Whitewater
Hydrogeology Ltd.

PROPOSED VIOLET HILL PIT

COMBINED LEVEL 1 AND 2 HYDROGEOLOGICAL ASSESSMENT

Prepared for:
Greenwood Aggregates

Date: June 2016

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June 3, 2016

Greenwood Aggregates.
RR2 LCD Main,
Orangeville, Ontario.
L9W 2Y9

Attention: Mr. Sam Greenwood

Dear Sir:

Re: Greenwood Aggregates: Proposed Orangeville Pit

Whitewater Hydrogeology Ltd. is pleased to present the combined Level 1 and 2 Hydrogeological Assessment for the Greenwood Aggregates (Greenwood) proposed Violet Hill Pt, located on the on Part Lots 30, 31, and 32, Concession 4 E.H.S Town of Mono, Dufferin County. Greenwood have filed an application with the Ministry of Natural Resources and Forestry (MNRF) for an Aggregate Resources Act (ARA) Category 3, Class "A" Pit Above Water license for development of the proposed Violet Hill Pit. The proposed licenced area will be 149.4 ha, of which 86.5 ha will be reserved for the extraction of sand and gravel. Extraction will proceed to a depth ranging between approximately 20-25 m below ground surface, which will remain at least 5 m above the seasonally high water table elevation.

In the Combined Level 1 and 2 Hydrogeological Assessment, multiple lines of evidence were used to support the position that the groundwater and surface water regimes will be unaffected by the proposed operations at the Violet Hill Pit. As a result, there will be no measureable influence from the proposed above water operation on: the groundwater system (including quality and quantity of water to domestic water wells); and the surface water system.

The findings of the site specific assessment completed for the proposed Violet Hill Pit were found to be consistent with understanding of the influence of above water extraction of sands and gravels in the Province of Ontario.

Yours truly,

Tecia White, M.Sc., P.Geo.
Senior Hydrogeologist / President
Whitewater Hydrogeology Ltd.

Executive Summary

Greenwood Aggregates (Greenwood) have filed an application with the Ministry of Natural Resources and Forestry (MNRF) for an Aggregate Resources Act (ARA) Category 3, Class "A" Pit Above Water license for development of the proposed Violet Hill Pit. The subject property is located on Part Lots 30, 31, and 32, Concession 4 E.H.S Town of Mono, Dufferin County. The proposed licenced area will be 149.4 ha, of which 86.5 ha will be reserved for the extraction of sand and gravel. Extraction will proceed to a depth ranging between approximately 20-25 m below ground surface (an approximately elevation of 413-417 masl), which will remain at least 5 m above the seasonally high water table elevation.

The Combined Level 1 and 2 Hydrogeological Assessment was prepared to comply with the relevant legislation. The Provincial Standards, which support the ARA, outline the technical requirements for the various aggregate applications. For a Category 3, Class "A" Pit Above Water the only hydrogeological requirement is to "*determine the elevation of the established groundwater table within the site or demonstrate that the final depth of extraction is at least 1.5 m above the water table*." The Provincial Policy Statement states that "*the quality and quantity of groundwater and surface water and the function of sensitive groundwater recharge/discharge areas, aquifers and headwaters will be protected or enhanced*."

In the Combined Level 1 and 2 Hydrogeological Assessment, multiple lines of evidence were used to support the position that the groundwater and surface water regimes will be unaffected by the proposed operations at the Violet Hill Pit. As a result, there will be no measureable influence from the proposed above water operation on: the groundwater system (including quality and quantity of water to domestic water wells); and the surface water system.

The findings of the site specific assessment completed for the proposed Violet Hill Pit were found to be consistent with understanding of the influence of above water extraction of sands and gravels in the Province of Ontario.

Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 INTRODUCTION

Greenwood Aggregates (Greenwood) have filed an application with the Ministry of Natural Resources and Forestry (MNRF) for an Aggregate Resources Act (ARA) Category 3, Class "A" Pit Above Water license for development of the proposed Violet Hill Pit. The subject property is located on Part Lots 30, 31, and 32, Concession 4 E.H.S Town of Mono, Dufferin County (Figure 1 and Figure 2).

The proposed Violet Hill Pit location was selected based on its proximity to market, the natural characteristics of the property (limited environmental, planning, and cultural constraints, depth to water table), and the quality of the aggregate resource. The proposed licenced area will be 149.4 ha, of which 86.5 ha will be reserved for the extraction of sand and gravel. The extraction limit remains outside of the defined erosion hazard limit (C.C. Tatham, 2015). Extraction will proceed to a depth ranging between approximately 20-25 m below ground surface (an approximately elevation of 413-417 masl), which will remain at least 5 m above the seasonally high water table elevation.

Whitewater Hydrogeology Ltd. (Whitewater) was retained by Greenwood to undertake the hydrogeological assessment for the proposed aggregate operation. The study approach was developed to comply with the relevant legislation. The Provincial Standards, which support the ARA, outline the technical requirements for the various aggregate applications. For a Category 3, Class "A" Pit Above Water the only hydrogeological requirement is to "*determine the elevation of the established groundwater table within the site or demonstrate that the final depth of extraction is at least 1.5 m above the water table*." The Provincial Policy Statement states that "*the quality and quantity of groundwater and surface water and the function of sensitive groundwater recharge/discharge areas, aquifers and headwaters will be protected or enhanced*."

To comply with the abovementioned requirements, the hydrogeological work program was designed to characterize the regional and local geological, hydrogeological, and hydrological conditions. An impact assessment was completed to determine the potential impacts (if any) of the operations of an above water pit on the groundwater and surface systems.

Above water sand and gravel pits do not require dewatering or off-site discharge of surface water or groundwater. However, it is very common for an above water pit to incorporate the washing of aggregate into their day to day operations. Greenwood is proposing to construct their washing facility as a common "closed loop" system which will included a series of lined holding ponds and settling ponds where the water is re-circulated. Although the volume of water required to operate a washing facility appears large, the amount of water actually consumed in the process is usually less than 12% of the rain that falls on the site (Golder, 2006). The make-up water is proposed to come from a groundwater well or pond.

The water takings from the groundwater well and the washing facility are regulated separately from the pit licence. If an ARA licence is issued by the MNRF, Greenwood would be required to apply for an Ontario Water Resources Act Section 34 Permit to Take Water (PTTW). The applications and related hydrogeological studies are carefully reviewed by the Ministry of the Environment and Climate Change (MOECC), other government agencies, and the interested public through the Environmental Bill of Rights process to ensure there will be no unacceptable impacts from these water takings, before the permit is issued. Regardless that future water takings fall under a separate provincial regulation, details of the proposed water use and the associated potential impacts have been included in this report to ensure transparency throughout the ARA application process.

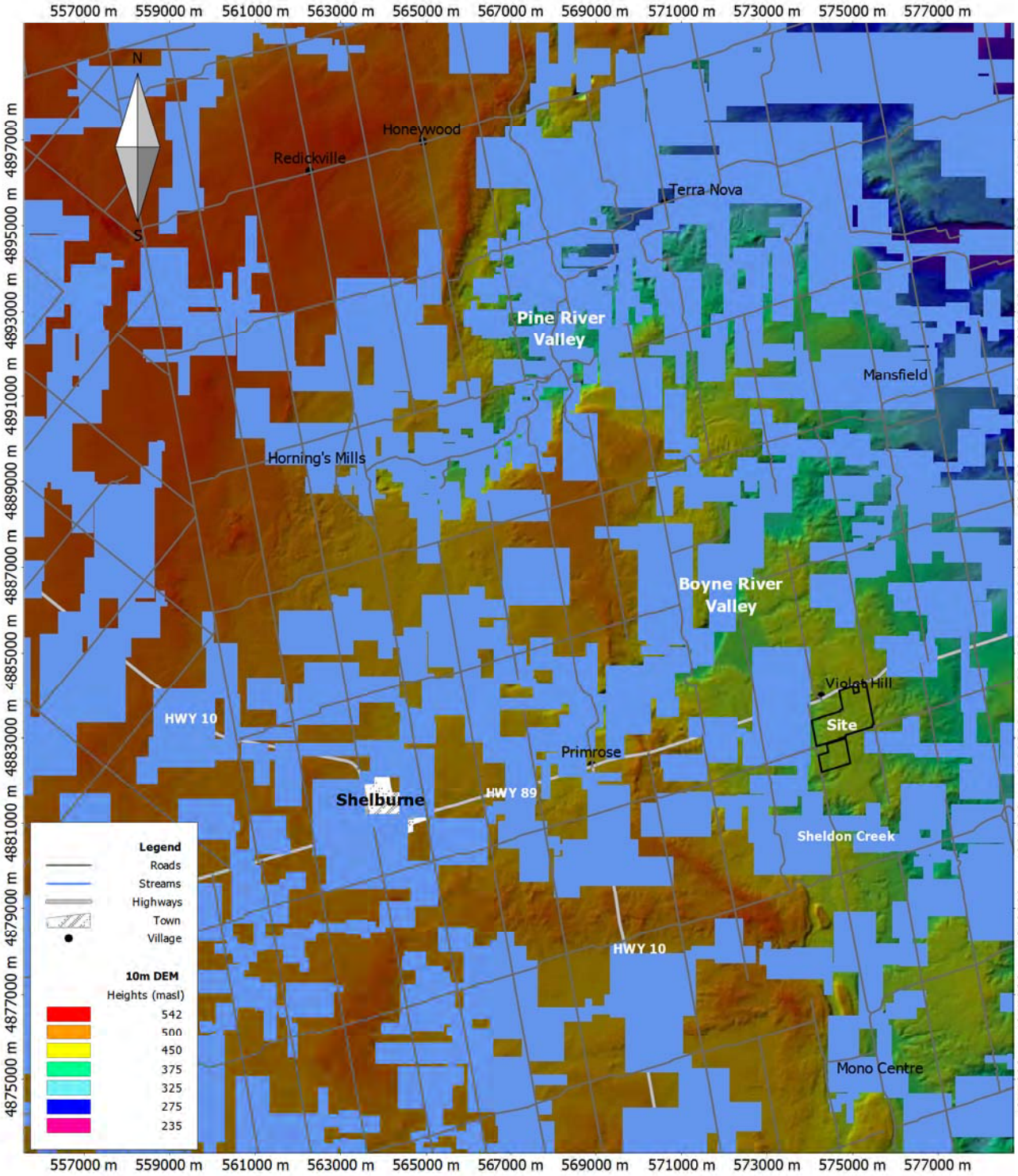


FIGURE 1: REGIONAL LOCATION MAP AND DIGITAL ELEVATION MODEL (DEM)

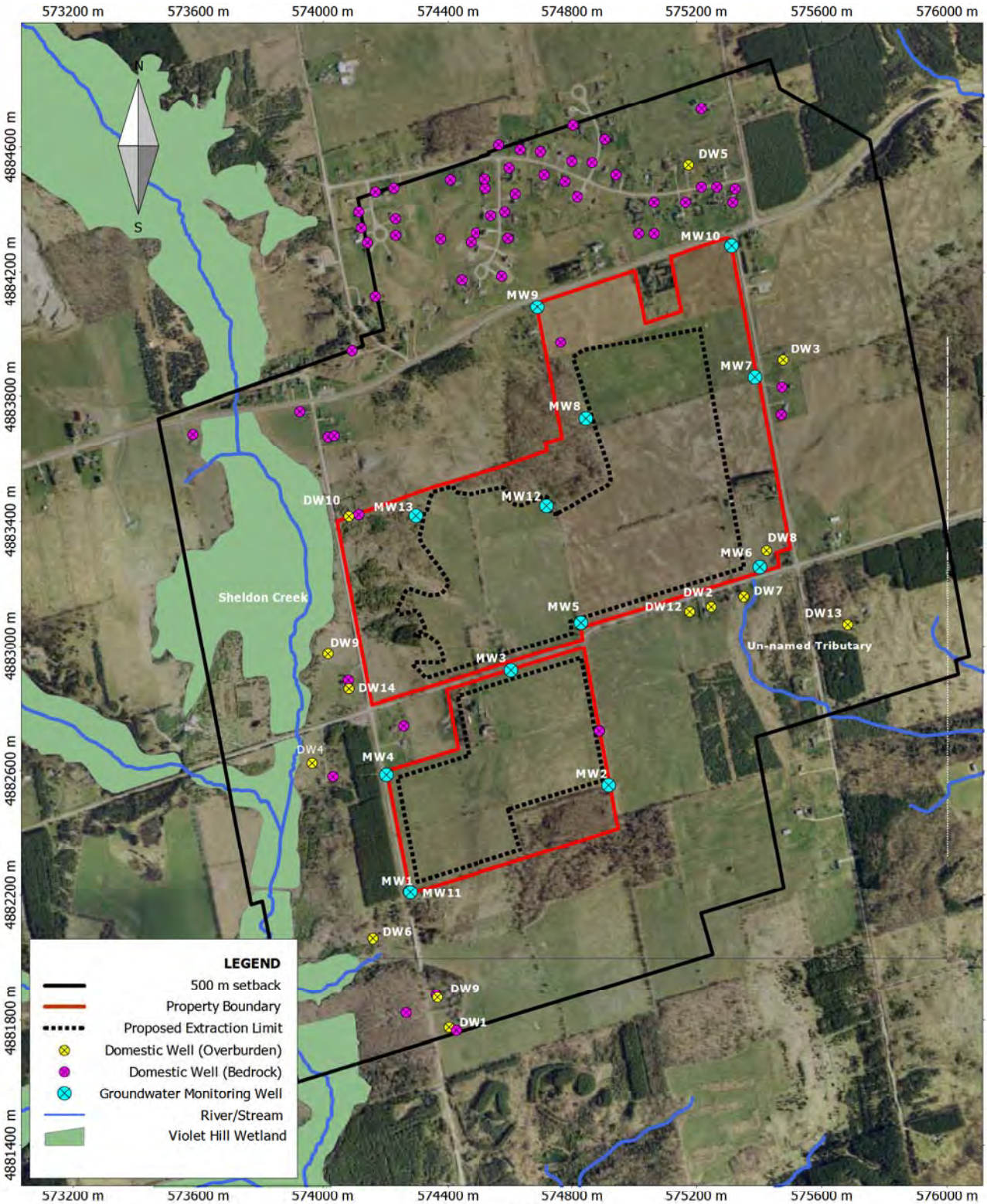


FIGURE 2: SITE MAP

2.0 WORK PROGRAM

The work program was designed to build upon the regional geological and hydrogeological setting (refer to Section 3.0) and to provide a comprehensive characterization of the site. This characterization, often referred to as the site conceptual model, provides the foundation to the impact assessment, and subsequently, the recommended groundwater long-term monitoring program.

2.1 Borehole Drilling and Monitoring Well Construction

Geological Investigations was retained by Greenwood to evaluate the aggregate resource on the subject property. The investigation required a drilling program to characterize the lithology across the site. The drilling program was carried out by Canadian Soil Drilling and was completed between May and October 2014. The boreholes were drilled to a maximum depth of 30.5 m.

Groundwater monitoring wells were installed in the boreholes that resulted from the geological exploration program. The work program included the installation of 13 groundwater monitoring wells, located around the perimeter of the proposed license area. The groundwater monitoring locations are provided on Figure 2. The well construction detail are provided in Table 1.

TABLE 1: GROUNDWATER MONITORING WELLS

Well No.	Top of Casing (masl)	Ground Surface (masl)	Screen Interval (masl)		Location	
					Easting	Northing
MW1	427.20	426.50	420.40	417.36	574,278	4,882,209
MW2	434.98	434.27	411.41	405.31	574,917	4,882,553
MW3	437.37	436.71	410.80	407.75	574,605	4,882,923
MW4	425.75	425.17	411.45	408.41	574,202	4,882,588
MW5	430.88	430.24	407.38	404.33	574,829	4,883,077
MW6	432.25	431.57	418.46	416.94	575,401	4,883,252
MW7	436.97	436.30	418.01	414.96	575,385	4,883,861
MW8	431.68	430.94	413.26	410.21	574,845	4,883,730
MW9	439.17	438.55	414.78	411.73	574,690	4,884,086
MW10	439.67	438.96	412.14	409.09	575,311	4,884,284
MW11	427.15	426.50	405.77	402.73	574,277	4,882,211
MW12	435.76	~435.00	409.40	406.35	574,720	4,883,450
MW13	435.53	~434.80	409.20	406.15	574,295	4,883,419

Copies of the borehole logs are provided in Appendix A.

2.2 Groundwater Elevation Monitoring

Manual groundwater level elevation monitoring has been on-going since May 2014. In addition to manual water level measurements, 7 of the 13 groundwater monitoring wells are equipped with automatic pressure transducers, which measure absolute pressure on a 6-hour frequency. Absolute pressure data have been corrected to barometric conditions and calibrated to the monthly water levels. The result is a continuous (6-hour) record of water level elevations over the course of the 2 year study period.

The water level elevation data has been used to establish the seasonal high water table elevation and to determine the local groundwater flow direction.

2.3 Groundwater Quality Monitoring

The groundwater quality monitoring program was conducted on May 19, 2015 and September 14, 2015. The objective of the program was to characterize the groundwater signature and to determine if seasonal trends in water chemistry exists. In total, 8 groundwater samples were collected from 5 monitoring wells. In May 2015 groundwater samples were collected from MW2, MW4, MW9, and MW11. In September 2015, there was insufficient water in MW9 for sampling, so MW5 was sampled in its place.

2.4 Aquifer / Hydraulic Testing Program

The Slug Testing is a field method that is commonly used to evaluate the general permeability (or hydraulic conductivity) of an aquifer and or aquitard. A slug test requires a rapid (instantaneous) water-level change and measurement of the water level response at high frequency. The slug tests that were completed at the proposed Violet Hill Pit involved the displacing the water level by injecting a known volume of water to the water column and measuring and recording of the water levels with a pressure transducer.

From the water level data, an estimate of hydraulic conductivity was calculated using the Bouwer and Rice method (1976). It is noted that caution should be used when relying on slug test data for characterizing large-scale formation properties because only a small volume of water is used to perturb the hydraulic conditions in the well in comparison to the volume of water in the formation. Nevertheless, slug tests are regarded as a simple and efficient means of estimate the hydraulic characteristics of an aquifer in the vicinity of any given well. For a hydrogeological evaluation of a proposed aggregate operation where extraction will remain at least 5 m above the water table, this approach is deemed sufficient. Three slug tests were completed at the proposed Violet Hill Pit.

Transmissivity is the rate at which groundwater flow horizontally through an aquifer. The higher the transmissivity, the more productive the aquifer. The transmissivity of the overburden aquifer was determined by: multiplying the hydraulic conductivity by the saturated thickness of the aquifer; and from the specific capacity values calculated from pumping test information provided on the water well records. The hydraulic conductivity and the transmissivity values of the overburden aquifer were used in the characterization the hydrogeological setting and impact assessment.

3.0 REGIONAL SETTING

3.1 Physiography and Drainage

The physiography, or physical geography of the Town of Mono is controlled by the nature of the bedrock surface. The Niagara Escarpment is the dominant physiographic feature in the region. It is a cuesta scarp, produced by erosive agents eroding the bedrock surface for millions of years. It divides the township into two physiographic units: an upper, thinly drift-covered plain to the west and a lower, thickly drift-covered plain to the east. The subject property resides within the eastern physiographic region referred to as the Horseshoe Moraines (Chapman and Putnam, 1984).

One of the moraines within this physiographic region is the Signhampton-Gibraltar Moraine. The Signhampton-Gibraltar Moraine is characterized by a north – south trending ridge of hummocky terrain which is located immediately east of Violet Hill and beneath the subject lands. The ridge is up to 4 km wide and has a broad crest that is 15 to 45 m above the areas to the east and west. The sediments in the moraine consist predominantly of ice-contact stratified drift. The drift ranges in thickness between 23 and 61 m. The western limit of the moraine is defined by the Lavender-Violet Hill Meltwater Channel

A Digital Elevation Model (DEM) of the region is presented on (Figure 1). The most dominant features on the DEM in this region is the glacial re-entrant valley of the Pine River and Boyne River. The Pine River valley extends east of Horning Mills, terminating at Terra Nova. The Boyne River is also obvious on the DEM just north of Primrose. Both re-entrant valley systems cut deeply into the bedrock escarpment from the east. The subject property is located on a spillway located immediately south of Violet Hill.

The subject lands are within the Nottawasaga watershed, which covers an area of 3,361 km^2. Sheldon Creek, a tributary of the Nottawasaga River runs just west of the subject property and through the provincially significant Violet Hills Wetland Complex. It arises along the steep, forested slopes of the Niagara Escarpment near the hamlet of Violet Hill and flows eastward through a well-forested valley system through the hamlet of Sheldon. Sheldon Creek then enters an agricultural landscape that extends to the main river east of County Road 50.

Figure 3 shows the local topography based on the 1 m contours. Elevations on site range between a high of 442 masl along the northern property boundary to a low of 405 masl along the western property boundary, where the ground surface falls toward the valley floor (Sheldon Creek). Away from the valley slopes, the hummocky topography that is characteristic of the Signhampton-Gibraltar Moraine is evident.

There are no streams, permanent watercourses, or wetlands on the site, which suggests that the soil conditions promote groundwater infiltration and limits surface water runoff. Groundwater recharge during rain events is likely to occur as dispersed infiltration, in comparison to spring melt where conditions are likely to result in runoff collecting and infiltrating in closed basins. Approximately 60% of the proposed extraction area is defined by closed drainage basins (Figure 3).

Outside of these closed basins, surface water drainage is primarily towards Sheldon Creek to the west. There is evidence of periodic surface water flow through the box culvert located along Concession Road #3 E (Figure 3). However, there is no defined flow channel from the culvert to Sheldon Creek or the wetland indicating the surface water flow is limited.

Figure 3 shows provincially map a headwater of an un-named water course immediately south-east of the site at the 4th Concession. Site inspections revealed that there is no defined channel or stream at this location. Furthermore, there is no culvert suggesting that surface water flow does not occur in this area.

3.2 Geology

The underlying geology forms the basis for groundwater movement in the vicinity of the proposed Violet Hill Pit. Therefore, the objective of the geological mapping was to characterize the Quaternary geology down to the bedrock contact. Determining an appropriate conceptual model for the three-dimensional arrangement stratigraphic units was essential in understanding groundwater flow through the overburden. The

characterization began with a review of existing studies that provided relevant information on the regional geological setting. To determine if the regional conditions were locally represented at the site, a detailed geological work program was completed (refer to Section 2.0).

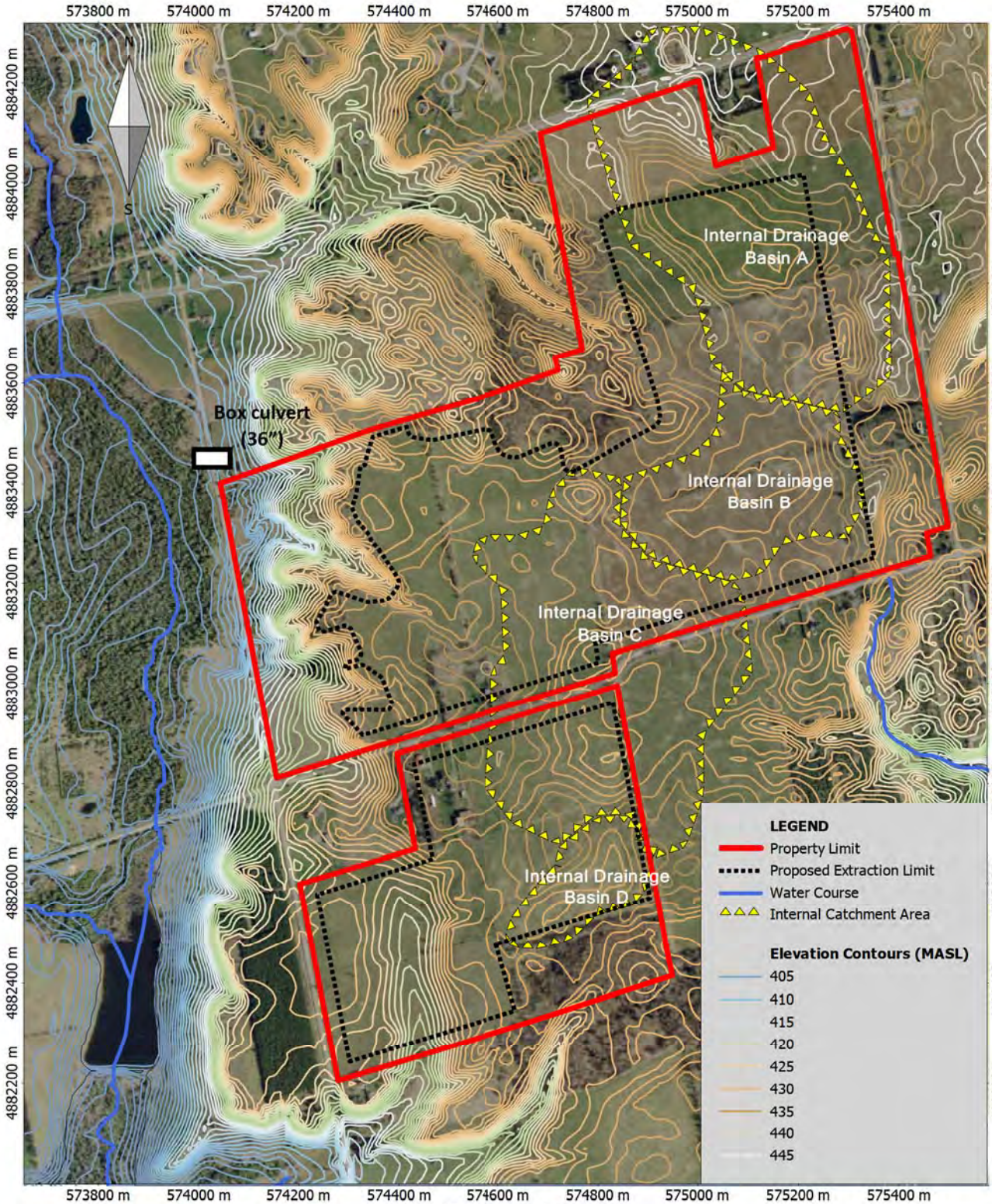


FIGURE 3: SITE DRAINAGE

3.2.1 Bedrock Geology

The bedrock in the study area is the Upper Ordovician aged Queenston Formation; a red micaceous and arenaceous shale and clay unit, which is buried under approximately 65 m of Quaternary sediments in the study area (elevation of approximately 365 masl). The Queenston Formation shale has a maximum thickness east of the Escarpment of up to 135 to 150 m, and thins in a northerly direction.

3.2.2 Quaternary Geology

The Quaternary deposits in the study area are all the result of Late Wisconsinan glaciation (approx. 23,000 to 10,000 years B.P.; Dreimanis and Karrow, 1972) and are presented on Figure 4.

The earliest ice advance in the area deposited the regionally extensive Tavistock Till and built at its margin the Orangeville moraine, which is situated to the west of the site. The ice then retreated and re-advanced where the ice built the Singhampton-Gibraltar moraine (Figure 4: Unit 3); as well as depositing the Newmarket Till on and below the Niagara Escarpment. Glaciofluvial material deposited in contact with ice may consist of gravel, sand and finer sediments. In the study area a greater portion of glaciofluvial sediments were deposited as ice-contact drift in the Orangeville moraine and Singhampton-Gibraltar moraines. It is typical for ice-contact deposits to be highly variable in texture especially in moraines, which is evident in both moraines.

The Singhampton-Gibraltar Moraine is up to 4 km wide and has a broad crest that is 15 to 45 m above the areas to the east and west (off-site). The sediments in the moraine consist predominantly of ice-contact stratified drift, which includes primarily sand and gravel with some till, silt, and clay. The drift ranges in thickness between 23 and 65 m. Most of the exposures in the Singhampton-Gibraltar Moraine reveal the predominance of pebbley to bouldery medium sand containing variable amounts but relatively little crushable material.

The final retreat of the glacier in the area led to the development of an extensive meltwater channel system carrying sediment-laden water south between the Escarpment and the ice margin. Extensive outwash terrace gravel was deposited at this time forming what has been named the Lavender-Violet Hill Meltwater Channel (Gwyn 1975). The Lavender-Violet Hill Meltwater Channel is equivalent to Unit 4a on Figure 4.

A regional geological and hydrogeological model was developed as part of the Wellhead Protection Area Delineation, Vulnerability Scoring, and Threats Assessment in the Town of Shelburne, Ontario report (Earthfx, 2015). Figure 5 is a cross section which was cut along Highway #89 between the 1st and 5th concessions and shows the approximate proposed extraction area in profile. The undifferentiated overburden materials extend to a depth of over 65 m. The proposed extraction will occur within the upper 25 m and the floor will remain above the base of Sheldon Creek. The regional profiles show that the bedrock surface is undulating and that it is the primary water supply aquifer for private water wells.

Local cross sections cut across the proposed Violet Hill Pit were generated as part of the Site Plans (Rollings Hyland Consulting, 2015). These sections have been modified to include the local geological conditions based on the borehole logs for the site (Figure 6). The local geological conditions are representative of ice-contact stratified deposits. On-site exploratory drilling noted that the materials that make up the Singhampton-Gibraltar moraine are predominantly sands and gravels, which ranges between fine and coarse

grained, with up to 30% stone content. Isolated layers of silt and clay were reported, but are limited in aerial extent and contained within the southwest portion of the site.

3.3 Hydrogeology

The regional hydrogeology of an area is controlled by the geometry of the geological features which influence the distribution and movement of groundwater. Groundwater is the water found underground in the voids of geological units (both consolidated and unconsolidated materials). Geological units, which store and transmit groundwater are called aquifers and are relied upon as a source of potable drinking water in many areas across the province, including the Town of Mono.

Local water well records and regional modelling indicate that there are two aquifers in the study area: an unconfined/semi-confined overburden aquifer and the deeper bedrock aquifer. Based on the local water well records and on-site drilling, the overburden aquifer may be thin and in areas unsuitable as a private water source (refer to Section 4.2). As a result, the primary water supply aquifer is the deeper confined bedrock system.

The overburden aquifer in the area is found within the stratified deposits that make up the Singhampton and Gibraltar Moraine (water table aquifer). Beneath the Singhampton and Gibraltar Moraine the water table is generally greater at a depth greater than 15 m due to the relatively high relief. The regional groundwater flow direction in the unconfined aquifer is from west to east (Burnside and Waterloo Hydrogeologic, 2001).

