20	83	80 - 120	93	80 - 120	<0.020	mg/L				
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO3)	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F-)	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br-)	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO4)	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L	NC	25		
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L	NC	20		
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				



Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.



NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

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

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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.



## **HENDERSVALE HOUSE**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO3)	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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: 1

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP8808		
Sampling Date		2012/11/15		
	<b>Units</b>	<b>MAIN HOUSE</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Hardness (CaCO <sub>3</sub> )	mg/L	530	1.0	3041014
<b>Inorganics</b>				
Total Ammonia-N	mg/L	0.71	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.23	0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	3045136
Orthophosphate (P)	mg/L	<0.010	0.010	3042705
pH	pH	7.97		3042434
Phenols-4AAP	mg/L	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002	0.002	3045083
Total Suspended Solids	mg/L	<10	10	3041751
Sulphide	mg/L	<0.020	0.020	3042157
Turbidity	NTU	3.3	0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	360	1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	140	1.0	3042686
Nitrate (N)	mg/L	<0.10	0.10	3042878
Nitrate + Nitrite	mg/L	<0.10	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0	1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	170	1.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8808		
Sampling Date		2012/11/15		
	<b>Units</b>	<b>MAIN HOUSE</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Metals</b>				
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	5.5	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	10	1.0	3045889
Total Barium (Ba)	ug/L	29	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889
Total Boron (B)	ug/L	630	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	92000	200	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	9.0	1.0	3045889
Total Iron (Fe)	ug/L	830	100	3045889
Total Lead (Pb)	ug/L	1.0	0.50	3045889
Total Magnesium (Mg)	ug/L	83000	50	3045889
Total Manganese (Mn)	ug/L	39	2.0	3045889
Total Molybdenum (Mo)	ug/L	4.1	0.50	3045889
Total Nickel (Ni)	ug/L	8.2	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	3045889
Total Potassium (K)	ug/L	9600	200	3045889
Total Silicon (Si)	ug/L	9400	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	66000	100	3045889
Total Strontium (Sr)	ug/L	5400	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889
Total Uranium (U)	ug/L	1.3	0.10	3045889
Total Vanadium (V)	ug/L	0.91	0.50	3045889
Total Zinc (Zn)	ug/L	8.9	5.0	3045889

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8808  
**Sample ID** MAIN HOUSE  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake



Maxxam Job #: B2H9928  
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Golder Associates Ltd  
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Site Location: TANSLEY QUARRY  
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**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042157	Sulphide	2012/11/20	NC <sup>(1)</sup>	80 - 120	86	80 - 120	<0.020	mg/L	0	20		
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO <sub>3</sub> )	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F <sup>-</sup> )	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br <sup>-</sup> )	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO <sub>4</sub> )	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.



(1) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B2H9928

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

---

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

=====  
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**HENDERVALE CISTERN  
(Hendervale Main Barn Tap)**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/21	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

\* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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Total cover pages: 1

Page 2 of 9

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP8810		
Sampling Date		2012/11/15		
	Units	MAIN BARN	RDL	QC Batch
<b>Calculated Parameters</b>				
Hardness (CaCO <sub>3</sub> )	mg/L	420	1.0	3041014
<b>Inorganics</b>				
Total Ammonia-N	mg/L	0.067	0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.23	0.10	3042449
Free Cyanide	mg/L	<0.0020	0.0020	3043123
Orthophosphate (P)	mg/L	<0.010	0.010	3042705
pH	pH	6.78		3042434
Phenols-4AAP	mg/L	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	<0.002	0.002	3045083
Total Suspended Solids	mg/L	<10	10	3041751
Sulphide	mg/L	<0.020	0.020	3042041
Turbidity	NTU	1.4	0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	75	1.0	3042447
Nitrite (N)	mg/L	<0.010	0.010	3042878
Dissolved Chloride (Cl)	mg/L	560	5.0	3042686
Nitrate (N)	mg/L	1.9	0.10	3042878
Nitrate + Nitrite	mg/L	1.9	0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	6.6	5.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	330	5.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8810		
Sampling Date		2012/11/15		
	<b>Units</b>	<b>MAIN BARN</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Metals</b>				
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	22	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	<1.0	1.0	3045889
Total Barium (Ba)	ug/L	24	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889
Total Boron (B)	ug/L	2400	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	120000	200	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	3.2	1.0	3045889
Total Iron (Fe)	ug/L	<100	100	3045889
Total Lead (Pb)	ug/L	0.52	0.50	3045889
Total Magnesium (Mg)	ug/L	36000	50	3045889
Total Manganese (Mn)	ug/L	57	2.0	3045889
Total Molybdenum (Mo)	ug/L	1.9	0.50	3045889
Total Nickel (Ni)	ug/L	<1.0	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	3045889
Total Potassium (K)	ug/L	14000	200	3045889
Total Silicon (Si)	ug/L	1800	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	320000	100	3045889
Total Strontium (Sr)	ug/L	3900	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.19	0.10	3045889
Total Vanadium (V)	ug/L	0.94	0.50	3045889
Total Zinc (Zn)	ug/L	66	5.0	3045889

