REPORT

Level 1 and Level 2 Water Report

Site Plan Licence Application for a Class 'A' Quarry Below Water
Proposed Stittsville 2 Quarry
Ottawa, Ontario

Submitted to:

R.W. Tomlinson Limited

100 Citigate Dr.
Ottawa, ON
K2J 6K7

Submitted by:

WSP Canada Inc.

1931 Robertson Road, Ottawa, Ontario, K2H 5B7, Canada

+1 613 592 9600

19130670

October 2023

Distribution List

1 e-copy –	R.W. Tomlinson Limited
1 e-copy –	MHBC Planning Limited
1 e-copy –	WSP Canada Inc.

Executive Summary

This hydrogeological and hydrological technical report was prepared in support of an application to license (under the *Aggregate Resources Act*) the R.W. Tomlinson Limited Stittsville 2 Quarry property as a quarry below the groundwater table. The proposed Stittsville 2 Quarry property is adjacent to licensed operational quarries to the south and west. It is proposed that the extraction of Bobcaygeon Formation and Gull River Formation limestone and dolostone bedrock would proceed to an average depth of approximately 36 metres below the existing ground surface on the proposed Stittsville 2 Quarry property.

As a consequence of the location of the proposed quarry in relation to the other licensed operational quarries nearby, the groundwater level drawdown at full development of the Stittsville Quarry and the proposed Stittsville 2 Quarry (combined) is similar in extent (to the north and east) to the total drawdown from all of the quarries at their full extent of development (based on the one metre groundwater level drawdown contour).

During the operational period, water collecting in the base of the existing Stittsville Quarry and the proposed Stittsville 2 Quarry will be directed to the same sump and discharged off-site in accordance with the existing Environmental Compliance Approval (Industrial Sewage Works) for the Stittsville Quarry.

Development of the proposed Stittsville 2 Quarry will result in modifications to the local surface water drainage patterns. Specifically with respect to the proposed Stittsville 2 Quarry footprint, the estimated incremental discharge from that footprint is expected to increase during operations and decrease following rehabilitation. Based on the impact assessment, it is not expected that the development of the proposed Stittsville 2 Quarry will have a negative impact on surface water receptors (Goulbourn Wetland Complex) or groundwater receptors (private water supply wells) during the operational life of the quarry. A comprehensive surface water and groundwater monitoring program will be in place during the operational life of the proposed Stittsville 2 Quarry to provide confirmation that local receptors are not negatively impacted.

Following the extraction of the bedrock at the proposed Stittsville 2 Quarry, the excavation area will be rehabilitated by filling the site such that the property returns to similar grading and land use as currently exists. The long-term groundwater levels in the bedrock surrounding the site are predicted to increase above the existing levels. Consequently, it is not expected that the development of the proposed Stittsville 2 Quarry will have a negative impact on surface water receptors (Goulbourn Wetland Complex) or groundwater receptors (private water supply wells) under rehabilitated conditions.

SPECIAL REPORT NOTE

R.W. Tomlinson Limited (Tomlinson), Lafarge Canada Inc. (Lafarge) and Thomas Cavanagh Construction Limited (Cavanagh) have entered into a data-sharing agreement whereby all three parties would have access to the comprehensive geological and hydrogeological database for the Jinkinson Road study area. This comprehensive geological and hydrogeological database includes work previously conducted on, and in the vicinity of, the Tomlinson Moore Quarry, Tomlinson Stittsville Quarry, Lafarge Bell Quarry, Cavanagh Henderson Quarry and the Cavanagh Beagle Club Quarry in addition to data collected as part of the Voluntary Monitoring Program. These quarry properties in the Jinkinson Road study area are shown on Figure 4. The comprehensive geological and hydrogeological data database includes detailed rock core logs, borehole logs, monitoring well installation records, geophysical logs, groundwater level data, hydraulic conductivity data, etc. The borehole locations that are included in the data-sharing agreement are shown on Figure 4. The total number of boreholes and monitoring wells that comprise the database for the Jinkinson Road study area are 100 and 158, respectively.

Through the data-sharing agreement, the geological and hydrogeological data are made available to WSP Canada Inc. (by Tomlinson, Lafarge and Cavanagh) for use by either of the three aggregate producers in the context of the quarry licensing projects under the *Aggregate Resources Act* and/or applications for Permits to Take Water or Environmental Compliance Approvals – Industrial Sewage Works under the *Ontario Water Resources Act*. This comprehensive geological and hydrogeological database (i.e., Paleozoic bedrock stratigraphy, hydraulic conductivity data and groundwater level data) has been used in the development of the conceptual and numerical hydrogeological model for the study area as presented in this document. In this report prepared specifically for Tomlinson, the detailed rock core logs, borehole logs, monitoring well installation records, geophysical logs, groundwater level data, hydraulic conductivity data, etc. belonging to Lafarge and Cavanagh are not presented, however, these data were used in the development of the conceptual and numerical hydrogeological model for the Jinkinson Road study area. This report does include the detailed site-specific geological and hydrogeological investigation data (borehole logs, monitoring well installation records, geophysical logs, groundwater level data, hydraulic conductivity data, etc.) for work conducted by Tomlinson as it relates to the studies completed since 1999 on, and in the vicinity of, the Tomlinson Stittsville Quarry and Tomlinson Moore Quarry.

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background

R.W. Tomlinson Limited (Tomlinson) operates a number of pits and limestone quarries in the Ottawa area. The materials are used in the Ottawa area for road construction and in site preparation for commercial and residential developments. As part of the long-term business plan in the Ottawa area, Tomlinson wishes to license, under the *Aggregate Resource Act* (ARA), a property adjacent to the existing licensed Tomlinson Stittsville Quarry in order to supply the western end of Ottawa with aggregate products into the future.

WSP Canada Inc. (WSP) was retained by Tomlinson to complete the necessary hydrogeological and hydrological studies to support an application under the ARA and the *Planning Act*. This report presents the combined results of the hydrogeological and hydrological studies completed in support of a site plan license application for a Class ‘A’ license for a quarry below the ground water table, under Ontario Regulation 244/97 under the ARA. These studies were conducted for the purpose of addressing the requirements for the Level 1 and Level 2 Water Report studies as described in “Aggregate Resources of Ontario: Technical reports and information standards”, dated August 2020.

The site-specific geological, hydrogeological and hydrological data presented in this report were collected for the proposed Stittsville 2 Quarry and neighbouring Tomlinson Stittsville and Moore Quarries during investigations and monitoring programs conducted between 2000 and 2022.

The qualifications and experience of the report authors are presented in Appendix A.

1.2 Site Description

The proposed Stittsville 2 Quarry is located in the Geographic Township of Goulbourn in the City of Ottawa, Ontario. The proposed quarry property is located in Lots 15 and 16, Concession XI. The location of the proposed Stittsville 2 Quarry is shown on Figure 1. The proposed extraction area covers an area of approximately 109.8 hectares (ha). The property is bounded by Jinkinson Road and the existing Tomlinson Stittsville Quarry to the north, the Goulbourn Wetland Complex to the east, the Trans-Canada Trail to the south and the Lafarge Canada Inc. (Lafarge) Bell Quarry property to the west. Access to the site is currently from Jinkinson Road. The Stittsville 2 Quarry will be developed in three lifts. The final quarry floor for the proposed Stittsville 2 Quarry will slope from approximately 123 metres above sea level (asl) in the southwest to approximately 101 metres asl in the northeast which generally follows the contact between the Bobcaygeon Formation and Gull River Formation. The base of the quarry excavation is below the average position of the groundwater table.

The nearest permanent residents to the site are located northeast along Jinkinson Road and across Highway 7. The site area is comprised largely of a limestone plain with shallow overburden. More detailed information concerning the Stittsville 2 Quarry can be found in Section 3.0.

In addition to the proposed Stittsville 2 Quarry, a number of licensed aggregate quarries also exist in the area. Three properties, the Lafarge Bell Quarry, the Tomlinson Stittsville Quarry and the Thomas Cavanagh Construction Limited (Cavanagh) Henderson Quarry are located to the west side of the site. The Taggart Fernbank Quarry and Cavanagh Beagle Club Quarry are located to the south of the site. The Tomlinson Moore Quarry is located to the northwest of the proposed Stittsville 2 Quarry across Highway 7.

1.3 Proposed Quarry Development and Rehabilitation Plan

The development of the Stittsville 2 Quarry is anticipated to occur simultaneously to the operation of the existing Stittsville Quarry. Extraction activities will proceed east and south from the common boundary with the existing Stittsville Quarry. Once excavation to the southern limit has been reached, any remaining bedrock in the extraction area to the north (along Jinkinson Road) will be removed. During the initial phases of quarry development, a sump will be located in the existing Stittsville Quarry, and this sump would be relocated (as required) within the extraction area during the operational life of the proposed Stittsville 2 Quarry. The proposed quarry will be developed in three lifts, which may operate simultaneously depending on rock quality and market demand. The depth of each lift is dependent on bedrock formation thickness. The anticipated lowest quarry floor elevation will be approximately 101 metres asl.

Following the extraction of material, the property will be rehabilitated by backfilling the excavation. It is anticipated that the excavation will be backfilled to the original grade throughout the limit of extraction allowing for future potential development in the area near Jinkinson Road and a naturalized area and wetland in the southern portion of the site.

1.4 Scope of Hydrogeological and Hydrological Studies

The main objectives of the hydrogeological and hydrological studies were to:

- Characterize the existing hydrogeological and hydrological conditions of the proposed quarry property and surrounding lands; and,
- Assess potential impacts on groundwater and surface water associated with operation and rehabilitation of the proposed quarry.

The work program consisted of the following:

- Data review and compilation;
- Receptor identification;
- Bedrock percussion drilling program;
- Borehole geophysical investigation program;
- Groundwater level, surface water level and surface water flow monitoring programs; and,
- Groundwater and surface water flow modelling and impact assessment.

2.0 REGIONAL SETTING

2.1 Topography and Physiography

The study area is located in the Smiths Falls Limestone Plains Physiographic Region of Chapman and Putnam (1984). This physiographic region is characterized by shallow soils overlying relatively flat lying limestone or dolostone bedrock. The area is generally flat with a slight dip to the northeast. Many parts of the area are poorly drained as evident by the occurrence of many bogs and wetlands throughout the region.

2.2 Geology and Hydrogeology

2.2.1 Surficial Geology

Published information (Belanger, 2008) indicates the surficial geology within the area surrounding the Stittsville Quarry consists primarily of bedrock with thin unconsolidated Quaternary sediments or organic deposits (Figure 2). The organic deposits are primarily composed of muck and peat.

2.2.2 Bedrock Geology

The sequence of Paleozoic sedimentary rock underlying the study area (from oldest to youngest and deepest to shallowest) is Nepean Formation (sandstone), March Formation (sandstone/dolostone), Oxford Formation (dolostone), Rockcliffe Formation (limestone/sandstone/shale), Shadow Lake Formation (dolostone/sandstone), Gull River Formation (limestone/dolostone/shale) and Bobcaygeon Formation (limestone).

Based on the OGS mapping, the bedrock of the area surrounding the Stittsville Quarry is mapped as the Gull River Formation at surface (refer to Figure 3). A small area of the Bobcaygeon Formation is mapped at surface on the southwest corner of the quarry site (Figure 3).

2.2.2.1 Bobcaygeon Formation

The youngest of the Paleozoic Formations in the study area is the Bobcaygeon Formation. The formation consists of limestone with shaley partings (Williams, 1991). The thickness of the Bobcaygeon Formation in the Ottawa area is approximately 87 metres thick (Williams, 1991).

2.2.2.2 Gull River Formation

The lower member of the Gull River Formation is made up of interbedded limestone and dolostone with shaley partings. Interbeds of sandstone and shale also occur. The upper member of the Gull River Formation consists of limestone with shaley partings (Williams, 1991). The thickness of the formation in the Ottawa area is approximately 51 metres thick (Williams, 1991).

2.2.2.3 Shadow Lake Formation

The Shadow Lake Formation consists of dolostone with shaley partings and thin interbeds of sandstone (Williams, 1991). The Formation is a somewhat constant thickness across the Ottawa - St. Lawrence Lowland ranging from 2.5 to 2.8 metres thick (Williams, 1991). The Shadow Lake Formation is disconformably underlain by the Rockcliffe Formation.

2.2.2.4 Rockcliffe Formation

The Rockcliffe Formation is sub-divided into lower and upper members. The lower member of the formation contains interbedded shale and sandstone, while the upper portion contains additional interbeds of limestone and dolostone (Williams, 1991). The Rockcliffe Formation unconformably overlies the Oxford Formation.

2.2.2.5 Oxford Formation

The Oxford Formation consists primarily of thin to thickly bedded dolostone. Shaley interbeds up to 30 centimetres in thickness occur within the Oxford Formation (Williams, 1991). The Oxford Formation was fully penetrated during the installation of the King's Park sentinel wells in the Village of Richmond (Golder, 2005). The borehole logs for the sentinel wells indicate that the Oxford Formation is between 57.45 metres and 62.5 metres thick within the Village of Richmond located approximately 12.5 kilometres southeast of the Stittsville 2 Quarry.

The thickness of the Oxford Formation was found to be about 42 metres in TW09-1 adjacent to the Stittsville 2 Quarry.

2.2.2.6 March Formation

The March Formation is characterized by interbedded quartz sandstone and dolostone. The lithology of the quartz sandstone beds of the March Formation are similar to those of the underlying Nepean Formation, while the lithology of the dolostone beds of the March Formation are similar to those of the overlying Oxford Formation (Williams, 1991). As a result, the March Formation is referred to as a transitional unit between the Nepean and Oxford Formations. The contact between the March and Oxford Formations is marked by the upper limit of the common occurrence of quartz sand (Williams, 1991).

2.2.2.7 Nepean Formation

The Nepean Formation sandstone overlies the unevenly eroded Precambrian granitic basement within the study area. Williams (1991) describes the Nepean Formation as white to cream coloured, weathering to grey. It is generally thick-bedded; however, portions are thinly-bedded and water-bearing. The cementing minerals include both calcite and quartz. The thickness of the Nepean Formation is difficult to ascertain precisely as there are few drillholes that have been reported to fully penetrate it. Two wells were completed at Canadian Golf and Country Club, located approximately 2.5 kilometres southwest of the Stittsville 2 Quarry that fully penetrated the Nepean Formation into the underlying Precambrian granite. At this location, the Nepean Formation had a total thickness between 31.7 metres and 35.65 metres (Golder, 2007). The thickness of the Nepean Formation was found to be about 21 metres in TW09-1 adjacent to the Stittsville 2 Quarry.

2.2.3 Hydrogeology

2.2.3.1 Overburden Deposits

Extensive deposits of coarse and permeable overburden, capable of supplying sufficient quantities of groundwater for domestic use, are not prevalent in the vicinity of the Stittsville 2 Quarry. For this reason, the bedrock aquifers are considered the principal aquifers for water supply.

2.2.3.2 Bedrock Formations

The Nepean, March and Oxford Formations are considered to be the primary aquifers (i.e., potentially capable of supplying adequate quantities of groundwater for domestic use) within the study area however, these formations may be too deep to access. The Rockcliffe, Shadow Lake, Gull River and Bobcaygeon Formations, located above the primary aquifers are considered marginally adequate for domestic consumption.

2.2.3.2.1 Nepean Formation (Sandstone)

A deep bedrock aquifer is interpreted to be present within the lower part of the March Formation and within the Nepean Formation. This aquifer is generally associated with sandstone rather than dolostone or limestone. Flow within this aquifer is mainly through fractures, since the primary porosity of the sandstone has been reduced by cementation. The aquifer tends to be most productive at the contact between the Nepean Formation and overlying March Formation and at the contact of the Nepean Formation with the underlying Precambrian rock (Brandon, 1960).

Within the Village of Manotick, Raven Beck (1996) measured a transmissivity of approximately 600 square metres per day (m^2/day) over the upper 50 metres of the Nepean Formation using five metre test-interval straddle packers and found enhanced permeability at the March Formation/Nepean Formation contact. Available data indicate that sustainable yields in the deep aquifer are high, ranging from 150 to 4,450 Litres per minute (L/min; Brandon, 1960; Oliver, Mangione, McCalla & Associates 1990, 1991; Geo-Analysis and J.L. Richards and Associates Limited, 1992).

The deep aquifer is regionally extensive and is the primary source of water for large residential/municipal groundwater supply systems including the municipal wells in Almonte, Kemptville, King's Park (Richmond), Hyde Park (Richmond), Merrickville and Munster. Aquifer testing completed on the communal wells at these locations have demonstrated high sustainable well yields (i.e., as high as 4,450 L/min in Almonte). The range in transmissivity of the lower March and Nepean Formations measured during aquifer testing at these locations was between 27 and 6,048 m^2/day, with a typical transmissivity for the lower March and Nepean Formations aquifer of greater than 600 m^2/day (Golder, 2000, 2001, 2003, 2004, Oliver, Mangione, McCalla & Associates 1990, 1991, 2000).

2.2.3.2.2 March and Oxford Formation (Limestone/Dolostone)

Typical well yields reported for the aquifer in the Oxford Formation are between 45 to 115 L/min (Geo-Analysis and J.L. Richards and Associates Limited, 1992). Drillers' records indicate that water bearing zones occur at distinct depths within the formation, with water being found within a network of fractures, possibly enhanced by carbonate dissolution, and possibly associated with shale partings (Williams, 1991).

Aquifer testing of three wells completed in the Oxford Formation found a range in transmissivity between 9 m^2/day and 248 m^2/day, with an average of 90 m^2/day (Golder, 2006). A study completed by Geo-Analysis Inc. in 1991 consisting of aquifer testing of eleven test wells found the transmissivity of the Oxford Formation aquifer in the Village of Richmond ranged between 5 m^2/day to greater than 100 m^2/day, with an average of 46 m^2/day.

A bedrock aquitard is interpreted to lie within the lower part of the Oxford Formation and the upper part of the March Formation (Raven Beck, 1996). Its presence is indicated by strong vertical gradients across this zone and by flowing artesian conditions observed in some wells completed below the aquitard, (i.e., the Alfred Street municipal well in Kemptville (Oliver, Mangione, McCalla and Associates Ltd., 2000) and the Village of Richmond sentinel wells (Golder, 2005).

2.2.3.2.3 Rockcliffe, Shadow Lake, Gull River and Bobcaygeon Formations

The well yields in these formations typically range from <14 to 22 m^2/day and are considered marginally acceptable for domestic consumption. Golder (2003a) reports that the yield of the wells in these formations typically decreases with depth. These aquifers are usually only used where the better aquifers such as the Nepean and March Formations are too deep to access.

2.3 Hydrology

The study area, as shown in Figure 1, is within the Flowing Creek catchment, which is a part of the Jock River sub-watershed. The Flowing Creek catchment has a drainage area of approximately 50 square kilometres (km^2) and the Jock River sub-watershed has a drainage area of 555 km^2 (Rideau Valley Conservation Authority, 2016).

The most prominent surface water feature in the local area is the provincially significant Goulbourn Wetland Complex, located on and to the east of the Stittsville 2 Quarry property. Under existing conditions, the surface runoff from the proposed Stittsville 2 Quarry property either drains towards the western wetland or the eastern wetland (Goulbourn Wetland Complex) which are connected by a drainage pathway, as seen in Figure 1. The Goulbourn Wetland Complex drains from northwest to southeast from its headwaters directly northwest of Speedway Road, approximately 1.5 kilometres northwest of the proposed quarry site, to its confluence with a branch of the Flowing Creek southeast of Fallowfield Road, approximately 6 kilometres southeast of the proposed quarry site. Flowing Creek then drains to the Jock River near the Town of Richmond, Ontario.

2.4 Ecological Context

A detailed description of the ecosystem and an impact assessment analysis are provided in the Natural Environment Report (WSP, 2023).

2.5 Surrounding Land Use - Existing Quarries

As previously described, a number of licensed aggregate quarries currently exist in the area of the proposed Stittsville 2 Quarry. Tomlinson owns the Stittsville Quarry and the Moore Quarry located to the west and northwest of the proposed Stittsville 2 Quarry, respectively. Lafarge owns the Bell Quarry located to the west of the proposed quarry site. Further to the west, across Jinkinson Road is the Cavanagh Henderson Quarry. To the southeast of the site are the Taggart Fernbank Quarry and the Cavanagh Beagle Club Quarry. Locations of the existing quarries are shown on Figure 4.

Details regarding the general properties of the existing quarry sites are included in the following table:

Table 1: Summary of Existing Quarries

Quarry Operator	Quarry Name	Approximate Licensed Area (hectares)	Approved Quarry Floor Elevation (metres above sea level)	Rehabilitation Plan
Tomlinson	Stittsville Quarry	55.4	108 (minimum)	Rehabilitate to a lake with level at 141 metres asl.
	Moore Quarry	49	112 to 126	Rehabilitate to a lake with level at 134.5 metres asl.
Cavanagh	Henderson Quarry	124.7	112	Rehabilitate to a lake with level at 135.5 metres asl.
	Beagle Club Quarry	20.9	117	Rehabilitate to a lake with level at 135 metres asl.
Lafarge	Bell Quarry	59.1	132	Rehabilitate to a lake with level at 141 metres asl.
Taggart	Fernbank Quarry	115.1	126.5	Rehabilitate to a lake with level at 135 metres asl.

In considering the potential hydrogeological impacts from quarry dewatering at the proposed Stittsville 2 Quarry, a cumulative impacts assessment including all of the quarries in the area was completed. For the existing conditions, the quarry floor elevations were assumed as follows:

Table 2: Summary of Existing Quarries Under Existing Conditions

Quarry Operator	Quarry Name	Simulated Floor Elevation
Tomlinson	Stittsville Quarry	Quarry floor elevations within the excavated area were set at 120 metres asl
	Moore Quarry	There is currently no excavation on the property.
Cavanagh	Henderson Quarry	Quarry floor elevations within the excavated area were set at 121 metres asl
	Beagle Club Quarry	Quarry excavation is flooded
Lafarge	Bell Quarry	Quarry floor elevations within the excavated area were set at 135 metres asl
Taggart	Fernbank Quarry	Quarry floor elevations within the excavated area were set at 136 metres asl

As the majority of the sites are being operated independently, it is not possible to predict depth and breadth of excavation at any given future point. For that reason, cumulative impacts are assessed with all quarries at full development or, for cumulative rehabilitation, once final rehabilitation has been completed at all sites.

For the purposes of the assessment presented in this report, rehabilitated conditions are assumed as follows:

Table 3: Summary of Existing Quarries Under Rehabilitated Conditions

Quarry Operator	Quarry Name	Rehabilitation Plan
Tomlinson	Stittsville Quarry	Entire site rehabilitated to a lake with a level of 141 metres asl.
	Moore Quarry	Entire site rehabilitated to a lake with a level of 134.5 metres asl.
Cavanagh	Henderson Quarry	Entire site rehabilitated to a lake with a level of 135.5 metres asl.
	Beagle Club Quarry	Entire site rehabilitated to a lake with a level of 135 metres asl.
Lafarge	Bell Quarry	Entire site rehabilitated to a lake with a level of 141 metres asl.
Taggart	Fernbank Quarry	Entire site rehabilitated to a lake with a level of 135 metres asl.

3.0 STUDIES AT THE SITE AND ADJACENT TOMLINSON PROPERTIES

Various studies have been conducted at the proposed Stittsville 2 Quarry and other nearby Tomlinson properties for the purposes of licensing and obtaining the necessary permits to operate the various quarries. The other nearby properties include the Moore Quarry (on the north side of Hwy. 7) and the Stittsville Quarry, adjacent to the proposed Stittsville 2 Quarry.

The following sections provide a summary of the studies and data collected from the proposed Stittsville 2 Quarry site as well as the Stittsville Quarry and the Moore Quarry.

3.1 Geological Studies

3.1.1 Bedrock Drilling

3.1.1.1 Stittsville Quarries

Tomlinson has drilled a number of boreholes over time in the area of the proposed Stittsville 2 Quarry site and the adjacent Stittsville Quarry. The original on-site drilling program at the Stittsville Quarry was conducted in 1999. The drilling was carried out in order to identify bedrock stratigraphy, to obtain rock core samples for aggregate quality testing, to provide locations for undertaking subsurface geophysical logging and to permit monitoring well installations to allow for measurement of groundwater levels, collection of groundwater samples, and hydraulic conductivity testing of the bedrock beneath the site. The borehole locations are shown on Figure 1. Well logs/well records for the wells located on the proposed Stittsville 2 Quarry property and the Stittsville Quarry property are attached in Appendix B.

Borehole BH99-1 was drilled to obtain rock core samples for aggregate quality testing. It was drilled by Marathon Drilling, under the direction of Tomlinson, to a total depth of approximately 31 metres. Borehole BH99-2 was also drilled by Marathon Drilling under the direction of Tomlinson to obtain rock core samples for aggregate quality testing. Borehole BH99-3 was cored to a total depth of approximately 31 metres below ground surface.

The three additional boreholes (BH99-4, BH99-5 and BH99-6) were drilled by Capital Water Supply Ltd. using air rotary percussion drilling techniques, at a diameter of 150 millimetres (6 inches).

An assessment of lithology and stratigraphy was completed using the bedrock core recovered from DDH2001-1 and DDH2001-2. The assessment involved a systematic description of the core including: weathered state; structure; colour; grain size; bedding; texture; material type; and, the location of open bedding planes/voids.

Boreholes BH99-4, BH99-5 and BH99-6 were decommissioned in August 2004 and replaced with new monitors BH03-7, BH03-8 and BH03-9 (respectively) in order to accommodate the reconstruction of Highway 7. A new borehole (BH13-16) was drilled in October 2013 to replace BH03-8 which was removed in June 2014 by progressive quarry development.

Boreholes TW05-10, TW05-11 and TW05-12 were drilled using air rotary percussion drilling techniques at a diameter of 150 millimetres (6 inches). The boreholes were drilled for a resource evaluation of a portion of the Stittsville 2 Quarry property.

Borehole BH18-17 was installed at the request of the Ministry of Environment, Conservation and Parks (MECP) in order to provide an additional location for groundwater level monitoring under the Permit to Take Water (PTTW) monitoring program for the Stittsville Quarry.

Boreholes SQAT18-01 to SQAT18-20 were completed at the Stittsville Quarry site by means of an air track drill rig. These boreholes were used in a resource assessment/mining plan for the Stittsville Quarry.

Boreholes SQAT20-21 to SQAT20-31 were completed at the proposed Stittsville 2 Quarry site by means of an air track drill rig. These boreholes were used in a resource assessment for the proposed Stittsville 2 Quarry.

A number of water supply wells exist or have existed on the site. Water Well TW03-1 was drilled as a water supply well for the original scalehouse in 2003 but was destroyed in 2013 due to quarry extraction in the area of the well. Water wells TW09-1, TW09-2 and TW09-3 are all used to supply the Tomlinson Ready Mix concrete plant that exists on the Stittsville 2 Quarry site.

The following table provides a summary of the boreholes on the Stittsville Quarry and Stittsville 2 Quarry sites:

Table 4: Stittsville Quarry Properties Borehole Summary

Well Name	Comments
DDH2001-1 (T-EXPL)[1]	Rock core recovered for resource evaluation. Borehole has been destroyed.
DDH2001-2[1]	Rock core recovered for resource evaluation. Borehole has been destroyed.
BH99-1	BH99-1 was cored as part of the original geological/hydrogeological investigation of the Stittsville Quarry site.
BH99-2	BH99-2 was cored as part of the original geological/hydrogeological investigation of the Stittsville Quarry site. Borehole was decommissioned in 2019 due to progressive quarry development.
BH99-3[1]	BH99-3 was cored as part of the original geological/hydrogeological investigation of the Stittsville Quarry site.
BH99-4	BH99-4 was drilled as part of the original geological/hydrogeological investigation of the Stittsville Quarry site. Borehole was decommissioned in 2004 to allow for expansion of Hwy 7.
BH99-5	BH99-5 was drilled as part of the original geological/hydrogeological investigation of the Stittsville Quarry site. Borehole was decommissioned in 2004 to allow for expansion of Hwy 7.
BH99-6[1]	BH99-6 was drilled as part of the original geological/hydrogeological investigation of the Stittsville Quarry site. Borehole was decommissioned in 2004 to allow for expansion of Hwy 7.
BH03-7	BH99-7 was drilled in 2003 as a replacement for BH99-4 to allow for expansion of Hwy 7. Borehole was decommissioned in 2020 due to progressive quarry development.
BH03-8	BH99-8 was drilled in 2003 as a replacement for BH99-5 to allow for expansion of Hwy 7. Borehole was decommissioned in 2014 due to progressive quarry development.
BH03-9[1]	BH03-9 was drilled in 2003 as a replacement for BH99-6 to allow for expansion of Hwy 7.
TW05-10[1]	TW05-10 was drilled as part of a resource evaluation for the Stittsville 2 Quarry site.
TW05-11[1]	TW05-11 was drilled as part of a resource evaluation for the Stittsville 2 Quarry site.
TW05-12[1]	TW05-12 was drilled as part of a resource evaluation for the Stittsville 2 Quarry site.
BH13-16[2]	BH13-16 was drilled in 2013 as a replacement for BH03-8 due to removal through progressive quarry development.
BH18-17[1]	BH18-17 was drilled in 2018 as a requirement of the Permit to Take Water groundwater level monitoring program for the Stittsville Quarry.
TW03-1	TW03-1 was drilled as a water supply well for the original scalehouse. The well has been destroyed

Well Name	Comments
TW09-1[1]	TW09-1 was drilled as a water supply well for Tomlinson Ready Mix concrete plant. The well is still in use.
TW09-2[1]	TW09-2 was drilled as a water supply well for Tomlinson Ready Mix concrete plant. The well is still in use.
TW09-3[1]	TW09-3 was drilled as a water supply well for Tomlinson Ready Mix concrete plant. The well is still in use.
SQAT18-01 to SQAT18-20	SQAT18-01 to SQAT18-20 were drilled as part of a resource evaluation conducted on the Stittsville Quarry property.
SQAT20-21 to SQAT20-31[1]	SQAT20-21 to SQAT20-31 were drilled as part of a resource evaluation conducted on the proposed Stittsville 2 Quarry property.
Notes: [1] - Borehole located on the proposed Stittsville 2 Quarry property [2] - Borehole located on the Moore Quarry property	

3.1.1.2 Moore Quarry

The original percussion drilling program at Moore Quarry was conducted on October 19 and 27, 2005 by Capital Water Supply Ltd. using an air percussion water well rig. The boreholes are identified as BH05-13, BH05-14 and BH05-15, and were drilled to provide access for subsurface geophysical logging and observation points for the collection of water levels and hydraulic conductivity data.

The three boreholes were 152 millimetres in diameter and drilled to depths of approximately 35 metres each. The depths of any large fractures or water producing zones in the wells were recorded by personnel from Golder Associates Ltd. at the time of drilling. The method of drilling did not allow for a direct assessment of the lithology and rock conditions. The borehole locations are shown on Figure 1.

Additional borehole installations were carried out on July 4 and 7, 2014 at the Moore Quarry site. During that time, a total of three boreholes (numbered BH14-17, BH14-17A and BH14-18) were put down at the locations shown on Figure 1. The boreholes were advanced using a track-mounted hollow-stem auger drill rig supplied and operated by Marathon Drilling Company of Ottawa, Ontario. These boreholes were advanced to depths ranging from 2.0 to 9.1 metres below the existing ground surface and boreholes BH14-17 and BH14-18 were terminated after advancing 7 metres into bedrock.

A total of four mini-piezometers (MP14-19, MP14-20, MP14-21 and MP14-22) were installed on July 2, 2014, at the locations shown on Figure 1. Each mini-piezometer (MP) was installed by hand-augering a hole to the depth of auger refusal, then installing a 51 mm diameter PVC screen and riser in the augered hole.

Borehole BH18-18 (refer to Figure 1) was installed at the request of MECP during development of the groundwater monitoring program under the PTTW for the site.

Boreholes MQAT18-01 to MQAT18-06 (refer to Figure 1) were completed at the site by means of an air track drill rig. These boreholes were used in a resource assessment/mining plan for the Moore Quarry.

Well logs for the Moore Quarry on-site wells are attached in Appendix B.

3.1.2 Geophysical Logging

Many open cored boreholes and air rotary boreholes were geophysically logged following completion of the drilling operations by geophysicists from Golder Associates Ltd. The log suite included both apparent conductivity and natural gamma logs. The conductivity and gamma logs were used in conjunction with the logging of the rock core to assess the bedrock stratigraphy beneath the site.

Natural Gamma

The natural gamma log provides a measurement (recorded in counts per second – cps) that is proportional to the natural radioactivity of the formation. The sample volume for the γ_n log is typically a 25 to 30 cm radius. The log is used principally for lithologic identification and stratigraphic correlation.

The tool used for logging employs a scintillation sodium iodide (NaI) detector. The gamma-emitting radio isotopes that naturally occur in geologic materials are Potassium 40 and nuclides in the Uranium 238 and Thorium 232 decay series. Potassium 40 occurs with all potassium minerals including potassium feldspars. Uranium 238 is typically associated with dark shale and uranium mineralization. Thorium 232 is typically associated with biotite, sphene, zircon and other heavy minerals.

The usual interpretation of the γ_n log is that measured counts are proportional to the quantity of clay minerals (shale) present. This assumes that the natural radioisotopes of potassium, uranium and thorium occur as exchange ions attached to the clay particles, so that the correlation is between gamma counts and the cation exchange capacity (CEC).

Electromagnetic Induction (Apparent Conductivity)

Apparent conductivity is a measure of the bulk apparent conductivity of the subsurface, which is primarily a function of interconnected porosity, clay content, moisture content and the dissolved ion concentration in the pore fluid. Temperature, phase state of the pore water and the amount and composition of any suspended colloids in the pore water also contribute to conductivity but to a lesser degree. An increase in any of these properties would result in an elevated apparent conductivity.

However, changes in clay content can also significantly alter instrument response. Clay particles have a relatively large number of ions adsorbed to their surface. When clays are saturated, these adsorbed ions can become partially dissociated and available for ionic conductivity. Since clay particles have a relatively large surface area, the presence of small amounts of clay can significantly increase bulk apparent conductivity.

Typically, the apparent conductivity of carbonate bedrock is low (<1 or 2 millisiemens per metre; mS/m) due to low porosity and clay content. Shaley or clay rich lithologies within carbonate rock show as natural gamma highs but may or may not have an associated apparent conductivity high although usually a shale layer will have a higher apparent conductivity than limestone or dolomite. Metamorphic rocks (slates and marbles) also produce very low apparent conductivity due to low porosity. Reported values are generally around 4 mS/m for these rock types.

Metal objects, such as steel casing in the borehole, will show as an anomalous response in the apparent conductivity log, either as large positive or negative deflections.

3.1.2.1 Stittsville Quarries

The geophysical logging at the boreholes drilled on the Stittsville Quarry property was conducted in several phases as boreholes were drilled between 1999 and 2020. The geophysical log suite included both apparent conductivity and natural gamma logs. To date, all of the wells on the Stittsville Quarry site have been geophysically logged. The geophysical logs for each borehole are presented on the logs in Appendix B.

After drilling was completed, boreholes BH05-10, BH05-11 and BH05-12 were geophysically logged. The geophysical logging program was conducted in December 2005. The log suite included both apparent conductivity and natural gamma logs. Geophysical logging, including apparent conductivity and natural gamma logs, has also been completed on DDH2001-1 and DDH2001-2. Geophysical logging of boreholes SQAT20-21 through SQAT20-31 was completed in 2020. The geophysical logs for each of these nearby borehole locations are presented on the logs in Appendix B.

3.1.2.2 Moore Quarry

After drilling was completed, boreholes BH05-13, BH05-14 and BH05-15 were geophysically logged. In addition, geophysical logging was completed in boreholes BH18-18 and MQAT-01 through MQAT18-06 (where possible). The log suite included both apparent conductivity and natural gamma logs and the geophysical logs for each borehole are presented on the logs in Appendix B.

3.1.2.3 Discussion

The conductivity and gamma logs were used in conjunction with WSP's knowledge of the bedrock formations obtained from the core retrieved from cored borehole DDH2001-1, DDH2001-2 and other detailed core logging from sites in the area of the proposed Stittsville 2 Quarry to create composite geological and geophysical reference logs for the Jinkinson Road Area including the proposed Stittsville 2 Quarry, the Stittsville Quarry and the Moore Quarry properties.

The Composite Geological Reference Log – Jinkinson Road Area is presented on Figure 5 and was developed based on WSP's experience to date in the logging of rock core in this area. Based on the examination of the Composite Geological Reference Log – Jinkinson Road Area on Figure 5, WSP has logged rock core (in the Jinkinson Road Area) that represents the upper part of the Bobcaygeon Formation through to the upper Rockcliffe Formation. The limitation of quarry coring programs to the Bobcaygeon Formation and the Gull River Formation is based on the fact that it is these two rock formations that represent the target aggregate resource materials in this area. The penetration of some cored boreholes into the top of the Rockcliffe Formation occasionally occurs at locations where the upper rock unit is the Gull River Formation and the depth to the top of the Rockcliffe Formation is minimal. The top of the Rockcliffe Formation represents a significant change in the geology and is accompanied by a dramatic shift in the natural gamma signal (see Figure 5) and, as such, this stratigraphic position is a significant geological marker horizon in this area. With reference to Figure 5, the top of the Rockcliffe Formation is identified as one of the two regional "Horizontal Correlation Lines" (the other being the geological contact between the Bobcaygeon Formation and the Gull River Formation with the top of the Gull River Formation being marked by the "first dolostone marker bed").

The Geophysical Log for TW09-1 (Figure 5) includes the entire Paleozoic stratigraphic sequence (in the Jinkinson Road Area) from the upper part of the Bobcaygeon Formation through to the Precambrian basement.

In an effort to relate the Paleozoic stratigraphy of the Jinkinson Road Area to the stratigraphy of the Ottawa area, two additional boreholes (with geological and/or geophysical data) are presented on Figure 5. These two additional boreholes are as follows:

1) GSC Dominion Observatory #1 borehole

2) GSC Lebreton borehole

Both of these boreholes were drilled by the Geological Survey of Canada and the approximate locations of these boreholes are shown on the inset on Figure 5.

The GSC Dominion Observatory #1 borehole was drilled to an approximate depth of 265 metres and penetrated the entire Paleozoic sequence from the lower Bobcaygeon Formation to the Precambrian basement.
This borehole was geophysically logged by the Geological Survey of Canada.

The GSC Lebreton borehole was drilled to a depth of 476.2 metres and penetrated the entire Paleozoic sequence from the Verulam Formation to the Precambrian basement. Only the upper 395.5 metres of this borehole is illustrated on Figure 5 as this was sufficient to display the entire Paleozoic sequence and the upper part of the Precambrian basement. This borehole was geophysically logged by the Geological Survey of Canada to a depth of 438 metres. In November 2000, Golder Associates Ltd. geophysically logged the upper 200 metres of this same borehole. Golder Associates Ltd. has also logged the rock core over the depth from ground surface to 395.5 metres.

The GSC Dominion Observatory #1 borehole and the GSC Lebreton borehole are shown on Figure 5 as a means of illustrating how the geology of the Jinkinson Road Area fits into the regional context.

3.1.3 On-Site Surficial Geology

Quaternary-aged sediments in the study area were deposited during the Wisconsinan glaciation by the Laurentide Ice Sheet approximately 10,000 years before present (BP). The surficial geology mapping indicates that there is generally a thin layer of overburden on the Tomlinson sites. The surficial deposits generally consist of glacial till and topsoil in the area of the Tomlinson properties (Figure 2). Organic muck and peat deposits are mapped in the area of the wetlands.

Based on the borehole data, there is limited overburden on the proposed Stittsville 2 Quarry and the Stittsville Quarry sites (with a maximum of 2.6 metres of overburden at SQAT20-30). Overburden thicknesses on the Moore Quarry site ranges from 0.15 metres at 14-18 to 2.8 metres at BH18-18.

3.1.4 On-Site Bedrock Geology

The upper Paleozoic bedrock formations that have been cored/geophysically logged in the vicinity of the existing Stittsville Quarry and Moore Quarry are, from top to bottom, the Bobcaygeon Formation, Gull River Formation and the Rockcliffe Formation (see Composite Geological Reference Log – Jinkinson Road Area on Figure 5). On the Tomlinson properties, the lower Bobcaygeon was encountered in all boreholes. The Gull River Formation underlies the Bobcaygeon Formation, and it was encountered in all boreholes (with geophysical information) on the Tomlinson properties with the exception of BH99-5, BH99-6, SQAT18-05, SQAT18-06, SQAT18-07, SQAT18-11, SQAT18-13, SQAT18-14, SQAT18-15, SQAT18-16, SQAT18-17, SQAT18-18, SQAT18-20, SQAT20-21, SQAT20-22, SQAT20-23, SQAT20-24, SQAT20-25 and SQAT20-27. The Bobcaygeon Formation and the Gull River Formation are the two bedrock formations that represent the target aggregate resource materials in this area. The Rockcliffe Formation underlies the Gull River Formation and was encountered in boreholes BH13-16 and TW09-1 on the Tomlinson properties.

A summary of the Bobcaygeon Formation and Gull River Formation stratigraphic sequence on the Tomlinson quarry properties is presented below based on the on-site geological and geophysical investigations, other studies in the Jinkinson Road Area and regional geological data. To assist in this discussion, reference should be made to the discussion presented in Section 3.1.2.3 and the Composite Geological Reference Log – Jinkinson Road Area and Composite Geophysical Reference Log – Jinkinson Road Area which are presented on Figure 5.

3.1.4.1 Bobcaygeon Formation

The Bobcaygeon Formation is identified in all boreholes (with geophysical information) drilled on the properties. The thickness of the Bobcaygeon formation ranges from 8.3 to 36.2 metres. The thickest portion of the Bobcaygeon Formation lies along the easternmost boundary of the Stittsville Quarry at boreholes BH99-6, BH03-9, BH18-17, DDH2001-1 and TW09-1. The Bobcaygeon Formation is a medium grey, very fine grained non-crystalline to fine grained, faintly crystalline, thinly to medium bedded, nodular textured limestone.

3.1.4.2 Gull River Formation

The Gull River Formation underlies the Bobcaygeon Formation. The upper portion of the formation is light to medium grey, very fine to fine grained, faintly crystalline, thinly to medium bedded, argillaceous limestone interbedded with dolostone and shale. The full thickness of the Gull River Formation, based on the results of geophysical testing at BH13-16 and BH09-1, beneath the quarry is approximately 38 metres.

3.2 Physical Hydrogeology

The hydrogeological characteristics of the bedrock formations beneath the site were investigated through various hydraulic testing programs. The hydraulic testing programs were developed to identify hydrostratigraphic units at the sites, and to identify hydraulically conductive zones to be used for monitoring well installations.

3.2.1 Monitoring Well Installation

Groundwater monitoring intervals were constructed in many of the boreholes to allow for the measurement of groundwater levels (and determination of groundwater elevations), horizontal hydraulic conductivity, and vertical gradients within the various bedrock formations encountered at the sites. The positions of the screened intervals in each borehole were selected based on the reported water bearing zone(s) as noted during drilling and results from geophysical testing, where available.

The monitoring wells were developed following their installation in order to remove drill cuttings from the sand filter pack. The development was carried out by evacuating the standing water in the wells to the surface using Waterra foot valves, flushing silt-sized drill cuttings in the sand filter pack out at the surface. Between one and three well volumes were evacuated from each well, prior to carrying out the hydraulic conductivity testing. The development ensures that the groundwater level measurements and hydraulic conductivity tests are accurate.

3.2.1.1 Stittsville Quarry Properties

Boreholes (BH99-1 to BH99-7, BH03-7 to BH03-9, BH13-16 and BH18-17) were instrumented with nested monitoring well installations at different depth intervals. These multi-level installations enable the determination of individual water levels and vertical hydraulic gradients within the various rock strata encountered beneath the site. The details of the well installations are shown on the Summary Logs in Appendix B.

Boreholes BH05-10 and BH05-12 were each instrumented with three nested monitoring well installations at specific depth intervals. The construction details of monitoring intervals are presented in Appendix B. Borehole BH05-11 was left as an open hole, with steel casing set just into the surface of the bedrock.

3.2.1.2 Moore Quarry

Boreholes BH05-13, BH05-14 and BH05-15 were each instrumented with three nested monitoring well installations at specific depth intervals. The construction details of these monitoring wells are presented in Appendix B.

A groundwater monitor was installed in borehole BH14-17A to allow subsequent measurement of the groundwater levels in the overburden adjacent to borehole BH14-17. Borehole BH14-17A is located approximately 2 metres from borehole BH14-17. There was insufficient thickness of overburden at borehole BH14-18 to allow the installation of an adjacent overburden groundwater monitor. Boreholes BH14-17 and BH14-18 were left as open holes, with steel casings set just into the surface of the bedrock.

Borehole BH18-18 was instrumented with 4 nested monitoring well installations at specific depth intervals. The construction details of these monitoring wells are presented in Appendix B.

3.2.2 Hydraulic Conductivity Testing

A total of 20 well response tests were carried out in the monitoring intervals installed in the boreholes using the rising/falling head method. The well response tests provide an estimate of the horizontal hydraulic conductivity of the bedrock adjacent to the monitoring well interval. The response testing was either performed by quickly removing water from the monitoring well with a Waterra foot valve and tubing or displacing water by inserting/removing a plastic slug and monitoring the recovery to the static water level by measuring the depth to the water using a water level tape and/or pressure transducer and datalogger at frequent intervals.

For analysis, the intervals for response testing were defined as the sand pack interval (zone filled with sand surrounding the screens) between the bentonite seals. This definition of screen length is applicable in the bedrock formations encountered in the area of the site since inflow to the sand pack is fairly slow and thus the assumption for horizontal flow over the entire length of the sand pack is preserved. The details regarding the locations of the test intervals for each monitoring well are provided on the borehole logs in Appendix B. The well response test graphs and interpretations are provided in Appendix C. The hydraulic conductivity value from each test was calculated using the Hvorslev (1951) method.

A summary of the well response testing results is provided in the following table:

Table 5: Summary of Well Testing Results

Monitoring Well	Geophysical Unit(s) Tested	Date Tested	Calculated Hydraulic Conductivity (m/s)
BH99-2A	Bobcaygeon/Gull River Contact	January 24, 2000	9×10^{-7}
BH99-2B	Bobcaygeon	January 24, 2000	1×10^{-6}
BH99-3A	Gull River	January 24, 2000	2×10^{-6}
BH99-3B	Bobcaygeon	January 24, 2000	1×10^{-6}
BH99-4A	Gull River	January 24, 2000	5×10^{-7}

Monitoring Well	Geophysical Unit(s) Tested	Date Tested	Calculated Hydraulic Conductivity (m/s)
BH99-4C	Bobcaygeon	January 24, 2000	1×10^{-6}
BH99-4D	Bobcaygeon	January 24, 2000	2×10^{-8}
BH05-10A	Bobcaygeon/Gull River Contact	June 23, 2006	Could not draw water down
BH05-10B	Bobcaygeon	June 23, 2006	Could not draw water down
BH05-10C	Bobcaygeon	June 23, 2006	$4x10^{-9}$
BH05-12B	Bobcaygeon/Gull River Contact	June 24, 2016	Well was dry
BH05-12C	Bobcaygeon	June 24, 2006	Could not draw water down
BH05-13A	Bobcaygeon/Gull River Contact	June 24, 2006	Could not draw water down
BH05-13B	Bobcaygeon	June 24, 2006	3×10^{-6}
BH05-13C	Bobcaygeon	June 24, 2006	4×10^{-9}
BH05-14A	Gull River	June 22, 2006	2×10^{-8}
BH05-14B	Bobcaygeon/Gull River Contact	June 22, 2006	Could not draw water down
BH05-14C	Bobcaygeon	June 22, 2006	3×10^{-8}
BH05-15A	Gull River	June 23, 2006	7×10^{-8}
BH05-15B	Gull River	June 23, 2006	Could not draw water down
BH05-15C	Bobcaygeon/Gull River Contact	June 23, 2006	Could not draw water down

Four successful well response tests were completed in the Gull River Formation. The hydraulic conductivity values for the Gull River Formation range from 2×10^{-8} m/s to 2×10^{-6} m/s. The geometric mean for the Gull River Formation is 2×10^{-7} m/s and the arithmetic mean is 6×10^{-7} m/s. The water level could not be drawn down during a testing attempt on BH05-15B indicating a hydraulic conductivity greater than 10^{-4} m/s.

Six well response tests were attempted using monitors that straddled the contact between the Bobcaygeon Formation and the Gull River Formation (BH99-2A, BH05-10A, BH05-12B, BH05-13A, BH05-14B and BH05-15C). The water level could not be drawn down during the tests on BH05-10A, BH05-13A, BH05-14B and BH05-15C indicating a hydraulic conductivity greater than 10^{-4} m/s, and the hydraulic conductivity value for this zone in monitoring well BH99-2A was 9×10^{-7} m/s.

Eight successful well response tests were completed in the Bobcaygeon Formation. The hydraulic conductivity values for the Bobcaygeon Formation range from 4×10^{-9} m/s to 3×10^{-6} m/s. The geometric mean for the Bobcaygeon Formation is 1×10^{-7} m/s and the arithmetic mean is 8×10^{-7} m/s.

3.2.3 Groundwater Level Monitoring

Monitoring of groundwater levels was conducted in the monitoring intervals installed in the on-site boreholes as well as in open boreholes. Depths to water were measured relative to the surveyed top of the casing and were recorded to the nearest centimetre. The water elevations in the monitoring wells and open boreholes were calculated by subtracting the measured depth to water from the top of pipe reference elevations.

3.2.3.1 Stittsville Quarry Properties

Groundwater level measurements for the monitoring intervals installed within the monitoring wells and in the open boreholes began in March 2000 and have continued through July 2022. During each monthly session, water levels were measured in all accessible intervals. A summary of the groundwater elevations measured through July 2022 are provided in Appendix D, following the text of the report.

Pre-development Water Level Trends

The pre-development groundwater elevation data for the exiting Stittsville Quarry are presented in Appendix D and shown on Figures 6 through 10. The pre-development groundwater elevations measured between January 28, 2000 and October 2, 2002 represent baseline groundwater elevation conditions in the vicinity of the Stittsville Quarry before development. Figures 6 through 10 show that, with the exception of the monitoring wells installed in borehole BH99-6, groundwater elevations at the Stittsville Quarry were generally consistent during the pre-development period. The trends in the groundwater levels in the monitoring wells installed in borehole BH99-6 are related to the slow recovery of the water levels after construction of the monitoring wells and following groundwater sampling events (see Figure 10). It is noted that groundwater elevations increased from about 141 metres above sea level (asl) to about 146 metres asl in monitoring well BH99-4C in June 2001 (see Figure 8). A drop in groundwater elevations is generally noted in monitoring wells after sampling events due to well purging (refer to Figures 8 and 10).

Post-Development Water Level Trends

Groundwater elevation data are presented in Appendix D and shown on Figures 6 through 18. These figures show that the post-development (of the existing Stittsville Quarry) groundwater elevations at many locations are comparable to those observed prior to existing Stittsville Quarry dewatering. The monitoring wells in boreholes BH99-1 and BH99-3 (Figures 6 and 7) are the only remaining locations with water level data that extends prior to existing Stittsville Quarry dewatering (October 14, 2002). Figure 6 shows that groundwater elevations in monitoring wells BH99-1 and BH99-2B have remained relatively consistent (within the historical range) between the pre-development and post-development monitoring programs at the Stittsville Quarry. The deeper monitoring intervals, BH99-2A, BH99-3A and BH99-3B show a decrease in groundwater elevations as compared to the recorded pre-development groundwater elevations. Groundwater elevations in monitoring wells BH99-3C and BH99-3D are more variable when compared to pre-development groundwater elevations (Figure 7).

Monitoring wells that were installed after quarry dewatering began (BH03-7, BH03-8, BH03-9, BH05-10, BH05-12, BH13-16 and BH18-17) generally show the same trend with the exception of the monitoring wells in BH03-9 and BH18-17. It should be noted the BH05-11, SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29 are open boreholes with no monitoring wells installed. The deeper monitoring intervals ("A" and "B" intervals) at the various locations show a decreasing water level trend over time whereas the shallower intervals ("C" and "D" intervals) are relatively stable (Figures 8, 9, 11, 12, 14, 15 and 16). The water levels in the deeper monitoring wells in BH03-9 have increased over time such that they are at the same elevation as the upper monitor (Figure 13). The water levels in the monitoring wells in BH18-17 do not show the same decrease in the deeper intervals.

The decline in water levels at the deeper intervals appears in early 2006 at most monitoring well locations and continued until mid-2012. After that time, water levels have been generally stable, but variable from one monitoring session to the next. The groundwater level in BH99-1 (Figure 6) dropped in July 2020 and has remained at approximately the same level ever since.

In plan view (Figure 1), borehole BH99-3 is the closest remaining borehole to the quarry excavation and, as such, should show the greatest decrease in water levels. The deep intervals at this location show the greatest decrease in groundwater elevations. The shallower intervals at this location, as well as the deep intervals at BH99-2, BH03-7, BH05-10 and BH13-16 farther from the quarry excavation, show less decrease in groundwater elevations. The overall decline in groundwater levels at BH99-1, BH99-2A, BH99-3A, BH99-3B, BH03-7A and BH03-7B, BH05-10A, BH05-10B, BH05-10C, BH05-12A, BH05-12B, BH13-16A and BH13-16B is interpreted to be related to quarry dewatering activities in the area.

3.2.3.2 Moore Quarry

Monitoring of groundwater levels has been conducted in the monitoring intervals installed on-site. Quarterly groundwater level measurements for the monitoring intervals installed within the monitoring wells (intervals “A”, “B” and “C”) began in June 2006, or when additional monitors were installed. Monthly groundwater level monitoring began in September 2012. During each session, water levels were measured in all accessible intervals.
A summary of the groundwater elevations measured to date are provided in Appendix D and presented on Figures 18 to 24.

The recorded values show that water levels in the monitoring wells are typically consistent over time however some monitors show a general decline since May 2008. Monitoring wells BH05-15A and BH05-15B show a decreasing trend of approximately 3 metres in groundwater levels between May 2008 and January 2016, after which water levels have leveled off (Figure 21). Monitoring wells BH05-13A, BH05-13C, BH05-14A, BH05-14B, BH05-14C and BH05-15C have generally remained consistent over the period from June 2006 to July 2022. Water levels in monitoring well BH05-15B increased by approximately 4.7 metres between May and August 2014. The reason for this increase is unknown, however water levels have remained consistent since that time. Groundwater levels in the shallow bedrock and overburden monitors installed in 2014 (BH14-17, BH14-17A, BH14-18, BH18-18 and MP14-19 through MP14-22) have remained consistent since monitoring began at those locations.

The drop in water levels at monitors BH05-15A and BH05-15B is likely due to quarry dewatering in the area. Groundwater elevation monitoring at Stittsville Quarry indicates that the drawdown due to quarry operations is more significant in the deeper monitoring wells surrounding the quarry.

3.2.3.3 Groundwater Flow Directions

The groundwater elevation data presented on Figures 6 through 24 along with the borehole locations presented on Figure 1 and the water levels recorded in the MECP Water Well information System (WWIS) indicate that groundwater flow is generally from east to west across the Moore Quarry site and from west to east across the Stittsville Quarry and proposed Stittsville 2 Quarry site. The figures also indicate that there are generally recharging conditions at all of the multi-level monitoring wells on-site. At the Moore Quarry site, the vertical gradient appears to decrease near the wetland (BH05-14 and BH05-15) as the difference in groundwater elevations in the different monitors at these locations is smaller than at BH05-13.

Based on the results of the groundwater elevations collected at the site, at the shallow intervals, groundwater flow generally flows from west to east. In the shallow intervals, the highest groundwater elevations are found in monitoring wells installed on the western side of the site (i.e., BH99-1, BH99-3D, BH03-9C, BH05-10C and BH13-16D) and the lower groundwater elevations are found in the monitoring wells installed along the eastern edge of the proposed extraction area (BH18-17D and SQAT20-27).

In the deeper intervals, groundwater flow is generally from east to west likely due to the existing dewatered quarry on the western side of the proposed Stittsville 2 Quarry site. The highest groundwater elevations are found in the monitoring wells located on the east edge of the proposed extraction area (BH18-17A). The lowest groundwater elevations are located on the western side of the site (BH05-10A, BH99-3A, BH13-16A and BH03-9A).

3.2.3.4 Identification of Hydrostratigraphic Units

The data presented on the borehole logs, along with the data collected during the well response tests and WSP's experience in the area forms the basis for the identification of hydrostratigraphic units. The hydraulic conductivity data presented in Section 3.2.2 illustrates the degree of variability of measured hydraulic conductivity values. The degree of variability is related to the scale of the hydraulic testing which, relative to the scale of the quarry is small. At larger scales, particularly at the scale of a grid block in a numerical groundwater flow model, the degree of variability is significantly reduced. For this reason, it is appropriate to take averages of smaller scale data and apply them to larger volumes. The geometric mean, which minimizes bias towards the high or low end of the large range in measured values, is appropriate for this task.

Based on the results of the on-site single well response testing and the responses (to quarry dewatering over the last decade) observed in monitoring wells in the Jinkinson Road Area, it is interpreted that there is a regionally significant transmissive zone (TZ) that exists in the subsurface in close proximity to the contact between the Bobcaygeon Formation and the Gull River Formation and is most likely associated with the dolostone beds in the upper part of the Gull River Formation. This regionally significant feature is referred to herein as the "Transmission Zone" or "TZ" and is characterized by a higher horizontal hydraulic conductivity as compared to the overlying Bobcaygeon Formation and underlying Gull River Formation. This TZ feature is recognized as a distinct hydrostratigraphic unit in the Jinkinson Road Area and has been subject to depressurization over time as a result of quarry development in the area.

Seven hydrostratigraphic units were identified on the basis of the hydraulic testing and the geological formations of the bedrock in the area. In order of increasing depth, the hydrostratigraphic units are: 1) the overburden; 2) the upper weathered bedrock; 3) the Bobcaygeon Formation; 4) a Transmissive Zone (TZ) between the Bobcaygeon Formation and the Gull River Formation; 5) the Gull River Formation; 6) the Rockcliffe Formation; and, 7) the Oxford Formation.

In summary, the overburden and the upper weathered bedrock together represent a moderately permeable upper horizon; while the Bobcaygeon Formation, the Gull River Formation and the Rockcliffe Formation represent an aquitard with a TZ at the contact between the Bobcaygeon and Gull River Formations.

3.3 Surface Water Studies

3.3.1 Monitoring Stations

Pursuant to the monitoring required by the Environmental Compliance Approval (ECA) and the PTTW for the existing Stittsville Quarry, a number of water level monitoring locations have been established for the existing Stittsville Quarry, as well as, and more recently, to increase the understanding of the Goulbourn Wetland Complex hydrological characteristics. A list of the monitoring stations, their locations and their installation dates are provided in Table 6.

Table 6: Surface Water Level Monitoring Locations

Station Name	Zone	Northing	Easting	Installation Date	Measurements[2]
SG-1	18	5009419	423182	September 26, 2002	Water Level (Continuous and Manual)
SG-2	18	5009475	423980	April 23, 2003	Water Level (Manual Only)
SG-4	18	5009429	423993	April 13, 2018	Water Level (Continuous and Manual)
SS-3	18	5009142	424418	July 21, 2020	Water Level (Continuous and Manual)
SS-7	18	5010001	423986	July 21, 2020	Water Level (Continuous and Manual)
SS-8	18	5010247	423400	April 9, 2021	Water Level (Continuous and Manual)
SW-A	18	5008093	425198	July 22, 2020	Water Level (Continuous and Manual)

Notes:
(1) The approximate locations of these monitoring stations are shown on Figure 1.
(2) All continuous and manual measurements at each station are seasonal (no winter measurements).

3.3.2 Surface Water Level Monitoring

Surface water stations (SG1, SG-2, SG-4, SS-3, SS-7, SS-8, and SW-A) were previously installed to assess seasonal water level and storage characteristics in the western and eastern wetlands within the existing quarry discharge drainage path which is also within the proposed Stittsville 2 Quarry boundary as well as to assess the Goulbourn Wetland Complex. Water level transducer dataloggers along with manual staff gauges were installed at the surface water stations detailed above with the exception of SG-2. The dataloggers were programmed to record water levels on a 15-minute interval. Where present, the pressure transducer (datalogger) is removed at the end of each season before winter and re-installed in the spring. The elevations of the staff gauges are surveyed annually relative to the Canadian Geodetic Vertical Datum of 1928 (1978 adjustment), or a nearby temporary benchmark, which was also surveyed relative to the Geodetic Datum. Water levels were manually recorded at the staff gauge locations monthly, during unfrozen periods, to verify continuous water level measurements recorded with the datalogger.

The ranges in water levels for the monitoring stations for the period of 2018 – 2022 are presented in the tables below. Any water levels recorded before 2018 at SG-1 and SG-2 are provided in Figures 25 and 26, respectively. These water level ranges are based on the continuous logger data.

Table 7: Maximum and Minimum Water Levels at the Surface Water Stations

Period of Record		Surface Water Monitoring Stations						
		SG-1 (1)	SG-2 (1)	SG-4 (1)	SS-3 (1)	SS-7 (1)	SS-8 (1)	SW-A (1)
2018	Minimum (masl)	139.85	132.91	133.65	- (2)	- (2)	- (2)	- (2)
	Average (masl)	139.94	139.94	133.79	- (2)	- (2)	- (2)	- (2)
	Maximum (masl)	140.22	132.91	133.99	- (2)	- (2)	- (2)	- (2)
2019	Minimum (masl)	139.79	132.96	132.76	- (2)	- (2)	- (2)	- (2)
	Average (masl)	139.92	132.99	132.96	- (2)	- (2)	- (2)	- (2)
	Maximum (masl)	140.13	133.05	133.11	- (2)	- (2)	- (2)	- (2)
2020	Minimum (masl)	139.85	132.94	132.71	131.85	133.24	- (2)	126.06
	Average (masl)	139.87	132.99	132.89	132.20	133.77	- (2)	126.56
	Maximum (masl)	140.09	133.01	133.03	132.33	133.88	- (2)	126.80
2021	Minimum (masl)	139.85	132.97	132.75	132.24	- (3)	136.38	126.56
	Average (masl)	139.88	133.00	132.94	132.38	- (3)	136.55	126.67
	Maximum (masl)	140.09	140.09	133.08	132.46	- (3)	136.87	126.86
2022	Minimum (masl)	139.90	139.90	132.89	132.15	- (3)	136.35	126.53
	Average (masl)	139.93	139.93	132.95	132.20	- (3)	136.42	126.61
	Maximum (masl)	140.06	133.03	133.02	132.25	- (3)	136.52	126.78
Continuous Fluctuation (m)		0.43	0.17	1.28	0.61	0.64	0.52	0.79

Note:

(1) Survey datum is based on Realtime Can-Net Network Observations (UTM Zone 18 CSRS 2010, Elevations are CGVD 1928, 1978 Adjustment).

(2) Surface water loggers had not been installed at these locations yet, therefore, no continuous data was available during these years.

(3) No continuous data available during these years.

Table 8: Summary of Range of Water Levels in Quarry Surface Water Receptors

Minimum Water Elevation (masl)	Maximum Water Elevation (masl)	Range of Water Levels (m)
Western Wetland (SG-1)		
139.79	140.22	0.43
Eastern Wetland (SG-2 and SG-4 (Post 2019))		
132.71	132.91	0.20
Goulbourn Wetland Complex North of the Rail Line (SS-3 and SS-7)		
131.85	132.25	0.40
Goulbourn Wetland Complex North of Fernbank Road (SW-A)		
126.06	126.86	0.79
Goulbourn Wetland Complex South of Highway 7 (SS-8)		
136.35	136.87	0.52

Note: Survey datum is based on Realtime Can-Net Network Observations (UTM Zone 18 CSRS 2010, Elevations are CGVD 1928, 1978 Adjustment).

As detailed in Tables 7 and 8 above, variations in water elevation at the surface water stations within the western and eastern wetland pockets on site were observed to be 0.43 m and 0.2 m, respectively, over the period of record. Variations in water elevation at the surface water stations within the Goulbourn Wetland Complex were observed to range from 0.4 m to 0.79 m over the period of record within the different sections of the complex.

Figures 25 through 31 show the continuous water level data for each monitoring station with the exception of SG-2 (detailed on Figure 26) which only shows manual measurements. Fluctuations in water elevation in the Goulbourn Wetland Complex, as measured at SG-2 (Figure 26), and in the western wetland pocket, as measured at SG-1 (Figure 24), have remained relatively consistent since 2008 at SG-1 and 2010 at SG-2. Based on the data collected at the two staff gauges to date, with the exception of a decrease in water levels at SG-1 between 2002 and 2007, there is no evidence of general increases or decreases in water levels at SG-1 or SG-2. Water elevations at SG-4 have also remained relatively stable since 2019.

Generally, water level records at the surface water stations are marked by low levels during the summer and early fall. Water levels through the spring were moderate to high following the freshet. Water levels in the fall were marked with responses to large precipitation events. As the majority of the stations were operated seasonally, no trends for the winter water levels were observed. Changes in water levels in SG-1 and SG-4, as detailed in Figures 25 and 27, respectively, are influenced by rainfall and quarry pumping events as these events tend to coincide (i.e., rainfall and snowmelt that enter the quarry excavation area is pumped out to maintain the quarry in a dewatered state). The staff gauge and data logger for SG-4 was moved in the spring of 2019 to better capture water levels within the Goulbourn Wetland Complex (i.e., within the eastern wetland pocket onsite) and, as such, water levels recorded in 2018 cannot be directly compared to 2019 through 2022.

3.3.3 Surface Water Flow Monitoring

Instantaneous flow measurements were collected seasonally at surface water stations SW-A, SS-3, and SS-8 (as seen on Figure 1) over the period of 2020 – 2022 and were used to verify the hydrological model. Continuous flow data were collected by a MACE Agriflo XCI flowmeter (MACE flowmeter), located in a culvert on the Stittsville 2 Quarry property downstream of the existing Stittsville Quarry effluent discharge location (shown in Figure 1) which provides continuous water level and velocity data (i.e., collected at 15-minute intervals) using acoustic Doppler velocity sensor technology. Continuous flow measurements were collected seasonally, and the MACE flowmeter was reinstalled yearly as early as April and retrieved before frost as late as December over the period of 2018 to 2022. Instantaneous flow measurements for SWA, SS-3, and SS-8 are summarized in Table 9. A summary of the continuous flow measurements at the MACE flowmeter is detailed in Table 10 and is displayed on Figure 32.

Table 9: Instantaneous Flow Measurements at SW-A, SS-3, and SS-8

SW Station	Flow (L/s)				
	Period of Record				
	Nov. 26, 2020	Dec. 02, 2020	Apr. 30, 2021	Sep. 24, 2021	April 8, 2022
SW-A	-[3]	206.9	106.9	189.2	934.9
SS-3	4.2	-[2]	-[2]	-[2]	46.7
SS-8	-[3]	-[3]	-[1]	-[1]	0.0

Note: L/s = Liters per second

(1) No flow was observed.

(2) Flow measurement was not recorded.

(3) Instantaneous flow measurements began during December 2020 field visit for SW-A and SS-8 during the April 2021 field visit.

Table 10: Summary of Continuous Flow Data at the MACE Flowmeter

Continuous Flows	Flow (L/s)				
	Period of Record				
	2018	2019	2020	2021	2022
Minimum	-0.04	-0.01	-0.01	-0.002	0.00
Average	0.36	0.64	0.08	0.02	0.18
Maximum	7.44	10.16	1.59	0.45	4.18

Note: L/s = Liters per second

The continuous flow record at the MACE flowmeter is marked by low flows during the summer and early fall. Precipitation events and quarry pumping seem to drive the majority of the flow through the culvert as the channel remains dry for extended periods of the year. It was noted that the flow data shows sudden spikes in flow and then quickly drops back down to zero. These trends can likely be attributed to the position of the flowmeter within the culvert. As demonstrated during field investigations, when the culvert is half full, the MACE flowmeter records zero flow even though water is still flowing around it. It is likely that the MACE flowmeter can only record data above a certain flow before the meter is unable to get a proper reading.

3.3.4 Water Quality Monitoring

Water quality monitoring for the existing Stittsville Quarry under the existing ECA has been taking place since 2000. Water quality where surface water from the Tomlinson property enters the Goulbourn Wetland Complex (SS-6), and at the outlet of the western wetland (SS-5), is typically similar to background (SS-2, SS-7, SS-8) parameter concentrations with the exception of general increases in concentrations of boron, hardness, nitrate, potassium, strontium and sulphate and general decreases in concentrations of chloride and sodium. These results indicate that the quarry discharge may be having an effect on downstream surface water quality in the Goulbourn Wetland Complex with respect to boron, hardness, nitrate, potassium, strontium and sulphate. With respect to these six parameters, only boron has a Provincial Water Quality Objective (PWQO) and both boron and nitrate have objectives for the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life. Although quarry discharge may be resulting in an increase in the boron concentration in the Goulbourn Wetland Complex, the boron concentrations do not exceed the interim PWQO value of 0.2 mg/L or the short-and long-term CCME objectives of 15 mg/l and 29 mg/L, respectively. Nitrate concentrations also do not exceed the short-and long-term CCME objectives of 550 mg/l and 13 mg/L, respectively. Water Quality results are presented in Appendix E.

4.0 GROUNDWATER FLOW MODELLING

4.1 Conceptual Model Development

A conceptual model describes the essential features of the hydrogeological system and identifies the principal processes affecting the potential impacts due to quarry dewatering. Since the potential impacts must account for uncertainty, an assessment of the usefulness of the available data to describe the hydrogeological system, and an identification of the uncertainties in the hydrogeological system is a critical part of the conceptual model.

A numerical model was developed to simulate the 3-D distribution of groundwater hydraulic head in the study area, using MODFLOW (Harbaugh, 2005). A base case calibrated flow model was developed through the establishment of a finite difference grid, distribution of hydraulic conductivity, distribution of boundary conditions, with adjustments, as necessary, to match the output of the model to observed conditions (i.e., the observed static water levels in the MECP WWIS in combination with groundwater elevations from the Jinkinson Road study area wells and quarry effluent discharge). The calibrated flow model was used to estimate future conditions surrounding the quarry site. Visual MODFLOW Version 4.6.0.169 was used as a pre- and post-processor for MODFLOW.

4.1.1 Data Considered

Data from a variety of sources are considered in this study. Mapping data includes Natural Resources Values Information System (NRVIS) maps from the MNRF, OGS maps from Ontario Ministry of Northern Development and Mines, and maps from the Geological Survey of Canada (GSC). Subsurface information was obtained from the MECP WWIS. At the watershed scale, reference documents include the Renfrew County – Mississippi – Rideau Groundwater Study (Golder, 2003a), the Wellhead Protection Study for Munster Hamlet and Kings Park Communal Wells (Golder, 2003), and the updates to that report (Golder, 2008 and 2009). At the local scale, references include various annual monitoring summary reports for quarries in the area and quarry licensing and permitting application documents for quarries in the area.

Tomlinson, Lafarge and Cavanagh have entered into a data-sharing agreement whereby all three parties would have access to the comprehensive geological and hydrogeological database for the Jinkinson Road study area. This comprehensive geological and hydrogeological database includes work previously conducted on, and in the vicinity of, the Tomlinson Moore Quarry, Tomlinson Stittsville Quarry, Lafarge Bell Quarry, Cavanagh Henderson Quarry and the Cavanagh Beagle Club Quarry in addition to data collected as part of the Voluntary Monitoring Program. These quarry properties in the Jinkinson Road study area are shown on Figure 4. The comprehensive geological and hydrogeological data database includes detailed rock core logs, borehole logs, monitoring well installation records, geophysical logs, groundwater level data, hydraulic conductivity data, etc. The borehole locations that are included in the data-sharing agreement are shown on Figure 4. The total number of boreholes and monitoring wells that comprise the database for the Jinkinson Road study area are 100 and 158, respectively.

Through the data-sharing agreement, the geological and hydrogeological data is made available to WSP (by Tomlinson, Lafarge and Cavanagh) for use by either of the three aggregate producers in the context of the quarry licensing projects under the *Aggregate Resources Act* and/or applications for Permits to Take Water or Environmental Compliance Approvals – Industrial Sewage Works under the *Ontario Water Resources Act*. This comprehensive geological and hydrogeological database (i.e., Paleozoic bedrock stratigraphy, hydraulic conductivity data and groundwater level data) has been used in the development of the conceptual and numerical hydrogeological model for the study area as presented in this document. In this report prepared specifically for Tomlinson, the detailed rock core logs, borehole logs, monitoring well installation records, geophysical logs, groundwater level data, hydraulic conductivity data, etc. belonging to Lafarge and Cavanagh are not presented, however, these data were used in the development of the conceptual and numerical hydrogeological model for the Jinkinson Road study area. This report does include the detailed site-specific geological and hydrogeological investigation data (borehole logs, monitoring well installation records, geophysical logs, groundwater level data, hydraulic conductivity data, etc.) for work conducted by Tomlinson as it relates to the studies completed since 1999 on, and in the vicinity of, the Tomlinson Stittsville Quarry and Tomlinson Moore Quarry.

4.1.2 Data Review and Processing

Based on a preliminary review of the available data, a fourteen kilometre by thirteen-kilometre study area was chosen, centred on the quarry operations in the Jinkinson Road area. Within this area, water well records were obtained from the WWIS, combined with available data from other sources, and examined to determine subsurface geological and hydrogeological conditions. The data was reviewed and processed as follows:

- Presentation of the geological information (“formations” as described by the GSC Mat1 Code in the WWIS, or equivalent in other data sets) and hydrogeological information (elevation of water found and elevation of static water level in the WWIS).
- Development of a “layer cake” model of subsurface geology (i.e., from the ground surface down) consistent with the geological information contained within the WWIS, geological mapping and data obtained from the various quarry field programs.
- Assessment of the data gaps.

The hydrogeological information contained in the WWIS represents water level data collected during different years, different seasons and from different formations depending on the depth of the well. The reported static water levels may not be representative of actual static conditions as they are likely measured shortly after completion of the drilling of the well. On an individual basis, the information cannot be relied upon to be representative of actual current conditions; however, when multiple wells are considered together, trends in water levels can be observed and outliers can be identified. It is recognized that the information in the WWIS should be used with an acknowledgement of its limitations.

4.1.3 Hydrostratigraphy

Based on the information in the WWIS and mapped geology, two general hydrostratigraphic units, were postulated for the regional hydrogeological system under investigation:

1) Sand or glacial till overburden (typically 2 metres thick)

2) Limestone bedrock (up to 150 metres thick)

The top of the model was set equal to ground surface elevation taken from the NRVIS digital elevation model.