4.0 GROUNDWATER USE

4.1 Regulated Groundwater Use: Permit to Take Water

Water takings in the province are governed by the Ontario Water Resources Act (OWRA) and the Water Taking Regulation (O. Reg. 387/04); a regulation under the OWRA. Section 34 of the OWRA requires anyone taking more than a total of 50,000 litres of water in a day, must obtain a PTTW from the MOECC. A review of the permitted water takings within a 5 km radius was completed, which include water takings for industrial, commercial, municipal, and agricultural. The results indicated that there was only one active PTTW in the study area (Section 4.1.1). This PTTW is for industrial use which permits the taking for the purpose of aggregate washing. Although no other PTTW's are active within the 5 km study area, the PTTW for the closest municipal water supply (Community of Rosemont) was included in the assessment for completeness.

4.1.1 Industrial Groundwater Use

The only PTTW within a 5 km radius has been issued to Mulmur Aggregates Inc. for the aggregate operation located on Part Lots 1 and 2, Concession 2 Township of Mulmur, County of Dufferin. The PTTW was issued for the purpose of aggregate washing. The taking is from a wash pond with a maximum pumping rate of 5,000 L/min for a period of 12 hours per day, 183 days per year.

4.1.2 Municipal Groundwater Use

The Township of Adjala-Tosorontio holds a PTTW (#6567-8NWMQP) for the municipal water supply system that services the Community of Rosmont. The Rosemont Water Supply System currently consists of two wells, PW1A (bedrock aquifer) and PW3A (screened in both the bedrock and overburden aquifers) and

services a population of approximately 280 people (South Georgian Bay-Lake Simcoe Source Protection Committee, 2015). The Rosemont PTTW permits the maximum daily taking combined groundwater taking of 85,000 L/day.

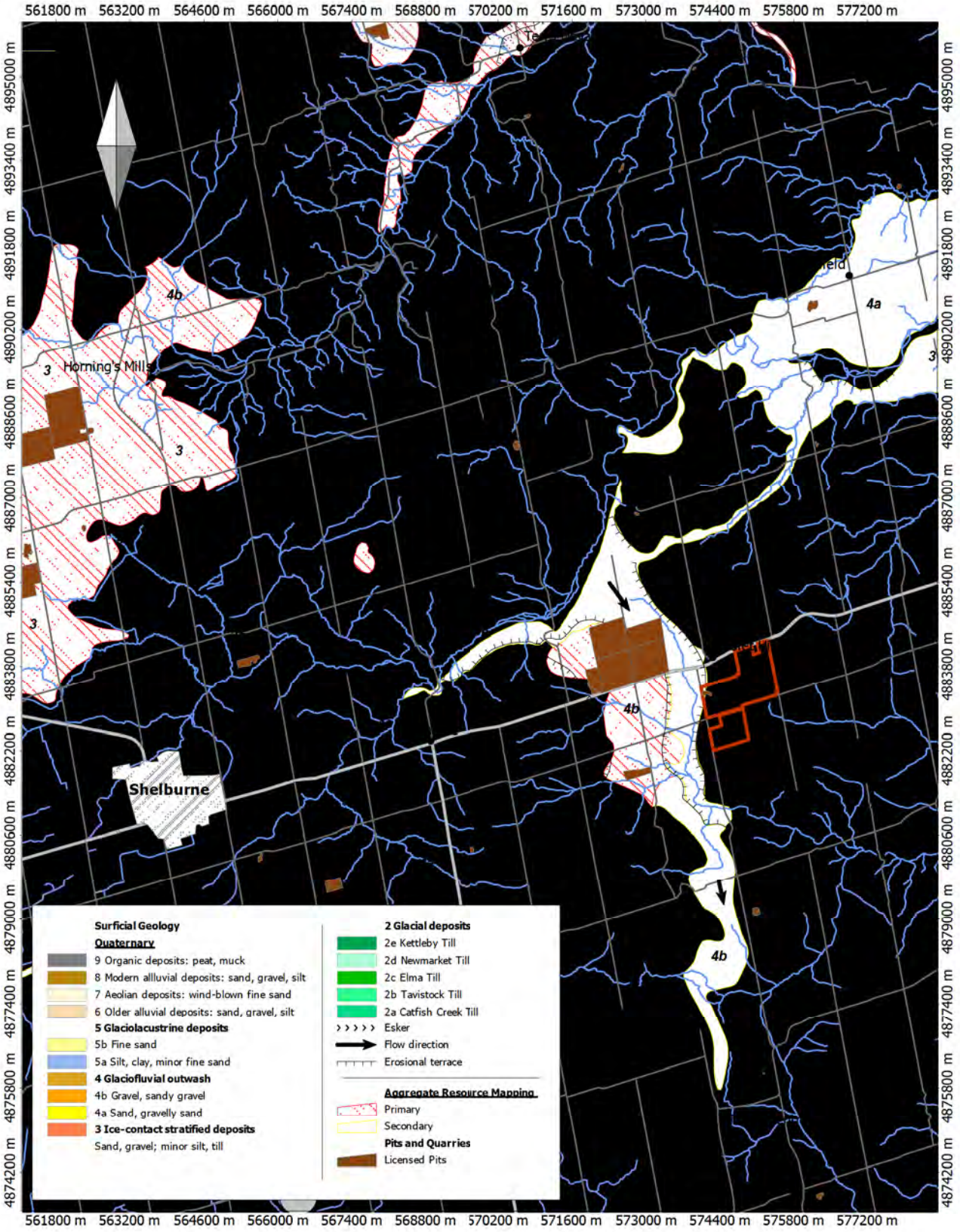


FIGURE 4: QUATERNARY GEOLOGY

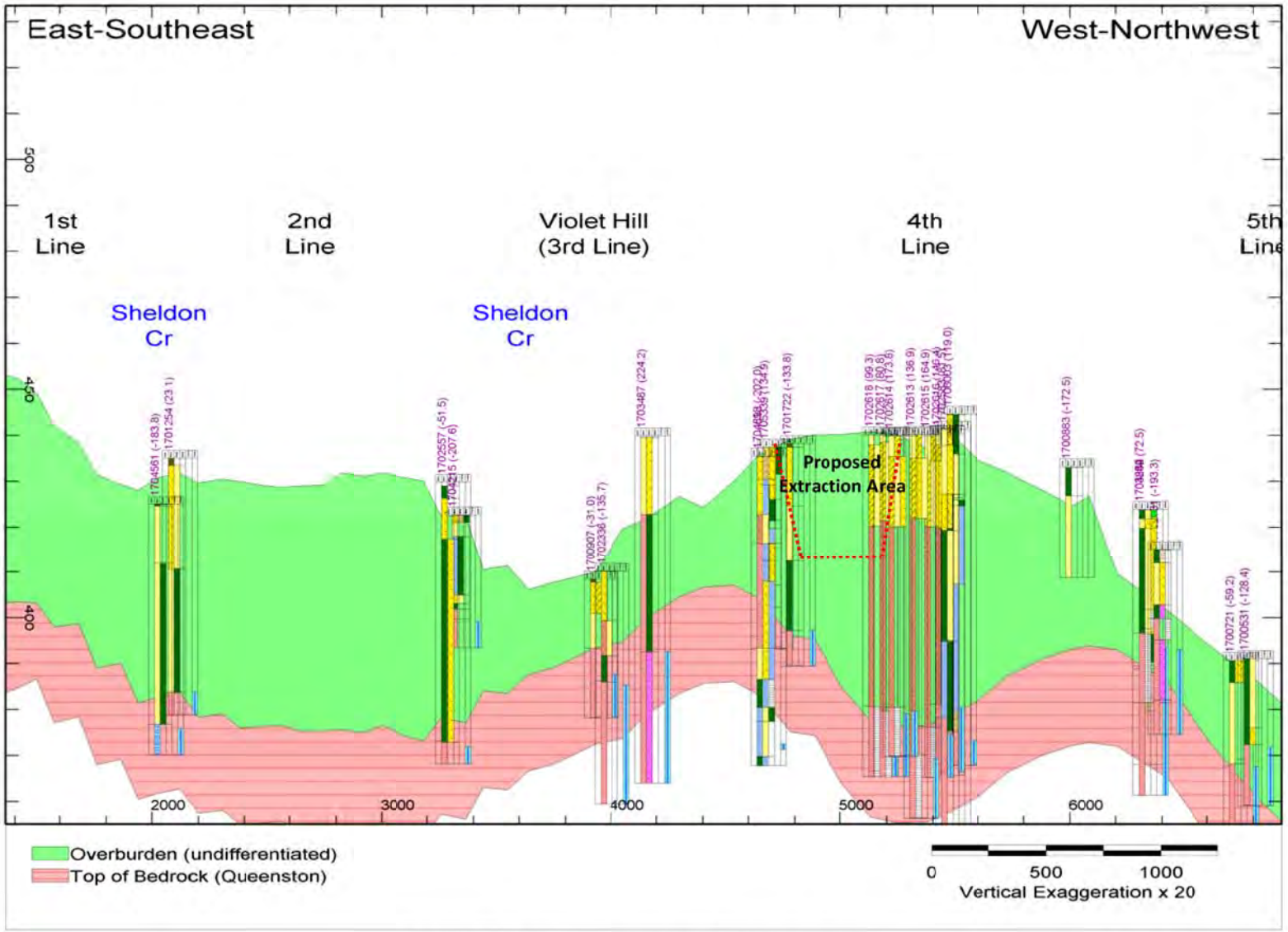


FIGURE 5: REGIONAL GEOLOGICAL CROSS SECTION

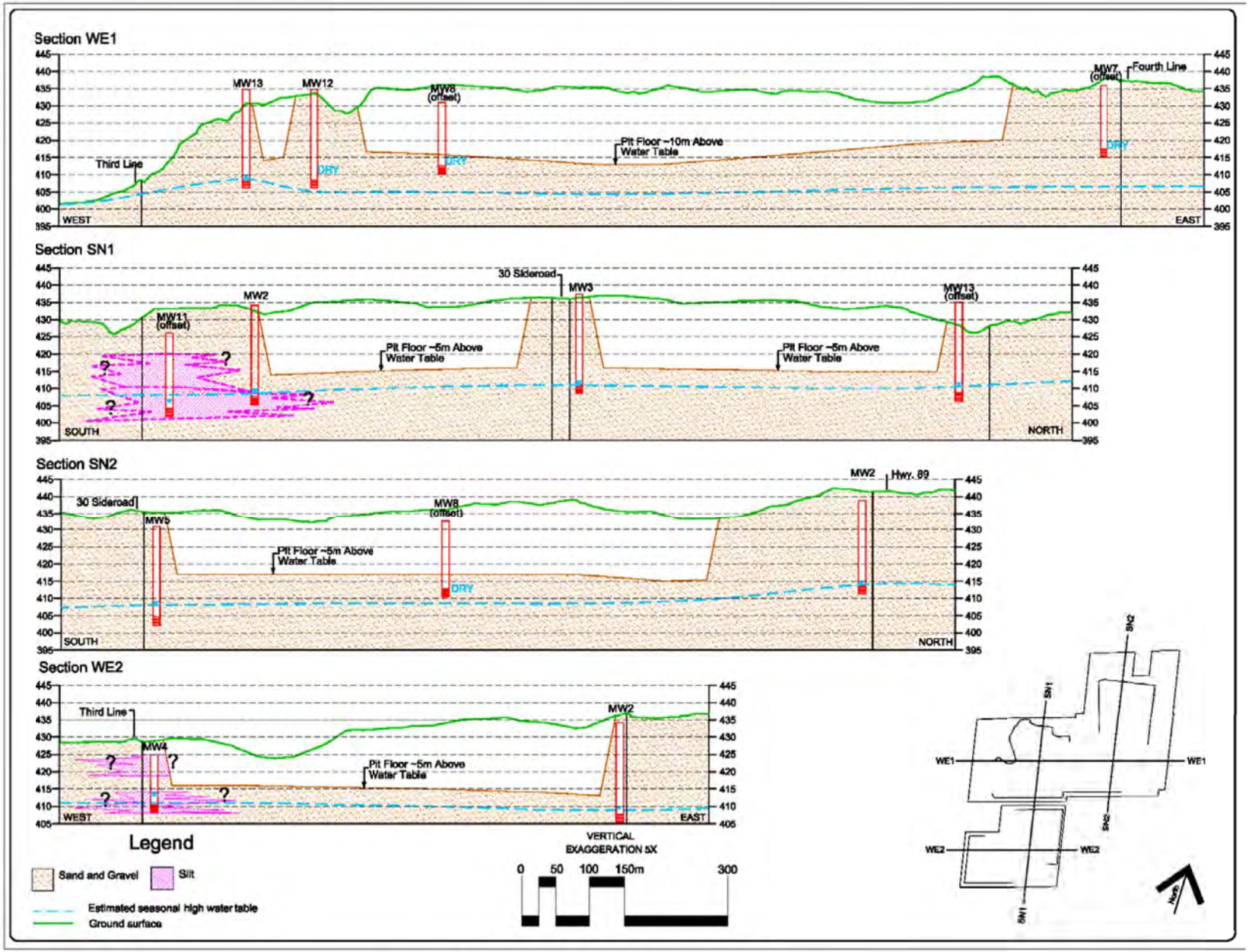


FIGURE 6: LOCAL GEOLOGICAL CROSS-SECTION

4.2 Private Domestic Water Use

The local private water well records are publically available through the MOECC. The MOECC water well database reports that there are 73 domestic water wells located in within 500 m radius of the proposed Violet Hill Pit (Figure 2). The majority of the wells are domestic water supply wells completed in the shale bedrock aquifer. Of the 73 domestic water wells, 13 are reported to be constructed in the water table aquifer. These overburden water wells are summarized in Table 2. A copy of the overburden domestic water well records, where available, are provided in Appendix B.

The specific capacity of a well is the pumping rate divided by the water level drawdown in the well. It is a valuable number that can be used to provide the design pumping rate or maximum yield for the well. In addition, it can be used to identify potential well, pump, or aquifer problems, and accordingly to develop a proper well maintenance schedule. Finally, it provides an estimate of the transmissivity of the aquifer(s) tapped by the well's perforations, which provides an indication of the aquifers hydraulic characteristics as described in Section 2.4.

TABLE 2: DOMESTIC WATER WELL (OVERBURDEN) SUMMARY

Figure 2 ID	MOE No.	Depth (m)	Pumping Rate (m^3/day)	Static Water Level (m)	Pumping Test Drawdown (m)	Specific Capacity	Transmissivity (m^2/day)
DW1	71-00340	55.5	52.4	26.4	3.5	15.0	15.6
DW2	17-03452	65.2	65.5	31.1	23.8	2.8	2.9
DW3	17-04612	67.7	327	38.1	22.8	14.3	14.9
DW4	17-00956	5.5	1.6	1.5	NA	NA	NA
DW5	17-02897	48.5	52.4	38.7	7	7.5	7.8
DW6	17-00491	3.7	13.1	1.8	NA	NA	NA
DW7	17-00515	61	65.5	32.6	10	6.6	6.9
DW8	17-00516	68.6	26.2	39.6	0.6	43.7	45.5
DW9	17-02402	30.2	78.6	20.1	7.3	10.8	11.3
DW10	17-02441	24.4	26.2	NA	NA	NA	NA
DW11	17-02442	45.7	32.7	12.2	15.4	2.1	2.2
DW12	17-05223	59.4	NA	31.1	NA	NA	NA
DW13	17-02360	51.2	52.4	32.0	3.9	13.4	14.0
DW14	71-64717	16.5	32.7	NA	NA	NA	NA

5.0 SOURCE WATER PROTECTION

The Clean Water Act (CWA S.O. 2006, Chapter 22) is a law enacted by the Legislative Assembly of Ontario. The CWA is not designed to protect all of the province's water resources. The Act focuses on sources of water that have been designated by a municipality as being a current or future source of residential municipal drinking water for the community. The OWRA and the Environmental Protection Act and other provincial and federal laws remain the main legislation for protecting the quality and quantity of Ontario's water resources.

The role of the proposed Violet Hill Pit in the context of Source Water Protection (SWP) has been undertaken. Specifically, the potential impacts associated with the extraction of aggregate on municipal water supplies in the study area. The closest municipal water supply is located in the Community of

Rosemont, which obtains its groundwater supply from both the overburden and bedrock aquifer. The proposed Violet Hill Pit is located 5.3 km from the delineated Rosemont Well Head Protection Areas (WHPAs).

Although the proposed Violet Hill Pit is located outside of a municipal WHPA, the assessment has included a review of the groundwater/aquifer vulnerability in the area. This review has been applied to the domestic groundwater wells, which are the primary source of potable water for the local residents. Specifically, Significant Groundwater Recharge Areas (SGRAs) and Highly Vulnerable Aquifers (HVAs), which have been mapped throughout the Town of Mono.

5.1 Significant Groundwater Recharge Areas and Highly Vulnerable Aquifers

Significant Groundwater Recharge Areas (SGRAs) are a type of vulnerable area identified in the Technical Rules (MOE, 2009b) under the CWA (2006). In the Nottawasaga Valley watershed, SGRAs are defined as an area that has an average annual recharge rate that is 15% greater than the average annual recharge rate for the Nottawasaga Valley watershed; and an area that has a hydrological connection to a surface water body or aquifer that is a source of drinking water for a drinking water system. The vulnerability of SGRAs is categorized as high, medium, or low based on their mapped intrinsic susceptibility. This susceptibility of the overburden soil layers are classified based on how readily each transmits water, and the thickness of each is considered. The estimated protective value of each layer is then added to calculate the total susceptibility at any point.

In general, all areas where infiltration occurs are defined as potential recharge areas. However, hydrogeologically, the recharge areas are identified by significant downward vertical gradients. Topographically elevated areas with permeable formations form the principal recharge areas. Based on the local surficial geology and physiography, almost all of the most of the Town of Mono is covered by permeable sand and gravel formations. As such, recharge occurs over a large part of the area. Therefore, it is not unexpected the majority of the Town of Mono, including the subject lands, are delineated as a SGRA in the Approved Nottawasaga Valley Source Water Protection Assessment Report (2015).

Groundwater vulnerability is reported to be "low" at the proposed Violet Hill Pit property, with the exception of limited area along the western property boundary, which is delineated as an area underlain by a Highly Vulnerable Aquifer (HVA) due to the thin unsaturated overburden thickness. The proposed change in land-use from agriculture to aggregate extraction may increase the vulnerability; therefore it is important to assess the threats (if any) associated with an aggregate operation (refer to Section 5.2).

5.2 Source Water Protection and the Aggregate Industry

In response to the CWA, regarding Source Water Protection, the Ontario Stone, Sand and Gravel Association (OSSGA) supported a literature review study by the MNRF to assess the role of the aggregate industry and associated lands in the context of source water programs. The MNRF study (Applied Research on Source Water Protection Issues in the Aggregate Industry; Blackport and Golder, 2006) did not find any documented scientific evidence linking the extraction and processing of stone, sand and gravel as a threat to drinking water sources.

The Province of Ontario has identified 21 prescribed drinking water threats under the CWA (2006). Nineteen of these relate to water quality and two to water quantity. The current land use at the proposed Violet Hill Pit is primarily agriculture, which results in at least 5 potential prescribed drinking water threats. These include:

1. Agricultural source material – application to land
2. Agricultural source material – storage
3. Agricultural source material – management
4. Commercial fertilizer – application
5. Pesticide – application

The proposed change in land use will temporality reduce the number prescribed drinking water threats to only the handling of fuel. An on-site above ground fuel storage tank will be required and will be located outside of the proposed extraction. Aggregate extraction is an interim land-use. Although the proposed final rehabilitation plan for the site is to be returned to agricultural lands, improved best management practices for the use of pesticides and fertilizer may be available at that time and overall threats reduced.

6.0 HYDROGEOLOGICAL ASSESSMENT

6.1 Groundwater Evaluation

Aquifers are natural systems and as a result they have a high degree of variability. The groundwater monitoring program outlined in Section 2.0 resulted in data that have been used to: assess aquifer hydraulic properties and degree of variability; direction of groundwater flow; and to characterize the groundwater chemistry. Having an understanding of these characteristics provides the foundation required for evaluating potential impacts to the groundwater regime.

6.1.1 Hydraulic Properties

a) Hydraulic Conductivity

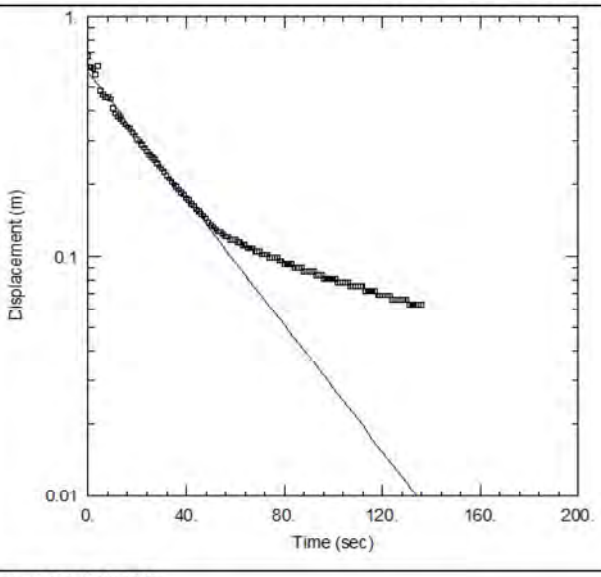
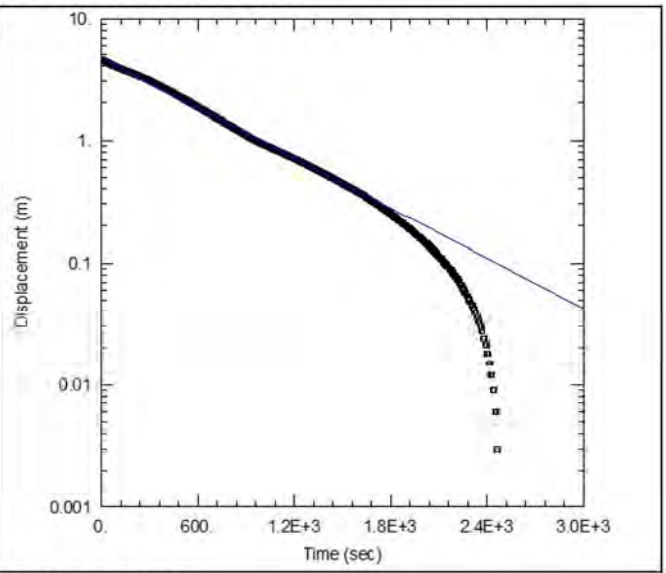
While the dimensions of hydraulic conductivity have the units of velocity (distance divided by time), it is in fact a flux representing a discharge of water per unit area under a hydraulic gradient of 1, with the full units of m^3 /day/m^2. In other words, the volume of water passing through a square cross-sectional area of the aquifer in a given time. It can't be used to describe the rate of groundwater flow on its own without knowledge of the hydraulic gradient, which is the driving force causing water to move.

Bouwer and Rice method (1976) has been used for slug tests at two of the groundwater monitoring wells (MW9 and MW11). The results indicate that at the locations tested, the horizontal hydraulic conductivity ranges between $3.4x10^{-5}$ cm/sec to $1.8x10^{-6}$ cm/sec. According to Freeze and Cherry (1979), the range in hydraulic conductivity is representative of silty sand. The aquifer materials at MW9 are reported to be a fine sand with trace fine stone. The aquifer materials at MW1 are reported to be much finer and described as primarily silt.

An anisotropy ratio relates hydraulic conductivities in different directions. For example, vertical-to-horizontal hydraulic conductivity anisotropy ratio is given by Kv (vertical) /Kh (horizontal). Todd (1980) reports values of Kv/Kh ranging between 0.1 and 0.5 for unconsolidated materials and possibly as low

as 0.01 when clay layers are present. Therefore, a conservative estimate of the range in the vertical hydraulic conductivity for the silty sandy aquifer would be $3.4x10^{-6}$ m/sec to $1.8x10^{-7}$ m/sec (ratio of 0.1).

TABLE 3: SUMMARY OF SLUG TEST RESULTS

	
Test Well: MW9 Horizontal Hydraulic Conductivity (K): $3.4x10^{-5}$ m/sec	Test Well: MW11 Horizontal Hydraulic Conductivity (K): $1.8x10^{-6}$ m/sec

b) Transmissivity

The hydraulic conductivity estimated from the slug testing data and the average aquifer thickness results in transmissivity values ranging between 3.9 m^2/day to 73.4 m^2/day. With the understanding that hydraulic characteristics estimated from slug test data may only be representative of the aquifer conditions in the immediate vicinity of the monitoring well, the results have been compared to the transmissivity values calculated from the specific capacities of the local domestic water wells (constructed in the overburden).

The initial specific capacity determined from the water well records resulted in an aquifer transmissivity which ranges between 2.2 and 45.4 m^2/day (Batu 1998). According to Krasny (1993) the transmissivity values estimated are adequate for local domestic water supplies. It is anticipated that there is considerable variability in the transmissivity of the sediments that make up the water table aquifer and that sources for local supply are limited based on the preference for the water well drillers to target the bedrock aquifer.

6.1.2 Groundwater Elevations

Manual and continuous water level elevation data that have been collected over the 17 month monitoring period are provided in Table 4 and on Figure 7. Groundwater monitoring wells MW1, MW6, MW7, MW8, MW10 and MW12 are reported as dry throughout the year. The continuous water level data collected from the wells constructed into the water table allow for an improved understanding of the water table and it's response to storm and drought conditions.

Water table elevations across the site remain relatively constant, with only a slight seasonal response observed at MW2 and MW3 (Figure 7). The thickness of the unsaturated overburden in the area (between 12.5 m and 27.9 m below ground surface) dampens/limits the water table response to recharge conditions. Large precipitation events and recharge of the spring freshet was generally not measured in the

groundwater monitoring wells. In MW2, water levels in the spring were reported to be 1.45 m higher than the water levels measured in the dry summer months. The remaining wells report a seasonal fluctuation that is less than 1 m. The smallest fluctuation in the water table elevation over the study period was measured at MW4 (0.32 m).

TABLE 4: GROUNDWATER ELEVATIONS (MANUAL)

Date	Manual Water Levels												
	MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13
14-May-14			411.51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12-May-14	<416.45	409.15	412.25	413.72	407.11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16-May-14	<416.45	409.17	411.81	413.71	407.10	<416.35	<415.22	<410.06	N/A	N/A	N/A	N/A	N/A
20-May-14	<416.45	409.33	411.42	413.71	407.14	<416.35	<415.22	<410.06	N/A	N/A	N/A	N/A	N/A
21-May-14	<416.45	409.43	411.45	413.72	407.16	<416.35	<415.22	<410.06	N/A	N/A	N/A	N/A	N/A
22-May-14	<416.45	409.42	411.44	413.72	407.16	<416.35	<415.22	<410.06	413.30	<408.59	N/A	N/A	N/A
23-May-14	<416.45	409.39	411.43	413.71	407.16	<416.35	<415.22	<410.06	413.34	<408.59	407.42	N/A	N/A
28-May-14	<416.45	409.48	411.57	413.65	407.28	<416.35	<415.22	<410.06	413.37	408.69	407.15	N/A	N/A
4-Jun-14	<416.45	409.60	411.66	413.75	407.31	<416.35	<415.22	<410.06	413.44	408.75	406.97	N/A	N/A
10-Jun-14	<416.45	409.52	411.79	413.52	407.35	<416.35	<415.22	<410.06	413.43	408.71	406.60	N/A	N/A
20-Jun-14	<416.45	409.47	411.90	413.35	407.40	<416.35	<415.22	<410.06	413.49	408.73	406.25	N/A	N/A
26-Jun-14	<416.45	409.37	411.98	413.35	407.48	<416.35	<415.22	<410.06	413.49	408.72	406.35	N/A	N/A
16-Jul-14	<416.45	409.05	412.18	413.65	407.49	<416.35	<415.22	<410.06	413.52	<408.59	407.10	N/A	N/A
21-Jul-14	<416.45	409.00	412.21	413.63	407.59	<416.35	<415.22	<410.06	413.55	<408.59	407.10	N/A	N/A
7-Aug-14	<416.45	409.03	412.25	413.65	407.52	<416.35	<415.22	<410.06	413.56	<408.59	407.11	N/A	N/A
14-Aug-14	<416.45	408.87	412.27	413.52	407.53	<416.35	<415.22	<410.06	413.58	<408.59	407.05	N/A	N/A
28-Aug-14	<416.45	408.80	412.23	413.47	407.52	<416.35	<415.22	<410.06	413.61	<408.59	407.01	N/A	N/A
18-Sep-14	<416.45	408.71	412.15	413.39	407.48	<416.35	<415.22	<410.06	413.63	<408.59	406.96	N/A	N/A
23-Sep-14	<416.45	408.43	412.08	413.38	407.48	<416.35	<415.22	<410.06	413.62	<408.59	407.05	N/A	N/A
2-Oct-14	<416.45	408.17	412.06	413.35	407.46	<416.35	<415.22	<410.06	413.64	<408.59	407.14	N/A	N/A
16-Oct-14	<416.45	408.12	412.04	413.31	407.45	<416.35	<415.22	<410.06	413.70	<408.59	406.83	N/A	N/A
17-Nov-14	<416.45	408.00	411.89	413.12	407.38	<416.35	<415.22	<410.06	413.72	<408.59	406.78	410.27	410.04
10-Dec-14	<416.45	407.72	411.70	413.18	407.29	<416.35	<415.22	<410.06	413.66	<408.59	406.50	<407.20	409.88
15-Jan-15	<416.45	407.58	411.53	413.27	407.22	<416.35	<415.22	<410.06	413.63	<408.59	406.40	<407.20	409.86
10-Feb-15	<416.45	407.34	411.35	413.15	407.16	<416.35	<415.22	<410.06	413.55	<408.59	406.30	<407.20	409.71
4-Mar-15	<416.45	407.35	411.32	413.08	407.11	<416.35	<415.22	<410.06	413.56	<408.59	406.53	<407.20	409.71
13-Apr-15	<416.45	407.29	411.24	413.24	407.10	<416.35	<415.22	<410.06	413.54	<408.59	406.36	<407.20	409.76
19-May-15	<416.45	408.53	411.19	413.16	407.12	<416.35	<415.22	<410.06	413.49	<408.59	406.20	<407.20	409.70
5-Jun-15	<416.45	408.40	411.18	413.12	407.14	<416.35	<415.22	<410.06	413.49	<408.59	406.08	<407.20	409.72
6-Jul-15	<416.45	407.89	411.09	413.07	407.08	<416.35	<415.22	<410.06	413.44	<408.59	406.08	<407.20	409.65
5-Aug-15	<416.45	407.46	411.02	413.07	407.05	<416.35	<415.22	<410.06	413.39	<408.59	406.06	<407.20	409.60
14-Sep-15	<416.45	407.19	410.98	413.00	407.03	<416.35	<415.22	<410.06	413.38	<408.59	406.02	<407.20	409.56
2-Oct-15	<416.45	407.09	410.92	412.94	406.97	<416.35	<415.22	<410.06	413.32	<408.59	406.02	<407.20	409.52
2-Nov-15	<416.45	406.95	410.87	412.88	406.92	<416.35	<415.22	<410.06	413.3	<408.59	405.96	<407.20	409.46
3-Dec-15	<416.45	406.83	410.79	412.83	406.85	<416.35	<415.22	<410.06	413.24	<408.59	405.82	<407.20	409.38
21-Jan-16	<416.45	NA	410.69	412.87	406.75	<416.35	<415.22	<410.06	413.22	<408.59	405.80	<407.20	409.29
23-Feb-16	<416.45	406.50	410.60	412.96	406.68	<416.35	<415.22	<410.06	413.18	<408.59	405.54	<407.20	409.29
7-Apr-16	<416.45	406.53	410.52	413.42	406.9	<416.35	<415.22	<410.06	413.14	<408.59	405.87	<407.20	409.25