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8810  
**Sample ID** MAIN BARN  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3043123	N/A	2012/11/21	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042041	Sulphide	2012/11/20	83	80 - 120	93	80 - 120	<0.020	mg/L				
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO3)	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F-)	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br-)	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO4)	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043123	Free Cyanide	2012/11/21	95	80 - 120	102	80 - 120	<0.0020	mg/L	NC	20		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

---

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

---

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

=====  
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**2012 ANNUAL MONITORING REPORT  
HANSON BRICK TANSLEY QUARRY**

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**HENDERVALE CISTERN  
(Hendervale XYZ Barn Tap)**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO3)	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

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- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.



(1) 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.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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: 1

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Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8807	PP8807		
Sampling Date		2012/11/15	2012/11/15		
	Units	XYZ	XYZ Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	440		1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	0.14	0.087	0.050	3042347
Fluoride (F <sup>-</sup> )	mg/L	0.25		0.10	3042449
Free Cyanide	mg/L	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	3042705
pH	pH	6.71			3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	3045083
Total Suspended Solids	mg/L	<10		10	3041751
Sulphide	mg/L	<0.020		0.020	3042157
Turbidity	NTU	4.2		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	75		1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	590		5.0	3042686
Nitrate (N)	mg/L	1.9		0.10	3042878
Nitrate + Nitrite	mg/L	1.9		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	6.9		5.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	340		5.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8807		
Sampling Date		2012/11/15		
	<b>Units</b>	<b>XYZ</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Metals</b>				
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	44	5.0	3045889
Total Antimony (Sb)	ug/L	<0.50	0.50	3045889
Total Arsenic (As)	ug/L	<1.0	1.0	3045889
Total Barium (Ba)	ug/L	30	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889
Total Boron (B)	ug/L	2400	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	120000	200	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	14	1.0	3045889
Total Iron (Fe)	ug/L	1000	100	3045889
Total Lead (Pb)	ug/L	2.2	0.50	3045889
Total Magnesium (Mg)	ug/L	37000	50	3045889
Total Manganese (Mn)	ug/L	67	2.0	3045889
Total Molybdenum (Mo)	ug/L	2.3	0.50	3045889
Total Nickel (Ni)	ug/L	<1.0	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	3045889
Total Potassium (K)	ug/L	14000	200	3045889
Total Silicon (Si)	ug/L	1800	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	330000	100	3045889
Total Strontium (Sr)	ug/L	4000	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889
Total Uranium (U)	ug/L	0.16	0.10	3045889
Total Vanadium (V)	ug/L	1.0	0.50	3045889
Total Zinc (Zn)	ug/L	260	5.0	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8807  
**Sample ID** XYZ  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042347	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8807 Dup  
**Sample ID** XYZ  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Ammonia-N	LACH/NH4	3042347	N/A	2012/11/22	Lemeneh Addis

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042157	Sulphide	2012/11/20	NC <sup>(1)</sup>	80 - 120	86	80 - 120	<0.020	mg/L	0	20		
3042347	Total Ammonia-N	2012/11/22	98	80 - 120	99	85 - 115	<0.050	mg/L	NC	20		
3042447	Alkalinity (Total as CaCO <sub>3</sub> )	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F <sup>-</sup> )	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br <sup>-</sup> )	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO <sub>4</sub> )	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.



(1) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

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

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Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

=====  
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**2012 ANNUAL MONITORING REPORT  
HANSON BRICK TANSLEY QUARRY**

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**SIMMS**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

\* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

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Total cover pages: 1

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

### RESULTS OF ANALYSES OF WATER

Maxxam ID		PP8813	PP8813		
Sampling Date		2012/11/15	2012/11/15		
	Units	SIMMS	SIMMS Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	340		1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	<0.050		0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.22		0.10	3042449
Free Cyanide	mg/L	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	3042705
pH	pH	8.02			3042434
Phenols-4AAP	mg/L	<0.0010	<0.0010	0.0010	3043330
Total Phosphorus	mg/L	0.006		0.002	3045083
Total Suspended Solids	mg/L	<10		10	3041751
Sulphide	mg/L	<0.020		0.020	3042157
Turbidity	NTU	0.7		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	300		1.0	3042447
Nitrite (N)	mg/L	<0.010		0.010	3042878
Dissolved Chloride (Cl)	mg/L	7.3		1.0	3042686
Nitrate (N)	mg/L	1.3		0.10	3042878
Nitrate + Nitrite	mg/L	1.3		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	<1.0		1.0	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	95		1.0	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8813		
Sampling Date		2012/11/15		
	<b>Units</b>	<b>SIMMS</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Metals</b>				
Mercury (Hg)	mg/L	<0.00010	0.00010	3043315
Total Aluminum (Al)	ug/L	<5.0	5.0	3045889
Total Antimony (Sb)	ug/L	1.2	0.50	3045889
Total Arsenic (As)	ug/L	<1.0	1.0	3045889
Total Barium (Ba)	ug/L	59	2.0	3045889
Total Beryllium (Be)	ug/L	<0.50	0.50	3045889
Total Bismuth (Bi)	ug/L	<1.0	1.0	3045889
Total Boron (B)	ug/L	100	10	3045889
Total Cadmium (Cd)	ug/L	<0.10	0.10	3045889
Total Calcium (Ca)	ug/L	88000	200	3045889
Total Chromium (Cr)	ug/L	<5.0	5.0	3045889
Total Cobalt (Co)	ug/L	<0.50	0.50	3045889
Total Copper (Cu)	ug/L	13	1.0	3045889
Total Iron (Fe)	ug/L	<100	100	3045889
Total Lead (Pb)	ug/L	0.79	0.50	3045889
Total Magnesium (Mg)	ug/L	30000	50	3045889
Total Manganese (Mn)	ug/L	16	2.0	3045889
Total Molybdenum (Mo)	ug/L	1.2	0.50	3045889
Total Nickel (Ni)	ug/L	<1.0	1.0	3045889
Total Phosphorus (P)	ug/L	<100	100	3045889
Total Potassium (K)	ug/L	3800	200	3045889
Total Silicon (Si)	ug/L	4000	50	3045889
Total Selenium (Se)	ug/L	<2.0	2.0	3045889
Total Silver (Ag)	ug/L	<0.10	0.10	3045889
Total Sodium (Na)	ug/L	15000	100	3045889
Total Strontium (Sr)	ug/L	1100	1.0	3045889
Total Thallium (Tl)	ug/L	<0.050	0.050	3045889
Total Tin (Sn)	ug/L	<1.0	1.0	3045889
Total Titanium (Ti)	ug/L	<5.0	5.0	3045889
Total Uranium (U)	ug/L	3.1	0.10	3045889
Total Vanadium (V)	ug/L	0.63	0.50	3045889
Total Zinc (Zn)	ug/L	1400	5.0	3045889

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8813  
**Sample ID** SIMMS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042157	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8813 Dup  
**Sample ID** SIMMS  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042157	Sulphide	2012/11/20	NC <sup>(1)</sup>	80 - 120	86	80 - 120	<0.020	mg/L	0	20		
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO <sub>3</sub> )	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F <sup>-</sup> )	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br <sup>-</sup> )	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO <sub>4</sub> )	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L	NC	25		
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L				
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L				
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L				
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L				
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L				
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L				
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L				
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L				
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L				
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L				
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L				
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L				
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L				
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L				
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L				
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L				
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L				
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L				
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L				
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L				
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L				
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L				



Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L				
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L				
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L				
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L				
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L				
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L				
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L				

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.



(1) - The recovery in the matrix spike was not calculated (NC). Spiked concentration was less than 2x that native to the sample.

Validation Signature Page

Maxxam Job #: B2H9928

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

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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.



## **SUGIYAMA**

Your Project #: 021-1228  
 Site Location: TANSLEY QUARRY  
 Your C.O.C. #: 38115605, 381156-05-01

**Attention: Sharon Wood**

Golder Associates Ltd  
 Mississauga - Standing Offer  
 2390 Argentia Rd  
 Mississauga, ON  
 L5N 5Z7

Report Date: 2012/11/27

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B2H9928**

Received: 2012/11/15, 15:35

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity	1	N/A	2012/11/21	CAM SOP-00448	SM 2320B
Anions	1	N/A	2012/11/21	CAM SOP-00435	SM 4110B
Free (WAD) Cyanide	1	N/A	2012/11/22	CAM SOP-00457	Ontario MOE CN-E3015
Fluoride	1	2012/11/20	2012/11/21	CAM SOP-00448	APHA 4500FC
Hardness (calculated as CaCO <sub>3</sub> )	1	N/A	2012/11/22	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA	1	2012/11/21	2012/11/21	CAM SOP-00453	SW-846 7470A
Total Metals Analysis by ICPMS	1	N/A	2012/11/23	CAM SOP-00447	EPA 6020
Total Ammonia-N	1	N/A	2012/11/22	CAM SOP-00441	US GS I-2522-90
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water (t)	1	N/A	2012/11/21	CAM SOP-00440	SM 4500 NO3/NO2B
pH	1	N/A	2012/11/21	CAM SOP-00448	SM 4500H+ B
Phenols (4AAP)	1	N/A	2012/11/21	CAM SOP-00444	MOE ROPHEN-E3179
Orthophosphate	1	N/A	2012/11/21	CAM SOP-00461	EPA 365.1
Sulphide	1	N/A	2012/11/20	CAM SOP-00455	SM 4500-S G
Total Phosphorus (Colourimetric)	1	2012/11/22	2012/11/23	CAM SOP-00407	APHA 4500 P,B,F
Total Suspended Solids	1	N/A	2012/11/20	CAM SOP-00428	SM 2540D
Turbidity	1	N/A	2012/11/21	CAM SOP-00417	APHA 2130B