The overburden hydrostratigraphic unit (glacial till and sand) was assumed to be present over the entire area with a constant thickness of 2 metres. The distribution of the various overburden types was based on the existing mapping (refer to Figure 2). Based on shallow subsurface data collected in the vicinity of the quarries, it was assumed that glacial till was present everywhere where other units, such as sand, were not mapped.

Bedrock in the area of the quarry includes (from depth to top of bedrock) the Precambrian basement, the Nepean Formation, the March Formation, the Oxford Formation, the Rockcliffe Formation, the Gull River Formation and the Bobcaygeon Formation. The rock units slope towards the northeast consistent with the strike and dip of the layered bedrock. The proposed Stittsville 2 Quarry will extract bedrock from the Bobcaygeon Formation.

Based on the results of the geophysical analysis, hydraulic conductivity testing, and pumping tests conducted in the monitoring wells located in the vicinity of the quarries as well as WSP’s experience in the surrounding area, the limestone bedrock general hydrostratigraphic unit was further divided into seven separate units.

The lowest unit included in the conceptual model was the Oxford Formation (up to 100 metres thick). Hydraulic conductivities in the formation generally range from 10^{-10} to 10^{-4} metres per second (Golder, 2003a). Above this unit is the Rockcliffe Formation (up to 30 metres thick), that generally has lower hydraulic conductivity and poor domestic well yields. Based on the water levels and model calibration, a more transmissive unit of the Rockcliffe Formation was defined in the southern portion of the model domain (refer to Figure 33). This more transmissive zone of the Rockcliffe Formation is located south of the proposed Stittsville 2 Quarry and is not expected to significantly impact any of the simulations. Above the Rockcliffe Formation is the Gull River Formation. This unit ranges in thickness from 0 to 30 metres depending on the location within the model domain.

In close proximity to the contact between the Bobcaygeon Formation and the Gull River Formation was a more transmissive unit (TZ) that was assumed to have a thickness of five metres. The TZ is a regionally significant feature that exists in the subsurface in close proximity to the contact between the Bobcaygeon Formation and the Gull River Formation and is most likely associated with the dolostone beds in the upper part of the Gull River Formation. This regionally significant feature is characterized by a higher horizontal hydraulic conductivity as compared to the overlying Bobcaygeon Formation and underlying Gull River Formation. This TZ feature is recognized as a distinct hydrostratigraphic unit in the Jinkinson Road Area and has been subject to depressurization over time as a result of quarry development in the area. The TZ ‘daylights’ (directly beneath the weathered bedrock) to the south and west of the proposed Stittsville 2 Quarry. The TZ does not exist to the south of the daylight area, as the formation has been weathered away due to geological erosional processes in the past (refer to Figure 33).

The TZ is overlain by the less permeable upper unit ranging in thickness from 0 to 55 metres (Bobcaygeon Formation). A weathered bedrock layer at the top of the bedrock surface (3 metres thick) was assumed over the entire model domain.

4.1.4 Groundwater Recharge, Discharge and Flow Direction

Based on the water well information in the WWIS and the on-site monitoring well data, it was assumed that local groundwater flow in the area of the proposed Stittsville 2 Quarry is recharged at the local topographic high located immediately to the west of the quarry site along Jinkinson Road. Shallow groundwater discharges at the surrounding lowlands including wetlands, and streams. Deeper groundwater likely follows the general west to east regional flow. An important discharge location includes the Goulbourn Wetland Complex located to the east of the Site.

4.1.5 Finite Difference Grid

The grid block size for the area surrounding the proposed Stittsville 2 Quarry and the other quarries was set equal to 20 metres and was increased to a maximum value of 150 metres as the distance from the quarries to the edge of the domain increased (refer to Figure 34). There was a total of 17 layers in the model. Figure 35 illustrates the relationship between the 17 numerical model layers and the hydrostratigraphic units present in the vicinity of the proposed Stittsville 2 Quarry. Layer thicknesses ranged from 0.25 metres to 25 metres. Overburden (glacial till and sand) was represented with a single two-metre thick layer (from ground surface) and the weathered bedrock had a thickness of 3 metres (from the bottom of the surficial overburden layer). The lower bedrock layers outside of the area immediately surrounding the quarries followed the general dip and strike of the bedrock. Within the area surrounding the quarries, the lower bedrock layers were defined by surfaces generated based on the results of the geophysical testing and core logging that has taken place in the boreholes/monitoring wells. The resulting finite difference grid consisted of 403 rows, 313 columns, and 17 layers. A total of 2,144,363 grid blocks were defined within the model domain.

4.1.6 Boundary Conditions

Boundary conditions are assigned to the model to match the boundaries of the flow system as defined in the conceptual model.

Recharge boundary conditions were established on the top layer (overburden) based on the mapped surficial geology units. Overburden (glacial till and sand) was assumed to be present over the entire area with a constant thickness of 2 metres. As indicated previously, it was assumed that glacial till was present everywhere where other units, such as sand, were not mapped. Because no vertical differentiation of the overburden units was considered, and because the model domain is dominated by the presence of the glacial till unit, a single value of 150 millimetres per year (mm/yr) was assigned for surficial recharge. This recharge rate is consistent with that used in previous models for this area (Golder, 2018).

Constant head boundary conditions were applied to the outside edges of the model domain based on the static water levels obtained from the WWIS. The values were then adjusted during model calibration to those indicated on Figure 36. The model domain of thirteen kilometres by fourteen kilometres, centred on the Proposed Stittsville 2 Quarry and the other nearby quarries, was chosen so that boundary conditions assigned to the outside edge of the model would not directly impact the centre of the model.

Drain boundary conditions were applied to the upper surface of the model at the locations shown on Figure 36. Such boundary conditions were applied to mapped streams and rivers within the model domain as well as the mapped wetlands, with the drain elevation set equal to the model-top elevation (ground surface). The conductance for the drain boundary conditions used at groundwater discharge locations were set at 25 m^2/day.

The quarry excavations are simulated using drain boundary conditions in the cells surrounding the excavation and at the bottom of the excavation. The elevation of the drain boundary conditions for the cells representing the bottom of the quarry excavation are set equal to the base elevation of the quarry. The elevation of the drain boundary conditions used to represent the sides of the quarry excavation are set equal to the bottom of the cell block plus one tenth of the total thickness of the block. The conductance for the drain boundary conditions used to represent the quarry excavations is set at 25 m^2/day. The boundary conditions for the quarry excavations are shown on Figure 35.

4.1.7 Hydraulic Conductivity and Storativity

Hydraulic conductivity is assigned to the individual grid blocks based on their location within the assumed hydrostratigraphic model. Initial hydraulic conductivity values are assigned based on measured values, typical ranges and professional experience with the specific hydrostratigraphic units. Adjustments are considered during the model calibration exercise.

The numerical model is run to steady state conditions (as a conservative approach) and, as such, storativity is not required for the numerical model.

Details regarding the hydraulic conductivity values assigned for the numerical model are provided in Section 4.1.8, where the calibration of the model is discussed.

4.1.8 Model Calibration

In general terms, model calibration is the exercise of adjusting model properties and boundary conditions (generally referred to as "parameters"), within reasonable bounds, to best match the model output to the observed conditions. In the case of steady state groundwater flow modelling, the model output is limited to groundwater elevations and groundwater discharge rates. In this case, both were considered in the model calibration.

Observed groundwater elevations (i.e., hydraulic heads) considered during model calibration were calculated by subtracting the depth-to-water from the ground surface elevation, while the measuring point (i.e., elevation head) was inferred from information about the well, as shown in the following table.

Table 11: Groundwater Calibration Data

Data Source	Ground Surface Elevation	Depth to Water	Measurement Point (i.e., Elevation Head)
WWIS	Interpolated from digital elevation model	In database	Lowest elevation of "water found"
Jinkinson Road Study Area Monitoring Wells	Surveyed to Geodetic datum	Measured using water level tape	Centre of monitoring interval

For comparison to the observed values, simulated groundwater elevations (from the numerical model) at each measurement point were interpolated from the simulated groundwater elevations in the surrounding grid blocks. The match between the observed and simulated groundwater elevations was assessed from plots of simulated versus observed groundwater elevations and from calibration statistics: maximum over-prediction, maximum under-prediction, residual mean, absolute residual mean, root mean square (RMS) and normalized RMS.

The strategy employed for model calibration was to first adjust hydraulic conductivities of the hydrostratigraphic layers and recharge rates as inferred from the conceptual model in order to best match simulated to observed groundwater elevations on a regional scale (i.e., throughout the model), prior to any quarry development (Scenario 1). Starting values and reasonable ranges for these parameters were inferred from the available data and from tabulated values (i.e., published typical values and from WSP's experience with similar formations).

The Scenario 1 model was then used to develop the Scenario 2 model where existing conditions at the Bell Quarry, Henderson Quarry, Stittsville Quarry, Moore Quarry, Beagle Club Quarry and the Fernbank Quarry were simulated. The parameters obtained from the calibration of Scenario 1 were applied to Scenario 2 to determine if the presence of the existing quarries, as observed in the drawdown from the Jinkinson Road study area wells, was captured by the numerical model. Adjustments to the hydraulic conductivities and recharge were again considered to best match both the pre-development water levels (Scenario 1) and the existing conditions (Scenario 2) in the area. The observed groundwater elevations used for the calibration included all the records in the WWIS and water levels collected from the Jinkinson Road study area monitoring wells. For the existing conditions scenario, all available records from the WWIS were used along with the 2021 average water levels for the Jinkinson Road study area monitoring wells.

To achieve the best calibration, it was determined that the hydraulic conductivity anisotropy ratio (K_h:K_v) of the weathered bedrock layer, the TZ, located between the Gull River and Bobcaygeon Formations, and the permeable layer at the bottom of the model (Oxford Formation) in the numerical model was 10:1, whereas the other bedrock layers in the model had an anisotropy ratio of 100:1.

The hydraulic conductivity of the sand unit was assumed to be within the typical range of a silty sand ($1x10^{-4}$ m/s; Freeze and Cherry, 1979), while the hydraulic conductivity of the glacial till unit was based on the results of the model calibration process.

The input parameters of the calibrated model (for both Scenario 1 and Scenario 2) that produced the modelling results presented in this report are shown in cross section on Figure 37 and summarized in the following table:

Table 12: Calibrated Input Parameters

Model Parameter	Horizontal Hydraulic Conductivity (m/s)	K_h:K_v
Sand and Gravel	$1x10^{-4}$	1:1
Glacial Till	$2x10^{-6}$	1:1
Upper Weathered Bedrock	$2x10^{-5}$	10:1
Bobcaygeon Formation	$9x10^{-8}$	100:1
Transmissive Zone	$6x10^{-6}$	10:1
Gull River Formation	$1x10^{-7}$	100:1
Rockcliffe Formation	$1x10^{-7}$	100:1
Transmissive Rockcliffe Formation	$6x10^{-6}$	100:1
Oxford Formation	$3x10^{-5}$	10:1

The hydraulic conductivity of the TZ was the primary parameter that has been adjusted from previous instances of this model being calibrated. The hydraulic conductivity was lowered from 5×10^{-5} m/s in previous calibrations to 6×10^{-6} m/s. The adjustment was made to better match the water level trends in the Jinkinson Road monitoring wells and the most recent pumping records for the quarries.

Contours of simulated water table elevations without the existence of any of the quarries, and with the existing quarries (as of 2021) are illustrated on Figures 38 and 39, along with calibration plots and statistics for the groundwater elevations from the WWIS and monitoring wells (Jinkinson Road study area wells).

The results of the calibration of Scenario 1 and Scenario 2 indicate a reasonable agreement between the simulated groundwater elevations and the observed groundwater elevations, based on the following observations:

- As shown on Figures 38 and 39, the majority of the simulated groundwater elevations are within 5 metres of the observed elevations, with an absolute residual mean error of 3.13 metres for Scenario 1 (pre-quarry conditions – Figure 38), and 3.37 metres for Scenario 2 (existing conditions – Figure 39). A strong bias was not present in the simulated groundwater elevations, as indicated by the residual mean, which was 0.96 metres for Scenario 1 and 0.87 metres for Scenario 2. The normalized root mean squared error (nRMS) was 6.70% for Scenario 1, and 7.33% for Scenario 2.
- Recent water levels measured from the Jinkinson Road study area monitoring wells generally compare well to the simulated values at these locations.
- Groundwater flow directions simulated by the model are similar to those inferred from the measured water levels across the model area (Figures 38 and 39).
- Groundwater seepage into the existing Stittsville and Henderson quarries was simulated to be 510 cubic metres per day (m^3/day) and 500 m^3/day, respectively. Although direct measurements of groundwater inflow are not available at the existing quarries, these values are within the range of values noted in the available pumping records during periods of low precipitation (when surface water / runoff inflow to the quarries should be minimal).

4.2 Forecast Simulations

Once calibration was complete, the existing conditions model (Scenario 2) was used as a predictive tool to assess the potential drawdown associated with the development and rehabilitation of the proposed Stittsville 2 Quarry. Predictive scenarios were developed to assess the drawdown from existing conditions associated with the proposed development and rehabilitation of the Stittsville 2 Quarry. The different calibration and predictive scenarios are as follows:

Calibration Scenarios:

- Scenario 1 – Pre-quarry Conditions (Calibration Run) – no quarry development in Jinkinson Road study area.
- Scenario 2 – Existing Conditions (Calibration Run) – Bell Quarry, Henderson Quarry, Stittsville Quarry, Beagle Club Quarry and Fernbank Quarry at existing conditions (as of 2021).

Forecast Scenarios:

- Scenario 3 – Stittsville Quarry and Proposed Stittsville 2 Quarry at Full Development – Stittsville Quarry and proposed Stittsville 2 Quarry fully extracted and dewatered with remaining quarries at existing (2021) level of development.
- Scenario 4 – Existing Quarries Full Development – All licensed quarries fully extracted and dewatered with the proposed Stittsville 2 Quarry remaining at existing (undeveloped) conditions.
- Scenario 5 – All Quarries at Full Development - All licensed quarries fully extracted and dewatered including the proposed Stittsville 2 Quarry.
- Scenario 6 – Stittsville Quarry and Proposed Stittsville 2 Quarry at Full Rehabilitation – Stittsville Quarry and proposed Stittsville 2 Quarry fully developed and rehabilitated with remaining quarries at existing (2021) level of development.
- Scenario 7 – Existing Quarries at Full Rehabilitation – All licensed quarries fully developed and rehabilitated with the proposed Stittsville 2 Quarry remaining at existing (undeveloped) conditions.
- Scenario 8 – All Quarries at Full Rehabilitation – All licensed quarries fully developed and rehabilitated including the proposed Stittsville 2 Quarry.

Table 13 describes the full development and rehabilitation states of the proposed Stittsville 2 Quarry and each currently licensed quarry considered in the model. The full development and rehabilitation conditions for the proposed Stittsville 2 Quarry were selected based on the proposed quarry development plan outlined in Section 1.3.

As previously discussed in Section 1.2, the final quarry floor for the proposed Stittsville 2 Quarry will slope from approximately 123 metres asl in the southwest to 101 metres asl in the northeast which generally follows the contact between the Bobcaygeon Formation and Gull River Formation. For modelling purposes and as a conservative measure, the final quarry floor for the proposed Stittsville 2 Quarry was set at a constant elevation of 108 metres asl.

Table 13: Quarry Development and Rehabilitation Summary

Quarry Operator	Quarry Name	Approved Quarry Floor Elevation (metres above sea level)	Rehabilitation Plan
Tomlinson	Proposed Stittsville 2 Quarry	101 to 123	Backfill excavation to original grade
	Stittsville Quarry	108 (minimum)	Rehabilitate to a lake with level at 141 metres asl.
	Moore Quarry	112 to 126	Rehabilitate to a lake with level at 134.5 metres asl.
Cavanagh	Henderson Quarry	112	Rehabilitate to a lake with level at 135.5 metres asl.
	Beagle Club Quarry	117	Rehabilitate to a lake with level at 135 metres asl.

Quarry Operator	Quarry Name	Approved Quarry Floor Elevation (metres above sea level)	Rehabilitation Plan
Lafarge	Bell Quarry	132	Rehabilitate to a lake with level at 141 metres asl.
Taggart	Fernbank Quarry	126.5	Rehabilitate to a lake with level at 135 metres asl.

For the rehabilitation scenarios where backfilling will be completed, the backfilled material was assumed to have a hydraulic conductivity value of $1x10^{-5}$ m/s (K_h=K_v)

4.3 Forecast Simulation Results

4.3.1 Existing Groundwater Levels

Simulated pre-quarry and existing quarry (as of 2021) water table elevations are shown in plan view on Figures 38 and 39, respectively. In general, the direction of groundwater flow in the vicinity of the Proposed Stittsville 2 Quarry site is from northwest to southeast, which corresponds to the interpreted groundwater elevation data.

4.3.2 Predicted Groundwater Drawdown

The results of the predictive groundwater flow model simulations for each of the scenarios are presented on Figures 40 through 47 and illustrate the simulated groundwater level drawdown due to the development and rehabilitation of the proposed Stittsville 2 Quarry. The results are presented as drawdown contours from the weathered bedrock (Layer 2 of the numerical model), the TZ (Layer 8 of the numerical model), and the Gull River Formation (Layer 10 of the numerical model). The maximum extent of drawdown discussed is based on the 1-meter drawdown contour.

Scenario 3: Stittsville Quarry and Proposed Stittsville 2 Quarry Development

Figure 40 shows the contours of simulated groundwater level drawdown in the weathered bedrock (Layer 2), TZ (Layer 8) and Gull River Formation (Layer 10) of the numerical model, induced by the full extraction of the Stittsville Quarry and the proposed Stittsville 2 Quarry as compared to current conditions. The contours are produced by subtracting the simulated groundwater elevations in Scenario 3 from those in Scenario 2 (existing conditions, i.e., 2021 estimate).

The simulated drawdown in the TZ and the Gull River Formation have similar extent with the one metre drawdown contour extending between approximately 800 metres (to the south and west) and 2,100 metres (to the north and east) of the proposed Stittsville 2 Quarry excavation footprint. The more extensive drawdown to the north and east corresponds with where the TZ is present. The simulated drawdown in the weathered bedrock extends to a maximum of approximately 350 metres from the proposed Stittsville 2 Quarry excavation footprint.

Incremental Drawdown Associated with Stittsville 2 Quarry under Full Development Conditions

The contours of simulated groundwater level drawdown in the weathered bedrock (Layer 2), TZ (Layer 8) and Gull River Formation (Layer 10) of the numerical model for Scenario 4 (all quarries except Stittsville 2 Quarry at full development) and Scenario 5 (all quarries at full development) are shown on Figures 41 and 42, respectively. Figure 43 shows the incremental drawdown associated with the proposed Stittsville 2 Quarry under full development conditions calculated by subtracting the drawdown contours of Scenario 5 from those of Scenario 4.

As shown on Figure 43, the simulated additional drawdown related to the development of the proposed Stittsville 2 Quarry is the highest in the TZ (Layer 8) and extends to the north and east a maximum of approximately 1,900 metres from the proposed Stittsville 2 Quarry excavation footprint. The simulated incremental drawdown in the weathered bedrock extends to a maximum of approximately 200 metres from the proposed Stittsville 2 Quarry excavation footprint.

Scenario 6: Stittsville Quarry and Proposed Stittsville 2 Quarry Rehabilitation

Figure 44 shows the contours of simulated groundwater level drawdown in the weathered bedrock (Layer 2), TZ (Layer 8) and Gull River Formation (Layer 10) of the numerical model, induced by the full extraction and rehabilitation of the Stittsville Quarry and the proposed Stittsville 2 Quarry as compared to current conditions. The contours are produced by subtracting the simulated groundwater elevations in Scenario 6 from those in Scenario 2 (existing conditions, i.e., 2021 estimate).

As shown in the negative drawdown contours in Figure 44, groundwater levels simulated for the rehabilitation of the Stittsville Quarry and proposed Stittsville 2 Quarry are generally higher than the simulated groundwater levels in the Existing Conditions Model.

Incremental Drawdown Associated with Stittsville 2 Quarry under Full Rehabilitation Conditions

The contours of simulated groundwater level drawdown in the weathered bedrock (Layer 2), TZ (Layer 8) and Gull River Formation (Layer 10) of the numerical model for Scenario 7 (all quarries except Stittsville 2 Quarry at full rehabilitation) and Scenario 8 (all quarries at full rehabilitation) are shown on Figures 45 and 46, respectively. Figure 47 shows the incremental drawdown associated with the proposed Stittsville 2 Quarry under full rehabilitation conditions calculated by subtracting the drawdown contours of Scenario 8 from those of Scenario 7.

As shown in the incremental drawdown contours on Figure 47, the simulation generally predicts a negligible change or an increase in groundwater levels related to the rehabilitation of the proposed Stittsville 2 Quarry.

4.3.3 Predicted Quarry Inflow

The table below shows the simulated groundwater inflows to the proposed Stittsville 2 Quarry, the Stittsville Quarry, other nearby quarries and the Goulbourn Wetland Complex. For the purposes of this model, the Goulbourn Wetland Complex was defined as the drain cells within the area mapped as the Goulbourn Wetland Complex in the MNRF wetland mapping and watercourses that were interpreted to be discharging to it based on topography.

Table 14: Simulated Groundwater Inflow Results

Simulation	Simulated Groundwater Inflow (m^3/d)			
	Proposed Stittsville 2 Quarry	Stittsville Quarry	Other Quarries	Goulbourn Wetland Complex
Scenario 1 – pre-quarry conditions	-	-	-	12,450
Scenario 2 – existing conditions	-	513	719	12,245
Scenario 3 – Stittsville Quarry and Proposed Stittsville 2 Quarry at full development	1,238	501	657	11,298

Simulation	Simulated Groundwater Inflow (m^3/d)			
	Proposed Stittsville 2 Quarry	Stittsville Quarry	Other Quarries	Goulbourn Wetland Complex
Scenario 4 – all quarries except the proposed Stittsville 2 Quarry at full development	-	650	2,336	11,713
Scenario 5 – all quarries at full development	1,185	392	2,208	11,003

Based on this assessment, full development of the Stittsville Quarry and the proposed Stittsville 2 Quarry while the other quarries remain in the existing (2021) level of development (Scenario 3) will cause a reduction in groundwater inflow to the Goulbourn Wetland Complex of approximately 8% as compared to existing conditions. Development of the proposed Stittsville 2 Quarry with all other quarries fully developed (Scenario 5) results in a 6% (710 m^3/day) decrease in groundwater inflow to the Goulbourn Wetland Complex compared to the full development of the currently licensed quarries (Scenario 4).

Should the Stittsville Quarry and the Proposed Stittsville 2 Quarry develop to the full extent (while the surrounding quarries remain in the current level of development – Scenario 3), groundwater inflow to the proposed Stittsville 2 Quarry excavation will be approximately 1,238 m^3/day. Should all of the surrounding quarries be developed to their full extent (Scenario 5), the predicted groundwater inflow to the proposed Stittsville 2 Quarry is 1,185 m^3/day.

4.4 Sensitivity Analysis

It is recognized that there is inherently some uncertainty associated with the calibrated groundwater model, which stems from limitations in the available subsurface information and can be related to variability in the aquifer properties and uncertainties with the conceptual model. To gain some understanding of the potential impact of this uncertainty in the groundwater model forecasts, a sensitivity analysis was completed where six additional simulations were completed with variations on the model input parameters. These six sensitivity runs were completed specifically to test the parameters that were thought to have the most impact on the proposed Stittsville 2 Quarry. The sensitivity scenarios are summarized as follows:

- Sensitivity Run 1 (SR1) – Higher hydraulic conductivity in the TZ. For this simulation, the hydraulic conductivity of the TZ was increased to $5x10^{-5}$ m/s which is what has been used in previous calibrations of this model (Golder, 2018).
- Sensitivity Run 2 (SR2) – Lower hydraulic conductivity in the TZ. For this simulation, the hydraulic conductivity of the TZ was decreased to $1x10^{-6}$ m/s.
- Sensitivity Run 3 (SR3) – Higher hydraulic conductivity in the Gull River Formation. For this simulation, the hydraulic conductivity of the Gull River Formation was increased to $1x10^{-6}$ m/s (compared to $1x10^{-7}$ m/s for the base case).
- Sensitivity Run 4 (SR4) – Lower hydraulic conductivity in the Gull River Formation. For this simulation, the hydraulic conductivity of the Gull River Formation was decreased to $5x10^{-8}$ m/s.
- Sensitivity Run 5 (SR5) – Lower recharge. For this simulation, the recharge was halved.

- Sensitivity Run 6 (SR6) – Higher recharge. For this simulation, the recharge was increased by 50%.

All sensitivity runs were completed for Scenario 2 (existing conditions) and Scenario 3 (Stittsville Quarry and proposed Stittsville 2 Quarry at full development). Results are summarized in terms of the simulated rates of groundwater inflow in the table below.

Table 15: Simulated Groundwater Inflow Results – Sensitivity Analysis

Scenario 3 – Stittsville Quarry and Proposed Stittsville 2 Quarry Full Development (Other Quarries at Existing Conditions)	Simulated Groundwater Inflow (m^3/d)			
	Proposed Stittsville 2 Quarry	Stittsville Quarry	Other Quarries	Goulbourn Wetland Complex
Base Case	1,238	501	657	11,298
SR1 – Higher K TZ	2,364	833	461	10,479
SR2 – Lower K TZ	995	399	682	11,477
SR3 – Higher K Gull River	1,450	661	767	10,663
SR4 – Lower K Gull River	1,224	491	654	11,477
SR5 – Lower Recharge	826	326	297	5,016
SR6 – Higher Recharge	1,588	666	1,005	17,606

Note: K = Hydraulic Conductivity

A review of results of the sensitivity analysis (Table 15) allows the following observations:

- The maximum extent of drawdown across the sensitivity simulations was similar to what was predicted by the simulation results from Scenario 3 except for sensitivity run 1 (higher K TZ).
- Increasing the hydraulic conductivity of the TZ to what has been used in previous calibrations of this model ($5x10^{-5}$ m/s) caused an increase in the maximum extent of drawdown (approximately 2,000 metres). This higher conductivity for the TZ was not considered a good fit during the calibration process due to a poor match with the available quarry pumping records and the recent groundwater level trends.
- Simulated groundwater inflow to the proposed Stittsville 2 Quarry is sensitive to the hydraulic conductivity of the TZ. Increasing the hydraulic conductivity of the TZ to what has been used in previous calibrations of this model ($5x10^{-5}$ m/s) resulted in an approximate 91% increase in flow to the proposed Stittsville 2 Quarry, whereas decreasing the hydraulic conductivity of the TZ by a factor of 6 resulted in an approximate 20% decrease in the amount of flow to proposed Stittsville 2 Quarry. Simulated groundwater inflow to the Goulbourn Wetland Complex is relatively insensitive to the hydraulic conductivity of the TZ. Increasing the hydraulic conductivity of the TZ to what has been used in previous calibrations of this model ($5x10^{-5}$ m/s) resulted in an approximate 7% decrease in flow to the Goulbourn Wetland Complex, whereas decreasing the hydraulic conductivity of the TZ by a factor of 6 resulted in an approximate 2% increase in flow to the Goulbourn Wetland Complex.
- The sensitivity of the hydraulic conductivity of the Gull River Formation on the simulated groundwater inflows are relatively minor. Increasing the hydraulic conductivity of the Gull River Formation by one order of magnitude resulted in an approximate 17% increase in flow to the proposed Stittsville 2 Quarry and a 6%

reduction in flow to the Goulbourn Wetland Complex, whereas decreasing the hydraulic conductivity of the Gull River Formation by a factor of 2 resulted in an approximate 1% decrease in flow to the proposed Stittsville 2 Quarry and a 2% increase in groundwater flow to the Goulbourn Wetland Complex.

- All groundwater inflows are sensitive to changes in recharge. Reducing the recharge by a factor of 2 resulted in an approximate 33% decrease in flow to the proposed Stittsville 2 Quarry and a 56% reduction in flow to the Goulbourn Wetland Complex, whereas increasing the recharge by 50% resulted in an approximate 28% increase in flow to the proposed Stittsville 2 Quarry and a 56% increase in groundwater flow to the Goulbourn Wetland Complex.

5.0 HYDROLOGICAL ASSESSMENT

Within the vicinity of the proposed Stittsville 2 Quarry, several wetlands (delineated as western and southern wetlands in Figure 1) and the Goulbourn Wetland Complex (which includes the on-site eastern wetland) may experience changes due to surface water drainage alterations, changed land uses, quarry water management (e.g., quarry dewatering) and the propagation of groundwater level drawdown beneath the surface water features as a result of quarry dewatering. These changes have some potential to affect the receptor flow regimes (e.g., distribution of base flow and storm flow/flooding), channel erosion and water quantity at a local scale, but are not expected to significantly change the annual site water budget.

Under existing conditions, the area around the proposed Stittsville 2 Quarry was separated into 13 sub-catchments, including the existing Stittsville quarry, based on a convergence point selected at a culvert located downstream of the site at Fernbank Road, as detailed in Figure 48. Discharge from the existing quarry (i.e., sub-catchment 3) is pumped directly into the western wetland (i.e., sub-catchment 1C and 4A). Drainage from these sub-catchments as well as 5C then flows east to a small drainage pathway with a culvert crossing, located within the proposed extraction area, before continuing to the Goulbourn Wetland Complex. Ultimately, all the sub-catchments detailed in Figure 48 drain to the Goulbourn Wetland Complex.

As a result of the proposed quarry, the western and southern wetlands will be removed, and drainage will be captured by the quarry footprint and will ultimately continue to report to the Goulbourn Wetland Complex via a quarry discharge point directed towards Sub-catchment 4B under operational conditions.

Under rehabilitated conditions, the quarry will be backfilled. It is anticipated that the excavation will be backfilled to original grade throughout the limit of extraction, allowing for future potential development in the area near Jinkinson Road and a naturalized area in the southern portion of the property. The proposed naturalized area will include forests, wetlands, meadow and thicket. This area will be planted with mixed native species and will provide a range of habitats for wildlife. The ultimate drainage directions and sub-catchments areas are expected to closely resemble existing pre-development conditions.

The purpose of the hydrological assessment was to evaluate the potential implications of the proposed Stittsville 2 Quarry operations on surface water flows in the key surface water receptors. The points of analysis to conduct the hydrologic assessment were selected at the drainage outlet of the western wetland pocket (at the MACE flowmeter modelled as Junction 1) and where the Goulbourn Wetland Complex drains under Fernbank Road (at surface water station SW-A modelled as Junction 4). The model schematic representing the linkages between sub-catchments and location of calibration stations (where applicable), modelled as junctions, is presented on Figures 48 through 50.

The hydrologic model assesses the differences in infiltration, runoff and peak flows within the surface water sub-catchments for the following scenarios (as defined in Section 4.2):

- Scenario 2: Existing Conditions (Calibration Run) – All quarries in the area including Bell Quarry, Henderson Quarry, Stittsville Quarry, Beagle Club Quarry and Fernbank Quarry as well as the proposed Stittsville 2 Quarry site at existing conditions (as of 2021), sub-catchments for this scenario are shown on Figure 48;
- Scenario 4: Existing Conditions at Full Development – All licensed quarries fully extracted and dewatered with the proposed Stittsville 2 Quarry remaining at existing (undeveloped) conditions, sub-catchments for this scenario are shown on Figure 49;
- Scenario 5: All Quarries at Full Development – All licensed quarries fully extracted and dewatered including the proposed Stittsville 2 Quarry, sub-catchments for this scenario are shown on Figure 50; and,
- Scenario 8: All Quarries at Full Rehabilitation – All licensed quarries fully developed and rehabilitated including the proposed Stittsville 2 Quarry with the assumption that the proposed Stittsville 2 Quarry site will be filled, graded, and vegetated. Sub-catchments for this scenario are shown on Figure 50. Both the existing Stittsville Quarry and Bell Quarry will be rehabilitated as a lake and will continue to contribute surplus to the Goulbourn Wetland Complex.

The assessment focused on quantifying changes within the surface water sub-catchments. As the evaluation point moves further downstream the magnitude of the changes predicted becomes smaller as available surplus and storage capacity from unaffected sub-catchments may contribute maintaining pre-existing conditions. The surface water catchment areas contributing to the points of analysis and estimated groundwater capture zones, defined as the areas where shallow groundwater flows to the quarry, are provided on Figures 48 through 50.

5.1 Hydrologic Model Methodology

A hydrologic model was prepared as a tool to help quantify effects and to assess their impacts under the operational and rehabilitated conditions to the key surface water receptors that receive discharge from the proposed quarry site, including the Goulbourn Wetland Complex. Results of the model are provided in Section 6.0. For the purposes of the model, it was assumed that, under rehabilitated conditions, the proposed Stittsville 2 Quarry would be modelled as a filled quarry that had an area for future potential development in the area near Jinkinson Road (seeded area) and a naturalized area and wetland in the southern portion of the site.

A HEC-HMS model was developed for the study area, simulating hydrologic conditions on a continuous basis. HEC-HMS was developed by U.S. Army Corps of Engineers to simulate the precipitation-runoff processes of natural and urban watershed systems (Scharffenberg, 2016). For this application, the model was designed to run on a continuous basis to capture the long-term average effects of proposed development, considering the following parameters:

- Meteorological data (precipitation and potential evapotranspiration)
- Canopy interception
- Surface depression storage
- Infiltration
- Baseflow
- Runoff transform

Four HEC-HMS models were developed to represent the Existing Conditions (Scenario 2 - Calibration), Existing Conditions at Full Development (Scenario 4), All Quarries at Full Development (Scenario 5) and All Quarries at Full Rehabilitation (Scenario 8) of the surface water system. The models include both surface water and groundwater inputs during full development conditions. Each model scenario was simulated using an hourly time step, spanning January 1, 1991, to September 22, 2022, to correspond with available meteorological data. Calibration of the model was conducted using an hourly timestep, spanning from January 1, 2018, to September 22, 2022, to correspond with available discharge pumping records.

Land use in the sub-catchment areas was interpreted from Southern Ontario Land Resource Information System (SOLRIS), and includes grassed and forested land, sand/gravel areas, wetlands including swamps and marshes, as well as impervious areas including roads, built-up areas, and existing extraction areas. Topography data and site boundaries were used to help delineate the various sub-catchments within the Goulbourn Wetland Complex at Fernbank Road. These estimated sub-catchments form the basis of the HEC-HMS model.

The model was split into various elements to help represent sub-catchments, wetlands, and adjacent quarries. Specifically, the following elements were considered:

- Sub-Basins (used to represent sub-catchments) → parameters including area, land uses, baseflow, slope, and canopy/surface depression storage were used to characterize the sub-catchments response to precipitation events in relation to runoff and infiltration.
- Reservoirs (used to represent large wetland areas) → storage – discharge relationships were developed based on available outlet specifications/assumptions and wetland surface areas for each applicable sub-catchment to properly characterize the storage capacity in each wetland section and its role on dampening outflow.
- Junctions (used to represent the points of analysis)
- Sources (used to represent available quarry discharge over the period of record)
- Sinks (used to represent the final point of analysis, i.e., SW-A)

Please see Appendix F which shows a model schematic figure of the HEC-HMS model described above.

5.1.1 Meteorological Data

Meteorological data for use in the HEC-HMS model consisted of composite hourly precipitation data collected at the Environment Canada (EC) Ottawa MacDonald Cartier International Airport (ID 6106000) monitoring station from 1950 to 2005 and EC Ottawa CDA RCS (ID 6105978) monitoring station from 2005 to 2022. Potential evaporation (PE) data from the Meteorological Service of Canada (MSC) Thornthwaite water budgets for Ottawa MacDonald Cartier International Airport (ID 6106000) with a period of 1939 – 2021 was also used. HEC-HMS requires hourly precipitation and average monthly PE. Hourly precipitation from EC was used in the HEC-HMS model. The PE rate (mm per month) for each month was obtained by taking average values over the period of record (1950 to 2013) for Scenarios 4, 5, and 8 while PE rates for each month were taken from 2018 to 2021 for Scenario 2. Monthly PE values for each sub-catchment are listed in Appendix F.

Evapotranspiration (ET) refers to water losses from soil surfaces to the atmosphere. The term combines evaporation (i.e., water lost from the soil surface) and transpiration (i.e., water lost from plants and trees) because of the difficulties involved in separating these processes. PE refers to the loss of water from a vegetated surface to the atmosphere under conditions of an unlimited water supply. The actual rate of evapotranspiration is typically less than the potential rate under dry conditions (e.g., during the summer months when there is a soil moisture deficit).

5.1.2 Canopy Interception

The Simple Canopy Method was used to calculate canopy interception. Inputs to the Simple Canopy Method include initial storage (%) and maximum storage (mm) within the canopy. For all sub-catchments, initial storage was set to zero, while maximum storage values were prorated based on land uses percentages in each sub-catchment using an assumed maximum storage value of 1 mm to represent the canopy within the forested and wetland areas, based on a typical range of 0.5 to 2 mm (Shuttleworth, 1989). Canopy storage values for each sub-catchment are listed in Appendix F.

5.1.3 Surface Depression Storage

The Simple Surface Method was used to calculate depression storage. Inputs to the Simple Surface Method include initial storage (%) and maximum storage (mm) on the surface. Initial storage was set to zero for all sub-basins. Maximum storage was based on land use impervious percentages assuming a depression storage on impervious areas would equal 2 mm while natural land types would fall between 5-10 mm (depending on slope). Maximum storage values were then prorated based on percentage of wetland and impervious area. Storage values for each sub-catchment are listed in Appendix F.

5.1.4 Infiltration

The Soil Moisture Accounting Method was used to model infiltration losses. The Soil Moisture Accounting Method represents the movement of water through and the storage of water in three layers: the soil layer, and upper and lower groundwater layers. This method is well suited for continuous simulation including both wet and dry conditions.

Inputs to the Soil Moisture Accounting Method are listed in Appendix F and are based on surficial geology mapping for the sub-basins (Belanger, 2008), as seen in Figure 2.

5.1.5 Groundwater Inflows (Baseflow)

The Constant Monthly Method was used to represent baseflow. This method utilizes simulated groundwater discharge estimates assuming a vertical hydraulic conductivity of $2x10^{-6}$ m/s for overburden and bedrock and a groundwater recharge rate of 150 mm/yr. Groundwater inflow to existing quarries with effluent discharge records (i.e., Stittsville Quarry) were omitted from the model as the discharge records would include any contribution from groundwater inflow. Other existing quarries within the model (i.e., Bell Quarry) considered the contribution from groundwater discharge estimates in place of available effluent discharge records. Baseflow estimates for each sub-catchment are listed in Appendix F.

5.1.6 Runoff Transform

The Soil Conservation Service (SCS) Unit Hydrograph was used to transform excess precipitation to runoff. This is a parametric unit hydrograph based upon averages of unit hydrographs derived from gauged rainfall and runoff for a large number of small agricultural watersheds (Feldman, 2000). Lag time was assumed to be 0.6 of the time of concentration, which was calculated according to the velocity method, for each sub-catchment, as the sum of estimated travel times for sheet flow, shallow flow and channel flow (NRCS, 2010). Times of concentration and lag times for each sub-catchment are listed in Appendix F.

5.2 Hydrologic Model Validation

The baseline hydrologic model flows were validated at two separate locations (i.e., Junction 1 and Junction 4) from 2018 – 2019 due to the sparse observed data record at Junction 1 during 2020 to 2022. Continuous flow data recorded over this period at Junction 1 was either missing a substantial portion of the year or showed several gaps between months. The methods and assumptions for the validation process for both locations are detailed in the sections below.

5.2.1 Hydrologic Model Assumptions

The following assumptions were utilized in the calibration of the hydrological model.

- The western wetland was modelled as a sub-basin with a reservoir. While the sub-basin would direct outflow into the reservoir, the reservoir would direct its outflow towards Junction 1 utilizing the rating curve developed for Junction 1, which was also utilized in the flow hydrograph for Junction 1 as seen in Figure 32. The storage capacity and outflow curve in the wetland was adjusted for verification purposes. The remaining wetland areas were also modelled as sub-basins with reservoirs. Similar to above, the reservoirs would outlet to the downstream junction, however, for these reservoirs, a storage-discharge relationship via a culvert outlet was created to model the outflow.
- For verification purposes for Junction 1, baseflow contributions from Sub-catchments 1C and 5C were omitted to avoid double counting, as it was assumed that any baseflow or infiltration within those sub-catchments would be recirculated back into the existing Stittsville or Bell Quarries. The annual discharge from the quarries, would include any baseflow or recirculated infiltration contributions to these sub-catchments.
- Discharge flow contributions from the existing and fully operational Bell Quarry to SS-3 were considered in Scenarios 2, 4, and 5 of the HEC-HMS models, respectively, through a simplified surplus estimation using a water budget for the quarry footprint. A Water Holding Capacity (WHC) of 10 mm was assumed for the quarry footprints under both scenarios. The annual surplus was then used to estimate an average annual discharge rate that would act as the existing and proposed pumping rates for the Bell Quarry in the HEC-HMS models.

5.2.2 Hydrologic Model Verification – Junction 1

Hydrologic flows at Junction 1 were validated against the continuous flow data captured by the MACE flowmeter from 2018 - 2019. Based on these flow records, the simulated model flow output was adjusted through the manipulation of wetland storage capacities and outflows (i.e., using the reservoir functions). The results of the verifications for Junction 1 are shown in Table 16 below:

Table 16: Verification of Continuous Stream Flow Measurements – Junction 1 (Average Annual Flow)

Flows at Junction 1	Available Period of Flow Data		
	2018	2019	Total Period
Average Annual Observed Flow (m^3/s)	0.0055	0.0088	0.0074
Average Annual Simulated Flow (m^3/s)	0.0062	0.0081	0.0073
% Difference from Observed	12%	-8%	-2%

As seen in Table 16 above, the average annual simulated flows were within +/-12% of the average annual observed flows at Junction 1 and were within +/- 2% of the average annual observed flows across the entire period. Overall, the discrepancy in average annual flows seen in Table 16 can be partially attributed to the placement of the MACE flowmeter within the culvert as discussed above in Section 3.3.3. For calibration purposes, zero and negative flows captured by the flow meter were omitted from the average annual observed and modelled flow estimates detailed above as there was little confidence in the MACE flowmeters' ability to properly estimate low flows through the culvert.

5.2.3 Hydrologic Model Verification – Junction 4

Hydrologic flows at Junction 4 were verified against a combination of catchment-area-prorated average monthly flows captured downstream at the WSC flow gauge “Jock River Near Richmond (ID: 02LA007)” between 2018 – 2019 as well as average monthly flow estimates from water balance calculations across the 13 sub-catchments including Bell Quarry. This method of verification differs from the Junction 1 verification method detailed above due to the availability and credibility of the manual flow measurements at Junction 4 from 2020 – 2022. As detailed in Table 9 in Section 3.3.3, the manual flow measurements for Junction 4 (SW-A) vary greatly in value over a two-year period and could likely be impacted by beaver activity in the area. Due to this, it is determined that the water balance estimates and proration from the WSC gauge would be more representative of average monthly and annual surplus contributing downstream to the Goulbourn Wetland Complex. The methodology used for the water balance and WSC gauge proration estimates are detailed in the sections below.

5.2.3.1 Water Balance Methodology

5.2.3.1.1 Meteorological Data

A water balance assessment related to the 13 sub-catchments with consideration of the Bell Quarry flow input under existing conditions was carried out to characterize the average monthly surplus estimates contributing downstream to Junction 4. The water balance assessment was based on meteorological data from the EC Thornthwaite water budgets (Environment Canada Ottawa MacDonald Cartier International Airport (ID 6106000) between 2018 and 2019), watershed boundaries, land use data, and the existing soil types.

The Thornthwaite method describes water flux in a unit area of soil on a monthly basis based on a balance of precipitation (rainfall and snowmelt), evapotranspiration (ET), soil storage, and surplus.

The water budget can be summarized as follows:

$$P = S + ET + R + I$$

Where: P = precipitation;

S = change in soil water storage;

ET = evapotranspiration;

R = surface runoff; and,

I = infiltration (infiltration below the root zone and available for groundwater recharge).

The various water budget components associated with catchment areas are typically presented in millimetres (mm) per time step over their respective sub-catchments and represent the amount of water per unit of watershed area.

The water budget model combines accumulated rainfall and snowmelt to estimate total precipitation. Rainfall represents precipitation when monthly mean temperatures are greater than 0^{o} C. Snowmelt is initiated when snow is on the ground and monthly mean temperatures are greater than 0^{o} C. Hence, snowmelt is based on the depletion of snow storage (accumulated precipitation during periods of sub-zero temperatures). Composite precipitation data collected at the Ottawa MacDonald Cartier International Airport meteorological station (2018 to 2019) indicated a mean annual precipitation (P) of 947 mm/y.

The potential or maximum ET is estimated, in this case, by the empirical Thornthwaite equation (using average monthly temperature and hours of daylight) and represents the amount of water that would be evaporated or transpired under saturated soil-water scenarios. The actual ET is the total evapotranspiration for the period of study based on evapotranspiration demand, available soil-water storage, and the rate at which soil water is drawn from the ground (as defined by an established drying curve specific to the soil type). Wintertime sublimation was assumed to approach zero in all evaluated scenarios. As this assumption was applied to all scenarios, it is not expected to significantly affect the presented effects assessment, which is based on comparison of the scenarios. The mean annual potential ET for the site is approximately 608 mm/y based on data provided by EC.

Annual water surplus is the difference between P and the actual ET assuming year to year changes in soil moisture storage are negligible. The water surplus represents the total amount of water available for either surface runoff (R) or groundwater infiltration (I) on an annual basis. On a monthly basis, surplus water remains after actual evapotranspiration has been removed from the sum of rainfall and snowmelt, and maximum soil or snowpack storage is exceeded. Maximum soil storage is quantified using a WHC specific to the soil type and land use. WHC is defined as the difference in soil moisture content between the field capacity and wilting point and is assigned across the site based on soil type and vegetation cover.

5.2.3.1.2 Water Balance Parameters

Soils within the 13 sub-catchment areas consist primarily of bedrock or organic deposits with sections of fine sandy loam present within sub-catchment 7. Land uses were separated out based on differing soil classifications based available surficial geology mapping. The maximum soil storage is quantified using a WHC that is based on guidelines provided in Table 3.1 of the MECP Stormwater Management Planning and Design Manual (MECP, 2003; MECP SWM Manual).

The water balance analyses were developed under the following assumptions:

- WHCs were chosen based on Table 3.1 in the MECP SWM Manual (2003) corresponding to the specific soil types and existing land uses for the 13 sub-catchment area water balances.
  - Forested Area (Mature Forest): 100 mm WHC on bedrock, 250 mm WHC on fine sandy loam, and 400 mm WHC on organic deposits.
  - Meadow / Grasslands (Pasture and Shrubs): 100 mm WHC on bedrock or fine sandy loam and 250 mm WHC on organic deposits.
  - Quarry Extraction Area / Stripped Areas (Dewatered Quarry / Operational Areas): 10 mm WHC (utilized for Bell Quarry and sections of overlapping quarry area on other sub-catchments while the existing Stittsville Quarry surplus was estimated using available effluent discharge records).
  - Exposed Sand / Gravel Deposits (Bare Area): 75 mm WHC on bedrock and 100 mm WHC on fine sandy loam.
  - Wetlands (Swamp Area): 100 mm WHC on bedrock and 150 mm WHC on fine sandy loam or organic deposits.
  - Impervious Built-Up Areas (i.e., compacted operational roadways and buildings): 3 mm WHC on all soil types.
- Net surplus was estimated by multiplying the estimated monthly surplus (mm/month) for the assumed WHC by the associated drainage area. Annual evapotranspiration and surplus values were obtained from the

meteorological data from the Ottawa MacDonald Cartier International Airport EC Meteorological Station based on the WHC assigned to each land use area.

- Runoff was calculated as the difference between surplus and infiltration.

The results of the water balance surplus estimations for the 13 sub-catchments and Bell Quarry under existing conditions are provided in Appendix G.

5.2.3.2 WSC Gauge Proration Methodology

To perform a comparative analysis of the simulated HEC-HMS model flow outputs to the WSC "Jock River Near Richmond" flow gauge, daily average flows from 2018 – 2019 were prorated to match catchment size at the downstream point of analysis (Junction 4). A summary of the catchment areas at each location are provided in Table 17 below. Prorated average monthly flows for Junction 4 are detailed in the section below.

Table 17: Summary of Catchment Areas for Each Flow Location

Flow Locations	Catchment Areas (km^2)
"Jock River Near Richmond" Flow Gauge [1]	526
Downstream Point of Analysis (Junction 4) [2]	5.65

Note:

(1) The catchment area was taken from the total drainage area provided within the summary of the WSC flow gauge.

(2) The catchment area is the total drainage area of the 13 sub-catchments.

5.2.3.3 Junction 4 Calibration Results

Similar to the Junction 1 calibration method, the simulated model flow output was calibrated through the manipulation of wetland storage capacities and outflows (i.e., using the reservoir functions) as well as re-estimating baseflow contributions to account for recirculating infiltration. The results of this calibration on a monthly basis are shown in Table 18 below.

Table 18: Calibration of Prorated WSC Flow Gauge Data and Water Balance Surplus Estimates – Junction 4

	Average Monthly Surplus - HEC-HMS Model (m^3/s)	Average Monthly Surplus - Water Balance (m^3/s)	Average Monthly Surplus - Jock River (m^3/s)
Surplus Flow	0.093	0.097	0.084

As seen in Table 18 above, the average annual simulated flow was estimated to be 0.093 m^3/s which is within +/-5% of the water balance surplus flow estimate (i.e., 0.097 m^3/s) and +/-9% of the Jock River flow proration estimate (i.e., 0.084 m^3/s).

These results from the verification exercises for Junctions 1 and 4 are within an acceptable range for existing pre-development conditions. Therefore, the parameters manipulated in the calibration exercise were applied to predict total discharge to the point of interest under the modelled baseline, operational, and rehabilitation conditions.

6.0 HYDROLOGIC MODEL RESULTS

The hydrologic model assesses the differences in total discharge for Existing Conditions at Full Development (Scenario 4), Operational Condition (Scenario 5), and the Rehabilitated Condition (Scenario 8) models of the proposed Stittsville 2 Quarry. The area of study for the analysis focuses on the drainage area reporting to the points of analysis, which correspond to Junction 4.

A summary of the estimated average annual discharge at the point of analysis is included in the following table. The average annual discharge was developed from the results of the daily hydrologic model.

Table 19: Estimated Average Annual Discharge in Flowing Creek (m^3/year) at Fernbank Road (Junction 4)

Scenario	Junction 4 – Goulbourn Wetland Complex at Fernbank Road	
	Estimated Average Annual Surface Water Volume[1] (m^3/yr)	Change from Existing Condition Scenario 4 (%)
Existing Conditions at Full Development (Scenario 4)	2,836,915	-
All Quarries at Full Development (Scenario 5)	3,119,911	*+10%*
All Quarries at Full Rehabilitation (Scenario 8)	2,164,146	*-24%*

Notes: [1] – Corresponding to estimated average annual amounts for the 626 ha draining to Junction 4 in these scenarios

Based on the cumulative effect of all the quarries together (i.e., Scenario 5), the estimated discharge at the point of analysis on Fernbank Road (Junction 4) is expected to increase by approximately 283,000 m^3/year (or 10%) over Existing Conditions at Full Development (Scenario 4).

Under Rehabilitated Conditions (Scenario 8 – All quarries at full rehabilitation including the proposed Stittsville 2 Quarry), the estimated cumulative discharge will decrease by approximately 673,000 m^3/yr (or 24%) as compared to Existing Conditions at Full Development (Scenario 4 - All quarries at full development excluding the proposed Stittsville 2 Quarry). The effect of the proposed Stittsville 2 Quarry alone on average annual discharge at Junction 4 under rehabilitated conditions represents a decrease of approximately <1% as compared to existing conditions (Scenario 4).

The increase and subsequent decrease in estimated average annual surface water volume (see Table 19) in large part, is the result of changes in the amount of groundwater captured in the quarry excavations and discharged to surface in the existing condition (as compared to rehabilitation) with some changes in evaporative losses.

7.0 IMPACT ASSESSMENT

This section provides an analysis of the data in the context of the potential water resources impacts associated with the development of the proposed Stittsville 2 Quarry. The development of the proposed Stittsville 2 Quarry can affect potential receptors mainly via land use changes, surface water drainage alterations (mainly catchment area changes as the drainage features themselves will not be altered), quarry water management (e.g., quarry dewatering) and the area of groundwater level drawdown ("drawdown cone") and residual groundwater level drawdown.

Ecological implications of the development of the proposed Stittsville 2 Quarry are discussed in the Natural Environment Report (WSP, 2023).

7.1 Groundwater Impact Assessment

7.1.1 Groundwater Receptors

Water supplies in the area surrounding the quarry are typically obtained from the limestone bedrock. Based on WSP's experience in the area, and the data in the Ministry of the Environment, Conservation and Parks (MECP) Water Well Information System (WWIS), a limited number of water supply wells are located near the licensed extraction area.

The primary hydrogeological concern with respect to nearest water supply wells is the development of the groundwater drawdown cone that is associated with quarry dewatering, and the potential for drawdown to cause an interruption of the water supply at nearby homes as a result of the lowering of water levels in the water supply wells and/or to reduce the groundwater contribution to local surface water features and wetlands.

There are many licensed aggregate quarries in the area of the Stittsville Quarry. As illustrated by the modelling results in Section 4.3, the predicted drawdown (from existing conditions) from the Stittsville Quarry and the proposed Stittsville 2 Quarry combined (refer to Figure 40) or the drawdown associated with the proposed Stittsville 2 Quarry with all of the nearby licensed quarries (refer to Figure 43) is similar. Thus, the potential impacts to groundwater users from the proposed Stittsville 2 Quarry (combined with the existing Stittsville Quarry) will be similar with or without the contributions of the other licensed quarries in the area.

There are a total of 42 water supply wells listed in the MECP WWIS, with a known location of within 300 metres or less, that fall within the predicted zone of influence in the TZ due to quarry dewatering at the combined Stittsville and the Stittsville 2 Quarries (refer to Figure 51). Appendix H provides the details from the WWIS for the wells identified within the predicted zone of influence in the TZ (based on the one metre drawdown contour).

The depths of the wells range from 9.1 to 200.9 metres and static water levels range from 0.6 to 23.5 metres below ground surface (where static water levels are available in the WWIS). Total available drawdown in the wells range from 6.1 to 171.3 metres (where data is available for calculation in WWIS) based on the difference between the recorded static water level and the deepest water found elevation. It is noted that a minor reduction in available drawdown in a local supply well does not necessarily result in a negative impact on the well user as the minor reduction may not be perceptible to the user.

Of the 42 wells identified within the predicted radius of influence in the TZ, seven have a predicted drawdown of 20% or greater of the available drawdown. When examining the historical air photos at the locations of these wells (1502597, 1502824, 1502939, 1511033, 7132600, 7132601 and 7314134), the following comments regarding the status of the wells can be made.

Table 20: Status of Water Supply Wells

Well ID	Date Drilled	Observations regarding water well use
1502597	1950	Based on historical air photos, no building or development has been present nearby the well location since 1976. The well is likely no longer in use.
1502824	1960	Based on historical air photos, there may have been a structure in close proximity to where the well is located (1976). The structure is no longer present as of 1999. The well is likely no longer in use.
1502939	1964	The well was originally drilled for use as a water supply for a trailer. Based on historical air photos, no structure was present in the area of the well in 1976 however a house was built on the lot in the intervening time between 1976 and 1991. The well may be in use by the existing house.
1511033	1971	Based on historical air photos, no building or development has been present nearby the well location since 1976. The well plots on a wetland area and the street name on the well record does not match up with current or historical street names. The well likely does not exist at the location, or if it does it is likely no longer in use.
7132600	2009	The well is located on the proposed Stittsville 2 Quarry site and is used as a water supply for the concrete plant
7132601	2009	The well is located on the proposed Stittsville 2 Quarry site and is used as a water supply for the concrete plant
7314134	2018	The well is likely in use by the commercial building present on the property.

Of the wells that are likely still in use, two of them (1502939 and 7132601) are completed above the TZ and, as such, the predicted drawdown in the TZ is greater than what would be predicted for the actual depth of the well (less than 0.5 metres of drawdown at each well location). Wells 7132600 and 7132601 are both owned and operated by Tomlinson for use as a water supply at their on-site concrete plant. Should issues arise with these wells, Tomlinson will seek other sources of water supply (i.e., deeper wells).

The remaining well, 7314134, predicts 8.7 metres of drawdown from an available drawdown of 36.7 metres (24%). In all likelihood, the well owner would not perceive the reduction in available drawdown in the well. The well plots in the property adjacent to the proposed Stittsville 2 Quarry where a commercial building is currently located. Monitoring well (BH18-17) exists in close proximity to this water well and monitoring well BH18-17A is screened at approximately the same depth as the bottom of the private well. The results of monitoring data from monitoring well BH18-17A can be used to determine if dewatering from the proposed Stittsville 2 Quarry could impact the well.

7.1.2 Potential for Impacts to Local Surface Water Features

This section discusses the potential of groundwater level (water table) drawdown in the upper weathered bedrock during the operational period and the associated potential to underdrain and thus affect local surface water features and wetlands. The nearest significant surface water feature to the proposed Stittsville 2 Quarry is the western wetland, the southern wetland and Goulbourn Wetland Complex. It should be noted that the western wetland and the southern wetland are both within the proposed excavation area of the proposed Stittsville 2 Quarry and, as such, will be removed during operations.

As it relates to the ongoing development of the Stittsville Quarry, comprehensive, multi-disciplinary surface water, groundwater and biological monitoring programs have been ongoing at the quarry properties for many years for the purpose of assessing the potential effects of quarry development on the various surface water features. These monitoring programs are stipulated on the PTTW and the ECA (industrial sewage works) for the Stittsville Quarry and compliance reports are prepared and submitted to the MECP on an annual basis. To date, no negative impacts to the surface water features have been observed.

With the addition of the proposed Stittsville 2 Quarry, numerical modelling (refer to Section 4.3 and Figure 43) indicates that there will be limited additional drawdown in the upper weathered bedrock beneath the Goulbourn Wetland Complex (based on the one-metre outer drawdown contour) beyond that which would be experienced by the existing operational quarries under current conditions. That being said, a decrease in the groundwater flow to the Goulbourn Wetland Complex has been predicted. Under full development of the Stittsville Quarry and the proposed Stittsville 2 Quarry, while the other quarries remain in the existing (2021) level of development (Scenario 3), a reduction in groundwater inflow to the Goulbourn Wetland Complex of approximately 8% as compared to existing conditions is predicted. Development of the proposed Stittsville 2 Quarry with all other quarries fully developed (Scenario 5) results in a 6% (710 m^3/day) decrease in groundwater inflow to the Goulbourn Wetland Complex compared to the full development of the currently licensed quarries (Scenario 4). It is anticipated that the increased volume being pumped to the Goulbourn Wetland Complex will compensate for the reduction in groundwater inflow to the Goulbourn Wetland Complex. Water level data collected in the wetland pocket to date does not indicate any reduction in water levels over time as the existing Stittsville Quarry developed.

The results of groundwater level monitoring over time indicates that there is hydraulic separation between the shallow and deeper bedrock. This lower permeability layer will serve to slow down the infiltration of water from the wetland to the underlying bedrock. As such, based on the results of the groundwater and surface water monitoring data collected at the site, the following conclusions are presented with respect to the potential effects of groundwater level (water table) drawdown in the upper weathered bedrock on the Goulbourn Wetland Complex during the operational period of the proposed Stittsville 2 Quarry:

- During the operational period for the proposed Stittsville 2 Quarry, there will be limited additional drawdown in the upper weathered bedrock beneath the Goulbourn Wetland Complex (based on the one metre outer drawdown contour) beyond that which would be experienced by the existing operational quarries under current conditions.
- The results of monitoring data collected to date indicate that groundwater level drawdown within the upper weathered bedrock is not expected to induce significant downward movement of groundwater ("under draining") from the wetland/overburden that would have the potential to cause a negative impact to the Goulbourn Wetland Complex.
- Given that the quarry sump water will continue to be discharged to the Goulbourn Wetland Complex during the operational period for the Stittsville and Stittsville 2 Quarries, any potential effects associated with the propagation of the drawdown cone beneath the Goulbourn Wetland Complex during the operational period would be mitigated. In fact, as discussed in Section 6.0, an increase in the average annual flow volume in the receiving drainage features is predicted during the operational period.

7.1.3 Source Water Protection

The proposed Stittsville 2 Quarry falls outside of the mapped Wellhead Protection Areas (A through D) within the Mississippi-Rideau Source Protection Region protection plans. Impacts to groundwater quality or quantity at the water supply wells, where Wellhead Protection Areas have been established, as a result of the proposed development of the proposed Stittsville 2 Quarry are not predicted.

The site lies within a Highly Vulnerable Aquifer due to the thin layer of overburden that currently exists in the area. No Significant Groundwater Recharge Areas have been identified on the site. The status of the Highly Vulnerable Aquifer will remain unchanged following the addition of the proposed quarry.

7.2 Surface Water Features

7.2.1 Surface Water Receptors

The main surface water receptor of concern is the Goulbourn Wetland Complex located along the east quarry boundary (Figure 1). This feature is mainly of concern for its ecological function.

The primary concerns with respect to the wetlands are the surface water drainage alterations (mainly catchment area changes as the drainage features themselves will not be altered), quarry water management (e.g., quarry dewatering) and the propagation of the groundwater level drawdown cone beneath the wetlands as a result of quarry dewatering. These changes could affect the receptor flow regimes (base flow and storm flow/flooding), channel erosion and water quality.

The following sections describe the changes (as compared to the existing quarry development conditions) that are anticipated to occur in the downstream receiving drainage features during the proposed operational and rehabilitated stages of the site.

7.2.2 Average Annual Stream Flow

Under the proposed fully operational conditions (Scenario 5), a reduction in evapotranspiration, increased groundwater input, and a corresponding increase in the amount of surface water runoff collecting within the proposed Stittsville 2 Quarry is expected to occur. During operations, surface water runoff and groundwater inflow will be directed to a quarry sump within the proposed Stittsville 2 Quarry and discharged off-site towards the Goulbourn Wetland Complex (likely via the on-site eastern wetland shown on Figure 1).

The estimated average annual discharge from the proposed Stittsville 2 Quarry would be 1,014,103 m^3/year [i.e., the sum of surface water runoff (581,578 m^3/year) and groundwater inflow (432,525 m^3/year) within the Stittsville 2 Quarry catchment]. Overall, an increase of approximately 10% in average annual total discharge volume through the point of analysis on Fernbank Road within the Goulbourn Wetland Complex (Junction 4) compared to the Existing Conditions at Full Development (Scenario 4) is predicted. It is noted that the overall surplus draining from other catchments decreased under operational conditions due to groundwater drawdown from quarry excavations. This is due to the change in land use across the proposed Stittsville 2 Quarry footprint to represent dewatered quarry floor which will increase overall surplus reporting to the point of analysis. However, these estimates are under an assumption that the outflow from the proposed Stittsville 2 Quarry is unmitigated. It should also be noted that flows estimated for Bell Quarry are under unmitigated conditions as no knowledge of the existing pumping records for Bell Quarry are available for use in this model. Under mitigated operational conditions, the quarry surplus will be collected within the quarry sump and discharged towards the Goulbourn Wetland Complex under an appropriate maximum discharge rate that will be designed with consideration of potential impacts including flow increase. During the rehabilitated stage of the proposed Stittsville 2 Quarry, average annual total discharge at Junction 4 will decrease to within 26% of existing conditions as the site will be rehabilitated to similar grading.

The estimated changes in overall average annual flow volume to the Goulbourn Wetland Complex during the operational phase of the proposed Stittsville 2 Quarry is not predicted to significantly change flows and water levels, which are highly influenced by external factors under mitigated conditions. The incremental surface flow will be diffused in the connecting water bodies and the change in flows are expected to be minimal. Based on calculations and visual observations in the field, it is expected that there will be no change to the form or function of the receiving features in comparison to current conditions.

7.2.3 Water Quality

The proposed Stittsville 2 Quarry will extract aggregate from the same geological units as the existing Stittsville Quarry, and similar operational procedures are expected to be followed. For these reasons, the quality of the quarry effluent from the proposed Stittsville 2 Quarry is expected to be similar to existing Stittsville Quarry effluent. It is expected that the existing Stittsville Quarry effluent monitoring program will be continued under the existing ECA (Industrial Sewage Works) with the addition of the proposed Stittsville 2 Quarry.

The water quality samples collected from the water sampling locations where surface water from the Tomlinson property enters the Goulbourn Wetland Complex and the outlet of the western wetland as part of the ongoing monitoring program under the existing ECA (Industrial Sewage Works) for the site indicate that no parameters exceed the PWQO or CCME guidelines and are similar to background parameter values. While general increases in concentrations of boron, hardness, nitrate, potassium, strontium and sulphate and general decreases in concentrations of chloride and sodium have been observed, only boron has a PWQO which has not exceeded the interim value of 0.2 mg/L. Additionally, only nitrate (550 mg/L for short-term and 13 mg/L for long-term) and boron (15 mg/L for short-term and 29 mg/L for long-term) have CCME objectives. Concentrations of these parameters will continue to be monitored during the operational phase of the proposed Stittsville 2 Quarry.

7.2.4 Hydrological Function and Flooding

As detailed in Section 3.3, the water levels within the Goulbourn Wetland Complex have remained fairly consistent at SG-2 since 2010 and at SG-4 since 2019, noting that SG-4 was moved into the Goulbourn Wetland Complex during 2019 to better characterize the seasonal water levels. Through this time, impacts to water levels within the Goulbourn Wetland Complex were largely correlated with precipitation. Hence, the interception of contributing catchment area and addition of quarry discharge from the proposed Stittsville 2 Quarry would have a minimal impact on overall water levels.

Development of the proposed Stittsville 2 Quarry will result in the removal of approximately 10 ha of existing wetland that is not provincially significant. The hydrological function of these wetland areas, i.e., temporary retention and moderated outflow, will be replaced with the quarry water management system for the quarry. The quarry excavation will intercept precipitation inputs and behave like a large extended detention pond during events. Following runoff events, water will be pumped from the quarry at a controlled rate, as required to maintain dry working conditions, and the quarry will have the ability to temporarily store a significant volume of runoff during large events. Therefore, the peak storm flow rates during large events are expected to be lower during operations than under Existing Conditions (Scenario 2), and the proposed Stittsville 2 Quarry is not expected to negatively contribute to flooding issues within the receiving water features. Storage detention and pumped discharge rates will vary as the quarry is developed and will be governed by the existing ECA or an amended ECA issued by the MECP. As the proposed Stittsville 2 Quarry property will return to similar conditions as seen during existing conditions after rehabilitation, the proposed Stittsville 2 Quarry is not anticipated to contribute to flooding during the rehabilitation period.

8.0 COMPLAINTS RESPONSE PROGRAM

Based on the results of the groundwater modelling and the review of local water supply wells, it is concluded that water well interference complaints attributable to the proposed Stittsville 2 Quarry are unlikely. Water well interference complaints will be responded to in light of the collected monitoring data and under the Complaints Response Program described below.

A comprehensive complaints response program has been developed for the purpose of responding to well interference complaints from local water supply well users. Each complaint will be dealt with on a case-by-case basis. When a complaint is received by Tomlinson, a representative of Tomlinson or their agent will visit the site to make an initial assessment within three days of receiving the complaint. This will include a well/system inspection (where accessible) by a licensed pump maintenance contractor to determine the groundwater level, pump depth setting and condition of the well system. The available groundwater level data from the existing on-site monitoring well network will be reviewed by a licensed professional geoscientist/engineer to develop an estimate of the potential groundwater level drawdown at the potentially affected well that is the subject of the complaint response. The information obtained by the contractor from the well/well system inspection and the review of the available groundwater level data will be used by the professional hydrogeologist/engineer to prepare an opinion on the likelihood that the well interference complaint is attributable to quarry dewatering.

If it is concluded that the well interference complaint is most likely attributable to quarry dewatering activities at the site and the water supply is at risk, then a temporary supply will immediately be arranged, and a water supply restoration program will be implemented. The decision as to whether to proceed with the water supply restoration program will be based on a review of groundwater level information by the professional geoscientist/engineer and well construction and performance information from the licensed pump maintenance contractor as noted above.

The water supply restoration program consists of the following generic measures which are considered applicable for local water supply wells where the operation of the water supply wells may have been compromised by quarry excavation or based on the analysis of all monitoring data, are assessed to likely be compromised in the near future:

- Well System Rehabilitation – The well system could be rehabilitated by replacement or lowering of pumps, pump lines flushing, well deepening, etc. to improve performance. Where water is unavailable in the shallow bedrock and a well in deeper bedrock is being considered, a water sample(s) would be taken from the existing well for chemical, physical and bacteriological analyses prior to deepening the well to provide a basis of comparison. If the groundwater in the deeper bedrock is found to be of acceptable quality by the homeowner, either directly from the well or with treatment, it will be developed as the domestic supply. Any modifications to a well would be conducted in accordance with Ontario Regulation 903;

- Well Replacement or Additional Well(s) – The well could be replaced or augmented with a new well(s). The feasibility of well replacement would be based on a test drilling program. Where water is unavailable in the shallow bedrock and a well in deeper bedrock (compared to the original water supply well) is being considered, a water sample(s) would be taken from the existing well for chemical, physical and bacteriological analyses to provide a basis of comparison. If the groundwater in the deeper bedrock is found to be of acceptable quality by the homeowner, either directly from the well or with treatment, it will be developed as the domestic supply. Construction of a new well(s) would be conducted in accordance with Ontario Regulation 903;

- Connect to Existing City of Ottawa Municipal Water Supply – Municipal water is not currently available within the area of the proposed Stittsville 2 Quarry however, connection to the City water supply could be an option in the future should well interference occur due to dewatering of the proposed quarry if the municipal water supply extends to the area;
- Communal Water Supplies – In specific situations, the communal water supply option is also available for consideration. The communal well water supply could be developed by tapping water bearing formations beyond the quarry influence along with the installation of water distribution lines to the affected property(ies). The communal well(s) could be developed on Tomlinson property and the distribution system could be placed along public right-of-ways. The water from the communal well(s) could be distributed to plumbing in homes with pipelines. Although communal water supplies are a viable option to address well interference, it is not likely that this would be a practical option for addressing confirmed well interference due to the remote nature of water supply wells in the area; and,
- Water Treatment Considerations – Appropriate water treatment will be incorporated into any restored water supply as discussed above. Tomlinson would be responsible for all costs associated with the water supply restoration program. It is important to note that water supply restoration activities undertaken to address an adverse effect would be done so in consultation with the affected property owner in order to ensure a mutually agreeable solution is implemented.

9.0 MONITORING PROGRAM FOR PROPOSED STITTSVILLE 2 QUARRY

If Tomlinson is successful in obtaining a license under the ARA from the MNRF for the proposed Stittsville 2 Quarry, this technical document would be used as supporting documentation to apply to the MECP for an amendment to the existing PTTW for the Stittsville Quarry. This PTTW amendment would be required to recognize the proposed Stittsville 2 Quarry in the impact assessment of the PTTW and to add some existing monitoring wells at the proposed Stittsville 2 Quarry into the monitoring program associated with the PTTW. It is anticipated that any water collecting in the base of the Stittsville Quarry, and the proposed Stittsville 2 Quarry will be collected in the same sump and discharged off-site in accordance with the existing ECA for the Stittsville Quarry. The existing quarry sump dewatering system is presently operated relatively infrequently at about 80 Litres per second which is below the maximum permissible discharge rate of 90 Litres per second. As such, it is envisaged that the management of water collecting within the confines of the proposed Stittsville 2 Quarry excavation could be accommodated (at least during the early stages of the development of the proposed Stittsville 2 Quarry) within the constraints imposed by the existing Stittsville Quarry ECA (Industrial Sewage Works) without requiring a technical amendment to the ECA.

The objectives of the groundwater and surface water monitoring programs will be to measure and evaluate the actual effects on water resources associated with long term quarry development on the combined quarry properties, and to allow a comparison between the actual effects measured during the monitoring program with those predicted as part of the impact assessment (refer to Section 7.0). It is proposed that the groundwater and surface water monitoring programs defined on the existing PTTW and the ECA for the existing Stittsville Quarry be continued during the development of the proposed Stittsville 2 Quarry.

The existing Stittsville Quarry ECA/PTTW groundwater and surface water monitoring programs consist of the following activities:

Table 21: Existing Stittsville Quarry Permit to Take Water Monitoring Program

Groundwater Level Monitoring

- Monthly groundwater level monitoring (during operational periods) in monitoring wells BH99-1, BH99-3A, BH99-3B, BH99-3C, BH99-3D, BH03-9A, BH03-9B, BH03-9C, BH13-16A, BH13-16B, BH13-16C, BH13-16D, BH18-17A, BH18-17B, BH18-17C and BH18-17D and monitoring wells BH05-13A, BH05-13B, BH15-13C located on the Tomlinson Moore Quarry Property. Monitoring frequency reverts to quarterly during non-operational periods at the Stittsville Quarry.

Groundwater Quality Monitoring

- Annual groundwater quality sampling at the “Spruce Ridge Residence”.
- Groundwater quality samples shall be analysed for alkalinity, aluminum, ammonia, barium, beryllium, boron, chemical oxygen demand (COD), chloride, cadmium, chromium, cobalt, conductivity (field), copper, dissolved organic carbon (DOC), hardness (calcium and magnesium), iron, lead, manganese, molybdenum, nickel, nitrate, nitrite, pH (field), potassium, silver, sodium, strontium, sulphate, temperature (field), thallium, titanium, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), total phosphorus, total suspended solids (TSS), vanadium and zinc.

Surface Water Level Monitoring

- Monthly staff gauge and continuous surface water level measurements (during ice-free conditions) at SG-1 and SG-4.

Surface Water Flow Monitoring

- Measurement of the water flow downstream of the outlet of the western wetland (at the culvert beneath the on-site road) by measuring water levels upstream of the culvert inlet on a daily basis during ice-free conditions and converting to daily discharge flows using calculations based on the culvert dimensions.

Table 22: Existing Stittsville Quarry Environmental Compliance Approval (Industrial Sewage Works) Monitoring Program

Surface Water Quality Monitoring

- Monthly surface water quality sampling during periods of effluent discharge at stations SS-1, SS-3, SS-4, SS-5, SS-6 and SS-8.
- Surface water quality samples are analysed for alkalinity, ammonia, barium, biochemical oxygen demand, boron, chloride, chromium, chromium III, hexavalent chromium, cobalt, chemical oxygen demand, copper, dissolved organic carbon, hardness (calcium and magnesium), iron, manganese, potassium, silicon, silver, sodium, strontium, sulphur, thallium, mercury, nitrate, nitrite, sulphate, total dissolved solids, total suspended solids, total Kjeldahl nitrogen and total phosphorus.