Notes:

1. All units expressed as meters above sea level (masl)
2. < = water table is below the base of the well (well was measured as dry)
3. N/A = not available (groundwater monitoring well was not constructed at time of water level measurement)

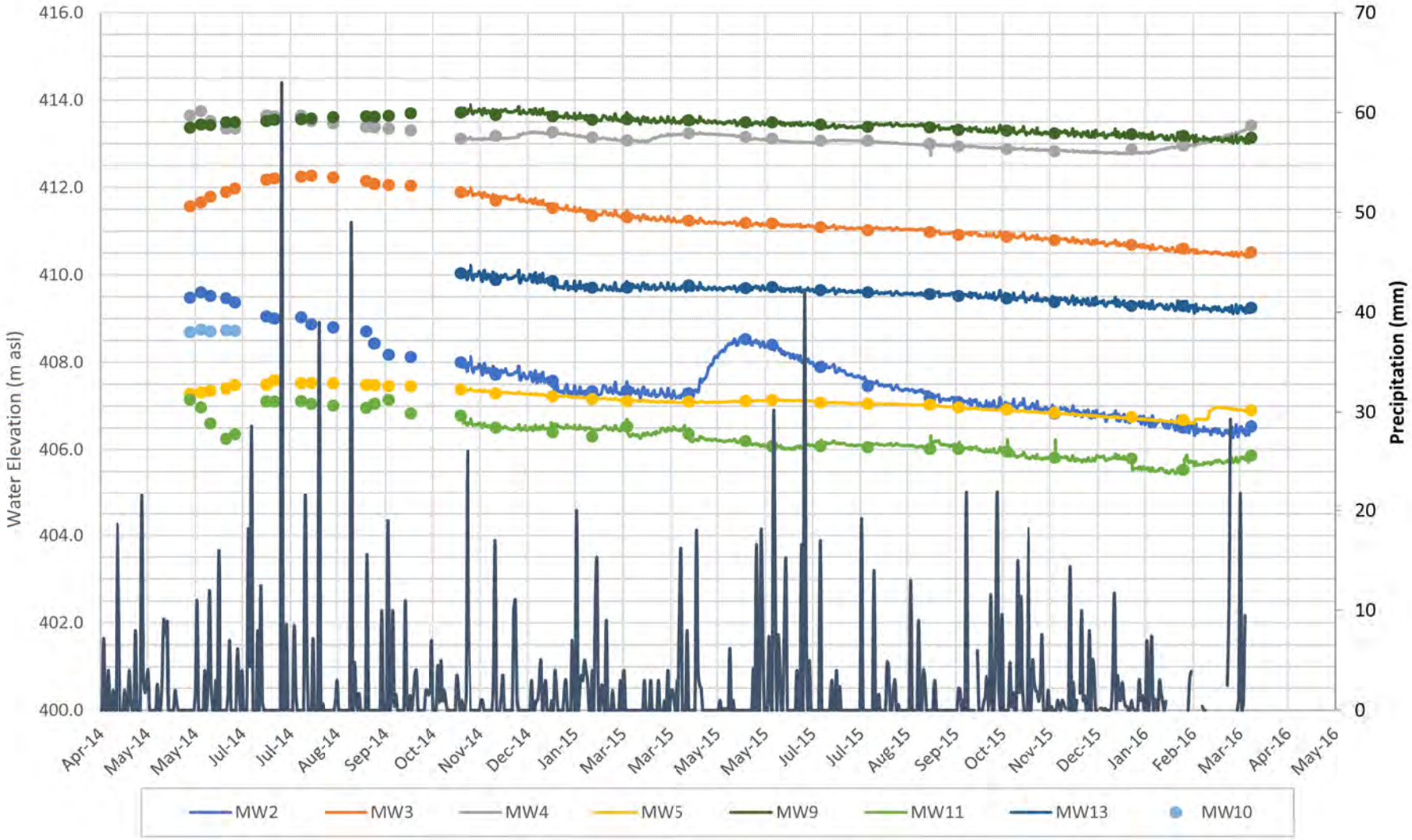


FIGURE 7: GROUNDWATER HYDROGRAPH

6.1.3 *Groundwater Flow*

In an aquifer, groundwater flows from points of higher pressure to points of lower pressure, and the direction of groundwater flow typically has both a horizontal and a vertical component. The slope of the water table is known as the hydraulic gradient (horizontal component), which depends on the rate at which water is added to and removed from the aquifer and the permeability of the material. The slope of the water table reflects the surface relief due to the capillary effect in soils, sediments and other porous media.

Although the regional groundwater flow pattern is eastward (Burnside 2001), the local groundwater flow shows a subdued replica of the land surface topography with a minor flow components towards the south. The local groundwater flow pattern is presented on Figure 8. .

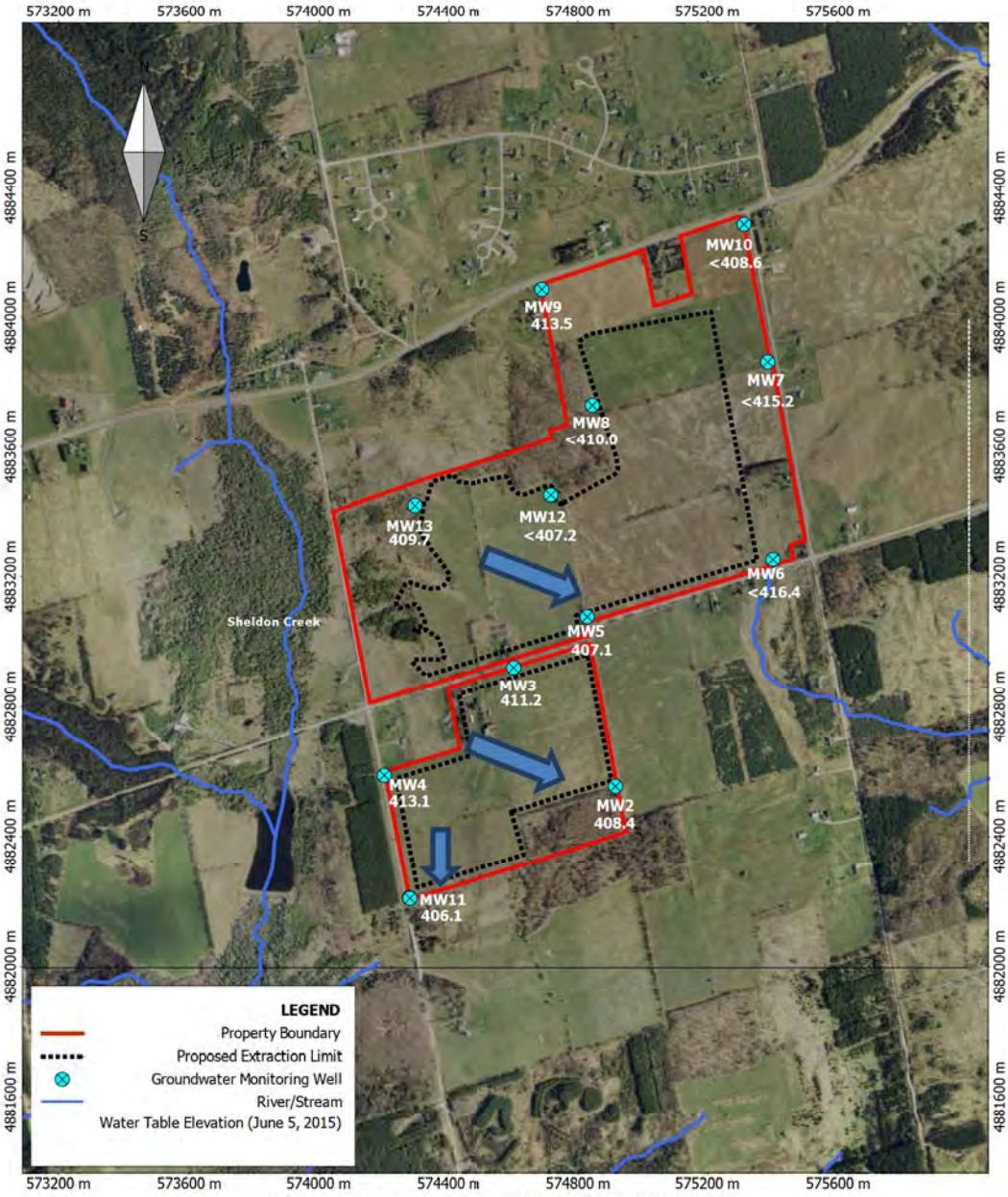


FIGURE 8: GROUNDWATER FLOW DIRECTION

6.1.4 *Background Groundwater Quality*

The water quality results for selected parameters from the on-site groundwater monitoring wells are summarized in Table 5. Copies of the laboratory reports are provided in Appendix C.

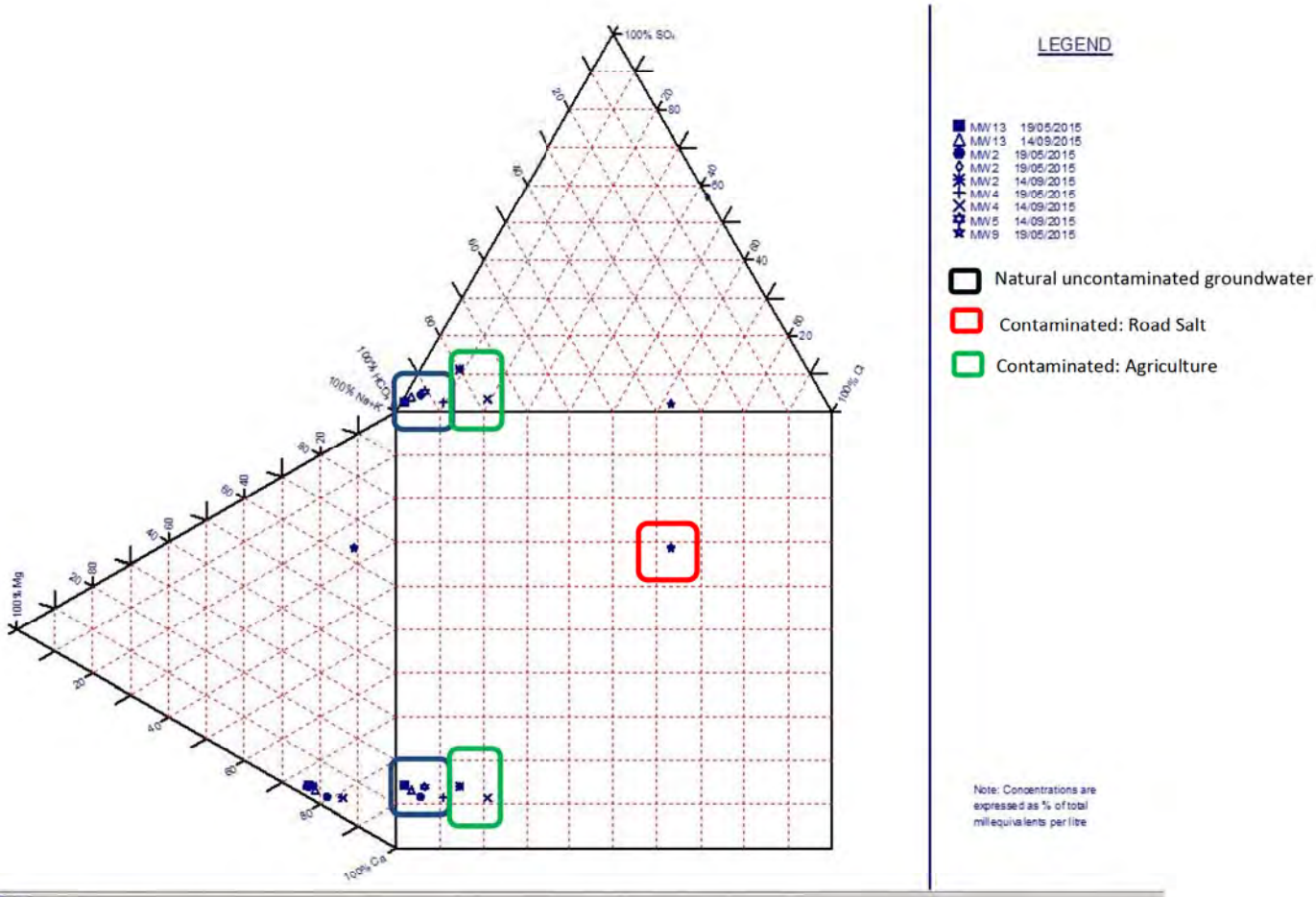
TABLE 5: SUMMARY OF GENERAL WATER QUALITY

Parameter	Units	ODWS	MW 2		MW 4		MW 9	MW5	MW 13	
			May-15	Sep-15	May-15	Sep-15	May-15	Sep-15	May-15	Sep-15
pH	pH		7.85	7.95	7.76	7.74	7.92	7.98	8.06	7.96
Bicarbonate	mg/L		246	266	272	284	352	286	223	228
Carbonate	mg/L		1.6	2.2	1.5	1.5	2.8	2.6	2.4	2
Conductivity	µS/cm		530	559	585	719	1830	552	398	409
Total Hardness	mg/L	100	228	314	254	410	291	322	173	228
Ammonia (as N)	mg/L		0.029	0.11	<	0.1	0.021	0.11	0.058	0.084
Nitrate (as N)	mg/L	10	7.16	12.2	7.08	7.48	2.76	3.88	0.375	0.58
Nitrite (as N)	mg/L	1	<	<	0.177	<	<	<	<	<
Calcium	mg/L		74.2	97.3	86.6	140	81.5	98	52.8	71.2
Chloride	mg/L	250	6.34	21	20.8	50	434	8.58	1.18	2.5
Magnesium	mg/L		10.3	17.2	9.22	14.6	21.2	18.8	9.97	12.1
Potassium	mg/L		1.34	2.34	1.63	2.63	1.58	1.56	0.974	1.12
Sodium	mg/L	20	1.94	3.31	4.35	7.14	227	2.48	1.69	2.08
Sulphate	mg/L	500	11.6	35.8	7.71	12	19.7	16.4	5.75	9.36
Phosphorus	mg/L		<	1.85	<	2.88	<	0.484	<	0.212

Generally, the water quality is typical of groundwater from overburden aquifers in southern Ontario. The major ions in groundwater are sodium, magnesium, calcium, chloride, bicarbonate, and sulphate. The total concentration of these six major ions normally comprises more than 90 % of the total dissolved solids in groundwater. The chemical signature of water begins to change as if flows from areas of groundwater recharge to areas of groundwater discharge. The groundwater composition changes progressively along the flow path towards the composition of seawater (Chebotarev Sequence). The dominant ion in the groundwater correlates with distance along the flow path and residence time or age of the groundwater.

Durov diagrams (Durov, 1948) can be used to classify water types by their major ion composition. Natural waters and the evolutionary sequence described by Chebotarev (1955) has been classified into four water types by Howard and Beck (1986). These water types represent the elements of the Chebotarev Sequence. The dominant water type found at the proposed Violet Hill Pit are strongly calcium bicarbonate in character which is typical of natural (uncontaminated) groundwater in southern Ontario. The sequence evolved as the relative proportion of sodium increases, as a result of cation exchange with calcium. During this evolutionary process, groundwater exhibits only a slight increase in chloride. Deviations from this evolutionary path are explained by contamination as a result of chemicals used in agricultural and rural/urban environments. These waters plot with increasing chloride and sodium.

Generally, the groundwater from the overburden aquifer is strongly calcium bicarbonate in character, typical of natural (uncontaminated) young/shallow groundwater (Figure 9). The groundwater signature from MW2, MW4, and MW9 deviate from the natural evolutionary path. MW9 has elevated concentrations of sodium and chloride (Table 5 and Figure 9). This well is located in proximity to Highway 89 and appears to be contaminated by road salt. The remaining wells (MW2 and MW4) may be influenced by local farming practices.



Sample Name and Date	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	K (mg/L)	Cl (mg/L)	SO4 (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	SO4 (meq/L)	HCO3 (meq/L)	CO3 (meq/L)	Ca (%)	Mg (%)	Na+K (%)	Cl (%)	SO4 (%)	HCO3 +CO3 (%)
MW13 19/05/2015	52.80	9.970	1.690	0.974	1.180	5.750	223.0	2.400	2.635	0.820	0.074	0.025	0.033	0.120	4.456	0.000	74.1	23.1	2.77	0.72	2.69	96.7
MW13 14/09/2015	71.20	12.10	2.080	1.120	2.500	9.360	228.0	2.000	3.553	0.995	0.090	0.029	0.071	0.195	4.556	0.000	76.1	21.3	2.55	1.46	4.04	94.5
MW2 19/05/2015	74.20	10.30	1.940	1.340	6.365	11.45	246.0	1.600	3.703	0.847	0.084	0.034	0.180	0.238	4.916	0.000	79.3	18.2	2.54	3.37	4.47	92.2
MW2 14/09/2015	97.30	17.20	3.310	2.340	21.00	35.80	266.0	2.200	4.855	1.415	0.144	0.060	0.592	0.745	5.315	0.000	75.0	21.9	3.15	8.90	11.2	79.9
MW4 15/05/2015	86.60	9.220	4.350	1.630	20.80	7.710	272.0	1.500	4.321	0.759	0.189	0.042	0.587	0.161	5.435	0.000	81.4	14.3	4.35	9.49	2.60	87.9
MW4 14/09/2015	140.0	14.60	7.140	2.630	50.00	12.00	284.0	1.500	6.986	1.201	0.311	0.067	1.411	0.250	5.675	0.000	81.6	14.0	4.41	19.2	3.41	77.4
MW5 14/09/2015	98.00	18.80	2.480	1.560	8.580	16.40	286.0	2.600	4.890	1.547	0.108	0.040	0.242	0.341	5.715	0.000	74.3	23.5	2.24	3.84	5.42	90.7
MW9 19/05/2015	81.50	21.20	227.0	1.580	434.0	19.70	352.0	2.800	4.067	1.744	9.875	0.040	12.24	0.410	7.034	0.000	25.9	11.1	63.0	62.2	2.08	35.7

FIGURE 9: DUROV DIAMGRAM

Nitrate concentrations in the groundwater are elevated at the site and exceed the ODWS of 10 mg/L at MW2 (12.2 mg/L). Nitrate in groundwater which is relied upon as a potable water supply is of concern because private domestic water wells are not provincially regulated. It is the owner's responsibility to test and treat their own well for nitrate and other pollutants. While nitrate does occur naturally in groundwater, concentrations greater than 3 mg/L generally indicate contamination (Madison and Brunett, 1985), and a more recent nationwide study found that concentrations over 1 mg/L nitrate indicate human activity (Dubrovsky et al. 2010).

The nitrate found in the on-site monitoring wells are at a level that is likely anthropogenic. Agricultural land use and the overuse of chemical fertilizers are a major source of nitrates, which can infiltrate the groundwater system and are most likely the source of the nitrate in the overburden aquifer.

Total hardness concentrations exceed the ODWS at all locations monitored. Hardness is naturally occurring and commonly elevated in groundwater sources in Ontario.

7.0 IMPACT ASSESSMENT

When completing an impact assessment that will be relied upon for making decisions regarding risk of a proposed above water gravel pit, there are often multiple lines of evidence that need to be considered. The baseline data collected as part of the Combined Level 1 and 2 Hydrogeological Assessment have been generated and gathered from different sources as presented in Section 6.0. By combining data from these sources, a comprehensive groundwater impact assessment was completed.

The most common and effective approach for determine potential impacts to the groundwater system is through the water balance method. Changes to the water balance components can alter groundwater levels and its interaction with surface water features, such as streams and wetlands.

7.1 Water Balance

The water balance is a quantitative expression that describes the relationship between inflows (into) and outflows (out of) a hydrogeology system over a specified time period. The basic concept is simply a conservation of mass. The parameters involved depend on the nature and scale of the system of interest. For the proposed Violet Hill Pit, a water balance analysis was required to estimate the pre-development and post-development infiltration and runoff components. The Nottawasaga Valley Conservation Authority have policies related to maintaining groundwater infiltration. The maintenance of pre-development recharge is a general requirement of the Provincial Policy Statement that is often captured in municipal Official Plans.

The purpose of the water balance analysis is to reasonably estimate the current infiltration rates to the groundwater and to then determine how much this rate will change as a result of the proposed future land use. It is recognized that site specific water budgets are difficult to accurately estimate, therefore goal was to assess the difference between pre-development and post-development infiltration conditions. If there is a decrease infiltration, mitigation measures would be required to maintain or enhance groundwater recharge.

Recharge is highly dependent on the soil properties that control evapotranspiration (ET) and soil moisture retention such as: the soil zone thickness; field capacity; and wilting point. Due to the highly permeable nature of the sand and gravel surficial deposits and the topographic relief, recharge is a dominant component of the water budget at this site. Pre-development infiltration factors are estimated based on site topography, vegetation cover and soil type.

The data provided is an annual water budget summary (Thornwaite and Mather, 1957) based on daily climate data collected by Environment Canada at the Orangeville Climate Station (No.: 6155790). The period of record is from 1963 to 2005. The water surplus was calculated using a monthly water-balance model driven by a graphical user interface, referred to as the Thornthwaite monthly water-balance program, which was developed by the U.S. Geological Survey (McCabe, G.J., and Markstrom, S.L., 2007). Computations of monthly water-balance components of the hydrologic cycle are made for a specified location, such as the proposed Violet Hill Pit. Inputs to the model are monthly temperature and precipitation. Outputs include

monthly potential and actual ET, soil moisture storage, snow storage, surplus, and runoff (Appendix D). The mean annual precipitation for the area is 890 mm, with a mean water surplus of 390 mm.

Infiltration factors are used to determine the fraction of water surplus that infiltrates into the ground and the fraction that runs off to nearby streams. Infiltration rates were estimated using the method from the MTO Stormwater Management Planning and Design Manual (March 2003). In general, hummocky lands promote infiltration as do higher permeable soils. The estimated infiltration factor (IF) based on the existing site characteristics is 0.7, which relates to an average infiltration rate of 273 mm/year. This infiltration rate has been applied to the areas that do not drain internally to Basins A, B, C, or D (Figure 3). Recharge within these internally drained basins will be equal to the mean water surplus (390 mm/year). Therefore the total annual groundwater recharge across the site is approximately 292,363 m^3. A summary of the pre-development infiltration rates and total volume of water recharging the groundwater regime is provided in Table 6.

TABLE 6: PRE-DEVELOPMENT INFILTRATION RATES

Development Scenario	Drainage Area (m^2)	Infiltration Rate (m/year)	Volume of Groundwater Recharge (m^3)
Pre-Development Infiltration			
Internally Drained Area	480,500	0.390	187,395
Remaining Area	384,500	0.273	104,968
Total	**865,000**		**292,363**

As aggregate is extracted, the flattening of the pit floor promotes infiltration as the average land slope lessens and the highly permeable materials are exposed (vegetation and topsoil removed). Furthermore, the pit itself creates an internally drained system. Therefore, post-development, the groundwater infiltration within the extraction area will be equivalent to the water surplus value of 390 mm/year. Therefore the total annual groundwater recharge across the site is approximately 337,350 m^3. A summary of the pre-development infiltration rates and total volume of water recharging the groundwater regime is provided in Table 6

TABLE 7: POST-DEVELOPMENT INFILTRATION RATES

Development Scenario	Drainage Area (m^2)	Infiltration Rate (m/year)	Volume of Groundwater Recharge (m^3)
Post-Development Infiltration			
Internally Drained Area	865,000	0.390	337,350
Remaining Area	0	0	0
Total	**865,000**		**337,350**

Based on this assessment, the proposed Violet Hill Pit will enhance groundwater recharge across the pit floor by 13% (or 44,987 m^3).

The increase in groundwater recharge is a positive outcome of the water balance assessment. As noted above, the primary concern with certain development applications is the potential for a reduction in groundwater recharge and ensuring that there are mitigation measures in place to maintain or enhance groundwater infiltration.

7.2 Potential Interference with Local Groundwater Regime

The proposed extraction of aggregate will occur at an elevation of at least 5 m above the established high water table elevation. As discussed in Section 7.1, the permeable materials on the pit floor will allow for groundwater to recharge at an enhanced rate of an average of 390 mm/year. Therefore, pit operations will not require a water management program to divert or control incidental waters entering the pit area. Furthermore, no pit dewatering will be required.

As extraction occurs, the unsaturated thickness of the overburden material will be reduced from an average of 40 m to approximately 5 m. Although the unsaturated thickness will be reduced, Greenwood has proposed an increased buffer of 3.5 m from the maximum 1.5 m above the water table required under the ARA (1.5 to 5.0 m). This added thickness will increase the attenuation zone and reduce the vulnerability of the aquifer.

As part of the operations at the proposed Violet Hill Pit, aggregate will be washed in a lined closed-loop system designed to limit leakage from the settling and wash ponds. Once full, the water in these ponds will be recirculated through the system. Water lost throw the process (evaporation and retention on product) is conservatively estimated to be approximately 10% of the water used in the processing. A typical wash plant operates at 4 m^3/min for a period of 10 hours on the days washing occurs (2,400 m^3/day). Therefore, the estimated water loss would be approximately 240 m^3/day. This water would be drawn from a groundwater well.

Theis (1935) non-equilibrium method has been used to assess the potential impacts associated with the proposed water taking from the unconfined aquifer. Using the average hydraulic properties of the aquifer, the estimated volume of water to be replenished on the days washing occurs is 240 m^3. To minimize the influence, a pumping rate of 0.4 m^3/min for a period of 10 hours was used to determine the potential impacts from the daily withdrawal of the required make-up water. The results indicate that the cone of influence from the pumping would extend approximately 30 m and would result in a drawdown of 11.3 m at the wellhead.

The detailed analysis for the potential future water taking will be completed as part of the OWRA PTTW application, if the ARA license is granted.

7.3 Potential Interference with Groundwater Resources: Domestic Water Wells

The water balance assessment indicates that there will be a slight increase in groundwater recharge at the site as a result of the extraction of aggregate. Furthermore, based on the site hydraulic characteristics, potential future water taking for the purpose of supplying make up water to the washing facility will not result in any off-site influence to the groundwater elevations. The limited pumping (10% of the wash plant capacity) would create a drawdown radius from the wellhead of approximately 30 m. Therefore, there are no foreseen impacts associated with the operation of the proposed Violet Hill Pit on the local private groundwater wells. Regardless, a precautionary approach is proposed to monitor selected private water wells within a 500 m radius.

It is proposed that a door-to-door domestic water well survey be completed within the 500 m radius to confirm the findings of the desk top survey of the MOECC water well record database. The MOECC database indicates that 14 of 73 wells domestic water wells that obtain groundwater from the overburden aquifer. It

is proposed that a selected number of representative wells be chosen for inclusion in the groundwater monitoring program (if permission is granted by the home owner). The intent of this program is to document the baseline conditions (water quantity and water quality) and monitor these conditions during the operation and rehabilitation stages. This program would allow for early detection of any unforeseen influences associated with the aggregate operation and provide data to assist in the assessment of any potential water well interference complaints.

7.4 Potential Interference with Surface Water Features

Local surface water features include Sheldon Creek and the Violet hill Wetland located immediately to the west of the proposed Violet Hill Pit. The water balance analysis concluded that the majority of the water surplus from within the proposed extraction area (are to be disturbed) entered the groundwater system either as direct recharge (internally drained basins) or infiltrated along the runoff flow path. This is supported by the observation that there is no surface water features on-site (intermittent streams, creeks, springs, or wetlands).

Infiltration across the subject property recharges the overburden aquifer and becomes a part of the local groundwater flow system. The primary groundwater flow direction is eastward, with a minor westerly and southerly component towards Sheldon Creek. Based on the findings of the water balance assessment, groundwater recharge may increase by approximately 14%. The slight increase in infiltration will be dispersed into the overburden aquifer resulting in very slight increases to no measurable changes in water levels at the site. If the local groundwater conditions are not being influenced, then there will be no impacts to the local surface water systems.

8.0 MITIGATION MEASURES

Although there are no anticipated impacts associated with the proposed extraction of aggregate, which will occur at least 5 m above the established water table, there are preventative operational practices that are recommended to further protect groundwater quality:

- Refueling of machinery should not be conducted in areas of the excavation that are within 5 m of the water table (i.e., on the pit floor).
- No chemical spray (pesticide/herbicide) should be used in areas of the excavation.
- An access/egress route/road should be maintained greater than 1.0 m above the maximum proposed depth in the excavation areas.
- Operator training should include understanding and implementing the preventative measures provided above, in addition to Greenwood Aggregates corporate Spill Contingency Plan.

9.0 RECOMMENDED COMPLIANCE MONITORING PROGRAM

1. Manual water levels shall be completed monthly at all on-site groundwater monitoring wells between March and November of each operating year.
2. Continuous water levels and temperatures shall be collected at groundwater monitoring wells MW2, MW5, MW11, and MW13 between March and November of each operating year.

3. A selection of representative domestic water wells located within 500 m of the extraction area should be included in the groundwater monitoring program if they meet the selection criteria, which includes: wells are in compliance with Ontario Regulation 903 (as amended), are accessible, and constructed in the overburden aquifer. Prior to operations, water samples shall be collected from the participating domestic water wells and analyzed for general chemistry, major anions, oil and grease, and bacteria. Subsequent samples should be collected and analyzed on an annual basis at the end of the operational season (late fall). Continuous water levels should be collected from each domestic well and the data retrieved on a semi-annual basis.
4. An annual report summarizing the findings of the groundwater monitoring program for the operational season shall be prepared and submitted to the MNRF by June 1st of the following year.