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Mathura Thirukkumaran, CS Rep  
Email: MThirukkumaran@maxxam.ca  
Phone# (905) 817-5700

=====  
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: 1

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Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		PP8812	PP8812		
Sampling Date		2012/11/15	2012/11/15		
	Units	SUGIYAMA	SUGIYAMA Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>					
Hardness (CaCO <sub>3</sub> )	mg/L	1300		1.0	3041014
<b>Inorganics</b>					
Total Ammonia-N	mg/L	2.2		0.050	3042338
Fluoride (F <sup>-</sup> )	mg/L	0.43		0.10	3042449
Free Cyanide	mg/L	<0.0020		0.0020	3045136
Orthophosphate (P)	mg/L	<0.010		0.010	3042705
pH	pH	7.62			3042434
Phenols-4AAP	mg/L	<0.0010		0.0010	3043330
Total Phosphorus	mg/L	<0.002		0.002	3045083
Total Suspended Solids	mg/L	15		10	3041751
Sulphide	mg/L	<0.020	<0.020	0.020	3042041
Turbidity	NTU	3.9		0.2	3042483
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	180		1.0	3042447
Nitrite (N)	mg/L	0.048		0.010	3042878
Dissolved Chloride (Cl)	mg/L	1800		10	3042686
Nitrate (N)	mg/L	1.6		0.10	3042878
Nitrate + Nitrite	mg/L	1.6		0.10	3042878
Dissolved Bromide (Br <sup>-</sup> )	mg/L	22		10	3042686
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	910		10	3042686

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		PP8812	PP8812		
Sampling Date		2012/11/15	2012/11/15		
	Units	SUGIYAMA	SUGIYAMA Lab-Dup	RDL	QC Batch
<b>Metals</b>					
Mercury (Hg)	mg/L	<0.00010		0.00010	3043315
Total Aluminum (Al)	ug/L	<25	<25	25	3045889
Total Antimony (Sb)	ug/L	<2.5	<2.5	2.5	3045889
Total Arsenic (As)	ug/L	<5.0	<5.0	5.0	3045889
Total Barium (Ba)	ug/L	12	11	10	3045889
Total Beryllium (Be)	ug/L	<2.5	<2.5	2.5	3045889
Total Bismuth (Bi)	ug/L	<5.0	<5.0	5.0	3045889
Total Boron (B)	ug/L	4900	4900	50	3045889
Total Cadmium (Cd)	ug/L	<0.50	<0.50	0.50	3045889
Total Calcium (Ca)	ug/L	350000	350000	1000	3045889
Total Chromium (Cr)	ug/L	<25	<25	25	3045889
Total Cobalt (Co)	ug/L	<2.5	<2.5	2.5	3045889
Total Copper (Cu)	ug/L	36	34	5.0	3045889
Total Iron (Fe)	ug/L	<500	<500	500	3045889
Total Lead (Pb)	ug/L	<2.5	<2.5	2.5	3045889
Total Magnesium (Mg)	ug/L	120000	120000	250	3045889
Total Manganese (Mn)	ug/L	100	99	10	3045889
Total Molybdenum (Mo)	ug/L	4.5	4.6	2.5	3045889
Total Nickel (Ni)	ug/L	<5.0	<5.0	5.0	3045889
Total Phosphorus (P)	ug/L	<500	<500	500	3045889
Total Potassium (K)	ug/L	38000	37000	1000	3045889
Total Silicon (Si)	ug/L	3900	3800	250	3045889
Total Selenium (Se)	ug/L	<10	<10	10	3045889
Total Silver (Ag)	ug/L	<0.50	<0.50	0.50	3045889
Total Sodium (Na)	ug/L	870000	840000	500	3045889
Total Strontium (Sr)	ug/L	22000	21000	5.0	3045889
Total Thallium (Tl)	ug/L	<0.25	<0.25	0.25	3045889
Total Tin (Sn)	ug/L	<5.0	<5.0	5.0	3045889
Total Titanium (Ti)	ug/L	<25	<25	25	3045889
Total Uranium (U)	ug/L	<0.50	<0.50	0.50	3045889
Total Vanadium (V)	ug/L	<2.5	<2.5	2.5	3045889
Total Zinc (Zn)	ug/L	<25	<25	25	3045889