Surface Water Level Monitoring
■ Monthly staff gauge and continuous surface water level measurements (during ice-free conditions) at SG-1. ■ Monthly staff gauge measurements (during ice-free conditions) at SG-2.

It is proposed that the groundwater and surface water monitoring programs continue as described in Tables 21 and 22, except where an existing monitoring component will be removed as the quarry is developed (e.g., monitoring well removed by progressive quarry development), with the addition of the following components to the monitoring program on the current PTTW:

Table 23: Proposed Additional Monitoring Program

Groundwater Level Monitoring
■ Monthly groundwater level monitoring (during operational periods) in monitoring wells BH05-10A, BH05-10B, BH05-10C, BH05-11, BH05-12A*, BH05-12B*, BH05-12C*, SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29. Monitoring frequency reverts to quarterly during non-operational periods at the Stittsville and Stittsville 2 Quarries. ■ Note: * Monitoring wells installed in BH05-12 should either be repaired or replaced prior to operations commencing at the Stittsville 2 Quarry.
Surface Water Level Monitoring
■ Monthly staff gauge and continuous surface water level measurements (during ice-free conditions) at a background station upstream of the proposed quarry discharge for Stittsville 2 Quarry (i.e., SS-8), at the convergence of the proposed quarry discharge and the Goulbourn Wetland Complex (e.g. SS-6 but subject to changes during operational conditions), at the rail trail (i.e., SS-3), and at Fernbank Road (i.e., SW-A). ■ Water quality sampling at the above locations, as required by the ECA.

The ultimate need for mitigation measures and the timing for implementation of mitigation measures would be based on the data obtained from the groundwater and surface water monitoring programs.

It is expected that an annual performance report will continue to be a requirement of an amended ECA; this annual report would be submitted to the MECP for review and comment. In addition, Tomlinson will continue to prepare an annual report that provides an assessment and interpretation of the groundwater level data that is collected in accordance with the monitoring program defined on the amended PTTW. These monitoring data would ensure that quarry operations on the combined quarry properties (i.e., proposed Stittsville 2 Quarry and Stittsville Quarry) are undertaken in a manner that does not negatively impact surface water and groundwater receptors in the area of the site.

Where appropriate, comments received from the regulatory agencies (as part of this ARA licensing application process) that relate to the monitoring of the groundwater and surface water would be considered in the context of preparing the future monitoring program that takes into account the proposed development of the Stittsville 2 Quarry.

10.0 SUMMARY AND CONCLUSIONS

Tomlinson operates a number of pits and limestone quarries in the Ottawa area. The materials are used in the Ottawa area for road construction and in site preparation for commercial and residential developments. As part of the long-term business plan in the Ottawa area, Tomlinson wishes to license, under the *Aggregate Resource Act* (ARA), a property adjacent to the existing licensed Tomlinson Stittsville Quarry in order to supply the western end of Ottawa with aggregate products into the future.

WSP was retained by Tomlinson to complete the necessary hydrogeological and hydrological studies to support an application under the ARA and the *Planning Act*. This report presents the combined results of the hydrogeological and hydrological studies completed in support of a site plan license application for a Class ‘A’ license for a quarry below the ground water table, under Ontario Regulation 244/97 under the ARA. These studies were conducted for the purpose of addressing the requirements for the Level 1 and Level 2 Water Report studies as described in “Aggregate Resources of Ontario: Technical reports and information standards”, dated August 2020.

The results of the ecological studies are presented in a separate Natural Environment Report (WSP, 2023).

The proposed Stittsville 2 Quarry is located in the Geographic Township of Goulbourn in the City of Ottawa, Ontario. The proposed quarry property is located in Lots 15 and 16, Concession XI. The proposed extraction area covers an area of approximately 108 ha. The property is bounded by Jinkinson Road and the existing Tomlinson Stittsville Quarry to the north, the Goulbourn Wetland Complex to the east, the Trans-Canada Trail to the south and the Lafarge Bell Quarry property to the west. Access to the site is currently from Jinkinson Road. The proposed Stittsville 2 Quarry will be developed in three lifts. The final quarry floor for the proposed Stittsville 2 Quarry will slope from approximately 123 metres asl in the southwest to 101 metres asl in the northeast which generally follows the contact between the Bobcaygeon Formation and Gull River Formation. The base of the quarry excavation is below the average position of the groundwater table.

A number of licensed aggregate quarries also exist in the area. Three properties, the Lafarge Bell Quarry, the Tomlinson Stittsville Quarry and the Cavanagh Henderson Quarry are located to the west side of the site. The Taggart Fernbank Quarry and Cavanagh Beagle Club Quarry are located to the south of the site. The Tomlinson Moore Quarry is located to the northwest of the proposed Stittsville 2 Quarry across Highway 7.

The main objectives of the hydrogeological and hydrological studies were to:

- Characterize the existing hydrogeological and hydrological conditions of the proposed quarry property and surrounding lands; and,
- Assess potential impacts on groundwater and surface water associated with operation and rehabilitation of the proposed quarry.

The work program consisted of the following:

- Data review and compilation;
- Receptor identification;
- Bedrock percussion drilling program;
- Borehole geophysical investigation program;

- Groundwater level, surface water level and surface water flow monitoring programs; and,
- Groundwater and surface water flow modelling and impact assessment.

The on-site hydrogeological and hydrological data for the proposed Stittsville 2 Quarry were supplemented by the existing available data associated with the Stittsville Quarry. These data were used to develop the conceptual model for the proposed Stittsville 2 Quarry property.

A regional numerical groundwater model was developed to estimate the groundwater level drawdown associated with operations at the proposed Stittsville 2 Quarry. The numerical model was developed and calibrated based on the site-specific data, the monitoring data collected from all the nearby quarry operations and the information in the MECP WWIS.

A hydrologic model was prepared as part of an impact assessment under the operational and rehabilitated conditions for the key receptors that receive discharge from the proposed quarry site, including the Goulbourn Wetland Complex at Fernbank Road.

A number of model scenarios were developed to assess additional drawdown associated with operational and rehabilitated conditions at the proposed Stittsville 2 Quarry as compared to the already licensed quarries in the immediate area. The scenarios included:

- Scenario 1 – Pre-quarry Conditions (Calibration Run) – no quarry development in the study area.
- Scenario 2 – Existing Conditions (Calibration Run) – Bell Quarry, Henderson Quarry, Stittsville Quarry, Beagle Club Quarry and Fernbank Quarry at existing conditions (as of 2021).
- Scenario 3 – Stittsville Quarry and Proposed Stittsville 2 Quarry at Full Development – Stittsville Quarry and proposed Stittsville 2 Quarry fully extracted and dewatered with remaining quarries at existing (2021) level of development.
- Scenario 4 – Existing Quarries Full Development – All licensed quarries fully extracted and dewatered with the proposed Stittsville 2 Quarry remaining at existing (undeveloped) conditions.
- Scenario 5 – All Quarries at Full Development - All licensed quarries fully extracted and dewatered including the proposed Stittsville 2 Quarry.
- Scenario 6 – Stittsville Quarry and Proposed Stittsville 2 Quarry at Full Rehabilitation – Stittsville Quarry and proposed Stittsville 2 Quarry fully developed and rehabilitated with remaining quarries at existing (2021) level of development.
- Scenario 7 – Existing Quarries at Full Rehabilitation – All licensed quarries fully developed and rehabilitated with the proposed Stittsville 2 Quarry remaining at existing (undeveloped) conditions.
- Scenario 8 – All Quarries at Full Rehabilitation – All licensed quarries fully developed and rehabilitated including the proposed Stittsville 2 Quarry.

The development of the proposed Stittsville 2 Quarry can affect potential receptors mainly via land use changes, surface water drainage alterations (mainly catchment area changes as the drainage features themselves will not be altered), quarry water management (e.g., quarry dewatering) and the area of groundwater level drawdown (“drawdown cone”) and residual groundwater level drawdown.

The primary hydrogeological concern with respect to nearest water supply wells is the development of the groundwater drawdown cone that is associated with quarry dewatering, and the potential for drawdown to cause an interruption of the water supply at nearby homes as a result of the lowering of water levels in the water supply wells and/or to reduce the groundwater contribution to local surface water features and wetlands. The main surface water receptor of concern is the Goulbourn Wetland Complex located along the east property boundary of the proposed Stittsville 2 Quarry.

The potential impacts of the operational phase of the quarry life were assessed separately from the rehabilitated conditions.

Operational Period

Based on the results of the impact assessment, the following can be concluded during operational conditions:

- Forty-two (42) private wells are located within the area where at least one-metre of additional drawdown due to the operation of the proposed Stittsville 2 Quarry is expected (refer to Figure 51). It is noted that a minor reduction in available drawdown in a local supply well does not necessarily result in a negative impact on the well user as the minor reduction may not be perceptible to the user. Of those wells, seven have a predicted drawdown (in the TZ) of 20% or greater of the available drawdown in the wells. Two of the identified wells are likely no longer in use and two of the identified wells are used by Tomlinson for the water requirements associated with their concrete plant. Two of the wells are completed above the TZ and, as such, the predicted drawdown in the TZ is greater than what would be predicted for the actual depth of the well (less than 0.5 metres of drawdown at each well location).

- The remaining well has a predicted decrease in total available drawdown of 24%. In all likelihood, the well owner would not perceive the reduction in available drawdown in the well. In the event that the groundwater level monitoring program indicates that there is a potential for the progressive development of the proposed Stittsville 2 Quarry to adversely interfere with water supply wells in the local area, a complaints response program has been developed for the site that outlines a number of mitigative actions that can be undertaken (Section 8.0).

- As the extent of additional groundwater drawdown in the shallow bedrock due to the proposed Stittsville 2 Quarry is limited off of the site, impacts to the identified surface water features are not anticipated during the operational stage of the proposed Stittsville Quarry.

- During the Full Development of all Quarries including proposed Stittsville 2 Quarry (Scenario 5), an increase of approximately 10% in average annual total discharge volume at the point of analysis on Fernbank Road at the Goulbourn Wetland Complex (SW-A) is anticipated compared to Existing Conditions at Full Development (Scenario 4). This is due to the decrease in evapotranspiration from land use changes within the quarry as well as the quarry dewatering limiting any potential evaporation of pooled water before discharging to the point of analysis.

- The estimated changes in overall average annual flow volume to the Goulbourn Wetland Complex during the operational phase of the proposed Stittsville 2 Quarry is not predicted to significantly change flows and water levels, which are highly influenced by external factors. The incremental surface flow will be diffused in the connecting water bodies and the change in flows are expected to be minimal. Based on calculations and visual observations in the field, it is expected that there will be no change to the form or function of the receiving features in comparison to current conditions.

- While this site is operational, the proposed Stittsville 2 Quarry excavation will act as a large extended detention pond during storms due to the collection of water in the excavation. Therefore, the peak storm flow rates during large events are expected to be lower during operations than under Existing Conditions (Scenario 2), and the proposed Stittsville 2 Quarry is not expected to negatively contribute to flooding issues within the receiving water feature.

In summary, it is not expected that the development of the proposed Stittsville 2 Quarry will have a negative impact on surface water or groundwater receptors during the operational period, and it is not expected that the implementation of mitigation measures will be required during the operational period. During the operational period, it is anticipated that a monitoring program will be implemented for the purpose of verifying that the operation of the proposed Stittsville 2 Quarry does not adversely impact surface water or groundwater receptors.

Rehabilitated Conditions

Based on the results of the impact assessment, the following can be concluded during rehabilitated conditions:

- As the extent of long term additional residual groundwater drawdown due to the proposed Stittsville 2 Quarry is limited off of the site (water levels will increase in comparison to existing conditions), impacts to the identified surface water features and groundwater users are not anticipated following rehabilitation of the proposed Stittsville 2 Quarry (and surrounding quarries); and,
- As per the rehabilitation plan for the proposed Stittsville 2 Quarry, the proposed Stittsville 2 Quarry will be backfilled to the original grade throughout the limit of extraction, allowing for future potential development in the area near Jinkinson Road and a naturalized area in the southern portion of the property. The proposed naturalized area will include forests, wetlands, meadow and thicket. This area will be planted with mixed native species and will provide a range of habitats for wildlife. The ultimate drainage directions and sub-catchments areas are expected to closely resemble existing pre-development conditions. Runoff from the rehabilitated Stittsville 2 Quarry will then flow east off the property towards the Goulbourn Wetland Complex.
- Under Rehabilitated Conditions (Scenario 8 – All quarries at full rehabilitation including the proposed Stittsville 2 Quarry), the estimated cumulative discharge will decrease by approximately 673,000 m^3/yr (or 24%) as compared to Existing Conditions at Full Development (Scenario 4 - All quarries at full development excluding the proposed Stittsville 2 Quarry). The effect of the proposed Stittsville 2 Quarry alone on average annual discharge at Junction 4 under rehabilitated conditions represents a decrease of approximately <1% as compared to existing conditions (Scenario 4).

In summary, it is not expected that the development of the proposed Stittsville 2 Quarry will have a negative impact on surface water or groundwater receptors under rehabilitated conditions, and it is not expected that the implementation of mitigation measures will be required.

Comprehensive Site-Specific Monitoring Programs

Proposed groundwater and surface water monitoring programs are presented in Section 9.0 of this report. The objectives of the groundwater and surface water monitoring programs will be to measure and evaluate the actual effects on water resources associated with long term quarry development on the combined quarry properties, and to allow a comparison between the actual effects measured during the monitoring program with those predicted as part of the impact assessment (refer to Section 7.0). Given that the combined quarries will continue to be developed over a period of several decades, these monitoring programs will permit the development of a comprehensive groundwater and surface water database prior to any potential impacts on local receptors including local private water supply wells.

If Tomlinson is successful in obtaining a license under the ARA from the MNRF for the proposed Stittsville 2 Quarry, this technical document would be used as supporting documentation to apply to the MECP for an amendment to the existing PTTW. This PTTW amendment would be required to recognize the proposed Stittsville 2 Quarry in the impact assessment of the PTTW and to add some existing monitoring wells at the proposed Stittsville 2 Quarry into the monitoring program associated with the PTTW. It is anticipated that any water collecting in the base of the Stittsville Quarry and the proposed Stittsville 2 Quarry will be collected in the same sump and discharged off-site in accordance with the existing ECA for the Stittsville Quarry. As noted above, the existing quarry sump dewatering system is presently operated relatively infrequently at about 80 Litres per second which is below the maximum permissible discharge rate of 90 Litres per second. As such, it is envisaged that the management of water collecting within the confines of the proposed Stittsville 2 Quarry excavation could be accommodated (at least during the early stages of the development of the proposed Stittsville 2 Quarry) within the constraints imposed by the existing ECA (Industrial Sewage Works) without requiring a technical amendment to the ECA.

It is expected that an annual performance report will continue to be a requirement of a future amended ECA; this annual report would be submitted to the MECP for review and comment. In addition, Tomlinson will continue to prepare an annual report that provides an assessment and interpretation of the groundwater level data that is collected in accordance with the monitoring program defined on the amended PTTW. These monitoring data would ensure that quarry operations on the combined quarry properties (i.e., Stittsville Quarry and proposed Stittsville 2 Quarry) are undertaken in a manner that does not negatively impact surface water and groundwater receptors in the area of the site.

Where appropriate, comments received from the regulatory agencies (as part of this ARA licensing application process) that relate to the monitoring of the groundwater and surface water would be considered in the context of preparing the future monitoring program that takes into account the proposed development of the Stittsville 2 Quarry.

11.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of R.W. Tomlinson Limited. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by WSP Canada Inc. and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by WSP Canada Inc. as described in this report. Each of these reports must be read and understood collectively and can only be relied upon in their totality.

Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore authenticity of any electronic media versions of WSP’s report should be verified.

WSP Canada Inc. has relied in good faith on all information provided and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the reports as a result of omissions, misinterpretation, or fraudulent acts of the persons contacted or errors or omissions in the reviewed documentation.

The assessment of environmental conditions and possible hazards at this site has been made using the results of physical measurements and chemical analyses of liquids from a limited number of locations. The site conditions between sampling locations have been inferred based on conditions observed at groundwater sampling locations. Conditions may vary from these sampled locations.

The services performed, as described in this report, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The groundwater level lowering, and groundwater inflow/seepage estimates developed from the groundwater model described in this report are considered to represent reasonable "theoretical" estimates based on the available data. There is uncertainty inherently associated with the (subsequent) forecasts by the groundwater model, stemming from limitations in the available subsurface information and can be related to variability in the bedrock properties (e.g., hydraulic conductivity, porosity, etc.) or uncertainties with the conceptual model (e.g., groundwater-surface water interactions, location of flow boundaries, recharge rates, continuity in aquitards, direction of regional groundwater flow, etc.). It is the intention of WSP Canada Inc. that the model results be used as a screening tool to predict groundwater inflow/seepage rates and groundwater level lowering for the purposes of this license application process, and not for any other purposes.

The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, WSP Canada Inc. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

12.0 CLOSURE

We trust the information presented in this report meets your requirements. Should you have any questions or concerns, please contact the undersigned.

WSP Canada Inc.

LICENSED PROFESSIONAL ENGINEER
B. J. HENDERSON
100110984
2-Nov-2023
PROVINCE OF ONTARIO

PROFESSIONAL GEOSCIENTIST
KRIS A. MARENTETTE
PRACTISING MEMBER
0287
02/11/2023
ONTARIO

B. Henderson, M.A.Sc., P.Eng.
Environmental Engineer

K.A. Marentette, M.Sc., P.Geo.
Senior Hydrogeologist

LICENSED PROFESSIONAL ENGINEER
K. M. MacKENZIE
02/11/2023
PROVINCE OF ONTARIO

K. Mackenzie, M.Sc., P.Eng.
Senior Water Resources Engineer

S. Spanik, M.A.Sc., P.Eng.
Environmental Engineer

BH/MR/SPS/CD/KMM/KAM/rk

https://golderassociates.sharepoint.com/sites/115663/project files/6 deliverables/water report/final/19130670-r-rev0_stittsville_2_water_report_31oct2023.docx

13.0 REFERENCES

Belanger, J.R., 2008. *Urban Geology of the National Capital Area*, Geological Survey of Canada, Open File 5311.

Brandon, L.V., 1960. *Preliminary Report on Hydrogeology, Ottawa-Hull Area, Ontario and Quebec*, Geological Survey of Canada Paper 60-23, 17p.

Chapman, L.J. and Putnam, D.F., 1984. *The Physiography of Southern Ontario*, Third Edition. Ontario Geological Survey Special Volume 2. Ontario Ministry of Natural Resources, Toronto, Ontario.

Feldman, A.D., 2000. *Hydrologic Modeling System HEC-HMS Technical Reference Manual.* U.S. Army Corps of Engineers, Hydrologic Engineering Center. Washington, D.C.

Freeze, R. Allan, and John A. Cherry. 1979. *Groundwater*. Englewood Cliffs, N.J.: Prentice-Hall.

Geo-Analysis Inc., 1991. *Hydrogeologic Evaluation – Potential for Village Expansion Based on Private Individual Services, Village of Richmond.* May 1991.

Geo-Analysis Inc. and J.L. Richards & Associates Limited. 1992. *File No. G9105. Private Individual Services in the Rural Area*, Submitted to the Regional Municipality of Ottawa-Carleton and Ministry of Municipal Affairs.

Golder Associates Ltd., 2000. Village of Merrickville – Wolford Municipal Groundwater Management Study. November 2000.

Golder Associates Ltd., 2001. *Hydrogeological Evaluation for Communal Water Supply in Support of the Groundwater Component Requirement for a Permit to Take Water and Water Works C of A*. May 2001.

Golder Associates Ltd., 2003. *Final Report on Wellhead Protection Study Munster Hamlet and Kings Park Communal Wells, City of Ottawa, MVCA Study Group*. Prepared for Mississippi Valley Conservation Study Group. April 2003.

Golder Associates Ltd., 2003a. *Renfrew County – Mississippi – Rideau Groundwater Study.* Prepared for Mississippi Valley Conservation Authority Study Group. September 2003.

Golder Associates Ltd., 2004. *Hydrogeological Evaluation for Communal Water Back-Up Supply Well in Support of the Groundwater Component Requirement for a Permit to Take Water, Hyde Park Townhome Project, Ottawa, Ontario*. November 2004.

Golder Associates Ltd., 2005. *Construction of Multi-Level Sentinel Wells for the King's Park Communal Wells, Village of Richmond (Ottawa), Ontario*. September 2005.

Golder Associates Ltd., 2006. *Hydrogeological Investigation – Proposed Residential Subdivision, Lot 24 and 25, Concession III, Village of Richmond, Ottawa, Ontario.*

Golder Associates Ltd., 2007. *Hydrogeological Study in Support of a Category 3 Permit to Take Water Amendment Application, Canadian Golf and Country Club, Ottawa (Ashton)*, Ontario. July 2007.

Golder Associates Ltd., 2008. *Report on Wellhead Protection Area Maps, Carp, Munster Hamlet and Kings Park*. Prepared for Mississippi – Rideau Source Protection Region. May 2008.

Golder Associates Ltd., 2009. *Letter Report Vulnerability of the Upper Aquifer Wellhead Protection Areas of the Munster Hamlet and Kings Park Municipal Wells*. Prepared for Mississippi – Rideau Source Protection Region. May 2009.

Golder Associates Ltd., 2018. *Hydrogeological Impact Assessment – Lafarge Canada Inc., Bell Quarry, Geographic Township of Goulbourn, Ottawa, Ontario.*

Harbaugh, A.W. 2005. *MODFLOW-2005, the U.S. Geological Survey modular ground-water model -- the Ground-Water Flow Process*: U.S. Geological Survey Techniques and Methods 6-A16.

Hvorslev, M.J., 1951. Time Lag and Soil Permeability in Ground-Water Observations, Bull. No. 36, *Waterways Exper. Sta. Corps of Engrs*, U.S. Army, Vicksburg, Mississippi, pp. 1-50

Natural Resources Conservation Service, 2010. Part 630 Hydrology, *National Engineering Handbook*. U.S. Department of Agriculture.

Oliver, Mangione, McCalla & Associates Limited, 1990. *Hydrogeology and Well Construction Report*, New Municipal Well, Almonte, Ontario. November 1990.

Oliver, Mangione, McCalla & Associates Limited, 1991. *Hydrogeology and Well Construction Report*, Municipal Well #8, Almonte, Ontario. November 1991.

Oliver, Mangione, McCalla & Associates, 2000. *Municipal Well Head Protection Study, Town of Kemptville, Township of North Grenville*. November 2000.

Ontario Ministry of the Environment, Conservation, and Parks (MECP). “Stormwater Management, Planning and Design Manual”. 2003.

Raven Beck Environmental Ltd., 1996. *Supplementary Bedrock Hydrogeologic Investigation of PCE Contamination, Village of Manotick.* Final Report prepared for the Ontario Ministry of the Environment and Energy.

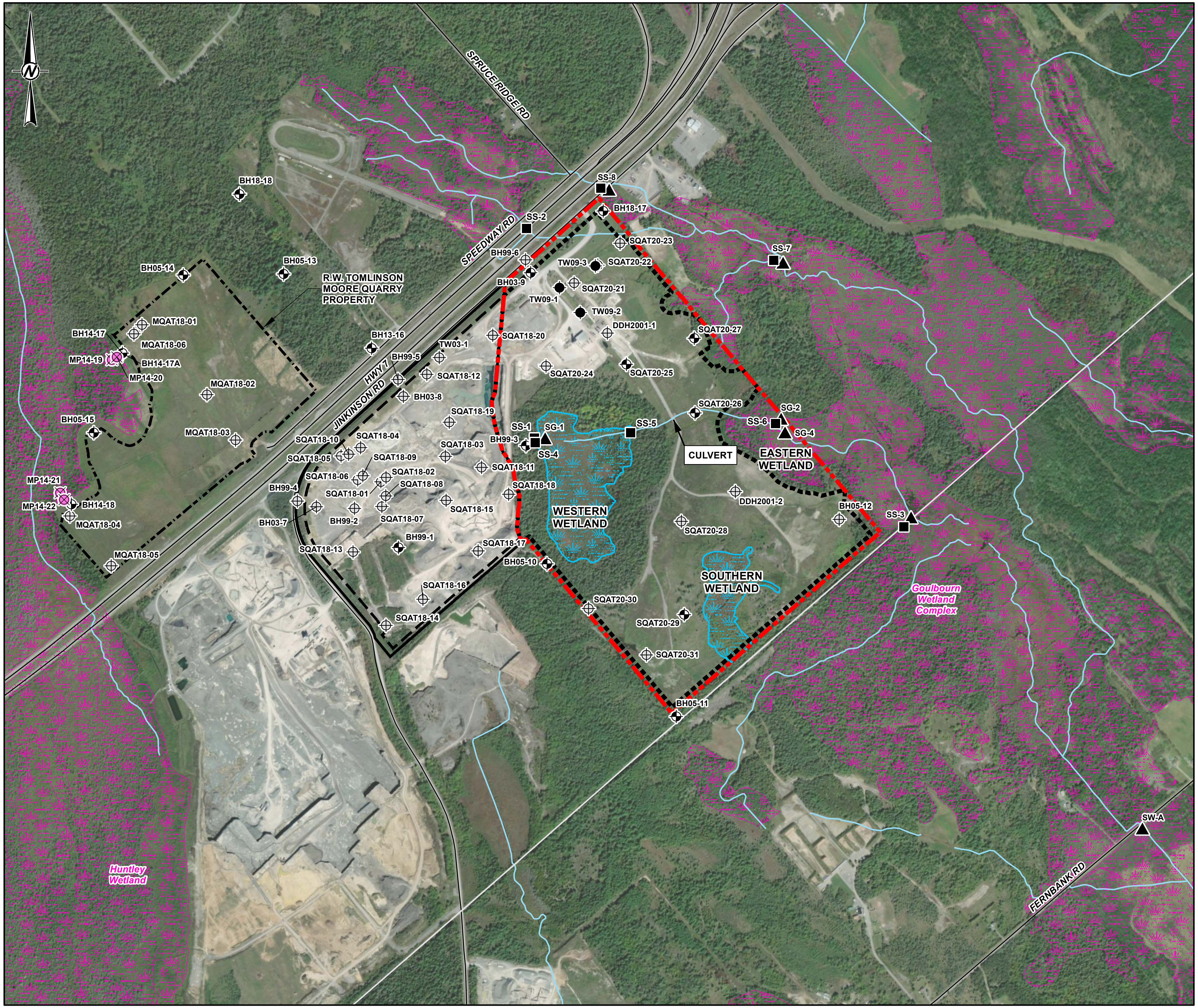
Rideau Valley Conservation Authority, 2016.

Scharffenberg, W., 2016. *Hydrologic Modeling System HEC-HMS User’s Manual.* U.S. Army Corps of Engineers, Institute for Water Resources. Davis, CA.

Shuttleworth, W.J., 1989. *Micrometeorology of temperate and tropical forests*. Philosophical transactions of the Royal Society. London, UK.

Williams, D.A., 1991. *Paleozoic Geology of the Ottawa-St Lawrence Lowland, Southern Ontario*; Ontario Geological Survey, Open File Report 5770, 292p.

WSP Canada Inc., 2023. *Natural Environment Report and Environmental Impact Study, Proposed Stittsville 2 Quarry, Ottawa, Ontario.* October 2023.



KEY MAP

SCALE 1:1,000,000

LEGEND

●	EXISTING BOREHOLE LOCATION
⊕	MONITORING WELL LOCATION
⊕	DECOMISSIONED BOREHOLE/MONITORING WELL LOCATION
⊗	MINI-PIEZOMETER LOCATION
▲	STAFF GAUGE
■	SURFACE WATER OR EFFLUENT MONITORING LOCATION
—	ROADWAY
—	RAIL TRAIL
—	WATERCOURSE
▨	PROVINCIALLY SIGNIFICANT WETLAND (PSW)
▨	WETLAND (NOT PROVINCIALLY SIGNIFICANT)
▭	PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
▭	PROPOSED STITTSVILLE 2 QUARRY EXTRACTION AREA
▭	STITTSVILLE QUARRY LICENSED AREA
▭	STITTSVILLE QUARRY EXTRACTION AREA
▭	MOORE QUARRY LICENSED PROPERTY

0 130 260 520

1:13,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
SITE PLAN

CONSULTANT

wsp

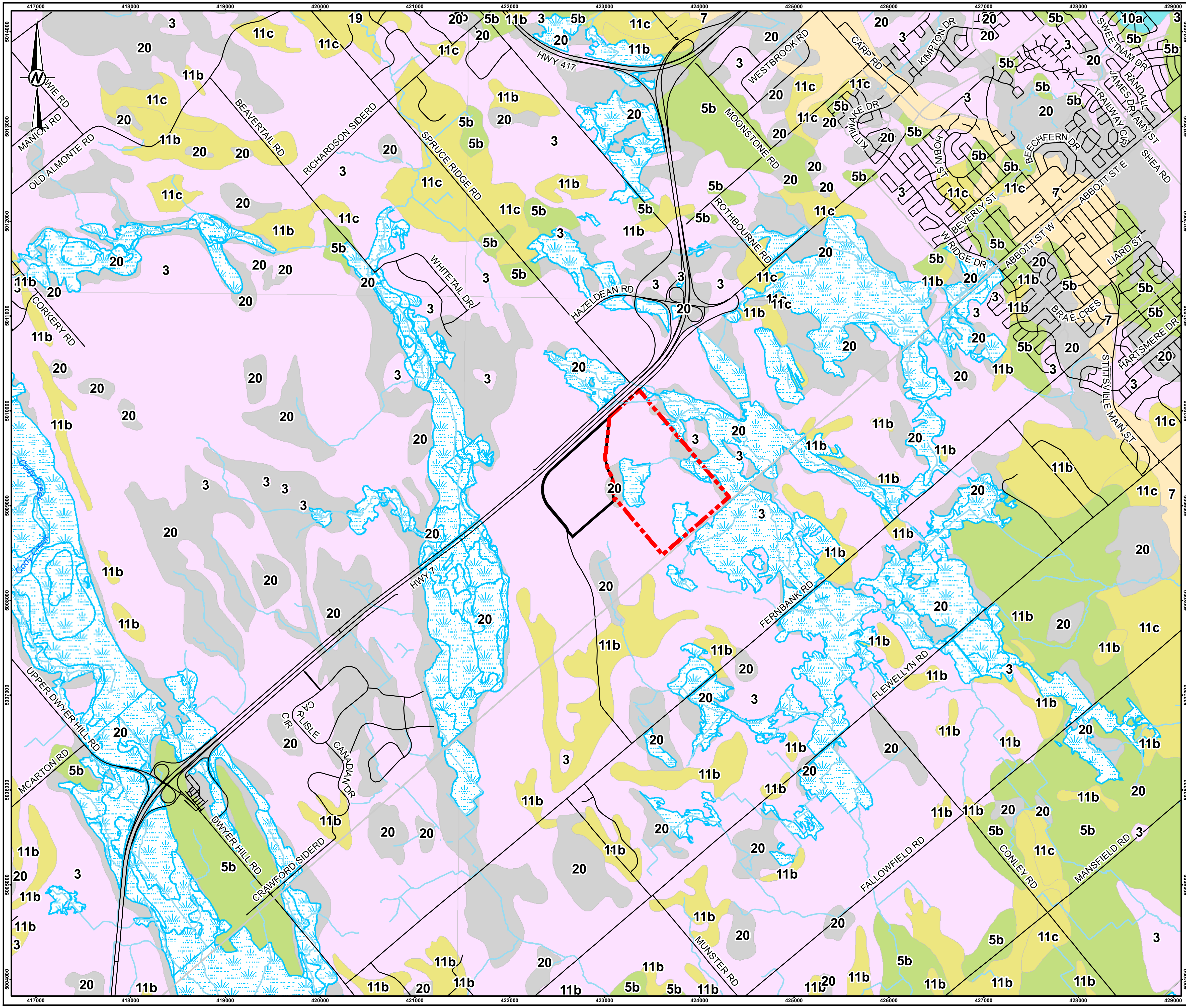
YYYY-MM-DD	2023-07-31
DESIGNED	BH
PREPARED	BR/MG
REVIEWED	BH
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	1

PATH: S:\Clients\Tomlinson\Stittsville\19130670\99_PROJ\19130670_Tomlinson_Stittsville2Quarry\0008_Level_1_2_Water_Report\19130670-0008-CH-0001.mxd PRINTED ON: 2023-07-31 AT: 3:49:43 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm



KEY MAP

SCALE 1:1,000,000

LEGEND

—	ROADWAY
—	RAIL TRAIL
—	WATERCOURSE
▨	WETLAND
⬚	PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
☐	STITTSVILLE QUARRY LICENSED AREA

OGS SURFICIAL GEOLOGY

■	3. **PALEOZOIC BEDROCK**
■	5b. **TILL:** STONE-POOR, SANDY SILT TO SILTY SAND-TEXTURED TILL ON PALEOZOIC TERRAIN
■	7. **GLACIOFLUVIAL DEPOSITS:** RIVER DEPOSITS AND DELTA TOPSET FACIES
■	10a. **FINE-TEXTURED GLACIOMARINE DEPOSITS:** SILT AND CLAY, MINOR SAND AND GRAVEL; MASSIVE TO WELL LAMINATED
■	11b. **COARSE-TEXTURED GLACIOMARINE DEPOSITS:** SAND, GRAVEL, MINOR SILT AND CLAY; LITTORAL DEPOSITS
■	11c. **COARSE-TEXTURED GLACIOMARINE DEPOSITS:** SAND, GRAVEL, MINOR SILT AND CLAY; FORESHORE AND BASINAL DEPOSITS
■	19. **MODERN ALLUVIAL DEPOSITS:** DAY, SILT, SAND, GRAVEL, MAY CONTAIN ORGANIC REMAINS
■	20. **ORGANIC DEPOSITS:** PEAT, MUCK, MARL

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. *GSC SURFICIAL:* BÉLANGER, J. R. 2008 URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE 5311, 1 DVD.
2. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
3. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

0 395 790 1,580
1:40,000 METRES

CLIENT
R.W.TOMLINSON LIMITED

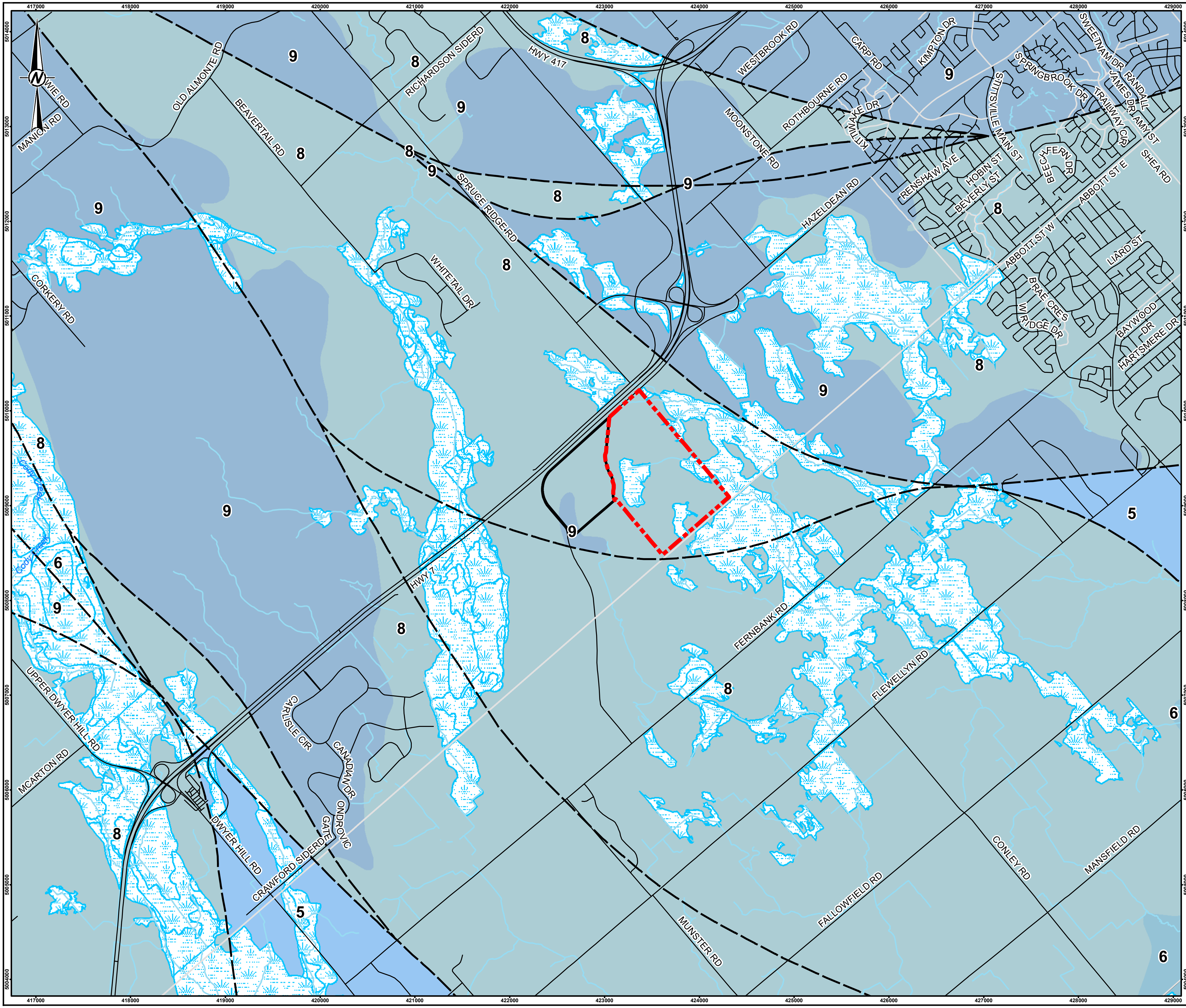
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
SURFICIAL GEOLOGY

CONSULTANT

YYYY-MM-DD	2023-01-24
DESIGNED	----
PREPARED	ABD/MG
REVIEWED	BH
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	2



KEY MAP

SCALE 1:1,000,000

LEGEND

—	ROADWAY
—	RAIL TRAIL
—	FAULT
—	WATERCOURSE
▨	WETLAND
▭	PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
▭	STITTSVILLE QUARRY LICENSED AREA

OGS BEDROCK GEOLOGY

■	9: BOBCAYGEON FORMATION - LIMESTONE, WITH MINOR SHALES IN UPPER PART
■	8: GULL RIVER FORMATION - LIMESTONE, WITH DOLOSTONE BEDS TOWARDS BASE
■	6: ROCKCLIFFE FORMATION - SANDSTONE, SHALE, LIMESTONE, DOLOSTONE
■	5: OXFORD FORMATION - DOLOSTONE, MINOR SHALE AND SANDSTONE

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. *OGS BEDROCK GEOLOGY:* ARMSTRONG, D.K. AND DODGE, J.E.P. 2007. PALEOZOIC GEOLOGY OF SOUTHERN ONTARIO; ONTARIO GEOLOGICAL SURVEY, MISCELLANEOUS RELEASE--DATA 219
2. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
3. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

0 395 790 1,580
1:40,000 METRES

CLIENT
R.W.TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
BEDROCK GEOLOGY

CONSULTANT

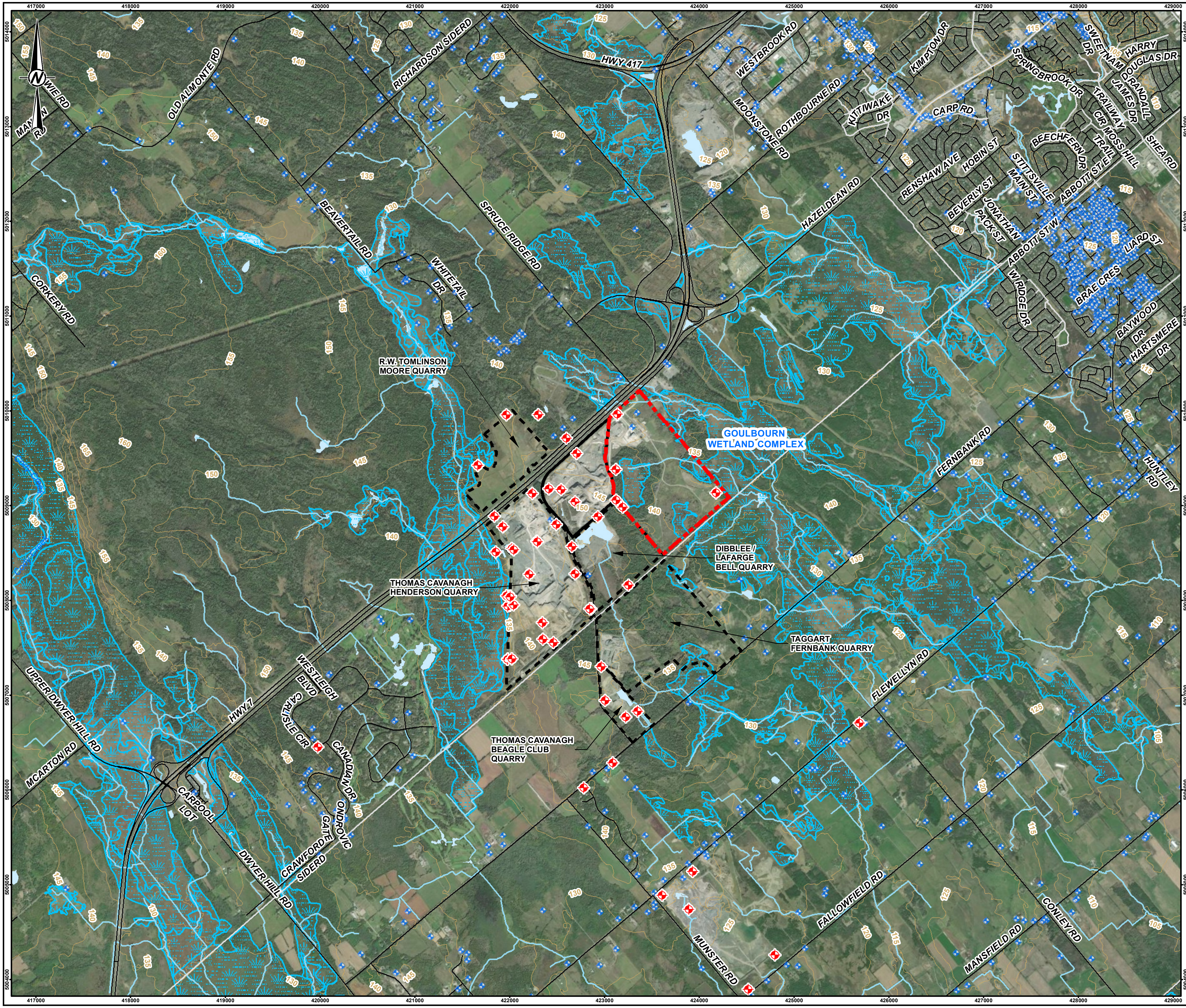
wsp

YYYY-MM-DD	2023-01-24
DESIGNED	----
PREPARED	ABD/MG
REVIEWED	BH
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	3

Path: N:\Active\Spatial_IM\Tomlinson\Stittsville\19130670\99_PROJ\19130670_Tomlinson_Stittsville2Quarry\0008_Level_1_2_Water_Report\19130670-0008-CH-0003.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0



KEY MAP

SCALE 1:1,000,000

LEGEND

✦	WATER WELL (MECP WWIS)
✦	BOREHOLES INCLUDED IN JINKINSON ROAD STUDY AREA
—	ROADWAY
—	RAIL TRAIL
—	TOPOGRAPHIC CONTOUR, METRES
—	WATERCOURSE
▨	WETLAND
▭	WATERBODY
⬚	PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
▭	STITTSVILLE QUARRY LICENSED AREA
⬚	LICENSED QUARRY

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

0 395 790 1,580

1:40,000 METRES

CLIENT
R.W.TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
REGIONAL PLAN

CONSULTANT

wsp

YYYY-MM-DD	2023-07-31
DESIGNED	----
PREPARED	ABD/MG
REVIEWED	BH
APPROVED	KAM

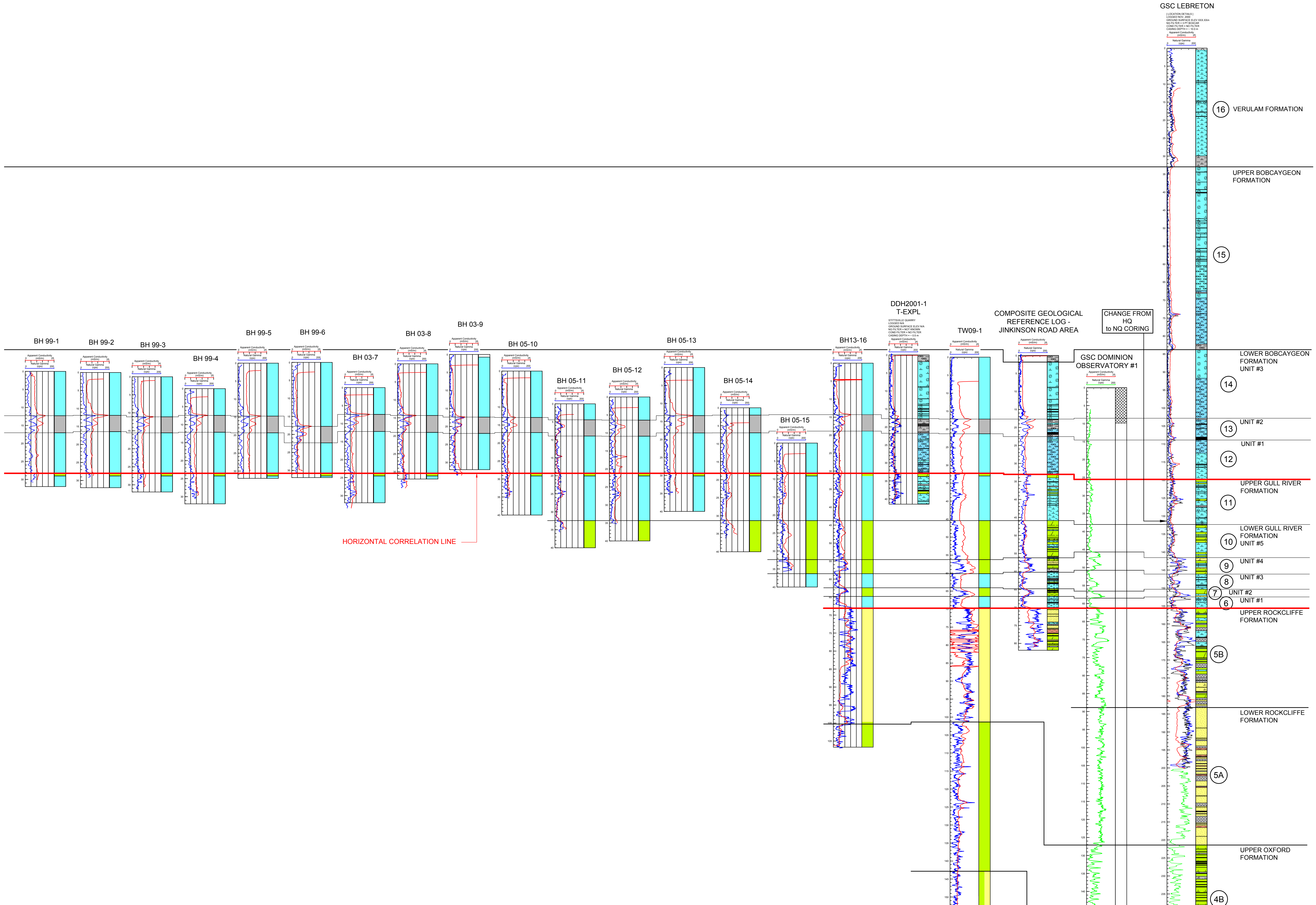
PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	4

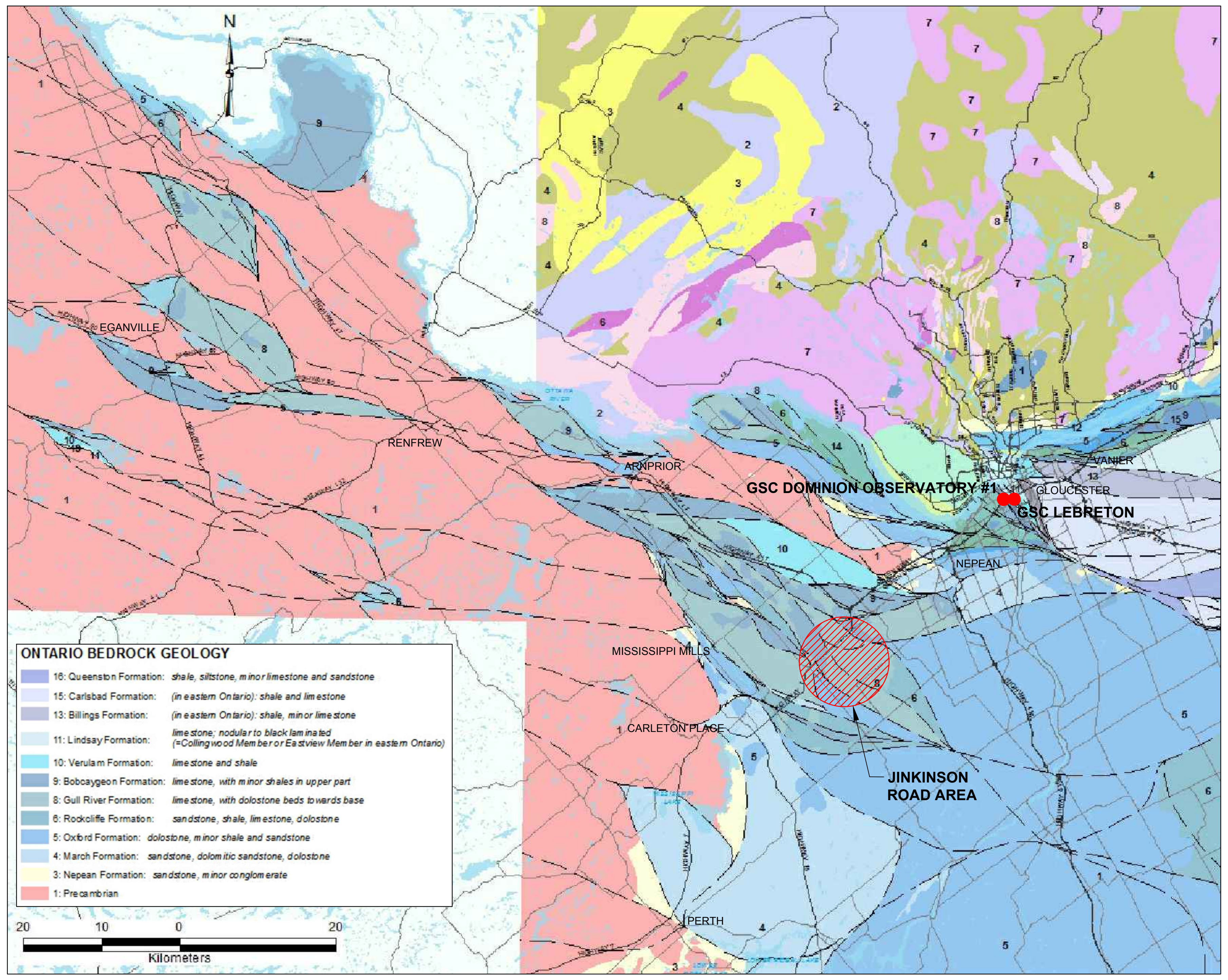
Path: S:\Clients\Tomlinson\Stittsville\19130670\99_PROJ\19130670_Tomlinson_Stittsville2Quarry\0008_Level_1_2_Water_Report\19130670-0008-CH-0004.mxd

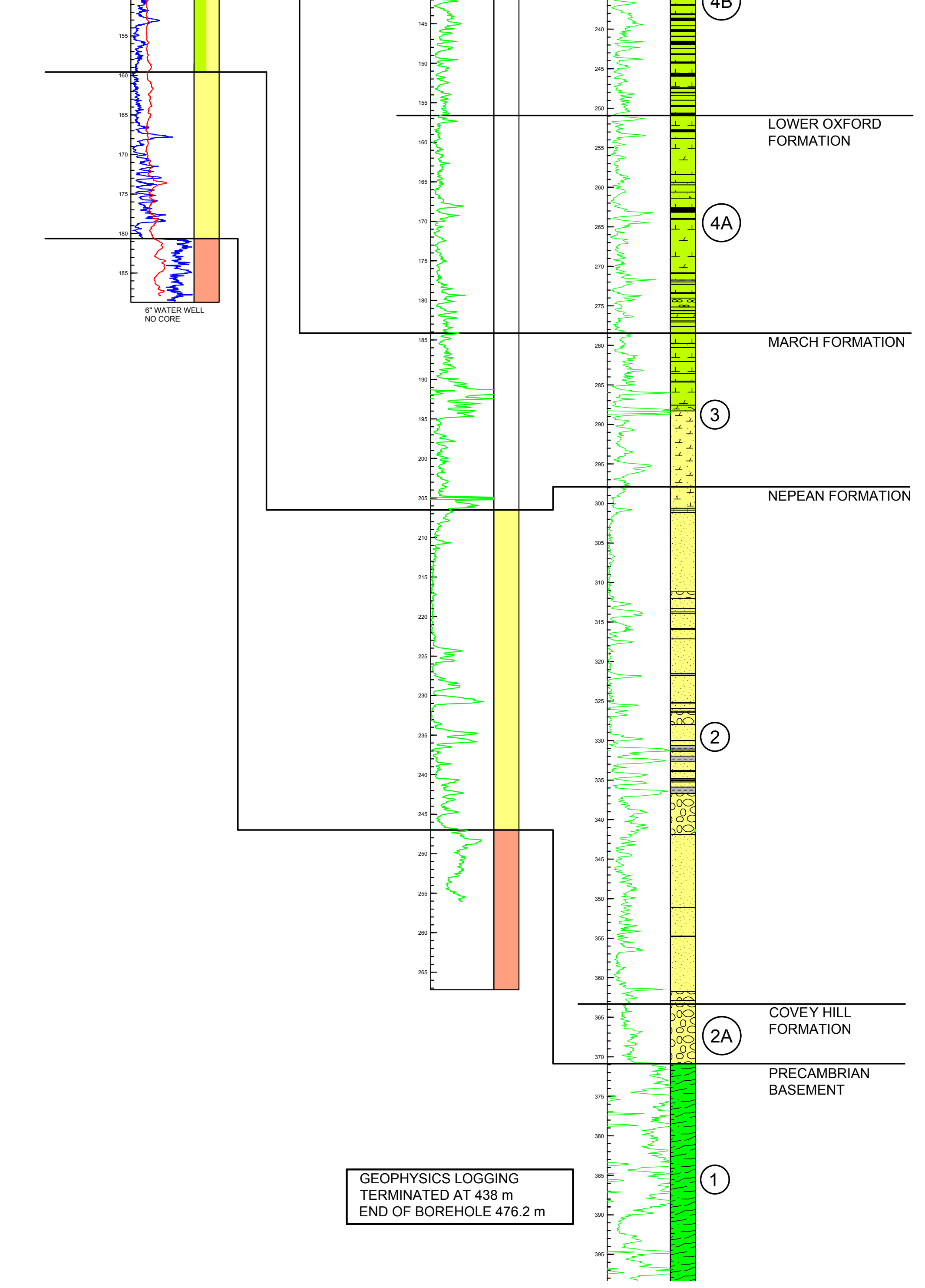
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:

25mm

0







GEOPHYSICS LOGGING TERMINATED AT 438 m
END OF BOREHOLE 476.2 m

STRATIGRAPHY

ORDOVICIAN PERIOD

⑯ VERULAM FORMATION

Medium brownish grey, fine to medium grained crystalline, non porous, thinly to medium bedded, **SHALEY CALCARENITIC LIMESTONE,** subordinate nodular limestone, minor thin lithoclastic limestone beds and very thin to thinly interbeds of dark grey, calcareous, slake susceptible shale at semi regular intervals of 0.25 to 2.5 m. Contains traces of fossil fragments of brachiopods and pelecypods, thicker shale beds contain circular burrow casts. Shale and shaley limestone comprise approximately 7.5 to 10 % increasing to approximately 20 to 25% in basal 3 m to 4 m of sequence. Verulam Formation is not recognized west of the Gloucester Fault. Sharp basal contact with the underlying light to medium brownish grey medium to coarse grained crystalline calcarenitic limestone of the Upper Bobcaygeon Formation.

⑮ UPPER BOBCAYGEON FORMATION

Light to medium brownish grey, fine to medium grained crystalline, medium to thickly bedded **CALCARENITIC LIMESTONE** with weakly to well developed stylolites and fine laminar depositional bedding texture and widely spaced black argillaceous bedding partings. Sequence includes subordinate sections of medium to dark grey, fine grained, partly crystalline, thinly to medium bedded, argillaceous micritic limestone and nodular micritic limestone and minor calcarenitic lithoclastic limestone interbeds. Middle of sequence locally contains a 0.5 to 2.5 m thick micritic limestone beds with brown to black chert nodules. Lower portion of sequence is gradational into argillaceous calcarenite and thinly bedded argillaceous nodular limestone. Sharp basal contact with Lower Bobcaygeon Formation. Upper Bobcaygeon Formation does not appear to occur west of the Gloucester Fault except for occasional basal remnants.

LOWER BOBCAYGEON FORMATION

⑭ **UNIT 3,** Light to medium brownish grey, fine to medium grained crystalline, non porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Contact with Upper Bobcaygeon Formation in Stittsville-Ottawa area marked by sharp transition from overlying argillaceous nodular limestone to underlying crystalline calcarenitic limestone. West of Stittsville-Henderson Quarries unit tends to contain more argillaceous beds. Unit is traceable west into the Arnprior area. Transitional to sharp basal contact.

⑬ **UNIT 2,** Dark grey, fine grained, non porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS LIMESTONE** and **SHALEY LIMESTONE.** Slake susceptible dark grey to black shaley limestone and shale beds comprise approximately 10% of sequence. In the urban Ottawa area a 1 m thick slake susceptible black shale and shaley limestone forms base of unit. Transitional basal contact.

⑫ **UNIT 1,** Medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE**. Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of micritic limestone, occasional very fine grained thin to medium lithographic limestone beds, medium grained oolitic limestone beds and widely spaced black shaley partings 5 to 30 mm thick. Thin black shale bed locally marks sharp basal contact of sequence directly above Gull River Formation dolostone bed.

The Bobcaygeon-Gull River Formation sequence is transitional. The contact has been placed at the first occurrence of a dolostone bed considered to mark the top of the Gull River Formation. The dolostone bed is regionally consistent between Ottawa and Arnprior/Eganville.

⑪ UPPER GULL RIVER FORMATION

Medium grey, very fine to fine grained, non porous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick. Distinct interbeds of medium greenish grey, fine to medium grained, faintly porous, partly lithoclastic to massive textured, medium to thickly bedded **ARGILLACEOUS** to **CALCAREOUS DOLOSTONE** occur interbedded within the limestone. Top of the unit is marked by the first appearance of dolostone, the **"first dolostone marker bed",** approximately 1 m thick with sharp upper and lower contacts associated with 20 to 40 mm thick, dark grey to black, slake susceptible shale and shaley dolostone parting. Additional individual dolostone beds 0.1 to 1 m thick occur interbedded within the underlying limestone that are also associated with shaley caps and bases. Thin to medium bedded lithoclastic limestone beds (more prevalent in the urban Ottawa area) and oolitic limestone beds also occur within the sequence.

The **first dolostone marker bed** with its greenish colouration and outwardly appearing massive texture is readily recognizable in rock core and quarry faces and marks a general transition from overlying asphalt/concrete quality stone to underlying granular materials.

⑩ LOWER GULL RIVER FORMATION

The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units.

UNIT 5, Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts. In the urban Ottawa area dolostone is subordinate to lithographic to micritic limestone with thin lithoclastic beds.

⑨ **UNIT 4,** Interbedded sequence of light to medium grey to greenish grey to dark grey, fine grained, faintly porous, thinly to medium bedded, massive textured, argillaceous to shaley **DOLOSTONE** and medium grey **DOLOMITIC LIMESTONE**. Thin interbeds of laminar to nodular textured limestone and thin oolitic limestone beds occur. Unit also includes light to medium grey and greenish grey, medium grained, thinly to medium bedded, calcareous to dolomitic cemented**,** partly bioturbated **QUARTZ SANDSTONE** and minor black **SHALE.**

⑧ **UNIT 3,** Medium grey to brownish grey, fine grained, non porous, laminated to thinly bedded, **ARGILLACEOUS LIMESTONE.** Unit includes interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings, thin beds of oolitic limestone, weakly developed lithoclastic limestone, minor burrow bioturbated limestone, with lesser amounts of calcareous dolostone, dark grey dolomitic shale, shaley dolostone. Black argillaceous to shaley bedding partings occur.

⑦ **UNIT 2,** Interbedded sequence of medium grey to greenish grey, fine grained, faintly porous, thinly to medium bedded, argillaceous **DOLOSTONE** and **CALCAREOUS DOLOSTONE** with thinly interbedded black **SHALE, SHALEY DOLOSTONE** and **DOLOMITIC SILTSTONE** with localized burrowed bioturbation.

⑥ **UNIT 1,** Medium grey, fine grained, non porous, thinly bedded, **ARGILLACEOUS LIMESTONE** weakly nodular in part with interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings and very thin beds of black calcareous shale. Sharp basal contact locally marked by thin black shaley parting.

(5B) ROCKCLIFFE FORMATION,

Interbedded sequence composed of medium grey, fine grained, non-porous to faintly porous, massive textured to mottled, medium to thick beds of **DOLOSTONE** and **CALCAREOUS DOLOSTONE**, dark grey to black, slake susceptible **SHALE**, medium grey, mottled to laminar textured, fine grained, thin to medium beds of **ARGILLACEOUS LIMESTONE** with light grey, fine grained, calcareous cemented, medium to thick beds of **QUARTZ SANDSTONE**. Individual lithological sequences such as shale beds typically vary in thickness from approximately 0.25 m to 2.0 m. Upper Rockcliffe Formation is transitional with the underlying Lower Rockcliffe Formation noted by transition from predominately dolostone and shale in the upper sequence to predominately sandstone in the lower sequence.

(5A) LOWER ROCKCLIFFE FORMATION

Light whitish grey, fine grained (0.1-0.3 mm), laminar textured to rippled and cross bedded, thin to thick bedded **QUARTZ SANDSTONE** with thin to thick interbeds of medium to dark grey slake susceptible **SHALE** with fine laminations of siltstone and fine calcareous sandstone and light to medium grey, laminar textured, thin to medium beds of **SILTSTONE** to **SANDY SILTSTONE**. Sandstone is largely silica cemented subangular to subrounded quartz grains with minor beds having varying amounts of calcareous cement. Contact with the underlying Oxford Formation is transitional to sharp erosional.

OXFORD FORMATION

(4B) UPPER OXFORD FORMATION,

Medium grey, fine grained micritic, medium bedded, argillaceous **DOLOSTONE and CALCAREOUS DOLOSTONE** with 0.01-0.50 m thick interbeds of dark grey to black, slake susceptible **SHALE** and **SHALEY DOLOSTONE** set at regular intervals of approximately 0.5-1.0 m. Calcareous burrow casts occur in thicker shaley beds. Shale and shaley dolostone beds vary laterally comprise approximately 18-20% of the section in the Lebreton borehole LB-1 decreasing to approximately 7% in the Moodie Dr Quarry borehole CH-5577. Transitional lower contact noted by significant decrease in shaley content in the Lower Oxford Formation.

(4A) LOWER OXFORD FORMATION,

Medium grey, fine grained micritic, laminar textured, medium bedded **CALCAREOUS DOLOSTONE** with minor (approx. 5-6%) very thin to medium beds of dark grey to black, slake susceptible shale and shaley dolostone (Lebreton borehole LB-1) that laterally varies into an interbedded sequence comprised of argillaceous **NODULAR DOLOSTONE** with subordinate beds of **CALCAREOUS DOLOSTONE** and **LITHOCLASTIC DOLOSTONE** with approximately 1% shale and shaley dolostone partings(Rideau Rd Quarry borehole DDH12-06). Contact with the underlying March Formation is transitional.

③ MARCH FORMATION

Formation is composed of interbedded medium grey, fine to medium grained, non to faintly porous, partly oolitic, thinly to medium bedded **SANDY DOLOSTONE** to **DOLOMITIC SANDSTONE, SANDY LIMESTONE** and **CALCAREOUS SANDSTONE.** Top of formation is marked by first occurrence of sandstone/dolomitic sandstone. Sequence grades downward from predominately dolomitic sandstone to calcareous sandstone with interbeds of fine to medium grained quartz sandstone. Sandy component is comprised of quartz grains cemented in carbonate matrix. Calcareous sequence is partly oolitic. Minor black shaley partings occur. Contact with the underlying Nepean Formation is transitional.

ORDOVICIAN / CAMBRIAN PERIOD

② NEPEAN FORMATION

Light grey, medium grained, faintly porous, medium to thickly bedded, laminar to cross bedded texture, silica cemented **QUARTZ SANDSTONE.** Upper contact is transitional from calcareous cemented sandstone of the March Formation to much harder silica cemented sandstone of the Nepean formation. Sequence contains widely spaced interbeds of grey shale and shaley siltstone in beds typically 0.1 m to 1.0 m thick and occasional 1.0 m to 5.0 m thick individual beds of subangular to subrounded quartz pebbles and cobbles set in a coarse grained quartz sandstone matrix. The basal contact is sharp with either the Covey Hill Formation or the Precambrian basement.

CAMBRIAN PERIOD

(2A) COVEY HILL FORMATION

Light yellowish brown, thickly bedded to massive, loosely packed, matrix supported, subrounded **QUARTZ PEBBLE COBBLE CONGLOMERATE.** The base of the sequence also includes locally derived gneissic Precambrian clasts. The sandstone matrix is comprised of moderately to highly weathered medium to coarse grained quartz-feldspar arkose with the feldspathic component completely kaolinized which distinguishes it from the fresh quartz matrix of overlying conglomerate beds within the Nepean Formation.

① PRECAMBRIAN BASEMENT

Quartz feldspar biotite **GNEISS** or dolomitic **MARBLE** typically weathered near the unconformable surface with the overlying Covey Hill Formation or the Nepean Formation where the Covey Hill Formation is absent.

BOREHOLE SYMBOLOGY

BH 99-1	PERCUSSION BOREHOLE WITH GEOPHYSICAL INTERPRETATION ONLY
DDH2001-1	HQ DIAMOND CORED BOREHOLE WITH DETAILED CORE LOG INTERPRETATION AND GEOPHYSICS

GENERALIZED LITHOLOGICAL LEGEND

▨	OVERBURDEN
⬜	ARGILLACEOUS TO SHALEY LIMESTONE
▬	BLACK SHALE BEDS
🟦	LIMESTONE
🟩	DOLOSTONE, DOLOMITIC, LIMESTONE
🟨	SANDSTONE, SILTSTONE, DOLOSTONE
🟧	PRECAMBRIAN BASEMENT UNDIFFERENTIATED
🟩	PRECAMBRIAN BASEMENT DOLOMITIC MARBLE

BOREHOLE GEOPHYSICAL RECORDS

NATURAL GAMMA (LOGGED BY GOLDER)

NATURAL GAMMA (LOGGED BY GOLDER)

APPARENT CONDUCTIVITY (LOGGED BY GOLDER)

NOTE(S)

1. BOREHOLES ARE VERTICALLY SCALED IN DEPTH BELOW GROUND SURFACE IN METRES. ALL DETAILED GEOLOGICAL CORE LOGGING AND
2. GEOPHYSICAL INTERPRETATION OF ROTARY PERCUSSION BOREHOLES SHOWN WAS CARRIED OUT BY GOLDER ASSOCIATES.
3. STRATIGRAPHIC CORRELATION IS BASED UPON AN ASSUMED HORIZONTAL CORRELATION LINE AT THE TOP OF THE ROCKCLIFFE FORMATION AND THE TOP OF THE FIRST DOLOSTONE MARKER BED OF THE GULL RIVER FORMATION.
4. GEOLOGICAL INTERPRETATION : R. BLAIR, K. MARENTETTE
5. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT No. 1660916/5000.