10.0 CONCLUSIONS

1. The proposed Violet Hill Pit property was investigated to determine the feasible of the extraction of aggregate from above the water table. The proposed Violet Hill will extract aggregate from a minimum of 5 m from above the established water table.
2. There will be no water diversion or dewatering to maintain dry pit operating conditions at the subject lands.
3. The proposed operations will have an on-site washing facility. This will include a lined closed loop system which recycle water in ponds perched above the water table. Water that is lost through evaporation and retention to the product will be made up by pumping a groundwater well.
4. A PTTW will be obtained to allow for the taking from a groundwater well for the purpose of aggregate washing, if the ARA license is granted. The PTTW application and review process is completed under the OWRA and the MOECC.
5. Since the proposed aggregate operation will not be extracting from below the water table, there will be no influence on the water table aquifer. As a result, there will be no influence of the operations on the domestic water wells in the vicinity of the proposed Violet Hill Pit.

Based on the understanding of the groundwater and surface water regimes, it is of the professional opinion that no adverse impacts will occur as a result of the above water extraction.

Tecia White, M.Sc., P.Geo.
Senior Hydrogeologist / President
Whitewater Hydrogeology Ltd.

11.0 REFERENCES

Batu, V., 1998.
Aquifer Hydraulics: A Comprehensive Guide to Hydrogeologic Data Analysis, John Wiley & Sons, New York, 727p

Blackport Hydrogeology and Golder Associates, 2006.
Applied Research on Source Water Protection Issues in the Aggregate Industry. Technical report prepared for the Ontario Ministry of Natural Resources and Forestry

Bouwer, H. and R.C. Rice, 1976.
A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428

Burnside and Waterloo Hydrogeologic, 2001.
Town of Shelburne: Groundwater Management Study.

Chapman, L.J., and Putman, D.F., 1984.
The Physiography of southern Ontario. 3rd Edition. Ontario Geological Survey, Special Volume 2.

Chebotarev, I. I. 1955.
Metamorphism of natural waters in the crust of weathering. Geochimica et Cosmochimica Acta, Vol. 8, 22-48, 137-170, 198-212.

Cowan, W.R., and Sharpe, D.R., 1973: Quaternary Geology of the Orangeville Area,
Southern Ontario; Ontario Div. Mines, Prelim. Map P.848, Geol. Ser., scale 1:50,000. Geology 1971, 1972.

Dubrovsky, N.M., Burow, K.R., Clark, G.M., Gronberg, J.M., Hamilton P.A., Hitt, K.J., Mueller, D.K., Munn, M.D., Nolan, B.T. Puckett, L.J., Rupert, M.G., Short, T.M., Spahr, N.E., Sprague, L.A., and Wilber, W.G. 2010.
The quality of our Nation's waters—Nutrients in the Nation's streams and groundwater, 1992–2004: U.S. Geological Survey Circular 1350

Dreimanis, A., and Karrow, P. F., 1972.
Glacial history of the Great Lakes–St. Lawrence region, the classification of the Wisconsin(an) Stage, and its correlatives. In "24th International Geological Congress," Section 12

Earthfx Incorporated, 2015,
Wellhead Protection Area Delineation, Vulnerability Scoring, and Threats Assessment in the Town of Shelburne, Ontario: prepared for the Grand River Conservation Authority on behalf of the Lake Erie Source Protection Region, May 2015.

Freeze, R.A., and Cherry, J.A., 1979,
Groundwater: Englewood Cliffs, NJ, Prentice-Hall, 604 p

Geological Investigations, 2015.
Aggregate Investigation. Prepared for Greenwood Construction Company Limited.

Golder Associates, 2006.
Water Consumption Study completed for the Ontario Stone, Sand, and Gravel Association.

Gwyn, Q.H.J., 1975.
Quaternary Geology of the Dundalk Area, Southern Ontario; Ontario Div. Mines OFR 5132, 138p., 22 tables, 14 figures, 4 maps.

Howard, K.W.F., and Beck, 1986.
Hydrochemical interpretation of groundwater flow systems in Quaternary sediment of southern Ontario. Can. J. of Earth Sci., vol 23, pp 938-947.

Krásný, J. 1993.
Classification of Transmissivity Magnitude and Variation. Groundwater, 31: 230–236

Madison, R.J. and Brunett, J.O. 1985.
Overview of the occurrence of nitrate in ground water of the United States, in National Water Summary 1984-Hydrologic Events, Selected Water-Quality Trends, and Ground-Water Resources: U.S. Geological Survey Water-Supply Paper 2275, pp. 93-105.

McCabe, G.J., and Markstrom, S.L., 2007.
A monthly water-balance model driven by a graphical user interface: U.S. Geological Survey Open-File report 2007-1088, 6 p.

Ministry of the Environment, 2002.
Ontario Regulation 169/03, Ontario Drinking Water Quality Standards. Safe Drinking Water Act, 2002.

Ministry of the Environment, 2003.
Stormwater Management Planning and Design Manual

Ministry of the Environment, 2008.
Tables of Drinking Water Threats. Clean Water Act, 2006. Part X.

Ministry of the Environment, 2009.
Technical Rules: Assessment Report. Clean Water Act, 2006. Part X.

Ministry of the Environment, 2015
Well Record Data (date modified June, 2015)

Nottawasaga Valley Conservation Authority, 2015.

Source Water Protection Assessment Report. Approved Assessment Report: Nottawasaga Valley Source Protection Area

Rollings Hyland Consulting, 2015
Site Plans for the Proposed Violet Hill Pit

Theis, C.V., 1935.
The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16, pp. 519-524.

Thornthwaite, C.W. and J.R. Mather, 1957.
Instructions and Table for Computing Potential Evapotranspiration and the Water Balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, Number 3, Centerton, New Jersey.

APPENDIX A

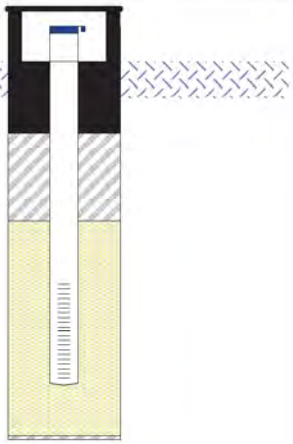
BOREHOLE RECORDS

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW1

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
-2	428			
0	426		TOP SOIL	
2	424		SAND: fine to medium, fine stones (maximum diameter 7 cm), dry	
4	422		SAND: coarse, fine stone with maximum diameter of 7 cm, dry	
6	420		SAND: Fine to medium, trace fine stones with maximum diameter of 5 cm	
8	418		SILT and CLAY: damp, grey, no stones	
10	416			
12	414			
14	412			
16	410			
18	408			
20	406			
22	404			
24	402			
26	400			
28	398			
30	396			



Drilling Date: May 12, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574278
Northing: 4882209

Greenwood

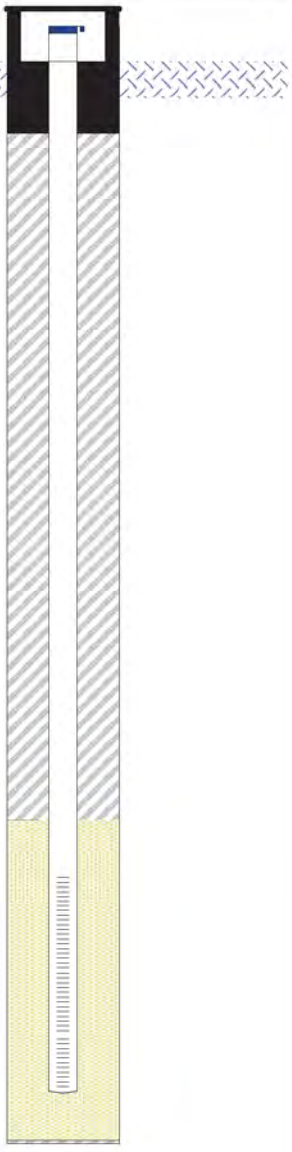
Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW2

Depth (m)	Elevation (masl)	Lithology	Lithology Description
-2	436		
0	434		TOP SOIL
2	432		
4	430		
6	428		
8	426		
10	424		
12	422		SAND: fine to medium with some coars, trace fine stone with maximum diameter of 7.5 cm
14	420		
16	418		
18	416		
20	414		
22	412		
24	410		
26	408		SAND: fine to medium with some silt and clay, dirty, damp
28	406		SILT and CLAY: damp, grey, trace stones
30	404		

Well Construction Diagram



Drilling Date: May 12, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574916
Northing: 4882552

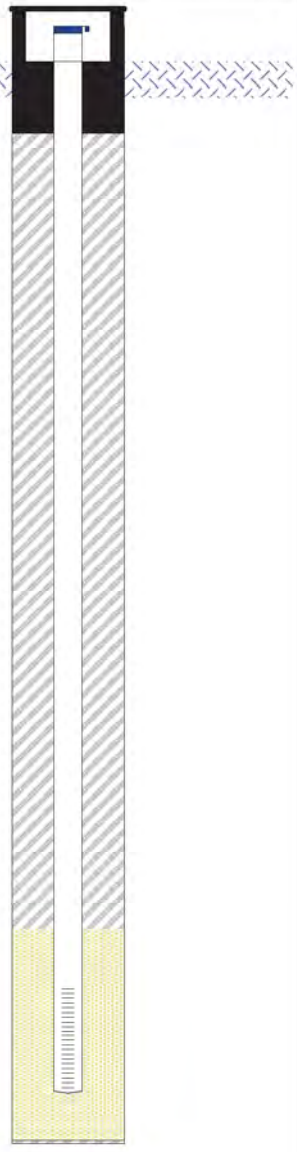
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW3

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
-2	438			
0	436		TOP SOIL	
2	434			
4	432			
6	430		SAND: fine to medium with some coarse, up to 15% fine stone with maximum diameter of 7.5 cm, clean, dry	
8	428			
10	426			
12	424			
14	422			
16	420			
18	418		SAND: fine clean, dry	
20	416			
22	414			
24	412		SAND: fine, strace fine stone, dirty	
26	410			
28	408			
30	406			



Drilling Date: May 13, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574605
Northing: 4882923

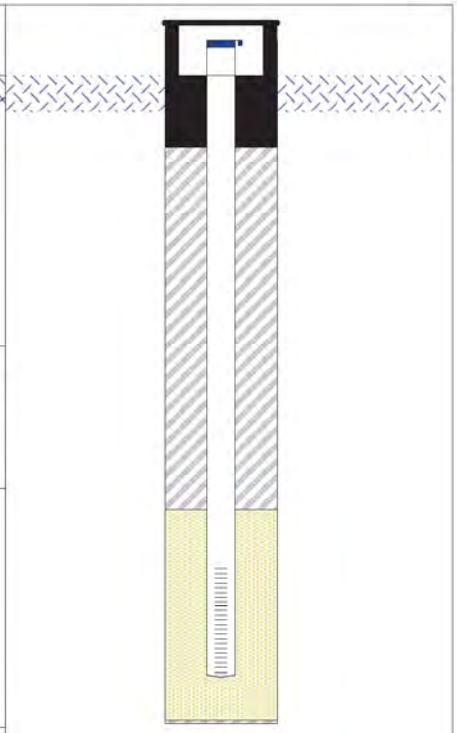
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW4

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
-2 to 0	426 to 424		TOP SOIL	
0 to 8	424 to 418		SILT: with sand and clay, some stones, dirty, damp, soft	
8 to 12	418 to 414		SAND: fine to medium with some coarse, up to 20% fine stone with maximum diameter of 7.5 cm, dirty, dry	
12 to 18	414 to 408		SILT: sandy, some fine stone, wet	
18 to 30	408 to 396			



Drilling Date: May 14, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574202
Northing: 4882588

Greenwood

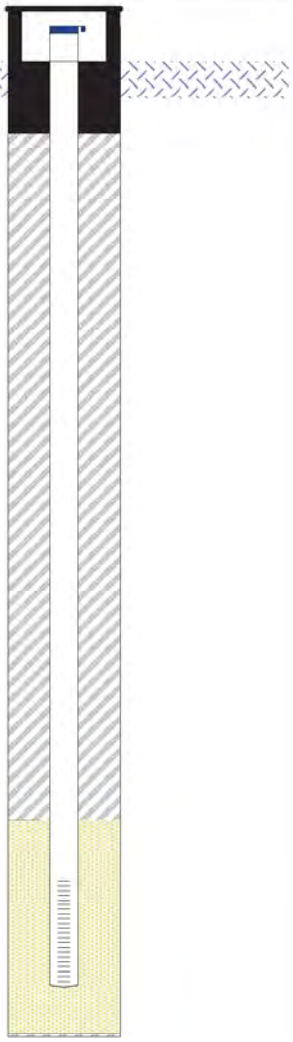
Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW5

Depth (m)	Elevation (masl)	Lithology	Lithology Description
-2	432		
0	430		TOP SOIL
2	428		SILT: with sand and clay, some stones, dirty, damp, soft
4	426		
6	424		
8	422		
10	420		
12	418		
14	416		SAND: fine with some medium, some fine stones, clean, wet below 25.9 m
16	414		
18	412		
20	410		
22	408		
24	406		
26	404		
28	402		
30	400		

Well Construction Diagram



Drilling Date: May 14, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574829
Northing: 4883076

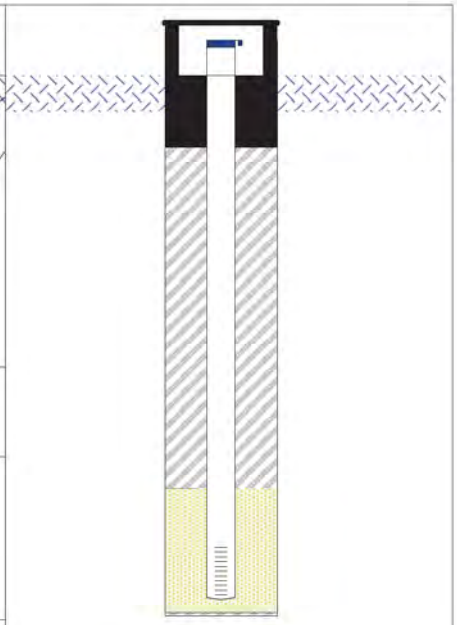
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW6

Depth (m)	Elevation (masl)	Lithology	Lithology Description
0	432		TOP SOIL
2	430		SILT: with sand and clay, some stones, dirty, damp, soft
4	428		SAND: medium to fine, up to 30% stone content, dry
6	426		
8	424		
10	422		SILT: with some clay, wet
12	420		SAND: silty, wet
14	418		
16	416		
18	414		
20	412		
22	410		
24	408		
26	406		
28	404		
30	402		



Well Construction Diagram

Drilling Date: May 15, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 575400
Northing: 4883252

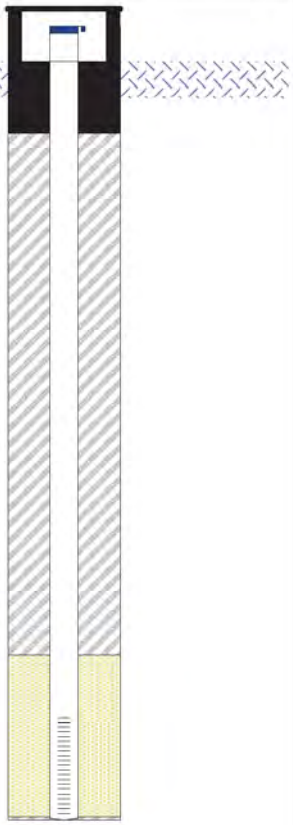
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW7

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
-2	438			
0	436		TOP SOIL	
2	434			
4	432		SAND: silty, sampe to wet, trace stones	
6	430			
8	428			
10	426			
12	424		SAND: fine, trace fine stones, damp to wet	
14	422			
16	420		SAND: medium to coarse, trace fine stone, damp to wet	
18	418			
20	416		SAND: fine, trace fine stone	
22	414			
24	412			
26	410			
28	408			
30	406			



Drilling Date: May 16, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 575385
Northing: 4883816

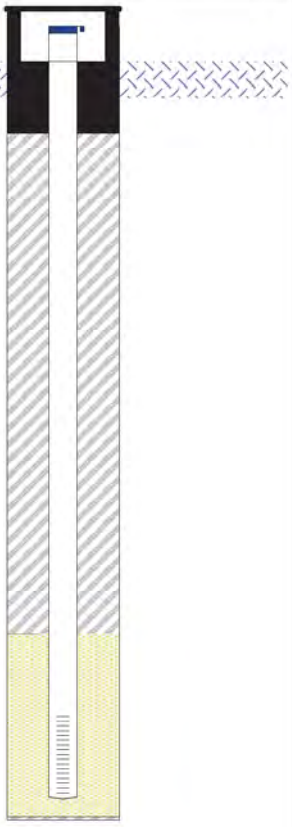
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW8

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
0	432			
2	430		TOP SOIL	
4	428		SILT: with some and and clay, wet to damp, alluvium	
6	426		SAND: fine, some silt and clay	
8	424			
10	422			
12	420		SAND: fine to medium, 20% fine stone up to 13 cm in diameter, dirty	
14	418			
16	416			
18	414			
20	412		SAND: medium to coarse, trace fine stones, saturated	
22	410			
24	408			
26	406			
28	404			
30	402			
	400			



Drilling Date: May 20, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574844
Northing: 4883730

Greenwood

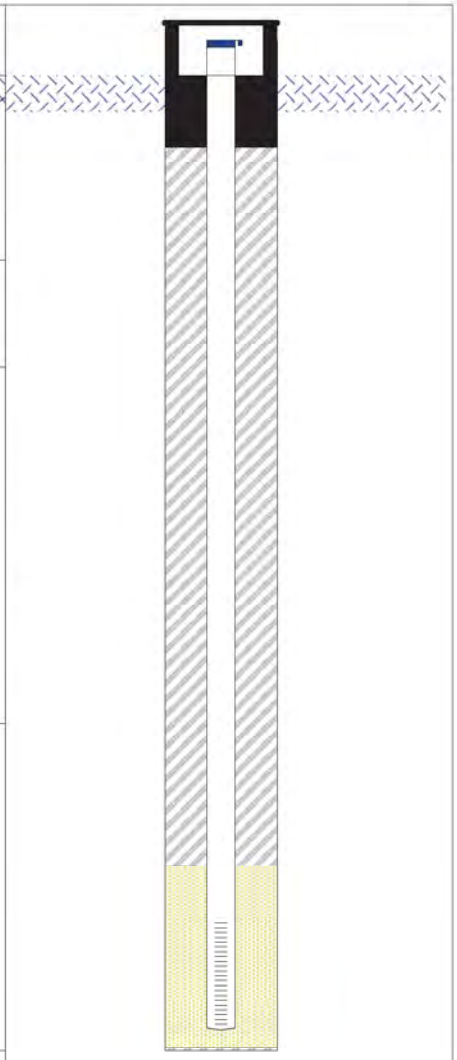
Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW9

Depth (m)	Elevation (masl)	Lithology	Lithology Description
-2	440		
0	438		TOP SOIL
2	436		SAND: fine, some fine stone, dirty
4	434		
6	432		SAND: medium to coarse, trace fine stone, red in colour
8	430		
10	428		SAND: fine to medium, trace fine stone, damp
12	426		
14	424		
16	422		
18	420		SAND: fine, strace fine stone, damp
20	418		
22	416		
24	414		
26	412		
28	410		
30	408		

Well Construction Diagram



Drilling Date: May 20, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574689
Northing: 4884086

Greenwood

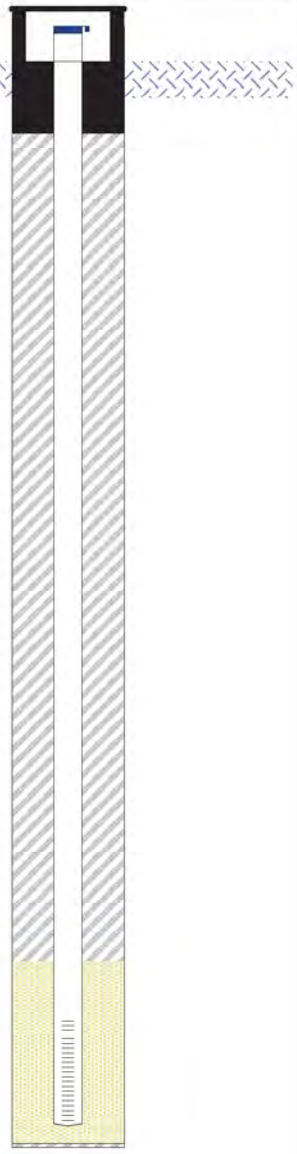
Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW10

Depth (m)	Elevation (masl)	Lithology	Lithology Description
-2 to 0	440 to 438		TOP SOIL
0 to 10	438 to 430		SAND: fine, some clay and silt, trace fine stone, dirty
10 to 14	430 to 426		SAND: fine to medium, 10% fine stone
14 to 18	426 to 422		SAND: fine, trace fine stone
18 to 30	422 to 408		SAND: fine to medium, 10-20% fine stone, clean

Well Construction Diagram



Drilling Date: May 20, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 575310
Northing: 4884283

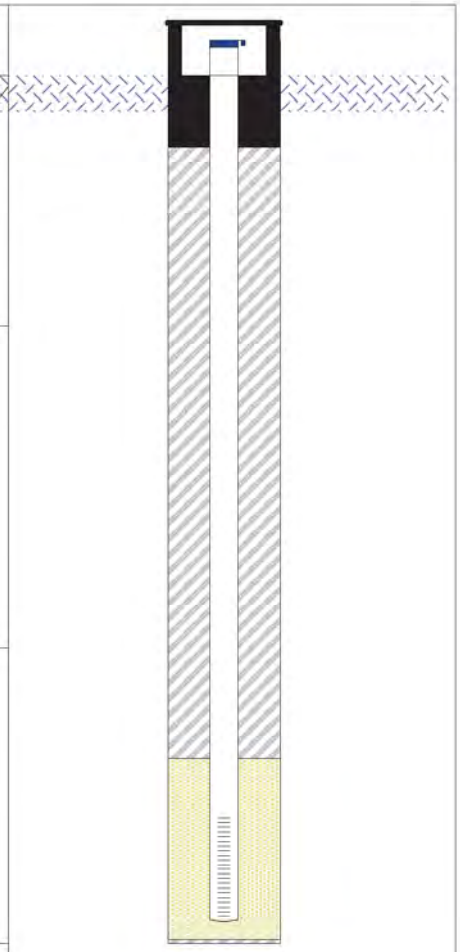
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW11

Depth (m)	Elevation (masl)	Lithology	Lithology Description
-2 to 0	428 to 426		TOP SOIL
0 to 8	426 to 418		SAND: fine to coarse, 20-30% fine stone, dirty
8 to 16	418 to 410		SILT: fine sand, clean
16 to 24	410 to 402		SILT: some clay, very soft, plastic, wet
24 to 30	402 to 396		



Drilling Date: May 20, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574276
Northing: 4882211

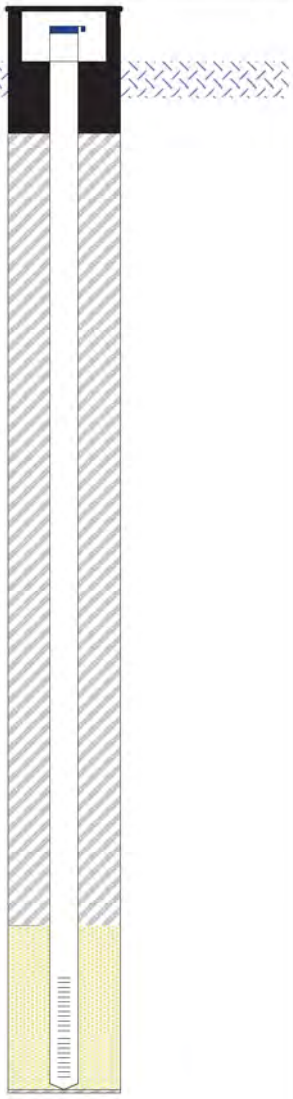
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW12

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
-2	436			
0	434		TOP SOIL	
2	432			
4	430			
6	428			
8	426		SAND: fine to medium, trace fine stone	
10	424			
12	422			
14	420			
16	418			
18	416			
20	414			
22	412		SAND: fine, some silt, dry	
24	410			
26	408			
28	406			
30	404			



rilling Date: October 23, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574719
Northing: 4883449

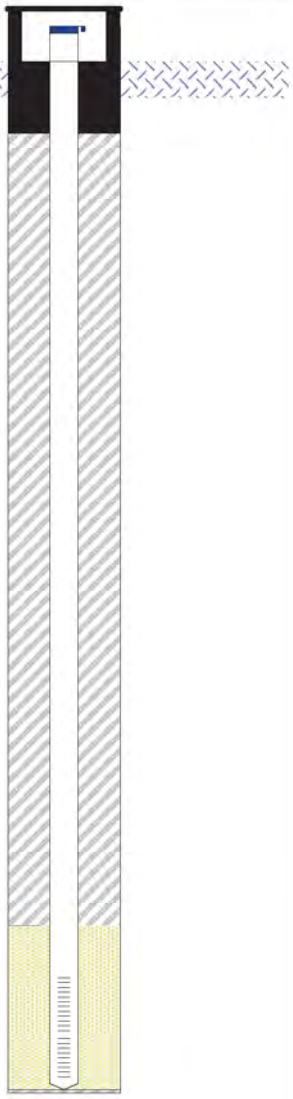
Greenwood

Whitewater Hydrogeology Ltd.

Project Name: Violet Hill Pit

Well ID: MW13

Depth (m)	Elevation (masl)	Lithology	Lithology Description	Well Construction Diagram
-2	436			
0	434		TOP SOIL	
2	432			
4	430			
6	428		SAND: fine to medium, trace fine stone	
8	426			
10	424			
12	422			
14	420			
16	418			
18	416			
20	414			
22	412		SAND: fine, some silt, dry	
24	410			
26	408			
28	406			
30	404			



rilling Date: October 24, 2014
Drilling Company: Canadian Soil Drilling
Geologist: Geological Investigations: Bill Fitzgerald
Location: Part Lots 30, 31, and 32, Concession 4 E.H.S. Town of Mono
Easting: 574295
Northing: 4883419

Greenwood

APPENDIX B

MINISTRY OF THE ENIVORNMENT WATER WELL RECORDS

9·15'

UTM Z 96a E
5 R N

Elev. 5 R 1360

Basin 22

The Ontario Water Resources Commission Act

WATER WELL RECORD

WATER RESOURCES DIVISION
JUN 22 1965
ONTARIO WATER RESOURCES COMMISSION

17 No 491

County or District Dufferin N½ of E½ Township, Village, Town or City Mono

Con. ~~IV~~ III E HS Lot ~~30~~ LOT 29 Date completed 18 (day) June (month) 1965 (year)

[redacted] dress 176 Lawrence Ave E Toronto

Casing and Screen Record

Inside diameter of casing 36"

Total length of casing 12½

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 36"

Pumping Test

Static level 6½

~~Test pumping rate~~ Coming in rate 2 G.P.M. G.P.M.

Pumping level

Duration of test pumping

Water clear or cloudy at end of test Clear

Recommended pumping rate 2 G.P.M.

with pump setting of 10 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Top soil	0	2	9 ft	Fresh
Sandy loam	2	9		
Gravel stone	9	12		

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

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

Drilling or Boring Firm G. Tortington

Address R.R. 1 Orangeville

Licence Number 72

Name of Driller or Borer G. Tortington

Address R.R. 1 Orangeville

Date June 19 1965

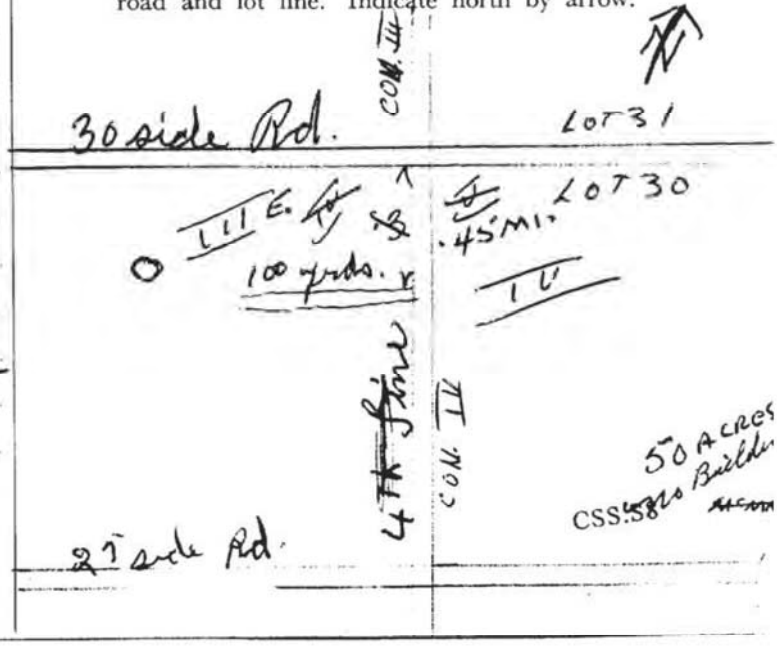
G. Tortington
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



96a

WATER RESOURCES DIVISION

17 No. 1967 515

ONTARIO WATER RESOURCES COMMISSION

UTM Z 17 E [illegible] N

Elev. R 1492

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Dufferin Township, Village, Town or City Mono

Con. TV H.S.E. Lot 30 Date completed 15 (day) July (month) 1967 (year)

[redacted] ess R.R. Rosemont

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 194 ft.

Type of screen #20 SLOT

Length of screen 5 FT

Depth to top of screen 195 FT

Diameter of finished hole 4"

Pumping Test

Static level 107 FT

Test-pumping rate 10 G.P.M.

Pumping level 140

Duration of test pumping 1½ hrs

Water clear or cloudy at end of test CLEAR

Recommended pumping rate 10 G.P.M.

with pump setting of 154 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Sand	0	6	195 TO 200 FT	FRESH
Clay - rocks	6	25		
Sand.	25	193		
Sand - gravel	193	200		

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

Domestic + stock

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

Drilling or Boring Firm Ladco Drilling and Exploration Co.

Address R.R.#1, HILLSBURGH, ONT.

Licence Number 2700

Name of Driller or Borer Thomas Lang

Address R.R.#1, Hillsburgh.