 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

### Test Summary

**Maxxam ID** PP8812  
**Sample ID** SUGIYAMA  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3042447	N/A	2012/11/21	Yogesh Patel
Anions	IC	3042686	N/A	2012/11/21	Fari Dehdezi
Free (WAD) Cyanide	TECH/CN	3045136	N/A	2012/11/22	Louise Harding
Fluoride	F	3042449	2012/11/20	2012/11/21	Yogesh Patel
Hardness (calculated as CaCO3)		3041014	N/A	2012/11/22	Automated Statchk
Mercury in Water by CVAA	CVAA	3043315	2012/11/21	2012/11/21	Lawrence Cheung
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Total Ammonia-N	LACH/NH4	3042338	N/A	2012/11/22	Lemeneh Addis
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3042878	N/A	2012/11/21	Chris Li
pH	PH	3042434	N/A	2012/11/21	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3043330	N/A	2012/11/21	Bramdeo Motiram
Orthophosphate	AC	3042705	N/A	2012/11/21	Birenkumar Patel
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu
Total Phosphorus (Colourimetric)	LACH/P	3045083	2012/11/22	2012/11/23	Anastasia Hamanov
Total Suspended Solids	SLDS	3041751	N/A	2012/11/20	Subhashchandra Patel
Turbidity	TURB	3042483	N/A	2012/11/21	Neil Dassanayake

**Maxxam ID** PP8812 Dup  
**Sample ID** SUGIYAMA  
**Matrix** Water

**Collected** 2012/11/15  
**Shipped**  
**Received** 2012/11/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	3045889	N/A	2012/11/23	Hua Ren
Sulphide	ISE/S	3042041	N/A	2012/11/20	Xuanhong Qiu



Maxxam Job #: B2H9928  
Report Date: 2012/11/27

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

**GENERAL COMMENTS**

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

Revised Report (2012/11/27): Results have been split onto separate reports as per client request.

Sample PP8812-01: Metal analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3041751	Total Suspended Solids	2012/11/20					<10	mg/L			101	85 - 115
3042041	Sulphide	2012/11/20	83	80 - 120	93	80 - 120	<0.020	mg/L	NC	20		
3042338	Total Ammonia-N	2012/11/22	99	80 - 120	100	85 - 115	<0.050	mg/L	8.9	20		
3042447	Alkalinity (Total as CaCO3)	2012/11/21					<1.0	mg/L	NC	25	98	85 - 115
3042449	Fluoride (F-)	2012/11/21	96	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
3042483	Turbidity	2012/11/21					0.3, RDL=0.2	NTU	11.0	20	104	85 - 115
3042686	Dissolved Chloride (Cl)	2012/11/21	111	80 - 120	98	80 - 120	<1.0	mg/L				
3042686	Dissolved Bromide (Br-)	2012/11/21	110	80 - 120	97	80 - 120	<1.0	mg/L				
3042686	Dissolved Sulphate (SO4)	2012/11/21	NC	80 - 120	96	80 - 120	<1.0	mg/L				
3042705	Orthophosphate (P)	2012/11/21	108	75 - 125	100	80 - 120	<0.010	mg/L				
3042878	Nitrite (N)	2012/11/21	103	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
3042878	Nitrate (N)	2012/11/21	102	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
3043315	Mercury (Hg)	2012/11/21	116	80 - 120	108	80 - 120	<0.00010	mg/L				
3043330	Phenols-4AAP	2012/11/21	99	80 - 120	102	85 - 115	<0.0010	mg/L				
3045083	Total Phosphorus	2012/11/23	98	80 - 120	103	85 - 115	<0.002	mg/L	NC	20	110	85 - 115
3045136	Free Cyanide	2012/11/22	103	80 - 120	109	80 - 120	<0.0020	mg/L				
3045889	Total Aluminum (Al)	2012/11/23	88	80 - 120	93	80 - 120	<5.0	ug/L	NC	20		
3045889	Total Antimony (Sb)	2012/11/23	112	80 - 120	113	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Arsenic (As)	2012/11/23	106	80 - 120	106	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Barium (Ba)	2012/11/23	99	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
3045889	Total Beryllium (Be)	2012/11/23	100	80 - 120	105	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Bismuth (Bi)	2012/11/23	96	80 - 120	104	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Boron (B)	2012/11/23	NC	80 - 120	104	80 - 120	<10	ug/L	0.3	20		
3045889	Total Cadmium (Cd)	2012/11/23	101	80 - 120	107	80 - 120	<0.10	ug/L	NC	20		
3045889	Total Calcium (Ca)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L	0.4	20		
3045889	Total Chromium (Cr)	2012/11/23	95	80 - 120	96	80 - 120	<5.0	ug/L	NC	20		
3045889	Total Cobalt (Co)	2012/11/23	96	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Copper (Cu)	2012/11/23	89	80 - 120	99	80 - 120	<1.0	ug/L	5.1	20		
3045889	Total Iron (Fe)	2012/11/23	101	80 - 120	102	80 - 120	<100	ug/L	NC	20		
3045889	Total Lead (Pb)	2012/11/23	95	80 - 120	104	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Magnesium (Mg)	2012/11/23	NC	80 - 120	97	80 - 120	<50	ug/L	0.7	20		
3045889	Total Manganese (Mn)	2012/11/23	96	80 - 120	98	80 - 120	<2.0	ug/L	2.7	20		
3045889	Total Molybdenum (Mo)	2012/11/23	112	80 - 120	110	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Nickel (Ni)	2012/11/23	93	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Phosphorus (P)	2012/11/23	119	80 - 120	96	80 - 120	<100	ug/L	NC	20		
3045889	Total Potassium (K)	2012/11/23	NC	80 - 120	100	80 - 120	<200	ug/L	1.9	20		
3045889	Total Silicon (Si)	2012/11/23	94	80 - 120	96	80 - 120	<50	ug/L	2.8	20		
3045889	Total Selenium (Se)	2012/11/23	98	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
3045889	Total Silver (Ag)	2012/11/23	94	80 - 120	102	80 - 120	<0.10	ug/L	NC	20		
3045889	Total Sodium (Na)	2012/11/23	NC	80 - 120	100	80 - 120	<100	ug/L	2.9	20		