VERTICAL:
0 20 40
1:500 METRES
HORIZONTAL: NOT TO SCALE

CLIENT
R.W. TOMLINSON LIMITED

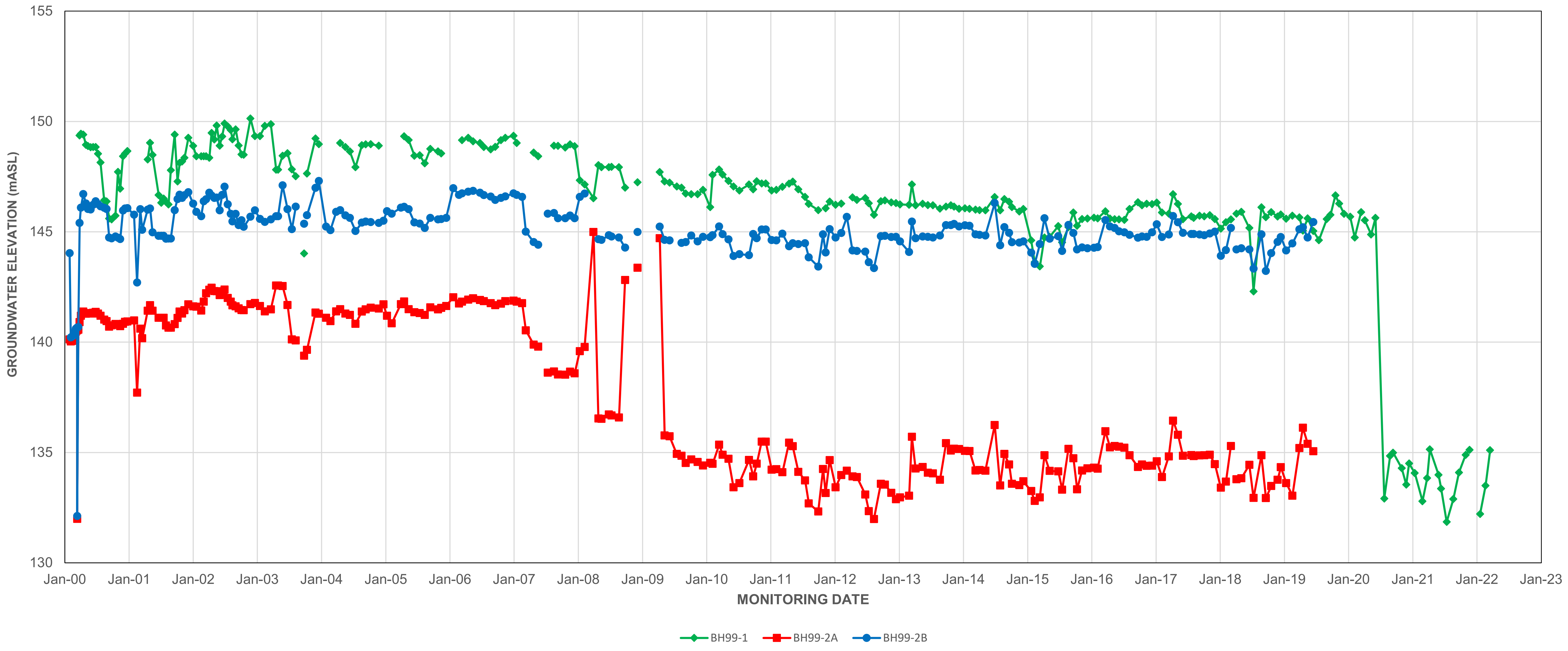
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
STRATIGRAPHIC CORRELATION
TOMLINSON PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023-01-24
PREPARED	JM
DESIGN	BH
REVIEW	BH
APPROVED	KAM

PROJECT No.	CONTROL	Rev.	FIGURE
19130670	0008	0	5



CLIENT
R.W. TOMLINSON LIMITED

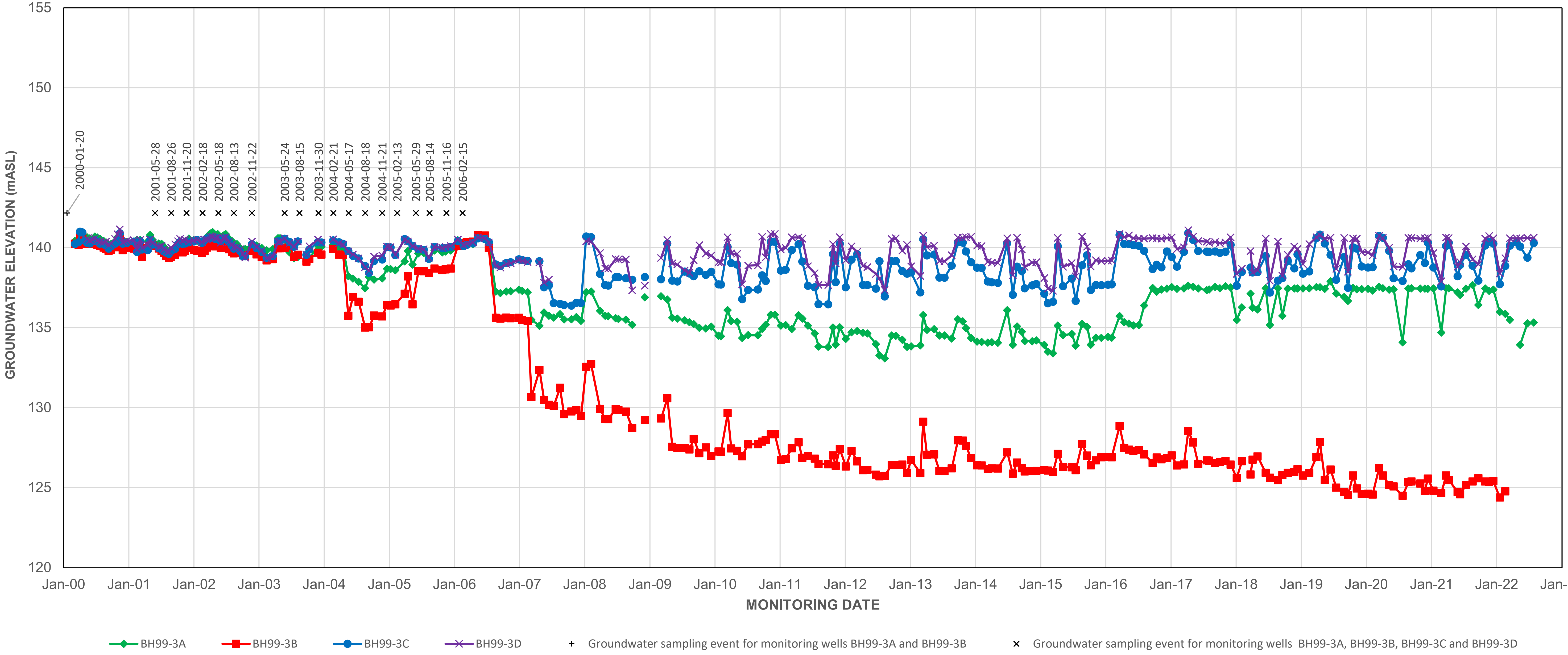
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH99-1, BH99-2A AND BH99-2B

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	6



CLIENT
R.W. TOMLINSON LIMITED

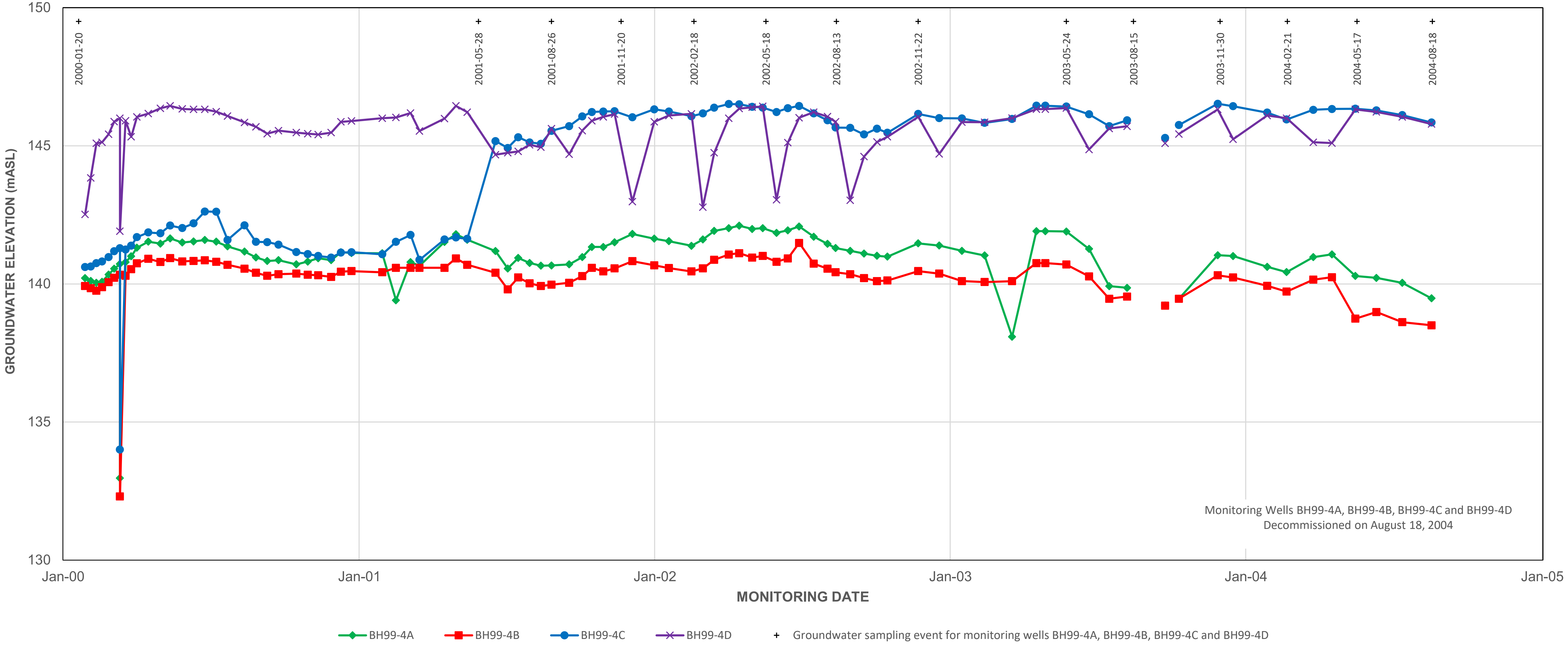
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

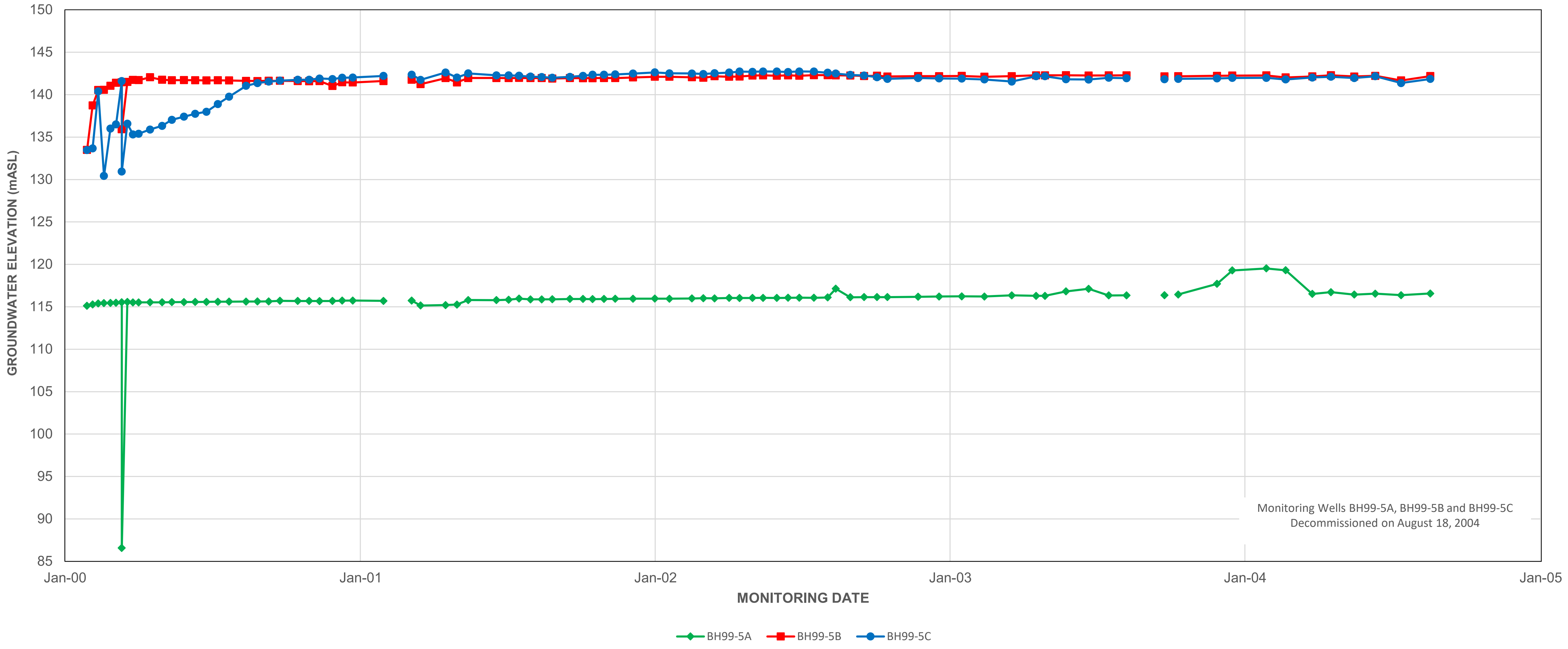
TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH99-3A, BH99-3B, BH99-3C AND BH99-3D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	7



Monitoring Wells BH99-4A, BH99-4B, BH99-4C and BH99-4D
Decommissioned on August 18, 2004

CLIENT R.W. TOMLINSON LIMITED			PROJECT PROPOSED STITTSVILLE 2 QUARRY LEVEL 1 AND LEVEL 2 WATER REPORT
CONSULTANT	YYYY-MM-DD	2022-10-03	TITLE GROUNDWATER ELEVATIONS AT MONITORING WELLS BH99-4A, BH99-4B, BH99-4C AND BH99-4D
	PREPARED	BH	
	DESIGN	BH	
	REVIEW	KAM	PROJECT No. 19130670 · PHASE · Rev. 0 · FIGURE 8
	APPROVED	KAM	



Monitoring Wells BH99-5A, BH99-5B and BH99-5C
Decommissioned on August 18, 2004

CLIENT
R.W. TOMLINSON LIMITED

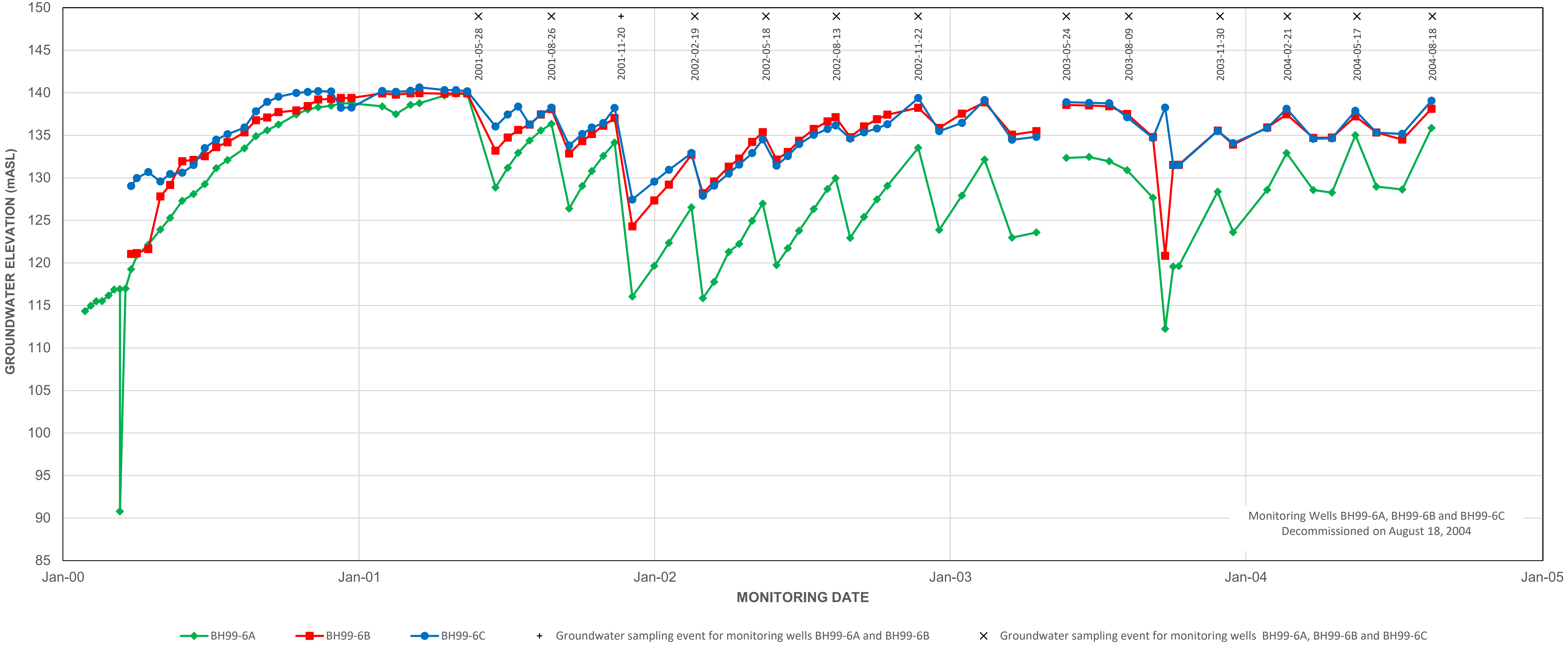
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH99-5A, BH99-5B AND BH99-5C

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	9



Monitoring Wells BH99-6A, BH99-6B and BH99-6C
Decommissioned on August 18, 2004

CLIENT
R.W. TOMLINSON LIMITED

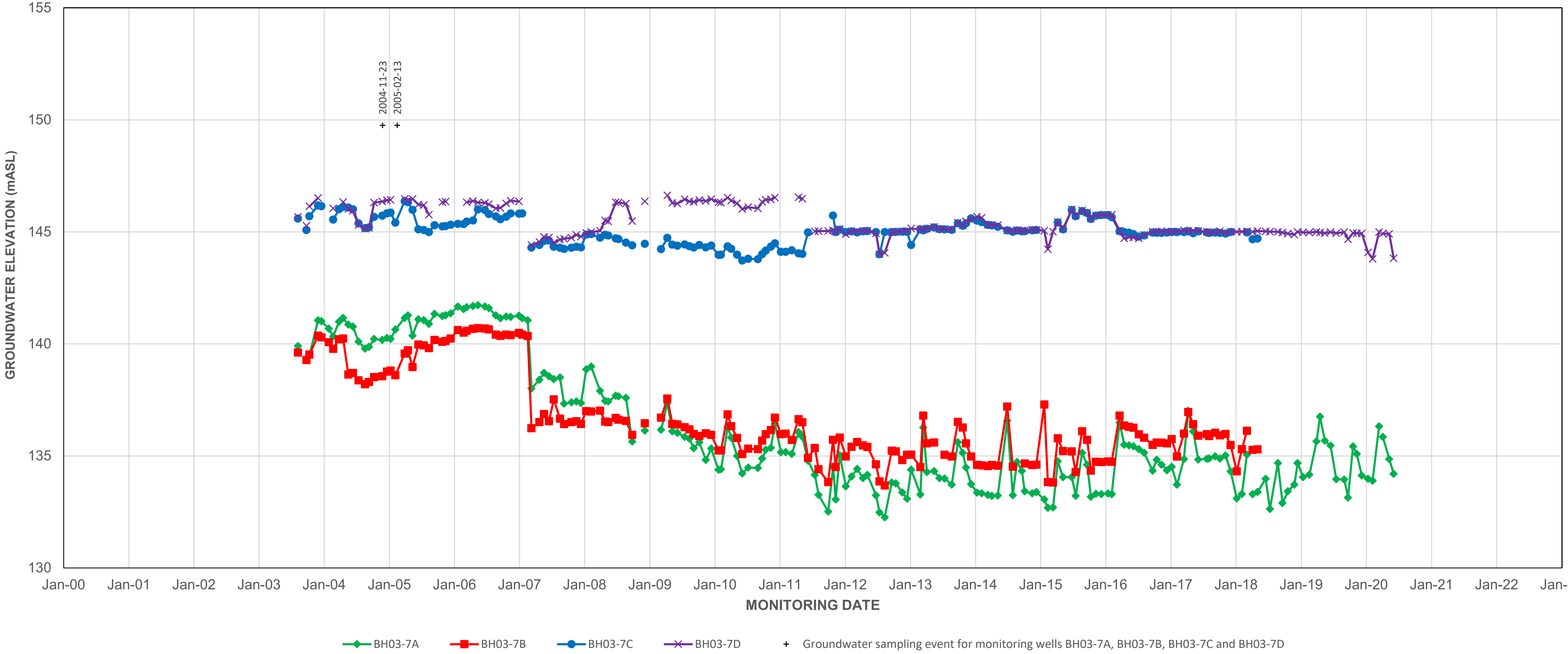
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH99-6A, BH99-6B AND BH99-6C

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	10



CLIENT

R.W. TOMLINSON LIMITED

PROJECT

PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

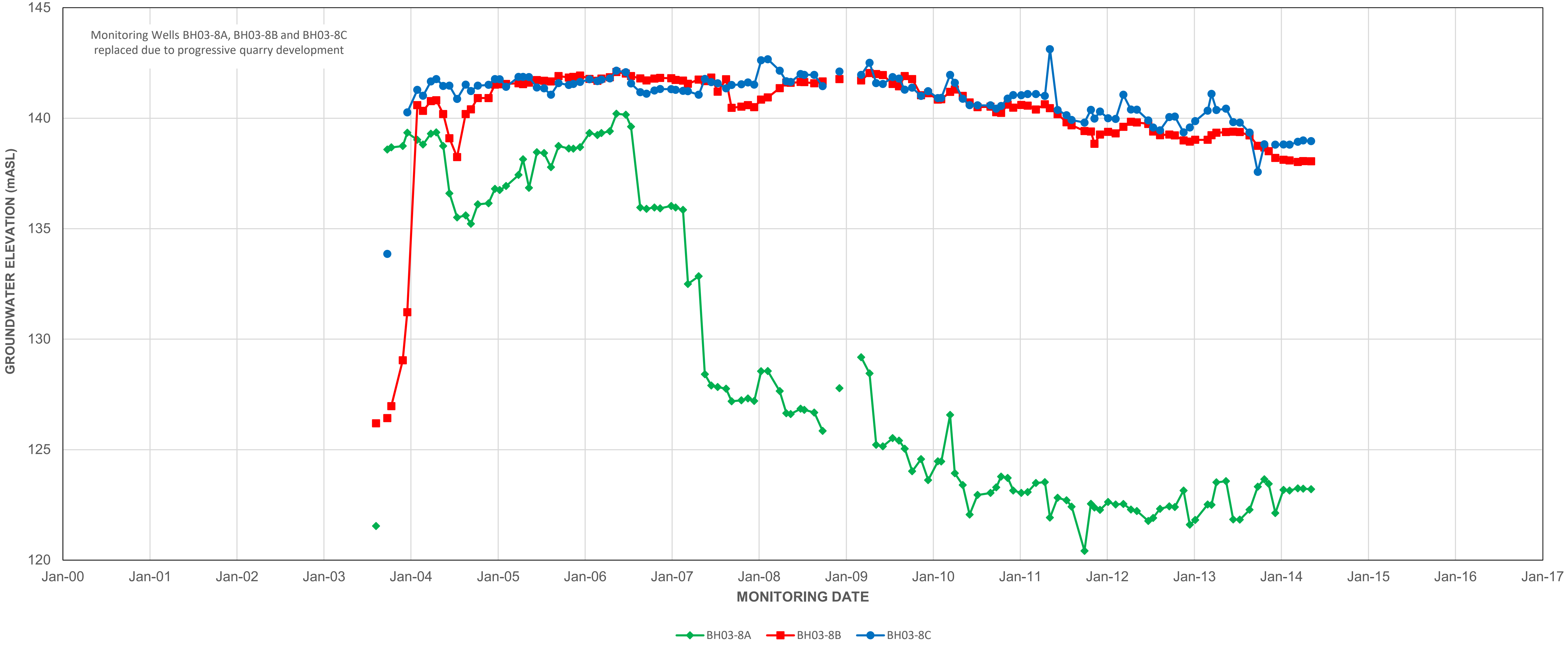
CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE

GROUNDWATER ELEVATIONS AT MONITORING WELLS BH03-7A, BH03-7B, BH03-7C AND BH03-7D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	11



CLIENT
R.W. TOMLINSON LIMITED

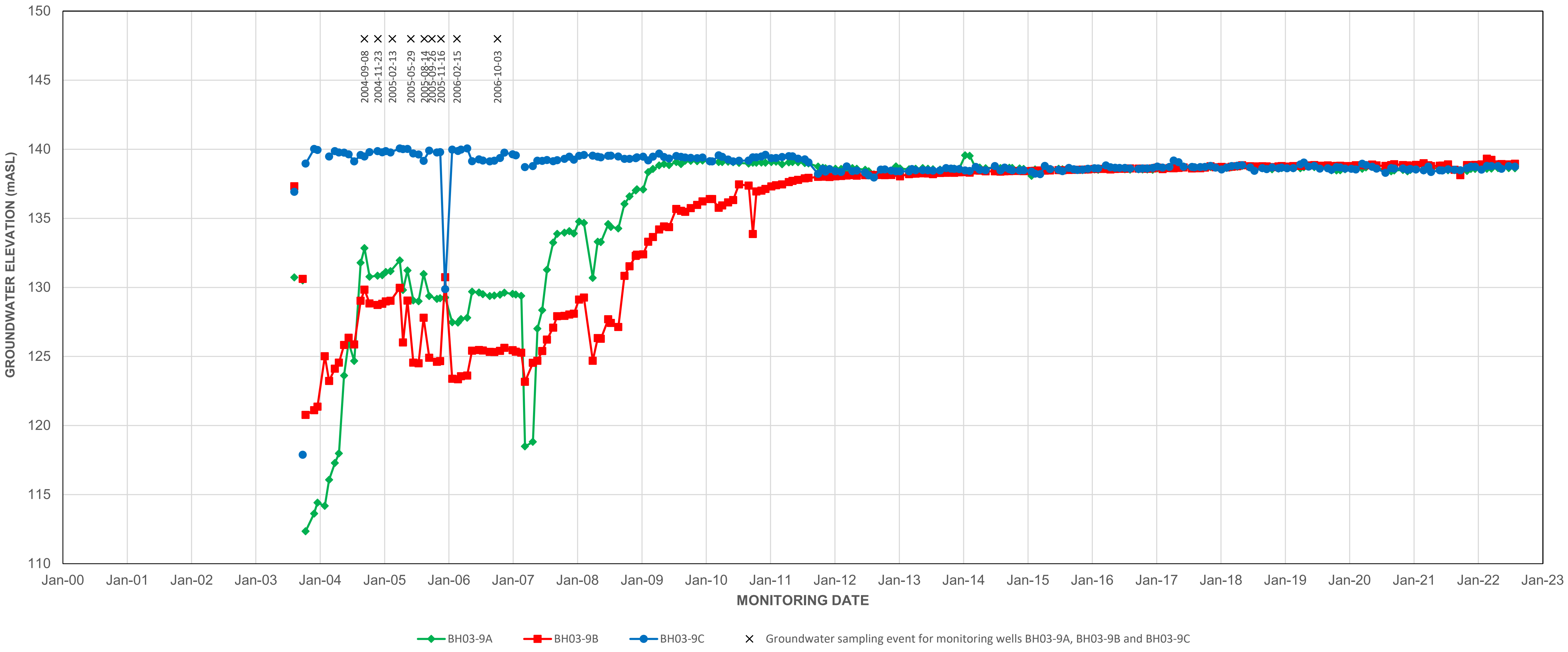
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH03-8A, BH03-8B AND BH03-8C

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	12



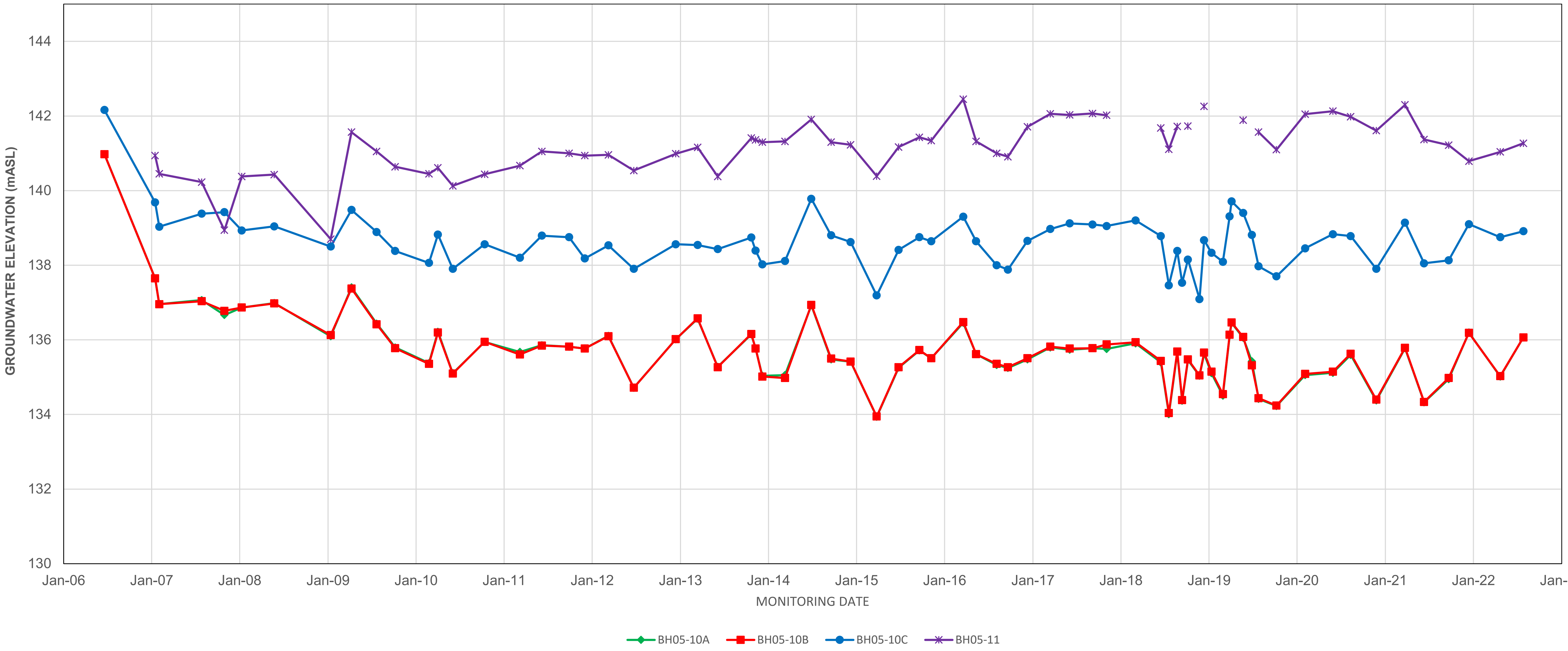
CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
YYYY-MM-DD 2022-10-03
PREPARED BH
DESIGN BH
REVIEW KAM
APPROVED KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH03-9A, BH03-9B AND BH03-9C

PROJECT No. 19130670
PHASE
Rev. 0
FIGURE 13



CLIENT
R.W. TOMLINSON LIMITED

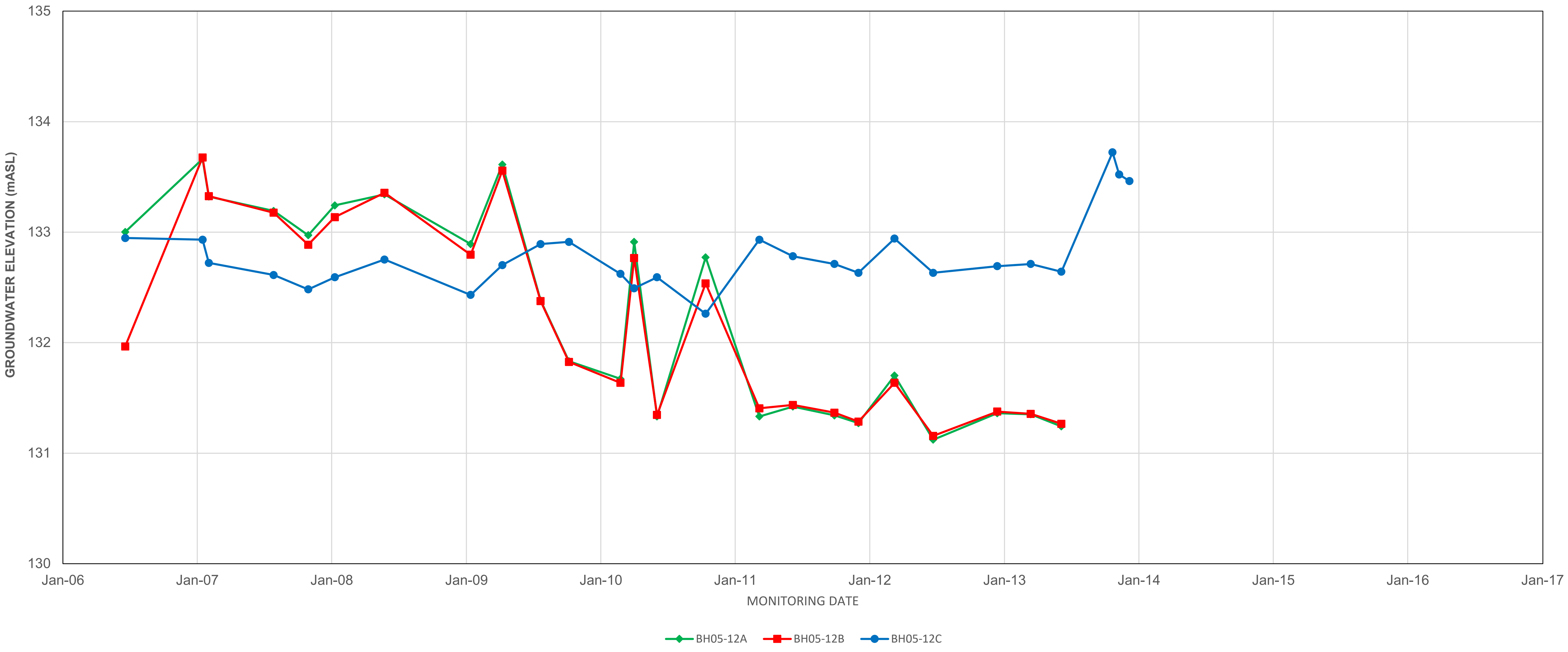
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD 2022-10-03
PREPARED BH
DESIGN BH
REVIEW KAM
APPROVED KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-10A, BH05-10B, BH05-10C AND BH05-11

PROJECT No. 19130670
PHASE
Rev. 0
FIGURE 14



CLIENT
R.W. TOMLINSON LIMITED

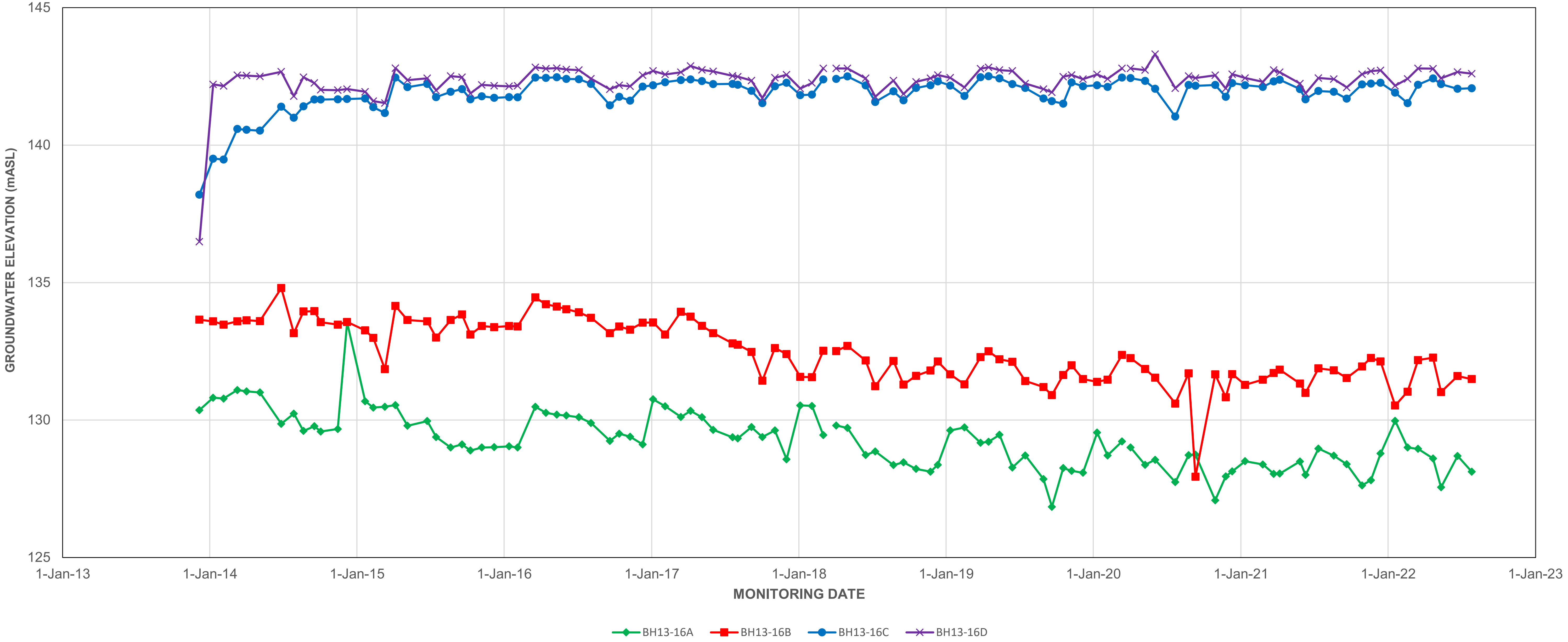
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-12A, BH05-12B AND BH05-12C

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	15



CLIENT
R.W. TOMLINSON LIMITED

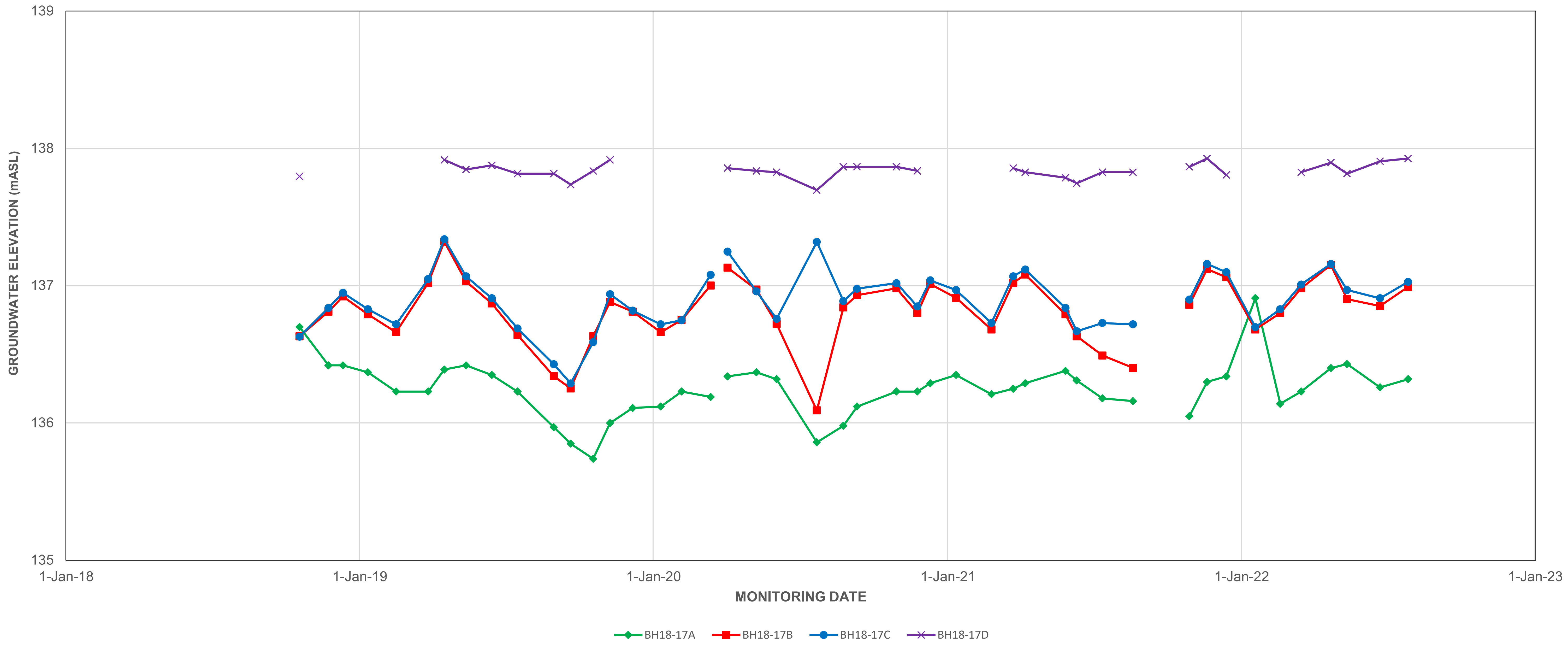
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH13-16A, BH13-16B, BH13-16C AND BH13-16D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	16



CLIENT

R.W. TOMLINSON LIMITED

PROJECT

PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

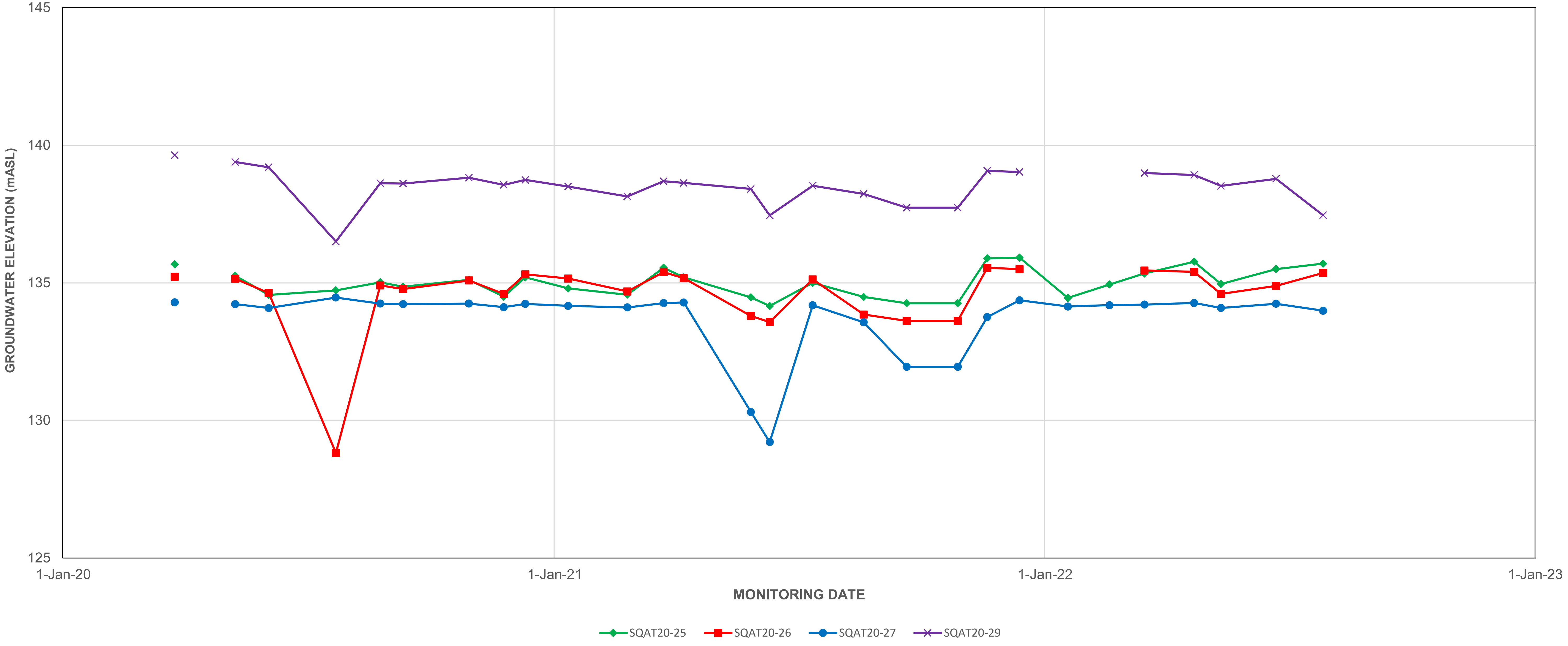
CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE

GROUNDWATER ELEVATIONS AT MONITORING WELLS BH18-17A, BH18-17B, BH18-17C AND BH18-17D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	17



CLIENT
R.W. TOMLINSON LIMITED

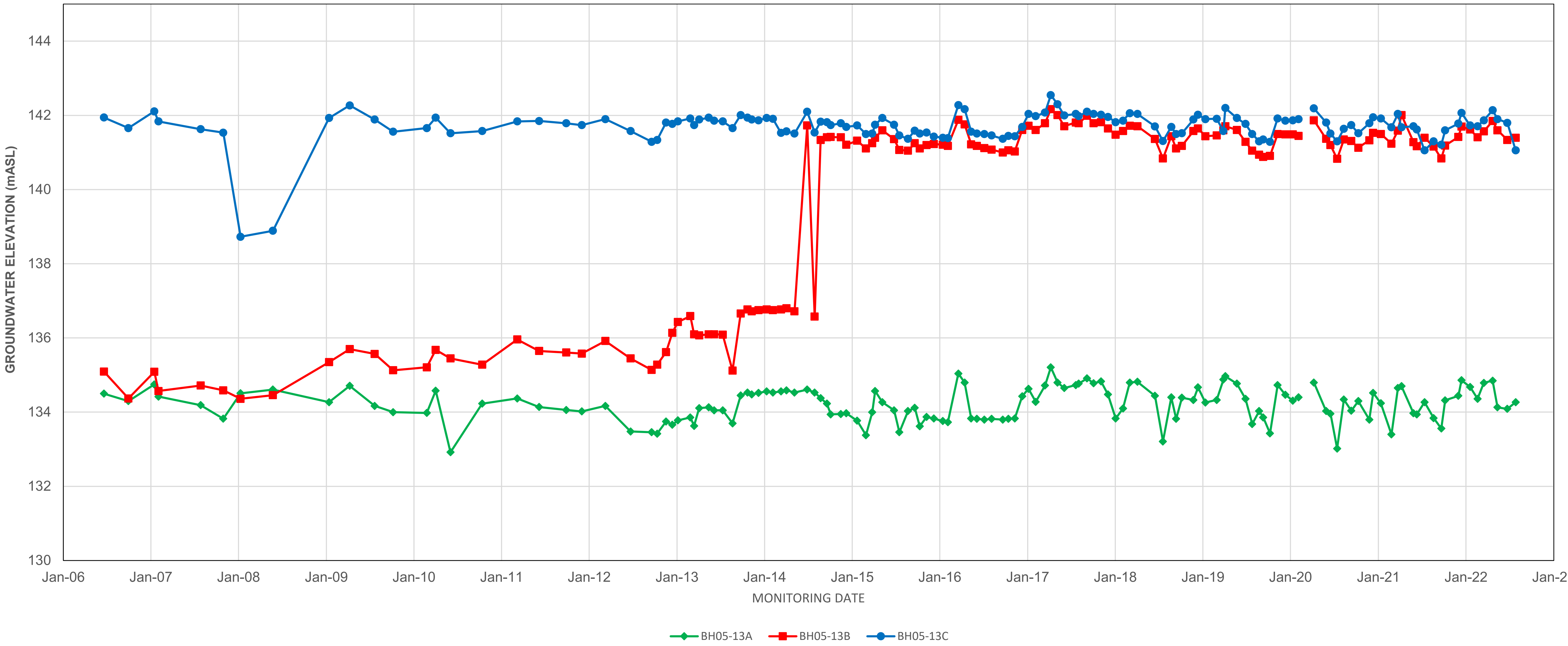
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

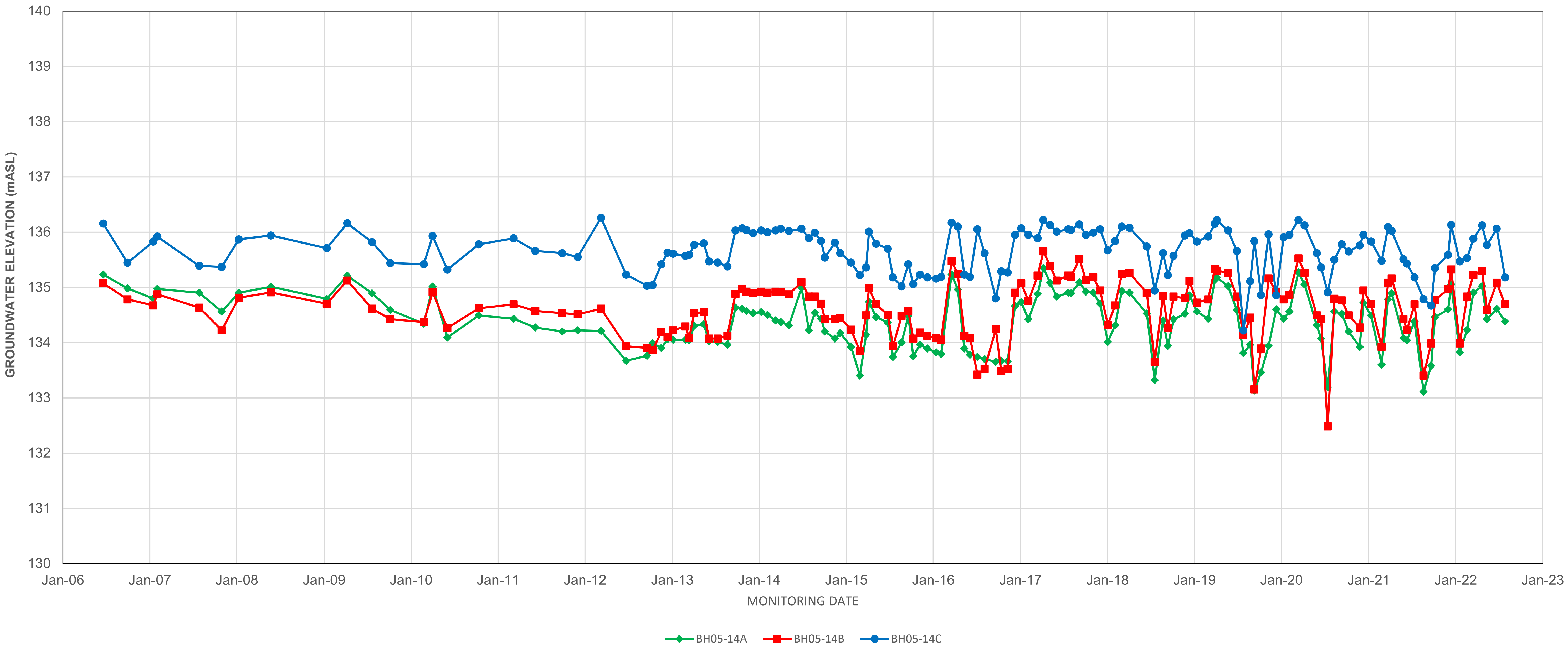
YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS SQAT20-25, SQAT20-26, SQAT20-27 AND SQAT20-29

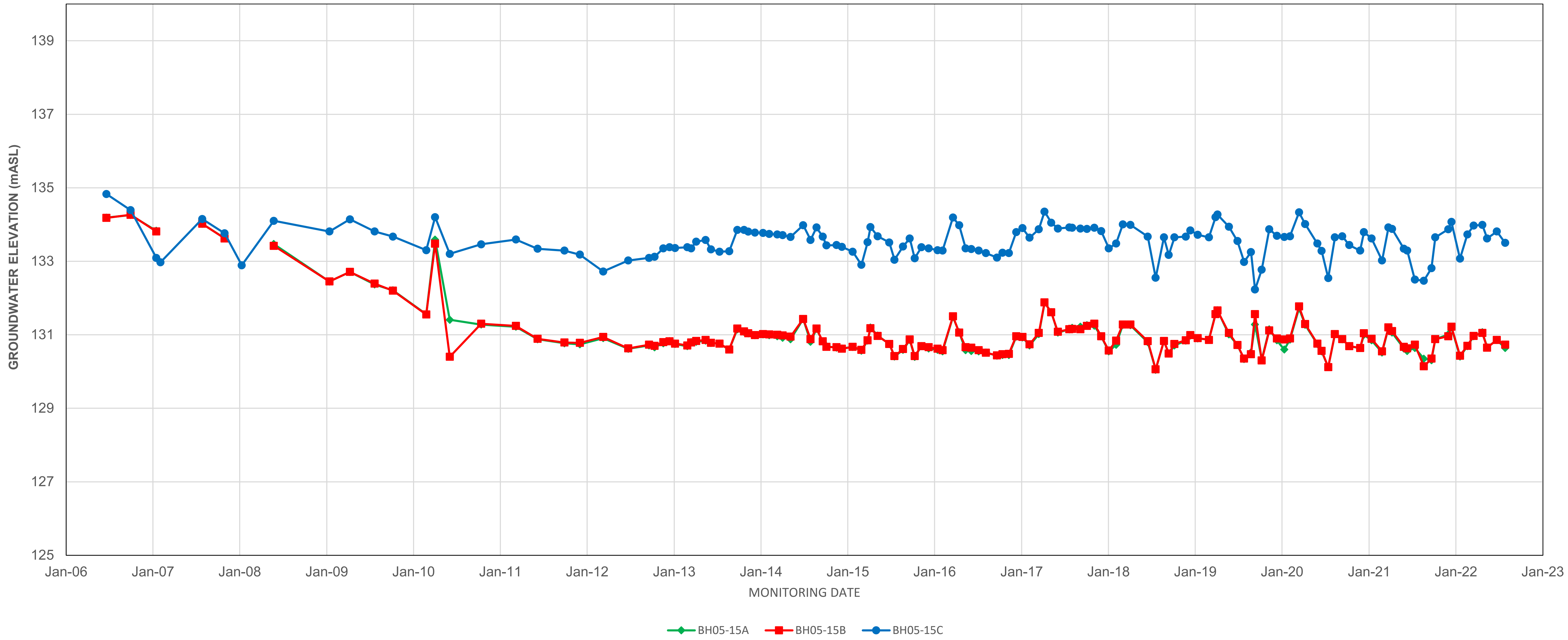
PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	18



CLIENT	R.W. TOMLINSON LIMITED
PROJECT	PROPOSED STITTSVILLE 2 QUARRY LEVEL 1 AND LEVEL 2 WATER REPORT
CONSULTANT	wsp
YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM
TITLE	GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-13A, BH05-13B AND BH05-13C
PROJECT No.	19130670
PHASE	
Rev.	0
FIGURE	19



CLIENT R.W. TOMLINSON LIMITED		PROJECT PROPOSED STITTSVILLE 2 QUARRY LEVEL 1 AND LEVEL 2 WATER REPORT	
CONSULTANT	YYYY-MM-DD	2022-10-03	TITLE GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-14A, BH05-14B AND BH05-14C
	PREPARED	BH	
	DESIGN	BH	
	REVIEW	KAM	PROJECT No. 19130670 PHASE Rev. 0 FIGURE 20
	APPROVED	KAM	



CLIENT
R.W. TOMLINSON LIMITED

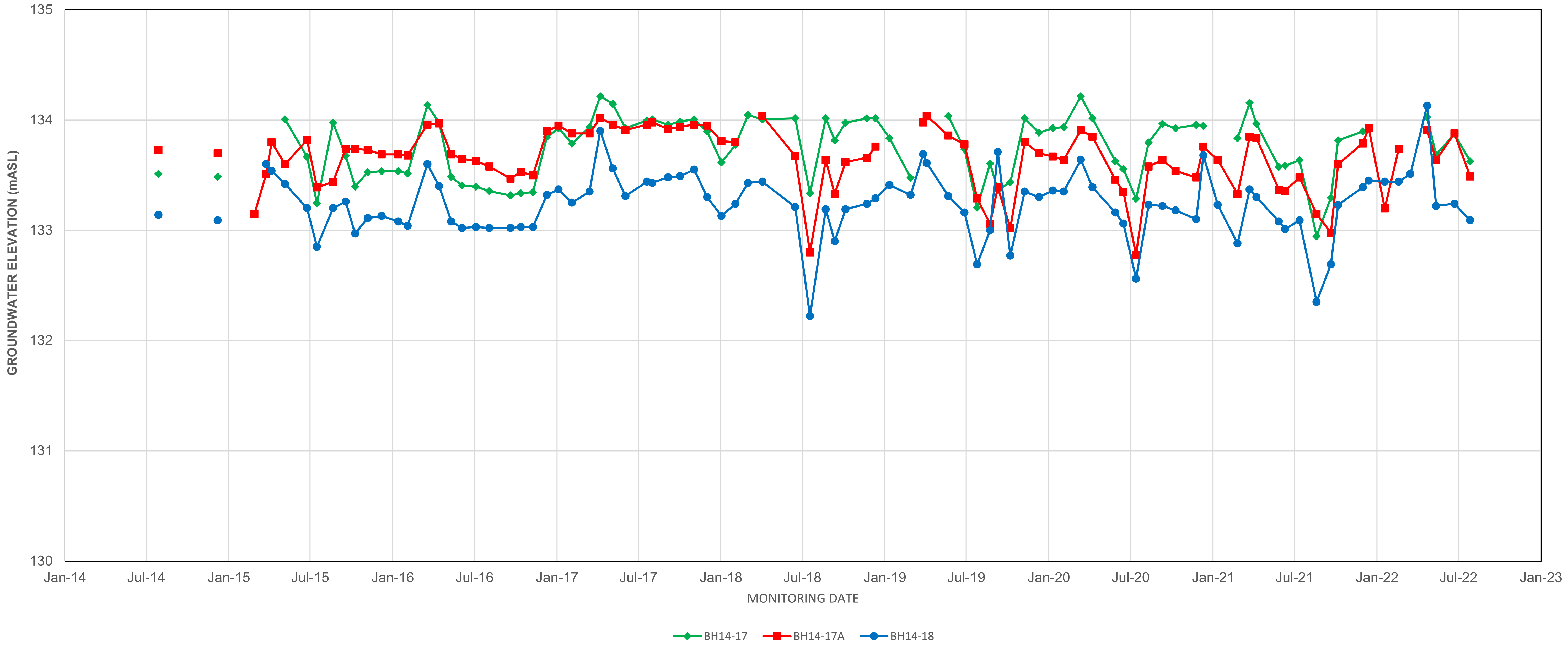
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-15A, BH05-15B AND BH05-15C

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	21



CLIENT
R.W. TOMLINSON LIMITED

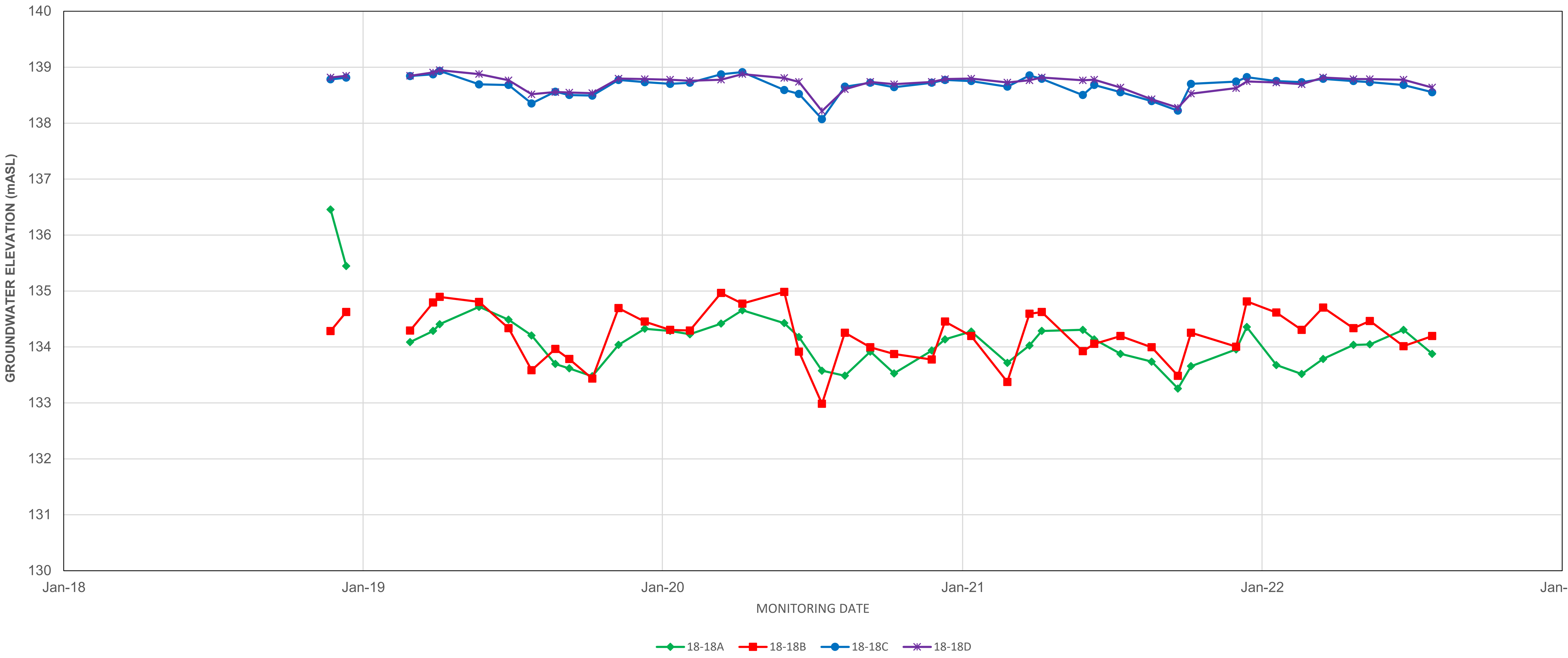
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH14-17, BH14-17A AND BH14-18

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	22



CLIENT
R.W. TOMLINSON LIMITED

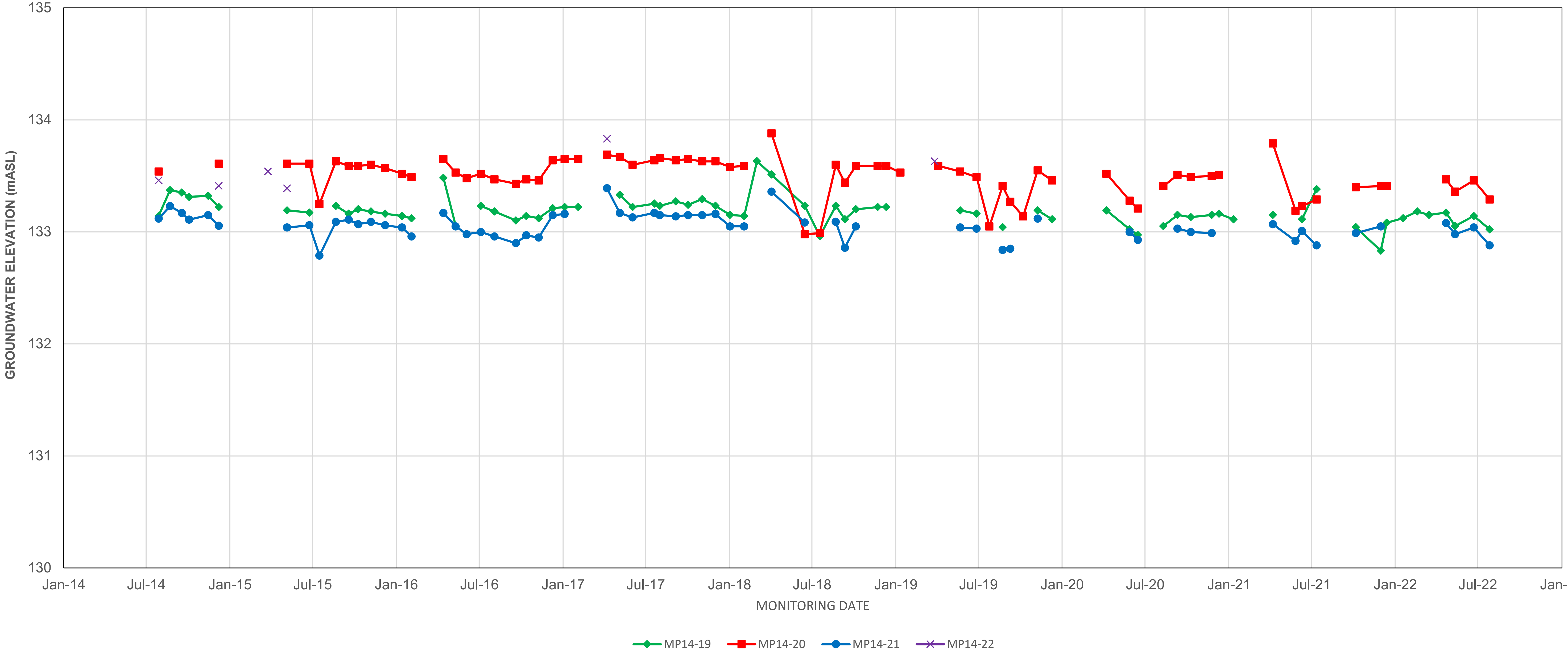
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH18-18A, BH18-18B, BH18-18C AND BH18-18D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	23



CLIENT
R.W. TOMLINSON LIMITED

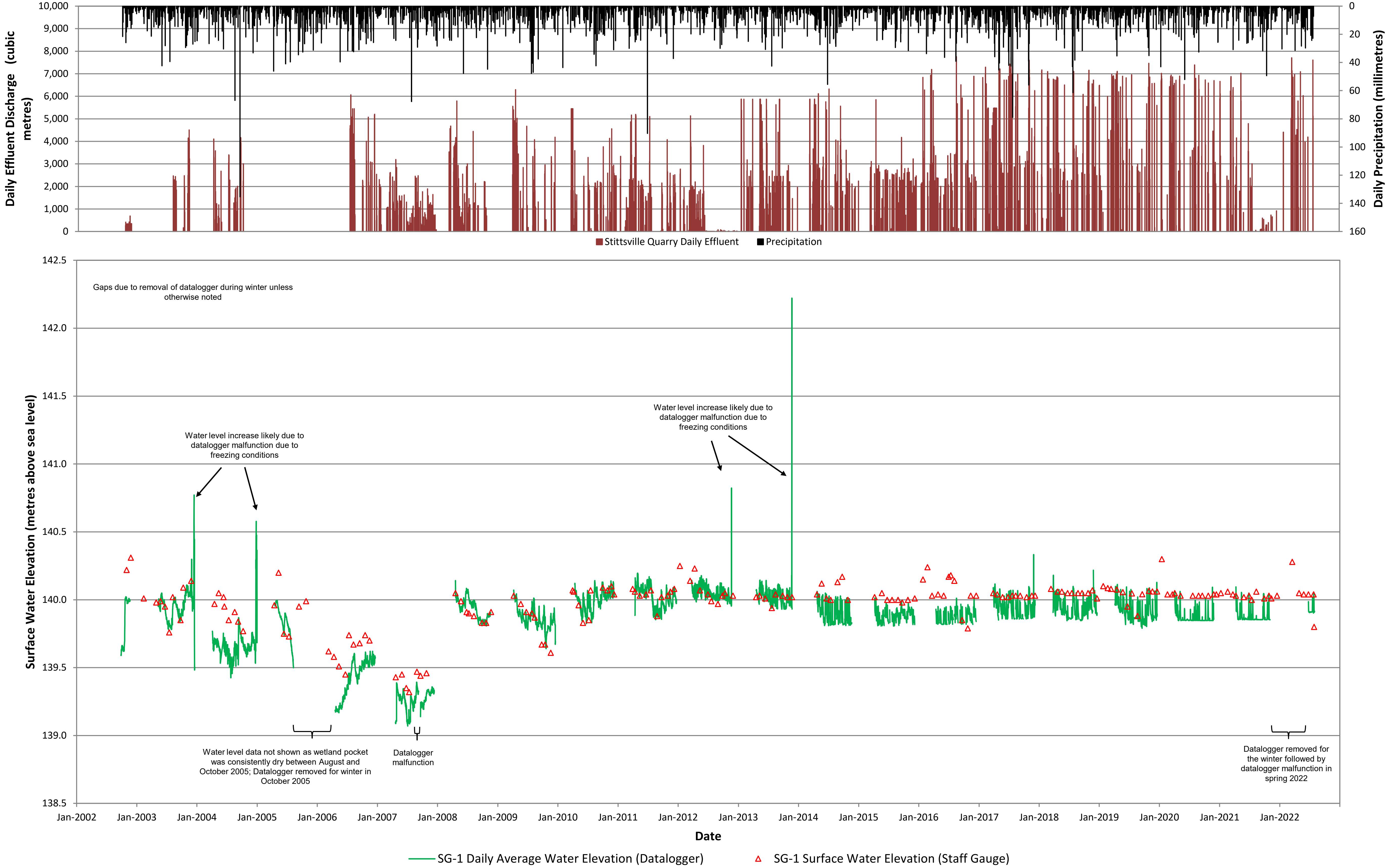
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS MP14-19, MP14-20,
MP14-21 AND MP14-22

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	24



Gaps due to removal of datalogger during winter unless otherwise noted

Water level increase likely due to datalogger malfunction due to freezing conditions

Water level increase likely due to datalogger malfunction due to freezing conditions

Water level data not shown as wetland pocket was consistently dry between August and October 2005; Datalogger removed for winter in October 2005

Datalogger malfunction

Datalogger removed for the winter followed by datalogger malfunction in spring 2022

CLIENT
R.W. TOMLINSON LIMITED

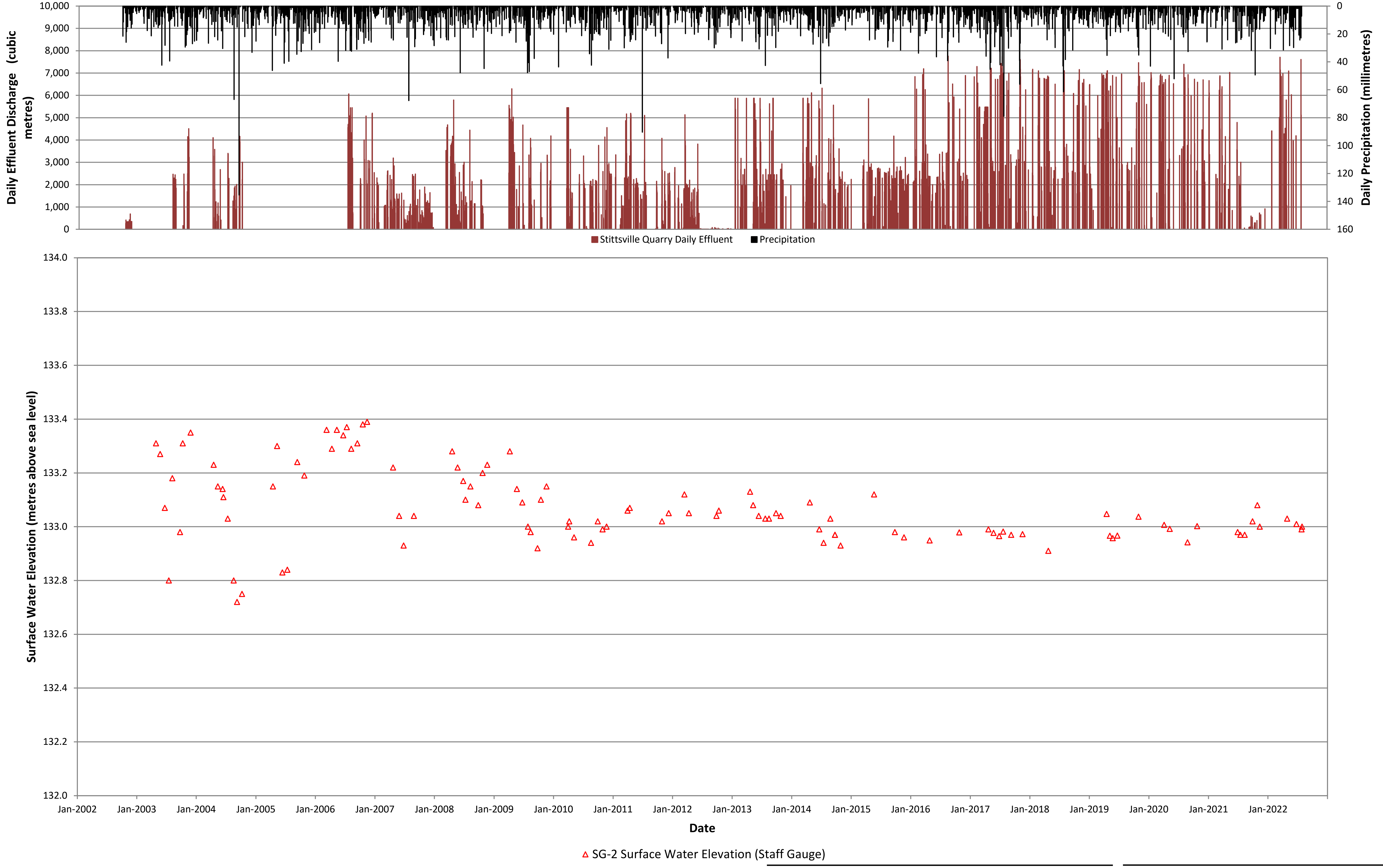
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
SURFACE WATER ELEVATION DATA AT SG-1, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2002 - 2022

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	25



CLIENT
R.W. TOMLINSON LIMITED

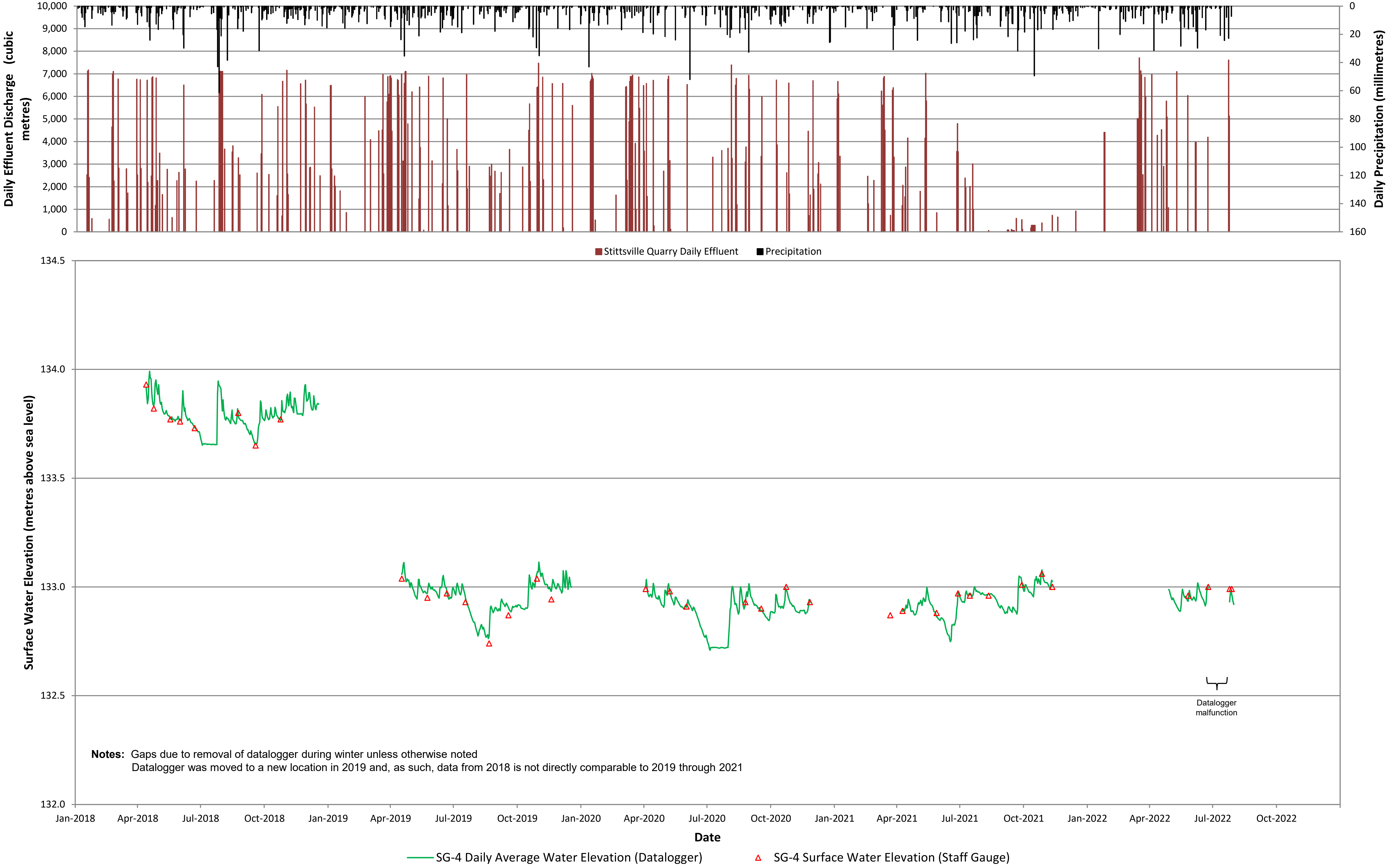
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
SURFACE WATER ELEVATION DATA AT SG-2, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2002 - 2022

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	26



Notes: Gaps due to removal of datalogger during winter unless otherwise noted
Datalogger was moved to a new location in 2019 and, as such, data from 2018 is not directly comparable to 2019 through 2021

CLIENT
R.W. TOMLINSON LIMITED

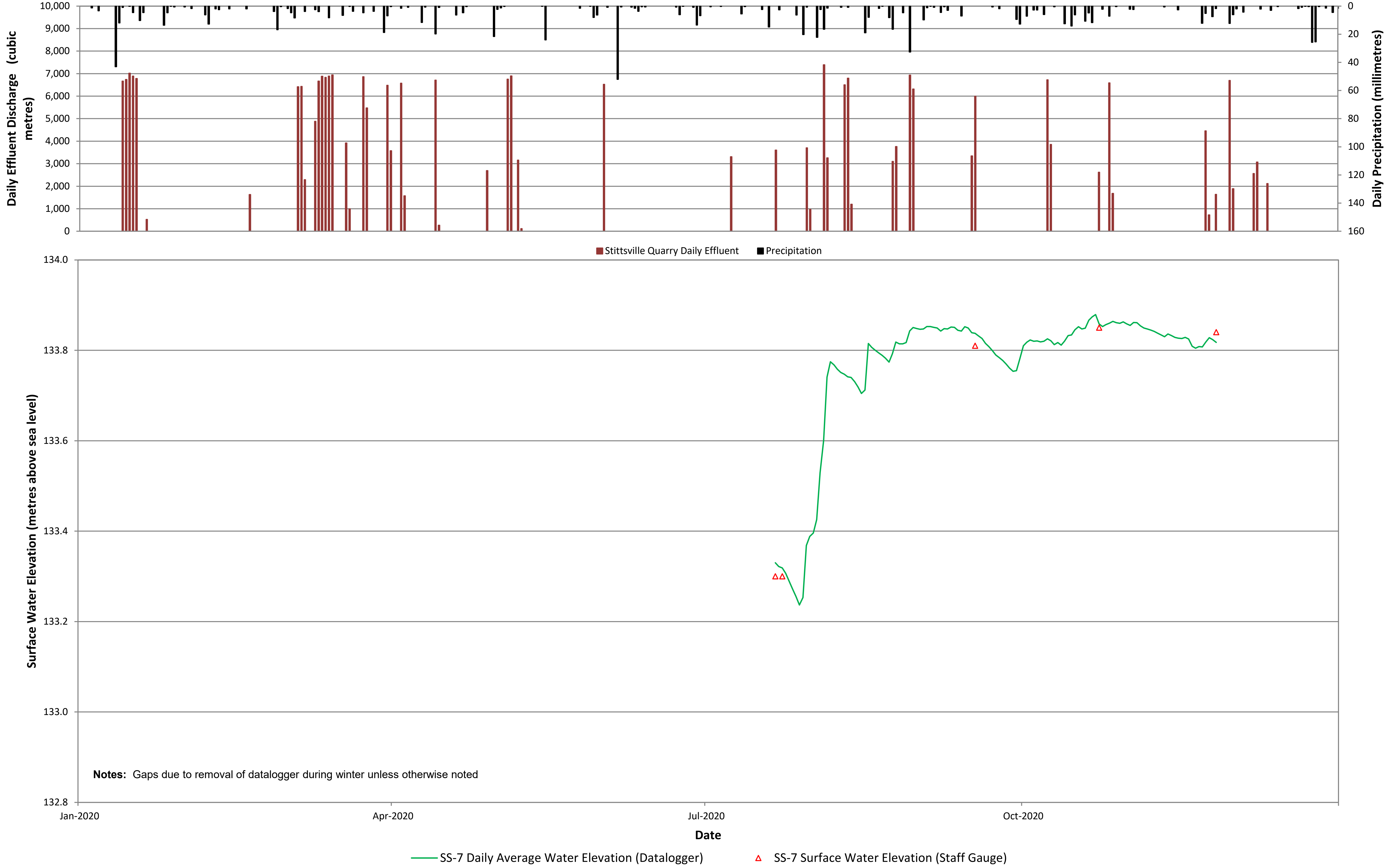
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
SURFACE WATER ELEVATION DATA AT SG-4, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2018 - 2022