Date July 18, 1967

T. Lang

(Signature of Licensed Drilling or Boring Contractor)

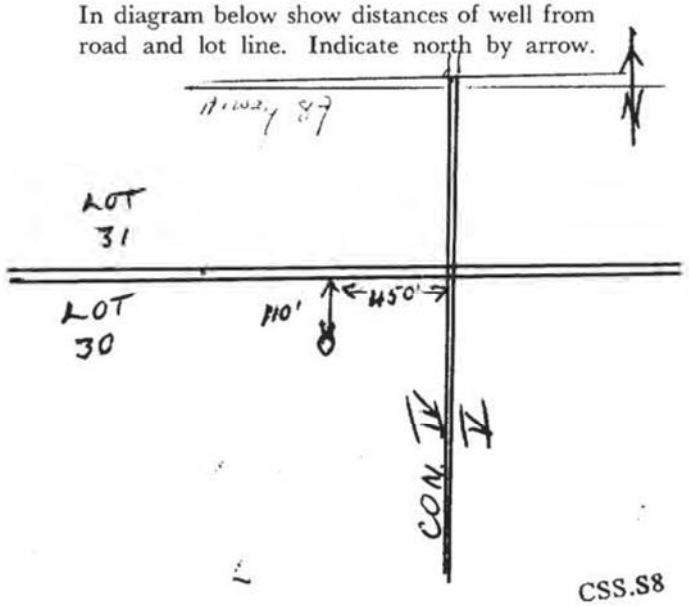
Form 7 15M-60-4138

OWRC COPY

120

Location of Well

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



CSS.S8

UTM Z E
N
Elev. Loc

The Ontario Water Resources Commission Act

WATER WELL RECORD

17 No. 516

Basin / County or District DUFFERIN Township, Village, Town or City MONO

Con. 4 EAST Lot 31 Date completed 23 (day) Oct. (month) 1965 (year)

[redacted] ress 435 ST. CLAIR AVE EAST TORONTO 7, ONT

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 124 FT

Type of screen NONE

Length of screen

Depth to top of screen

Diameter of finished hole 4"

Pumping Test

Static level 130 FT

Test-pumping rate 4 G.P.M.

Pumping level 132 FT

Duration of test pumping 4 hrs

Water clear or cloudy at end of test CLEAR

Recommended pumping rate 3 G.P.M.

with pump setting of 160 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
SANDY CLAY - SMALL STONES	0	120		
SAND	120	210	225 FT	FRESH
BROWN CLAY STONES	210	224		
GRAVEL	224	225		

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 LANCO DRILLING

Address HILLSBURG

Licence Number 1874

Name of Driller or Borer THOMAS LANG

Address HILLSBURG R.R. #1

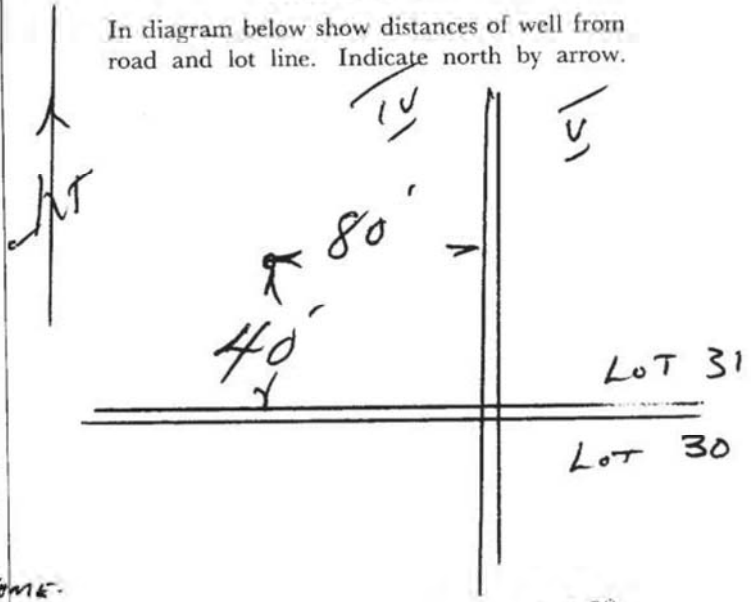
Date Oct 23 1965

T. Lang

(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.



Form 7 15M-60-4138 Note - OLD SCHOOL - NOW A HOME.

CSS.S8

OWRC COPY

121

C.B.

UTM 17 Z 571391570 Con III Lot 30
CODED E.H.S
4R 4818214010
Elev. ~~ZR~~ 13135
Basin 22

Water management in Ontario

1700956 P

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or ~~District~~ Dufferin Township, ~~Village, Town or City~~ Mono

Con. 3 E.H. Lot ~~E~~ 30 Date completed 27 (day) Nov (month) 65 (year)

[redacted] dress Shelburn ONT.

Casing and Screen Record

Inside diameter of casing 27"
Total length of casing 17½'
Type of screen —
Length of screen —
Depth to top of screen —
Diameter of finished hole 30"

Pumping Test

Static level 5'
Test-pumping rate ROCKER ½ G.P.M.
Pumping level —
Duration of test pumping —
Water clear or cloudy at end of test —
Recommended pumping rate ½ G.P.M.
with pump setting of 10' feet below ground surface

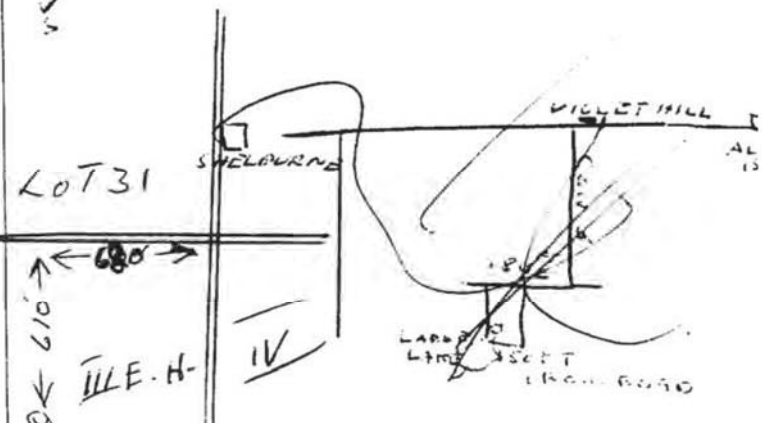
Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
LIGHT REDISH CLAY	CLAY	3FT		
"STONES WATER" BOULDERS" UNABLE TO GO FURTHER.	3FT	17½ FT		
WATER			15 FT	FRESH

For what purpose(s) is the water to be used?
HOUSEHOLD
Is well on upland, in valley, or on hillside? UPLAND
Drilling or Boring Firm T & B Well Boring
Address Mill St East Tottenham
Licence Number 152
Name of Driller or Borer [redacted]
Address Palgrave
Date Nov 24, 1965
[redacted]
(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.



Form 7
OWRC COPY

CSS.S8

S.C.N.B

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

41A/1E

Ontario

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

(11) 1702360 MUNICIP 17005 CON HS E 05

COUNTY OR DISTRICT: DUFFERIN
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: MONO
CON., BLOCK, TRACT, SURVEY, ETC.: 5 EHS
LOT: W 30
ADDRESS: [redacted] 73 HARPER AVE. TORONTO M4T 2L4
DATE COMPLETED: DAY 16 MONTH JUNE YEAR 77

(21) UTM ZONE 17 EASTING 575650 NORTHING 4882800 RC 5 ELEVATION 1410 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FEET FROM	DEPTH FEET TO
BROWN	CLAY			0	160
BROWN	GRAVEL			160	168

(31) 0160605 0168611
(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0168	☒ 1 FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	DEPTH FEET TO
188	☒ 1 STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	168
05				0168
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

(61) PLUGGING & SEALING RECORD

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

(71) PUMPING TEST

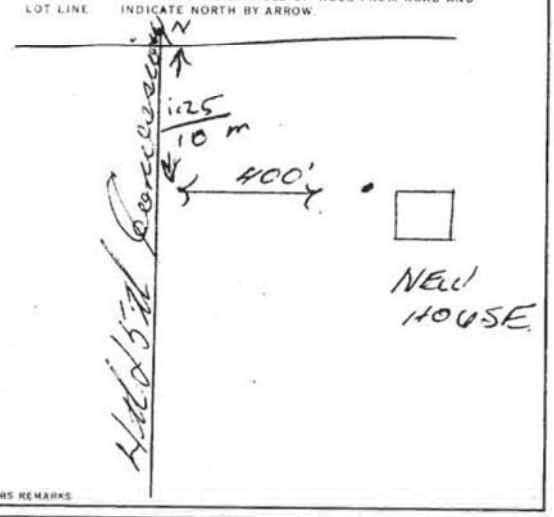
PUMPING TEST METHOD: ☒ 1 PUMP ☐ 2 BAILER
PUMPING RATE: 0008 GPM
DURATION OF PUMPING: 03 HOURS 00 MINS
WATER LEVELS DURING: ☐ 1 PUMPING ☒ 2 RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
105 FEET	118 FEET	109 FEET	105 FEET	105 FEET	105 FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: 120 FEET
WATER AT END OF TEST: ☒ 1 CLEAR ☐ 2 CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 120 FEET
RECOMMENDED PUMP RATE: 0006 GPM
GPM/FT. SPECIFIC CAPACITY

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL (54)	1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED
WATER USE (55-56) 01	1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF DRILLING (57) 2	1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: [illegible] Drilling Limited | LICENCE NUMBER: 3406
ADDRESS: 36 [illegible] VISTA DR. [illegible]
NAME OF WELL TECHNICIAN: [illegible] KINNEY | LICENCE NUMBER: 3406
SIGNATURE OF CONTRACTOR: [illegible] Kinney | SUBMISSION DATE: DAY ___ MO ___ YR ___

OFFICE USE ONLY

DATA SOURCE (58): 1 | CONTRACTOR (59-62): 3406 | DATE RECEIVED (63-68): 170478
DATE OF INSPECTION: Aug 18/78 | INSPECTOR: [illegible]
REMARKS: moved from RD. new modern brown house | CSS.S8 | P | WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

(11) 1702402 MUNICIP 17.005 CON HS E 04

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
DUFFERIN	MONO	WEST ½ CON 4 E.	029

[redacted] R# 1 ORANGEVILLE — DATE COMPLETED DAY 08 MO ~~NOV~~ 11 YR 72

81650 RC 6 ELEVATION 1400 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	GRAVEL	SAND		0	14
GREY	SAND			14	61
GREY	CLAY	SAND		61	96
BROWN	GRAVEL			96	99

(31) 00146128 | 00061228 | 00962058 28 | 00961111

(32)

(41) WATER RECORD

0098 4 TO 49

KIND OF WATER	
1 ☒ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERAL
1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERAL
1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERAL
1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERAL
1 ☐ FRESH 2 ☐ SALTY	3 ☐ SULPHUR 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	0099
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

(61) PLUGGING & SEALING RECORD

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

(71) PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER — PUMPING RATE: 0012 GPM — DURATION OF PUMPING: 02 HOURS 00 MINS

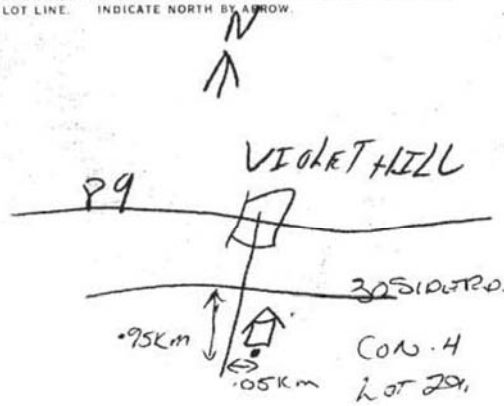
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
066 FEET	090 FEET	15 MINUTES 090 FEET	30 MINUTES 090 FEET	45 MINUTES 090 FEET	60 MINUTES 090 FEET

IF FLOWING GIVE RATE: GPM — PUMP INTAKE SET AT: 90 FEET — WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP — RECOMMENDED PUMP SETTING: 090 FEET — RECOMMENDED PUMPING RATE: 0006 GPM

LOCATION OF WELL

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



DRILLERS REMARKS: 200 FT OFF RD

FINAL STATUS OF WELL (64) 1	1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL	5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED
WATER USE (55-56) 01	1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER	5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF DRILLING (57) 4	1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☒ ROTARY (AIR) 5 ☐ AIR PERCUSSION	6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: RAY SPENCER & SON WELL DR. — LICENCE NUMBER: 4856

ADDRESS: RR#5 MT FOREST

NAME OF DRILLER OR BORER: RAY SPENCER — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Ray Spencer — SUBMISSION DATE: DAY ____ MO ____ YR ____

OFFICE USE ONLY

DATA SOURCE: 1 — (58) CONTRACTOR: 4856 — (59-62) DATE RECEIVED: 190678 — (63-66)

DATE OF INSPECTION: June 16, 1980 — INSPECTOR:

REMARKS: CSS.S8 PGS

FORM NO. 0506-4-77

MINISTRY OF THE ENVIRONMENT COPY

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

41 A/E

Ontario

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(11) 1702441 MUNICIP 17005 COR HS E 03

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Mulo	Con 8	031

DATE COMPLETED DAY 06 MO 09 YR 78

[redacted] CENDERE QUEBEC

UTM NG 8.82750 ZONE 5 ELEVATION 1330 ZONE 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BRWN	SAND	CLAY		0	19
	GRAVEL			19	33
BROWN	SAND			33	42
	GRAVEL	SAND		42	80

(31) 0019628005 0033 1/1 0072628 0060 1/128

(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0080	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	80
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			0080
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

(61) PLUGGING & SEALING RECORD

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

(71) PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☒ BAILER	0004 GPM	01 HOURS 45 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY			
	067 FEET	15 MINUTES	20 MINUTES	45 MINUTES	60 MINUTES
	69 FEET	FEET	FEET	FEET	FEET

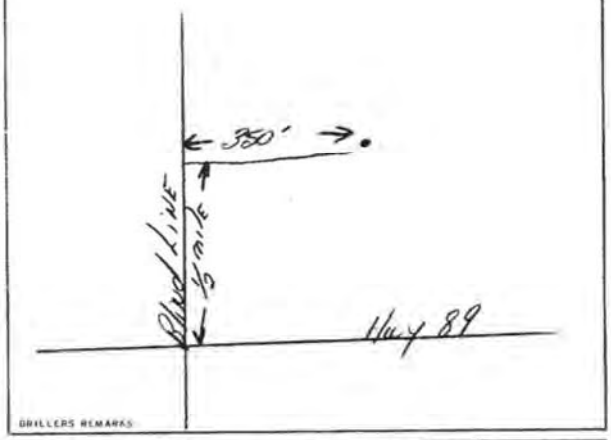
IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	069 FEET	0004 GPM

GPM / FT. SPECIFIC CAPACITY

LOCATION OF WELL

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



DRILLERS REMARKS

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

WATER USE 01
1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Kinney Well Drilling — LICENCE NUMBER: 2241

ADDRESS: Bayview RR2 Aurora

NAME OF DRILLER OR BORER — LICENCE NUMBER

SIGNATURE OF CONTRACTOR — SUBMISSION DATE: DAY 6 MO 2 YR 78

OFFICE USE ONLY

DATA SOURCE 1 — CONTRACTOR 2341 — DATE RECEIVED 110978

DATE OF INSPECTION August 1979 — INSPECTOR EJ

REMARKS

CSS.S8

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FORM 7 MOE 07-091

MINISTRY OF THE ENVIRONMENT COPY

41A/E

Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

(11) 1702442 MUNICIP 17005 CON HS E 04

COUNTY OR DISTRICT: ~~Simcoe~~ DUFFERIN
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: ~~Mulmur~~ MONO
CON. BLOCK, TRACT, SURVEY, ETC: IV III HSE
LOT: 032
DATE COMPLETED: DAY 05 MO 12 YR 73

[redacted] . #4 Shelburne

33200 5 1345 5 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	sand			0	12
	gravel			12	45
	sand gravel	and clay		45	93
	hard pan			93	139
	gravel and	sand		139	144

(31) 001 2628 | 0045 | 11 | 0093 | 28 | 11 | 05 | 0139 | 14 | 0144 | 11 | 28 | 0150 | 04

(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0139	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0 approximate	~~0032~~ 0032
~~06~~ 05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	244	0 approximate	0105
04	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	244	100 approximate	0150

SCREEN

SIZE (SLOT NO.): ~~COARSE~~
DIAMETER: ~~05~~ 05000 INCHES
LENGTH: 03 FEET
MATERIAL AND TYPE: stainless steel
DEPTH TO TOP OF SCREEN: 0150 FEET

(61) PLUGGING & SEALING RECORD

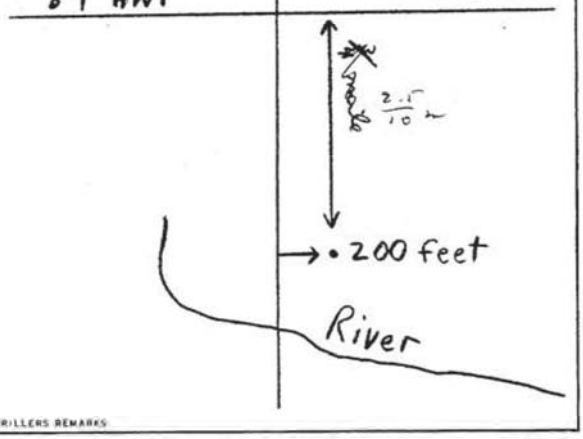
DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 5 0005 GPM
DURATION OF PUMPING: approximately 04 HOURS 00 MINS
STATIC LEVEL: 060 FEET
WATER LEVEL END OF PUMPING: ~~approx~~ 090 FEET
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY
15 MINUTES: 060 FEET
30 MINUTES: ~~060~~ 040 FEET
45 MINUTES: 040 FEET
60 MINUTES: 040 FEET
IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: 90 FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: 090 FEET
RECOMMENDED PUMPING RATE: 0005 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

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

WATER USE 01
1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Vandenboom Drilling & Contr. Co. Ltd.
LICENCE NUMBER: 5206
ADDRESS: Box 370 Schomberg, Ont. LOG 1T0
NAME OF DRILLER OR BORER:
LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Rinus Vandenboom
SUBMISSION DATE: DAY MO YR

OFFICE USE ONLY

DATA SOURCE: 1
CONTRACTOR: 5206
DATE RECEIVED: 05 09 78
DATE OF INSPECTION: August 1/79
INSPECTOR: SD
REMARKS:
CSS.S8

FORM NO. 0506-4-77

MINISTRY OF THE ENVIRONMENT COPY

Ministry of the Environment
Ontario

Kingsland Estates

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 1702897 — MUNICIP. 1,7,0,6 — LOT H.S. E. 1 — CON 04

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
DUFFERIN	MULMUR	CON 4 Sub Lot 10	1

[redacted] 52 Keele St. Apt #205 Toronto — DATE COMPLETED: DAY 20 MO 04 YR 83

RANGE — BC — ELEVATION — BC — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY	SAND STONES		0	62
BROWN	SAND	GRAVEL	WATER BEARING	62	102
BROWN	SAND		FINE	102	159

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
127	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☑ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE	188	0	106
5	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☑ OPEN HOLE	188	89	156
	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
#8	5"	3

MATERIAL AND TYPE: STAINLESS — DEPTH TO TOP OF SCREEN: 89 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE	CEMENT GROUT (LEAD PACKER ETC.)
0	102	BENTONITE	
		K-PACKER AT 89 FT	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☑ BAILER — PUMPING RATE: 8 GPM FOR 1 HOURS 30 MIN — DURATION OF PUMPING

STATIC LEVEL	WATER LEVEL END OF PUMPING
127 FEET	150 FEET

WATER LEVELS DURING: 1 ☐ PUMPING 2 ☑ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
127 FEET	FEET	FEET	FEET

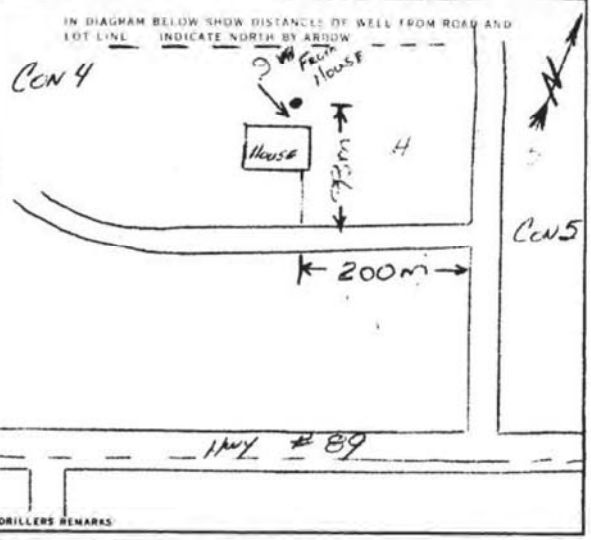
IF FLOWING GIVE RATE: GPM — PUMP INTAKE SET AT: FEET

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

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP — RECOMMENDED PUMP SETTING: 150 FEET — RECOMMENDED PUMPING RATE: 150 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL	1 ☑ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED
WATER USE	1 ☑ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; ☐ OTHER; 9 ☐ NOT USED
METHOD OF DRILLING	1 ☐ CABLE TOOL; 2 ☑ ROTARY (CONVENTIONAL); 3 ☐ ROTARY (REVERSE); 4 ☐ ROTARY (AIR); 5 ☐ AIR PERCUSSION; 6 ☐ BORING; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: LUNNEY WELL DRILLING — LICENCE NUMBER: 3406

ADDRESS: RR#1 LAUREL ONT.

NAME OF DRILLER OR BORER — LICENCE NUMBER

SIGNATURE OF CONTRACTOR — SUBMISSION DATE: DAY 20 MO 04 YR 83

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR: 3406 — DATE RECEIVED: 25 04 83

DATE OF INSPECTION — INSPECTOR

REMARKS: CSS.S8

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1703452

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

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT	DATE COMPLETED
[redacted]	MONO	4	30	DAY 23 MO 07 YR 87

[redacted] P.O. Box 714 Shelburne

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Gravel	Sand		0	17
Grey	Sand	Clay		17	60
	Gravel	Sand		60	68
	Sand			68	160
	Stones			160	163
	Sand			163	178
	Stones	Gravel Clay		178	184
	Sand	Gravel		184	208
	Stones	Gravel		208	214

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
214	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS — NOT TESTED
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. (INCHES)	MATERIAL	WALL THICKNESS (INCHES)	DEPTH - FEET FROM	DEPTH - FEET TO
006	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	2	214
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN (FEET)

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
0	214	Cutting & Holeplug

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER — Air

PUMPING RATE: 90 GPM — DURATION OF PUMPING: 2 HOURS 30 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
102 FEET	180 FEET			102 FEET		

IF FLOWING, GIVE RATE: — GPM

PUMP INTAKE SET AT: — FEET

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

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

RECOMMENDED PUMP SETTING: 130 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 9 ☐ DEWATERING

WATER USE

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

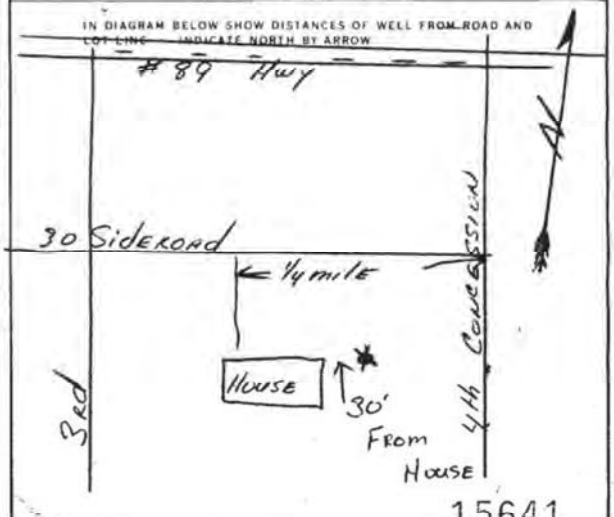
METHOD OF CONSTRUCTION

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

3406

LOCATION OF WELL

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



DRILLERS REMARKS: 15641

CONTRACTOR

NAME OF WELL CONTRACTOR: Lunney Well Drilling
WELL CONTRACTOR'S LICENCE NUMBER: 3406
ADDRESS: Laurel Ont.
NAME OF WELL TECHNICIAN: Erich Wilson
WELL TECHNICIAN'S LICENCE NUMBER:
SIGNATURE OF TECHNICIAN/CONTRACTOR:
SUBMISSION DATE: DAY — MO 07 YR 87

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR | DATE RECEIVED: SEP 10 1987
DATE OF INSPECTION | INSPECTOR
REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1704612

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

11

MUNICIP 17005 CON H.S. E LOT 04

COUNTY OR DISTRICT [redacted]

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE MONO

CON 4 BLOCK, TRACT, SURVEY, ETC. HS

LOT 32

ROSEMONT

DATE COMPLETED DAY 16 MO 06 YR 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	SAND	SILT GRAVEL		0	20
BROWN	SAND	SILT	SOFT	20	75
BROWN	SAND	SILT	LOOSE DRY	75	90
BROWN	SAND	GRAVEL SILT		90	160
GREY	CLAY	SILT SAND	LAYERED	160	180
RED	SILT	SAND CLAY		180	190
GREY	SILT	SAND	LOOSE	190	215
GREY	CLAY	SILT	SOFT	215	222

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
210	☑ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERALS ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	TO
6 1/4	☑ 1 STEEL ☐ 2 GALVANIZED ☐ 3 CONCRETE ☐ 4 OPEN HOLE ☐ 5 PLASTIC	.188	+2	145
5 1/2	☐ 1 STEEL ☐ 2 GALVANIZED ☐ 3 CONCRETE ☐ 4 OPEN HOLE ☐ 5 PLASTIC	.188	145	206
	☐ 1 STEEL ☐ 2 GALVANIZED ☐ 3 CONCRETE ☐ 4 OPEN HOLE ☐ 5 PLASTIC			

SCREEN

SIZE-SLOT OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
20	6	4

MATERIAL AND TYPE: STAINLESS

DEPTH TO TOP OF SCREEN: 206 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
140	206	4" Packer + 5" Drop Pipe

71 PUMPING TEST

PUMPING TEST METHOD: ☐ PUMP ☐ BAILER AIR

PUMPING RATE: 50 GPM

DURATION OF PUMPING: 2 HOURS 30 MINS

WATER LEVELS DURING: ☑ PUMPING ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	10 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
125 FEET	200 FEET	200 FEET	200 FEET	200 FEET	200 FEET

IF FLOWING, GIVE RATE: GPM

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: ☑ CLEAR ☐ CLOUDY

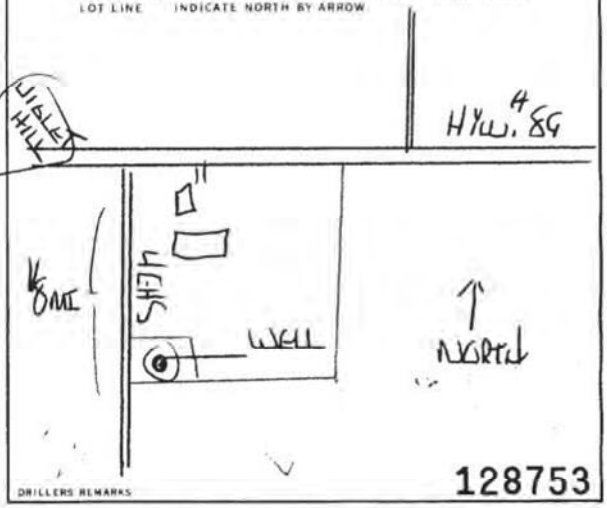
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

RECOMMENDED PUMP SETTING: 160 FEET

RECOMMENDED PUMPING RATE: 8 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

128753

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

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

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

CONTRACTOR

NAME OF WELL CONTRACTOR: R & B WELL DRILLING LTD

WELL CONTRACTOR'S LICENCE NUMBER: 4645

ADDRESS: PO Box 320 BEETON ONT. L0G 1A0

NAME OF WELL TECHNICIAN: CARL GOMER

WELL TECHNICIAN'S LICENCE NUMBER: T0038

SIGNATURE OF TECHNICIAN/CONTRACTOR: Carl Gomer

SUBMISSION DATE: DAY 16 MO 06 YR 93

OFFICE USE ONLY

DATA: CONTRACTOR 4645 DATE RECEIVED JUL 28 1993

DATE OF INSPECTION: INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 — 1705223 — Municipality 1700S — Con. HS E — 04

County or District: DUFFERIN [redacted] — Township/Borough/City/Town/Village: MONO — Con block tract survey, etc.: CON. 4 HSE. — Lot: 30

Address: RR#1 ROSEMONT — Date completed: 29 (day) 9 (month) 98 (year)

21 — Northing — RC — Elevation — RC — Basin Code — I II IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
	TOPSOIL			0	1
	STONES	CLAY		1	12
	GRAVEL	STONES		12	38
	SAND			38	55
	GRAVEL	CLAY		55	145
GREY	CLAY	GRAVEL		145	179
	SAND	STONES, CLAY		179	188
	SAND	STONES GRAVEL		188	195

31

32

41 WATER RECORD

Water found at – feet	Kind of water		
190	1 ☐ Fresh 2 ☐ Salty	3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas	
	1 ☐ Fresh 2 ☐ Salty	3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas	
	1 ☐ Fresh 2 ☐ Salty	3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas	
	1 ☐ Fresh 2 ☐ Salty	3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas	
	1 ☐ Fresh 2 ☐ Salty	3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas	

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
6 1/4	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	.188	+2	192 1/2
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)

AIR LIFT 60 GPM @ 150 FEET

71 PUMPING TEST

Pumping test method: 1 ☒ Pump 2 ☐ Bailer — Pumping rate: 10 GPM — Duration of pumping: 3 Hours ___ Mins

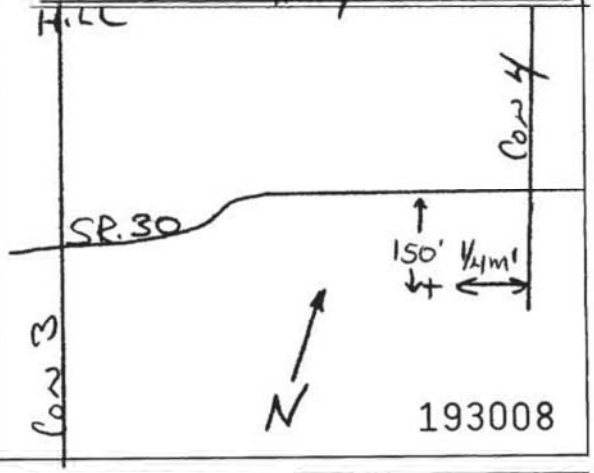
Static level	Water level end of pumping	Water levels during: 1 ☐ Pumping 2 ☐ Recovery			
		15 minutes	30 minutes	45 minutes	60 minutes
102 feet	103 feet	103 feet	103 feet	103 feet	103 feet

If flowing give rate: ___ GPM — Pump intake set at: ___ feet — Water at end of test: ☒ Clear ☐ Cloudy

Recommended pump type: ☐ Shallow ☒ Deep — Recommended pump setting: 140 feet — Recommended pump rate: 10 GPM

LOCATION OF WELL

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



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 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE

1 ☒ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☐ Not used 10 ☐ Other

METHOD OF CONSTRUCTION

1 ☐ Cable tool 2 ☒ Rotary (conventional) ☐ Rotary (reverse) 4 ☐ Rotary (air) 5 ☐ Air percussion 6 ☐ Boring 7 ☐ Diamond 8 ☐ Jetting 9 ☐ Driving 10 ☐ Digging 11 ☐ Other

Name of Well Contractor: NEUMANN WELL DRILLING — Well Contractor's Licence No.: 7015

Address: RR # A DUNDALK

Name of Well Technician: TOM GILLIES — Well Technician's Licence No.: T-1958

Signature of Technician/Contractor: [signature] — Submission date: day ___ mo 10 yr 98

MINISTRY USE ONLY

Data source — Contractor: 7015 — Date received: OCT 21 1998

Date of inspection — Inspector

Remarks: CSS. ES9

0506 (07/94) Front Form 9

2 - MINISTER OF ENVIRONMENT & ENERGY COPY

Ontario Ministry of the Environment

Well Tag Number A056917

A056917

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

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 Help Desk (Toll Free) at 1-888-396-9355.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

Dufferin	Mono	28	3EHS
RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.	