Maxxam Job #: B2H9928  
 Report Date: 2012/11/27

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

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3045889	Total Strontium (Sr)	2012/11/23	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.8	20		
3045889	Total Thallium (Tl)	2012/11/23	96	80 - 120	106	80 - 120	<0.050	ug/L	NC	20		
3045889	Total Tin (Sn)	2012/11/23	107	80 - 120	109	80 - 120	<1.0	ug/L	NC	20		
3045889	Total Titanium (Ti)	2012/11/23	101	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
3045889	Total Uranium (U)	2012/11/23	105	80 - 120	108	80 - 120	<0.10	ug/L	NC	20		
3045889	Total Vanadium (V)	2012/11/23	98	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
3045889	Total Zinc (Zn)	2012/11/23	91	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.



NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

**Maxxam Job #: B2H9928**

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

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Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

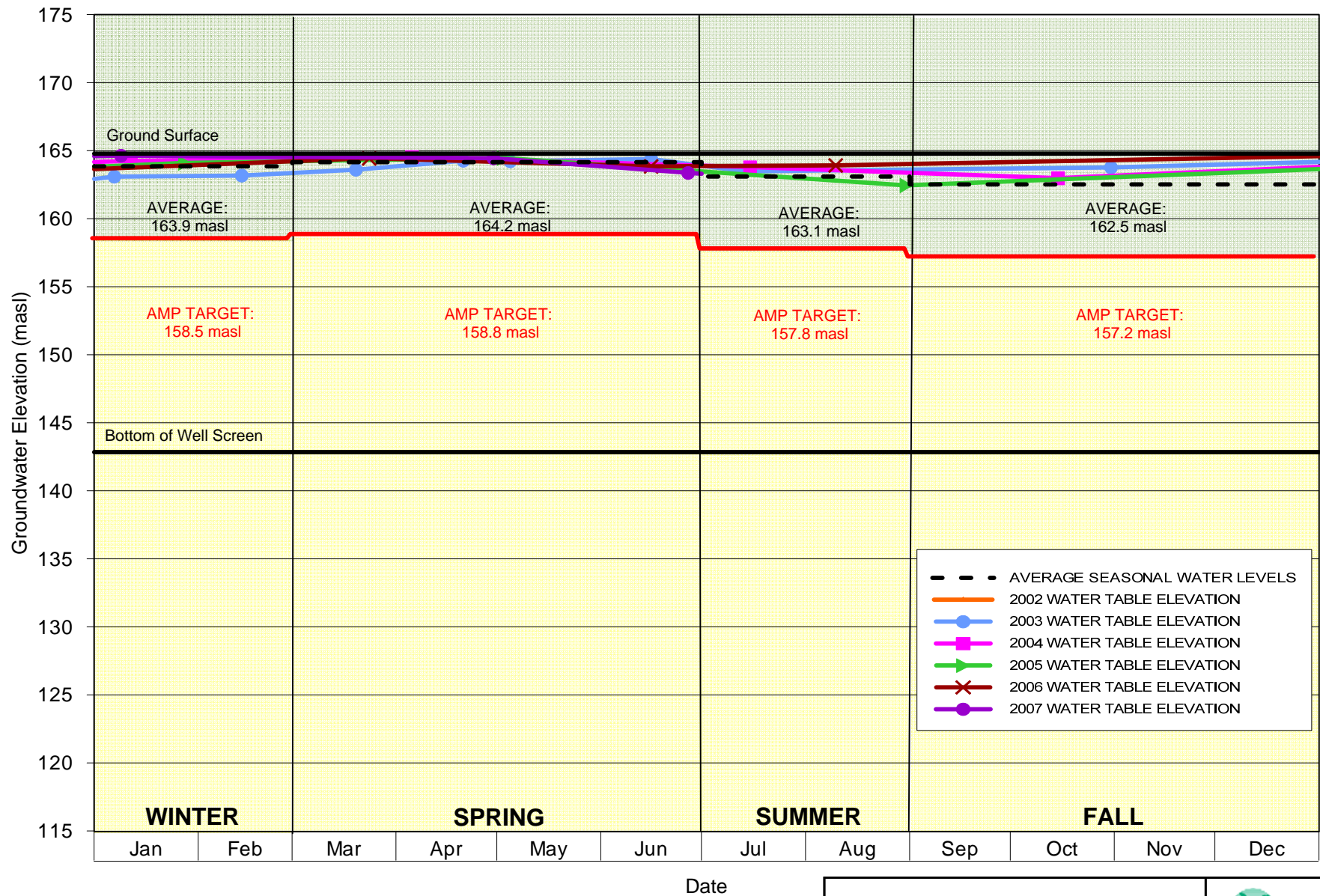
=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