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	27



Notes: Gaps due to removal of datalogger during winter unless otherwise noted

CLIENT
R.W. TOMLINSON LIMITED

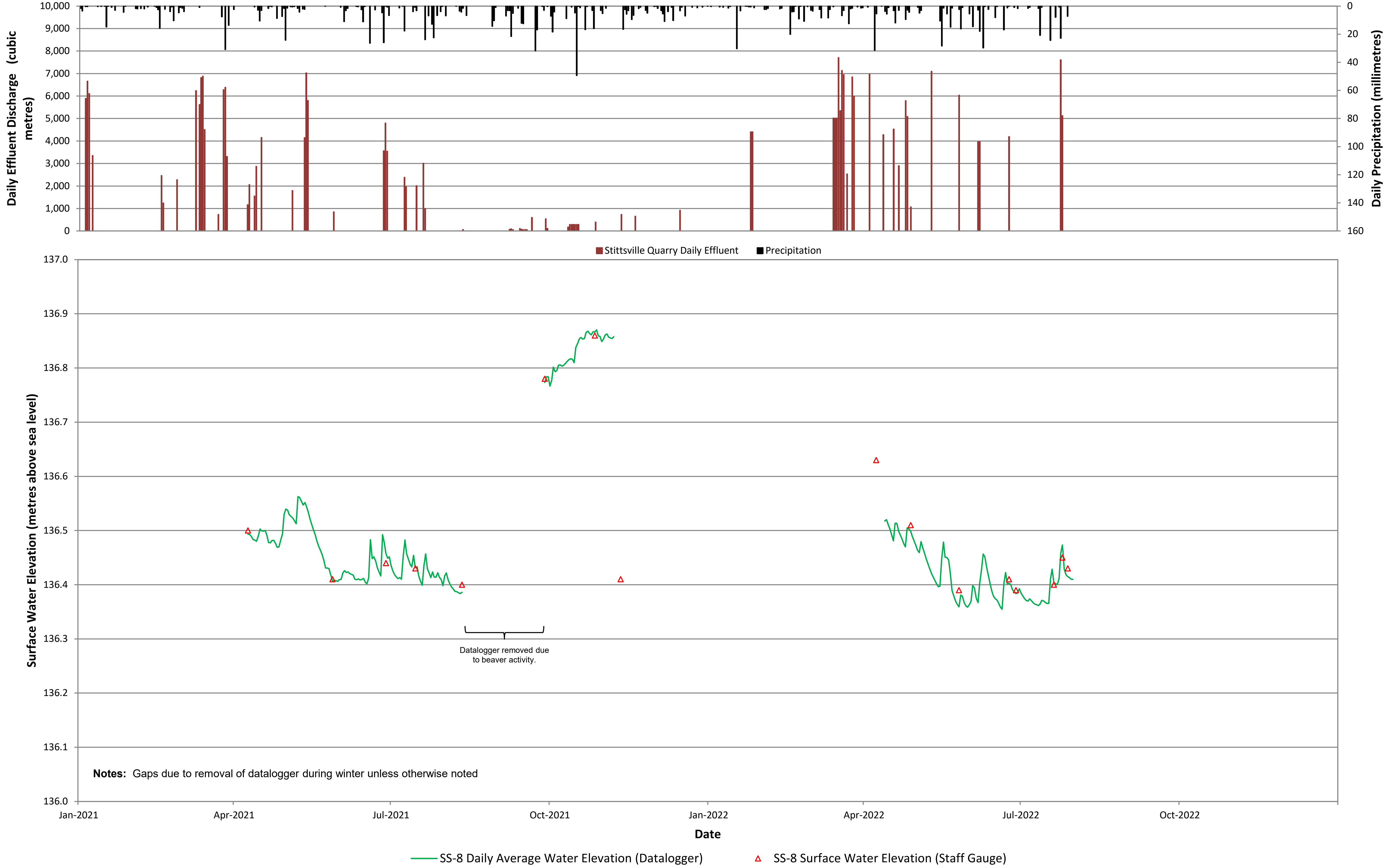
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
SURFACE WATER ELEVATION DATA AT SS-7, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2020 - 2021

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	28



Notes: Gaps due to removal of datalogger during winter unless otherwise noted

CLIENT
R.W. TOMLINSON LIMITED

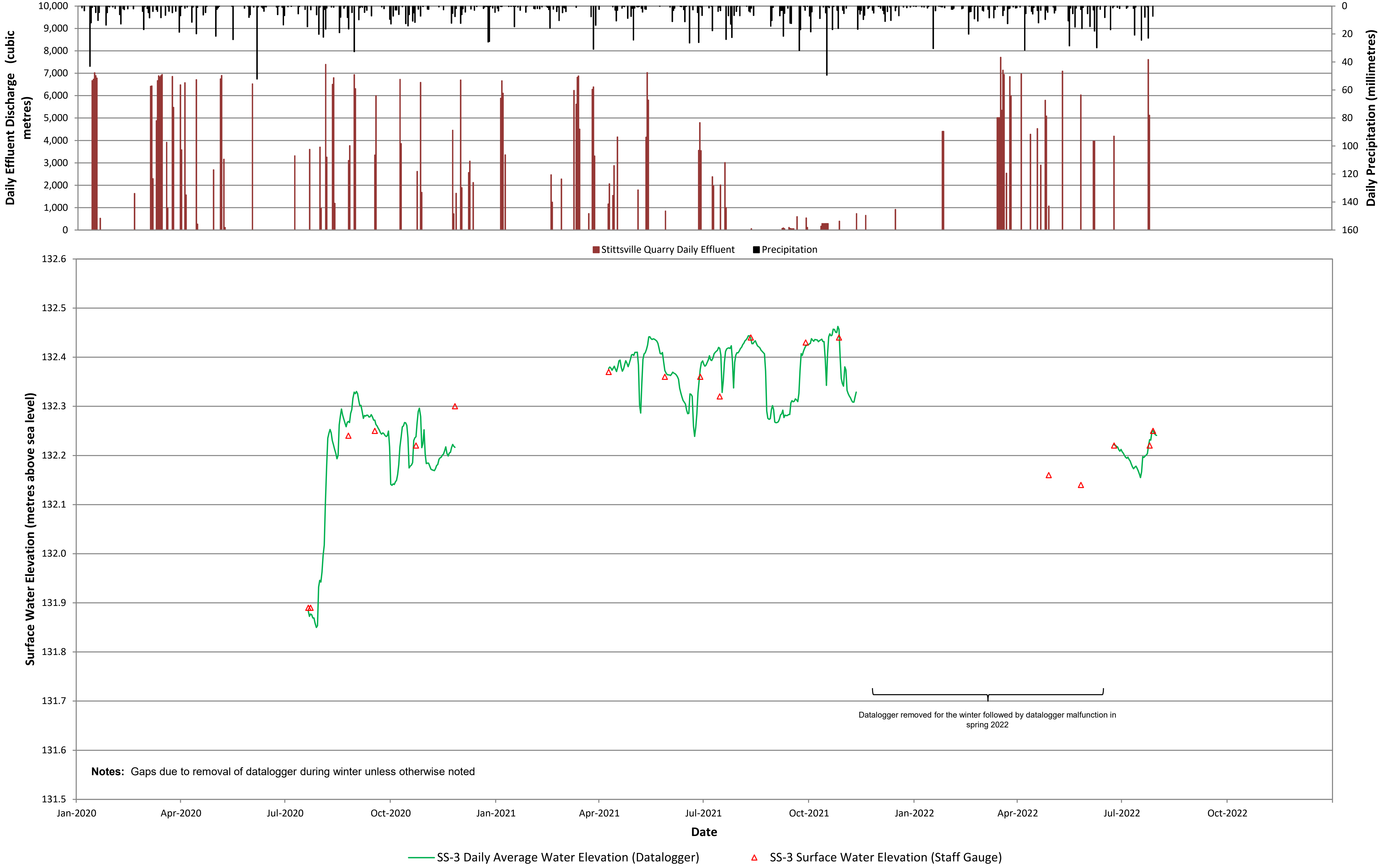
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
SURFACE WATER ELEVATION DATA AT SS-8, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2021 - 2022

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	29



CLIENT
R.W. TOMLINSON LIMITED

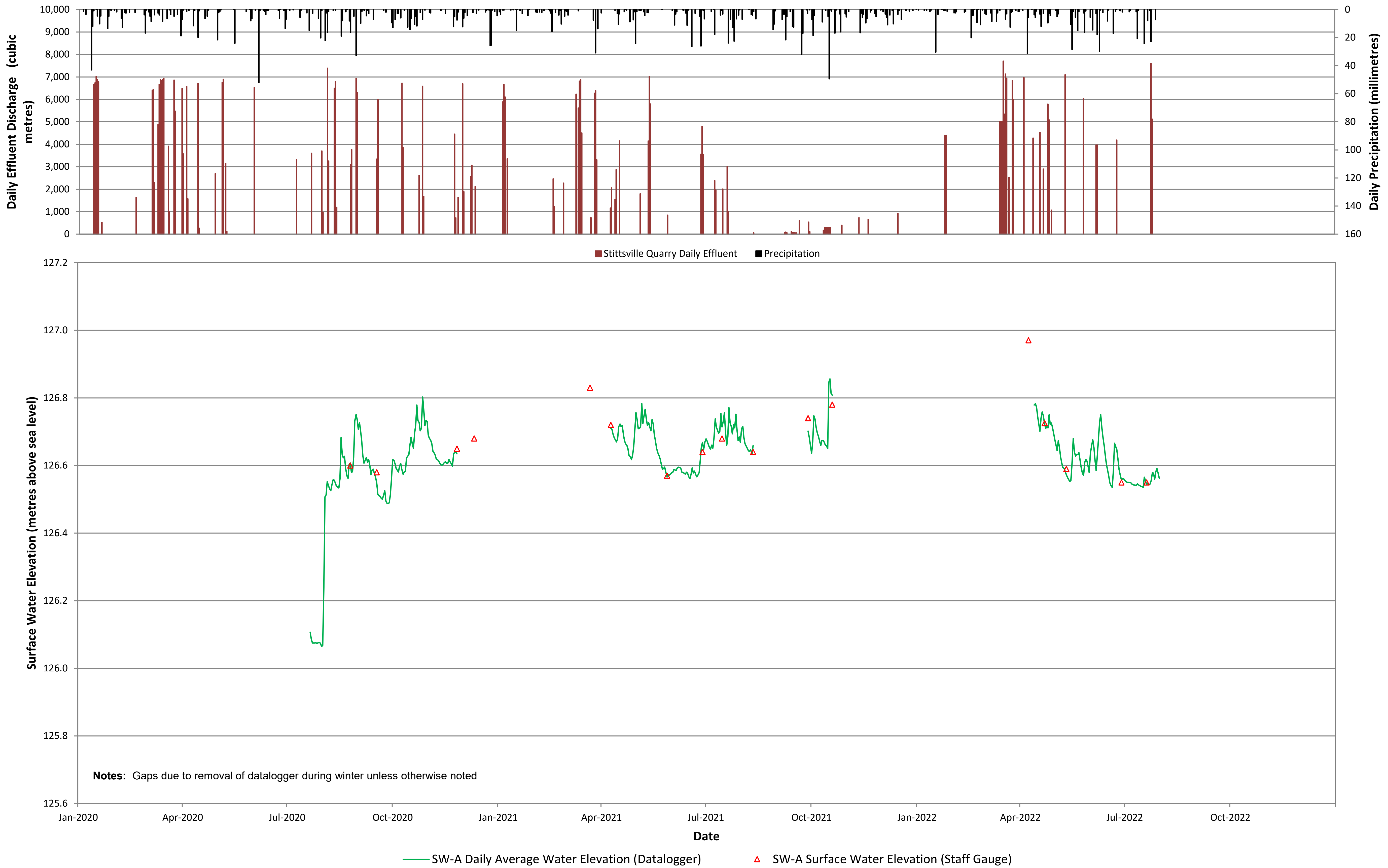
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-03
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
SURFACE WATER ELEVATION DATA AT SS-3, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2020 - 2022

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	30



Notes: Gaps due to removal of datalogger during winter unless otherwise noted

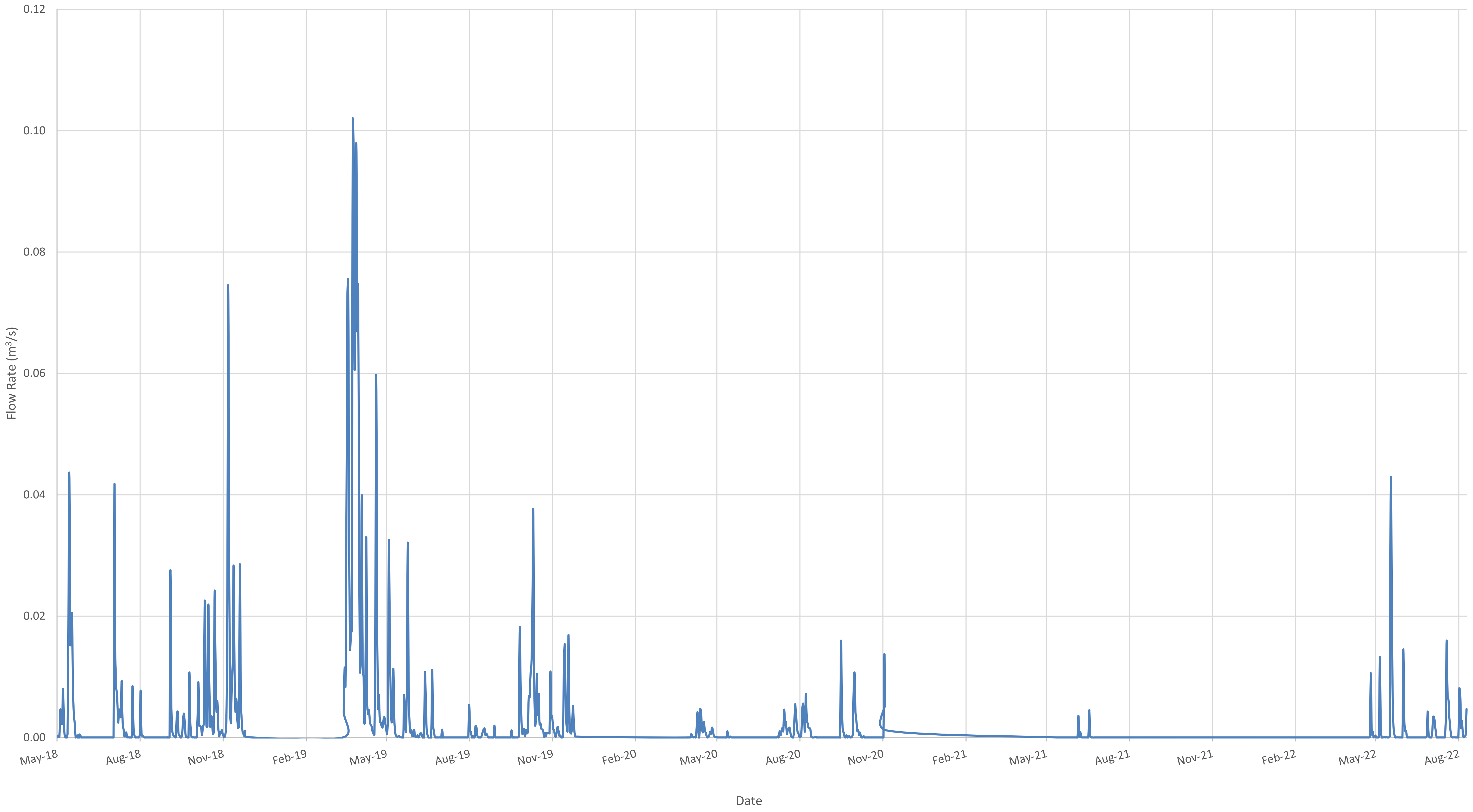
CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
YYYY-MM-DD 2022-10-03
PREPARED BH
DESIGN BH
REVIEW KAM
APPROVED KAM

TITLE
SURFACE WATER ELEVATION DATA AT SW-A, DAILY PRECIPITATION AND DAILY EFFLUENT PUMPING RECORDS, 2020 - 2022

PROJECT No. 19130670
PHASE
Rev. 0
FIGURE 31



CLIENT
R.W. TOMLINSON LIMITED

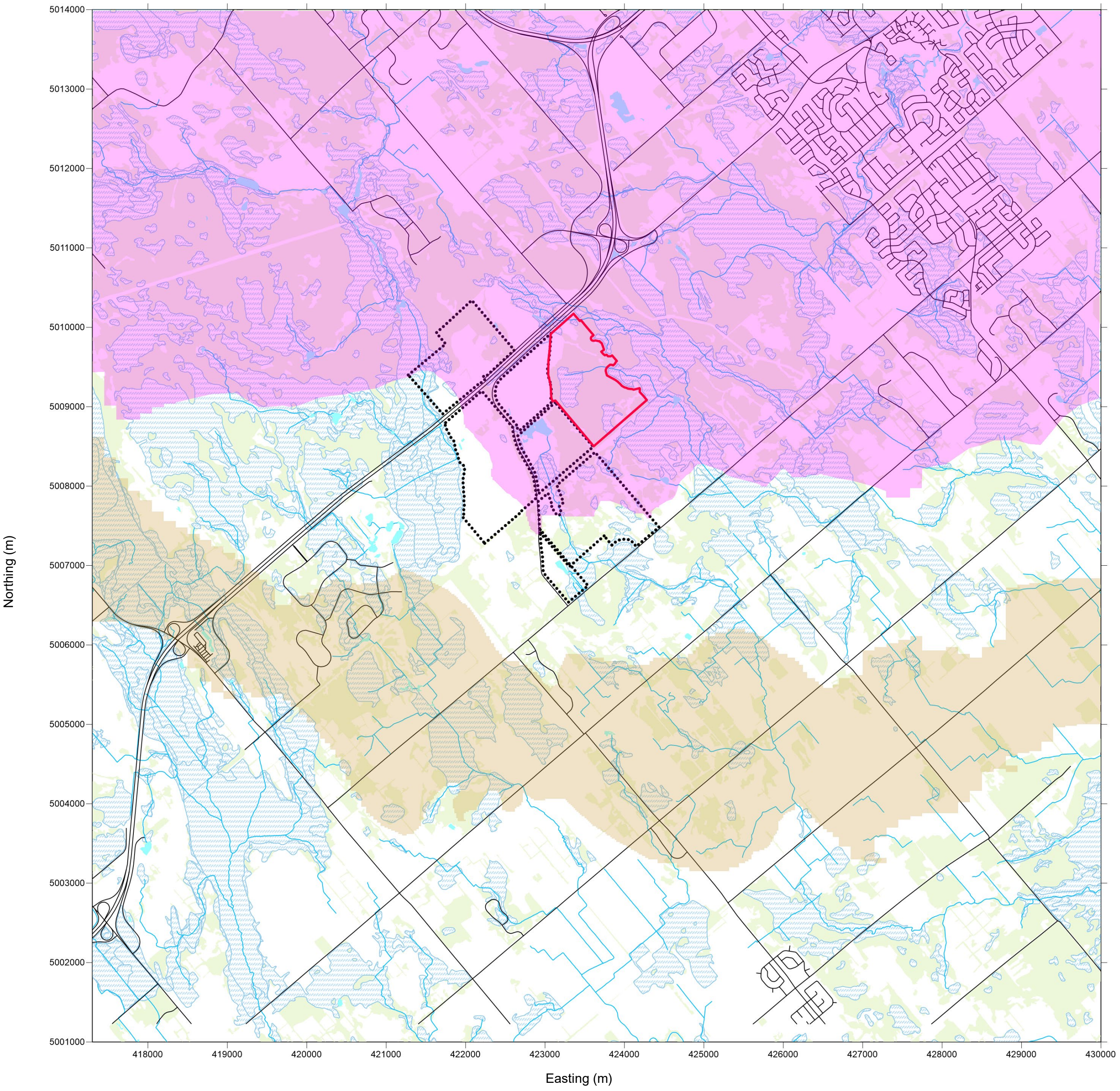
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-10-25
PREPARED	MR
DESIGN	MR
REVIEW	BH
APPROVED	KAM

TITLE
FLOW MEASURED AT THE MACE AGRIFLO XCI FLOWMETER ADJACENT TO
STITTSVILLE QUARRY (2018 - 2022)

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	32



LEGEND

- 🟩 WOODED AREA
- ▨ WETLAND AREA
- 🟦 WATERBODY
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ···· LICENSED QUARRY BOUNDARIES
- 🟪 AREA UNDERLAIN BY TRANSMISSIVE ZONE (Contact between Bobcaygeon and Gull River)
- 🟫 AREA OF HIGHER TRANSMISSIVITY ROCKCLIFFE FORMATION

CLIENT
R.W. TOMLINSON LIMITED

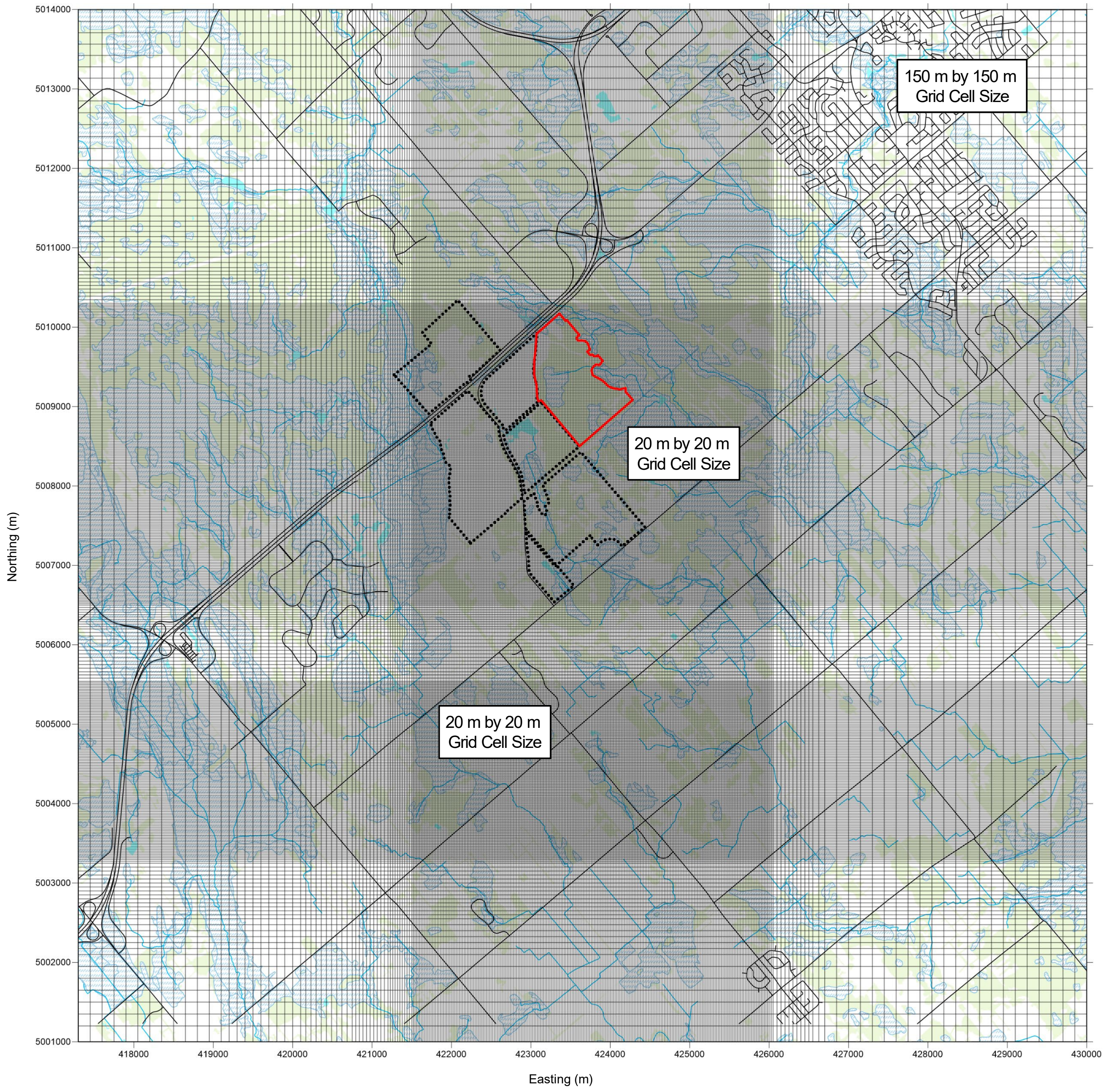
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-07-28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
TRANSMISSIVE ZONE AND HIGHER TRANSMISSIVITY ROCKCLIFFE ZONE

PROJECT No.	PHASE	Rev.	FIGUAE
19130670		0	33



LEGEND

- ▨ WETLAND AREA
- 🟦 WATERBODY
- — WATERCOURSE
- — ROADS
- 🟥 PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ┅ LICENSED QUARRY BOUNDARIES

CLIENT
R.W. TOMLINSON LIMITED

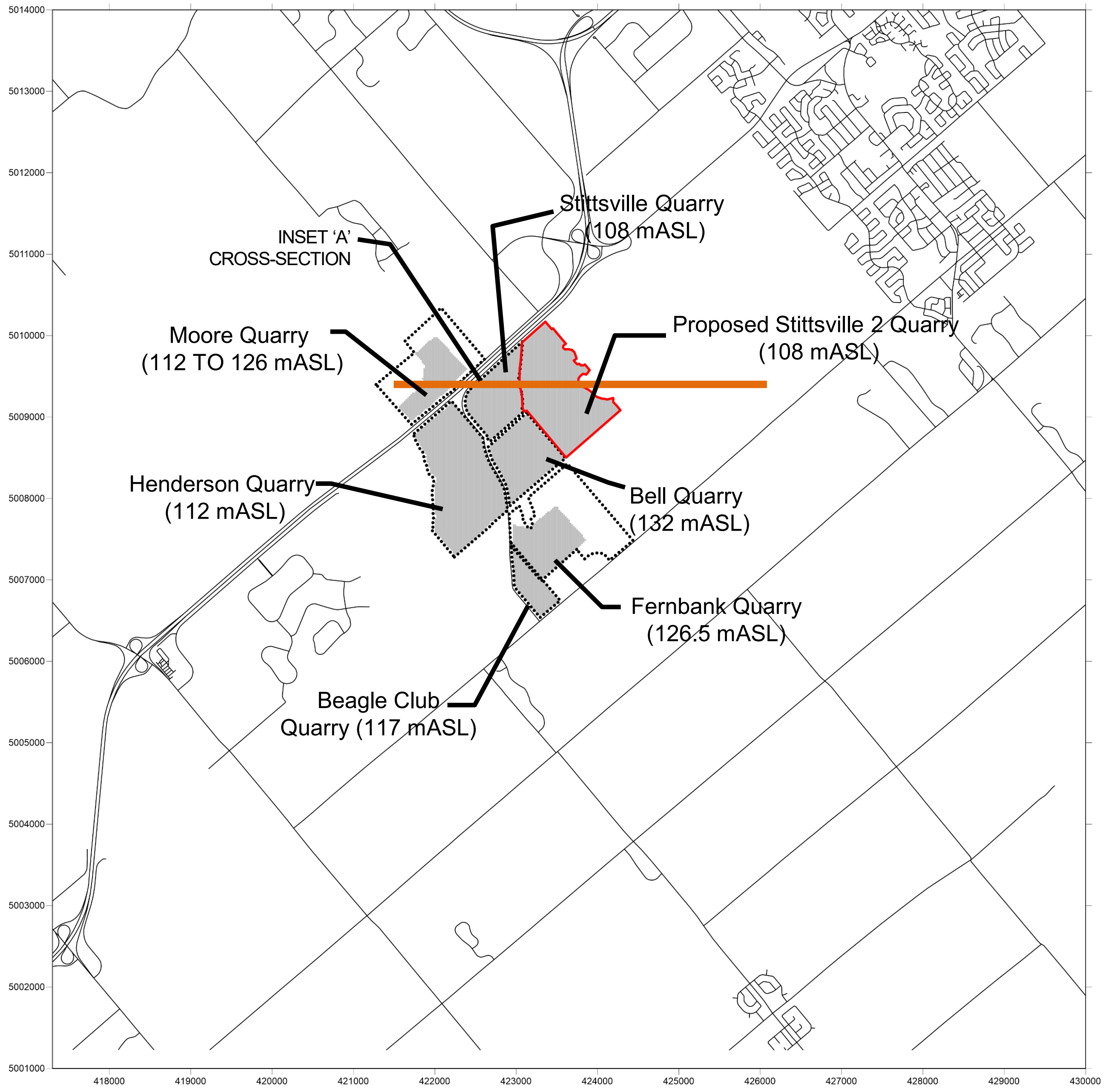
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

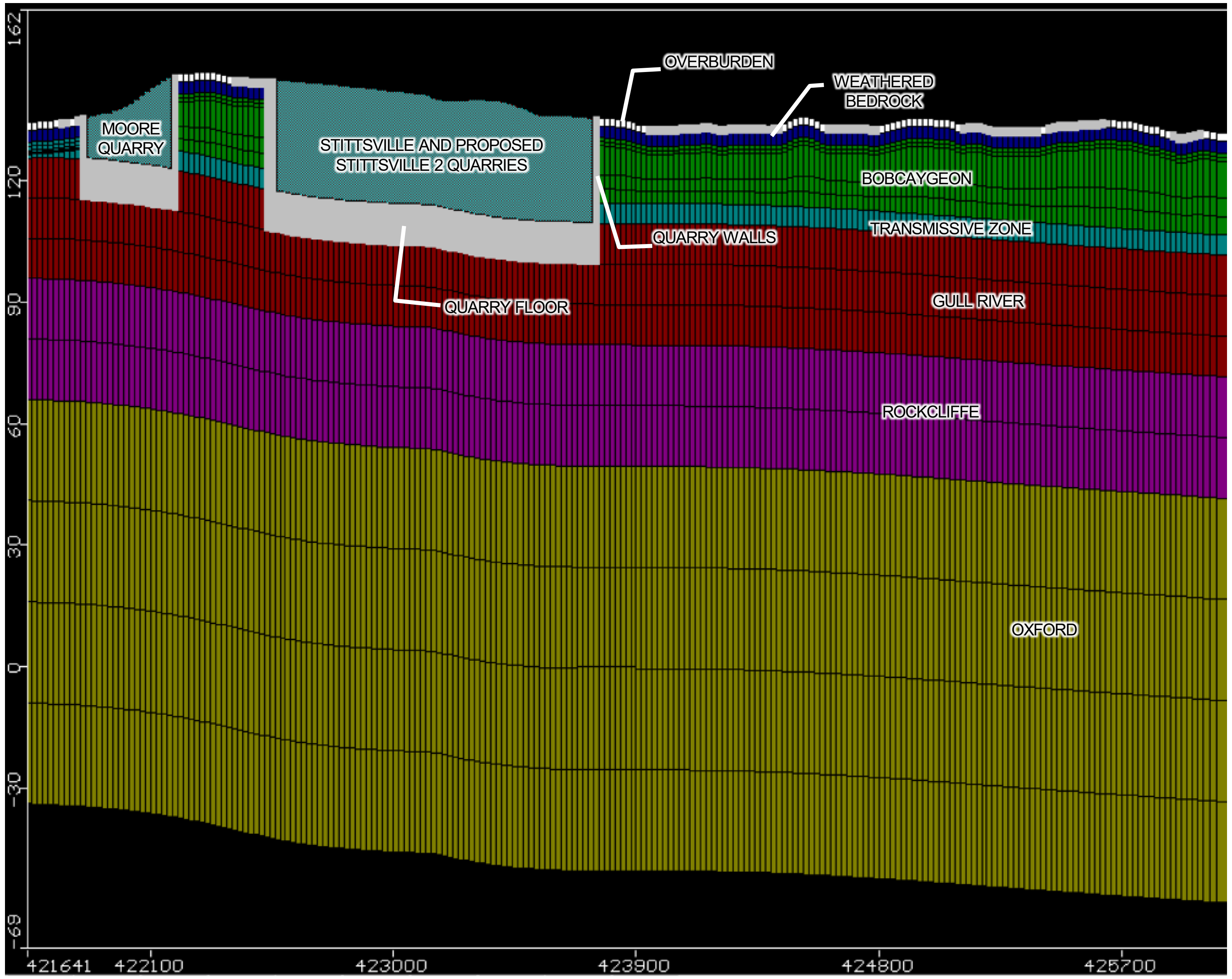
YYYY-MM-DD	2022-07-28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
MODEL GRID

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	34



PLAN VIEW OF STUDY AREA



INSET 'A' CROSS-SECTION

LEGEND

⬜	MODEL DRAIN BOUNDARY
🟦	MODEL INACTIVE FLOW CELL
—	ROADS
🟥	PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
⋯	LICENSED QUARRY BOUNDARIES

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

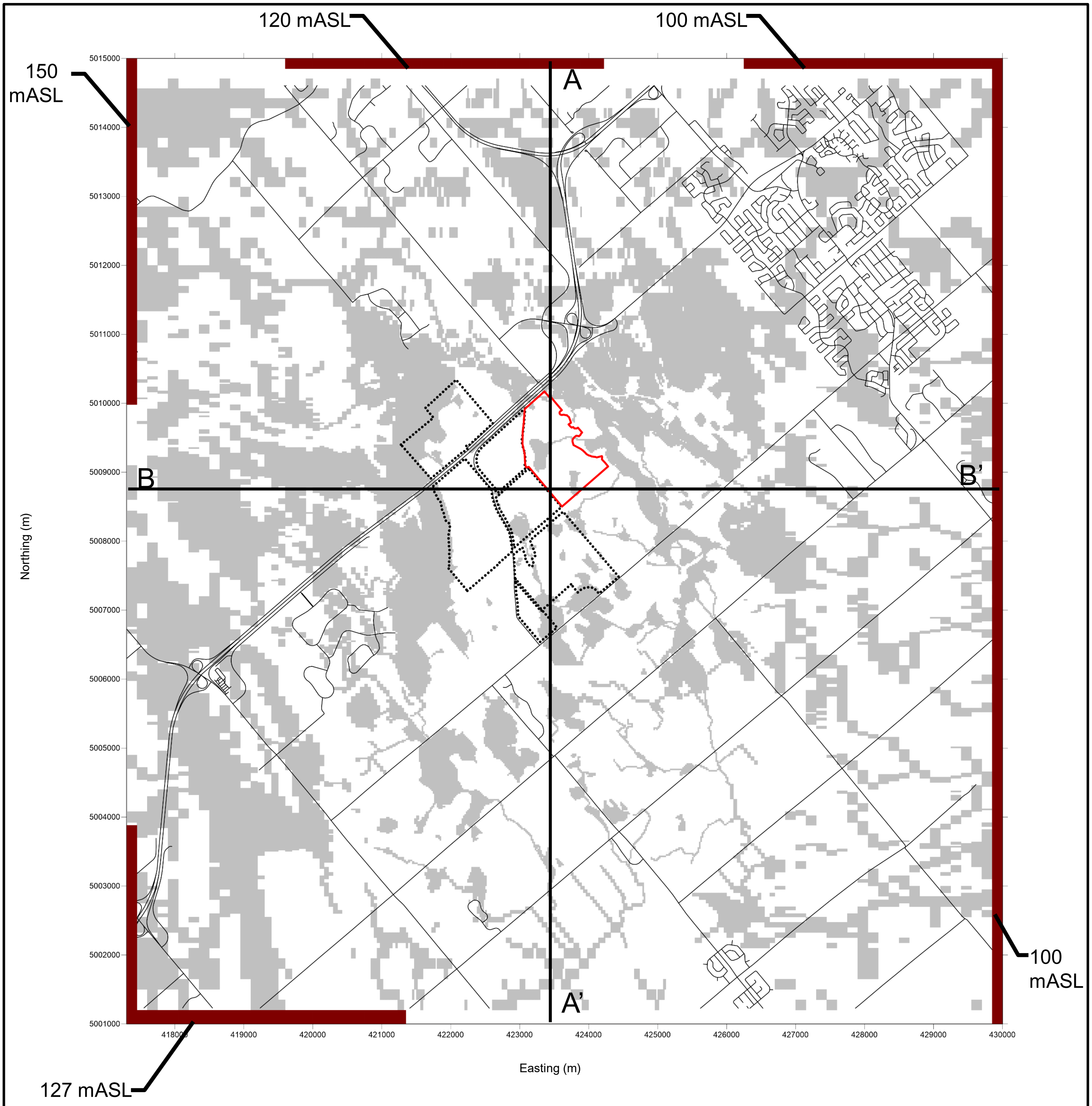
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGNED	SPS
REVIEWED	BH
APPROVED	BH

TITLE
NUMERICAL MODEL BOUNDARY CONDITIONS
(QUARRIES)

PROJECT NO.
19130670

REV.

FIGURE
35



LEGEND

- ▨ MODEL DRAIN BOUNDARY
- 🟥 MODEL CONSTANT HEAD BOUNDARY
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ▪▪▪▪ LICENSED QUARRY BOUNDARIES

NOTES

(1) Constant heads are assigned to each model layer at, and below, the specified constant head value.

CLIENT
R.W. TOMLINSON LIMITED

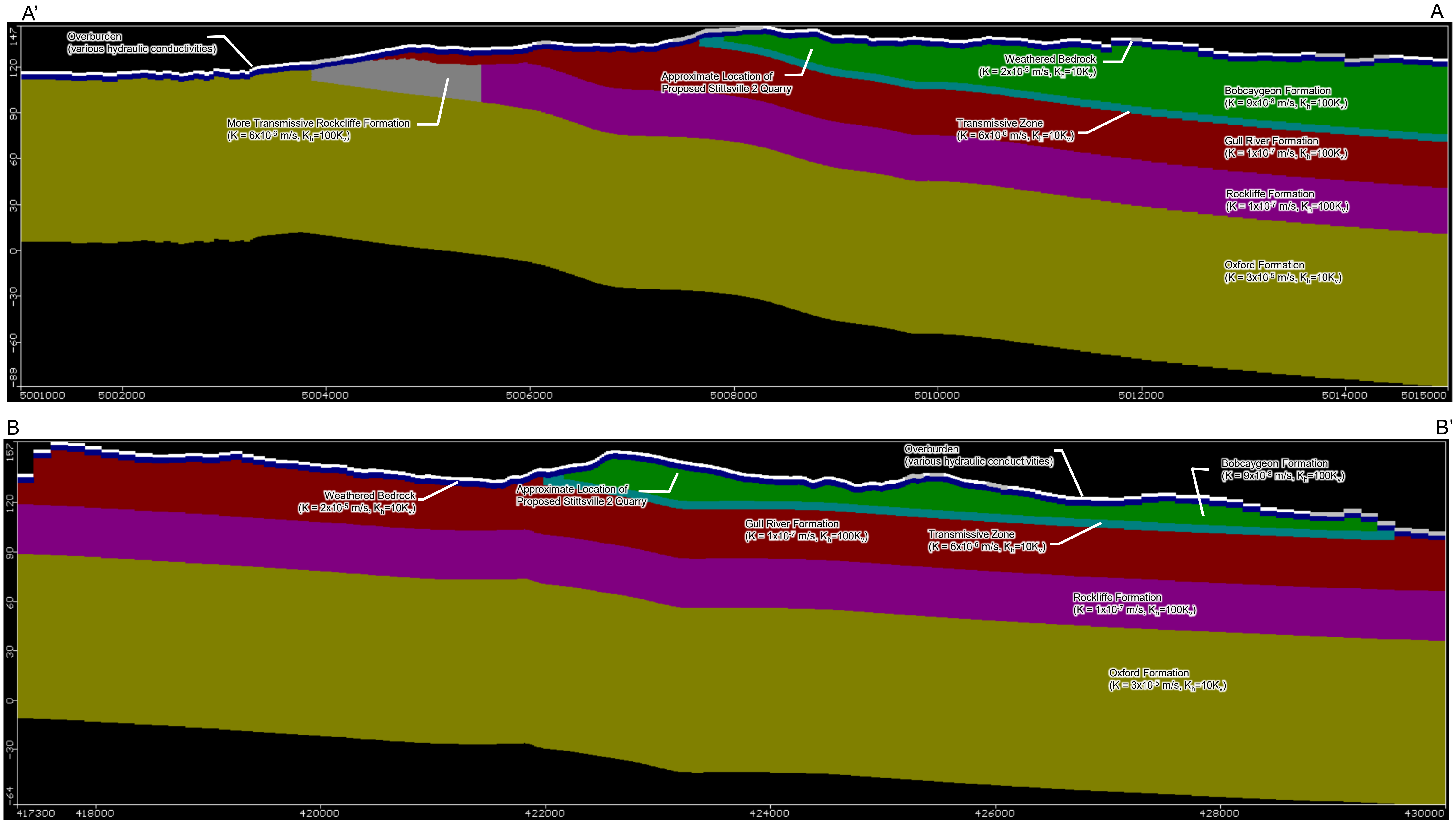
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022-07-28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
MODEL BOUNDARIES

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	36



Note:
Locations of Cross-Sections are provided on Figure 36

CLIENT
R.W. TOMLINSON LIMITED

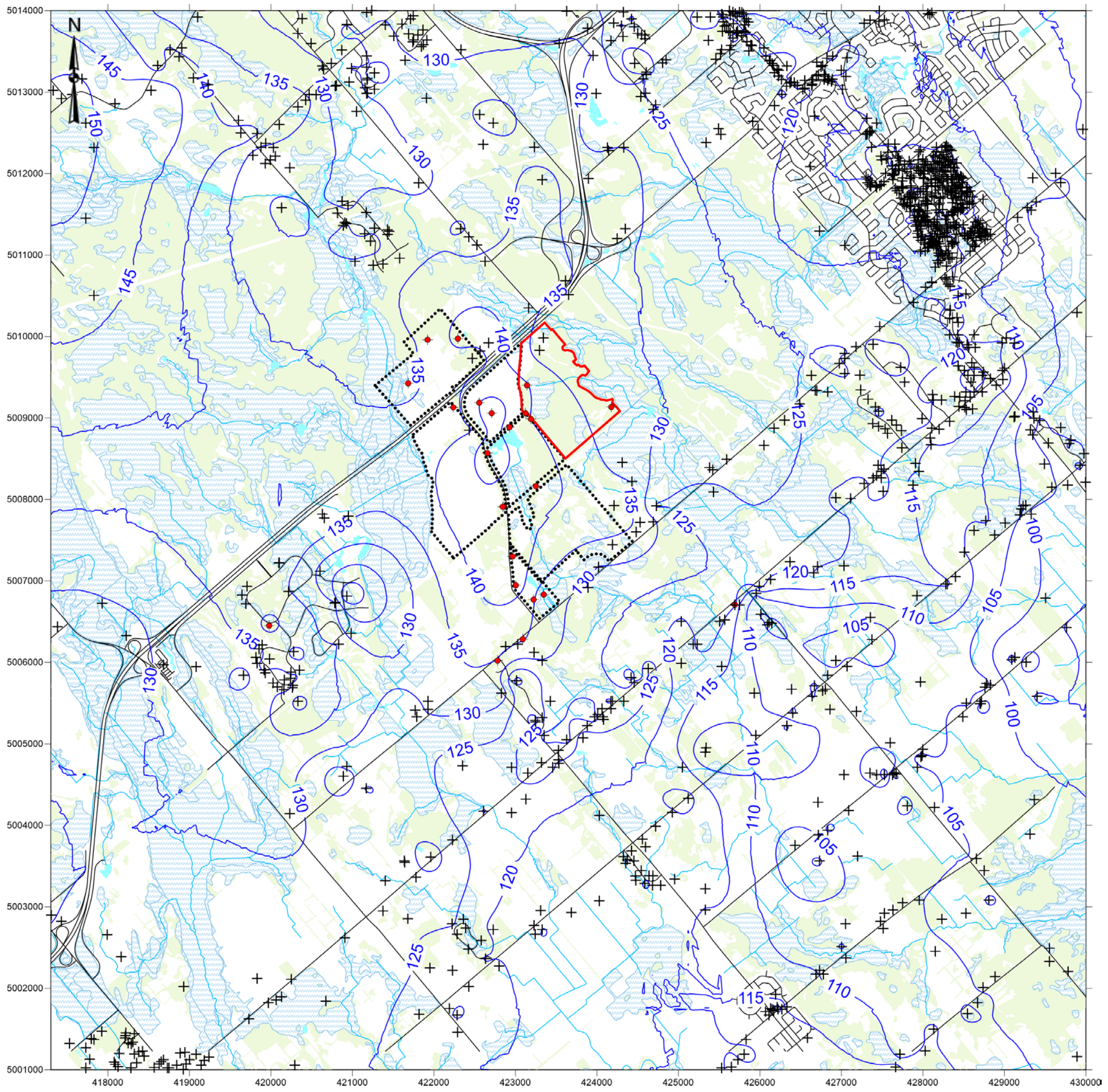
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

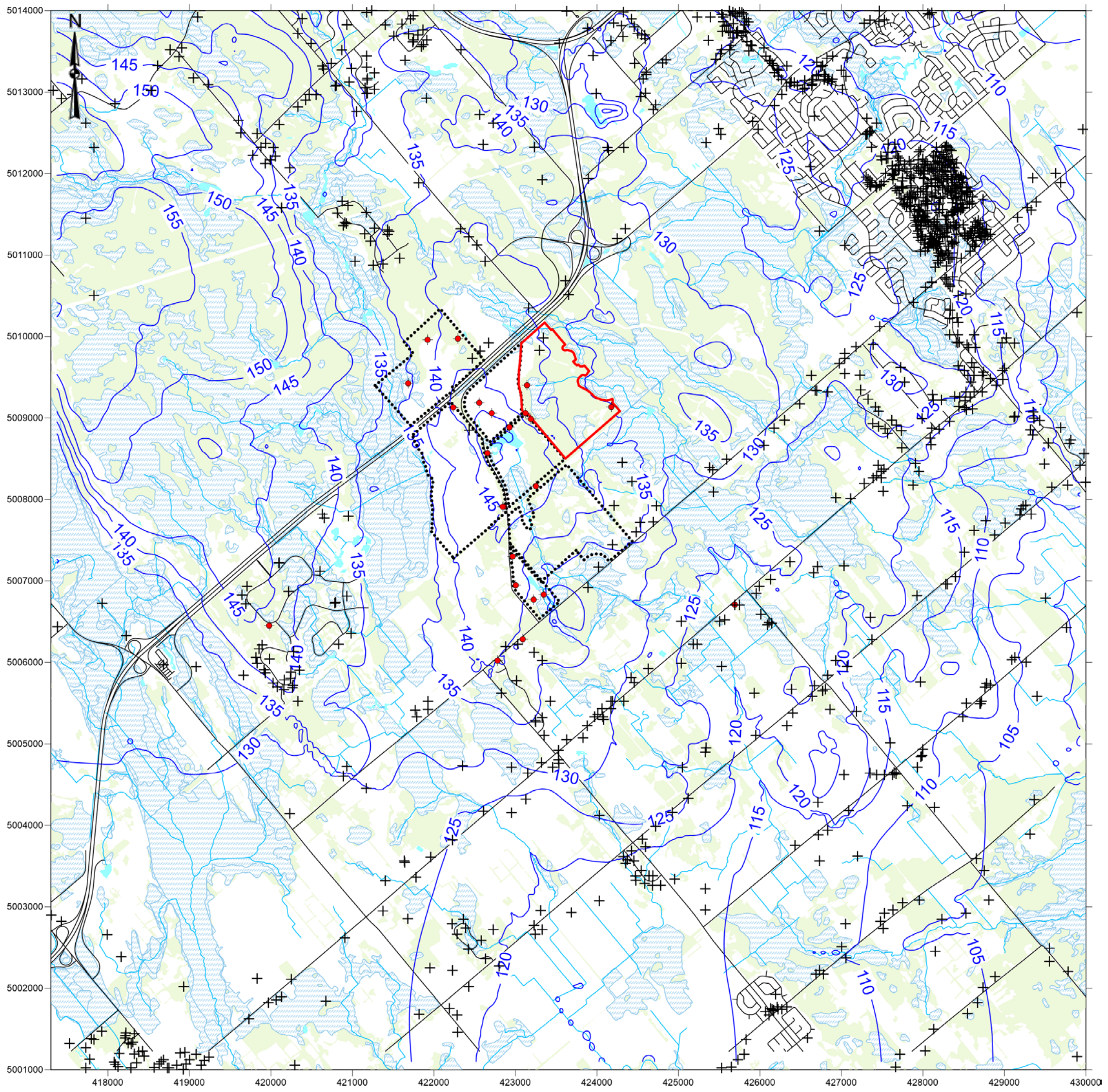
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGNED	SPS
REVIEWED	BH
APPROVED	BH

TITLE
NUMERICAL MODEL CROSS-SECTIONS

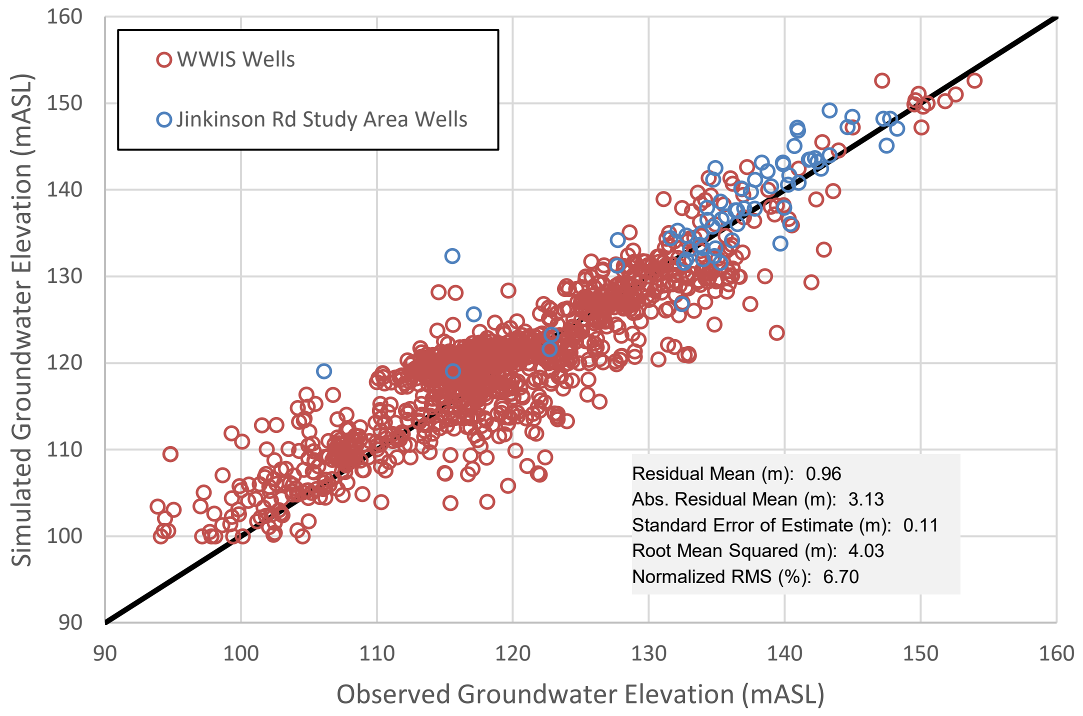
PROJECT NO.	Phase	REV.	FIGURE
19130670			37



PRE-QUARRY WATER WELL INFORMATION SYSTEM AND MONITORING WELL HEAD ELEVATION



NUMERICAL MODEL SIMULATED WATER TABLE ELEVATION



LEGEND

—	ROADS
🟩	WOODED AREA
▨	WETLAND AREA
🟦	WATERBODY
—	WATERCOURSE
—	PROP0SED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
·····	LICENSED QUARRY BOUNDARIES
- 100 -	GROUNDWATER ELEVATION CONTOUR (m)
✦	JINKINSON ROAD STUDY AREA WELL LOCATION
+	WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

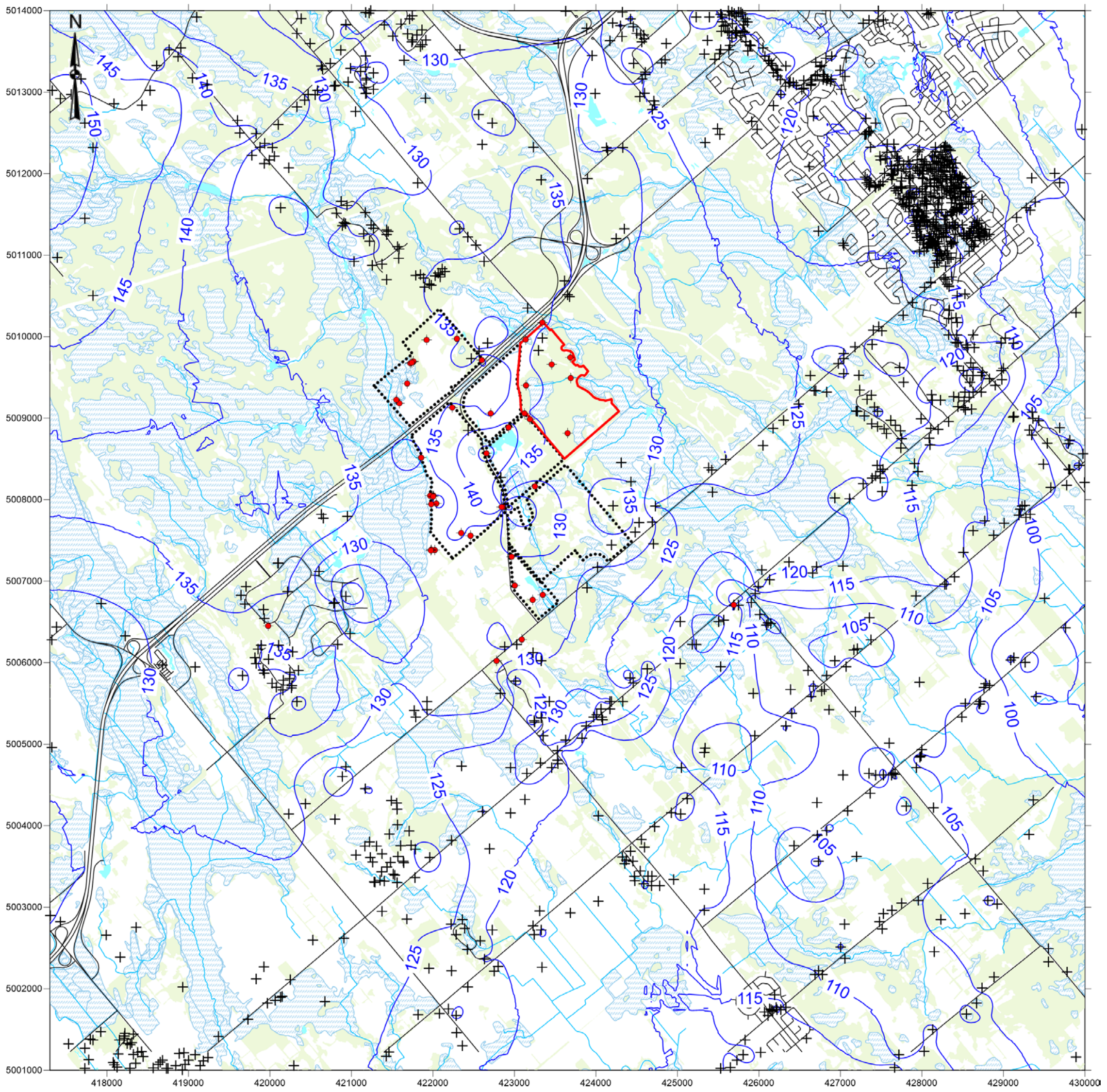
CONSULTANT

YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

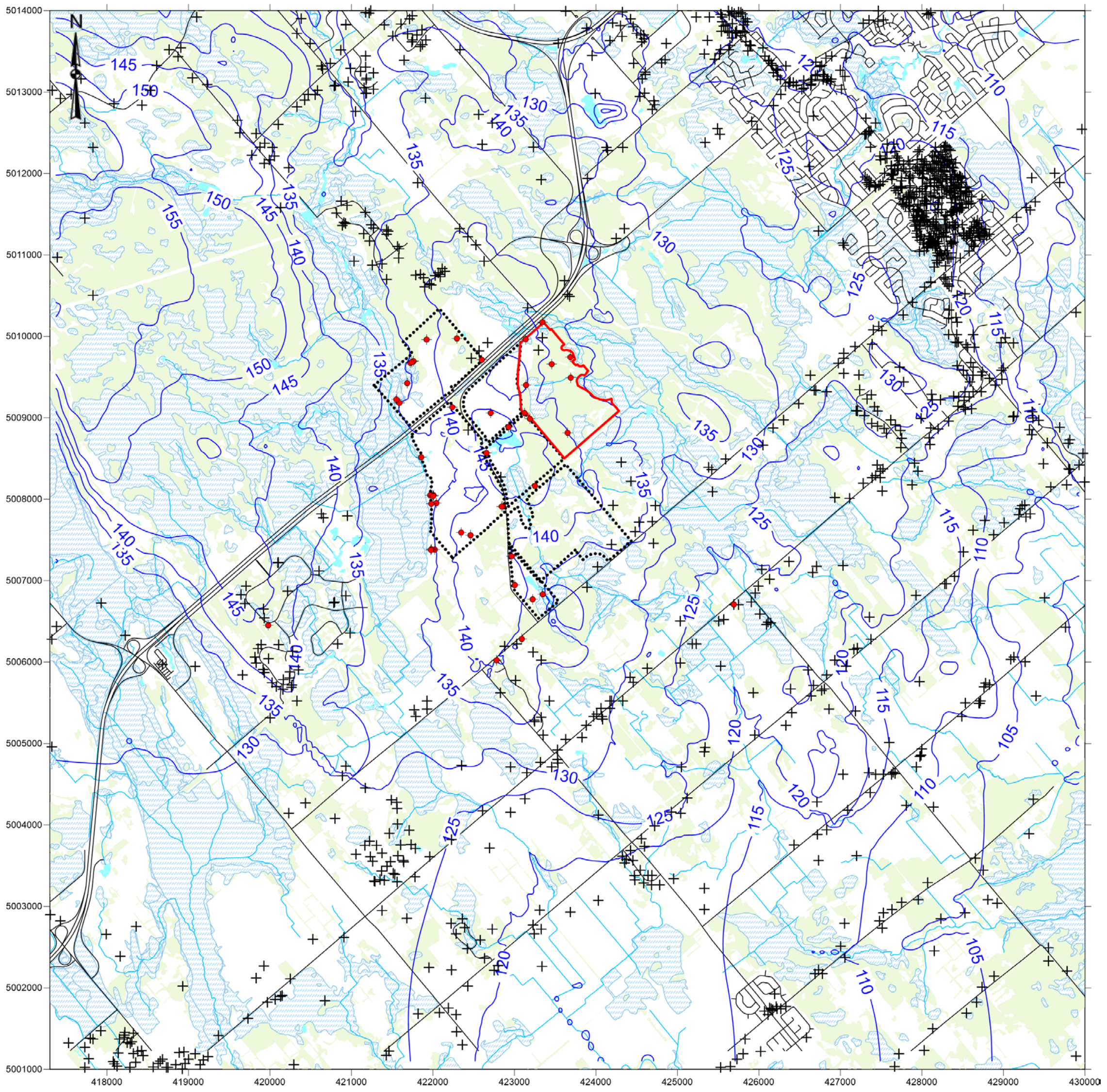
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

TITLE
MEASURED AND SIMULATED GROUNDWATER ELEVATION
CONTOURS UNDER SCENARIO 1
(PRE-QUARRY DEVELOPMENT CONDITIONS)

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	38



WATER WELL INFORMATION SYSTEM AND MONITORING WELL HEAD ELEVATION



NUMERICAL MODEL SIMULATED WATER TABLE ELEVATION

LEGEND

— ROADS
🟩 WOODED AREA
▨ WETLAND AREA
🟦 WATERBODY
— WATERCOURSE
— PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
···· LICENSED QUARRY BOUNDARIES
- 100 - GROUNDWATER ELEVATION CONTOUR (m)
✦ JINKINSON ROAD STUDY AREA WELL LOCATION
\+ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

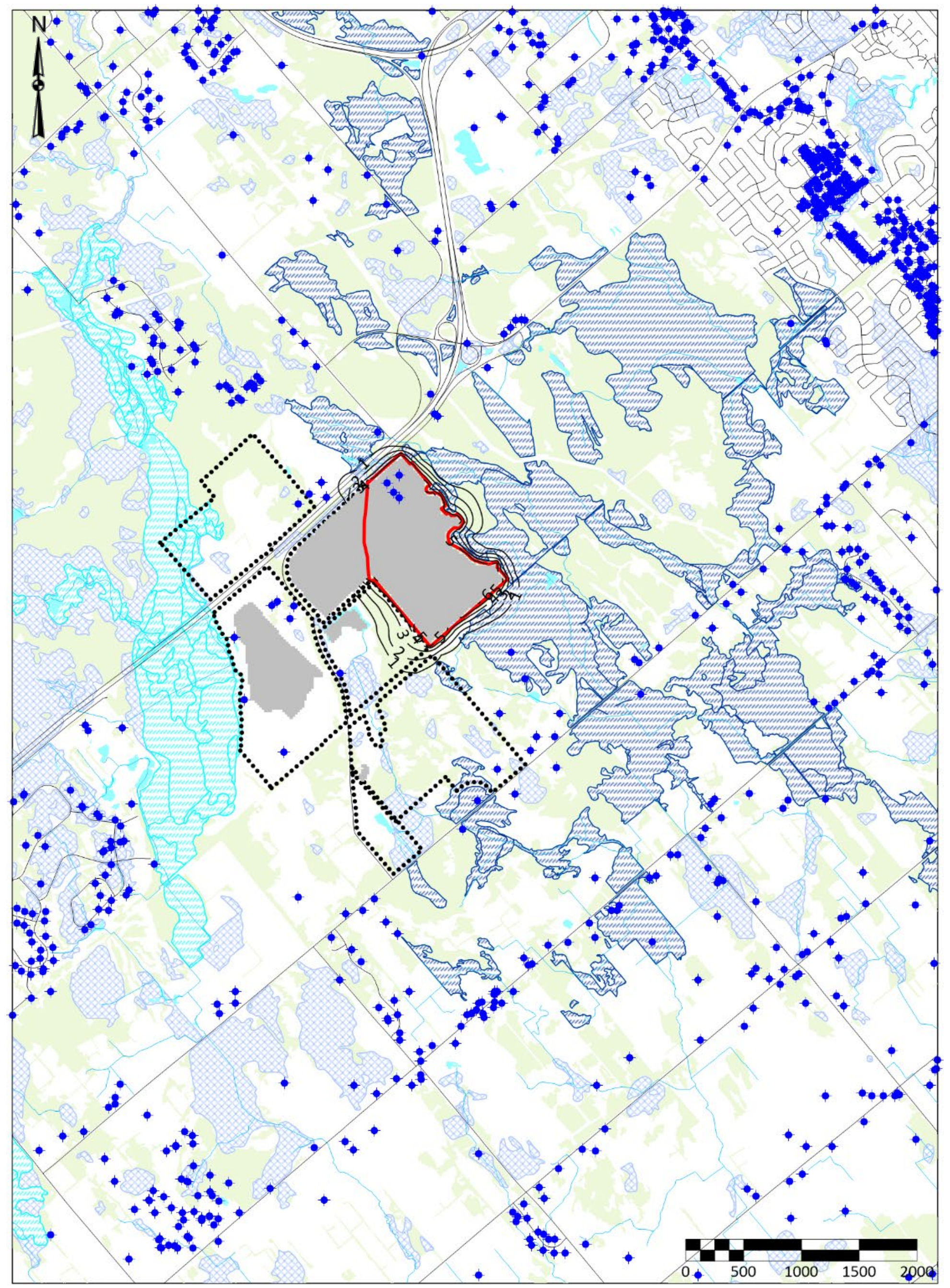
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

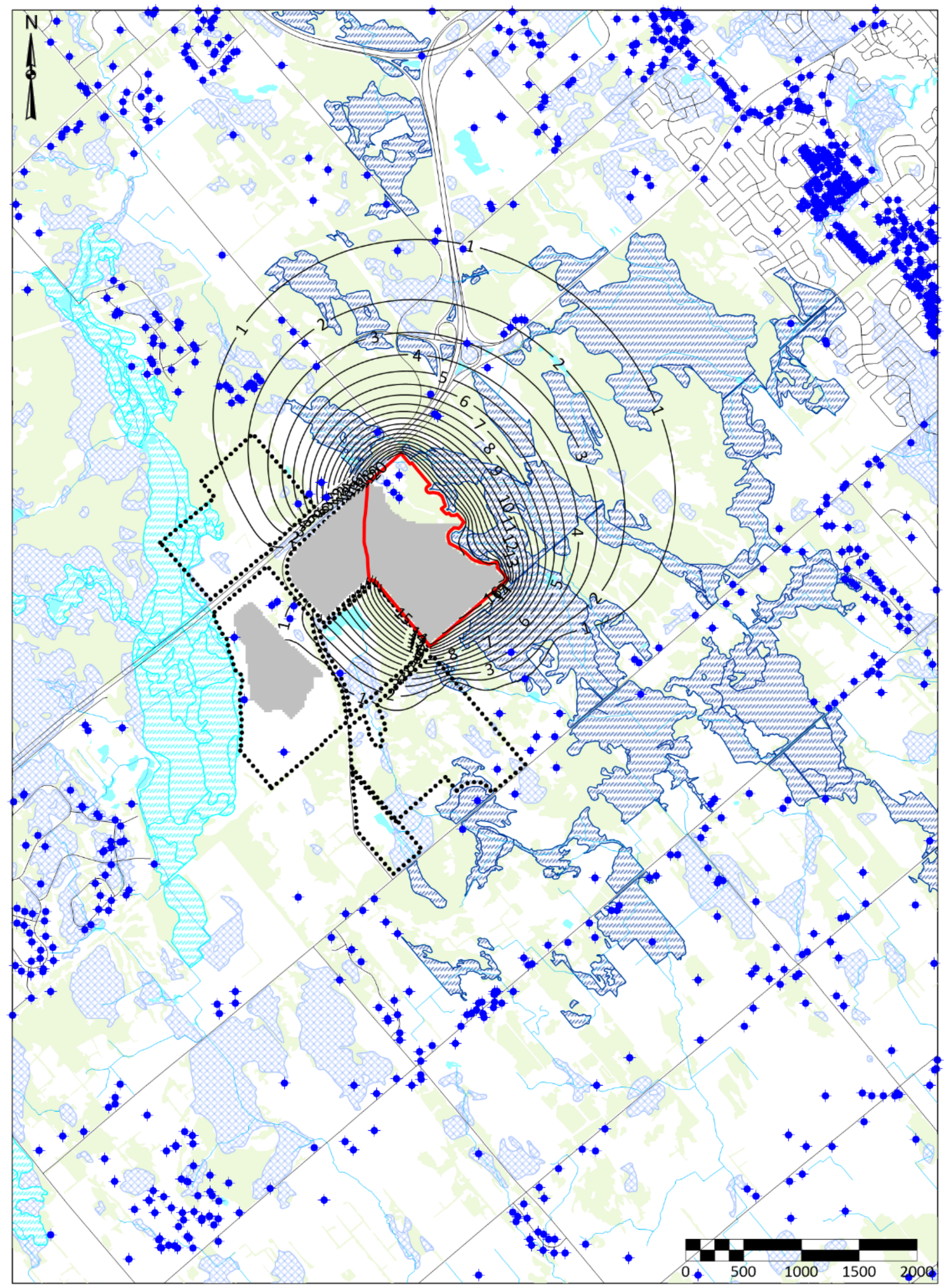
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
MEASURED AND SIMULATED GROUNDWATER ELEVATION
CONTOURS UNDER SCENARIO 2 (EXISTING CONDITIONS)

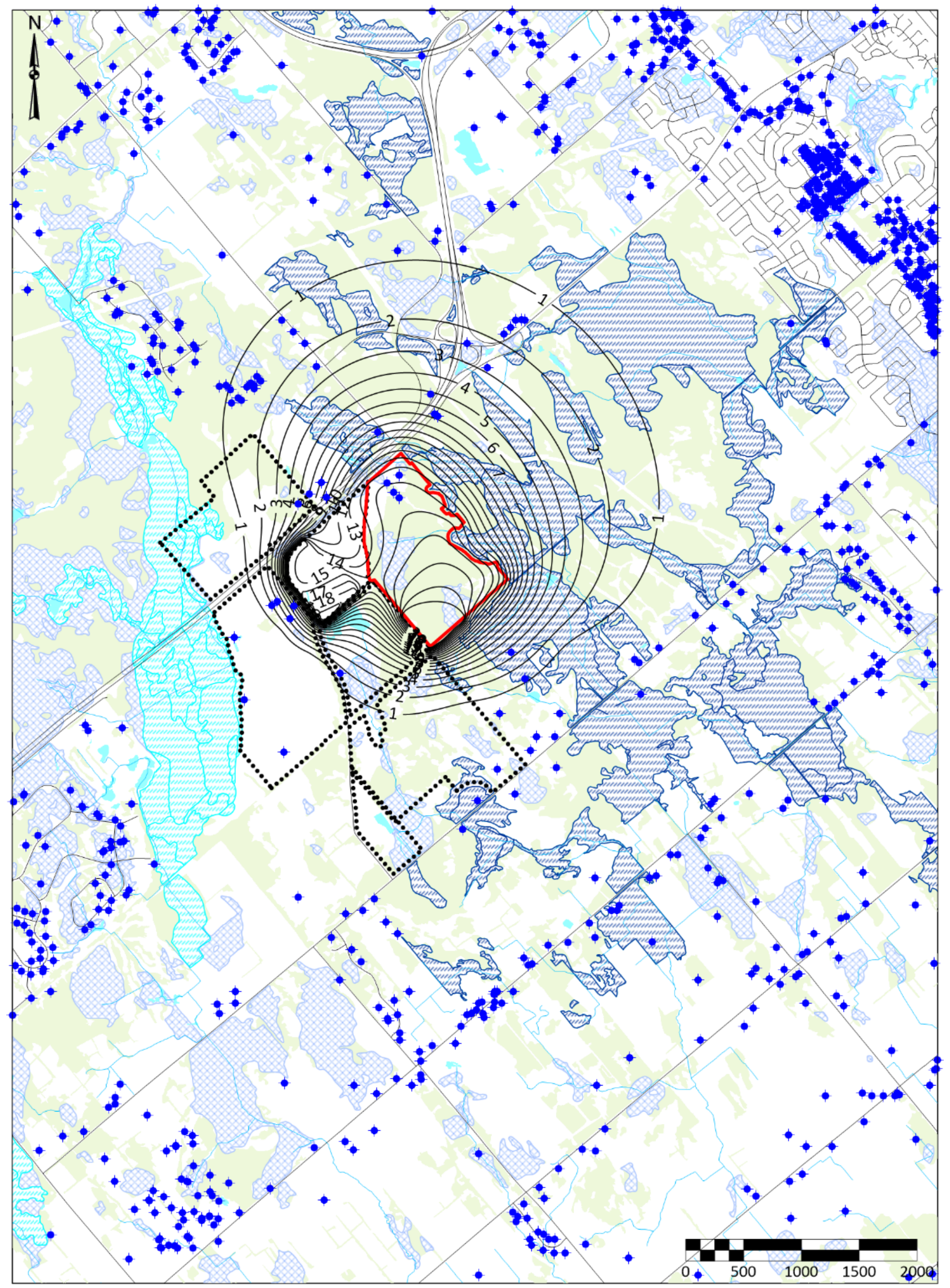
PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	39



WEATHERED BEDROCK (LAYER 2)



TRANSMISSIVE ZONE (LAYER 8)



GULL RIVER (LAYER 10)

LEGEND

- 🟩 WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▨ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- 🟦 WATERBODY
- ⬜ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ⋯ EXISTING QUARRY LICENSE BOUNDARY
- –1– SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

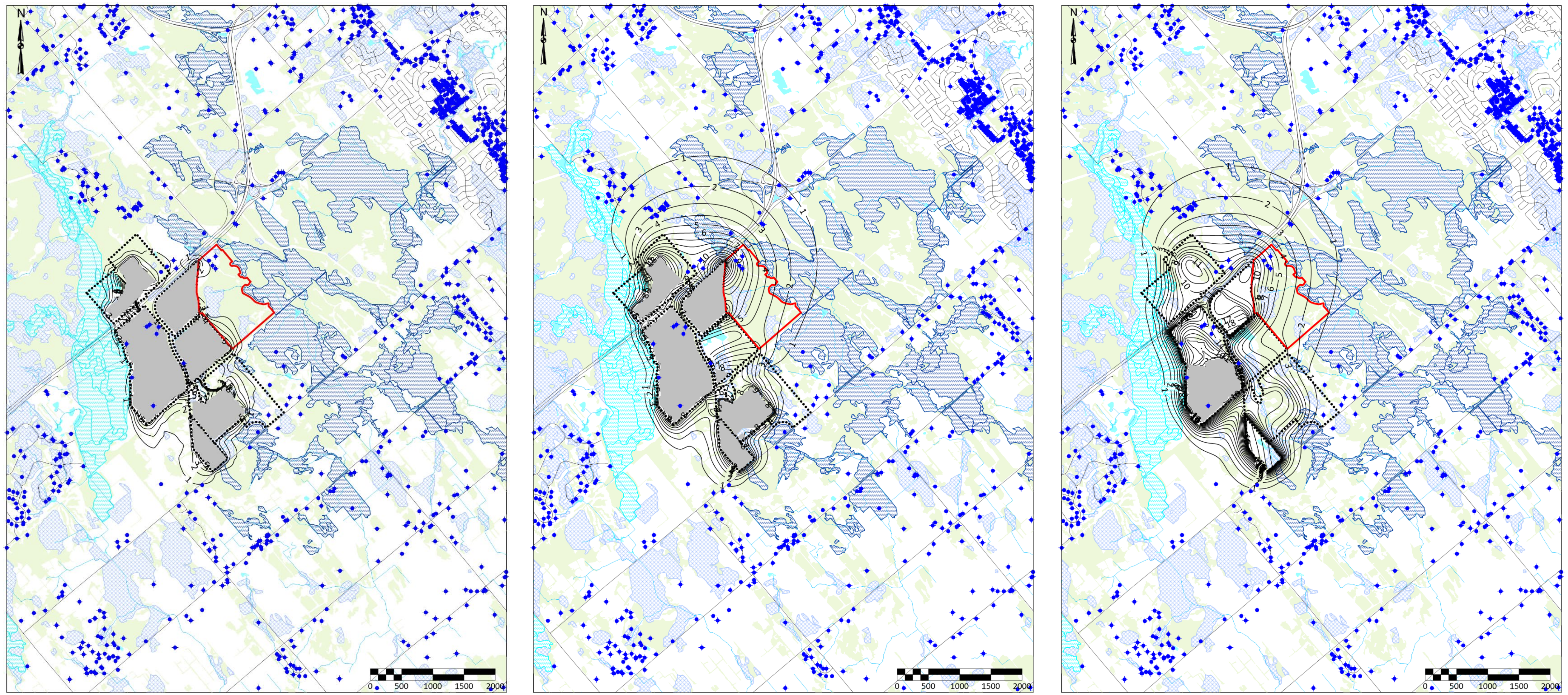
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED GROUNDWATER DRAWDOWN – SCENARIO 3 (STITTSVILLE
AND PROPOSED STITTSVILLE 2 QUARRIES AT FULL DEVELOPMENT)
COMPARED TO SCENARIO 2 (EXISTING CONDITIONS)