GPS Reading: NAD 83 | Zone 17 | Easting 574402 | Northing 4881777 | Unit Make/Model magellan | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
Brown	Sand	Stones		0	7.62
Grey	Silt	Clay & Stones	Loose	7.62	41.1
Brown	Clay	Silt	Dense	41.15	53.34
Brown	Sand	Gravel	Course	53.34	55.47

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	6.4	25.4
6.4	55.47	15.24

Water Record

Water found at Metres	Kind of Water
53 m	☒ Fresh ☐ Salty ☐ Gas ☐ Sulphur ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Salty ☐ Gas ☐ Sulphur ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Salty ☐ Gas ☐ Sulphur ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
Casing				
15.24	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	0.556	+0.50	54.56
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	Material	Slot No.		
14.6	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	25	54.56	55.47
No Casing or Screen				
	☐ Open hole			

Test of Well Yield

Pumping test method: Pump

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres) 53.4	Static Level	26.44		
Pumping rate - (litres/min) 36, 36	1	27.67	1	28,99
Duration of pumping 1 hrs + 0 min	2	27.97	2	28.53
Final water level end of pumping 29.97 metres	3	28.25	3	28.30
Recommended pump type. ☐ Shallow ☒ Deep	4	28.38	4	28.15
Recommended pump depth. ___ metres	5	28.40	5	28.03
Recommended pump rate. (litres/min)	10	28.90	10	27.70
If flowing give rate - (litres/min)	15	29.18	15	27.47
If pumping discontinued, give reason.	20	29.32	20	27.35
	25	29.46	25	27.25
	30	29.59	30	27.15
	40	29.74	40	27.03
	50	29.87	50	26.94
	60	29.97	60	26.88

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6.4	Bentonite	0.017

Method of Construction

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

Water Use

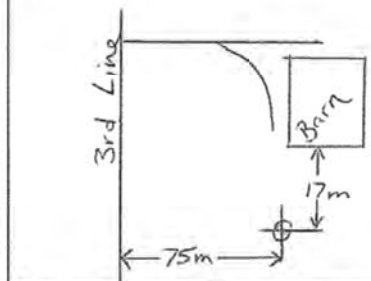
☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

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

Location of Well

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



Audit No. Z 65425

Date Well Completed: YYYY 2007 MM 05 DD

Was the well owner's information package delivered? ☒ Yes ☐ No

Date Delivered: YYYY 2007 MM 05 DD

Well Contractor/Technician Information Lunney Div. of

Name of Well Contractor	Well Contractor's Licence No.
Gerrits Drilling & Eng. Ltd.	3406

Business Address (street name, number, city etc.): RR#1 Grand Valley

Name of Well Technician (last name, first name)	Well Technician's Licence No.
Gerrits, Steve	T-2964

Signature of Technician/Contractor: X [signature] Date Submitted: YYYY 2007 MM 05 DD 14

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Data Source	Contractor
Date Received: YYYY JAN 19 2008 MM DD	Date of Inspection: YYYY MM DD
Remarks	Well Record Number

0506E (06/2006)

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Cette formule est disponible en français

Ontario Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Place Sticker and/or Print Below) **A113853**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
795640 3rd Line	Mono	EPL 31	3 East

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin	Shelburne	Ontario	L0N1S8

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	574082	4882861	7R1991 Part 2	

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Top Soil			0	1
Brown	Sand	small Stone		1	3
Brown	Clay	Sand Layers	Rocks	3	21
Grey	Silt	Sand Layers		21	54

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	8½	⅜ Bentonite Chips	
8½	54	Filter Sand	

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☑ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used ☑ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
36"	Concrete	3"	+1½	54

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☑ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Hole Diameter Depth To	Hole Diameter (cm/in)
3 (m/ft) ☐ Gas	☐ Fresh ☑ Untested ☐ Other, specify	0	54	48"
21 (m/ft) ☐ Gas	☐ Fresh ☑ Untested ☐ Other, specify			
45 (m/ft) ☐ Gas	☐ Fresh ☑ Untested ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping hrs + min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 47'

Recommended pump rate (l/min / GPM): 5 Gpm/int

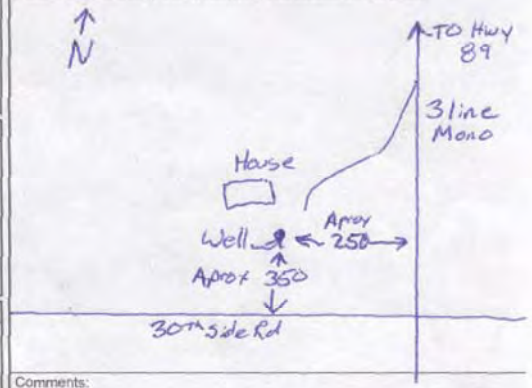
Well production (l/min / GPM): 1 Gpm

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			48'8"
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	48'6"
20		20	
25		25	
30		30	48'4"
40		40	
50		50	
60		60	47'

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Johnson & Baetz Well Boring	3030

Business Address (Street Number/Name)	Municipality
52 Church Rd RR#1	Waterford

Province	Postal Code	Business E-mail Address
On	N0E1Y0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5194430045	Avey Darcy

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2988		2011 06 09

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☑ No	Y Y Y Y M M D D	Audit No. z122291
	Date Work Completed: Y Y Y Y M M D D	Received JUL 04 2011

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APPENDIX C

WATER QUALITY RESULTS

TESTMARK Laboratories

Committed to Quality and Service

Analytical Report

Client: Tecia White
Company: Whitewater Hydrogeology Ltd.
Address: 80 Chamberlain Cres
Collingwood, Ontario, L9Y 0C8
Phone: (705) 888-7064
Fax:
Email: tecia@white-water.ca

Work Order Number: **242151**
Date Order Received: 5/21/2015
Regulation: ODWS
PO #:
Project #: Greenwood- Violet Hill (GVH)

Analyses were performed on the following samples submitted with your order.
The results relate only to the items tested.

Sample Name	Lab #	Matrix	Type	Comments	Date Collected	Time Collected
MW 2	639355	Ground Water	None		5/19/2015	
MW 4	639356	Ground Water	None		5/19/2015	
MW 9	639357	Ground Water	None		5/19/2015	
MW 13	639358	Ground Water	None		5/19/2015	

The following instrumentation and reference methods were used for your sample(s)

Method Name	Description	Reference
Ammonia Water	Determination of Ammonia/Ammonium in Water **Instrument group:** Internally Subcontracted	Based on APHA-4500NH3 H
T01-Alkalinity	Determination of Alkalinity in Water **Instrument group:** Accumet ISE Meter	Modified from APHA 2320
T02-pH Water	Determination of pH in Water **Instrument group:** Accumet ISE Meter	Modified from APHA-4500-H+B
T05-Anions Water	Determination of Anions by Ion Chromatography **Instrument group:** Dionex IC	Modified from SW846-9056
T12-CONDWATER	Determination of conductivity in Water **Instrument group:** Conductivity Meter	Modified from APHA-2510
T13-Hardness	Determination of Total Hardness **Instrument group:** Calculation	Modified from APHA-2340B
T13-ICPMS Water	Determination of Metals in Water by ICPMS **Instrument group:** PE Elan ICP/MS-1	Modified from SW846-6020
T94-Carbonate	Determination of Carbonate and Bi-Carbonate **Instrument group:** Calculation	Based on APHA-2330

Whitewater Hydrogeology Ltd. Work Order: 242151

This report has been approved by:

Mark Charbonneau, Ph.D.
Laboratory Director

Sample Data:

Sample Name: MW 2 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639355**

Ammonia Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Ammonia (as N)	0.01	0.029	mg/L	20150525.R42.1A

T01-Alkalinity				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity (pH 4.5)	2	248	mg/L as CaCO3	20150527.T01A
P-Alkalinity (pH 8.3)	2	<2	mg/L as CaCO3	20150527.T01A

T02-pH Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pH	N/A	7.85	pH	20150527.T02A

T05-Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.05	6.34	mg/L	20150527.T05A
Chloride (Dup)	0.05	6.39	mg/L	20150527.T05A
Nitrate (as N)	0.01	7.16	mg/L	20150527.T05A
Nitrate (as N) (Dup)	0.01	7.13	mg/L	20150527.T05A
Nitrite (as N)	0.01	<0.01	mg/L	20150527.T05A
Nitrite (as N) (Dup)	0.01	<0.01	mg/L	20150527.T05A
Sulphate	0.05	11.6	mg/L	20150527.T05A
Sulphate (Dup)	0.05	11.3	mg/L	20150527.T05A

T12-CONDWATER				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Conductivity	1	530	µS/cm	20150527.T12B

T13-Hardness				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Hardness (as CaCO3)	0.1	228	mg/L	20150526.T13E

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Antimony	0.5	<0.5	ug/L	20150526.T13D
Arsenic	1	<1	ug/L	20150526.T13D
Barium	1	71.6	ug/L	20150526.T13D
Boron	2	<2	ug/L	20150526.T13D
Cadmium	0.1	<0.1	ug/L	20150526.T13D
Calcium	500	74200	ug/L	20150526.T13D
Chromium	1	4.7	ug/L	20150526.T13D
Lead	1	<1	ug/L	20150526.T13D
Magnesium	4	10300	ug/L	20150526.T13D
Mercury	0.1	<0.1	ug/L	20150526.T13D
Phosphorus	50	<50	ug/L	20150526.T13D
Potassium	1	1340	ug/L	20150526.T13D
Selenium	1	<1	ug/L	20150526.T13D
Sodium	1	1940	ug/L	20150526.T13D
Uranium	1	<1	ug/L	20150526.T13D

Sample Name: MW 2 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639355**

T94-Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bicarbonate	1	246	mg/L	20150527.T94A
Carbonate	1	1.6	mg/L	20150527.T94A

Sample Name: MW 4 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639356**

Ammonia Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Ammonia (as N)	0.01	<0.01	mg/L	20150525.R42.1A

T01-Alkalinity				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity (pH 4.5)	2	274	mg/L as CaCO3	20150527.T01A
P-Alkalinity (pH 8.3)	2	<2	mg/L as CaCO3	20150527.T01A

T02-pH Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pH	N/A	7.76	pH	20150527.T02A

T05-Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.05	20.8	mg/L	20150527.T05A
Nitrate (as N)	0.01	7.08	mg/L	20150527.T05A
Nitrite (as N)	0.01	0.177	mg/L	20150527.T05A
Sulphate	0.05	7.71	mg/L	20150527.T05A

T12-CONDWATER				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Conductivity	1	585	µS/cm	20150527.T12B

T13-Hardness				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Hardness (as CaCO3)	0.1	254	mg/L	20150526.T13E

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Antimony	0.5	<0.5	ug/L	20150526.T13D
Arsenic	1	<1	ug/L	20150526.T13D
Barium	1	46.8	ug/L	20150526.T13D
Boron	2	<2	ug/L	20150526.T13D
Cadmium	0.1	<0.1	ug/L	20150526.T13D
Calcium	500	86600	ug/L	20150526.T13D
Chromium	1	5.6	ug/L	20150526.T13D
Lead	1	<1	ug/L	20150526.T13D
Magnesium	4	9220	ug/L	20150526.T13D
Manganese	1	4.8	ug/L	20150526.T13D
Mercury	0.1	<0.1	ug/L	20150526.T13D
Phosphorus	50	<50	ug/L	20150526.T13D
Potassium	1	1630	ug/L	20150526.T13D
Selenium	1	3.3	ug/L	20150526.T13D

Sample Name: MW 4 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639356**

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Sodium	1	4350	ug/L	20150526.T13D
Uranium	1	<1	ug/L	20150526.T13D

T94-Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bicarbonate	1	272	mg/L	20150527.T94A
Carbonate	1	1.5	mg/L	20150527.T94A

Sample Name: MW 9 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639357**

Ammonia Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Ammonia (as N)	0.01	0.021	mg/L	20150525.R42.1A

T01-Alkalinity				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity (pH 4.5)	2	355	mg/L as CaCO3	20150527.T01A
P-Alkalinity (pH 8.3)	2	<2	mg/L as CaCO3	20150527.T01A

T02-pH Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pH	N/A	7.92	pH	20150527.T02A

T05-Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.5	434	mg/L	20150527.T05A
Nitrate (as N)	0.1	2.76	mg/L	20150527.T05A
Nitrite (as N)	0.1	<0.1	mg/L	20150527.T05A
Sulphate	0.5	19.7	mg/L	20150527.T05A

T12-CONDWATER				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Conductivity	1	1830	µS/cm	20150527.T12B

T13-Hardness				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Hardness (as CaCO3)	0.1	291	mg/L	20150526.T13E

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Antimony	0.5	<0.5	ug/L	20150526.T13D
Arsenic	1	<1	ug/L	20150526.T13D
Barium	10	171	ug/L	20150526.T13D
Boron	2	<2	ug/L	20150526.T13D
Cadmium	0.1	<0.1	ug/L	20150526.T13D
Calcium	500	81500	ug/L	20150526.T13D
Chromium	1	8.3	ug/L	20150526.T13D
Magnesium	4	21200	ug/L	20150526.T13D
Mercury	0.1	<0.1	ug/L	20150526.T13D
Phosphorus	50	<50	ug/L	20150526.T13D

Sample Name: MW 9 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639357**

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Potassium	1	1580	ug/L	20150526.T13D
Selenium	1	<1	ug/L	20150526.T13D
Sodium	10	227000	ug/L	20150526.T13D
Uranium	1	<1	ug/L	20150526.T13D

T94-Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bicarbonate	1	352	mg/L	20150527.T94A
Carbonate	1	2.8	mg/L	20150527.T94A

Sample Name: MW 13 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639358**

Ammonia Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Ammonia (as N)	0.01	0.058	mg/L	20150525.R42.1A

T01-Alkalinity				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity (pH 4.5)	2	225	mg/L as CaCO3	20150527.T01A
P-Alkalinity (pH 8.3)	2	<2	mg/L as CaCO3	20150527.T01A

T02-pH Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pH	N/A	8.06	pH	20150527.T02A

T05-Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.05	1.18	mg/L	20150527.T05A
Nitrate (as N)	0.01	0.375	mg/L	20150527.T05A
Nitrite (as N)	0.01	<0.01	mg/L	20150527.T05A
Sulphate	0.05	5.75	mg/L	20150527.T05A

T12-CONDWATER				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Conductivity	1	398	µS/cm	20150527.T12B

T13-Hardness				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Hardness (as CaCO3)	0.1	173	mg/L	20150526.T13E

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Antimony	0.5	<0.5	ug/L	20150526.T13D
Arsenic	1	<1	ug/L	20150526.T13D
Barium	1	34	ug/L	20150526.T13D
Boron	2	<2	ug/L	20150526.T13D
Calcium	500	52800	ug/L	20150526.T13D
Chromium	1	3.7	ug/L	20150526.T13D
Lead	1	<1	ug/L	20150526.T13D
Magnesium	4	9970	ug/L	20150526.T13D

Whitewater Hydrogeology Ltd. Work Order: 242151

Sample Name: MW 13 **Date: 5/19/2015** **Matrix: Ground Water** **Lab #: 639358**

T13-ICPMS Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Mercury	0.1	<0.1	ug/L	20150526.T13D
Phosphorus	50	<50	ug/L	20150526.T13D
Potassium	1	974	ug/L	20150526.T13D
Selenium	1	<1	ug/L	20150526.T13D
Sodium	1	1690	ug/L	20150526.T13D
Uranium	1	<1	ug/L	20150526.T13D

T94-Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bicarbonate	1	223	mg/L	20150527.T94A
Carbonate	1	2.4	mg/L	20150527.T94A

MDL Method detection limit or minimum reporting limit.
% Rec Surrogate compounds are added to the sample in some cases and the recovery is reported as a percent recovered.
QAQCID This is a unique reference to the quality control data set used to generate the reported value.
Data reported for organic analysis in soil samples are corrected for moisture content
Matrix If the matrix is a leachate, the sample was extracted according to regulation 558.
INT Interferences
TNTC Too numerous to count
ND Not detected
NDOGN No Data, Overgrown with Non-Target
NDOGT No Data, Overgrown with Target
NDOGHPC No Data, Overgrown HPC

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CERTIFICATE OF ANALYSIS

Client:	Tecia White	Work Order Number:	253489
Company:	Whitewater Hydrogeology Ltd.	PO #:	
Address:	80 Chamberlain Cres Collingwood, Ontario, L9Y 0C8	Regulation: Project #:	ODWS Greenwood- Violet Hill (GVH)
Phone:	7058887064	Fax:	
Email:	tecia@white-water.ca	DWS #:	
Date Order Received:	9/18/2015	Analysis Started:	9/24/2015
Arrival Temperature:	21.1°C	Analysis Completed:	9/24/2015

WORK ORDER SUMMARY

ANALYSES WERE PERFORMED ON THE FOLLOWING SAMPLES. THE RESULTS RELATE ONLY TO THE ITEMS TESTED.

Sample Description	Lab ID	Matrix	Type	Comments	Date Collected	Time Collected
MW2	669058	Ground Water	None		9/14/2015	12:00:00 AM
MW4	669059	Ground Water	None		9/14/2015	12:00:00 AM
MW5	669060	Ground Water	None		9/14/2015	12:00:00 AM
MW13	669061	Ground Water	None		9/14/2015	12:00:00 AM

METHODS AND INSTRUMENTATION

THE FOLLOWING METHODS WERE USED FOR YOUR SAMPLE(S):

Method Name	Description	Reference
Ammonia	Determination of Ammonia/Ammonium in Water	Modified from APHA-4500-NH3
T01-Alkalinity	Determination of Alkalinity in Water	Modified from APHA 2320
pH	Determination of pH in Water	Modified from APHA-4500-H+B
T05-Anions Water	Determination of Anions by Ion Chromatography	Modified from SW846-9056
Conductivity	Determination of conductivity in Water	Modified from APHA-2510
Hardness	Determination of Total Hardness	Modified from APHA-2340B
T13-ICPMS Water	Determination of Metals in Water by ICPMS	Modified from SW846-6020

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Work Order Number:253489

T94-Carbonate	Determination of Carbonate and Bi-Carbonate	Based on APHA-2330
TP	Determination of Total Phosphorus in Water	Based on APHA-4500P

REPORT COMMENTS

Samples 669058, 669060 and 669061 were filtered before they were analyzed for Ammonia to prevent turbidity interference. MD 09/22/2015

This report has been approved by:

Mark Charbonneau, Ph.D.
Laboratory Director

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CERTIFICATE OF ANALYSIS

Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

WORK ORDER RESULTS

Lab ID	669058		669058[r]		669059			
Regulation/Standard (If Applicable)	ODWS		ODWS		ODWS			
Sample Description	MW2		MW2		MW4			
Anions	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Units**	**Regulation Criteria**
Chloride	21	0.5	20.2	0.5	50	0.3	mg/L	250
Nitrate (as N)	12.2	0.1	11.8	0.1	7.48	0.09	mg/L	10
Nitrite (as N)	<0.1	0.1	<0.1	0.1	<0.09	0.09	mg/L	1
Sulphate	35.8	0.5	34.1	0.5	12	0.3	mg/L	500

Lab ID	669060		669061			
Regulation/Standard (If Applicable)	ODWS		ODWS			
Sample Description	MW5		MW13			
Anions	**Result**	**MDL**	**Result**	**MDL**	**Units**	**Regulation Criteria**
Chloride	8.58	0.3	2.5	0.3	mg/L	250
Nitrate (as N)	3.88	0.09	0.58	0.09	mg/L	10
Nitrite (as N)	<0.09	0.09	<0.09	0.09	mg/L	1
Sulphate	16.4	0.3	9.36	0.3	mg/L	500

Lab ID	669058		669059		669060			
Regulation/Standard (If Applicable)	ODWS		ODWS		ODWS			
Sample Description	MW2		MW4		MW5			
General Chemistry	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Units**	**Regulation Criteria**

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CERTIFICATE OF ANALYSIS

Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

Lab ID	669058		669059		669060			
Regulation/Standard (If Applicable)	ODWS		ODWS		ODWS			
Sample Description	MW2		MW4		MW5			
Ammonia	0.11	0.02	0.1	0.02	0.11	0.02	mg/L	N/A
Bicarbonate	266	1	284	1	286	1	mg/L	N/A
Carbonate	2.2	1	1.5	1	2.6	1	mg/L	N/A
Conductivity	559	1	719	1	552	1	µS/cm	N/A
M-Alkalinity (pH 4.5)	268	2	285	2	289	2	mg/L as CaCO3	N/A
pH	7.95	N/A	7.74	N/A	7.98	N/A	pH	N/A
Hardness	314	0.1	410	0.1	322	0.1	mg/L	100
TP	1.85	0.01	0.0288	0.002	0.484	0.002	mg/L	N/A

Lab ID	669061		669061[r]			
Regulation/Standard (If Applicable)	ODWS		ODWS			
Sample Description	MW13		MW13			
General Chemistry	**Result**	**MDL**	**Result**	**MDL**	**Units**	**Regulation Criteria**
Ammonia	0.084	0.02	0.077	0.02	mg/L	N/A
Bicarbonate	228	1			mg/L	N/A
Carbonate	2	1			mg/L	N/A
Conductivity	409	1	408	1	µS/cm	N/A
M-Alkalinity (pH 4.5)	230	2	280	2	mg/L as CaCO3	N/A
pH	7.96	N/A			pH	N/A
Hardness	228	0.1			mg/L	100
TP	0.212	0.002			mg/L	N/A

Lab ID	669058		669059		669060			
Regulation/Standard (If Applicable)	ODWS		ODWS		ODWS			
Sample Description	MW2		MW4		MW5			
Metals	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Units**	**Regulation Criteria**
Aluminum	<1	1	<1	1	<1	1	ug/L	N/A
Antimony	<0.5	0.5	<0.5	0.5	<0.5	0.5	ug/L	6
Arsenic	<1	1	1.6	1	<1	1	ug/L	25

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Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

Lab ID	669058		669059		669060			
Regulation/Standard (If Applicable)	ODWS		ODWS		ODWS			
Sample Description	MW2		MW4		MW5			
Barium	58	1	41.8	1	87.8	1	ug/L	1000
Beryllium	<0.5	0.5	<0.5	0.5	<0.5	0.5	ug/L	N/A
Bismuth	<1	1	<1	1	<1	1	ug/L	N/A
Boron	8.5	2	13.7	2	4.4	2	ug/L	5000
Cadmium	<0.1	0.1	<0.1	0.1	<0.1	0.1	ug/L	5
Calcium	97300	500	140000	500	98000	500	ug/L	N/A
Cerium	<1	1	<1	1	<1	1	ug/L	N/A
Cesium	<1	1	<1	1	<1	1	ug/L	N/A
Chromium	1.3	1	1.6	1	3.5	1	ug/L	50
Cobalt	0.27	0.1	0.33	0.1	0.21	0.1	ug/L	N/A
Copper	2	1	2	1	1.2	1	ug/L	1000
Europium	<1	1	<1	1	<1	1	ug/L	N/A
Gallium	2.7	1	2.1	1	3.6	1	ug/L	N/A
Iron	596	20	828	20	539	20	ug/L	300
Lanthanum	1.2	1	<1	1	<1	1	ug/L	N/A
Lead	<1	1	<1	1	<1	1	ug/L	10
Lithium	<5	5	<5	5	<5	5	ug/L	N/A
Magnesium	17200	4	14600	4	18800	4	ug/L	N/A
Manganese	3.6	1	2.8	1	1.3	1	ug/L	50
Mercury	0.13	0.1	<0.1	0.1	0.12	0.1	ug/L	1
Molybdenum	<1	1	<1	1	<1	1	ug/L	N/A
Nickel	6.3	1	7.8	1	5	1	ug/L	N/A
Niobium	<1	1	<1	1	<1	1	ug/L	N/A
Potassium	2340	1	2630	1	1560	1	ug/L	N/A
Rubidium	5	1	1.7	1	<1	1	ug/L	N/A
Scandium	4.9	1	4.8	1	5.6	1	ug/L	N/A
Selenium	<1	1	3.1	1	2.4	1	ug/L	10
Silicon	9660	2	8890	2	10600	2	ug/L	N/A
Silver	<0.1	0.1	<0.1	0.1	<0.1	0.1	ug/L	N/A
Sodium	3310	1	7140	1	2480	1	ug/L	20000

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Work Order Number:253489

Lab ID	669058		669059		669060			
Regulation/Standard (If Applicable)	ODWS		ODWS		ODWS			
Sample Description	MW2		MW4		MW5			
Strontium	138	10	207	10	144	10	ug/L	N/A
Sulphur	22800	800	21100	800	23100	800	ug/L	N/A
Tellurium	<1	1	<1	1	<1	1	ug/L	N/A
Thallium	<0.1	0.1	<0.1	0.1	<0.1	0.1	ug/L	N/A
Thorium	<1	1	<1	1	<1	1	ug/L	N/A
Tin	<1	1	<1	1	<1	1	ug/L	N/A
Titanium	2.3	1	1.9	1	2.4	1	ug/L	N/A
Tungsten	2.6	1	<1	1	1.4	1	ug/L	N/A
Uranium	<1	1	<1	1	<1	1	ug/L	20
Vanadium	9.4	1	8.3	1	9.1	1	ug/L	N/A
Yttrium	<1	1	<1	1	<1	1	ug/L	N/A
Zinc	3.6	1	5	1	4.1	1	ug/L	5000
Zirconium	<1	1	<1	1	<1	1	ug/L	N/A

Lab ID	669061		669061[r]			
Regulation/Standard (If Applicable)	ODWS		ODWS			
Sample Description	MW13		MW13			
Metals	**Result**	**MDL**	**Result**	**MDL**	**Units**	**Regulation Criteria**
Aluminum	<1	1	<1	1	ug/L	N/A
Antimony	<0.5	0.5	<0.5	0.5	ug/L	6
Arsenic	<1	1	<1	1	ug/L	25
Barium	20.4	1	22.9	1	ug/L	1000
Beryllium	<0.5	0.5	<0.5	0.5	ug/L	N/A
Bismuth	<1	1	<1	1	ug/L	N/A
Boron	<2	2	<2	2	ug/L	5000
Cadmium	<0.1	0.1	<0.1	0.1	ug/L	5
Calcium	71200	500	77800	500	ug/L	N/A
Cerium	<1	1	<1	1	ug/L	N/A
Cesium	<1	1	<1	1	ug/L	N/A
Chromium	<1	1	1.6	1	ug/L	50

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Work Order Number:253489

Lab ID	669061		669061[r]			
Regulation/Standard (If Applicable)	ODWS		ODWS			
Sample Description	MW13		MW13			
Cobalt	0.18	0.1	0.2	0.1	ug/L	N/A
Copper	<1	1	<1	1	ug/L	1000
Europium	<1	1	<1	1	ug/L	N/A
Gallium	<1	1	<1	1	ug/L	N/A
Iron	407	20	402	20	ug/L	300
Lanthanum	<1	1	<1	1	ug/L	N/A
Lead	<1	1	<1	1	ug/L	10
Lithium	<5	5	<5	5	ug/L	N/A
Magnesium	12100	4	12400	4	ug/L	N/A
Manganese	<1	1	<1	1	ug/L	50
Mercury	<0.1	0.1	<0.1	0.1	ug/L	1
Molybdenum	<1	1	<1	1	ug/L	N/A
Nickel	3.6	1	3.8	1	ug/L	N/A
Niobium	<1	1	<1	1	ug/L	N/A
Potassium	1120	1	1240	1	ug/L	N/A
Rubidium	1.5	1	1.4	1	ug/L	N/A
Scandium	4.5	1	4.9	1	ug/L	N/A
Selenium	<1	1	<1	1	ug/L	10
Silicon	8700	2	9450	2	ug/L	N/A
Silver	<0.1	0.1	<0.1	0.1	ug/L	N/A
Sodium	2080	1	1980	1	ug/L	20000
Strontium	110	1	103	1	ug/L	N/A
Sulphur	14100	800	14800	800	ug/L	N/A
Tellurium	<1	1	<1	1	ug/L	N/A
Thallium	<0.1	0.1	<0.1	0.1	ug/L	N/A
Thorium	<1	1	<1	1	ug/L	N/A
Tin	<1	1	5.5	1	ug/L	N/A
Titanium	2	1	3.1	1	ug/L	N/A
Tungsten	<1	1	1	1	ug/L	N/A
Uranium	<1	1	<1	1	ug/L	20

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Work Order Number:253489

Lab ID	669061		669061[r]			
Regulation/Standard (If Applicable)	ODWS		ODWS			
Sample Description	MW13		MW13			
Vanadium	9.6	1	7.3	1	ug/L	N/A
Yttrium	<1	1	<1	1	ug/L	N/A
Zinc	1.8	1	2.3	1	ug/L	5000
Zirconium	<1	1	<1	1	ug/L	N/A

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CERTIFICATE OF ANALYSIS

Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

QUALITY CONTROL DATA

THIS SECTION REPORTS QC RESULTS ASSOCIATED WITH THE TEST BATCH; THESE ARE NOT YOUR SAMPLE RESULTS

A42-Ammonia Water

%RPD

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Ammonia	N/A	%	0	N/A	20	20150921.T42A