# **APPENDIX F**

## **Target Water Level Graphs**

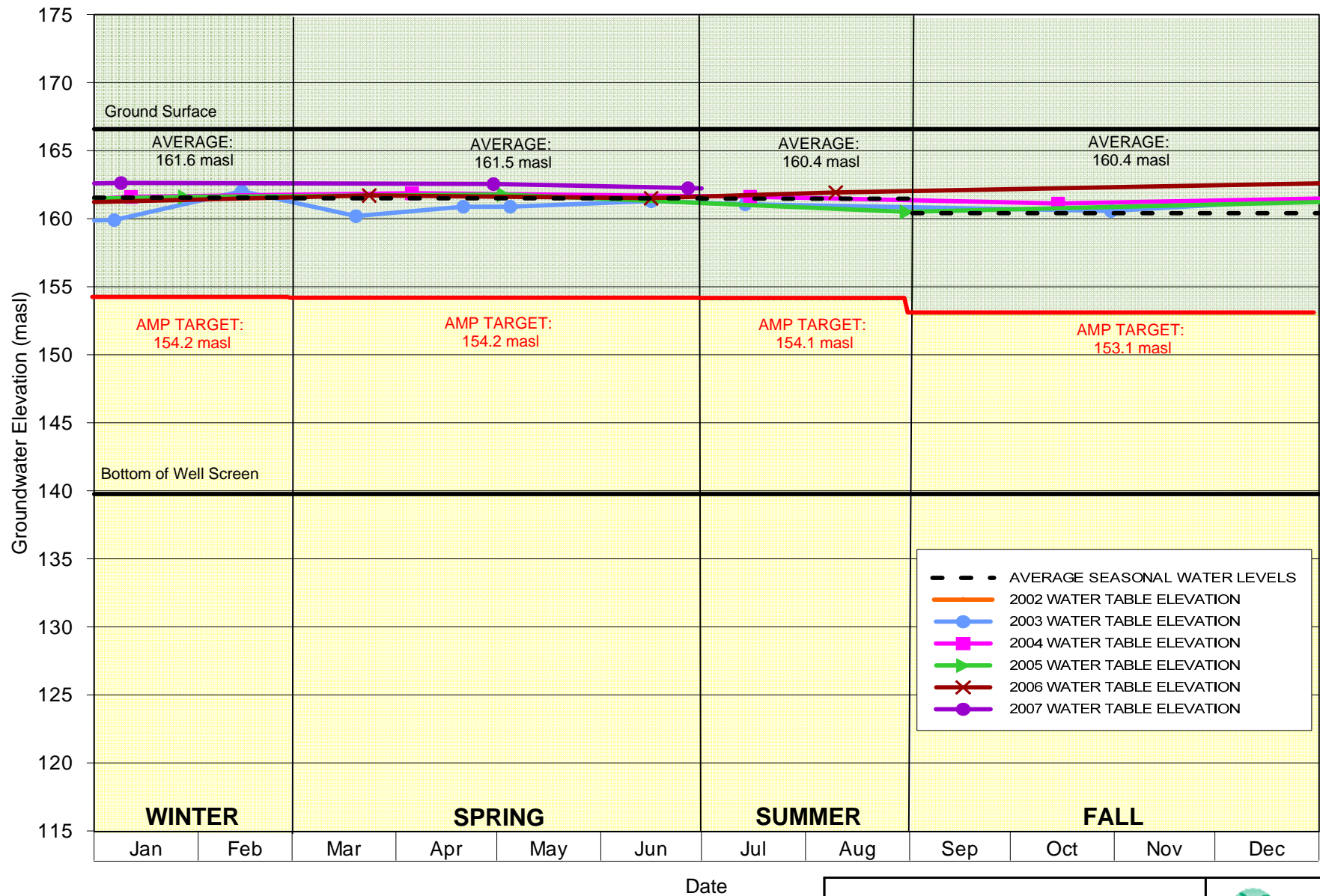
## Target Water Level Calculation for MW-01I