PROJECT No. 19130670
PHASE
Rev.
FIGURE 40



WEATHERED BEDROCK (LAYER 2)

TRANSMISSIVE ZONE (LAYER 8)

GULL RIVER (LAYER 10)

LEGEND

- ▭ WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▩ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- ■ WATERBODY
- ■ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ⋯ EXISTING QUARRY LICENSE BOUNDARY
- –1– SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

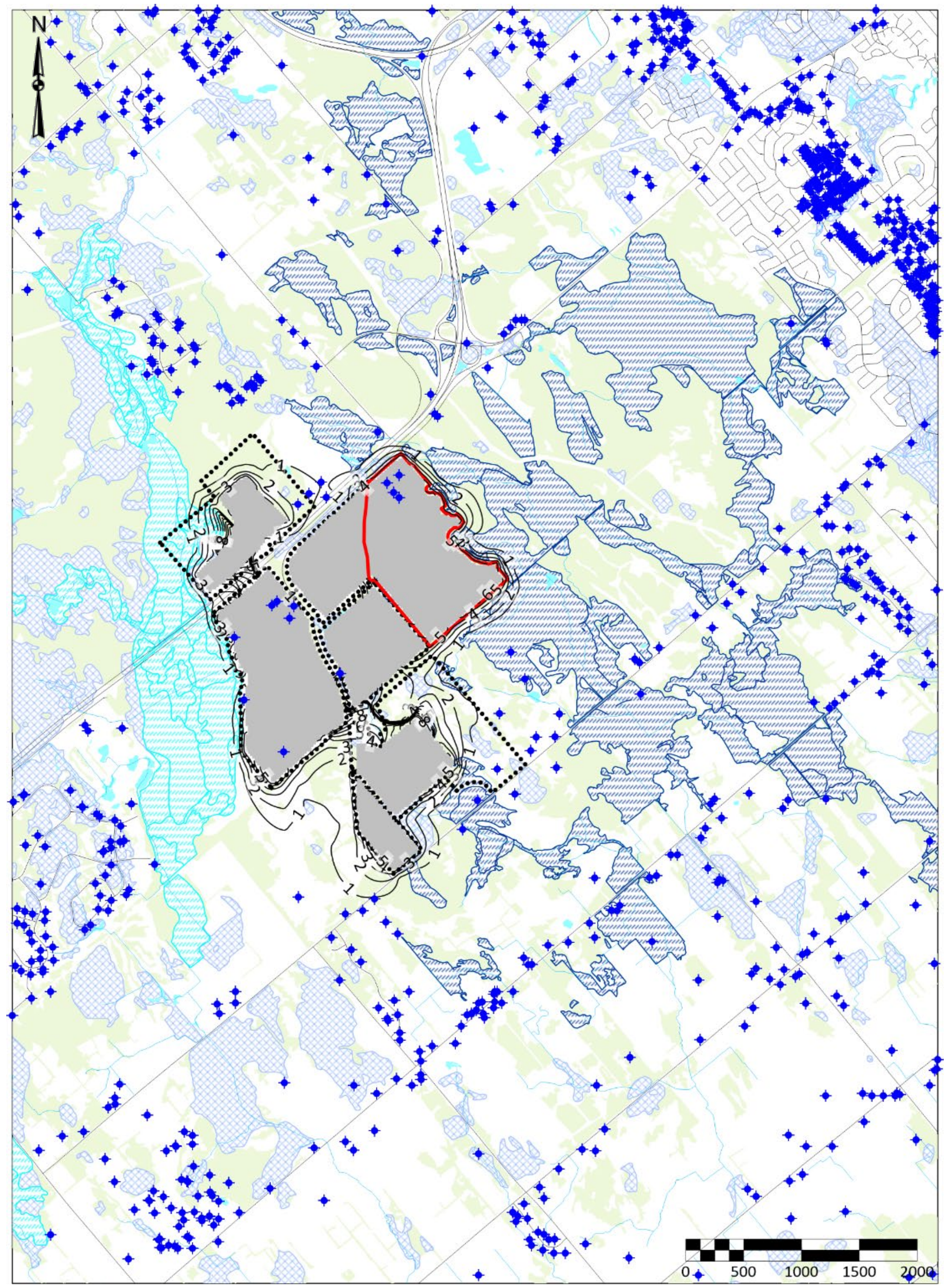
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

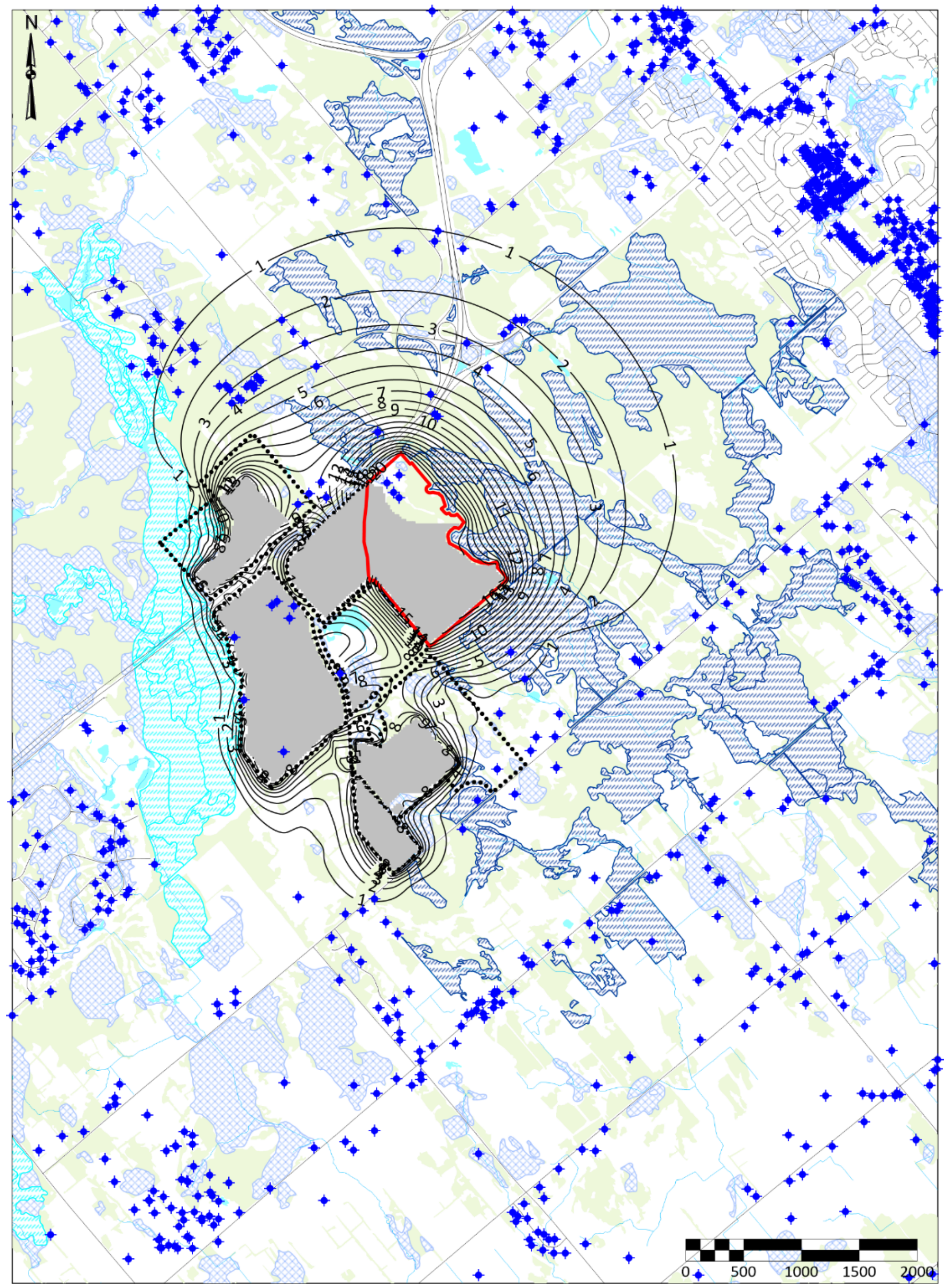
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED GROUNDWATER DRAWDOWN – SCENARIO 4 (ALL QUARRIES EXCEPT PROPOSED STITTSVILLE 2 QUARRY AT FULL DEVELOPMENT) COMPARED TO SCENARIO 2 (EXISTING CONDITIONS)

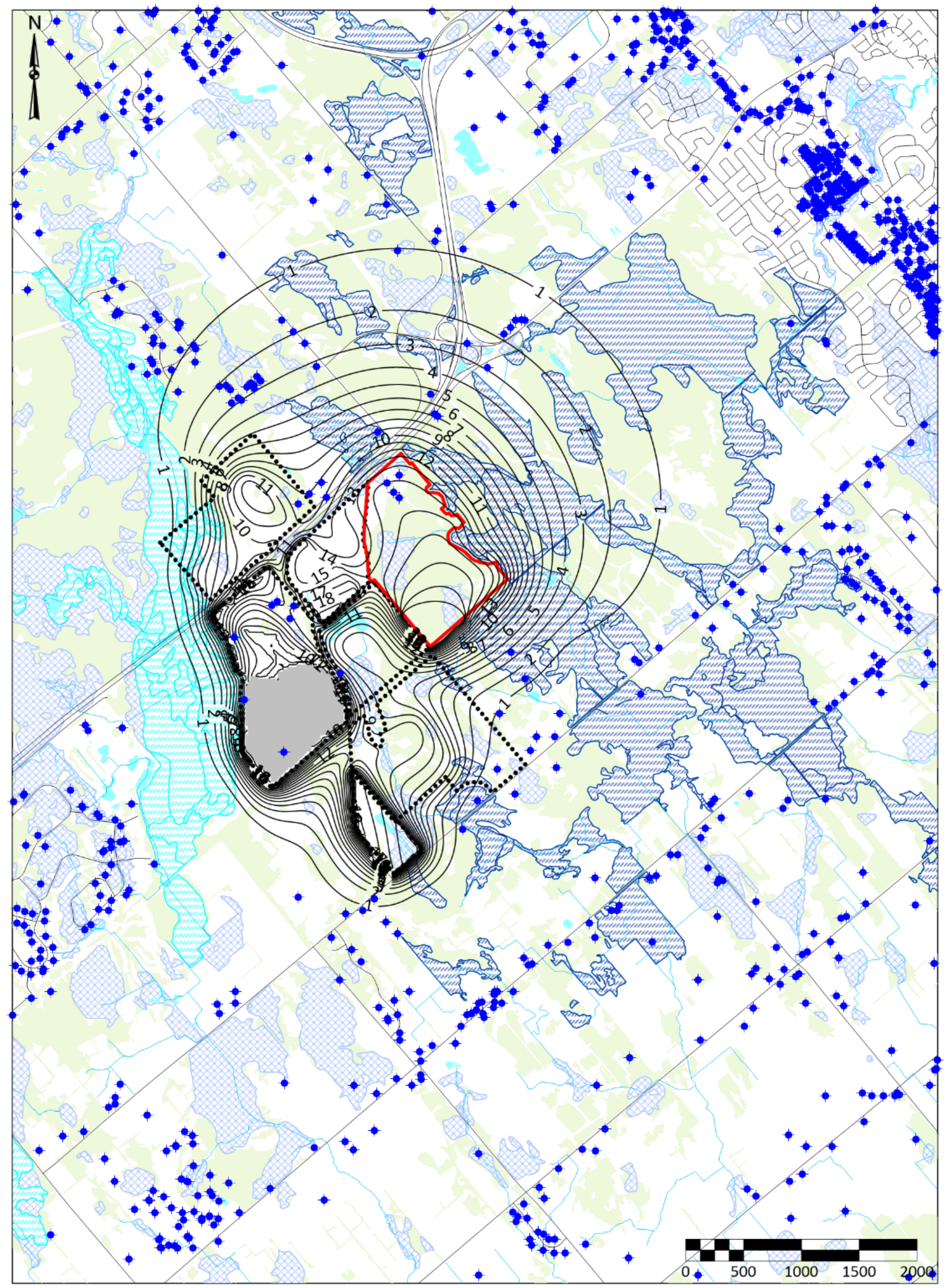
PROJECT No. 19130670
PHASE
Rev.
FIGURE 41



WEATHERED BEDROCK (LAYER 2)



TRANSMISSIVE ZONE (LAYER 8)



GULL RIVER (LAYER 10)

LEGEND

- 🟩 WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▨ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- 🟦 WATERBODY
- ⬜ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ⋯ EXISTING QUARRY LICENSE BOUNDARY
- –1– SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

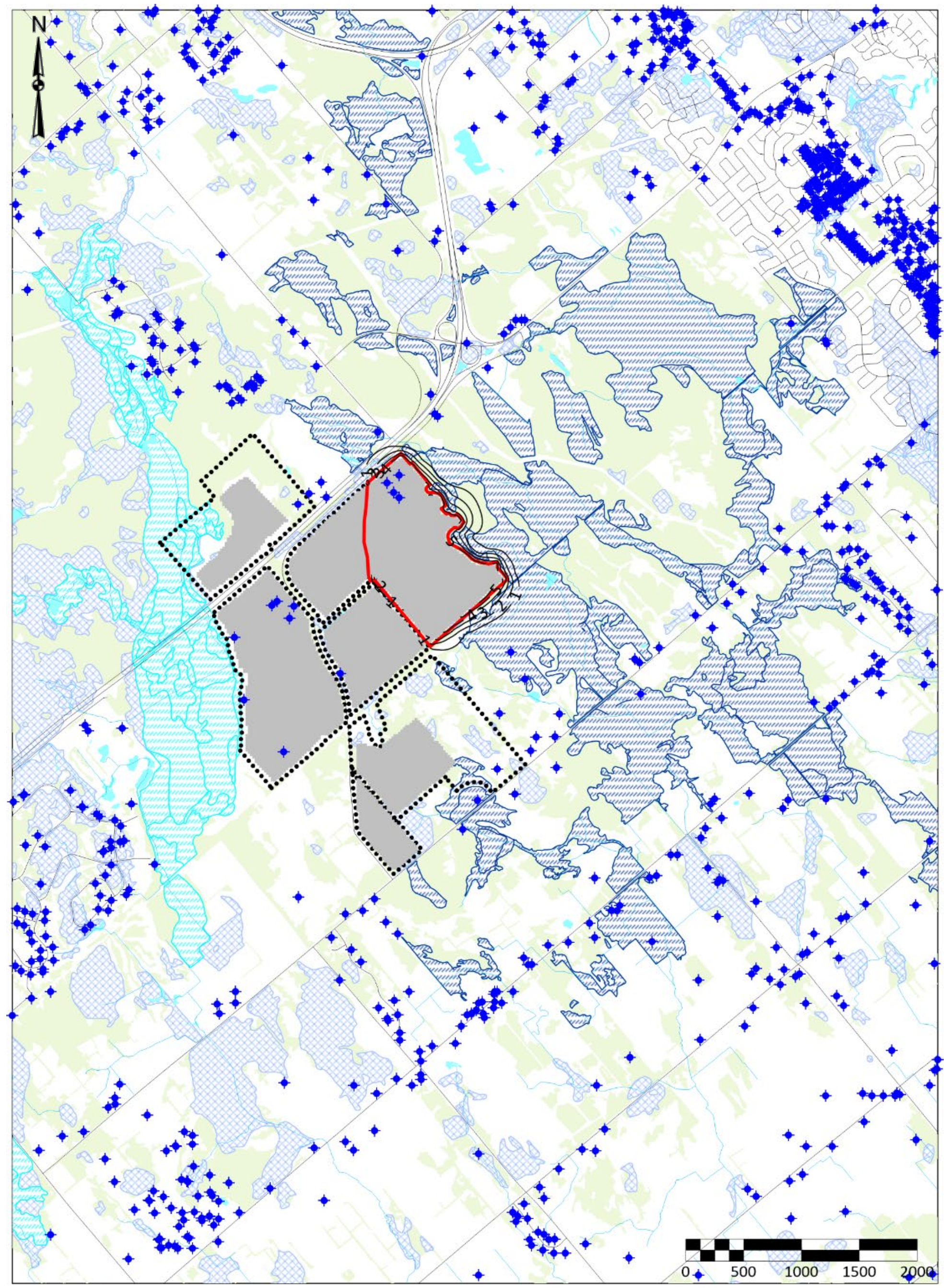
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

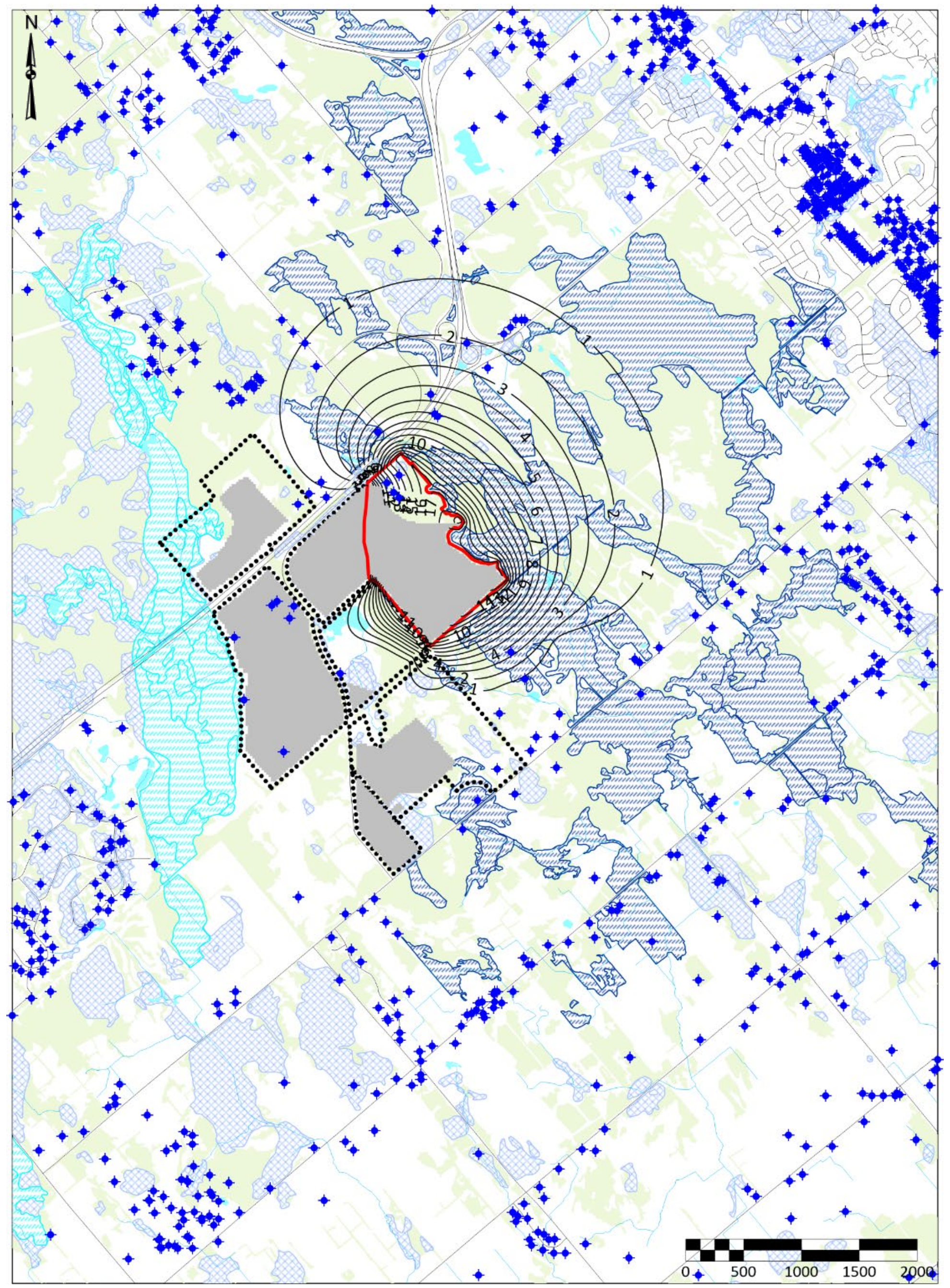
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED GROUNDWATER DRAWDOWN – SCENARIO 5 (ALL QUARRIES AT FULL DEVELOPMENT INCLUDING PROPOSED STITTSVILLE 2 QUARRY) COMPARED TO SCENARIO 2 (EXISTING CONDITIONS)

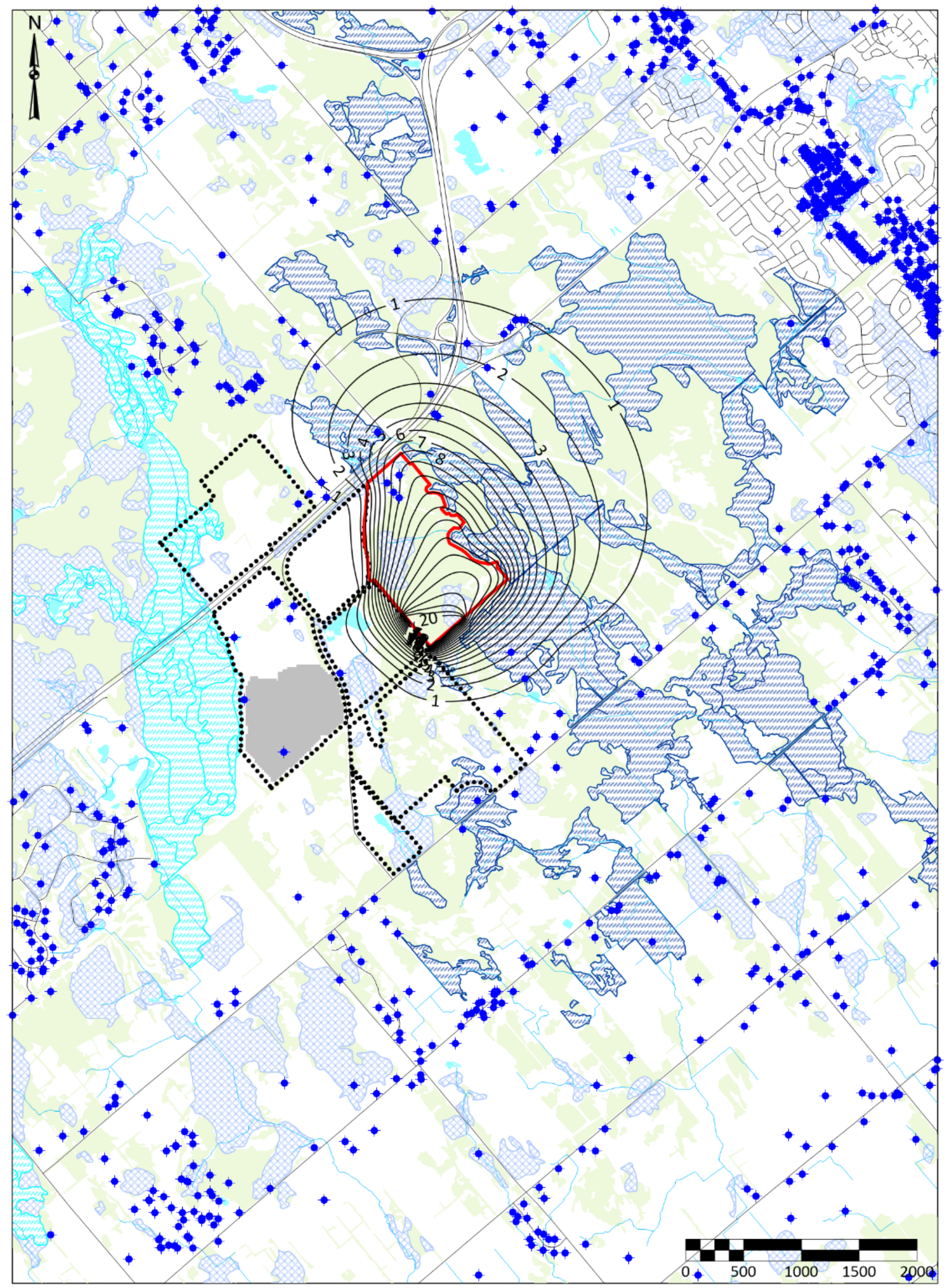
PROJECT No.	PHASE	Rev.	FIGURE
19130670			42



WEATHERED BEDROCK (LAYER 2)



TRANSMISSIVE ZONE (LAYER 8)



GULL RIVER (LAYER 10)

LEGEND

- WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▨ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- WATERBODY
- ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- WATERCOURSE
- ROADS
- PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- EXISTING QUARRY LICENSE BOUNDARY
- SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

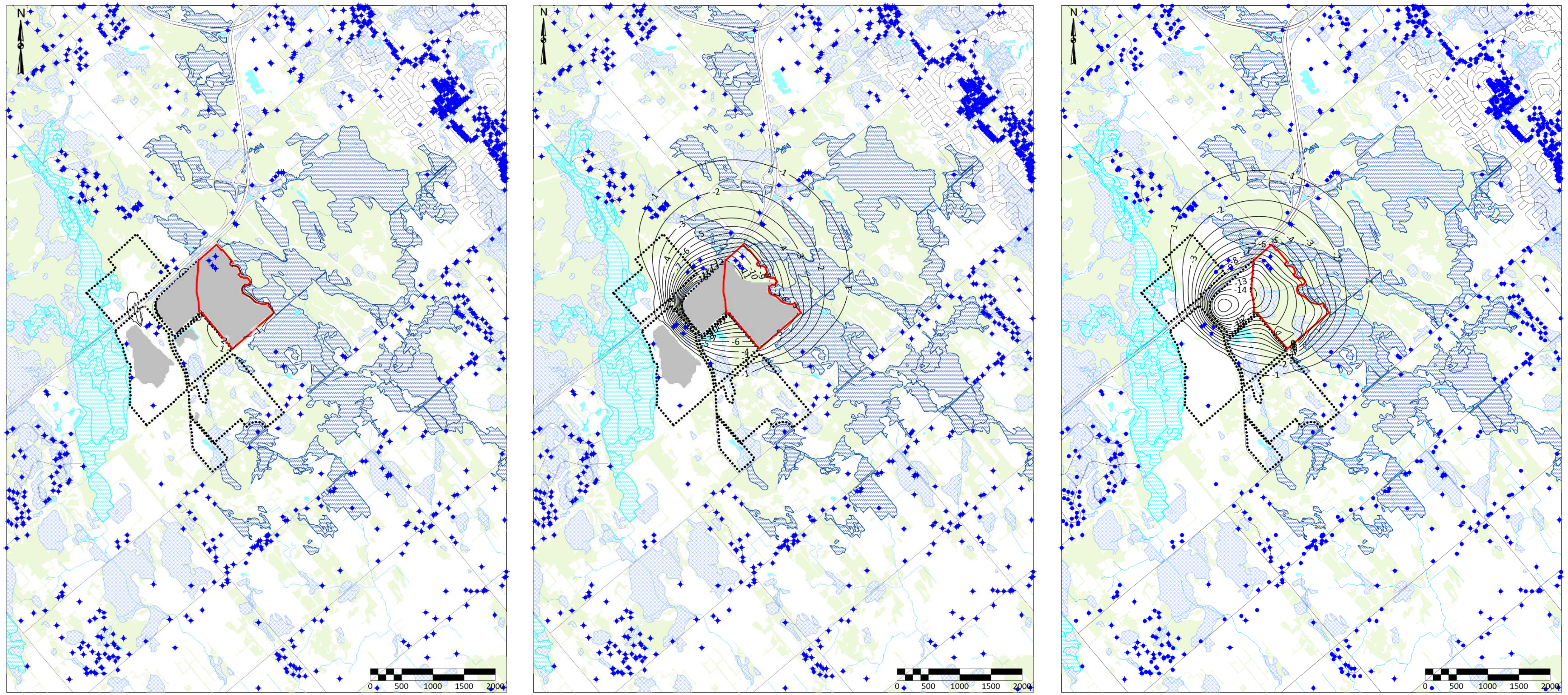
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED ADDITIONAL GROUNDWATER DRAWDOWN FROM DEVELOPMENT OF STITTSVILLE 2 QUARRY IN ADDITION TO FULL DEVELOPMENT OF ALL QUARRIES

PROJECT No.	PHASE	Rev.	FIGURE
19130670			43



WEATHERED BEDROCK (LAYER 2)

TRANSMISSIVE ZONE (LAYER 8)

GULL RIVER (LAYER 10)

LEGEND

- 🟩 WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▨ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- 🟦 WATERBODY
- ⬜ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ⋯ EXISTING QUARRY LICENSE BOUNDARY
- —1— SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

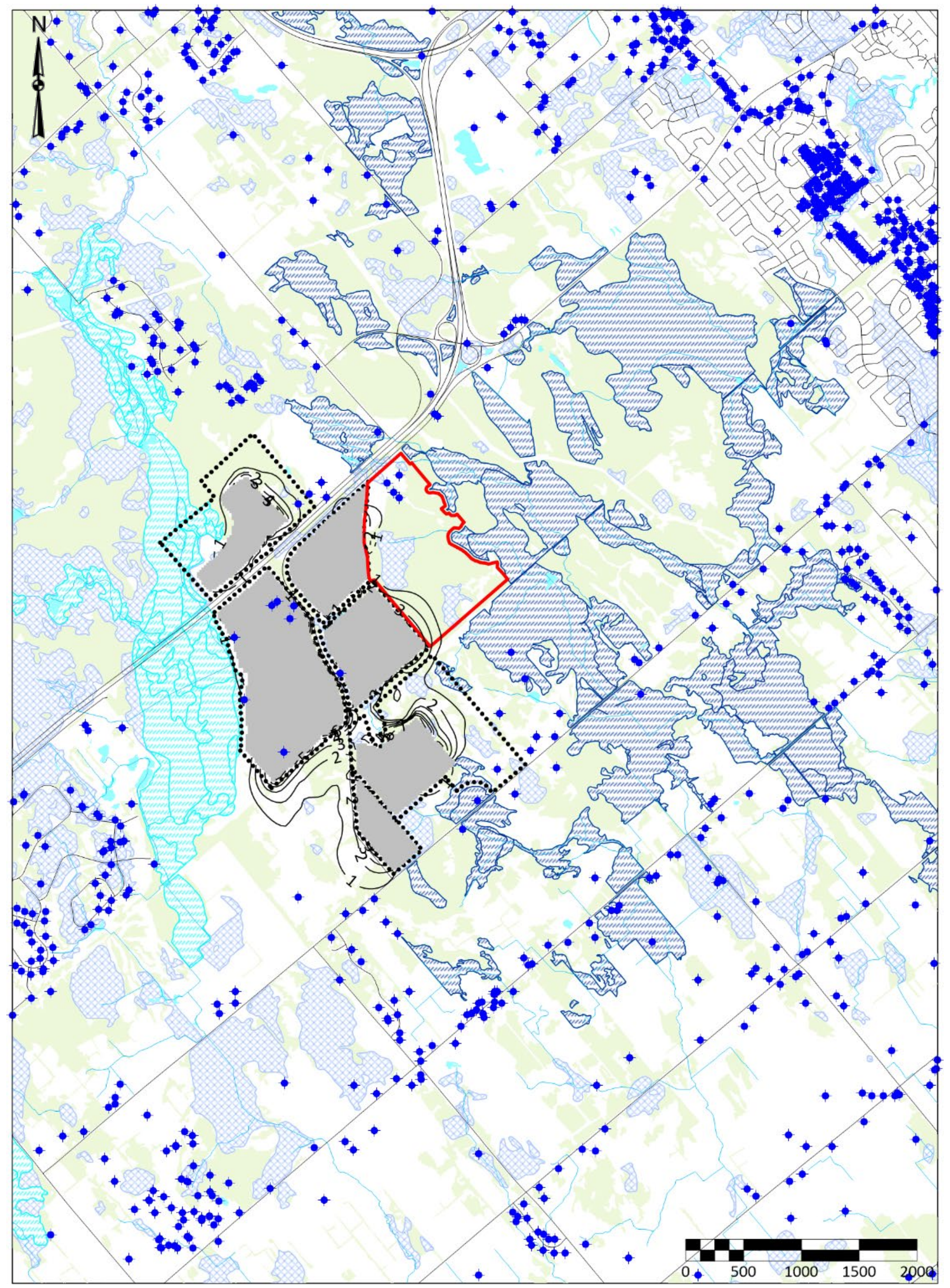
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

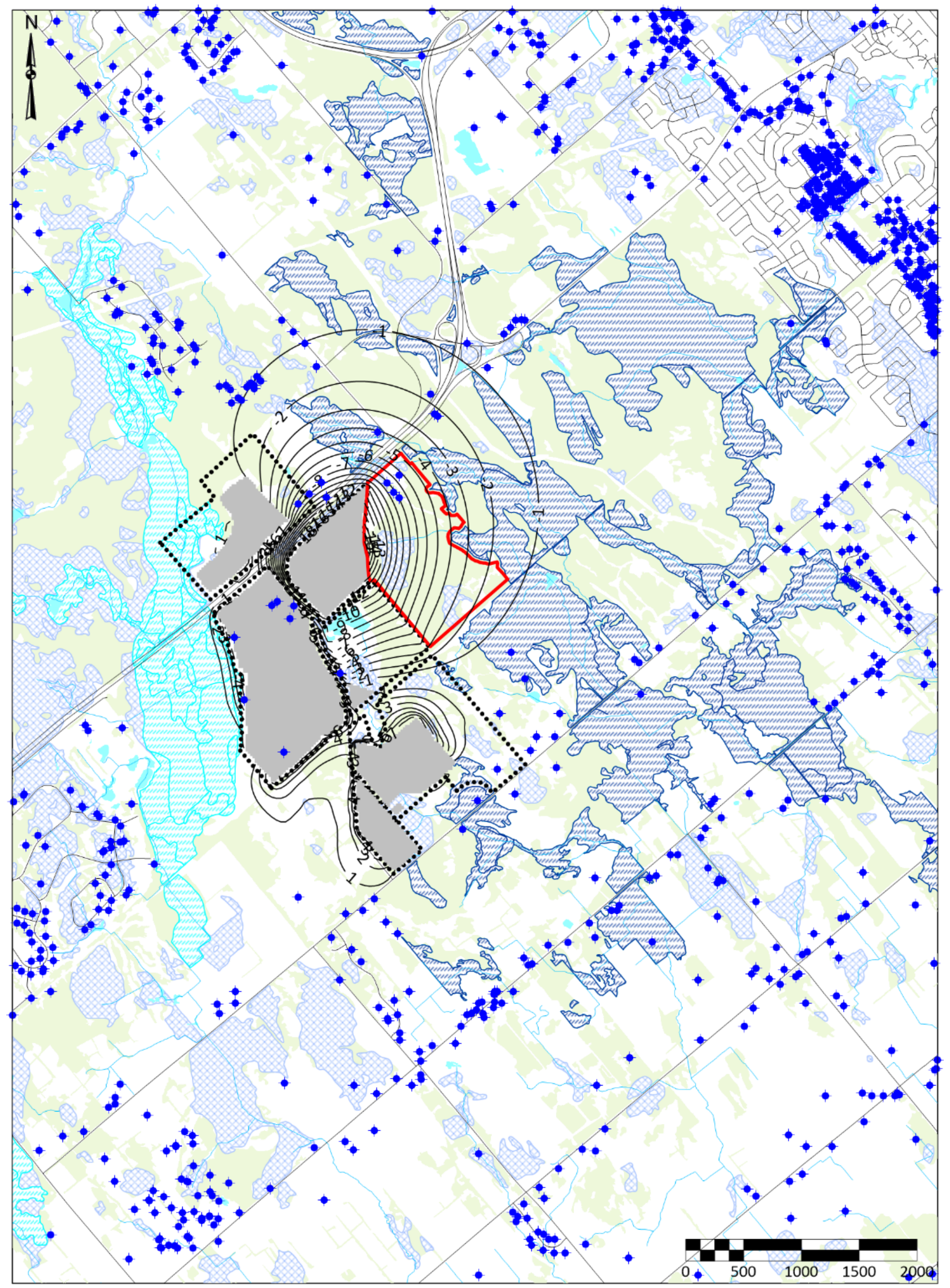
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED GROUNDWATER DRAWDOWN – SCENARIO 6 (STITTSVILLE AND PROPOSED STITTSVILLE 2 QUARRIES AT FULL REHAB) COMPARED TO SCENARIO 2 (EXISTING CONDITIONS)

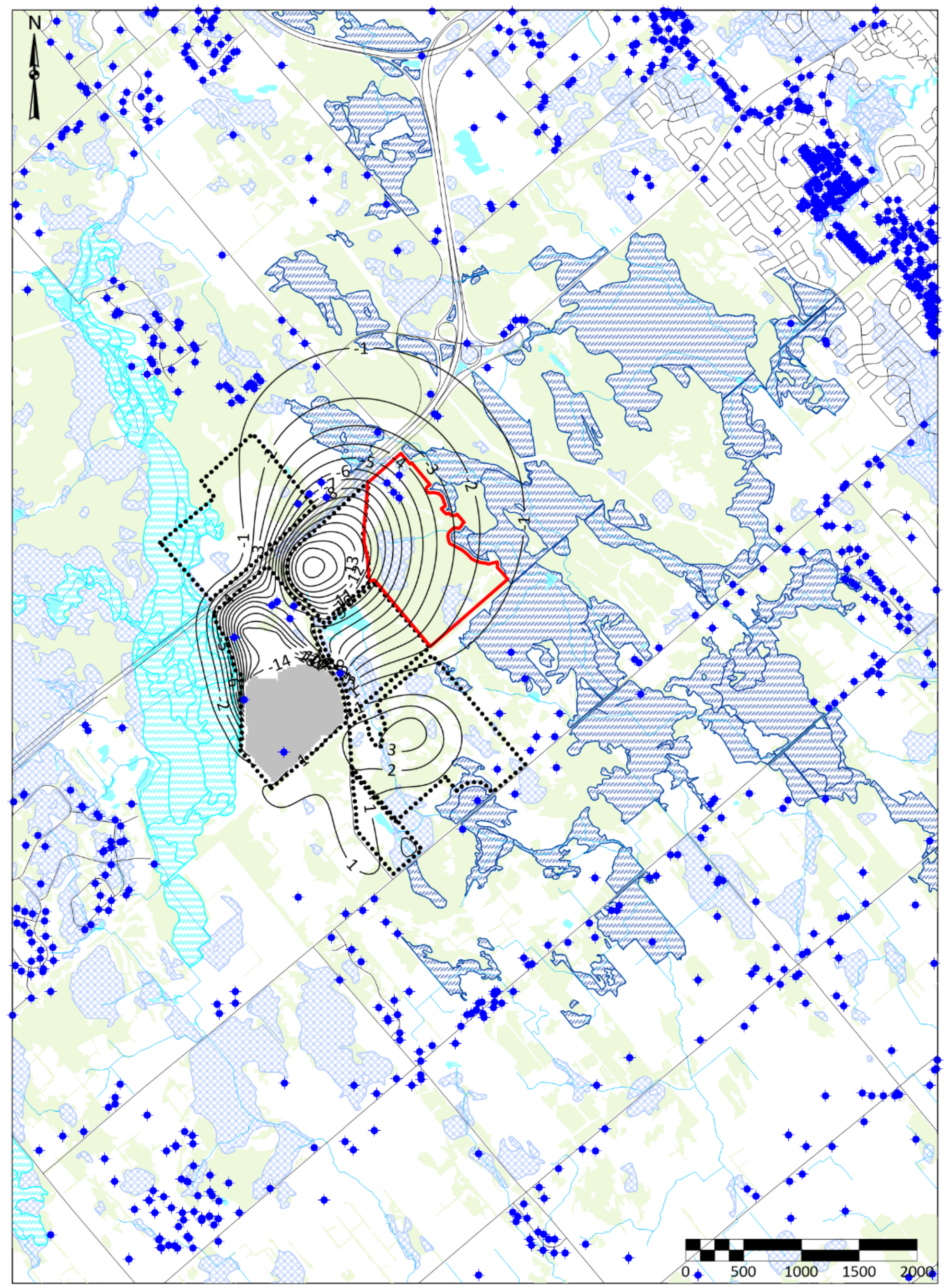
PROJECT No.	PHASE	Rev.	FIGURE
19130670			44



WEATHERED BEDROCK (LAYER 2)



TRANSMISSIVE ZONE (LAYER 8)



GULL RIVER (LAYER 10)

LEGEND

- 🟩 WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▦ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- 🟦 WATERBODY
- ⬜ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ⋯ EXISTING QUARRY LICENSE BOUNDARY
- —1— SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

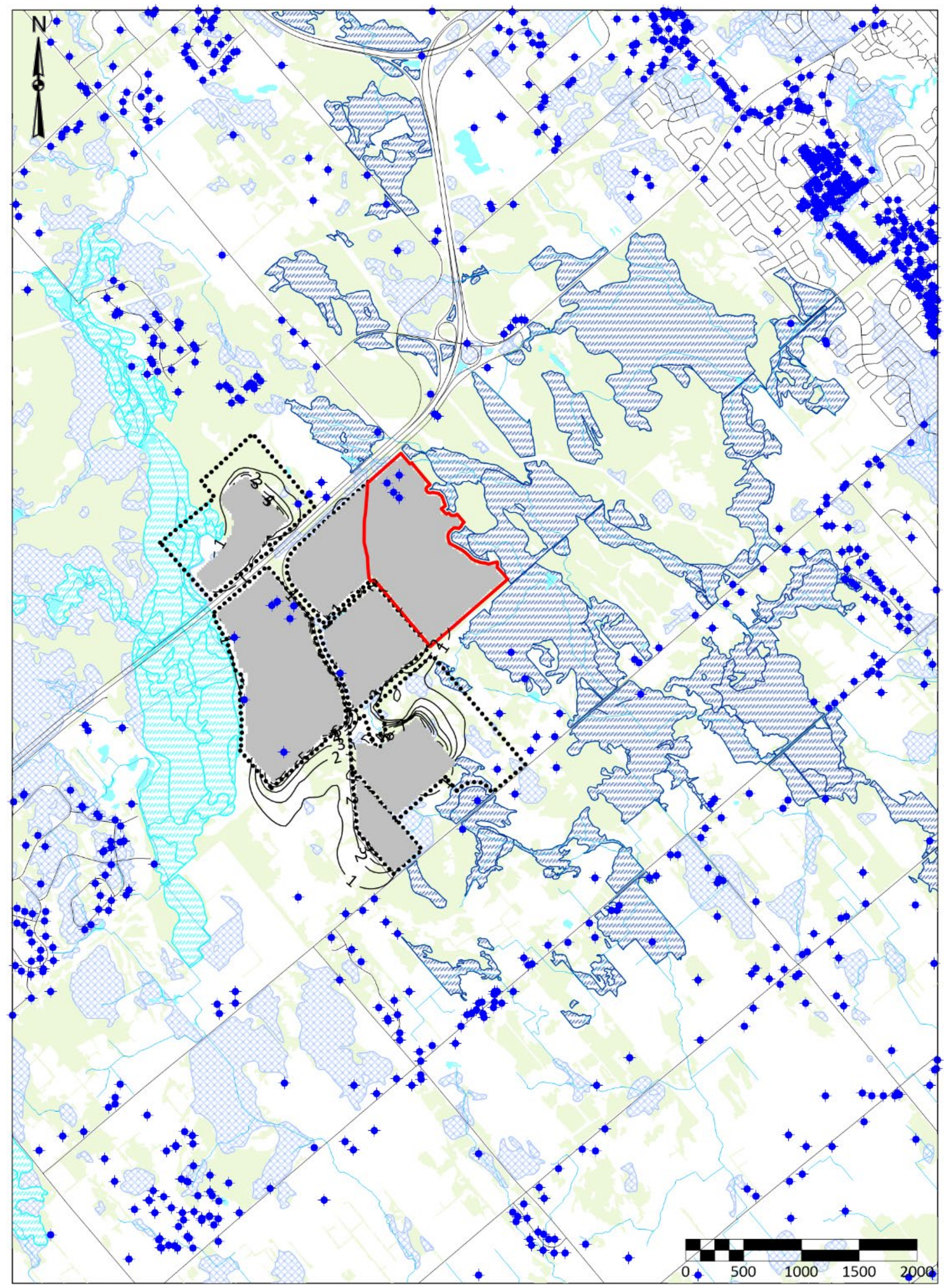
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

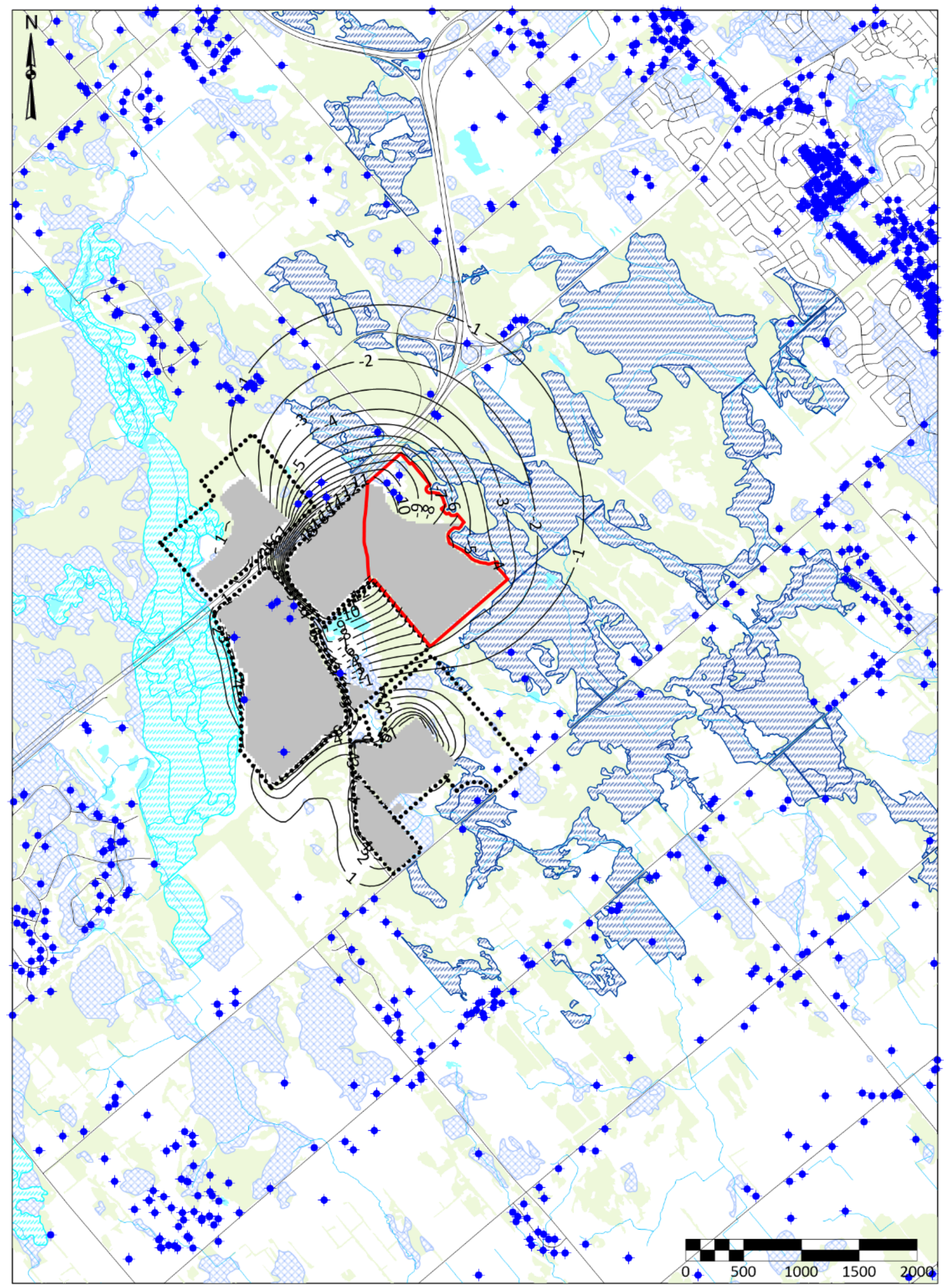
YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED GROUNDWATER DRAWDOWN – SCENARIO 7 ALL QUARRIES EXCEPT PROPOSED STITTSVILLE 2 QUARRY AT FULL REHAB) COMPARED TO SCENARIO 2 (EXISTING CONDITIONS)

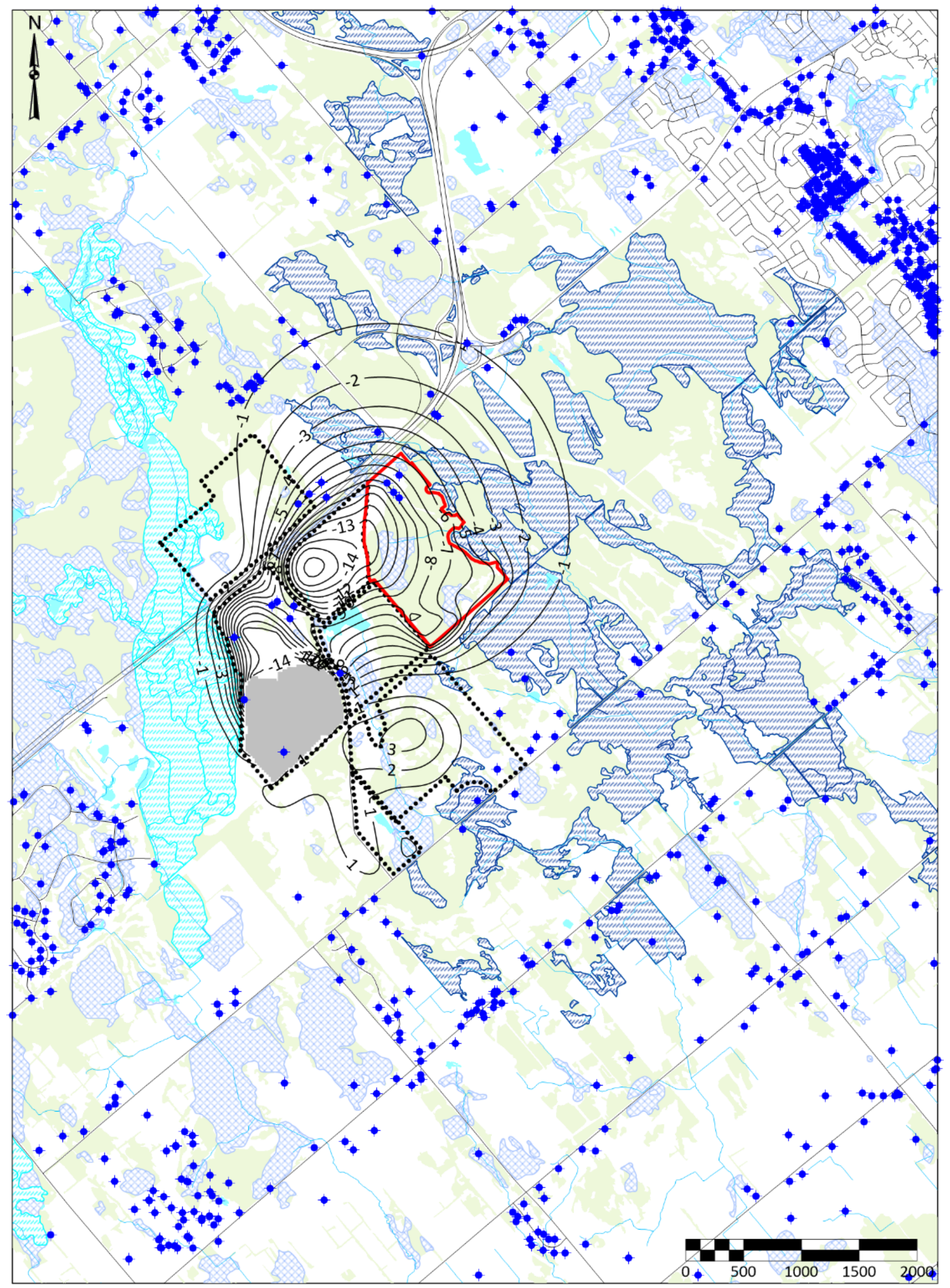
PROJECT No.	PHASE	Rev.	FIGURE
19130670			45



WEATHERED BEDROCK (LAYER 2)



TRANSMISSIVE ZONE (LAYER 8)



GULL RIVER (LAYER 10)

LEGEND

- 🟩 WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▨ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- 🟦 WATERBODY
- ⬜ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ···· EXISTING QUARRY LICENSE BOUNDARY
- –1– SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

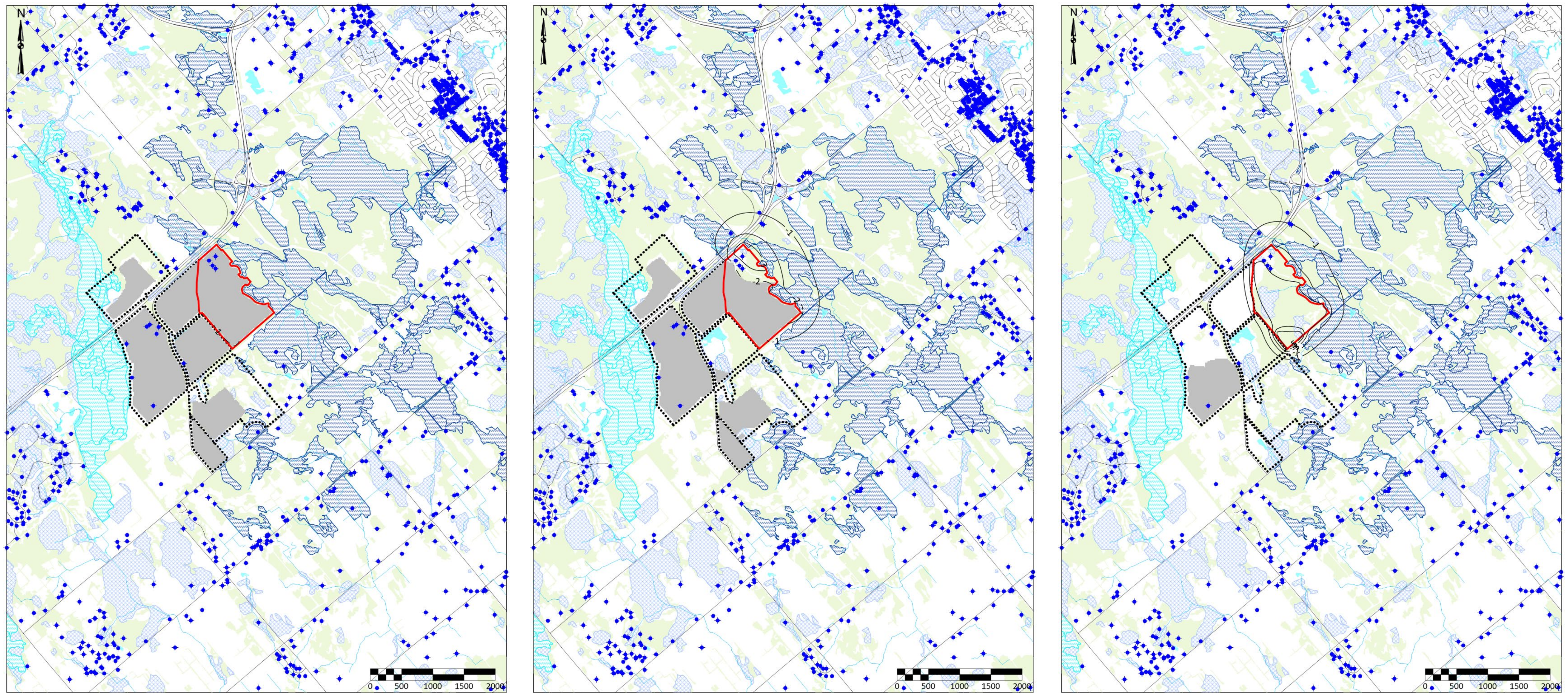
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED GROUNDWATER DRAWDOWN – SCENARIO 8 (ALL QUARRIES AT FULL REHAB INCLUDING PROPOSED STITTSVILLE 2 QUARRY) COMPARED TO SCENARIO 2 (EXISTING CONDITIONS)

PROJECT No.	PHASE	Rev.	FIGURE
19130670			46



WEATHERED BEDROCK (LAYER 2)   TRANSMISSIVE ZONE (LAYER 8)   GULL RIVER (LAYER 10)

LEGEND

- WOODED AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX
- ▨ PROVINCIALLY SIGNIFICANT WETLAND
- ▩ WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)
- ■ WATERBODY
- ■ ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER
- — WATERCOURSE
- — ROADS
- — PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
- ······ EXISTING QUARRY LICENSE BOUNDARY
- –1– SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
- ✦ WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

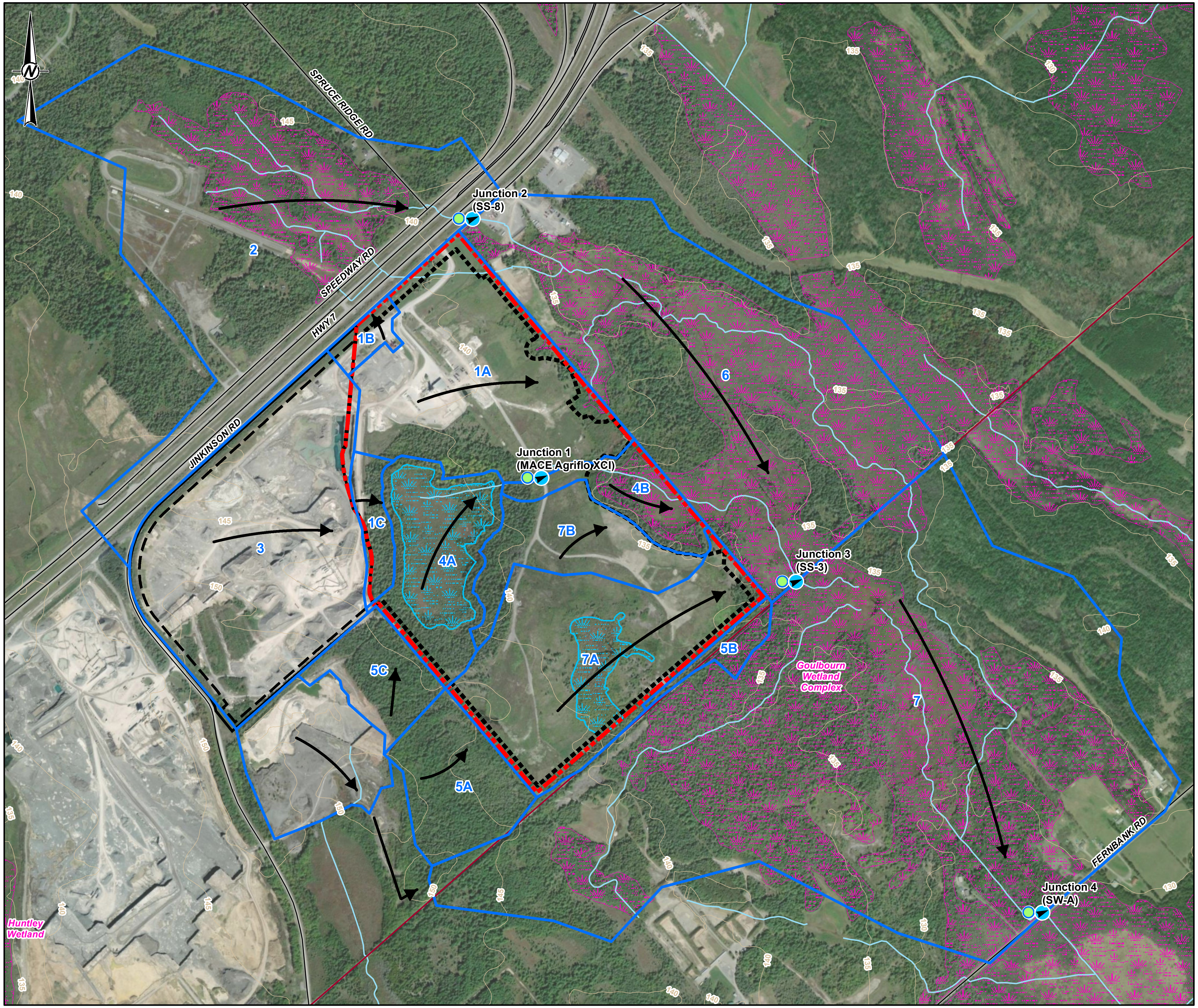
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT
wsp

YYYY-MM-DD	2022/07/28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
SIMULATED ADDITIONAL GROUNDWATER DRAWDOWN FROM
STITTSVILLE 2 QUARRY REHAB WITH ALL OTHER QUARRIES
AT FULL REHAB

PROJECT No.	PHASE	Rev.	FIGURE
19130670			47



KEY MAP

SCALE 1:1,000,000

LEGEND

●	JUNCTION
◤	FLOW MEASUREMENT LOCATION
—	ROADWAY
—	OTN SEGMENT DERIVED
—	TOPOGRAPHIC CONTOUR, metres
—	WATERCOURSE
→	FLOW DIRECTION
▭	SUB-CATCHMENT AREA
▨	PROVINCIALLY SIGNIFICANT WETLAND (PSW)
▨	WETLAND (NOT PROVINCIALLY SIGNIFICANT)
⬚	PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
⬚	PROPOSED STITTSVILLE 2 QUARRY EXTRACTION AREA
▭	STITTSVILLE QUARRY LICENSED AREA
⬚	STITTSVILLE QUARRY EXTRACTION AREA

0 120 240 480

1:12,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

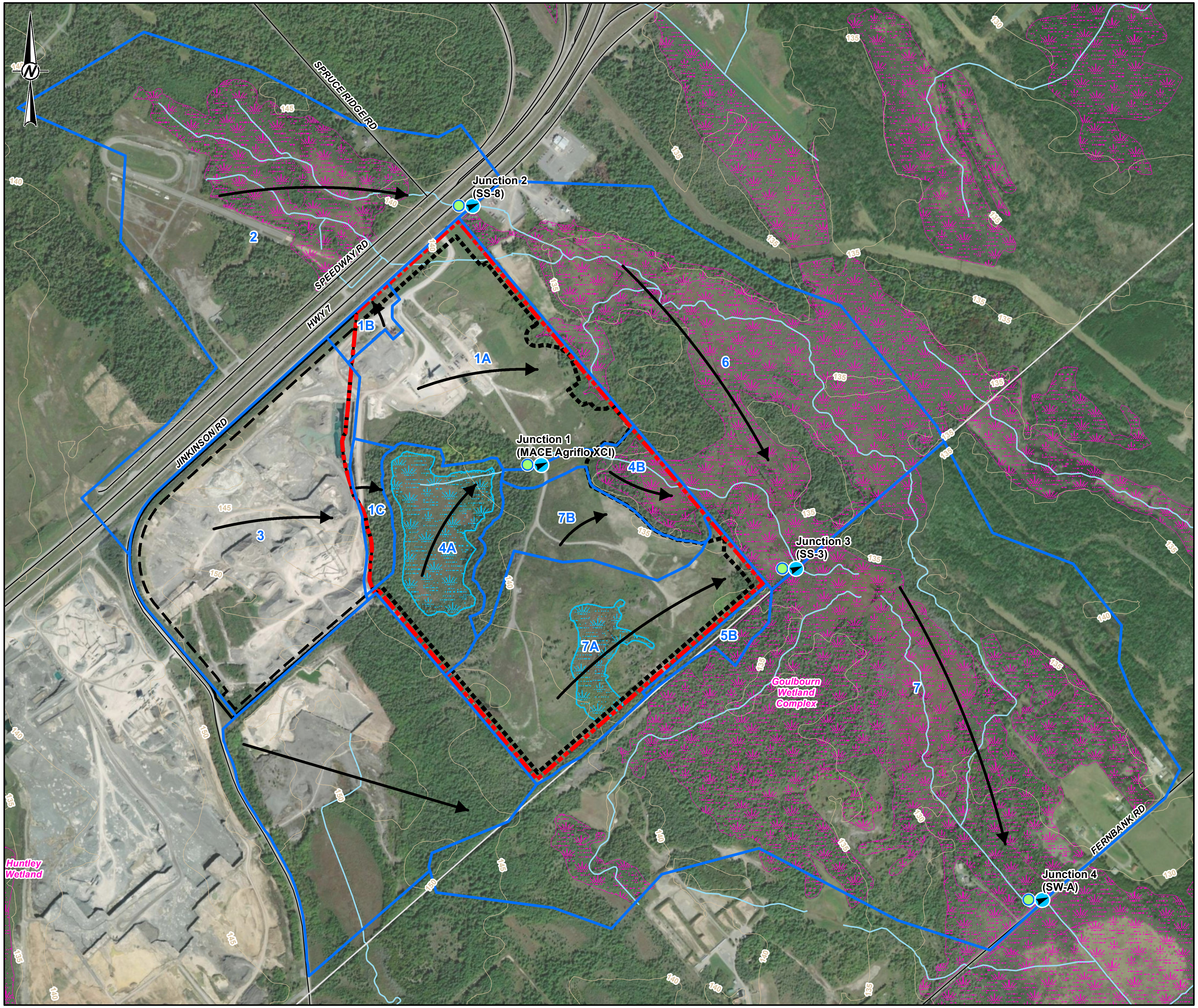
TITLE
HYDROLOGIC MODEL CATCHMENT BOUNDARIES - SCENARIO 2 (EXISTING CONDITIONS)

CONSULTANT

YYYY-MM-DD	2023-07-31
DESIGNED	BH
PREPARED	BR/MG
REVIEWED	MR
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	48

PATH: S:\Clients\Tomlinson\Stittsville\19130670\99_PROJ\19130670_Tomlinson_Stittsville2Quarry\0008_Level_1_2_Water_Report\19130670-0008-CH-0048.mxd PRINTED ON: 2023-07-31 AT: 3:59:07 PM



KEY MAP

SCALE 1:1,000,000

LEGEND

- ● JUNCTION
- ● FLOW MEASUREMENT LOCATION
- — ROADWAY
- — RAIL TRAIL
- — TOPOGRAPHIC CONTOUR, metres
- — WATERCOURSE
- → FLOW DIRECTION
- ☐ SUB-CATCHMENT AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- ▨ WETLAND (NOT PROVINCIALLY SIGNIFICANT)
- ☐ PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
- ☐ PROPOSED STITTSVILLE 2 QUARRY EXTRACTION AREA
- ☐ STITTSVILLE QUARRY LICENSED AREA
- ☐ STITTSVILLE QUARRY EXTRACTION AREA

0 120 240 480

1:12,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
HYDROLOGIC MODEL CATCHMENT BOUNDARIES – SCENARIO 4 (ALL QUARRIES EXCEPT PROPOSED STITTSVILLE 2 QUARRY AT FULL DEVELOPMENT)

CONSULTANT

wsp

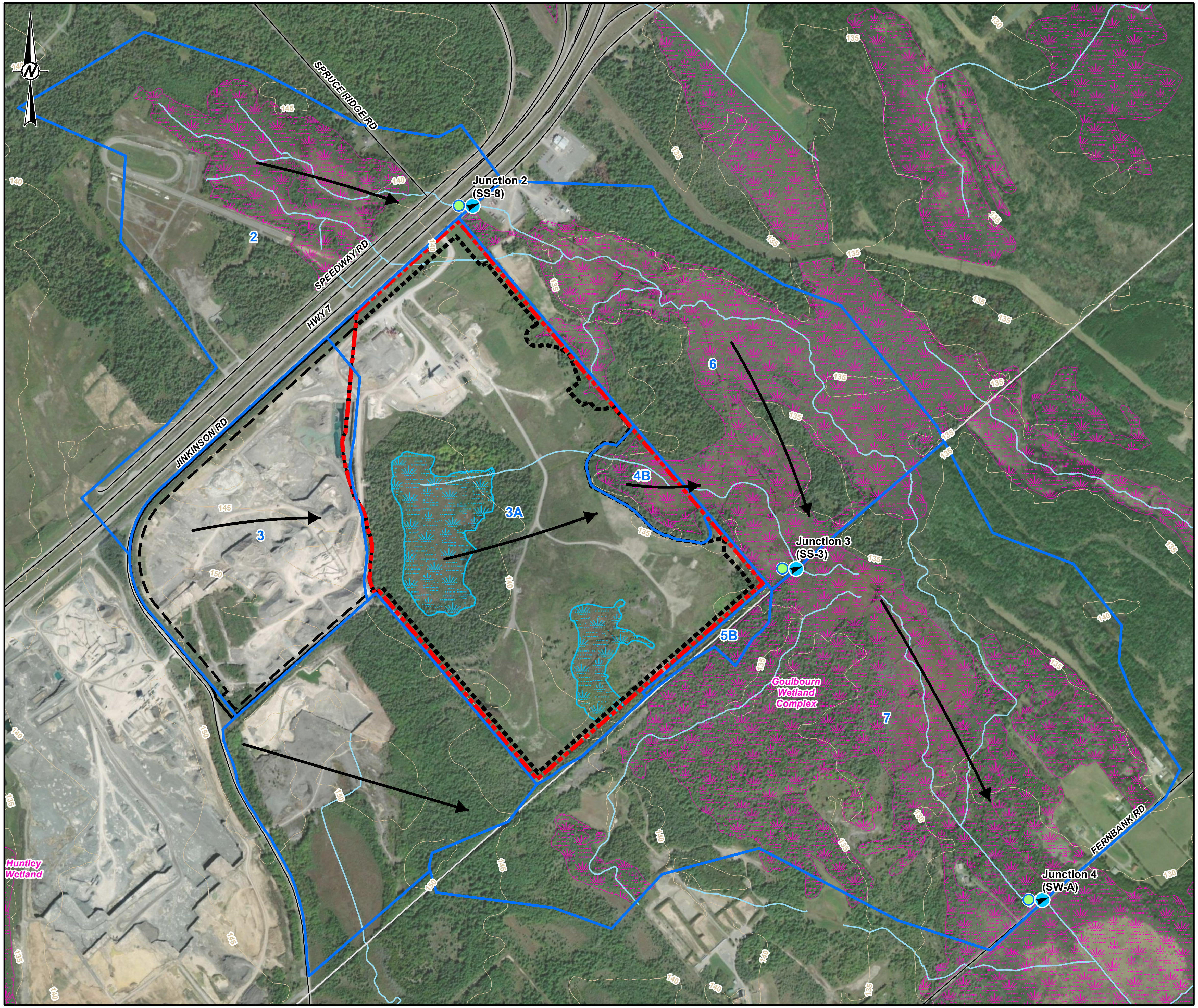
YYYY-MM-DD	2023-07-31
DESIGNED	BH
PREPARED	BR/MG
REVIEWED	MR
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	49

PATH: S:\Clients\Tomlinson\Stittsville\19130670\99_PROJ\19130670_Tomlinson_Stittsville2Quarry\0008_Level_1_2_Water_Report\19130670-0008-CH-0049.mxd PRINTED ON: 2023-07-31 AT: 4:02:08 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm



KEY MAP

SCALE 1:1,000,000

LEGEND

- ● JUNCTION
- ◐ FLOW MEASUREMENT LOCATION
- — ROADWAY
- — RAIL TRAIL
- — TOPOGRAPHIC CONTOUR, metres
- — WATERCOURSE
- → FLOW DIRECTION
- ☐ SUB-CATCHMENT AREA
- ▨ PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- ▨ WETLAND (NOT PROVINCIALLY SIGNIFICANT)
- ☐ PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
- ☐ PROPOSED STITTSVILLE 2 QUARRY EXTRACTION AREA
- ☐ STITTSVILLE QUARRY LICENSED AREA
- ☐ STITTSVILLE QUARRY EXTRACTION AREA

0 120 240 480
1:12,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT
R.W. TOMLINSON LIMITED

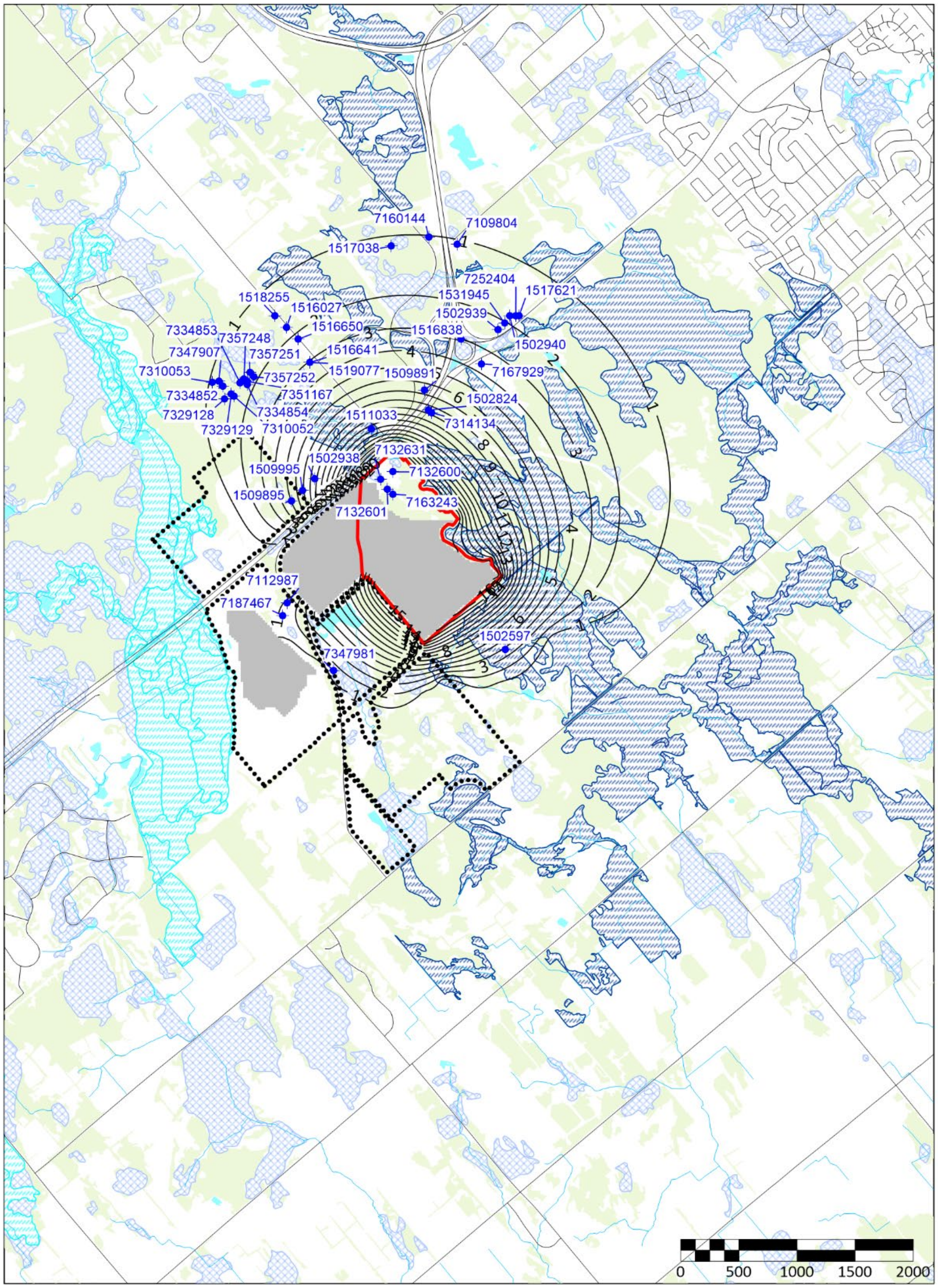
PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND 2 WATER REPORT

TITLE
HYDROLOGIC MODEL CATCHMENT BOUNDARIES – SCENARIOS 5/8 (ALL QUARRIES AT FULL DEVELOPMENT / REHAB INCLUDING PROPOSED STITTSVILLE 2 QUARRY)

CONSULTANT

YYYY-MM-DD	2023-07-31
DESIGNED	BH
PREPARED	BR/MG
REVIEWED	MR
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0008	0	50



TRANSMISSIVE ZONE (LAYER 8)

LEGEND

🟩	WOODED AREA	—	WATERCOURSE
▨	PROVINCIALLY SIGNIFICANT WETLAND - NORTH GOULBOURN WETLAND COMPLEX	—	ROADS
▨	PROVINCIALLY SIGNIFICANT WETLAND	—	PROPOSED STITTSVILLE 2 QUARRY EXTRACTION LIMIT
▩	WETLAND AREA (NOT PROVINCIALLY SIGNIFICANT)	▪▪▪▪	EXISTING QUARRY LICENSE BOUNDARY
🟦	WATERBODY	— 1 —	SIMULATED GROUNDWATER DRAWDOWN CONTOUR (m)
⬜	ZONE OF EXTRACTED BEDROCK WITHIN SPECIFIC MODEL LAYER	◆	WATER WELL (MECP WWIS)

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
LEVEL 1 AND LEVEL 2 WATER REPORT

CONSULTANT

YYYY-MM-DD	2022-07-28
PREPARED	SPS
DESIGN	SPS
REVIEW	BH
APPROVED	BH

TITLE
WWIS WATER WELLS LOCATED WITHIN THE PREDICTED ONE METRE DRAWDOWN CONTOUR IN THE TRANSMISSIVE ZONE

PROJECT No.	PHASE	Rev.	FIGUAE
19130670		0	51

APPENDIX A

Author Qualifications and Experience

Education

Master's of Applied Science Environmental Engineering, Carleton University, Ottawa, Ontario, 2006

Bachelor Environmental Engineering, Carleton University, Ottawa, Ontario, 2003

Bachelor of Arts Psychology, University of Guelph, Guelph, Ontario, 1996

Certifications

Registered Professional Engineer, Professional Engineers of Ontario, March 2009

WSP Canada Inc. – Ottawa, Ontario

Career Summary

Brian Henderson, P.Eng., is an Environmental Engineer with WSP Canada Inc. (previously Golder Associates), in Ottawa. He holds B.Eng. and M.A.Sc. degrees, both from the department of Civil and Environmental Engineering at Carleton University. He manages a wide variety of hydrogeological and environmental projects including borehole drilling, groundwater and surface water analysis and groundwater monitoring well installation. He has experience with the construction of numerical groundwater flow models used to assess the potential hydrogeological impacts of quarry and construction de-watering and larger scale models for regional studies.