Blank

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Ammonia	0.01	mg/L	0	<0.01	0.03	20150921.T42A

CRM

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Ammonia	0.02	mg/L	9.24	12	12.3	20150921.T42A

Positive Control

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Ammonia	0.01	mg/L	0.2	0.297	0.3	20150921.T42A

T01-Alkalinity

%RPD

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
M-ALK	N/A	%	0	19.6	20	20150923.T01A

Positive Control

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
M-ALK	2	mg/L as CaCO3	85	112	115	20150923.T01A

T02-pH Water

%RPD

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
pH	N/A	pH	0	0	0.2	20150923.T02A

Positive Control

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
pH	N/A	pH	7.86	8.01	8.14	20150923.T02A

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CERTIFICATE OF ANALYSIS

Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

T05-Anions Water

%RPD

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Chloride	N/A	%	0	3.9	20	20150923.T05A
Nitrate	N/A	%	0	3.3	20	20150923.T05A
Nitrite	N/A	%	0	N/A	20	20150923.T05A
Sulfate	N/A	%	0	4.9	20	20150923.T05A

Method Blank

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Chloride	0.05	mg/L	0	<0.05	0.15	20150923.T05A
Nitrate	0.01	mg/L	0	<0.01	0.045	20150923.T05A
Nitrite	0.01	mg/L	0	<0.01	0.045	20150923.T05A
Sulfate	0.05	mg/L	0	<0.05	0.15	20150923.T05A

Positive Control

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Chloride	0.05	mg/L	8	9.01	12	20150923.T05A
Nitrate	0.01	mg/L	1.8	1.94	2.7	20150923.T05A
Nitrite	0.01	mg/L	2.4	2.89	3.6	20150923.T05A
Sulfate	0.05	mg/L	20	22.8	30	20150923.T05A

Sample Spike

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Chloride	N/A	% Rec	70	83.4	130	20150923.T05A
Nitrate	N/A	% Rec	70	76	130	20150923.T05A
Nitrite	N/A	% Rec	70	89.8	130	20150923.T05A
Sulfate	N/A	% Rec	70	85.8	130	20150923.T05A

T12-CONDWATER

%RPD

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
cond	N/A	%	0	0.2	20	20150923.T12A

Positive Control

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
cond	1	µS/cm	75	105	125	20150923.T12A

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CERTIFICATE OF ANALYSIS

Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

T13-ICPMS Water

%RPD

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Ag	N/A	%	0	N/A	20	20150925.T13A
Al	N/A	%	0	N/A	20	20150925.T13A
As	N/A	%	0	N/A	20	20150925.T13A
B	N/A	%	0	N/A	20	20150925.T13A
Ba	N/A	%	0	11	20	20150925.T13A
Be	N/A	%	0	N/A	20	20150925.T13A
Bi	N/A	%	0	N/A	20	20150925.T13A
Ca	N/A	%	0	8	20	20150925.T13A
Cd	N/A	%	0	N/A	20	20150925.T13A
Ce	N/A	%	0	N/A	20	20150925.T13A
Co	N/A	%	0	N/A	20	20150925.T13A
Cr	N/A	%	0	N/A	20	20150925.T13A
Cs	N/A	%	0	N/A	20	20150925.T13A
Cu	N/A	%	0	N/A	20	20150925.T13A
Eu	N/A	%	0	N/A	20	20150925.T13A
Fe	N/A	%	0	1	20	20150925.T13A
Ga	N/A	%	0	N/A	20	20150925.T13A
Hg	N/A	%	0	N/A	20	20150925.T13A
K	N/A	%	0	10	20	20150925.T13A
La	N/A	%	0	N/A	20	20150925.T13A
Li	N/A	%	0	N/A	20	20150925.T13A
Mg	N/A	%	0	2	20	20150925.T13A
Mn	N/A	%	0	N/A	20	20150925.T13A
Mo	N/A	%	0	N/A	20	20150925.T13A
Na	N/A	%	0	4	20	20150925.T13A
Nb	N/A	%	0	N/A	20	20150925.T13A
Ni	N/A	%	0	N/A	20	20150925.T13A
Pb	N/A	%	0	N/A	20	20150925.T13A
Rb	N/A	%	0	N/A	20	20150925.T13A
S	N/A	%	0	4	20	20150925.T13A

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Work Order Number:253489

Sb	N/A	%	0	N/A	20	20150925.T13A
Sc	N/A	%	0	N/A	20	20150925.T13A
Se	N/A	%	0	N/A	20	20150925.T13A
Si	N/A	%	0	8	20	20150925.T13A
Sn	N/A	%	0	N/A	20	20150925.T13A
Sr	N/A	%	0	6	20	20150925.T13A
Te	N/A	%	0	N/A	20	20150925.T13A
Th	N/A	%	0	N/A	20	20150925.T13A
Ti	N/A	%	0	N/A	20	20150925.T13A
Tl	N/A	%	0	N/A	20	20150925.T13A
U	N/A	%	0	N/A	20	20150925.T13A
V	N/A	%	0	N/A	20	20150925.T13A
W	N/A	%	0	N/A	20	20150925.T13A
Y	N/A	%	0	N/A	20	20150925.T13A
Zn	N/A	%	0	N/A	20	20150925.T13A
Zr	N/A	%	0	N/A	20	20150925.T13A

Blank

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Ag	0.1	ug/L	0	<0.1	0.1	20150925.T13A
Al	1	ug/L	0	<1	1	20150925.T13A
As	1	ug/L	0	<1	1	20150925.T13A
B	2	ug/L	0	<2	2	20150925.T13A
Ba	1	ug/L	0	<1	1	20150925.T13A
Be	0.5	ug/L	0	<0.5	0.5	20150925.T13A
Bi	1	ug/L	0	<1	3	20150925.T13A
Ca	50	ug/L	0	<50	50	20150925.T13A
Cd	0.1	ug/L	0	<0.1	0.1	20150925.T13A
Ce	0.1	ug/L	0	<0.1	0.1	20150925.T13A
Co	0.1	ug/L	0	<0.1	0.1	20150925.T13A
Cr	1	ug/L	0	<1	1	20150925.T13A
Cs	1	ug/L	0	<1	1	20150925.T13A
Cu	1	ug/L	0	<1	1	20150925.T13A
Eu	1	ug/L	0	<1	1	20150925.T13A

6820 Kitimat Road Unit 4, Mississauga, ON, L5N 5M3
Phone: (905) 821-2095 Fax: (905) 821-2095 Web: www.testmark.ca

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Company: Whitewater Hydrogeology Ltd.

Work Order Number:253489

Fe	20	ug/L	0	<20	20	20150925.T13A
Ga	1	ug/L	0	<1	1	20150925.T13A
Hg	0.1	ug/L	0	<0.1	0.1	20150925.T13A
K	1	ug/L	0	<1	1	20150925.T13A
La	1	ug/L	0	<1	1	20150925.T13A
Li	5	ug/L	0	<5	5	20150925.T13A
Mg	4	ug/L	0	<4	4	20150925.T13A
Mn	1	ug/L	0	<1	1	20150925.T13A
Mo	1	ug/L	0	<1	1	20150925.T13A
Na	1	ug/L	0	<1	1	20150925.T13A
Nb	1	ug/L	0	<1	1	20150925.T13A
Ni	1	ug/L	0	<1	1	20150925.T13A
Pb	1	ug/L	0	<1	1	20150925.T13A
Rb	1	ug/L	0	<1	1	20150925.T13A
S	800	ug/L	0	<800	800	20150925.T13A
Sb	0.5	ug/L	0	<0.5	0.5	20150925.T13A
Sc	1	ug/L	0	<1	1	20150925.T13A
Se	1	ug/L	0	<1	1	20150925.T13A
Si	1	ug/L	0	<1	1	20150925.T13A
Sn	1	ug/L	0	<1	1	20150925.T13A
Sr	1	ug/L	0	<1	1	20150925.T13A
Te	1	ug/L	0	<1	1	20150925.T13A
Th	1	ug/L	0	<1	1	20150925.T13A
Ti	1	ug/L	0	<1	1	20150925.T13A
Tl	0.1	ug/L	0	<0.1	0.1	20150925.T13A
U	1	ug/L	0	<1	1	20150925.T13A
V	1	ug/L	0	<1	1	20150925.T13A
W	1	ug/L	0	<1	1	20150925.T13A
Y	1	ug/L	0	<1	1	20150925.T13A
Zn	1	ug/L	0	<1	1	20150925.T13A
Zr	1	ug/L	0	<1	1	20150925.T13A

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Work Order Number:253489

CRM

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Al	1	ug/L	89.9	103	110.1	20150925.T13A
As	1	ug/L	8.78	12.2	12.4	20150925.T13A
B	2	ug/L	63.4	86	94.7	20150925.T13A
Ba	1	ug/L	7.12	8.1	8.7	20150925.T13A
Be	0.5	ug/L	1.86	2	2.1	20150925.T13A
Ca	50	ug/L	365	402	599	20150925.T13A
Cd	0.1	ug/L	1.74	1.87	2.19	20150925.T13A
Co	0.1	ug/L	8.53	11	11	20150925.T13A
Cr	1	ug/L	11.7	12.1	13.7	20150925.T13A
Cu	1	ug/L	13.6	15.5	17.6	20150925.T13A
Fe	20	ug/L	24.1	27	31.6	20150925.T13A
K	1	ug/L	362	428	446	20150925.T13A
Mg	4	ug/L	41.5	42	50.1	20150925.T13A
Mn	1	ug/L	5.27	6.2	6.43	20150925.T13A
Mo	1	ug/L	19.8	22.3	25.3	20150925.T13A
Na	1	ug/L	190	219	268	20150925.T13A
Ni	1	ug/L	17.9	21	21.9	20150925.T13A
Pb	1	ug/L	3.65	4.2	4.35	20150925.T13A
Sb	0.5	ug/L	10.6	12.4	13.2	20150925.T13A
Se	1	ug/L	52.2	61.4	64.9	20150925.T13A
Sr	1	ug/L	131	144	151	20150925.T13A
Tl	0.1	ug/L	5.36	7.08	7.11	20150925.T13A
V	1	ug/L	12.5	13.7	14.7	20150925.T13A
Zn	1	ug/L	38.9	46.1	46.2	20150925.T13A

Positive Control

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Al	N/A	%	80	111	120	20150925.T13A
As	N/A	%	80	111	120	20150925.T13A
B	N/A	%	80	117	120	20150925.T13A
Ba	N/A	%	80	88	120	20150925.T13A
Be	N/A	%	80	117	120	20150925.T13A

6820 Kitimat Road Unit 4, Mississauga, ON, L5N 5M3
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CERTIFICATE OF ANALYSIS

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Work Order Number:253489

Ca	N/A	%	80	109	120	20150925.T13A
Cd	N/A	%	80	91	120	20150925.T13A
Co	N/A	%	80	117	120	20150925.T13A
Cr	N/A	%	90	113	120	20150925.T13A
Cu	N/A	%	80	114	120	20150925.T13A
Fe	N/A	%	80	107	120	20150925.T13A
Hg	N/A	%	80	101	120	20150925.T13A
K	N/A	%	80	104	120	20150925.T13A
Mg	N/A	%	80	102	120	20150925.T13A
Mn	N/A	%	80	115	120	20150925.T13A
Mo	N/A	%	80	92	120	20150925.T13A
Na	N/A	%	80	108	120	20150925.T13A
Ni	N/A	%	80	115	120	20150925.T13A
Pb	N/A	%	80	110	120	20150925.T13A
S	N/A	%	80	111	120	20150925.T13A
Sb	N/A	%	80	82	120	20150925.T13A
Se	N/A	%	80	106	120	20150925.T13A
Si	N/A	%	80	108	120	20150925.T13A
Tl	N/A	%	80	106	120	20150925.T13A
U	N/A	%	80	110	120	20150925.T13A
V	N/A	%	80	114	120	20150925.T13A
Zn	N/A	%	80	111	120	20150925.T13A

Sample Spike

Parameter	MDL	Units	LCL	Result	UCL	QAQCID
Al	N/A	% Rec	70	91	130	20150925.T13A
As	N/A	% Rec	70	104	130	20150925.T13A
B	N/A	% Rec	70	113	130	20150925.T13A
Ba	N/A	% Rec	70	99	130	20150925.T13A
Be	N/A	% Rec	70	112	130	20150925.T13A
Ca	N/A	% Rec	70	100	130	20150925.T13A
Cd	N/A	% Rec	70	80	130	20150925.T13A
Co	N/A	% Rec	70	108	130	20150925.T13A
Cr	N/A	% Rec	70	111	130	20150925.T13A

6820 Kitimat Road Unit 4, Mississauga, ON, L5N 5M3
Phone: (905) 821-2095 Fax: (905) 821-2095 Web: www.testmark.ca

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Company: Whitewater Hydrogeology Ltd. Work Order Number:253489

Cu	N/A	% Rec	70	120	130	20150925.T13A
Fe	N/A	% Rec	70	100	130	20150925.T13A
Mg	N/A	% Rec	70	91	130	20150925.T13A
Mn	N/A	% Rec	70	108	130	20150925.T13A
Mo	N/A	% Rec	70	91	130	20150925.T13A
Ni	N/A	% Rec	70	123	130	20150925.T13A
Pb	N/A	% Rec	70	108	130	20150925.T13A
Sb	N/A	% Rec	70	89	130	20150925.T13A
Se	N/A	% Rec	70	100	130	20150925.T13A
Tl	N/A	% Rec	70	103	130	20150925.T13A
V	N/A	% Rec	70	101	130	20150925.T13A
Zn	N/A	% Rec	70	102	130	20150925.T13A

LEGEND

% Rec	Surrogate compounds are added to the sample in some cases and the recovery is reported as a % recovered
Back	Background
EC	Escherichia coli
FC	Fecal Coliforms
HPC	Heterotrophic Plate Count
INT	Interferences are evident on the plate and therefore bacterial colonies cannot be properly counted (interferences can be anything that inhibit the proper growth and formation of target colonies)
LCL	Lower Control Limit
Matrix	If the matrix is a leachate, the sample was extracted according to Regulation 558
MDL	Method detection limit or minimum reporting limit
NDOGN	No Data, Overgrown with Non-Target
NDOGT	No Data, Overgrown with Target
TC	Total Coliforms
QAQCID	This is a unique reference to the quality control data set used to generate the reported value. Contact our lab for this information, as it is traceable through our LIMS.
UCL	Upper Control Limit

Any QC data is available on request.
For the analysis of Total Petroleum Hydrocarbons, the Chromatogram descended to the baseline at or before nC50; if F4G results are reported, they are not to be added to the C6 to C50 results.
BTEX and selected PAHs have been subtracted from the appropriate fractions only if the parameter names are F1-BTEX, F2-NAPTH, and F3-PAH, otherwise these compounds have not been subtracted from their respective fractions.
Data reported for organic analysis in soils samples are corrected for moisture content.
An "r" after the Lab ID indicates a laboratory replicate.

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APPENDIX D

WATER BALANCE ASSESSMENT

Date	PET	P	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal
Mar-62	16.5	39.7	-16.5	117.1	32.9	-16.5	39.7	0	5.1
Aug-62	78.1	120.6	62.4	75	78.1	0	19.8	104.5	25
Apr-62	33.9	141.7	117.7	75	33.9	0	9.9	117.7	43.5
Jan-62	8	155.2	-8	67	8	0	165.1	0	34.8
Jun-62	79.6	166.3	169.2	75	79.6	0	82.5	161.3	60.1
May-62	67.7	188.4	162	75	67.7	0	41.3	162	80.5
Dec-62	9.5	230	-9.5	65.5	9.5	0	271.3	0	64.4
Feb-62	8.4	257.1	-8.4	58.2	7.3	1.1	528.4	0	51.5
Sep-62	5.5	288.3	-5.5	53.9	4.3	1.2	816.7	0	41.2
Jul-62	83.4	293.2	618.2	75	83.4	0	408.4	597.2	152.4
Nov-62	15.3	378.3	379.6	75	15.3	0	391.8	379.6	197.8
Oct-62	31.4	433.6	598.1	75	31.4	0	195.9	598.1	277.9
Jun-63	81.8	48.7	64.8	75	81.8	0	97.9	64.8	235.3
Feb-63	7.5	53.9	-7.5	67.5	7.5	0	151.9	0	188.2
Oct-63	4.9	59.4	-4.9	63	4.4	0.5	211.2	0	150.6
Jan-63	7.5	82.6	-7.5	56.7	6.3	1.2	293.8	0	120.5
Mar-63	18.1	185.2	43.5	75	18.1	0	417.4	25.2	101.4
Dec-63	8	190	-8	67	8	0	607.4	0	81.1
Apr-63	4.2	198.3	-4.2	63.3	3.7	0.4	805.7	0	64.9
Sep-63	43.7	219.3	578.4	75	43.7	0	402.8	566.7	165.3
Jul-63	93.7	228.7	336.4	75	93.7	0	201.4	336.4	199.5
Nov-63	19.4	237	318.3	75	19.4	0	100.7	318.3	223.2
Aug-63	70.1	258.1	238.4	75	70.1	0	50.4	238.4	226.3
May-63	51.6	306.8	280.3	75	51.6	0	25.2	280.3	237.1
Sep-64	48.3	72	36.3	75	48.3	0	12.6	36.3	196.9
Nov-64	17.8	107.7	96.2	75	17.8	0	6.3	96.2	176.8
Feb-64	9.5	109.7	-9.5	65.5	9.5	0	116	0	141.4
Jun-64	78.7	112.7	92	75	78.7	0	58	82.5	129.6
Oct-64	27.7	117.1	118.4	75	27.7	0	29	118.4	127.4
May-64	63	192.3	143.7	75	63	0	14.5	143.7	130.7
Dec-64	10.6	211	-10.6	64.4	10.6	0	225.5	0	104.5
Jan-64	10.1	233.9	-10.1	55.7	8.7	1.4	459.3	0	83.6
Mar-64	17.5	237.4	17.2	72.9	17.5	0	662	0	66.9
Apr-64	31.4	239.7	539.3	75	31.4	0	331	537.2	161
Aug-64	67.3	439	537.3	75	67.3	0	165.5	537.3	236.2
Jul-64	99.3	492.3	475.7	75	99.3	0	82.8	475.7	284.1
Jun-65	74.3	117.7	84.7	75	74.3	0	41.4	84.7	244.2
Apr-65	26.4	160.7	125.4	75	26.4	0	50.3	125.4	220.5
Mar-65	14.8	161.9	-14.8	60.2	14.8	0	212.2	0	176.4
Jul-65	77.9	189	217.2	75	77.9	0	106.1	202.4	181.6
Dec-65	12.2	239.7	47	75	12.2	0	286.6	47	154.6
May-65	62.2	242.3	323.3	75	62.2	0	143.3	323.3	188.4
Sep-65	51.6	269.7	289.7	75	51.6	0	71.6	289.7	208.6
Jan-65	8.4	286.4	-8.4	66.6	8.4	0	358.1	0	166.9
Aug-65	73.5	311.3	416.8	75	73.5	0	179	408.4	215.2
Nov-65	16.1	311.7	308.1	75	16.1	0	166.6	308.1	233.8
Feb-65	9.8	345	-9.8	65.2	9.8	0	511.6	0	187
Oct-65	3.7	390.6	-3.7	62	3.2	0.5	902.2	0	149.6
Jul-66	97.7	130.3	483.7	75	97.7	0	451.1	470.7	213.8
Feb-66	10.4	132.9	-10.4	64.6	10.4	0	584	0	171.1
Apr-66	28.9	160.3	421.6	75	28.9	0	293.9	411.1	219.1
Oct-66	28.7	169	287.3	75	28.7	0	146.9	287.3	232.7

Date	PET	P	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal
Mar-66	19.5	194.2	96.7	75	19.5	0	224.9	96.7	205.5
Jan-66	8.3	217.7	-8.3	66.7	8.3	0	442.6	0	164.4
May-66	47.6	222.6	396.3	75	47.6	0	221.3	388	209.1
Dec-66	1.4	232.9	-1.4	73.6	1.4	0	454.2	0	167.3
Aug-66	78.8	241	389.2	75	78.8	0	227.1	387.9	211.4
Sep-66	45.4	293.3	361.5	75	45.4	0	113.5	361.5	241.4
Jun-66	82.1	337.3	312	75	82.1	0	56.8	312	255.5
Nov-66	17.4	376	373.4	75	17.4	0	42	373.4	279.1
Mar-67	16.4	71.3	-16.4	58.6	16.4	0	113.3	0	223.3
May-67	44.3	145.8	158.1	75	44.3	0	56.7	141.7	207
Feb-67	8	167.1	-8	67	8	0	223.8	0	165.6
Jan-67	1.5	214.2	-1.5	65.7	1.3	0.2	438	0	132.5
Nov-67	14.3	222.3	198.1	75	14.3	0	447.9	188.8	143.7
Apr-67	32.1	249.3	441.2	75	32.1	0	223.9	441.2	203.2
Sep-67	45.4	253.3	319.9	75	45.4	0	112	319.9	226.6
Jul-67	86.8	254.2	223.3	75	86.8	0	56	223.3	225.9
Dec-67	11.1	284.8	-11.1	63.9	11.1	0	340.8	0	180.7
Oct-67	29.4	322.9	463.9	75	29.4	0	170.4	452.7	235.1
Aug-67	71.1	360.6	374.8	75	71.1	0	85.2	374.8	263.1
Jun-67	90	639.7	592.2	75	90	0	42.6	592.2	328.9
Apr-68	36.6	135	119.7	75	36.6	0	21.3	119.7	287.1
Mar-68	19.9	177.7	76.5	75	19.9	0	102.7	76.5	244.9
Jun-68	79.3	206.3	178.4	75	79.3	0	51.4	178.4	231.6
Jan-68	7.8	211.6	-7.8	67.2	7.8	0	263	0	185.3
Oct-68	33.6	217.1	315	75	33.6	0	131.5	307.2	209.7
Jul-68	92.4	221.3	194.6	75	92.4	0	65.7	194.6	206.7
Dec-68	9.3	237.4	-9.3	65.7	9.3	0	303.2	0	165.3
May-68	50	298.7	400.3	75	50	0	151.6	391	210.5
Nov-68	16	359	330.3	75	16	0	164.3	330.3	234.4
Sep-68	56	418.3	444.5	75	56	0	82.2	444.5	276.5
Aug-68	78.4	485.2	447.8	75	78.4	0	41.1	447.8	310.7
Sep-69	51.3	53	22.2	75	51.3	0	20.5	22.2	253
Feb-69	10	140.4	-10	65	10	0	160.9	0	202.4
Dec-69	9	168.4	-9	57.2	7.8	1.2	329.3	0	161.9
Jul-69	89.9	181	255.8	75	89.9	0	164.6	238	177.1
Mar-69	15.9	181.3	-15.9	59.1	15.9	0	345.9	0	141.7
Aug-69	86.7	181.9	268.2	75	86.7	0	173	252.3	163.8
Jan-69	9.3	205.5	-9.3	65.7	9.3	0	378.4	0	131.1
Oct-69	29	264.5	424.7	75	29	0	189.2	415.4	187.9
May-69	54.9	271	310.7	75	54.9	0	94.6	310.7	212.5
Jun-69	73.2	285.7	259.7	75	73.2	0	47.3	259.7	221.9
Nov-69	17	342.7	323.5	75	17	0	49.5	323.5	242.2
Apr-69	34.4	391.7	382	75	34.4	0	24.8	382	270.2
Feb-70	9.1	82.5	-9.1	65.9	9.1	0	107.3	0	216.2
Jan-70	7.1	146.1	-7.1	59.7	6.2	0.9	253.4	0	172.9
Mar-70	15.1	157.1	-15.1	47.7	12.1	3.1	410.5	0	138.3
Jun-70	80.3	179	304	75	80.3	0	205.2	276.6	166
Nov-70	17.5	191	269.4	75	17.5	0	109.3	269.4	186.7
May-70	60	228.7	223.4	75	60	0	54.7	223.4	194
Apr-70	33	241.7	236	75	33	0	27.3	236	202.4
Dec-70	9.2	259.4	-9.2	65.8	9.2	0	286.7	0	161.9
Aug-70	80.4	278.7	341.6	75	80.4	0	143.3	332.5	196

Date	PET	P	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal
Jul-70	96.7	293.2	268.2	75	96.7	0	71.7	268.2	210.5
Oct-70	32.3	327.1	330.7	75	32.3	0	35.8	330.7	234.5
Sep-70	52.2	369.3	335.1	75	52.2	0	17.9	335.1	254.6
Sep-71	57.6	73	24.3	75	57.6	0	9	24.3	208.6
Apr-71	28.7	86.7	61.5	75	28.7	0	5.4	61.5	179.2
May-71	54.8	99.7	50.2	75	54.8	0	0	50.2	153.4
Mar-71	14.9	118.7	-14.9	60.1	14.9	0	118.7	0	122.7
Oct-71	38.7	121.9	142.6	75	38.7	0	59.4	127.8	123.7
Jan-71	7.6	142.3	-7.6	67.4	7.6	0	201.6	0	99
Nov-71	16.2	149.7	187.4	75	16.2	0	147.6	179.9	115.1
Feb-71	10.3	240.7	-10.3	64.7	10.3	0	388.3	0	92.1
Jun-71	86.9	272	379.3	75	86.9	0	194.2	369	147.5
Jul-71	87.5	281	290.5	75	87.5	0	97.1	290.5	176.1
Aug-71	76	314.5	287	75	76	0	48.5	287	198.3
Dec-71	11.8	343.2	16.5	75	11.8	0	363.5	16.5	161.9
Jul-72	93.8	119	207	75	93.8	0	181.8	207	170.9
Aug-72	77.1	137.4	151.2	75	77.1	0	90.9	151.2	167
Sep-72	53.1	168.7	161	75	53.1	0	45.4	161	165.8
May-72	61.9	181.3	142.1	75	61.9	0	22.7	142.1	161.1
Jan-72	9.2	181.9	-9.2	65.8	9.2	0	204.7	0	128.8
Feb-72	8.7	193.8	-8.7	58.2	7.7	1.1	398.4	0	103.1
Apr-72	26	200.7	280.9	75	26	0	292.2	264.1	135.3
Nov-72	14.7	207	183	75	14.7	0	301.5	183	144.8
Mar-72	14	283.6	-14	61	14	0	585	0	115.9
Jun-72	72.4	365.3	585.4	75	72.4	0	292.5	571.4	207
Oct-72	25.7	375.2	495.8	75	25.7	0	146.3	495.8	264.7
Dec-72	10.7	400.3	-10.7	64.3	10.7	0	546.6	0	211.8
Jan-73	10.2	142.6	-10.2	55.6	8.7	1.5	689.2	0	169.4
Jul-73	98.3	148.1	394.3	75	98.3	0	344.6	374.9	210.5
Feb-73	8.6	153.2	-8.6	66.4	8.6	0	497.8	0	168.4
Sep-73	52	166.7	363.6	75	52	0	248.9	355	205.7
Dec-73	10.2	243.9	-10.2	64.8	10.2	0	492.8	0	164.6
Apr-73	34.3	256	468.1	75	34.3	0	246.4	457.9	223.2
Jun-73	88.8	259.3	293.8	75	88.8	0	123.2	293.8	237.3
Nov-73	16.9	297.7	310.4	75	16.9	0	93.6	310.4	252
Oct-73	33.9	307.4	320.3	75	33.9	0	46.8	320.3	265.6
Mar-73	23.7	316.4	289.1	75	23.7	0	50.4	289.1	270.3
May-73	52.4	316.4	289.3	75	52.4	0	25.2	289.3	274.1
Aug-73	92.8	373.2	293.1	75	92.8	0	12.6	293.1	277.9
Jul-74	97	107.7	17	75	97	0	6.3	17	225.7
Oct-74	28.1	117.7	95.9	75	28.1	0	0	95.9	199.8
Dec-74	12	134.5	8.1	75	12	0	114.4	8.1	161.4
Sep-74	47.9	169.7	179	75	47.9	0	57.2	179	164.9
Mar-74	17.3	194.8	-7.3	67.7	17.3	0	242	0	132
Jun-74	80	216.7	257.7	75	80	0	121	250.4	155.6
Feb-74	8.4	248.6	-8.4	66.6	8.4	0	369.6	0	124.5
Aug-74	84.1	311.6	412.3	75	84.1	0	184.8	403.9	180.4
Jan-74	9.7	330.3	-9.7	65.3	9.7	0	515.1	0	144.3
Nov-74	17.1	334	528	75	17.1	0	304	518.3	219.1
May-74	50.3	342.6	444.2	75	50.3	0	152	444.2	264.1
Apr-74	35.3	347.3	388	75	35.3	0	76	388	288.9