- AVERAGE SEASONAL WATER LEVELS
- 2002 WATER TABLE ELEVATION
- 2003 WATER TABLE ELEVATION
- 2004 WATER TABLE ELEVATION
- ▶— 2005 WATER TABLE ELEVATION
- ×— 2006 WATER TABLE ELEVATION
- 2007 WATER TABLE ELEVATION

<b>Tansley Quarry</b>		 <b>Golder Associates</b>
DRAWN: LB	APPROVED: SW	
PROJECT: 021-1228		FIGURE: F.1

## Target Water Level Calculation for MW-02I



**Tansley Quarry**



DRAWN: LB

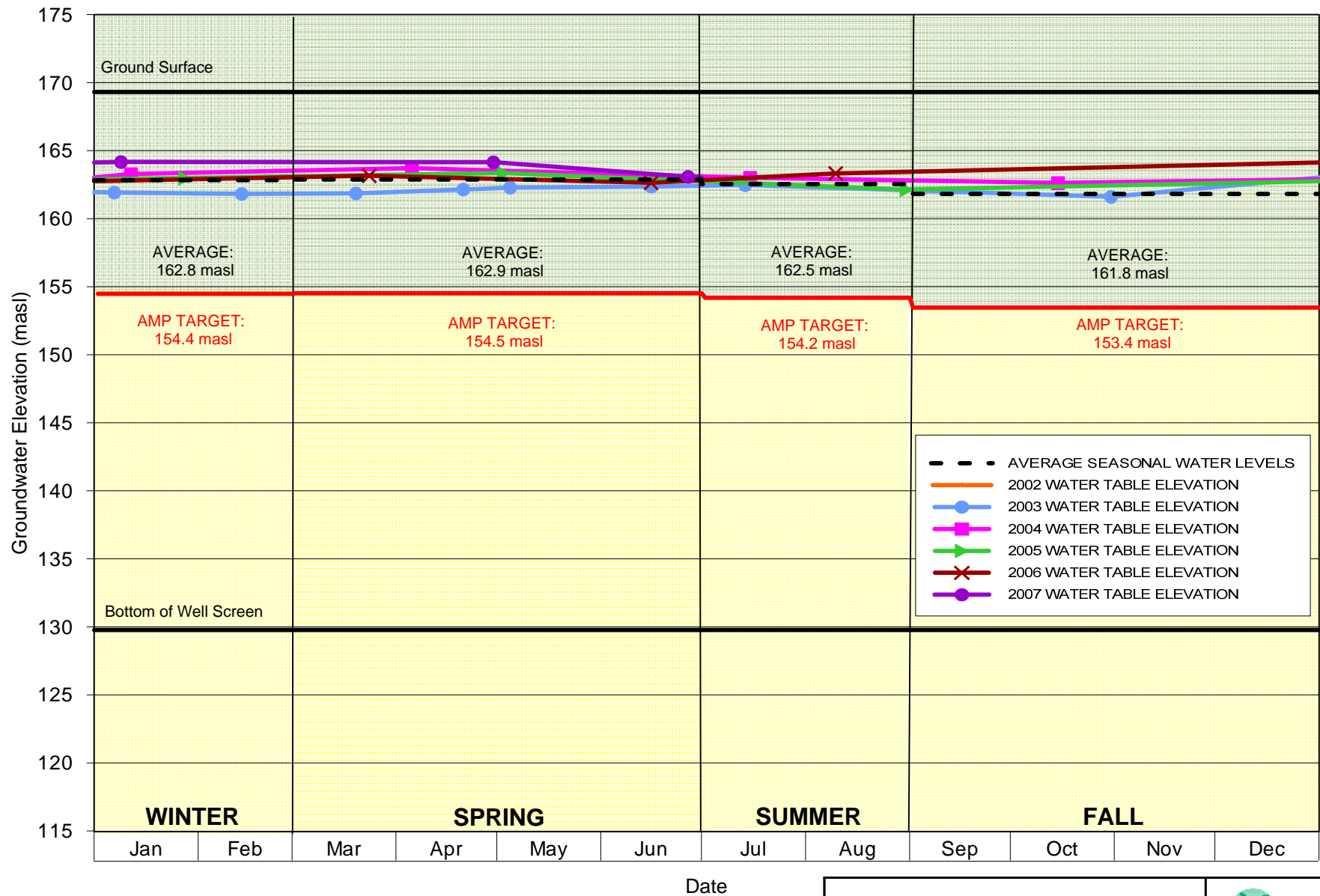
APPROVED: SW

DATE: April 2013

PROJECT: 021-1228

FIGURE: F.2

## Target Water Level Calculation for MW-03I



**Tansley Quarry**



DRAWN: LB

APPROVED: SW

DATE: April 2013

PROJECT: 021-1228

FIGURE: F.3



At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Ltd.**  
**6925 Century Avenue, Suite #100**  
**Mississauga, Ontario, L5N 7K2**  
**Canada**  
**T: +1 (905) 567 4444**