Employment History

WSP Canada Inc.(previously Golder Associates Ltd.) – Ottawa, Ontario

Environmental Engineer (2006 to Present)

Brian is responsible for project management, technical analysis, data management and reporting for a variety of hydrogeological and environmental projects. In this role he leads the planning, management and execution of permitting applications, groundwater resource protection studies and other environmental/hydrogeological projects. Brian carries out groundwater sampling, field investigations (including soil and groundwater investigations and monitoring); residential groundwater sampling; data management, analysis and interpretation. In addition, he monitors and reports on the compliance of quarry sites and landfills in accordance with their Certificates of Approval and Permits to Take Water. Brian performs groundwater modelling for wellhead protection studies, construction-related groundwater control and quarry hydrogeological studies.

Carleton University – Ottawa, Ontario

Teaching Assistant (2003 to 2005)

Conducted problem analysis sessions for several environmental engineering courses; prepared and coordinated seminars; and helped students one on one. Courses included third year contaminant transport, third year water resources engineering and a fourth year risk assessment course.

City of Ottawa – Ottawa, Ontario

Engineering Assistant (2003)

Working under supervision of City of Ottawa standards engineer, helped to write the City of Ottawa's Sewer Use Guidelines, attended meetings from other departments about the guidelines, researched current acceptable products to determine if they would meet future standards and reviewed new products to establish if they meet with the City's standards.

Carleton University – Ottawa, Ontario

Research Assistant – NSERC Undergraduate Research Award (2002)

Conducted research on the separation of cellulose from sugarcane bagasse plant residue; applied laboratory procedures and analytical techniques to investigate the effectiveness of the separation for a series of individual experimental trials; and designed a bench-scale model for the continuous separation of cellulose based on the experimental trials.

City of Ottawa – Ottawa, Ontario

Laboratory Assistant (2001 to 2002)

Laboratory tested asphalt, aggregates and concrete used in road construction. Laboratory tests included particle size distribution and proctor values for aggregates, the compressive strength of concrete, and particle distribution, volume of voids, percent asphalt cement, and marshal properties for asphalt. In the field, core samples were taken and densities of asphalt were measured using a nuclear density gauge.

PROJECT EXPERIENCE – HYDROGEOLOGY

Rehabilitation of the West Block Ottawa, Ontario	Undertook the hydrogeological components associated with the rehabilitation of the West Block prior to occupation by the House of Commons. Brian prepared a Category 3 Permit to Take Water (PTTW) application and supporting documentation for water taking for construction dewatering from the proposed excavations inside and outside of the building.
Retrofit, Historical Restoration and Seismic Upgrade of the Wellington Building Ottawa, Ontario	Undertook the hydrogeological components associated with the assessment, and development of a treatment system for contaminated groundwater which was encountered under the floor slab. Brian undertook the modelling required to estimate potential groundwater inflow to the treatment system.
Major Rehabilitation of the Government Conference Centre Ottawa, Ontario	Undertook the hydrogeological components associated with the rehabilitation of the Government Conference Center prior to occupation by the Senate of Canada. Brian designed the field testing components of the hydrogeological program and prepared a Category 3 Permit to Take Water (PTTW) application and supporting documentation for water taking for construction dewatering from the proposed excavations inside and outside of the building.
Integrated Road, Sewer and Watermain Replacement/ Rehabilitation Ontario	Conducted background review, technical hydrogeological analysis and reporting related to infrastructure installation/replacement throughout the City of Ottawa. Analysis included predictions of the rate of groundwater inflow, water quality testing and the identification of hydrogeological risks.
Permit to Take Water Applications/ Environmental Activity and Sector Registry Documentation Ontario	Conducted background review, technical hydrogeological analysis and reporting related to Category 1, 2 and 3 Permit to Take Water (PTTW) applications as well as dewatering and discharge plans to support Environmental Activity and Sector Registry (EASR) registrations for construction dewatering projects, quarry dewatering and pumping tests.
Groundwater Numerical Modelling Ontario	Conducted hydrogeological investigations for proposed and existing quarry sites and construction dewatering projects. Developed detailed conceptual and numerical models for groundwater flow, and demonstrated impacts to local environment.
Groundwater and Surface Water Monitoring Programs Ontario	Managed groundwater and surface water monitoring programs; conducted data checks, technical review and analysis; and, prepared a comprehensive annual report for various landfill and quarry sites.

Potable Water and Wastewater Expansion
Village of Limoges, Ontario

In response to a hydraulic review of the potable water and wastewater systems for the Village of Limoges, Golder completed the necessary studies to inform a Master Plan for the two systems in accordance with the requirements of a Municipal Class Environmental Assessment. The Master Plan addressed the growth potential and the capacity constraints to develop a long-term outlook for the community. Brian served as Project Manager and Hydrogeologist for this project. As Project Manager he was responsible for budget/schedule maintenance and control, QA/QC of deliverables, development of a health & safety plan, communication with client and stakeholders, contractor guidance and supervision as well as team organization and communication. Brian also carried out data analysis, report preparation, field program design and water level/sample collection to complete a hydrogeological study to evaluate possible well locations.

Hydrogeological and Hydrological Assessments for Quarry Licensing
Ottawa (Goulbourn Twp.), Ontario

Golder carried out the necessary hydrogeological, hydrological and ecological studies to support applications under the Aggregate Resource Act and the Planning Act for a site plan license for a new quarry. Brian developed detailed conceptual and numerical models of groundwater flow, demonstrated potential impacts to local environment and proposed mitigative measures.

Hydrogeological Assessment for Quarry Licensing
Ottawa (Gloucester Twp.), Ontario

Golder carried out a hydrogeological studies to support an application under the Aggregate Resource Act and the Planning Act for a site plan license for a new quarry. Brian developed detailed conceptual and numerical models of groundwater flow, demonstrated potential impacts to local environment and proposed mitigative measures. He carried out on-site hydraulic conductivity testing and groundwater/surface water interaction studies. He was responsible for designing the field program and health & safety plan and preparing the report.

Hydrogeological Assessment for Quarry Licensing
Canaan Quarry Expansion, Ottawa, Ontario

Golder carried out a hydrogeological study to support an application under the Aggregate Resource Act and the Planning Act for a site plan license for a quarry expansion. Brian developed detailed conceptual and numerical models of groundwater flow, demonstrated potential impacts to local environment and proposed mitigative measures. He carried analysis of on-site hydraulic conductivity testing data. He was responsible for designing the field program and health & safety plan and preparing the report.

Conceptual Design for the Remediation of a Closed Landfill
County of Northumberland, Ontario

Golder presented a number of remediation alternatives to the County to address surface water compliance issues arising from leachate derived impacts identified in a nearby creek caused by a closed landfill. After a review and analysis of existing data, Brian developed the conceptual groundwater flow model, carried out numerical modelling of the remediation options, and prepared reports.

Options Evaluation and Preliminary Design for Tailings Management Option
Nunavut

Golder completed a tailings and waste rock management options evaluation and preliminary design of selected tailings management options at a mine site in Nunavut. Brian completed monitoring well development and sampling for groundwater quality of a deep monitoring well below permafrost using the WestbayTM monitoring well system.

Groundwater Vulnerability Study
Kingston, Ontario

Golder completed a Groundwater Vulnerability Study for the municipal water supply well servicing a subdivision in the northeast part of Kingston, Ontario. The groundwater vulnerability study included the delineation of the wellhead protection area (WHPA) around the well and the determination of vulnerability scores for the different zones within the WHPA. Brian was responsible for field program design, compilation, interpretation and analysis of data and report preparation. He also carried out the QA/QC of deliverables, conceptual model development and numerical modelling.

Phase III ESA at the Ottawa International Airport
Ottawa, Ontario

Golder completed a Phase III Environmental Site Assessment at the MacDonald-Cartier Ottawa International Airport which attempted to define the extent of groundwater and soil impacts based on the data gap analysis and the water quality results from the available monitoring wells installed during previous investigations. Brian was responsible for the collection of soil and groundwater samples, field program development, data analysis and report preparation. He also carried out compilation and interpretation of data, conceptual model development and contractor guidance and supervision.

Wellhead Protection Study
Deloro, Ontario

Golder carried out a Wellhead Protection Study for the Village of Deloro municipal well. The study included a groundwater vulnerability analysis, a threats inventory and a water quality risk assessment. Brian carried out groundwater flow modelling for the delineation of wellhead protection areas for the municipal well in Deloro. He conducted groundwater vulnerability mapping using ISI methods within the delineated areas.

PROJECT EXPERIENCE – HYDROGEOLOGY - INFRASTRUCTURE

Combined Sewage Storage Tunnel
Ottawa, Ontario

Golder carried out geotechnical and hydrogeological investigations for a new 6 km combined sewer storage tunnel system in Ottawa. A field investigation and reporting program was completed through the downtown core to support the preliminary and detail design team. Brian assisted with the design and implementation of the hydrogeological field program, carried out the packer test data analysis, compiled and interpreted data and completed pumping tests which were challenging due to the location on the streets of downtown Ottawa. Results of the hydrogeological assessment were included in a report used as a supporting document for a Permit to Take Water application for construction dewatering for the project. Brian also provided technical review and guidance to the team and the guidance and supervision of contractors.

South Nepean Collector Sewer Phase Two
Ottawa, Ontario

Undertook hydrogeological investigation for 2.5 kilometers of new deep trunk sewer in Barrhaven just north of the Jock River through sensitive clays, bouldery glacial till with permeable sand seams, and limestone bedrock. Providing hydrogeological input to design, tender documents and construction, including a PTTW application with supporting documentation. Key issues included assessment of the potential for basal heave, basal instability and general excavation conditions for the 6 to 10 metre deep excavations.

Ottawa Light Rail Transit Preliminary Design Ottawa, Ontario	From 2010 to 2012, Golder carried out geotechnical, environmental and hydrogeological investigations for a new 12.5 km light rail transit system in Ottawa. A field investigation and reporting program was completed through the downtown core to support the preliminary design team. Brian assisted with the design and implementation of the hydrogeological field program, carried out the packer test data analysis, compiled and interpreted data and completed pumping tests which were challenging due to the location on the streets of downtown Ottawa. Brian also provided technical review and guidance to the team and the guidance and supervision of contractors.
West Transitway Extension (Bayshore Station to Moodie Drive) Ottawa, Ontario	Undertook the hydrogeological components of the functional and detailed design for the West Transitway extension from Bayshore Station to Moodie drive. Subsurface conditions were determined using pre-existing information and a limited number of new test pits and boreholes/monitoring wells. A pumping test was carried out in the vicinity of Moodie Drive, due to the high hydraulic conductivity of the shallow bedrock, and numerical modelling analyses were undertaken to evaluate the issues related to construction dewatering. Golder obtained draft PTTW's for construction dewatering associated with construction of Phases 1 and 2.
Manotick Watermain Link Ottawa, Ontario	Undertook hydrogeological investigations for detailed design of a watermain through the Village of Manotick, including two crossings under the Rideau River. Completed a Permit to Take Water application with supporting documentation.
Spencer Avenue Integrated Road, Sewer and Watermain Construction Ottawa, Ontario	Undertook the, hydrogeological investigation for the integrated replacement of the roadway, watermain and sewer along Spencer Avenue from Western Avenue to Holland Avenue. Providing hydrogeological input to design and construction, and a Permit to Take Water application with supporting documentation.
Gilmour Trunk Sewer Reconstruction Ottawa, Ontario	Undertook the hydrogeological investigation for the integrated replacement of the roadway, watermain and a deep trunk sewer along Gilmour Street, Waverley Street, Cartier Street and Elgin Street, with deep shaft connection to the Rideau Canal Interceptor trunk sewer. Providing hydrogeological input to design, tender documents and construction, including a Permit to Take Water application with supporting documentation.
Lavergne Street Integrated Road Sewer and Watermain Reconstruction Ottawa, Ontario	undertook the hydrogeological component of the design and construction for the integrated replacement of the roadway, watermain and sewer along Lavergne Street, Jolliet Avenue, Ste Monique Street, et al. in Vanier. Project included deep excavations in peats, highly permeability sands below the water table, and shallow shale bedrock. Non-standard construction measures were considered and assessed as a means of limiting the potential for impacts to adjacent structures resulting from compression of the underlying peat soils due to groundwater level lowering. A Permit to Take Water application with supporting documentation was prepared.
Holland Avenue Watermain Replacement Ottawa, Ontario	Geotechnical, hydrogeological and environmental subsurface investigations in support of design and tender of watermain replacement. Mr. Henderson undertook the hydrogeological components of the project, completed a Permit to Take Water application for the City of Ottawa, and assisted in developing construction specifications for soil and groundwater management.

Jockvale Road Jock River Bridge Replacement
Ottawa, Ontario

Undertook the hydrogeological components associated with the detailed design of the Jock River bridge replacement and the widening and reconstruction of Jockvale Road and associated subsurface utilities in Barrhaven. Golder obtained a Category 3 Permit to Take Water (PTTW) for water taking from the excavation for the Jockvale roadway/sewer service trenches, the bridge caissons and the North and South shafts for the construction of the horizontal utility bore below the Jock River. Analytical and numerical modelling was carried out to evaluate rates of water taking and impacts to the sensitive clay deposit and two dozen private water supply wells located within 500 metres of the site. Golder developed a monitoring program to support the water taking activities.

Education

M.Sc. Geology, University of Windsor, Windsor, Ontario, 1988

B.Sc. Geology, Honours, University of Windsor, Windsor, Ontario, 1986

Certifications

Registered Professional Geoscientist, 2002

Languages

English – Fluent

WSP Canada Inc. – Ottawa, Ontario

Employment History

Career Summary

Principal/Senior Hydrogeologist (1997 to Present)

Mr. Kris A. Marentette, M.Sc., P.Geo., is a Principal and Senior Hydrogeologist in the Ottawa office of WSP Canada Inc. (previously Golder Associates), and has 20 years of broad experience in the fields of water supply development, physical hydrogeological characterization studies, regional scale groundwater studies, waste management, contaminated sites assessment /remediation, aggregate resource evaluations and the licensing and permitting of quarry development and expansion projects. Kris is responsible for business development, project management, and senior technical review of hydrogeology, quarry and sand and gravel pit development and expansion, golf course irrigation, site assessment and remediation projects, and waste facility siting, design, operation and environmental compliance monitoring assignments from the Ottawa office.

From 1997 to 2001, Mr. Marentette was Project Manager for Golder Associates' component of one of the largest Environmental Site Assessment (ESA) contracts in Canada which involved the assessment of over 780 sites which were being transferred from Transport Canada to NAV CANADA. Golder Associates completed Phase I ESA of approximately 400 sites of which about 130 sites required Phase II ESA activities. The sites ranged from small antennas towers to large, complex international airports. Project involved considerable logistic planning to mobilize personnel across the country, familiarity with federal and provincial soil and groundwater remediation criteria, development of site-specific remediation options (including permafrost sites), and ongoing interaction with consultant team and Transport Canada/NAV CANADA.

Kris has also been involved as principal consultant or senior reviewer for over 100 Phase I ESAs and over 50 Phase II ESAs completed by the Ottawa office. These projects included industrial, commercial, and residential properties ranging from former coal gasification plants to microcircuit manufacturers. Projects have included an evaluation of permitting requirements related to waste water discharges and air emissions as well as designated substances surveys. Kris has also conducted subsurface investigations at numerous bulk storage, fuel dispensing and pipeline sites; development of groundwater and soil vapour monitoring programs; design and permitting of remedial measures including product recovery and excavation of contaminated soil; supervision and verification of site remediation.

Kris has provided environmental consultation services to many wood product manufacturers in Renfrew County and Lanark County in the context of assessing environmental impacts of wood waste storage and lumber yard and sawmill operations on the natural environment. While working for the wood product manufacturers, Kris established a consistent approach to site investigations and set a focused list of leachate indicator parameters for groundwater and surface water assessments which has met with Ontario Ministry of Environment (MOE) approval.

Kris has been the Golder Associates Project Manager on a number of Ministry of Natural Resources quarry and pit licensing projects for both new operations and expansions to existing operations and has extensive experience in managing these complex, multi-disciplinary projects. Participated in comprehensive aggregate resource evaluations of Paleozoic sedimentary sequences (limestone) and Precambrian marble deposits at quarries in eastern Ottawa for the purpose of developing preferred site development plans to maximize the production of high quality aggregate products. The aggregate resource evaluations have typically included borehole coring, geological core logging, geophysical evaluations and comprehensive laboratory testing programs. Participated in other quarry-related projects associated with the Ministry of Environment Permit to Take Water Program and the issuance of Certificates of Approval (Industrial Sewage Works) under Section 53 of the Ontario Water Resources Act as well as studies undertaken for the purpose of complying with requirements under the Aggregate Resources Act. In the case of the Permit to Take Water approvals and industrial sewage works applications under Sections 34 and 53 of the Ontario Water Resources Act, Kris has consulted with, and interacted extensively, with MOE personnel in both the local District and Regional offices and with key personnel within the Environmental Assessment and Approvals Branch of the MOE in Toronto. Kris was the Project Manager assigned to assist the City of Ottawa in a comprehensive project focused on assisting City staff in understanding the intricate details of the MOE's Permit to Take Water Program. Kris is also well known to the local conservation authorities (Rideau Valley Conservation Authority, Mississippi Valley Conservation Authority and South Nation Conservation) as a result of involvement in water supply and quarry-related projects in the Ottawa area and has interacted with the Ontario Stone, Sand & Gravel Association on various issues related to the aggregate industry (e.g., addressing the MOE concern associated with the potential presence of dinitrotoluene in quarry discharge water, source water protection, etc.). Kris has appeared as an expert witness before the Ontario Municipal Board on quarry-related applications.

Golder Associates Ltd. – Ottawa, Ontario

Hydrogeologist/Senior Hydrogeologist (1988 to 1997)

Responsible for business development and the initiation, implementation and direction of hydrogeological investigations from the Ottawa office. Projects have included test well drilling programs for private services developments; subsurface investigations as related to the installation of subsurface sewage disposal systems; communal water supply investigations; and, regional hydrogeological studies to assist in establishing planning policies for future private services developments and to develop standards for water well construction.

Project manager for numerous hydrogeological studies of existing/proposed landfill sites including the assessment of impacts on water resources and developing and implementing monitoring programs and contingency and remedial action plans. Participated in hydrogeological aspects of waste management studies, preparation and submission of documentation to obtain Emergency Certificates of Approval and Site Interim Expansions of landfill sites under both the Environmental Assessment Act and Environmental Protection Act. Projects have included preparation of landfill site development and operations plans including evaluations of landfill final cover design options. Expert testimony at hearings before the Environmental Assessment Board.

Also responsible for investigation, design and implementation of soil and groundwater remediation programs at hydrocarbons, metals, solvents, and PAH contaminated sites including the risk assessment approach to site management. Projects have included third party peer review of site remediation programs.

Conducted hydrogeological assessments of quarry developments/expansions and pre-acquisition environmental site audits.

PROJECT EXPERIENCE – WATER RESOURCES MANAGEMENT

Village of Winchester Water Supply Project Ontario, Canada	Project Hydrogeologist for the Village of Winchester Water Supply Expansion Project. This project included the preliminary evaluation of potential target aquifers followed by a comprehensive test well investigation and aquifer characterization program. Participated in the development of a comprehensive Water Resources Protection Strategy.
Rural Subdivision Development Ontario, Canada	Supervised test well drilling programs for numerous residential, industrial and commercial private services subdivision developments including evaluation and selection of target aquifers, development of site specific well construction requirements, analysis and interpretation of physical hydrogeological data and groundwater chemical data and preparation and submission of detailed hydrogeological reports. Responsible for conducting many subsurface investigations as related to the installation of small and large subsurface septic sewage disposal systems for private services developments including projects subject to the Ontario Ministry of the Environment Reasonable Use Guideline B-7.
Communal / Commercial Water Supply Evaluation Ontario, Canada	Project Manager for communal water supply investigations for non-profit housing developments in Elgin and Clayton, Ontario and time share condominium development in Cobden, Ontario; responsible for groundwater resource evaluation with respect to project specific water supply requirements. Conducted hydrogeological assessment of the Evergreen Spring Water Site in the Township of Sebastopol, Ontario for Cott Beverages Ltd.; assessment included characterization of geological setting, quantity, quality and age of spring water and evaluation of potential sources of contamination in the vicinity of the spring.
Township of Kingston Planning Study Ontario	Conducted hydrogeological study and general terrain analysis of rural Kingston Township to characterize the present status of the Township's groundwater resources to assist in establishing planning policies for locating new developments on private services and to provide standards for water well construction within the Municipality.
Land Development Evaluation Ontario	Conducted a preliminary hydrogeological and terrain evaluation of a 400 acre parcel of land south of the Ottawa International Airport with respect to the feasibility of developing the site as a rural residential subdivision on private services.

PROJECT EXPERIENCE – WASTE MANAGEMENT

Township of Clarence Landfill Buchanan Landfill Bourget, Ontario/Chalk River, Ontario, Canada	Preparation and submission of documentation to the Ontario Ministry of the Environment to obtain an exemption from the Environmental Assessment Act and approval under the Environmental Protection Act for interim expansions of the Township of Clarence Landfill and Buchanan Landfill. Project involved detailed hydrogeological and geophysical site characterization studies, development of mitigation measures to address existing off-site impacts on groundwater and surface water resources and participation in the preparation of the site development and operations reports, trigger mechanisms, and contingency measures, site closure plans, public participation/presentations, document preparation and representation to regulatory agencies. Expert testimony at the Environmental Assessment Board hearings resulting in successful applications.
Dodge Landfill Espanola, Ontario, Canada	Project Hydrogeologist responsible for hydrogeological studies of existing landfill in support of an application to the Ontario Ministry of Environment for a long-term site expansion.
Lanark County Waste Management Master Plan City/Township of Kingston Waste Management Master Plan Ontario, Canada	Hydrogeological consultant on the master plan study teams involving technical aspects and document preparation, Environmental Assessment process, EA level field investigations and evaluation of site-specific engineered containment system requirements at the preferred sites and presentations to the steering committees and the public.
Armbro Mine Landfill Development Marmora, Ontario, Canada	Project Hydrogeologist as part of the Metro Toronto area landfill site search, for hydrogeological assessment, conceptual design and technical feasibility evaluation of constructing a municipal landfill in the 250 metre deep former open pit iron ore mine.
Township of Clarence Waste Management Planning Study Ontario, Canada	As part of a multi-disciplinary team, responsible for the hydrogeological aspects of a long term waste management planning study under the Environmental Assessment Act and Environmental Protection Act, including development and evaluation of alternative waste management components and systems, a systematic landfill site selection process and interaction with the Public Liaison Committee, municipal council and the public.
Municipal Waste Management Planning Studies Ontario, Canada	Participated in hydrogeological aspects of waste management planning studies to identify potentially suitable areas for landfill development to satisfy the long term waste disposal requirements for the Township of Grattan, Township of Pittsburgh and the Townships of Palmerston, North and South Canonto.

Various Landfill Sites
Eastern and Northern Ontario, Canada

Responsible for undertaking and/or managing hydrogeological and waste management studies at in excess of 50 municipal landfill sites. The typical objectives of these studies have been to define the physical and contaminant hydrogeology including use of geophysical methods; undertake site-specific impact assessments on groundwater and surface water resources and gas migration; complete site performance evaluations in terms of current regulatory requirements; develop site-specific remedial action plans; design and implement annual hydrogeological monitoring programs; assist in the preparation of site development, operations and contingency and remedial action plans; and, to assemble the necessary documentation required to apply to the Ontario Ministry of Environment for Certificate of Approval revisions to permit continued disposal. Conducted evaluations of final cover design options using the Hydrologic Evaluation of Landfill Performance (HELP) computer model for the purpose of selecting the most appropriate final cover design for numerous landfills based on hydrogeological considerations, economics and availability of construction materials in the vicinity of the sites.

PROJECT EXPERIENCE – CONTAMINATED SITES INVESTIGATION AND REMEDIATION

Nation-Wide Environmental Site Assessments
Canada

Project Manager for Golder Associates' component of one of the largest environmental site assessment contracts in Canada which involved the assessment of over 780 sites which were being transferred from Transport Canada to NAV CANADA. Golder Associates completed Phase I ESAs of approximately 400 sites of which about 130 sites required Phase II ESA activities. The sites ranged from small antenna towers to large, complex international airports. Project involved considerable logistic planning to mobilize personnel across the country, familiarity with federal and provincial soil and groundwater remediation criteria, development of site-specific remediation options (including permafrost sites), and ongoing interaction with consultant team and Transport Canada/NAV CANADA.

Assessment of Rockcliffe Airbase Lands
Ottawa, Ontario, Canada

Project Manager to participate as part of a multi-disciplinary team assembled to conduct an existing conditions assessment related to potential redevelopment of the Rockcliffe site for residential land use. Completed a review of subsurface environmental investigation reports in terms of identifying potential development constraints associated with soil and groundwater conditions at the site. Presented recommended actions for evaluating issues of potential environmental concern including development of cost estimates to address these concerns.

Environmental Site Assessments
Eastern Ontario, Canada

Senior Reviewer for over 100 Phase I ESAs and over 50 Phase II ESAs completed by the Ottawa office. These projects included industrial, commercial and residential properties ranging from former coal gasification plants to microcircuit manufacturers. Projects have included an evaluation of permitting requirements related to waste-water discharges and air emissions as well as designated substances surveys.

Assessment of Diesel Fuel Release
Smiths Falls, Ontario, Canada

Project Manager for an environmental impact study which focused on a diesel fuel leak at a large industrial site and included the delineation of the areal extent of contamination, assessment with respect to current soil and groundwater remediation criteria and participation in the development and implementation of a site specific monitoring program and evaluation of remedial options.

Petroleum Hydrocarbon Releases
Eastern Ontario, Canada

Conducted subsurface investigations at numerous bulk storage, fuel dispensing and pipeline sites; development of groundwater and soil vapour monitoring programs; design and permitting of remedial measures including product recovery and excavation of contaminated soil; supervision and verification of site remediation.

Investigation of Salt Storage Facilities
Eastern Ontario, Canada

Project Manager for hydrogeological investigation relating to an assessment of poor groundwater quality adjacent to a salt dome near Almonte, Ontario. Project involved an evaluation of existing water quality data, development and implementation of a replacement well drilling program and long term groundwater quality monitoring program; project involved extensive consultation with municipal officials, affected homeowners and representatives from the Ontario Ministry of the Environment. Responsible for hydrogeological impact assessments relating to salt storage facilities near Eganville and Deep River, Ontario. Investigations included reconnaissance level geophysical surveys to characterize general dimension of the contaminant plumes followed by confirmation drilling, monitoring well installation and groundwater sampling programs to delineate the nature and extent of the contaminant plumes originating from the salt storage facilities and to differentiate between groundwater impacts from the salt storage facilities and that from nearby landfill sites.

PROJECT EXPERIENCE – AGGREGATE INDUSTRY

Stittsville Quarry
Township of Goulbourn (Ottawa), Ontario, Canada

Project Manager and Project Hydrogeologist retained by R.W. Tomlinson Limited to provide geoscience and engineering services and to co-ordinate a multi-disciplinary study team in the preparation of the supporting documents, for a submission to the Ontario Ministry of Natural Resources, in support of an application for a Category 2, Class “A” license for a 44 million tonne quarry which intends to extract limestone from below the established groundwater table. Assignment also included preparation and submission of applications to the Ontario Ministry of Environment for approval under Section 34 (Permit to Take Water) and Section 53 (Industrial Sewage Works) of the Ontario Water Resources Act. All required approvals were obtained and the quarry became operational in September 2002. Kris continues to be involved as Project Director on all environmental compliance monitoring requirements associated with the Ministry of Natural Resources aggregate license and the Ministry of Environment approvals under Section 34 and 53 on the Ontario Water Resources Act.

Rideau Road Quarries
City of Gloucester (Ottawa), Ontario, Canada

In 2003, Golder Associates was retained by R.W. Tomlinson Limited to provide geoscience and engineering services and to co-ordinate a multi-disciplinary study team in the preparation of the supporting documents, for a submission to the Ontario Ministry of Natural Resources, in support of an application for a Category 2, Class "A" license for a 40 hectare parcel of land adjacent to Tomlinson's existing quarry operations. The quarry was designed to extract limestone from below the established groundwater table for the production of high quality aggregate suitable for all types of asphalt pavements. Kris was Project Director and Project Hydrogeologist for this assignment and Golder Associates' primary responsibilities included preparation of Level 1 and Level 2 Hydrogeological studies and Natural Environment evaluations of the property. Of particular significant for this project was the innovative approach develop by Golder Associates (in consultation with the Ministry of Natural Resources) for the purpose of addressing the presence of the American ginseng plant species and butternut trees on the property. The aggregate license was issued by the Ministry of Natural Resources in 2006.

Tatlock Quarry
Township of Lanark Highlands, Ontario, Canada

Project Director and Project Hydrogeologist retained in 2002 by Omya Canada Inc. to conduct Level 1 and Level 2 hydrogeological studies in support of an application to the Ministry of Natural Resources for a Category 2, Class "A" license for the extraction of calcitic marble (crystalline limestone) at the Omya Tatlock Quarry located northwest of Perth, Ontario. Golder Associates was also responsible for the preparation of an application for an industrial sewage works approval under Section 53 of the Ontario Water Resources Act. The quarry license application was issued by the Ministry of Natural Resources in April 2006 and the industrial sewage works approval was issued by the Ministry of Environment in March 2006. Kris continues to advise Omya Canada Inc. on matters related to environmental compliance monitoring and other issues pertaining to Ministry of Natural Resources aggregate license and the Ministry of Environment approvals under Section 34 and 53 on the Ontario Water Resources Act.

Dunvegan Quarry
Township of North Glengarry, Ontario, Canada

Project Hydrogeologist retained by the Township of North Glengarry to conducted a peer review of the hydrogeological aspects of the Cornwall Gravel Company Ltd. Dunvegan Quarry license application. The peer review focused on developing an opinion as to whether the Hydrogeological Assessment Report addressed the various components specified as part of a Hydrogeological Level 1 study and Hydrogeological Level 2 study in the context of a Category 2, Class "A" Quarry Below Water.

Klock Quarry
Aylmer, Quebec, Canada

Golder Associates was retained by Lafarge Canada Inc. to conduct the hydrogeological and natural environment assessments associated with obtaining approval for the extraction of limestone from a property situated adjacent to the existing Klock Quarry. Kris is responsible for overall project co-ordination and direction of a multi-disciplinary team.

Brechin Quarry
City of Kawartha Lakes,
Ontario, Canada

Project Manager and Project Hydrogeologist retained by R.W. Tomlinson Limited to complete the necessary hydrogeological, hydrological and ecological studies to support an application under the Aggregate Resources Act. The proposed Brechin Quarry is located in the former Township of Carden within the City of Kawartha Lakes, Ontario. The property covers an area of approximately 206 hectares and involves an aggregate resource of 70 million tonnes with an expected operational timeframe of over 70 years. The assignment involves a comprehensive assessment of the potential effects of quarry development on private water supply wells and an adjacent Provincially Significant Wetland and other natural environment (biological) features as well as consideration of the potential cumulative impacts associated with multiple quarry developments in the area of the proposed Tomlinson Brechin Quarry. This project involves extensive municipal and public consultation as well as interaction with representatives of the Ontario Ministry of Natural Resources and Ontario Ministry of Environment. The aggregate license was issued by the Ministry of Natural Resources in 2009.

TRAINING

Ministry of Environment Approvals Reform and Air Emission Summary and Dispersion Modelling Report Workshop
Ministry of the Environment, 1998

Site Specific Risk Assessment Seminar
Ottawa, 1998

Contaminated and Hazardous Waste Site Management
1997

Occupational Health and Safety Course
1989, 1995

Groundwater Protection in Ontario Conference
Toronto, 1991

Short Course in Dense, Immiscible Phase Liquid Contaminants (DNAPLs) in Porous and Fractured Media
Waterloo Centre for Groundwater Research, 1990

PROFESSIONAL AFFILIATIONS

Associate Member, Ontario Stone Sand and Gravel Association (OSSGA)

Member, Association of Groundwater Scientists and Engineers (N.G.W.A.)

Member, International Association of Hydrogeologists

Member, Ottawa Geotechnical Group, The Canadian Geotechnical Society

Member, Ontario Water Well Association

PROJECT EXPERIENCE – HYDROLOGY/HYDRAULICS

Moira River Flood Mitigation Alternatives Assessment Foxboro, Ontario	Reviewed and updated floodplain mapping for the Foxboro area, identified several alternative flood mitigation alternatives ranging from floodways and hydraulic controls to lot level flood proofing. Alternatives were assessed and compared based on triple bottom line scores. Triple bottom line analysis considered detailed economic analysis using regions specific flood damage curves developed by Golder’s project partner.
Atlantic Gold Hydraulic and Geomorphic Channel Assessments Central Nova Scotia	Senior reviewer and technical advisor for hydraulic and fluvial geomorphic characterization and baseline studies for a mine development northeast of Halifax, Nova Scotia. Tributaries of 15 Mile Stream were inventoried and used as analogues to design channel diversions around proposed open pit mine excavations.
Low Impact Development Treatment Train Tool (LID-TTT) GTA, Ontario	Team lead and hydrology advisor for development of a software tool for modelling and evaluating water balance and nutrient budgets for development sites. Worked with three large conservation authorities in the GTA, through several phases implementation of the LID-TTT, to progressively add model capability for assessing the benefits of various LIDs to support planning and early stage engineering of urban development sites.
Garson Mine Water Management and Inundation Study Sudbury, Ontario	Senior review and technical advice for flood inundation study downstream of the Vale Garson Mine near Sudbury Ontario. The study included an options assessment, development of improved water management operating practices and conceptual design of reservoir retrofits.
International Falls Dam Rule Curve Cultural Study Rainy River, Ontario	The effects of a recently updated operating rule curve at the International Falls Dam on water levels in Rainy River and the potential for changed water levels to affect locations of cultural significance are being investigated on behalf of the International Joint Commission on the Great Lakes.
Credit River Floodline Mapping Mississauga, Ontario	Golder completed the most recent comprehensive update of the flood risk investigation and floodline mapping for the Credit River between Old Derry Road and Lake Ontario. This reach alternately flows through an entrenched bedrock valley and remnant beach plains adjacent to Lake Ontario in the most urbanised part of Mississauga. Mr. MacKenzie served as project staff on this project.

Water Quality Forecasting and Infrastructure
Annapolis Basin, Nova Scotia

Golder was part of a project team working with the Atlantic Innovation Fund / Applied Geomatics Research Group to develop a complex water quality forecasting tool for use by the shell fishing industry in the Digby Gut area. Real time weather forecasts were used to drive real time hydrology and database scenario models of runoff, water quality (bacteriological) and Bay of Fundy tidal fluctuations and their effects on contaminant movement in the Digby Gut. Hydrodynamic modelling was used to estimate contaminant movement and exposure of shell fishing areas to contamination. This information was packaged for use by shell fishers in order to minimize harvests of contaminated shellfish, thereby protecting the resource and minimizing post-harvest dupurification costs. Mr. MacKenzie was the hydrology and hydrometry technical lead for Golder on this project.

Brookfield Homes – Channel Rehabilitation
Brantford, Ontario

Assisted a channel rehabilitation/stabilization assessment and associated ‘field fit’ design for Brookfield at a tributary of Fairchild Creek to address debris removal and channel instability - responsible for field investigations and construction supervision/inspections.

River Diversion Design
Northern Ontario

Technical advisor for baseline channel hydraulics and fluvial geomorphic studies in support of a major mine development project in Northern Ontario to characterize baseline conditions at several stream channels, as well as to advance a conceptual design for a proposed diversion channel.

Borer’s Creek Modelling and Restoration Design
Dundas, Ontario

HEC-RAS modelling and assessment of a failing reach of Borer’s Creek that threatened to expose a high-pressure natural gas pipeline. Design of remedial measures for failing banks and restoration of the affected reach. Coordinated regulatory approvals. The project was successfully implemented before the spring freshet and significantly reduced the risk of damage to the pipeline.

Voisey’s Bay Nickel Mine
Voisey’s Bay, Labrador

A theoretical tailings dam breach was investigated using DAMBREAK to quantify potential impacts on an environmentally sensitive creek. Flood passage downstream of the breach was complicated by several small ponds and alternating sub and supercritical river reaches. Proposed mining operations at the Voisey’s Bay nickel deposit require extensive management of surface waters. Five small dams were considered to safely convey clean water around the proposed tailings facility and to contain and treat tailings water. Modelling and design of the reservoirs and outflow structures was completed using GAWSER.

Plains Midstream – Dechlorination and Approval
Sarnia, Ontario

Technical advisor for the design and permitting of a dechlorination system for the Plains Midstream fractionation plant in Sarnia, Ontario. The system is being designed to reduce the free chlorine concentration in the wastewater discharge. Golder is also preparing the ECA (Industrial Sewage Works) amendment package for the facility, to include additional Limited Operational Flexibility (LOF) for the facility for the additional of the dechlorination system, and future sewage work modifications. LOF for the facility will grant future modifications to the works through the appropriate MOE reporting progress, if a professional engineer can demonstrate the modifications will not alter the process discharge quantity and quality limits established for the facility.

Channel Restoration Design Algonquin Park, Ontario	Technical advisor for the hydraulic design of a stream re-alignment with associated grade controls at an historic train derailment site. Contaminated materials will be removed from the stream bed and banks and adjacent railway embankment. Removal of the contaminated materials will result in a net loss of stream substrate and a change to the fluvial geomorphology of the reach. Grade and stream bank controls were designed to minimize the risks of mobilizing residual contaminants and of significant channel migration.
Omya – Stormwater Management Design and Approvals Perth, Ontario	A review of existing stormwater management infrastructure was completed for an industrial mineral processing site near Perth Ontario. As a result of incremental development of the site, parts of the stormwater management infrastructure were found to be inadequate. Additional stormwater management works were conceptualized and submitted to MOE for approval. Following approval, Golder provided liaison with the local Conservation Authority, completed basic design drawings suitable for design-build and applied for permitting under the Conservation Authorities Act.
OSSGA Carden Plain Cumulative Impact Assessment Carden, Ontario	Due to the increased level of aggregate extraction activity in the Carden Plain area, the Ontario Ministry of the Environment (MOE) requested a multidisciplinary study and impact assessment to evaluate the potential cumulative impacts of quarry dewatering at multiple sites on groundwater, surface water and ecological receptors. Golder was retained by the Ontario Stone, Sand & Gravel Association to complete the required study. The project included extensive interaction with the MOE and the Ministry of Natural Resources (MNR). The objectives of the study were to screen out areas where cumulative impacts are unlikely, identify areas where cumulative impacts are likely, and to provide a preliminary assessment of the potential magnitude of predicted cumulative impacts. For the purpose of this study, a cumulative impact was defined as the additive effect of multiple quarry dewatering operations on groundwater, surface water and/or natural environment features. Golder was responsible for all aspects of this project including the development of the final field programs in consultation with personnel from the MOE. Mr. MacKenzie was the surface water lead for the project and participated in the public consultation aspects of the project.
Technical Reviewer Contaminated Site Channel Design Mississauga, Ontario	Golder was retained to review an options analysis and remedial channel design for a PCB contaminated channel in Mississauga. The remedial design included removal of the most contaminated material and design of a hardened channel lining to secure residual contaminants in-situ. Mr. MacKenzie reviewed the hydraulic channel analysis and design and provided a technical review report for consideration by the municipality and the channel designer.

Contaminated Site Channel Stability Analysis Welland, Ontario	Golder recently completed Phase IV of an assessment of 12 sites in the Niagara River Area of Concern that were identified in the RAP Stage 1 Update as requiring further assessment. The Phase IV study is a detailed assessment of remedial alternatives for the site including passive and intervention options. In support of the passive treatment options, Golder completed a detailed investigation of the complicated stream and wetland hydraulics of one of the sites on Lyon's Creek. In the intervening years since the historic contamination, the site had developed into a wetland, which provided habitat for threatened plant and animal species. The hydraulic conditions were evaluated using one- and two-dimensional hydraulic models (HEC-RAS and RIVER-2D) to identify areas that are at risk for re-suspension of contaminated sediments and areas that are likely to accumulate new un-contaminated sediment with time. The results supported the passive treatment alternative. Mr. MacKenzie led the hydraulic investigation component of the Lyon's Creek study.
Confidential Mine Site Closure Eastern Ontario	Technical advisor for comprehensive surface water investigations in support of a risk assessment at two former uranium mines near Bancroft, Ontario. The studies included meteorology and flow monitoring, water column profiling with a particular focus on lake stratification and turnover, and water quality sampling.
Confidential Mine Site Closure Northern Ontario	Technical advisor for surface water investigations, including streamflow studies, lake column profiling and water quality sampling, at a former nickel mine near Kenora, Ontario.
OPG Atikokan – Environmental Compliance Approval Northern Ontario	Technical advisor for the Environmental Compliance Approval ('ECA') Sewage (including Stormwater) amendment application for the Atikokan GS Biomass Conversion project. The study included a review of existing sewage works and associated ECA and MISA conditions. Implications from the proposed site changes to the sewage works, consisting of process streams (Furnace Ash Treatment Plant, Condenser Cooling Water), sanitary sewage system/lagoons and the coal pile runoff pond, along with their associated ECA conditions.
Confidential Manufacturing Client Norval, Ontario	Baseline characterisation and impact assessment modelling of a proposed shale quarry in order to quantify and where necessary mitigate potential flow, water quality and thermal effects of the quarry on nearby watercourse and wetlands. Included conceptual design of mitigation measures and preparation of application materials for re-zoning and license under the Ontario Aggregate Resources Act.
Big Bay Point Water Balance Barrie, Ontario	Monthly and annual water budgets were prepared using the Thornthwaite Water Budget method. This water budget assessment was performed to determine the rate of marina water pumping required from the proposed development area at Big Bay Point, to the golf course and Environmental Protection Area in support of detailed design of stormwater management facilities to meet post-development peak flow targets. Mr. MacKenzie provided technical advice and senior review for this project.
Baseline Hydrology Study for Proposed Mine Ring of Fire, Northern Ontario	Technical advisor for baseline hydrology studies and effects evaluations in support of a major mine development project in Northern Ontario. Assessments were prepared as part of a multi-disciplinary Environmental Impact Statement (EIS) and Environmental Assessment (EA) under the Canadian Environmental Assessment Act (CEAA).

Quarry License Expansion Flamborough, Ontario	A level II hydrogeology study was completed in support of a rock quarry license expansion application. The surface water component of the study included establishment of eight continuous stream flow gauges and associated baseflow separation analysis. The baseflow separations were used to estimate mean annual recharge to groundwater. This information was provided to Golder hydrogeologists for use in estimating boundary conditions for the FEFLOW groundwater model. In addition, monthly and annual surface water balances were modelled using the Thornthwaite Water Budget method coupled to a GIS procedure. The fraction of surplus water that infiltrates was estimated using GIS and the method outlined in MOE 2003. The infiltration estimates were initially assumed to equal recharge. The resulting modelled groundwater levels were reviewed to identify areas of upward gradient or minimal downward gradient. This information was used in subsequent iterations to adjust the recharge estimates.
Quarry License Expansion Northern Ontario	A level II hydrogeology study is underway in support of a rock quarry license expansion application. Surface water features in the area are characterized by shallow intermittent streams flowing on top of bedrock above a small escarpment running through the site. Below the escarpment, there is a line of small watercourses connecting a series of small lakes. The surface water study includes monitoring of several of the small intermittent watercourses and the outlet of two of the small lakes. Surface hydrological. The results of this analysis will form input to the groundwater modelling discipline. Recharge will initially be assumed to equal infiltration in the groundwater model; however, we expect this will cause mounding in parts of the model. Further iterations will be used to calibrate the recharge estimates subject to a mass balance at the surface.
Aggregate Site Water Use Study Southern Ontario	Participated in a “typical water use” study for the aggregate industry. The study was initiated by the Aggregate Producers Association of Ontario (now the Ontario Stone Sand and Gravel Association) in preparation for planned changes, by the MOE, to the Permit to Take Water application process. Changes to the process were anticipated to include charges for water taking or use. The MOE was simultaneously working on new Source Water Protection legislation. As a result, the APAO felt it would be prudent to quantify actual water use versus maximum permitted water taking rate and to illustrate typical water use at aggregate sites.
Aggregate Site Permitting and Approvals Southern Ontario	Application packages including MNRF and MECP applications and supporting studies and reports have been prepared for numerous aggregate sites across Southern Ontario. Applications have been completed for aggregate pit and quarry licenses under the Aggregate Resources Act, Permits to Take Water (PTTW) to allow quarry dewatering and for Environmental Compliance Approvals (ECA) under Section 53 of the Ontario Water Resources Act to allow offsite discharge of quarry and storm water.
Simcoe County Groundwater Studies Simcoe County, Ontario	A base flow survey was conducted to quantify groundwater discharge in a series of watershed in Simcoe County. The project was conducted in two phases, one for North Simcoe and one for South Simcoe. Water budget and average annual infiltration calculations were completed in support of groundwater modelling. Surface-groundwater interactions were estimated throughout the region to provide a water balance.

Hydrology Studies for Quarry Developments
Ottawa Region, Ontario

A series of water resources investigations were completed for aggregate producing clients in the Ottawa area. The studies were completed in support of Certificate of Approval applications made under Section 53 of the Water Resources Act. Each study included a water balance analysis for the quarry and an estimate of future quarry discharge rates. These data were used to estimate the effects of quarry development on downstream water resources.

Water Supply Studies
Sudbury, Ontario

Two municipal water supplies were investigated as Groundwater Under Direct Influence of surface water (GUDI). Surficial water resources were investigated, and a water balance was prepared in support of groundwater modelling studies.

Hydrological Effects Assessment
Hagersville, Ontario

A long-term field monitoring programme was designed and implemented to track changes in flow regime resulting from closure of an underground Gypsum mine. Part of the mine was closed and allowed to flood. Three flow monitoring stations were established in Boston Creek, which flows over the mine. The stations were selected to represent background conditions upstream of the mines influence, conditions above the mine and downstream of the mine influence. Data loggers and transducers were installed to continuously (hourly) record water levels and flows in the creek.

GORO Nickel Mine
New Caledonia

The GORO Nickel mine is located in an area of extreme precipitation. Hydrological and preliminary erosion assessments were completed in support of mine development planning and design. These data were used, by the multi-disciplinary project team, to design tailing basin capacities, diversion ditches and dams.

Round Lake Water Level Control Study
Engelhart, Ontario

Flow exiting Round Lake flows down several kilometres of a very mild sloped reach of the Blanche River before cascading down a set of rapids at a rock outcrop. The rock outcrop was historically blasted to facilitate log driving practices. This modification has caused large fluctuations in water levels in Round Lake and the Blanche River. A hydrological and hydraulic study of the river and lake were completed and a fish-friendly rock-fill weir was designed to stabilise water levels.

Bruce Nuclear Generating Station
Bruce County, Ontario

Participated in background water quality assessments in the surrounding environment. This work included water quality sampling in Baie du D'Or and Lake Huron. The data were used to assess potential effects of the generating station on the quality of surrounding water resources.

Pickering-A Nuclear Generating Station
Pickering, Ontario

A multi-disciplinary environmental assessment was completed for the re-start of four CANDU reactors at the Pickering A generating station. A comprehensive review of existing water quantity and quality data was completed. Potential effects, of operating the station, on surrounding water resources were identified and evaluated.

Falconbridge Smelter Area Closure
Falconbridge, Ontario

Performing a detailed analysis of water quantity and quality to address potential long-term impacts of the closure on the watersheds of Coniston and Emery Creeks. A daily water budget and reservoir routing model was implemented on a spreadsheet to investigate the efficiency of a variety of different closure scenarios. Also involved in hydrometry, automated water level monitoring, water quality sampling, hydrologic modelling.

Fire Water Intake Blind River, Ontario	Alternative designs for a fire water intake structure modification were assessed to minimise maintenance and sediment deposition and increase safety. Two-dimensional finite element flow modelling of the intake environment and one dimensional, coupled, unsteady, sediment and hydraulic modelling of the river reach was completed. Modelling results indicated that relocating the intake structure would reduce the risk of failure resulting from sediment accumulation.
Asacha Gold Mine Russia	The Asacha gold mine lies close to the divide between a pristine watershed and a partially developed watershed. Hydrologically modelled areas potentially affected by mining operations to aid in developing a safe and detailed water management plan.

PROJECT EXPERIENCE – LINEAR INFRASTRUCTURE

Trans Canada Pipelines Vaughan Mainline Expansion Vaughan, Ontario	Senior technical advisor for baseline hydrology studies, effects assessments and permitting, in support of the environmental and socio-economic assessment (ESA) under the National Energy Board (NEB) filing process and construction planning and design for a ~12 km pipeline expansion in the Greater Toronto Area.
Trans Canada Pipelines Eastern Mainline Expansion Vaughan, Ontario	Senior technical advisor for baseline hydrology studies, effects assessments and permitting in support of the environmental and socio-economic assessment (ESA) under the National Energy Board (NEB) filing for the Eastern Mainline Expansion in Ontario (~260 km long gas pipeline through central and eastern Ontario).
Trans Canada Pipelines Parkway West Connection Vaughan, Ontario	Senior technical advisor for baseline hydrology studies, effects assessments and permitting, in support of the environmental and socio-economic assessment (ESA) under the National Energy Board (NEB) filing process for a local service connection in the Greater Toronto Area.
Trans Canada Pipelines Kings North Connection Ontario	Surface water discipline lead for the Kings North Connection Project, including baseline hydrology studies and effects assessments in support of the environmental and socio-economic assessment (ESA) under the National Energy Board (NEB) process. Scour assessments, sag-bend setback recommendations and permitting were also completed to support construction activities.
Pipeline Corridor Investigations Timmins, Ontario	A pipeline was proposed to slurry tailing from the Kidd Metallurgical Site to the Kidd Mine, approximately 35 km away. The tailings are to be used for paste back-filling of depleted areas of the underground mine. An environmental review of water resources along the proposed pipeline corridor was completed. Larger watercourse crossings were mapped, and directional drilling was proposed to mitigate environmental effects.
Trans Canada Pipelines Borer's Creek Modelling and Restoration Design Dundas, Ontario	HEC-RAS modelling and assessment of a failing reach of Borer's Creek that threatened to expose a high pressure natural gas pipeline. Design of remedial measures for failing banks and restoration of the affected reach. Coordinated regulatory approvals. The project was successfully implemented before the spring freshet and significantly reduced the risk of damage to the pipeline.

PROJECT EXPERIENCE – CLIMATE CHANGE

Goldcorp Sudbury Integrated Nickel Operations – East End Water Management Sudbury, Ontario	Senior review and technical advisor for an assessment of potential climate change effects and vulnerabilities on a multi-site water management system including eight reservoirs, flooded underground mine works, an active smelter complex, a water treatment plant and associated dams and infrastructure. A Goldsim model of the water management system was constructed and validated. Ensemble Global Circulation Model (GCM) results, from approximately ninety model runs, were obtained for the 2050 horizon. Monte Carlo simulations were used to simulate daily weather patterns constrained by the GCM results and the same daily weather patterns were used to model a potential future range of water management scenarios using the Goldsim water management model.
Goldcorp Sudbury Integrated Nickel Operations – East End Infrastructure Assessment Sudbury, Ontario	Evaluated climate change risks to several small flow conveyance structures including culverts, pipes and flow measurement structures. Peak flows from small sub-catchments are typically sensitive to short duration intense precipitation events. A trend analysis and curve fitting exercise was completed on observed maximum annual events, over recent site history, for a range of event durations ranging up to 24 hours. The trend analysis was used to estimate potential changes to Intensity-Duration-Frequency statistics at the 2050 horizon. This information was used to assess the capacity of existing flow conveyance infrastructure in small sub-catchments.
Meteorological Service of Canada – Environment Canada Ottawa and across Canada	Participated on a national research team studying the effects of climate change on hydrological variables. Contribution to the study was to complete a regionalization study based on measured hydrologic variables from the Reference Hydrometric Basin Network (RHBN) including mean annual flow, lowest annual daily flow and peak annual daily flow. The data series were grouped according to their similarity using a cluster analysis routine. The homogeneous hydrologic regions identified by this method were compared to hydrologic regions identified in previous studies using meteorological and physiographic variables. Cluster analysis results consistently identified three homogeneous regions in the British Columbia mountains as well as several regions in Ontario, the Maritimes and along the St. Lawrence. The study demonstrated a significant lack of RHBN coverage in the northern part of the Prairie Provinces and the North West Territories, such that homogenous regions, if they exist in these areas, could not be identified by cluster analysis.
Infrastructure Ontario (Ontario Realty Corp.) – Infrastructure Climate Risk Assessment Ontario	Completed the water resources and drainage components of a climate risk assessment on three typical buildings owned by Infrastructure Ontario. Risk was assessed using guidance provided in Engineers Canada’s PIEVC protocol. Co-led focus group workshops with building operators and subject matter experts to assess potential future risk.
Iqaluit Water Supply Nunavut	Senior technical reviewer for a climate risk investigation of the Town of Iqaluit’s water supply. A Goldsim model was developed for the lake-based water supply. Various scenarios were investigated to assess the vulnerability of the supply to climate change.

BHP Billiton
Elliot Lake, Ontario

Technical advisor for applying climate change projections to extreme precipitation events used to assess potential climate change implications for tailings storage facilities and water management ponds. This work was completed as a part of the Dam Safety Surveillance and Management program at BHP Billiton's closed Canadian and U.S. sites.

PROJECT EXPERIENCE – SOURCE WATER PROTECTION

Ontario Clean Water Agency
Lake Ontario, Canada

Hydrology and river boundary conditions lead for the Ontario Clean Water Agency (OCWA) Lake Ontario Decision Support System (DSS). OCWA, in partnership with GTA municipalities, is developing a DSS for managing Lake Ontario based drinking water intakes. Golder teamed with DHI to develop a hydrodynamic, thermodynamic and water quality model to integrate into a web-based forecasting platform for Lake Ontario. The system is expected to go live in 2021 to provide municipalities with the advance information to anticipate and mitigate the effects of accidental spills on water supply infrastructure.

Source Water Protection: Midland and Penetanguishene Tier 3
Midland, Ontario

Surface water lead for the Midland and Penetanguishene Tier 3 water budget and water quantity risk level assessment. This study involved implementation of a combined surface and groundwater model using MIKE-SHE. The modelled recharge distribution was applied to a groundwater model developed by Golder using FEFLOW in order to further refine drawdown effects in close proximity to wells and surface water features. The study area included the whole of the Midland Peninsula and areas of provincially significant wetlands in close proximity to municipal wells with GUDI designation. Groundwater and surface water interactions, both recharge and discharge areas were significant in spatial scale and an important part of this project.

Source Water Protection: Peer Reviewer York Region Tier 3
York Region, Ontario

Peer reviewer for the surface water components of the ongoing York Region Tier 3 water budget and water quantity risk level assessment for the area between and surrounding Aurora and Stouffville. The project team is proposing to use GSFLOW to model both the surface and groundwater systems. GSFLOW is an integrated surface and groundwater hydrology model developed by the US Geological Survey, based on MODFLOW and PRMS components. The study area is complex as it includes the southern flank of the Oak Ridges Moraine and straddles the divide between Lake Ontario and Lake Simcoe. Stouffville is in the headwaters of the Rouge River watershed.

Source Water Protection: Peer Reviewer Halton Hills Tier 3
Halton, Ontario

Peer reviewer for the surface water components of the ongoing Halton Region Tier 3 water budget and water quantity risk level assessment for the Georgetown and Acton areas. The project team used MIKE-SHE to model surface and groundwater hydrology and applied the modelled recharge distribution to FEFLOW to provide further discretization around key areas of interest including wells and surface water features. The study area is complex as it includes the Niagara Escarpment, the Acton re-entrant valley and several buried bedrock valleys which are believed to play and important role in delivering groundwater to the area. The study area also straddles the divide between the Grand River and Credit River watersheds.

Source Water Protection: Peer Reviewer Orangeville Tier 3 Orangeville, Ontario	Peer reviewer for the surface water components of the ongoing Orangeville, Mono and Amaranth Pilot Tier 3 water budget and water quantity risk level assessment. The project team is using HSPF and MODFLOW to model surface and groundwater hydrology respectively. The study area is complex as it includes the Niagara Escarpment and the Oak Ridges Moraine. The study area also straddles the divides between the Grand River, Credit River and Nottawasaga River watersheds.
Source Water Protection: Peer Reviewer CTC Tier 1 and Tier 2 Southern Ontario	Peer reviewer for the surface water components of the Tier 1 and Tier 2 water quantity stress assessments for the CTC Source Protection Region, which includes the Credit River (CVC), Toronto Region (TRCA) and Central Lake Ontario (CLOCA) watersheds. Data availability and modelling approaches used by the different conservation authorities and their consultants varied across the CTC region.
Source Water Protection: Lower Speed River (Guelph) Tier 3 Guelph, Ontario	Golder Associates teamed with AquaResource to complete a Tier 3 water budget and water quantity risk level assessment for the Lower Speed River watershed. The study area includes the City of Guelph, part of Cambridge and contributing drainage and recharge areas located north and east of Guelph. An extensive baseflow survey was conducted across the study. Baseflow was measured at thirty-two locations during the spring, summer and autumn of 2008. This information was used to estimate varying groundwater discharge and recharge rates to support definition of boundary conditions for the groundwater model.
Source Water Protection: Nickel District CA Valley East Tier 3 Sudbury, Ontario	Senior technical advisor for the Valley East Tier 2 and Tier 3 water quantity stress assessment. The City of Sudbury draws drinking water from several wells located in the Valley East area. Worked with project team to identify a modelling approach that would make the best use of, sometimes limited, existing data. The Tier 2 results led to the initiation of the Tier 3 Local Area Water Budget for the groundwater supply in Valley East.
Source Water Protection: Ramsay Lake Tier 1 and Tier 2 Sudbury, Ontario	Senior technical advisor for the Ramsay Lake Tier 3 water budget and water quantity risk level assessment. The City of Sudbury draws water directly from Ramsay Lake for part of its drinking water supply. Ramsay Lake and its contributing drainage areas are being modelled using HEC-HMS (Hydraulic Engineering Corps - Hydrological Modelling System). Based on existing information, it appears that the hydrology of Ramsay Lake is dominated by surface water inputs and as such, there is no plan to include groundwater modelling at this time. HEC-HMS will be used to complete the risk level assessments. Additional field data collection has been initiated to fill existing data gaps regarding key inflows to the lake and the outflow adjacent to Science North.

Source Water Protection: Bronte Creek
Halton, Ontario

Golder Associates were commissioned to undertake a Threats Assessment of a potential intake at Bronte Creek. Mr. MacKenzie directed the project for Golder. The intake, intended to deliver surface water to a small water treatment plant, was identified as one potential alternative for providing a drinking water supply to nearby residential properties possibly affected through the construction of an adjacent quarry. The Threats Assessment identified eleven water quality issues at the potential intake location, attributing causes to a number of likely contaminant sources throughout the watershed. In accordance with MOE Draft Guidance Modules, the work undertaken as part of this assessment included stakeholder liaison, hydraulic modelling, IPZ delineation, vulnerability analysis, the compilation of issues and threats inventories and a description of data knowledge gaps. Should surface water abstraction from Bronte Creek be identified as the preferred alternative for providing long-term drinking water supply, this Threats Assessment report will provide the basis for the Tier 2 assessment.

Source Water Protection: Timmins IPZ Study
Timmins, Ontario

An Intake Protection Zone (IPZ) and the vulnerability scores for the City of Timmins drinking water treatment plant on the Mattagami River were assessed. The delineation of the IPZ included the consideration of river flow conditions, influences of dam operation, location of significant potential upstream sources of contamination, local transportation routes, storm sewer drainage patterns and the behaviour of spills in the river. The project also included the collection of site-specific data through a field program. The field program used non-conventional methods to measure travel time due to restrictions on the use of dye tracers in the river because of the presence of private drinking water intakes. The field program collected detailed velocity data that was used to estimate dispersion and to calibrate a HEC-RAS model that was used to predict the travel time under various flow conditions.

PROJECT EXPERIENCE – WASTE MANAGEMENT

Barrie Landfill Reclamation
Barrie, Ontario

Technical advisor for stormwater management modelling and conceptual stormwater infrastructure design. The project included a significant removal and replacement of historic municipal waste. Daily and permanent cover design required new stormwater management strategies and facility design. Interacted with groundwater modellers to develop representative and conservative boundary conditions for modelling.

Nexcycle
Southern Ontario

Technical advisor in support of the ECA (Sewage) application package for a glass recycling facility. The project included conceptual design of Best Management Practices and source controls to improve stormwater quality.

Eagleson Landfill Brookside Creek Channel Design
Northumberland, Ontario

Ongoing support regarding a channel remediation design/assessment for the County of Northumberland on a reach of Brookside Creek located downstream of the closed Eagleson Landfill to reroute unaffected surface water flows away from a zone of leachate influenced groundwater.

Edgewood Landfill Monitoring Flamborough, Ontario	Designed and implemented a flow and water quality monitoring programme to assess potential historic effects of watercourses surrounding the closed Edgewood Landfill site in Flamborough Ontario. This work was completed as part of an inventory and assessment of historic landfill operations in the City of Hamilton.
Bath CKD Landfill Design and Monitoring Kingston, Ontario	Monitored existing water quality and flows associated with an existing Cement Kiln Dust landfill. Designed stormwater control measures for design of a new landfill cover for the existing landfill as well as four new cells to increase the capacity of the landfill.
Brow Landfill Storm-water Management Plan Flamborough, Ontario	Developed a storm-water management plan to address drainage requirements for the site and mitigation measures required to control potential impacts as part of the closure process. Designed drainage channels, a stormwater management pond, hydraulic flow control structures and a drop structure to safely convey stormwater over the edge of the Niagara Escarpment into a purpose designed plunge pool.
Adams Mine Landfill Kirkland Lake, Ontario	Completed a baseline hydrology assessment including flow and water quality monitoring as part of an investigation into the feasibility of a proposed land-filling operation at Adams Mine. Monitoring included flow measurements from boats in medium to large rivers.

SUPPLEMENTAL SKILLS

Soil Erosion

Upland inter-rill soil erosion by rainfall impact; Upland soil erosion by concentrated flow in rills and gullies; In stream, bed and bank erosion and transport.

Hydrology

Stream-flow monitoring and hydrometry; Hydrologic modelling and calibration for event and continuous simulations; Potential and actual evapo-transpiration estimates; Single station frequency analysis; and Water balance calculations.

Hydraulics

Sediment transport hydraulics; Velocity profiling; Flood-wave routing in complex channels; Channel erosion potential analysis, including tractive force indices; and Hydraulic design of water management structures.

Fluvial Geomorphology

Initiation of sediment movement; Constructed bed-form frequency and channel stability issues; Channel plan-form and section morphology; Impacts of sediment transport on channel morphology and Stream form classification using the Rosgen Classification Scheme.

PROFESSIONAL AFFILIATIONS

Professional Engineers Ontario

Engineers Nova Scotia

PUBLICATIONS

Other

MacKenzie, K.M., Singh, K., Binns, A.D., Whiteley, H.R. and Gharabaghi, B., 2022. Effects of urbanization on stream flow, sediment, and phosphorous regime. *Journal of Hydrology*, *612*, p.128283.

MacKenzie, K.M., Gharabaghi, B., Binns, A.D. and Whiteley, H.R., 2022. Early detection model for the urban stream syndrome using specific stream power and regime theory. *Journal of Hydrology*, *604*, p.127167.

Rose, G. T and MacKenzie, K. M. (2013). Water Quality Forecasting and Infrastructure Optimization System. Meeting #68 of the Atlantic Coastal Zone Information Steering Committee (ACZISC). Bedford Institute of Oceanography, Halifax, Nova Scotia, January 16-17, 2013.

S. I. Ahmed, K. MacKenzie, B. Gharabaghi, R.P. Rudra, W.T. Dickinson. (2011). Within-storm rainfall distribution effect on soil erosion rate. ISELE Paper Number 11000. International Symposium on Erosion and Landscape Evolution. Anchorage, Alaska September 18-21, 2011.

Bell, J., K. MacKenzie and J. Southwood. (2011). Down Under Up North - Could an Australian water- sensitive urban design project work in the Canadian context? Water Canada July/August 2011.

DeVito, C. and MacKenzie K. (2011). Critical Shear Velocity Estimates Improved with In-Situ Flume. 20th Canadian Hydrotechnical Conference, Ottawa Ontario June 14th to 17th 2011.

Davidson C. and MacKenzie K. (2011). Golder Daily Climate Record Generator. 20th Canadian Hydrotechnical Conference, Ottawa Ontario June 14th to 17th 2011.

MacKenzie, Kevin. (2009). Industrial Wastewater Approvals. Canadian Environmental Compliance Conference and Trade Show (CANECT). Metro Toronto Convention Centre, April 2009.

MacKenzie, Kevin. (2007). Industrial Wastewater Approvals. Canadian Environmental Compliance Conference and Trade Show (CANECT). Metro Toronto Convention Centre, April 2007.

Mackenzie, K.M., R.P. Rudra and W.T. Dickinson. (1996). Modelling the inter-rill detachment process: Some considerations for improving model results. ASAE Paper No. NABEC96-94, Amer. Soc. Agr. Engr., St. Joseph, MI.

MacKenzie, K.M., R.P. Rudra and W.T. Dickinson. (1995). The effect of temporal distribution of rainfall on inter-rill detachment. ASAE Paper No. 95-2378, Amer Soc. Agr. Engr., St. Joseph, MI.

WSP Canada Inc. – Ottawa

Education

M.A.Sc. Civil Engineering, University of Toronto, Toronto, Ontario, 2017

B.A.Sc. Environmental Engineering, University of Windsor, Windsor, Ontario, 2015

Certifications

Registered Professional Engineer, Professional Engineers of Ontario, 2021

Environmental Consultant

Sean Spanik is an environmental engineer that joined the WSP (previously Golder Associates Ltd.) team in December 2017. Sean assists with technical analysis, groundwater modelling and reporting on a variety of hydrogeological and environmental projects. This includes hydrogeological investigations in support of infrastructure development; annual reporting for Environmental Compliance Approval (ECA) and Permit to Take Water monitoring programs at quarry sites; and preparation of PTTW applications and Environmental Activity Sector Registry (EASR) Water Taking Plans for construction dewatering projects. In addition to technical analysis and reporting, Sean also assists in the development and execution of field programs, including groundwater and surface water sampling, monitoring well installations, hydraulic conductivity testing, pumping tests, packer tests and infiltration testing.

Employment History

WSP Canada Inc. (Previously Golder Associates Ltd.) – Ottawa, Ontario

Environmental Engineer (2017 to Present)

Environmental engineer within the Geosciences group. Assists with technical analysis and reporting, groundwater flow modelling and the development and execution of field programs.

EXP Services – Windsor, Ontario

Geotechnical Field Technician (Co-op) (2014 to 2014)

Performing compaction and concrete testing for a major infrastructure project.

PROFESSIONAL AFFILIATIONS

Member of the Association of Professional Engineers of Ontario

PROJECT EXPERIENCE – HYDROGEOLOGY

Permit to Take Water Application Cavanagh Goulbourn Quarry Ontario, Canada	Assisted with updating and calibrating a groundwater flow model in MODFLOW. The model was used to run quarry development forecast scenarios for a permit to take water impact assessment.
Drawdown Assessment Spring Valley Trails Ontario, Canada	Constructed a two-dimensional groundwater flow model in FEFLOW to assess the magnitude of water level drawdown that would result from a proposed underground stormwater storage gallery for a residential development.
Source Water Protection Study Braestone Development Ontario, Canada	Assisted with the construction and calibration of a groundwater flow model in MODFLOW based on a conceptual hydrogeological model of the Oro Moraine. The model was used to delineate time-of-travel capture zones for communal water supply wells at the Braestone development.
Troilus Mine Project Quebec, Canada	Developed and calibrated a three-dimensional groundwater flow model in FEFLOW to predict drawdown and groundwater inflow for an open pit mining project.
Landfill Monitoring, Brockville Landfill Ontario, Canada	Golder carried out monitoring of groundwater and surface water at the City of Brockville Landfill Site and an adjacent former landfill and scrap yard. Sean assisted in coordinating the field program and preparing a comprehensive report. He also assessed compliance of the site with provincial regulations and site-specific triggers.
Integrated Road, Sewer and Watermain Construction Ontario, Canada	Assisted in the execution of the field program for various linear infrastructure projects, which involved taking water levels, hydraulic conductivity testing and sampling from monitoring wells along the proposed alignment. Sean helped to analyze field data and determine the water taking requirements for the projects. Sean has also assisted in the preparation of Category 3 Permit to Take Water Applications for construction dewatering activities.
Lebreton Flats Redevelopment Ontario, Canada	Sean was involved with a drilling program and completed rock coring, packer testing and the installation of monitoring wells. After the completion of the drilling program, Sean completed hydraulic conductivity testing and sampling of the monitoring wells.
Permit to Take Water and Environmental Compliance Approval Annual Monitoring Reports Ontario, Canada	Sean has prepared the annual monitoring reports for various quarry sites for both their Environmental Compliance Approval (ECA) and Permit to Take Water (PTTW) monitoring programs. This involved presenting, discussing, and analyzing the monitoring data to assess for potential impacts from quarry activities.
Infiltration Rate Assessment Ontario, Canada	Sean carried out infiltration testing at the site of a proposed development in Ottawa, Ontario. He analyzed the data and prepared a memo to detail the results and how they relate to the potential for low impact development (LID) measures to be implemented.