Date	PET	P	P-PET	Soil Moisture		AET	PET-AET	Snow Storage	Surplus	ROtotal
Oct-75	32.2	91.9	97.7	75		32.2	0	38	97.7	250.7
Jan-75	10.8	169.4	-10.8	64.2		10.8	0	207.3	0	200.5
Nov-75	21	175	257.7	75		21	0	103.7	246.8	209.8
May-75	72.2	191.6	171.2	75		72.2	0	51.8	171.2	202.1
Apr-75	25.3	192.7	136.8	75		25.3	0	82.4	136.8	189
Mar-75	15.5	214.2	-15.5	59.5		15.5	0	296.6	0	151.2
Sep-75	45.1	217.3	320.6	75		45.1	0	148.3	305.1	182
Jun-75	88.2	221.7	207.7	75		88.2	0	74.2	207.7	187.1
Dec-75	1.3	268.4	-1.3	73.7		1.3	0	342.5	0	149.7
Jul-75	100.3	274.5	345.5	75.0	1	0.3	0	171.3	344.2	188.6
Feb-75	10.8	323.6	-10.8	64.2		10.8	0	494.8	0	150.9
Aug-75	81.8	380.6	546.3	75		81.8	0	247.4	535.5	227.8
Nov-76	13.4	119.3	57.2	75		13.4	0	296.2	57.2	193.7
Dec-76	8	134.5	-8	67		8	0	430.7	0	154.9
Oct-76	25	240.6	431	75		25	0	215.3	423	208.6
Apr-76	36	242	313.6	75		36	0	107.7	313.6	229.6
Jun-76	90.3	254.3	217.9	75		90.3	0	53.8	217.9	227.2
May-76	52.7	275.5	249.7	75		52.7	0	26.9	249.7	231.7
Jan-76	7.5	286.1	-7.5	67.5		7.5	0	313	0	185.4
Feb-76	1.4	314.1	-1.4	66.2		1.3	0.1	627.2	0	148.3
Mar-76	19.2	342.6	222	75		19.2	0	728.5	213.2	161.3
Jul-76	90.8	364.2	637.6	75		90.8	0	364.3	637.6	256.6
Sep-76	49.1	389	522	75		49.1	0	182.1	522	309.6
May-77	66.3	76.4	101.3	75		66.3	0	91.1	101.3	268
Feb-77	9.6	118.9	-9.6	65.4		9.6	0	210	0	214.4
Apr-77	36.5	135.7	204.2	75		36.5	0	105	194.6	210.4
Jan-77	6.6	234.5	-6.6	68.4		6.6	0	339.5	0	168.3
Jun-77	75.3	243.3	337.8	75		75.3	0	169.8	331.2	200.9
Mar-77	21.3	274.8	222.5	75		21.3	0	200.8	222.5	205.2
Oct-77	28.2	280	352.2	75		28.2	0	100.4	352.2	234.6
Nov-77	17.4	286.3	306.7	75		17.4	0	62.7	306.7	249
Jul-77	100.8	291.3	221.8	75.0	1	0.8	0	31.3	221.8	243.6
Dec-77	9.6	369.7	-9.6	65.4		9.6	0	401	0	194.9
Sep-77	51.1	476.3	625.8	75		51.1	0	200.5	616.2	279.1
Aug-77	76.7	529	552.6	75		76.7	0	100.3	552.6	333.8
Feb-78	7.4	61.4	-7.4	67.6		7.4	0	161.7	0	267.1
Jul-78	95.5	76.8	62.1	75		95.5	0	80.8	54.7	224.6
Oct-78	28.9	145.8	157.4	75		28.9	0	40.4	157.4	211.1
Mar-78	14.7	161.3	-14.7	60.3		14.7	0	201.7	0	168.9
Apr-78	28.1	205.3	260.5	75		28.1	0	118.5	245.7	184.3
Nov-78	16.2	210.3	207.8	75		16.2	0	104.8	207.8	189
Jun-78	80.4	216	188	75		80.4	0	52.4	188	188.8
Dec-78	10.6	234.8	-10.6	64.4		10.6	0	287.2	0	151
Jan-78	7.9	266.1	-7.9	57.7		6.7	1.1	553.4	0	120.8
May-78	60.7	323.2	539.2	75		60.7	0	276.7	521.9	201
Aug-78	82.8	496.1	551.6	75		82.8	0	138.3	551.6	271.2
Sep-78	49.2	507.3	527.3	75		49.2	0	69.2	527.3	322.4
Jul-79	94.8	80.6	20.4	75		94.8	0	34.6	20.4	262
Feb-79	6.9	104.3	-6.9	68.1		6.9	0	138.9	0	209.6
Sep-79	50.9	124.7	143.2	75		50.9	0	69.4	136.3	194.9
Jan-79	8.2	216.8	-8.2	66.8		8.2	0	286.2	0	155.9
Jun-79	81.5	261.3	322.9	75		81.5	0	143.1	314.7	187.7

Date	PET	P	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal
Mar-79	20.5	269	177.7	75	20.5	0	213.9	177.7	185.7
May-79	55.7	281.9	333.2	75	55.7	0	107	333.2	215.2
Aug-79	75.4	287.7	265.8	75	75.4	0	53.5	265.8	225.3
Dec-79	11.6	294.2	-7.7	67.3	11.6	0	343.8	0	180.3
Oct-79	28.7	361.9	505.1	75	28.7	0	171.9	497.4	243.7
Nov-79	17	368	402.4	75	17	0	120.5	402.4	275.4
Apr-79	29.9	380.7	411	75	29.9	0	60.2	411	302.5
Feb-80	8.5	66.6	-8.5	66.5	8.5	0	126.8	0	242
May-80	63	110.3	110.7	75	63	0	63.4	102.2	214.1
Aug-80	87.7	148.4	92.4	75	87.7	0	31.7	92.4	189.7
Jan-80	9.5	152.9	-9.5	65.5	9.5	0	184.6	0	151.8
Nov-80	15	169.3	149	75	15	0	189.9	139.5	149.3
Dec-80	8.3	191.6	-8.3	66.7	8.3	0	381.5	0	119.5
Mar-80	16.4	206.4	-16.4	52.2	14.6	1.8	588	0	95.6
Oct-80	25.2	212.9	481.7	75	25.2	0	294	458.8	168.2
Sep-80	48.9	286.7	384.7	75	48.9	0	147	384.7	211.5
Jun-80	69.7	340	343.8	75	69.7	0	73.5	343.8	238
Apr-80	32.5	372.3	376.6	75	32.5	0	36.7	376.6	265.7
Jul-80	95.8	503.9	426.4	75	95.8	0	18.4	426.4	297.8
Jan-81	7.1	41.9	-7.1	67.9	7.1	0	60.3	0	238.3
Mar-81	18.5	100.6	16.5	75	18.5	0	125.9	9.4	192.5
Dec-81	10.6	143.9	-10.6	64.4	10.6	0	269.8	0	154
Apr-81	34.8	145.3	245.4	75	34.8	0	134.9	234.8	170.2
Feb-81	12.5	191.8	-12.5	62.5	12.5	0	326.7	0	136.1
May-81	54.2	193.6	302.7	75	54.2	0	163.3	290.3	167
Nov-81	16.7	206	238.4	75	16.7	0	114.2	238.4	181.2
Oct-81	25.8	295.5	326.8	75	25.8	0	57.1	326.8	210.4
Sep-81	49.1	296	275.5	75	49.1	0	28.6	275.5	223.4
Jun-81	83.1	339.3	270.5	75	83.1	0	14.3	270.5	232.8
Jul-81	96.4	372.3	283	75	96.4	0	7.1	283	242.9
Aug-81	78.4	438.7	367.4	75	78.4	0	0	367.4	267.8
Feb-82	9	75	-9	66	9	0	75	0	214.2
Oct-82	31	132.9	139.4	75	31	0	37.5	130.4	197.5
Apr-82	29.2	186.7	176.2	75	29.2	0	18.8	176.2	193.2
May-82	69.8	195.5	135.1	75	69.8	0	9.4	135.1	181.6
Jan-82	7	203.9	-7	68	7	0	213.2	0	145.3
Mar-82	16.4	226.4	-16.4	53.1	14.9	1.5	439.7	0	116.2
Jul-82	97.3	270.3	392.9	75	97.3	0	219.8	371	167.2
Dec-82	13.1	329.7	174.1	75	13.1	0	362.3	174.1	168.6
Sep-82	49.7	369.3	500.8	75	49.7	0	181.1	500.8	235
Aug-82	70.5	427.7	447.8	75	70.5	0	90.6	447.8	277.6
Jun-82	71.1	442	416.1	75	71.1	0	45.3	416.1	305.3
Nov-82	17.4	448	440.3	75	17.4	0	35.5	440.3	332.3
Feb-83	11.8	115	-11.8	63.2	11.8	0	150.5	0	265.8
Jun-83	83.1	116.7	108.9	75	83.1	0	75.3	97.1	232.1
Jan-83	10.1	121.3	-10.1	64.9	10.1	0	196.6	0	185.7
Sep-83	56.3	144.7	186.6	75	56.3	0	98.3	176.6	183.8
Mar-83	19.4	212.9	91.1	75	19.4	0	200.7	91.1	165.3
Jul-83	105.6	243.2	238	75.0 1	5.6	0	100.3	238	179.8
Nov-83	16.7	256.7	256.5	75	16.7	0	83.9	256.5	195.2
Aug-83	88.8	261.9	215.1	75	88.8	0	41.9	215.1	199.1
Oct-83	30.1	264.5	255.4	75	30.1	0	21	255.4	210.4

Date	PET	P	P-PET	Soil Moisture		AET	PET-AET	Snow Storage	Surplus	ROtotal
Dec-83	8.8	310	-8.8	66.2		8.8	0	331	0	168.3
Apr-83	30.6	320.7	455.5	75		30.6	0	165.5	446.8	224
May-83	49.4	407.7	441.1	75		49.4	0	82.7	441.1	267.4
Jan-84	7.7	133.9	-7.7	67.3		7.7	0	216.6	0	213.9
Jul-84	92.9	159.4	174.8	75		92.9	0	108.3	167.1	204.6
Oct-84	32.7	160	181.4	75		32.7	0	54.2	181.4	199.9
Apr-84	4.3	167.3	-4.3	70.7		4.3	0	221.5	0	159.9
Jun-84	84.9	182	207.8	75		84.9	0	110.7	203.5	168.7
Aug-84	89.6	238.1	203.9	75		89.6	0	55.4	203.9	175.7
Mar-84	14	244.5	-14	61		14	0	299.9	0	140.6
Feb-84	13.2	255.2	25.1	75		13.2	0	516.7	11.1	114.7
Nov-84	16.2	261.3	401.8	75		16.2	0	360	401.8	172.1
May-84	31.6	265.2	337.7	75		31.6	0	255.8	337.7	205.2
Sep-84	46.4	289	370.5	75		46.4	0	127.9	370.5	238.3
Dec-84	12.5	315.2	90.9	75		12.5	0	339.7	90.9	208.8
Jun-85	73.2	88.7	185.3	75		73.2	0	169.8	185.3	204.1
Apr-85	37.5	144.3	191.7	75		37.5	0	84.9	191.7	201.6
Dec-85	9.2	189.7	-9.2	65.8		9.2	0	274.6	0	161.3
Jul-85	93.6	192.3	235.9	75		93.6	0	137.3	226.7	174.4
Oct-85	30.4	201.3	239.5	75		30.4	0	68.6	239.5	187.4
Jan-85	8.1	204.2	-8.1	66.9		8.1	0	272.8	0	149.9
Mar-85	18.4	308.7	90.8	75		18.4	0	472.3	82.8	136.5
Nov-85	16.2	382	483.2	75		16.2	0	354.9	483.2	205.8
Feb-85	9.8	388.9	-9.8	65.2		9.8	0	743.8	0	164.7
Sep-85	56.8	396.3	711.4	75		56.8	0	371.9	701.6	272.1
Aug-85	79.1	479.7	586.5	75		79.1	0	186	586.5	335
Jan-86	9.4	99.4	-9.4	65.6		9.4	0	285.3	0	268
Nov-86	14.9	111.3	131.9	75		14.9	0	249.8	122.6	238.9
Dec-86	11.4	173.6	-11.4	63.6		11.4	0	423.4	0	191.1
Mar-86	19.9	191.3	162.2	75		19.9	0	432.6	150.7	183
Apr-86	37.3	210.3	389.4	75		37.3	0	216.3	389.4	224.3
Feb-86	9.3	229.6	-9.3	65.7		9.3	0	446	0	179.4
May-86	67.1	232.6	388.5	75		67.1	0	223	379.2	219.4
Jun-86	76.1	356.3	391.7	75		76.1	0	111.5	391.7	253.9
Jul-86	102	393.6	347.3	75.0	1	2	0	55.7	347.3	272.5
Aug-86	75.4	469.7	422.1	75		75.4	0	27.9	422.1	302.5
Sep-86	50.8	729.7	692.8	75		50.8	0	13.9	692.8	380.5
Feb-87	9.9	71.4	-9.9	65.1		9.9	0	85.4	0	304.4
May-87	66.7	108.4	84.4	75		66.7	0	42.7	74.4	258.4
Dec-87	12	144.8	13	75		12	0	162.5	13	209.3
Jun-87	89.2	206.7	198.7	75		89.2	0	81.3	198.7	207.2
Mar-87	20.6	221.6	135.2	75		20.6	0	147.1	135.2	192.8
Jan-87	9.8	227.1	-9.8	65.2		9.8	0	374.2	0	154.2
Sep-87	53.3	228.3	362.1	75		53.3	0	187.1	352.4	193.9
Oct-87	26.5	256.4	323.5	75		26.5	0	93.6	323.5	219.8
Apr-87	39.3	283.3	290.8	75		39.3	0	46.8	290.8	234
Aug-87	81.9	295.5	237	75		81.9	0	23.4	237	234.6
Jul-87	110.8	306.8	207.7	75.0	1	10.8	0	11.7	207.7	229.2
Nov-87	16.6	310.7	265.2	75		16.6	0	40.6	265.2	236.4
Mar-88	17.7	103.9	-3.6	71.4		17.7	0	130.5	0	189.1
Dec-88	10.3	119.4	-10.3	61.6		9.8	0.5	249.8	0	151.3

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Jun-88	81.5	160.7	204	75		81.5	0	124.9	190.6	159.2
May-88	65.3	169	166.2	75		65.3	0	62.5	166.2	160.6
Jan-88	9.4	170.3	-9.4	65.6		9.4	0	232.8	0	128.4
Apr-88	32.5	196.3	280.2	75		32.5	0	116.4	270.8	156.9
Jul-88	110.1	197.4	145.6	75.0	1	10.1	0	58.2	145.6	154.6
Aug-88	90.8	235.5	173.8	75		90.8	0	29.1	173.8	158.5
Oct-88	25.5	301.6	290.7	75		25.5	0	14.5	290.7	184.9
Feb-88	9.2	315.2	-9.2	65.8		9.2	0	329.7	0	147.9
Nov-88	17.9	339.7	486.6	75		17.9	0	164.9	477.4	213.8
Sep-88	50.6	353.7	385.5	75		50.6	0	82.4	385.5	248.2
Jul-89	100.3	84.5	25.4	75.0	1	0.3	0	41.2	25.4	203.6
Dec-89	6.7	132.3	-6.7	68.3		6.7	0	173.5	0	162.9
Sep-89	51.3	132.3	167.8	75		51.3	0	86.7	161.1	162.5
Feb-89	9	141.4	-9	66		9	0	228.2	0	130
Jan-89	11.4	158.1	-11.4	56		10	1.4	386.2	0	104
Apr-89	29.7	158.3	321.7	75		29.7	0	193.1	302.7	143.8
Mar-89	15.8	187.1	-15.8	59.2		15.8	0	380.2	0	115
Oct-89	30.4	242.6	402.3	75		30.4	0	190.1	386.5	169.3
Aug-89	80.3	324.5	339.3	75		80.3	0	95.1	339.3	203.3
May-89	58.4	342.6	331.7	75		58.4	0	47.5	331.7	229
Jun-89	85.6	440	378.1	75		85.6	0	23.8	378.1	258.8
Nov-89	14.8	515.3	320.2	75		14.8	0	204.1	320.2	271.1
Apr-90	37.7	165.3	229.7	75		37.7	0	102	229.7	262.8
Jan-90	12.2	194.2	-9.4	65.6		12.2	0	293.4	0	210.2
Mar-90	20	207.7	153.5	75		20	0	327.6	144.1	197
Feb-90	11	215	-11	64		11	0	542.6	0	157.6
Jul-90	95.2	259.4	435.4	75		95.2	0	271.3	424.4	211
Nov-90	18.3	277	394.3	75		18.3	0	135.6	394.3	247.6
Aug-90	82.2	284.2	269.8	75		82.2	0	67.8	269.8	252.1
Sep-90	50.6	303	286.3	75		50.6	0	33.9	286.3	258.9
Dec-90	11.8	316.1	17.1	75		11.8	0	321.1	17.1	210.6
Jun-90	84.9	366	441.7	75		84.9	0	160.6	441.7	256.8
May-90	54.4	400	425.8	75		54.4	0	80.3	425.8	290.6
Oct-90	29.3	433.6	444.4	75		29.3	0	40.1	444.4	321.3
Jun-91	92.6	147	74.4	75		92.6	0	20.1	74.4	272
Jan-91	9	154.8	-9	66		9	0	174.9	0	217.6
Sep-91	48.4	170.3	209.4	75		48.4	0	87.5	200.4	214.1
Nov-91	15.4	198.7	158.6	75		15.4	0	112.1	158.6	203
Dec-91	10.7	206.4	-10.7	64.3		10.7	0	318.5	0	162.4
May-91	73.6	211.6	297.3	75		73.6	0	159.3	286.6	187.3
Feb-91	11.9	226.1	-11.9	63.1		11.9	0	385.3	0	149.8
Aug-91	88.7	247.1	351.1	75		88.7	0	192.7	339.2	187.7
Jul-91	99.5	300	296.8	75		99.5	0	96.3	296.8	209.5
Oct-91	32.6	323.2	338.8	75		32.6	0	48.2	338.8	235.3
Mar-91	20.2	342.3	181.3	75		20.2	0	189	181.3	224.5
Apr-91	37.8	445.3	502	75		37.8	0	94.5	502	280
Jan-92	10.2	137.1	-10.2	64.8		10.2	0	231.6	0	224
Oct-92	26.3	156.8	246.3	75		26.3	0	115.8	236.1	226.4
Feb-92	10.9	159.3	-10.9	64.1		10.9	0	275.1	0	181.1
Mar-92	2.3	169.7	-2.3	62.1		1.9	0.3	444.8	0	144.9
Jun-92	72.1	184.7	335	75		72.1	0	222.4	322.1	180.4
Dec-92	11.5	227.7	-11.5	63.5		11.5	0	450.1	0	144.3

Date	PET	P	P-PET	Soil Moisture		AET	PET-AET	Snow Storage	Surplus	ROtotal
May-92	57	276.1	444.2	75		57	0	225.1	432.7	202
Sep-92	49.7	304.7	367.5	75		49.7	0	112.5	367.5	235.1
Apr-92	30.9	357.3	382.7	75		30.9	0	56.3	382.7	264.6
Jul-92	80.6	408.4	355.9	75		80.6	0	28.1	355.9	282.9
Nov-92	15.7	557.3	427.9	75		15.7	0	141.8	427.9	311.9
Aug-92	71.3	560.6	560.2	75		71.3	0	70.9	560.2	361.6
Dec-93	10.6	64.5	-10.6	64.4		10.6	0	135.4	0	289.2
Mar-93	15.7	107.1	-15.7	50.9		13.5	2.2	242.5	0	231.4
Feb-93	7.9	121.4	-7.9	45.6		5.3	2.5	364	0	185.1
Aug-93	86.9	175.5	270.6	75		86.9	0	182	241.2	196.3
May-93	55.6	198.7	234.1	75		55.6	0	91	234.1	203.9
Nov-93	15.7	211.3	177.6	75		15.7	0	109.1	177.6	198.6
Sep-93	44	229.3	239.9	75		44	0	54.6	239.9	206.9
Oct-93	27.5	233.2	233	75		27.5	0	27.3	233	212.1
Apr-93	33.3	252	232.4	75		33.3	0	13.6	232.4	216.1
Jul-93	100	259.4	166.2	75.0	1	0	0	6.8	166.2	206.2
Jan-93	10.1	277.1	-10.1	64.9		10.1	0	283.9	0	164.9
Jun-93	77.2	371.3	436.1	75		77.2	0	142	425.9	217.1
Feb-94	8.1	64.3	-8.1	66.9		8.1	0	206.2	0	173.7
Mar-94	17.2	114.2	-14.9	53.6		15.6	1.6	318.2	0	139
Dec-94	12.3	123.9	39.7	75		12.3	0	390.1	18.3	114.8
Aug-94	74.6	161.3	281.7	75		74.6	0	195	281.7	148.2
Jun-94	86.5	164.7	175.6	75		86.5	0	97.5	175.6	153.7
Jul-94	98.9	176.4	126.3	75		98.9	0	48.8	126.3	148.2
Oct-94	30.8	191.9	185.5	75		30.8	0	24.4	185.5	155.7
Sep-94	50.4	210	171.8	75		50.4	0	12.2	171.8	158.9
Jan-94	6.1	222.6	-6.1	68.9		6.1	0	234.8	0	127.1
Nov-94	18.6	236.7	335.4	75		18.6	0	117.4	329.3	167.6
Apr-94	34.7	291.3	315.3	75		34.7	0	58.7	315.3	197.1
May-94	53	347.1	323.4	75		53	0	29.3	323.4	222.4
Feb-95	8.6	86.4	-8.6	66.4		8.6	0	115.8	0	177.9
Sep-95	46.5	151.3	162.7	75		46.5	0	57.9	154.1	173.1
Aug-95	92	200.6	137.6	75		92	0	28.9	137.6	166
Jul-95	102	212.6	125.1	75.0	1	2	0	14.5	125.1	157.8
May-95	57.4	245.8	195.6	75		57.4	0	7.2	195.6	165.4
Apr-95	27.5	310.7	262.2	75		27.5	0	28.2	262.2	184.7
Jan-95	11	377.1	-11	64		11	0	405.3	0	147.8
Oct-95	33	471.9	641.6	75		33	0	202.7	630.5	244.3
Nov-95	13.6	474	193	75		13.6	0	470.1	193	234.1
Nov-96	14.1	135.3	138.8	75		14.1	0	452.6	138.8	215
Feb-96	9.7	151	-9.7	65.3		9.7	0	603.6	0	172
Aug-96	84.1	167.7	385.4	75		84.1	0	301.8	375.7	212.8
Mar-96	15.5	202.6	-15.5	59.5		15.5	0	504.4	0	170.2
Oct-96	29.7	210.3	432.8	75		29.7	0	252.2	417.3	219.6
Jan-96	8.5	215.5	-8.5	66.5		8.5	0	467.7	0	175.7
May-96	53.6	300	480.3	75		53.6	0	233.8	471.8	234.9
Apr-96	28.3	326	396.7	75		28.3	0	134.8	396.7	267.3
Dec-96	12.3	347.4	81	75		12.3	0	389	81	230
Jul-96	89.6	362.6	467.4	75		89.6	0	194.5	467.4	277.5
Jun-96	86.7	497.3	507.9	75		86.7	0	97.2	507.9	323.6
Sep-96	51.6	517	514	75		51.6	0	48.6	514	361.7

Date	PET	P	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal
Apr-97	31	98.7	92	75	31	0	24.3	92	307.7
Dec-97	11.7	98.7	-7.2	67.8	11.7	0	118.5	0	246.2
Jul-97	93.9	188.1	153.4	75	93.9	0	59.3	146.2	226.2
Aug-97	73.8	233.9	189.7	75	73.8	0	29.6	189.7	218.9
Nov-97	15.2	235.3	157.4	75	15.2	0	92.4	157.4	206.6
Jun-97	93.1	265.7	218.7	75	93.1	0	46.2	218.7	209
Mar-97	16.8	271	-16.8	58.2	16.8	0	317.2	0	167.2
Feb-97	11.4	277.1	-11.4	49.4	8.8	2.5	594.3	0	133.8
Jan-97	8.7	282.3	-8.7	43.6	5.8	3	876.6	0	107
May-97	46	292.9	685.2	75	46	0	438.3	653.9	216.4
Oct-98	30.9	43.9	232.1	75	30.9	0	219.1	232.1	219.5
Apr-98	36.1	130.7	204.1	75	36.1	0	109.6	204.1	216.5
Feb-98	13.4	145.7	15.3	75	13.4	0	226.5	15.3	176.2
Sep-98	55.2	146.7	204.7	75	55.2	0	113.3	204.7	181.9
Jul-98	96	154.2	114.9	75	96	0	56.6	114.9	168.5
May-98	75.3	182.9	135.9	75	75.3	0	28.3	135.9	162
Jun-98	84.6	190	119.6	75	84.6	0	14.2	119.6	153.5
Aug-98	86	311	232.1	75	86	0	7.1	232.1	169.2
Mar-98	20.1	380	189.4	75	20.1	0	177.6	189.4	173.2
Jan-98	11.1	416.8	-11.1	63.9	11.1	0	594.4	0	138.6
Mar-99	22.6	50	239.7	75	22.6	0	382.1	228.6	156.6
Feb-99	20	145	316.1	75	20	0	191.1	316.1	188.5
Apr-99	24.8	160.7	144.2	75	24.8	0	182.8	144.2	179.6
Dec-99	11.7	177.4	2.4	75	11.7	0	346	2.4	144.2
Oct-99	29.7	206.8	350.1	75	29.7	0	173	350.1	185.4
Aug-99	77.8	228.1	236.8	75	77.8	0	86.5	236.8	195.7
Jun-99	35	229	230.2	75	35	0	50.3	230.2	202.6
Sep-99	55.5	238.7	208.4	75	55.5	0	25.2	208.4	203.7
May-99	31.5	274.2	213.2	75	31.5	0	54.6	213.2	205.6
Nov-99	18.9	341.3	349.7	75	18.9	0	27.3	349.7	234.4
Oct-00	33.5	95.5	75.6	75	33.5	0	13.7	75.6	202.7
Mar-00	23.6	131	102.9	75	23.6	0	18.1	102.9	182.7
Jan-00	9.5	148.7	-9.5	65.5	9.5	0	166.8	0	146.2
Feb-00	12	192.1	-12	55	10.5	1.5	358.9	0	116.9
Nov-00	16.1	218	299.5	75	16.1	0	261.2	279.5	149.5
Aug-00	78.9	220.6	272.3	75	78.9	0	130.6	272.3	174
Apr-00	32.2	223.3	256.4	75	32.2	0	65.3	256.4	190.5
Jul-00	88.1	294.2	238.8	75	88.1	0	32.7	238.8	200.2
Sep-00	6.4	368.7	-6.4	68.6	6.4	0	401.3	0	160.1
May-00	63.1	531.9	669.5	75	63.1	0	200.7	663.1	260.7
Jun-00	85	730	745.3	75	85	0	100.3	745.3	357.6
Mar-01	17.3	98.4	-11.1	63.9	17.3	0	192.5	0	286.1
Dec-01	13.5	119.4	89.7	75	13.5	0	208.6	78.6	244.6
Apr-01	35.7	136.7	205.3	75	35.7	0	104.3	205.3	236.7
Aug-01	92.6	156.8	116.4	75	92.6	0	52.2	116.4	212.7
Feb-01	10.8	251.8	-10.8	64.2	10.8	0	304	0	170.1
May-01	63.9	255.5	343.5	75	63.9	0	152	332.7	202.7
Sep-01	51.8	281.3	305.5	75	51.8	0	76	305.5	223.2
Nov-01	20.9	285.3	302.4	75	20.9	0	38	302.4	239.1
Jun-01	85.5	314.7	248.2	75	85.5	0	19	248.2	240.9
Oct-01	30.8	484.8	463.5	75	30.8	0	9.5	463.5	285.4

Date	PET	P	P-PET	Soil Moisture		AET	PET-AET	Snow Storage	Surplus	ROtotal
Jan-02	12.4	101.6	-6.7	68.3		12.4	0	105.4	0	228.3
Dec-02	11	108.1	-11	58.3		10	1	213.5	0	182.7
Aug-02	87.9	112.9	131.8	75		87.9	0	106.7	115.1	169.2
Feb-02	12.4	163.6	-12.4	62.6		12.4	0	270.3	0	135.3
Mar-02	18.8	174.5	74.4	75		18.8	0	351.6	62	120.7
Sep-02	62.9	175	287.9	75		62.9	0	175.8	287.9	154.1
Nov-02	15.5	186.7	178	75		15.5	0	169	178	158.9
Jul-02	111.4	214.8	187.9	75.0	1	11.4	0	84.5	187.9	164.7
Jun-02	86.3	249.3	205.3	75		86.3	0	42.3	205.3	172.8
Oct-02	27.6	251.6	245.2	75		27.6	0	21.1	245.2	187.3
May-02	50	359.4	319.9	75		50	0	10.6	319.9	213.8
Apr-02	34.8	375	345.5	75		34.8	0	5.3	345.5	240.1
Jan-03	7.8	93.6	-7.8	67.2		7.8	0	98.8	0	192.1
Apr-03	30.5	112	130.9	75		30.5	0	49.4	123	178.3
Mar-03	17.9	124.5	5.9	75		17.9	0	150.1	5.9	143.8
Jul-03	97.2	125.2	103	75		97.2	0	75.1	103	135.7
Feb-03	8.4	180.4	-8.4	66.6		8.4	0	255.4	0	108.5
Jun-03	83.5	257.7	301.9	75		83.5	0	127.7	293.5	145.5
Dec-03	12	260	26.4	75		12	0	349.4	26.4	121.7
Oct-03	28.1	308.4	454.9	75		28.1	0	174.7	454.9	188.3
May-03	55.5	308.4	340.2	75		55.5	0	87.3	340.2	218.7
Aug-03	88.6	322.3	277.3	75		88.6	0	43.7	277.3	230.4
Sep-03	52.6	359.3	328.5	75		52.6	0	21.8	328.5	250
Nov-03	18	388	380.9	75		18	0	10.9	380.9	276.2
Feb-04	10.7	69	-10.7	64.3		10.7	0	79.9	0	221
Sep-04	57.2	132.3	115.1	75		57.2	0	39.9	104.4	197.7
Oct-04	30.7	188.4	177.7	75		30.7	0	20	177.7	193.7
Jun-04	78.7	191.7	123	75		78.7	0	10	123	179.5
Aug-04	73.6	196.1	132.5	75		73.6	0	0	132.5	170.1
Jan-04	7.4	234.5	-7.4	67.6		7.4	0	234.5	0	136.1
Apr-04	33	239.3	323.6	75		33	0	117.3	316.3	172.1
Nov-04	17.7	246.3	285.1	75		17.7	0	60.8	285.1	194.7
Dec-04	9.8	334.5	-9.8	65.2		9.8	0	395.3	0	155.8
Mar-04	20.3	354.8	272.3	75		20.3	0	457.6	262.5	177.1
Jul-04	93.1	376.4	512.1	75		93.1	0	228.8	512.1	244.1
May-04	58.3	377.4	433.5	75		58.3	0	114.4	433.5	282
Jun-05	104.7	107.7	60.2	75.0	1	4.7	0	57.2	60.2	237.6
May-05	50.8	152.3	130	75		50.8	0	28.6	130	216.1
Oct-05	32.5	164.5	146.3	75		32.5	0	14.3	146.3	202.2
Mar-05	16.4	182.3	-16.4	58.6		16.4	0	196.6	0	161.7
Jan-05	8.4	206.4	-8.4	52.1		6.6	1.8	403	0	129.4
Sep-05	58.6	255.3	398.2	75		58.6	0	201.5	375.3	178.6
Feb-05	10.6	280.4	-10.6	64.4		10.6	0	481.9	0	142.9
Dec-05	10	313.9	-10	55.8		8.6	1.4	795.7	0	114.3
Apr-05	33.6	323.7	687.9	75		33.6	0	397.9	668.7	225.2
Nov-05	17.9	409.7	590.7	75		17.9	0	198.9	590.7	298.3
Jul-05	107.9	457.1	448.7	75.0	1	7.9	0	99.5	448.7	328.4
Aug-05	11.6	478.4	-11.6	63.4		11.6	0	577.9	0	262.7
Mar-06	19.1	202.9	142.7	75		19.1	0	619	131.1	236.4
Jan-06	12.8	354.5	94.9	75		12.8	0	865.8	94.9	208.1
Feb-06	10.4	503.6	-10.4	64.6		10.4	0	1369.4	0	166.5