APPENDIX B

Borehole and Geophysical Logs

Stittsville Quarry Properties

PROJECT: 18111853

GEOPHYSICAL LOG OF: DDH2001-1 T-EXPL

SHEET 1 OF 3

LOCATION: N 5009762.7 ;E 423394.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: October 19-22, 2001

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | GEOPHYSICAL RECORD | PIEZOMETER OR STANDPIPE INSTALLATION

GROUND SURFACE

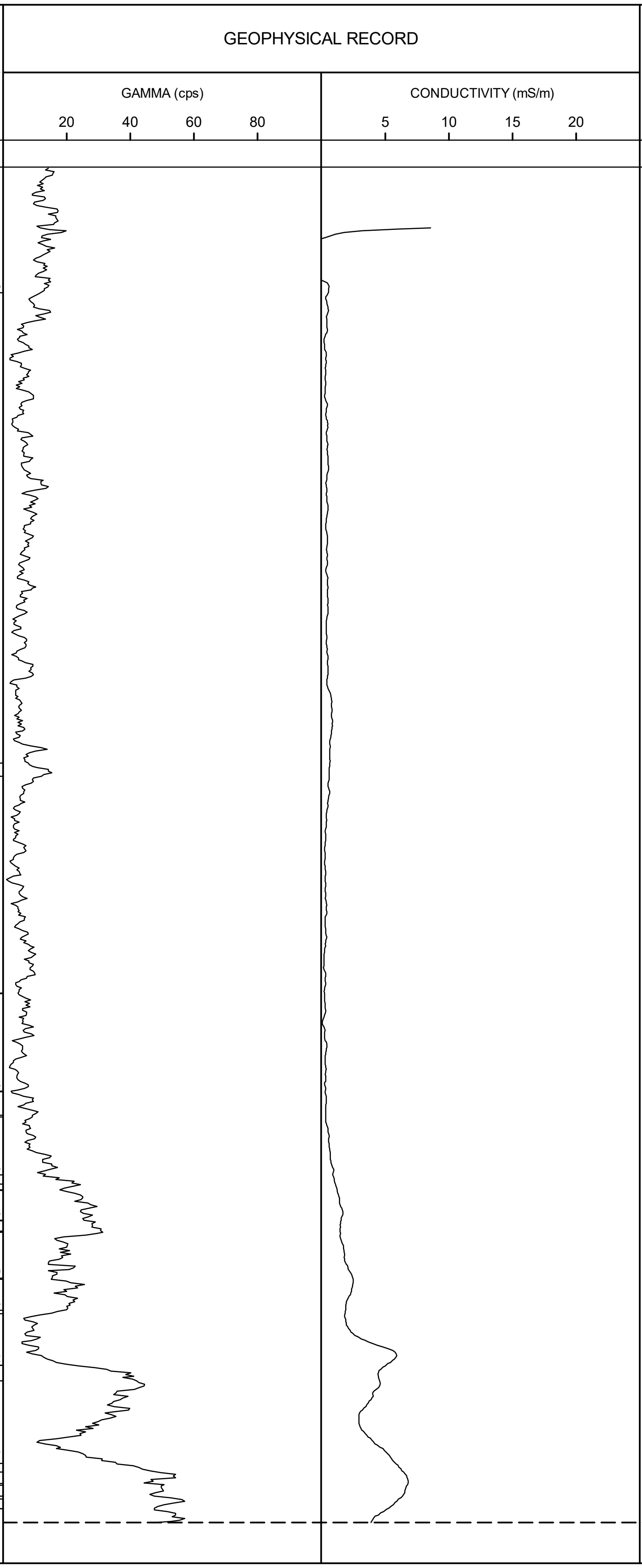
BOBCAYGEON FORMATION 0.0 m to 32.84 m

UNIT 4, 0.0 m to 1.85 m, Medium grey to brownish grey, fine grained, non porous, micritic, thinly bedded ARGILLACEOUS NODULAR LIMESTONE. Broken rubble core from 0.0 m to 1.22 m. Comparatively sharp basal contact with underlying calcarenite.

UNIT 3, 1.85 m to 17.68 m, Light to medium brownish grey, fine to medium grained crystalline, non porous, finely stylolitic, medium bedded CALCARENITIC LIMESTONE. Bioturbation associated with mollusk burrow casts become more evident below 14.6 m.
Individual black argillaceous laminar bedding partings occur between 8.79 m and 8.99 m within very thinly bedded calcarenite, at 12.19 m (3 mm parting), 13.64 m (1-2 mm parting), 13.99 m (30 mm argillite and limestone), 14.87 and 15.01 m (5-10 mm partings in limestone), 15.09 (10 mm parting), 15.54 m (10 mm parting), 15.70 (20 mm parting), 16.40 m (10 mm parting) and 16.87-.92 m. Sharp basal contact on shaley limestone bed at 17.68 m.

UNIT 2, 17.68 m to 22.60 m Dark grey to black, fine grained, non porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) ARGILLACEOUS LIMESTONE AND SHALEY LIMESTONE.
Slake susceptible dark grey to black shaley limestone and shale beds occur at 17.68-.91 m, 19.13-.26 m, 19.43 m (20

ELEV. / DEPTH (m):
138.60
0.00
136.75
1.85
129.81
8.79
8.99
126.41
12.19
124.96
13.64
14.02
123.73
15.10
123.06
15.72
122.20
16.41
121.73
16.92
120.92
17.68
17.91
119.47
19.26
19.45
19.80



Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: DDH2001-1 T-EXPL

SHEET 2 OF 3

LOCATION: N 5009762.7 ;E 423394.3

INCLINATION: -90°   AZIMUTH: ---

DRILLING DATE: October 19-22, 2001
DRILL RIG: CME 55
DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION

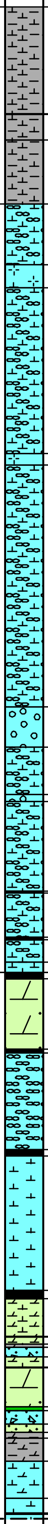
--- CONTINUED FROM PREVIOUS PAGE ---

mm parting), 19.61-.66 m, 19.80 m and 21.41 m (10 mm). Transitional basal contact.

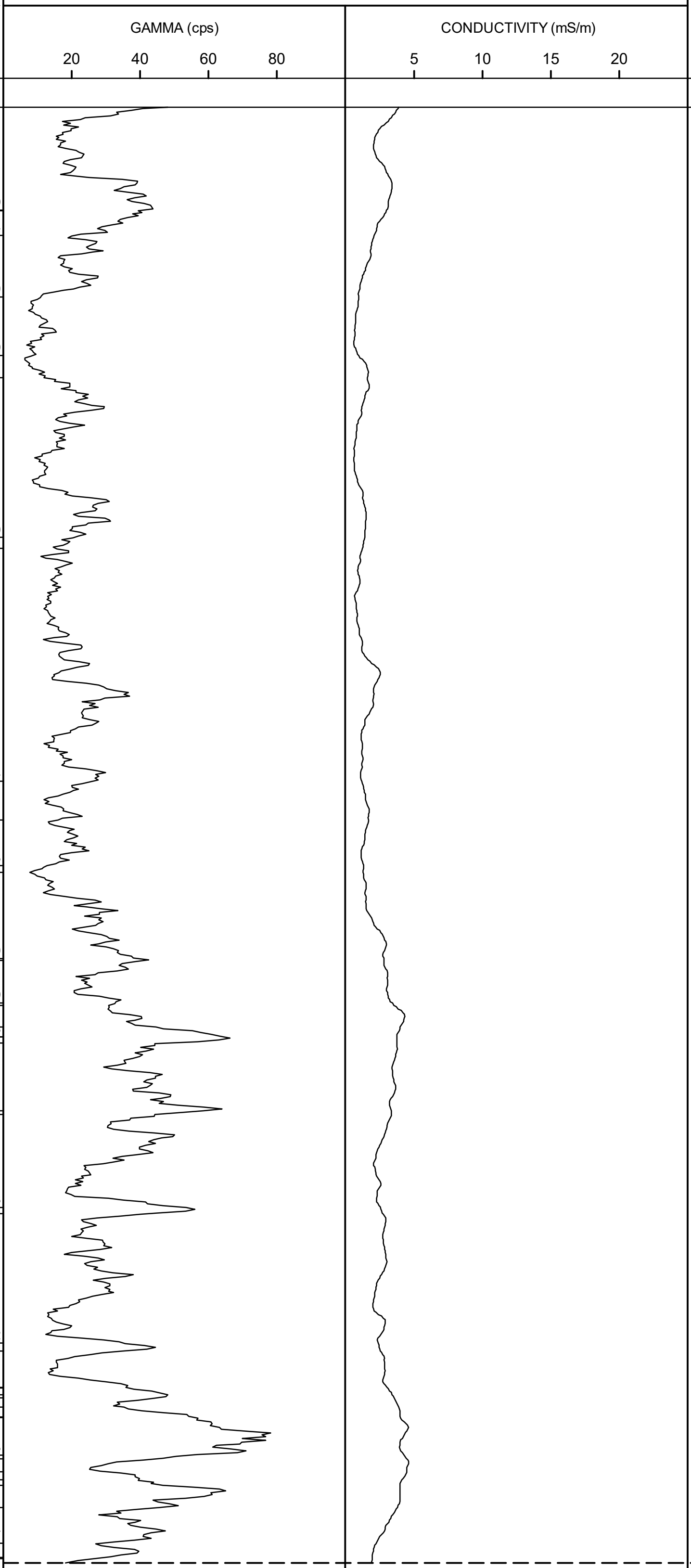
UNIT 1, 22.60 m to 32.77 m Fresh, medium to dark brownish grey, fine grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated, partly stylolitic **NODULAR LIMESTONE** with wavy shaley limestone laminations at 31.71-.75 m, 31.91-.95 m and 32.31-.33 m. Burrow casts are infilled with medium grained crystalline calcarenite. Very fine grained lithographic limestone beds occur at 23.41-.71 m and 25.91-26.06 m. Medium grained oolitic limestone beds occur at 29.26-.79 m and 30.42-.51 m. Shaley argillaceous limestone bed at 32.68-.77 m. Sharp basal contact with dolostone bed and shale cap of underlying Upper Gull River Formation.

UPPER GULL RIVER FORMATION, 32.77 m to 41.32 m
Medium to dark grey, very fine to fine grained, nonporous, micritic, thinly to thickly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone, the **"first dolostone marker bed",** at 32.77 m to 33.84 m. Bed has black shale caps at 32.77-.86 m and 33.79-.84 m. The **"second dolostone marker bed"** sequence occurs at 36.98 m to 39.73 m consisting of a black shaley cap (36.98-37.09 m) overlying medium greenish grey, medium grained crystalline, mottled textured, bioturbated, lithoclastic calcareous dolostone (37.09-.69 m) with black shaley partings at 37.59-.60 m and 37.69-.73 m. Thin lithoclastic limestone bed occurs at 37.73-.86 m overlying greenish grey calcareous dolostone bed at 37.86-38.00

CONTINUED NEXT PAGE



ELEV.	DEPTH (m)
117.19	21.42
116.84	
116.00	22.60
115.19	23.41
	23.71
112.69	26.06
109.34	29.26
108.81	29.79
108.18	30.51
106.90	31.72
106.29	32.34
105.83	32.77
	32.86
104.81	33.84
103.48	35.20
101.62	37.09
101.01	
	38.01
100.08	38.57
	38.94
	39.24
98.87	39.73



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: DDH2001-1 T-EXPL

SHEET 3 OF 3

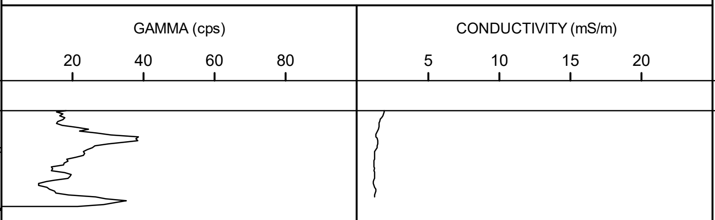
LOCATION: N 5009762.7 ;E 423394.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: October 19-22, 2001
DRILL RIG: CME 55
DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
40		m. Thick bed of greenish grey dolostone occurs at 38.00-.52 m with dark greenish grey calcareous shale base at 38.52-.57 m overlying medium lithoclastic limestone bed (38.57-.75 m), lithoclastic calcareous dolostone bed (38.75-.86 m) and shaley calcareous dolostone (38.86-.94 m). Medium bed of absorbent, greenish grey, shaley calcareous dolostone at 38.94-39.24 m overlying thinly to medium bedded argillaceous dolomitic limestone at 39.24-.73 m. Dark grey, fine grained, medium to thickly bedded micritic limestone beds between 39.73 m and 41.32 m have disseminated medium to coarse grained calcite crystals. Additional black shale partings occur at 35.12-.20 m (absorbent), 39.93-.94 m, 40.49-.55 and 41.29-.31 m.	┴ ┴	39.94 98.11 40.55 97.31 97.28 41.32		
		End of Borehole, 41.32 m				
42						
44						
46						
48						
50						
52						
54						
56						
58						
60						



DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: DDH2001-2

SHEET 1 OF 3

LOCATION: N 5009228.4 ;E 423825.8

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: November 2001
DRILL RIG: CME 55
DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | GEOPHYSICAL RECORD | PIEZOMETER OR STANDPIPE INSTALLATION

GAMMA (cps): 20 40 60 80

CONDUCTIVITY (mS/m): 5 10 15 20

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	135.60
0 2 4 6	**Bedrock Surface, 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 24.63 m** **Unit 3, 0.0 m to 7.86 m** Fresh, weathered on bedding partings from 0.0 m to 2.44 m, medium brownish grey, fine to medium grained crystalline, faintly porous, thinly bedded **CALCARENITIC LIMESTONE** with fine argillaceous bedding partings transitioning into argillaceous nodular limestone from 6.95 m to 7.86 m with 1-3 mm fine argillaceous bedding partings. Horizontal 3-6 mm burrow casts in argillaceous limestone at 4.89-.92 m. Transitional basal contact marked by 0.06 m shaley lamination.	0.00 130.71 4.92 128.65 6.95 127.91 127.74
8 10 12	**Unit 2, 7.86 m to 13.58 m** Fresh, medium to dark brownish grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) with burrow casts **ARGILLACEOUS to SHALEY NODULAR LIMESTONE.** Numerous slake susceptible dark grey to black shaley laminations 0.01 to 0.08 m thick comprise approximately 20% of sequence between 7.86 m and 11.81 m with main shaley bands at 8.52-9.18 m and 11,00-.81 m. Last shaley lamination at 11.79-.81m overlying shaley nodular limestone (11.81-12.08 m), argillaceous nodular limestone (12.08-.62 m) and argillaceous to shaley nodular limestone (12.62-13.42 m) with transitional bed of argillaceous nodular limestone at 13.42-.58 m.	7.86 7.92 8.34 9.00 9.18 9.38 9.69 10.26 124.78 11.35 11.81 12.08 122.98 12.62 122.18 122.02 13.42
14 16 18 20	**UNIT 1, 13.58 m to 24.63 m** Fresh medium to dark brownish grey, fine grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated, partly stylolitic **NODULAR LIMESTONE** with beds of argillaceous nodular limestone at 19.35-.77 m, 23.38-.62 m and 23.85-24.63 m with numerous 0.001-.01 m absorptive argillaceous partings. Wavy argillaceous partings at 14.05-.08 m, 15.64-.67 m and 23.85-.86 m. Sharp basal contact with dolostone bed and shale cap of underlying Upper Gull River Formation.	13.58 121.55 14.08 119.96 15.67 116.25 19.35 115.83 19.77

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: DDH2001-2

SHEET 2 OF 3

LOCATION: N 5009228.4 ;E 423825.8

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: November 2001

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

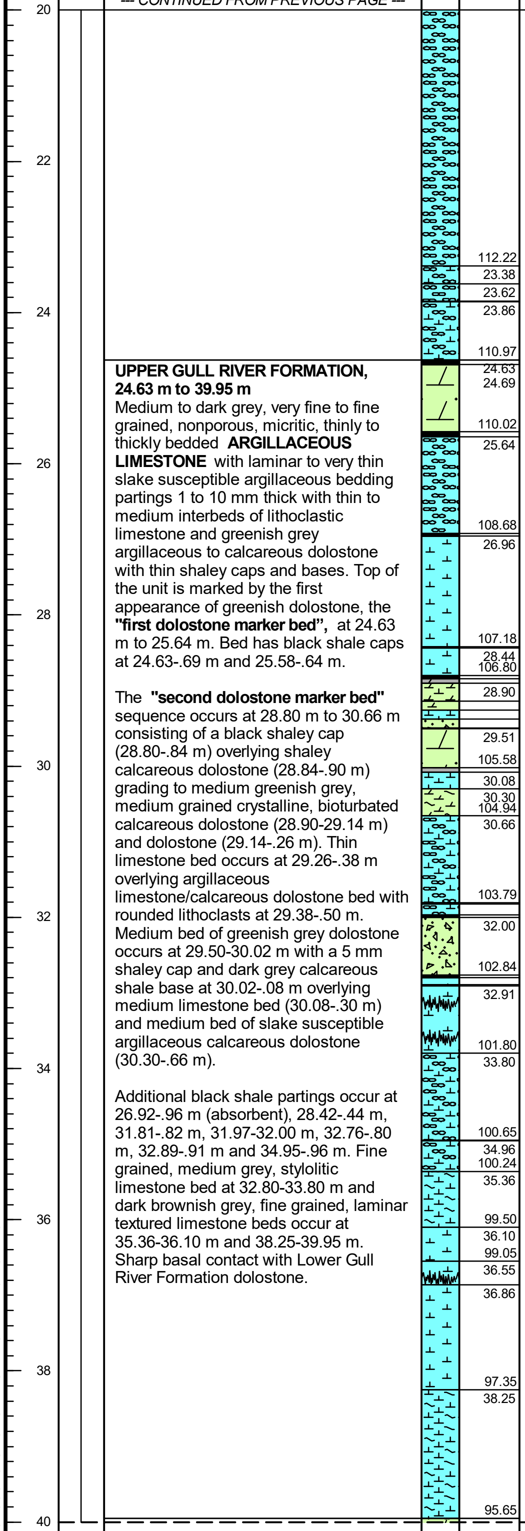
DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD: GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD: CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION

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

UPPER GULL RIVER FORMATION, 24.63 m to 39.95 m
Medium to dark grey, very fine to fine grained, nonporous, micritic, thinly to thickly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone, the **"first dolostone marker bed",** at 24.63 m to 25.64 m. Bed has black shale caps at 24.63-.69 m and 25.58-.64 m.

The **"second dolostone marker bed"** sequence occurs at 28.80 m to 30.66 m consisting of a black shaley cap (28.80-.84 m) overlying shaley calcareous dolostone (28.84-.90 m) grading to medium greenish grey, medium grained crystalline, bioturbated calcareous dolostone (28.90-29.14 m) and dolostone (29.14-.26 m). Thin limestone bed occurs at 29.26-.38 m overlying argillaceous limestone/calcareous dolostone bed with rounded lithoclasts at 29.38-.50 m. Medium bed of greenish grey dolostone occurs at 29.50-30.02 m with a 5 mm shaley cap and dark grey calcareous shale base at 30.02-.08 m overlying medium limestone bed (30.08-.30 m) and medium bed of slake susceptible argillaceous calcareous dolostone (30.30-.66 m).

Additional black shale partings occur at 26.92-.96 m (absorbent), 28.42-.44 m, 31.81-.82 m, 31.97-32.00 m, 32.76-.80 m, 32.89-.91 m and 34.95-.96 m. Fine grained, medium grey, stylolitic limestone bed at 32.80-33.80 m and dark brownish grey, fine grained, laminar textured limestone beds occur at 35.36-36.10 m and 38.25-39.95 m. Sharp basal contact with Lower Gull River Formation dolostone.



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: DDH2001-2

SHEET 3 OF 3

LOCATION: N 5009228.4 ;E 423825.8

DRILLING DATE: November 2001

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
40		**LOWER GULL RIVER FORMATION, 39.95 m to 41.45 m** **UNIT 5, 39.95 m to 41.45 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Fresh medium greenish grey, fine grained, faintly porous, medium bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding parting at 40.81-.82m.	🟩	39.95 94.79 40.82 94.15 41.45			
42		**End of Borehole, 41.45 m**					
44							
46							
48							
50							
52							
54							
56							
58							
60							

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-1

SHEET 1 OF 2

LOCATION: N 5009040.1 ;E 422689.8

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: October 25-26, 1999

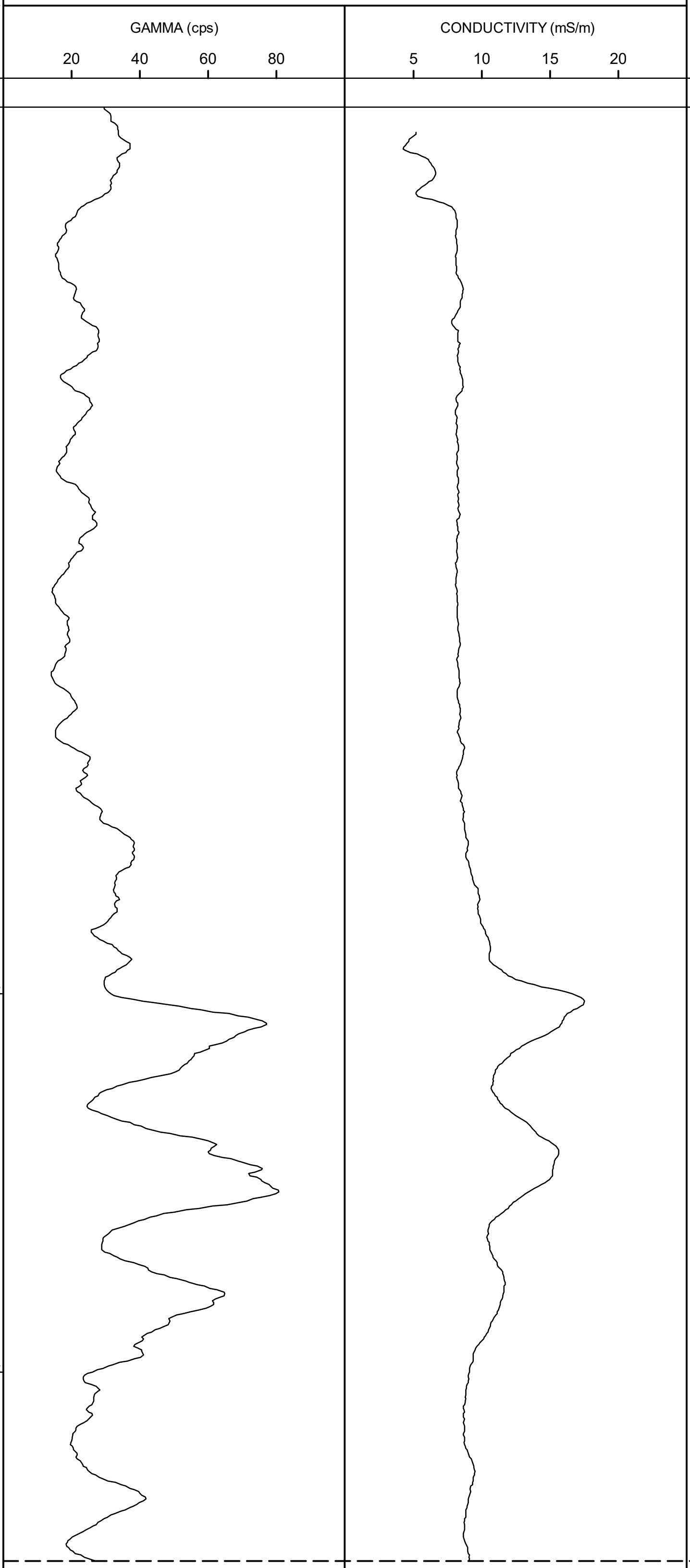
DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Ltd.

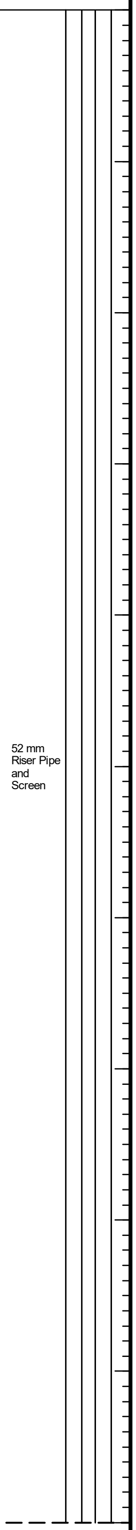
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		
0 2 4 6 8 10 12		**Bedrock Surface, 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 28.3 m** **UNIT 3, 0.0 m to 12.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	150.14 0.00
14 16		**UNIT 2, 12.2 m to 17.4 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	137.94 12.20
18 20		**UNIT 1, 17.4m to 28.3 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally	🟦	132.74 17.40

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

GEOPHYSICAL LOG OF: BH99-1

PROJECT: 18111853

SHEET 2 OF 2

LOCATION: N 5009040.1 ;E 422689.8

DRILLING DATE: October 25-26, 1999

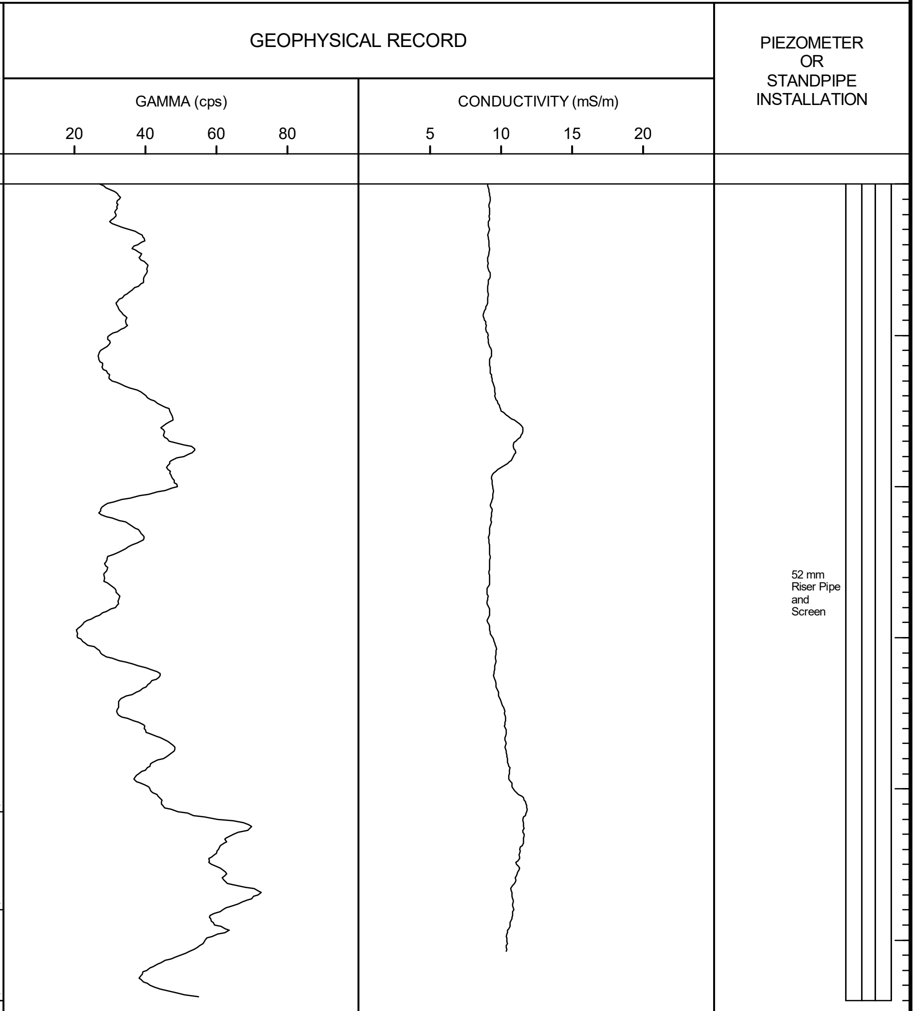
DATUM: Geodetic

DRILL RIG: CME 55

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Marathon Drilling Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	
22				
24				
26				
28				121.84 28.30
		UPPER GULL RIVER FORMATION, 28.3 m to 30.8 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 28.3 m to 29.6 m.	🟩	120.54 29.60
30			🟦	119.34 30.80
		End of Borehole, 30.8 m		
32				
34				
36				
38				
40				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-2

SHEET 1 OF 2

LOCATION: N 5009171.7 ;E 422542.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: November 27-29, 1999

DRILL RIG: CME 55

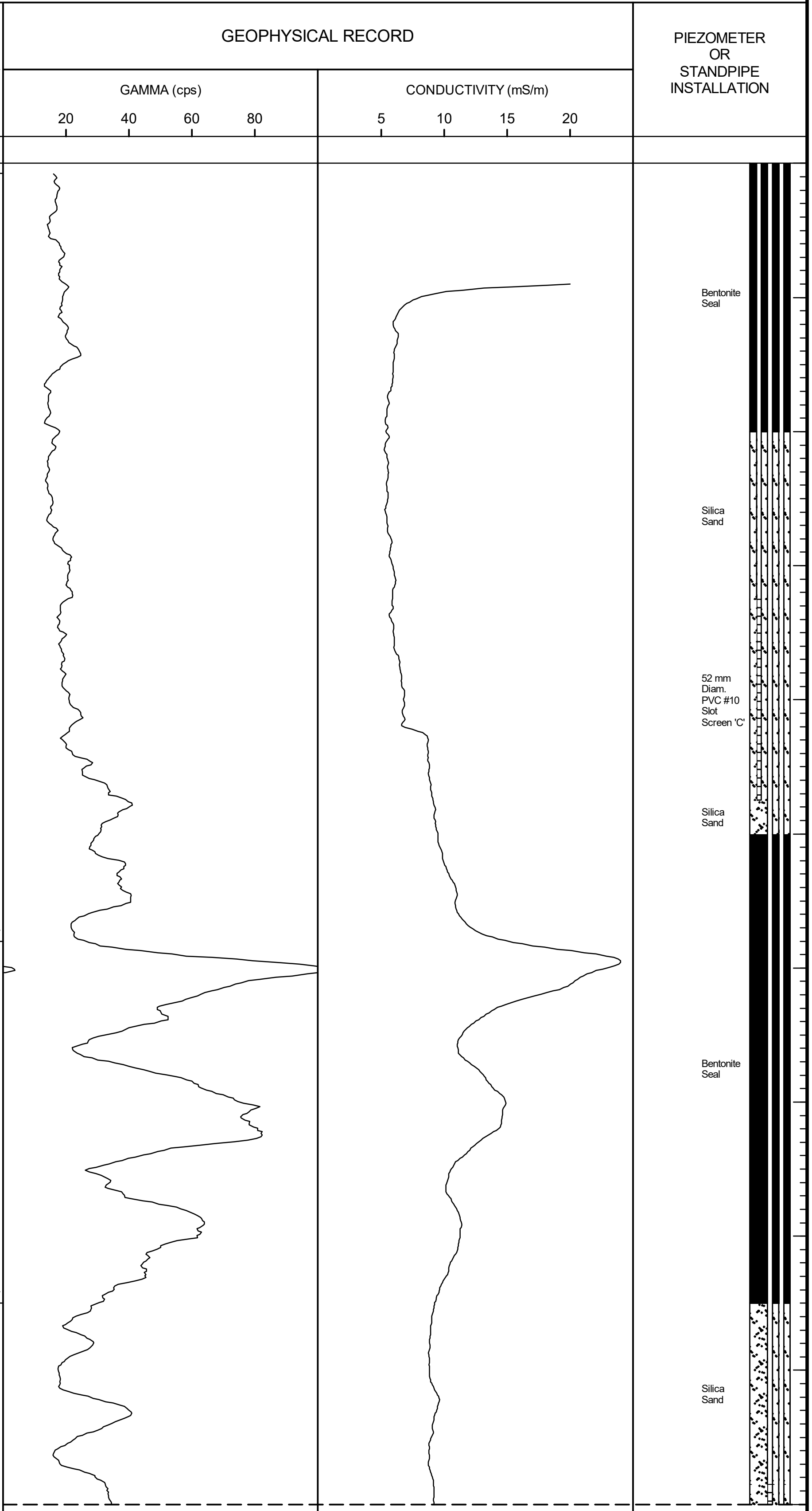
DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		148.27
0		**Overburden, 0.0 m to 0.15 m**		0.00
		LOWER BOBCAYGEON FORMATION, 0.15 m to 27.8 m **UNIT 3, 0.15 m to 11.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.15
		UNIT 2, 11.6 m to 17.0 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		136.67 11.60
				131.27 17.00
20				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-2

SHEET 2 OF 2

LOCATION: N 5009171.7 ;E 422542.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: November 27-29, 1999
DRILL RIG: CME 55
DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | GEOPHYSICAL RECORD | PIEZOMETER OR STANDPIPE INSTALLATION

--- CONTINUED FROM PREVIOUS PAGE ---

20
22
24
26
28
30
32
34
36
38
40

UNIT 1, 17.0 m to 27.8 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.

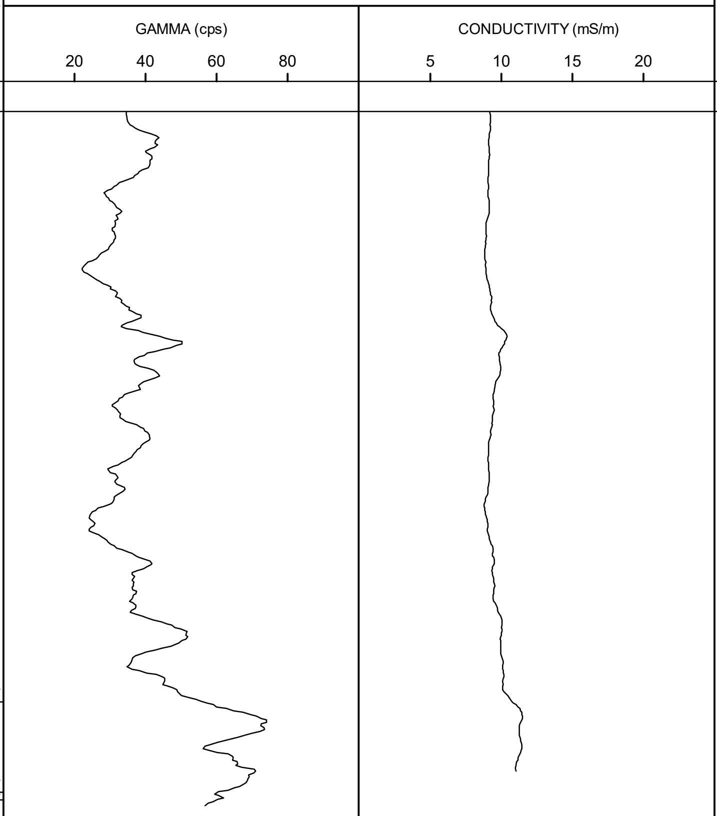
120.47
27.80

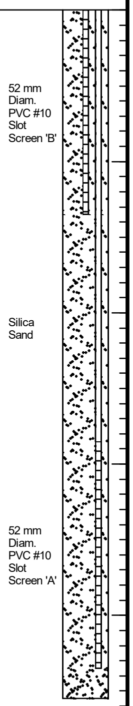
UPPER GULL RIVER FORMATION, 27.8 m to 29.1 m
Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 27.8 m to 29.0 m.

119.27
119.17
29.00

117.77
30.50

End of Borehole, 30.5 m





DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-3

SHEET 1 OF 2

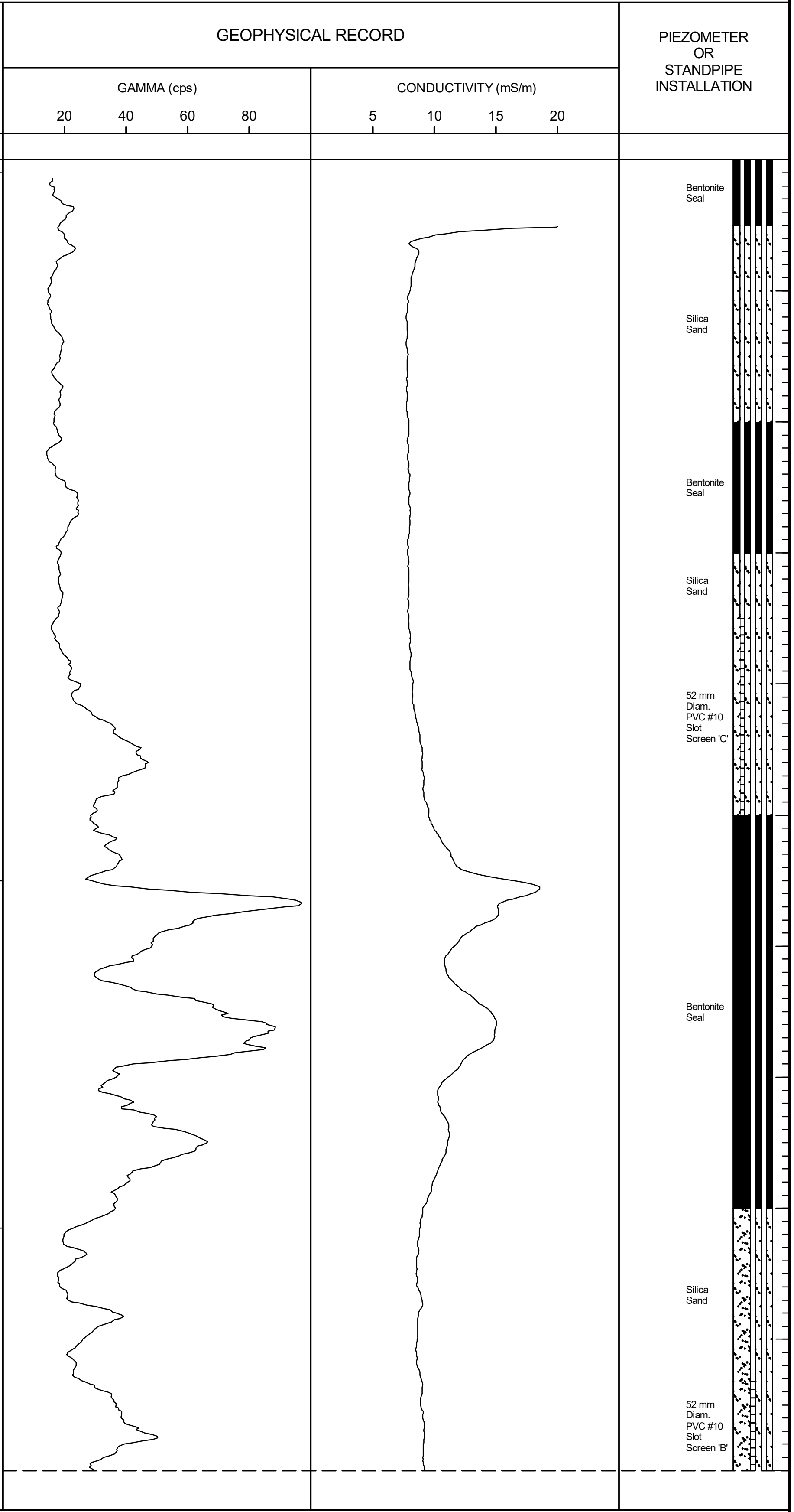
LOCATION: N 5009382.9 ;E 423119.5

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 15, 1999
DRILL RIG: CME 55
DRILLING CONTRACTOR: Marathon Drilling Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		141.10
0		**Overburden, 0.0 m to 0.2 m**		0.00
		Bedrock Surface, 0.20 m **LOWER BOBCAYGEON FORMATION, 0.2 m to 26.6 m** **UNIT 3, 0.0 m to 11.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.20
11		**UNIT 2, 11.0 m to 16.3 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		130.10 11.00
16.3		**UNIT 1, 16.3 m to 26.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium		124.80 16.30
20				



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-3

SHEET 2 OF 2

LOCATION: N 5009382.9 ;E 423119.5

DRILLING DATE: December 15, 1999

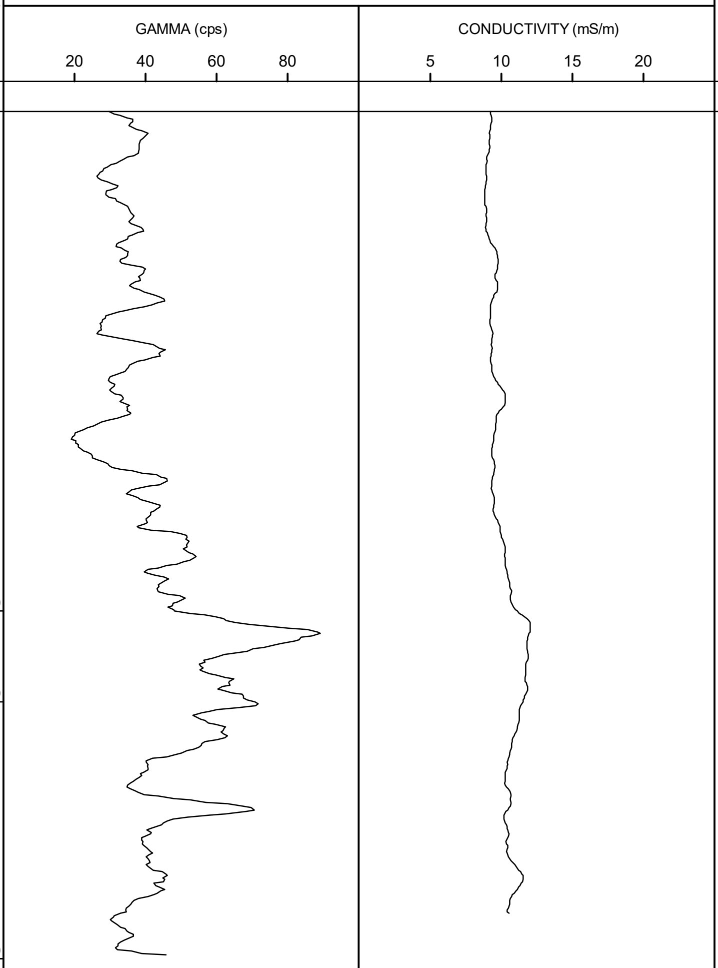
DATUM: Geodetic

INCLINATION: -90°   AZIMUTH: ---

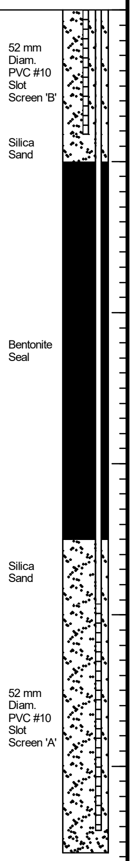
DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	
		UPPER GULL RIVER FORMATION, 26.6 m to 31.2 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 26.6 m to 27.8 m.	🟩 🟦	114.50 26.60 113.30 27.80
		End of Borehole, 31.2 m		109.90 31.20



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-4

SHEET 1 OF 2

LOCATION: N 5009196.2 ;E 422348.9

INCLINATION: -90° AZIMUTH: ---

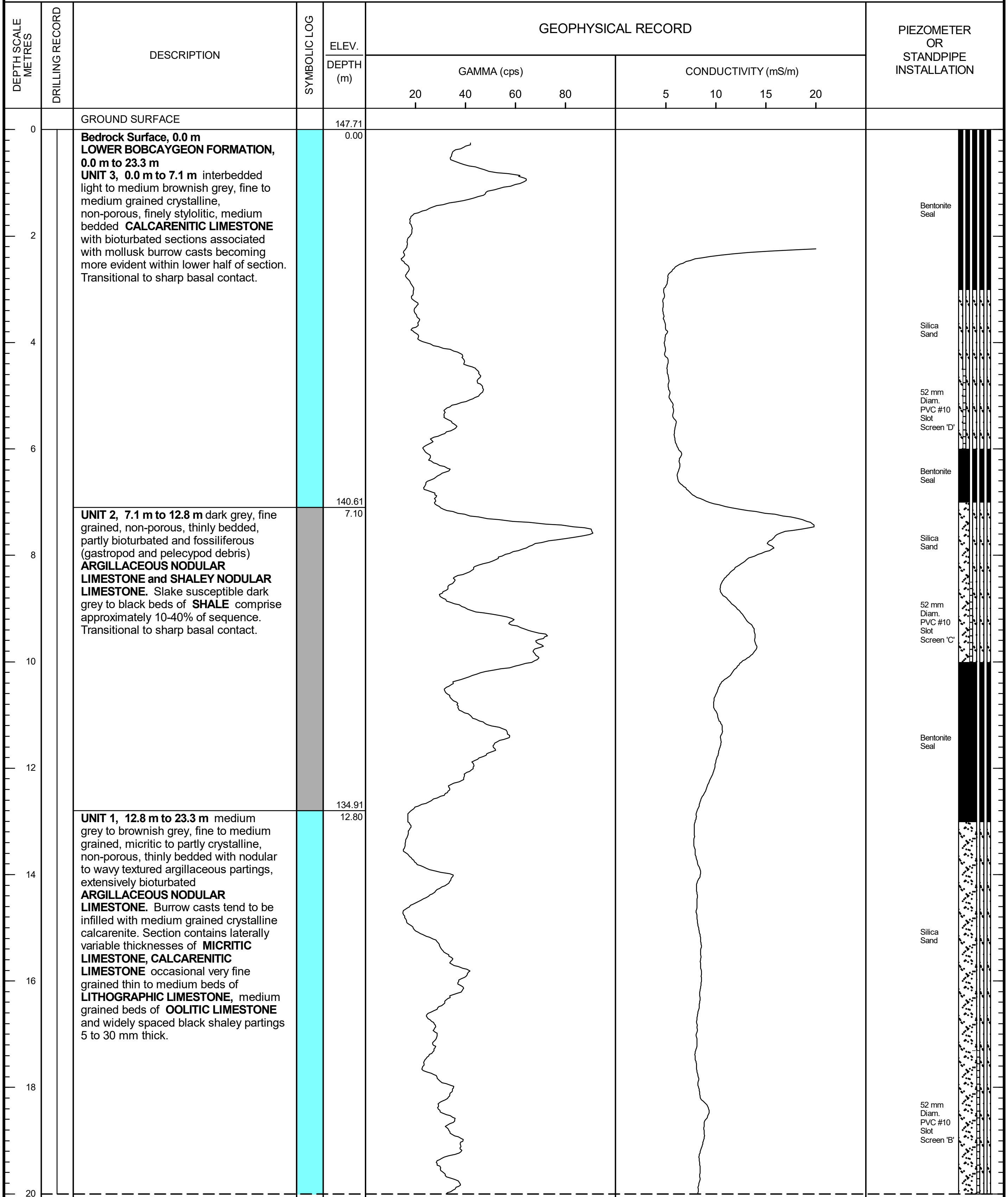
DRILLING DATE: 1999

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DESCRIPTION	ELEV. DEPTH (m)
GROUND SURFACE	147.71
Bedrock Surface, 0.0 m **LOWER BOBCAYGEON FORMATION, 0.0 m to 23.3 m** **UNIT 3, 0.0 m to 7.1 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	0.00
UNIT 2, 7.1 m to 12.8 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	140.61 7.10
UNIT 1, 12.8 m to 23.3 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	134.91 12.80



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-4

SHEET 2 OF 2

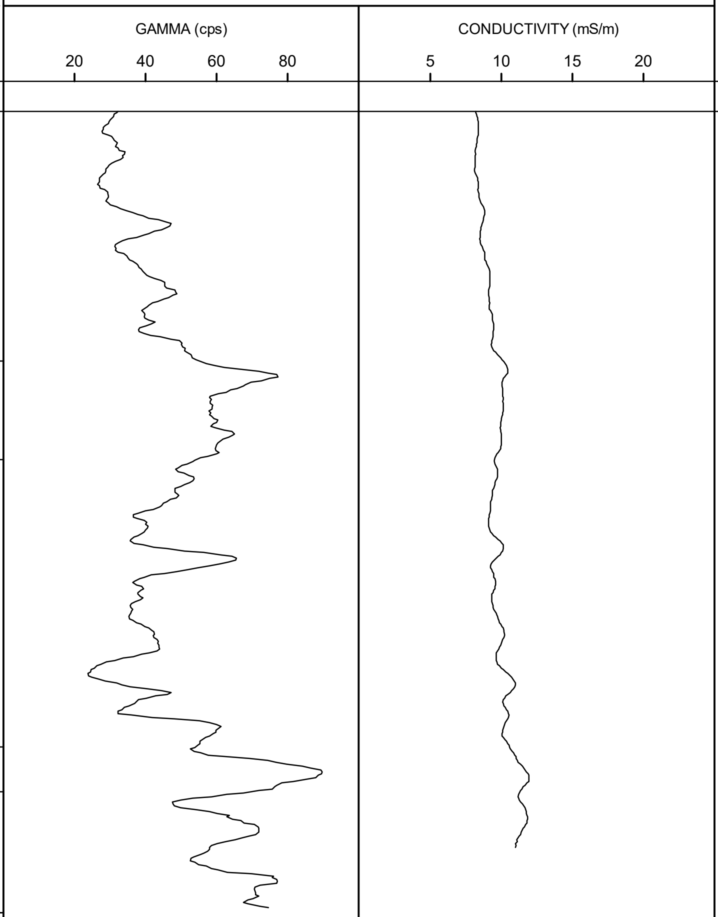
LOCATION: N 5009196.2 ;E 422348.9
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 1999
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

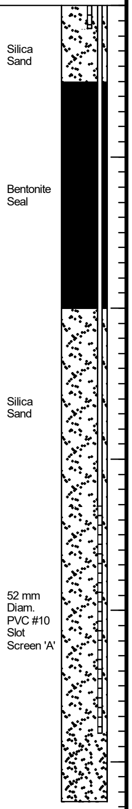
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20				
22				
		UPPER GULL RIVER FORMATION, 23.3 m to 30.6 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 23.3 m to 24.6 m with second dolostone bed at 28.4-29.0m.		124.41 23.30
24				123.11 24.60
26				
28				119.31 28.40
				118.71 29.00
30				117.11 30.60
		End of Borehole, 30.6 m		
32				
34				
36				
38				
40				

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-5

SHEET 1 OF 2

LOCATION: N 5009606.6 ;E 422688.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 1999

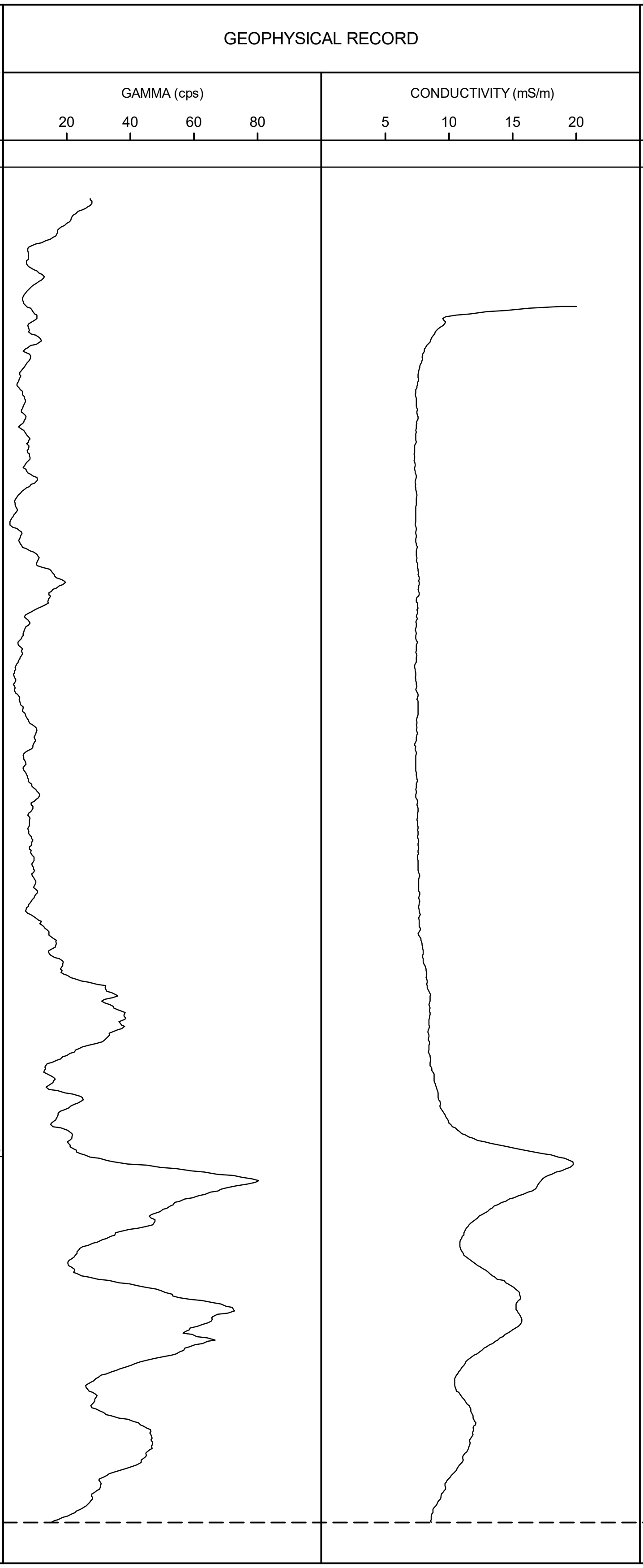
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

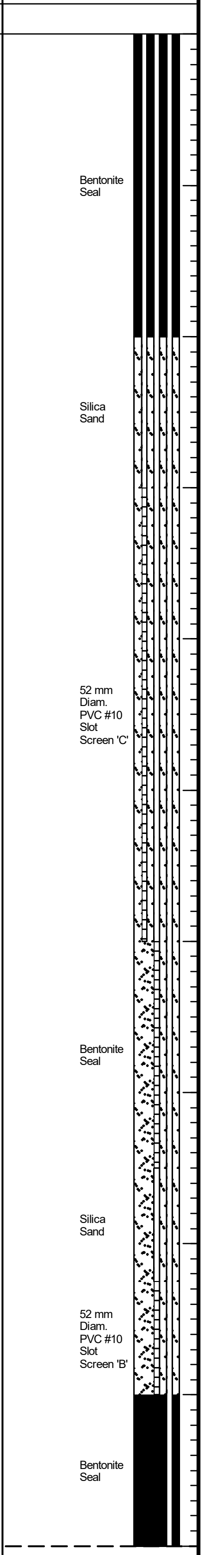
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		
0		**Bedrock Surface, 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 30.7 m** **UNIT 3, 0.0 m to 14.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	144.06 0.00
14.6		**UNIT 2, 14.6 m to 20.1 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	129.46 14.60
20		*CONTINUED NEXT PAGE*		

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-5

SHEET 2 OF 2

LOCATION: N 5009606.6 ;E 422688.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 1999

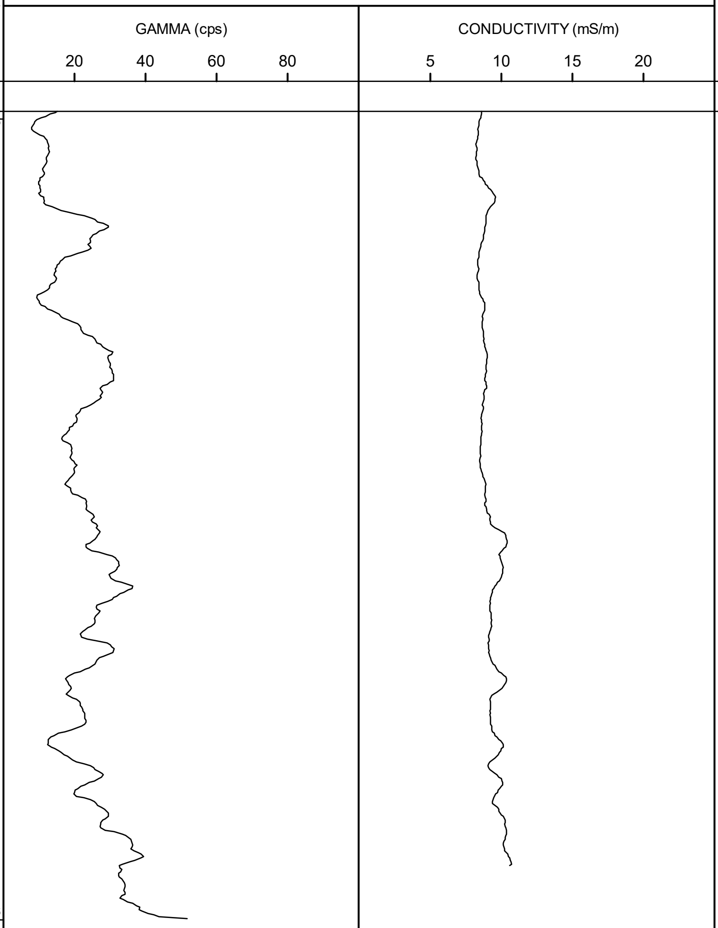
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

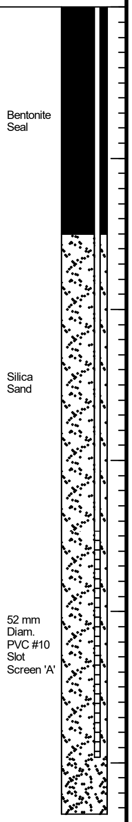
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		**UNIT 1, 20.1 m to 30.7 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick. Thin black shale bed locally marks sharp basal contact of sequence directly overlying Gull River Formation dolostone bed.		123.96 20.10
22				
24				
26				
28				
30				113.36 30.70
		End of Borehole, 30.7 m		
32				
34				
36				
38				
40				

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-6

SHEET 1 OF 2

LOCATION: N 5010009.9 ;E 423117.8

DRILLING DATE: 1999

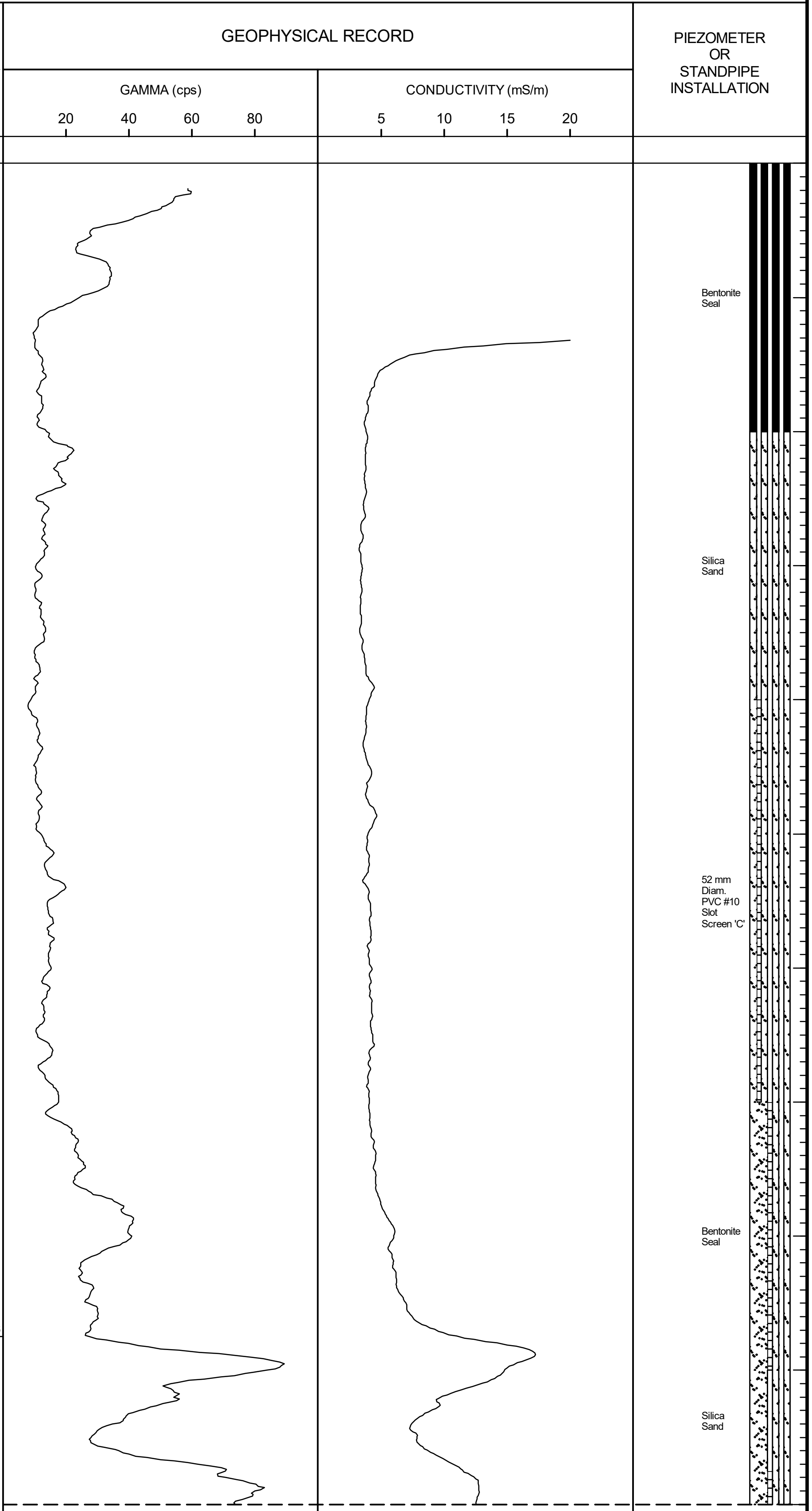
DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		140.76
0		**Bedrock Surface, 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 30.7 m** **UNIT 3, 0.0 m to 17.5 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
		UNIT 2, 17.5 m to 22.9 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		123.26 17.50
20		*CONTINUED NEXT PAGE*		



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH99-6

SHEET 2 OF 2

LOCATION: N 5010009.9 ;E 423117.8

DRILLING DATE: 1999

DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

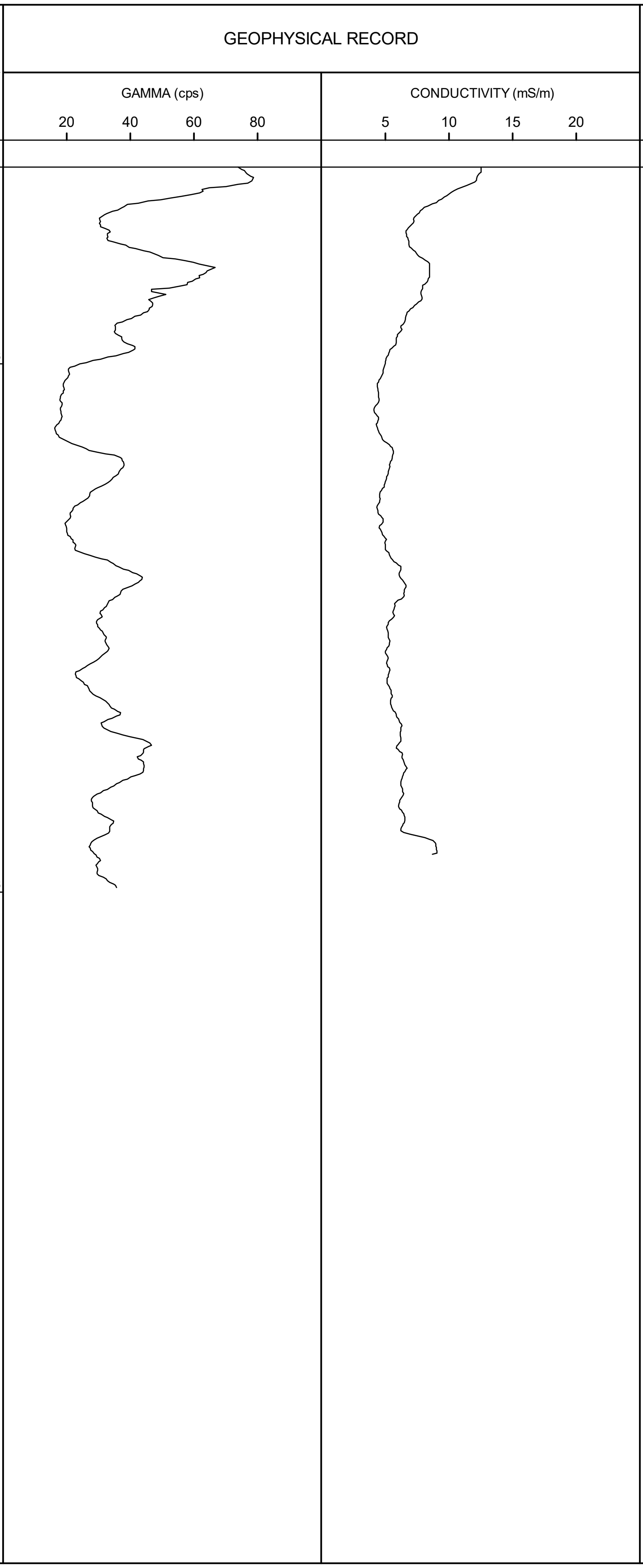
INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

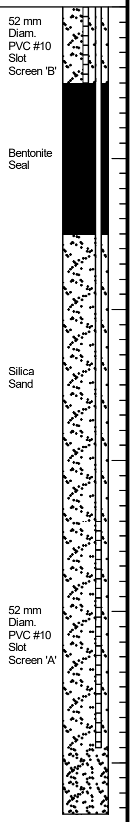
DEPTH SCALE METRES: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

DRILLING RECORD

DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
--- CONTINUED FROM PREVIOUS PAGE ---		
UNIT 1, 22.9 m to 30.7 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		117.86 22.90
End of Borehole, 30.7 m		110.06 30.70



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

GEOPHYSICAL LOG OF: BH03-7

PROJECT: 18111853

SHEET 1 OF 2

LOCATION: N 5009177.5 ;E 422413.5

DRILLING DATE: 2003

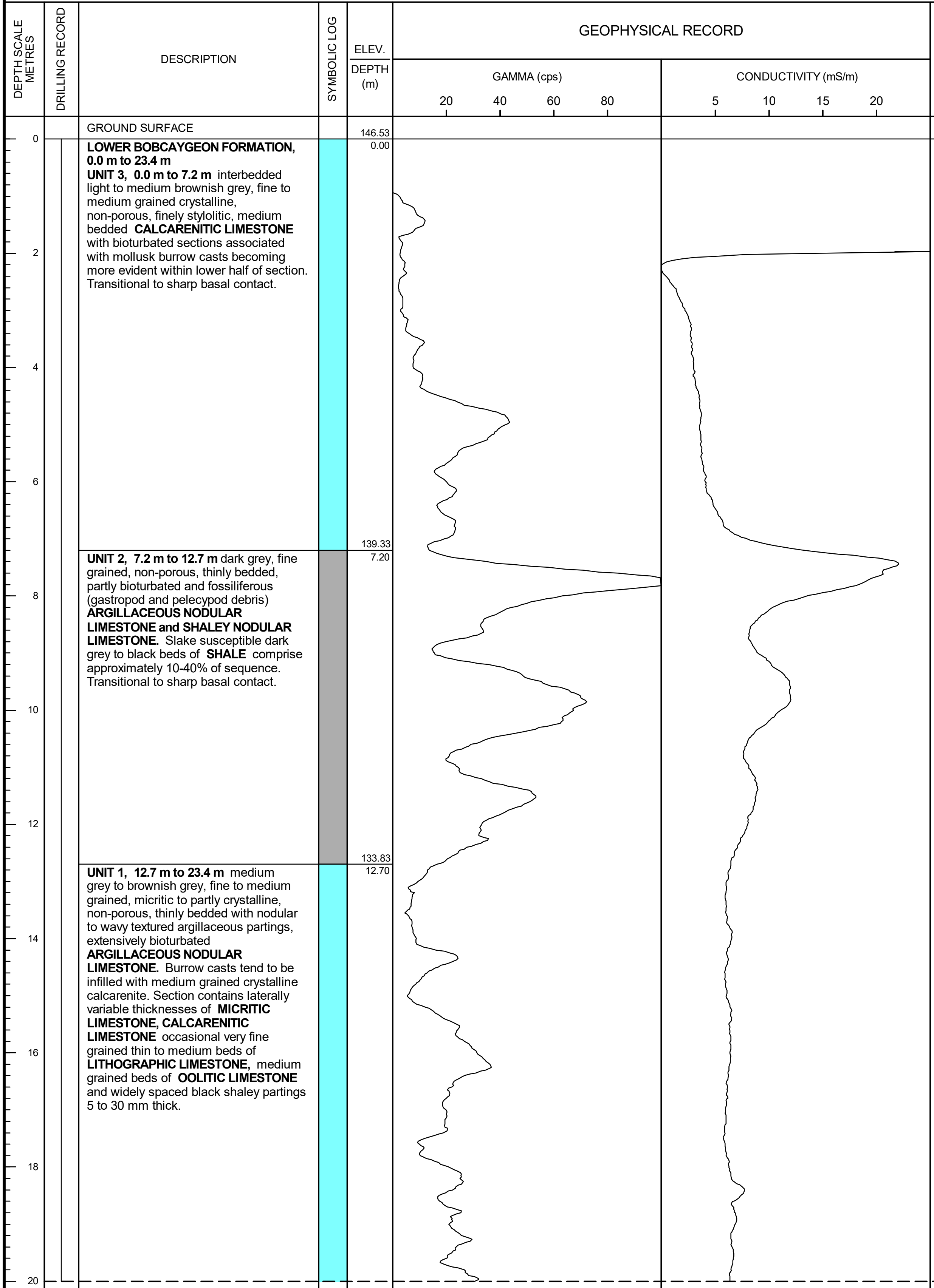
DATUM: Geodetic

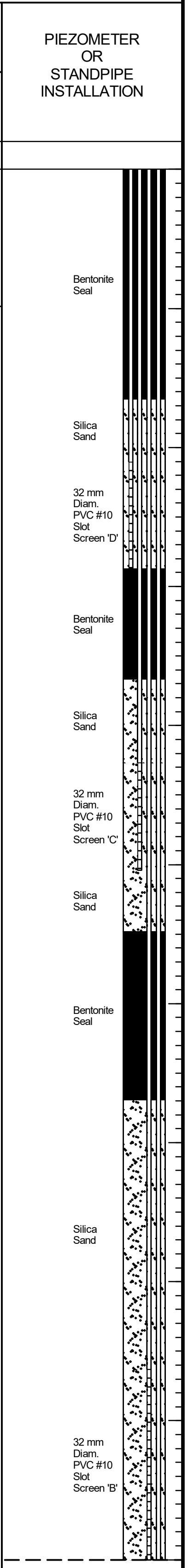
DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	146.53
0	**LOWER BOBCAYGEON FORMATION, 0.0 m to 23.4 m** **UNIT 3, 0.0 m to 7.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	0.00
		139.33
	UNIT 2, 7.2 m to 12.7 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	7.20
		133.83
	UNIT 1, 12.7 m to 23.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	12.70
20	*CONTINUED NEXT PAGE*	





DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

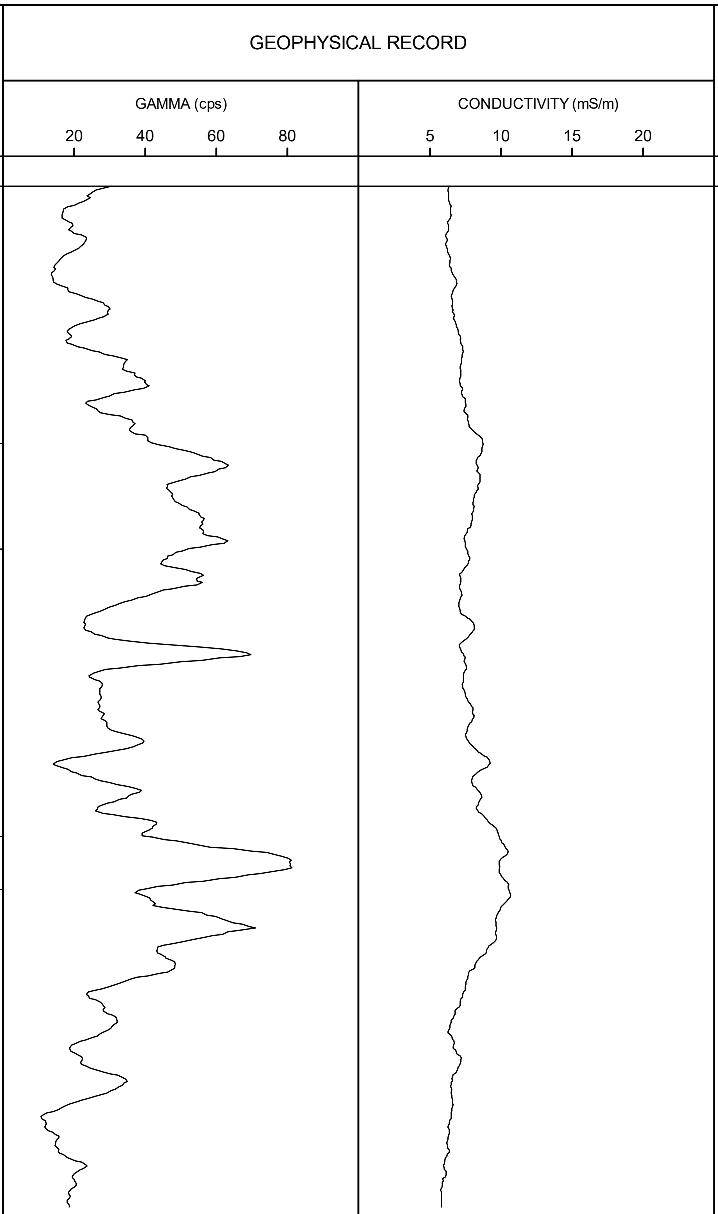
PROJECT: 18111853

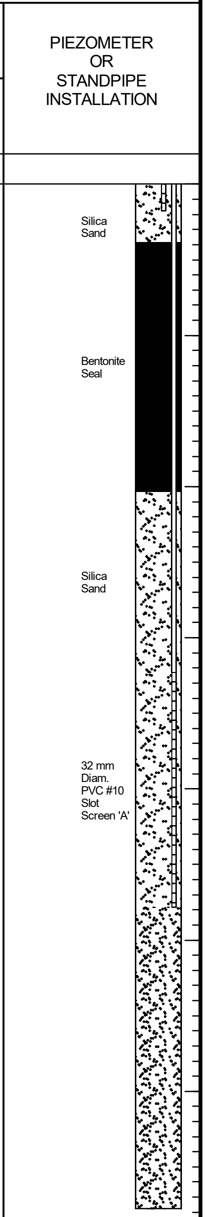
GEOPHYSICAL LOG OF: BH03-7

SHEET 2 OF 2

LOCATION: N 5009177.5 ;E 422413.5
DRILLING DATE: 2003
DATUM: Geodetic
INCLINATION: -90° AZIMUTH: ---
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20				
22				
				123.13 23.40
24		**UPPER GULL RIVER FORMATION, 23.4 m to 33.6 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 23.4 m to 24.8 m with second dolostone bed at 28.6-29.3m.		
				121.73 24.80
26				
28				
				117.93 28.60
				117.23 29.30
30				
32				
				112.93 33.60
34		**End of Borehole, 33.6 m**		
36				
38				
40				





DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH03-8

SHEET 1 OF 2

LOCATION: N 5009549.8 ;E 422706.5

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 2003

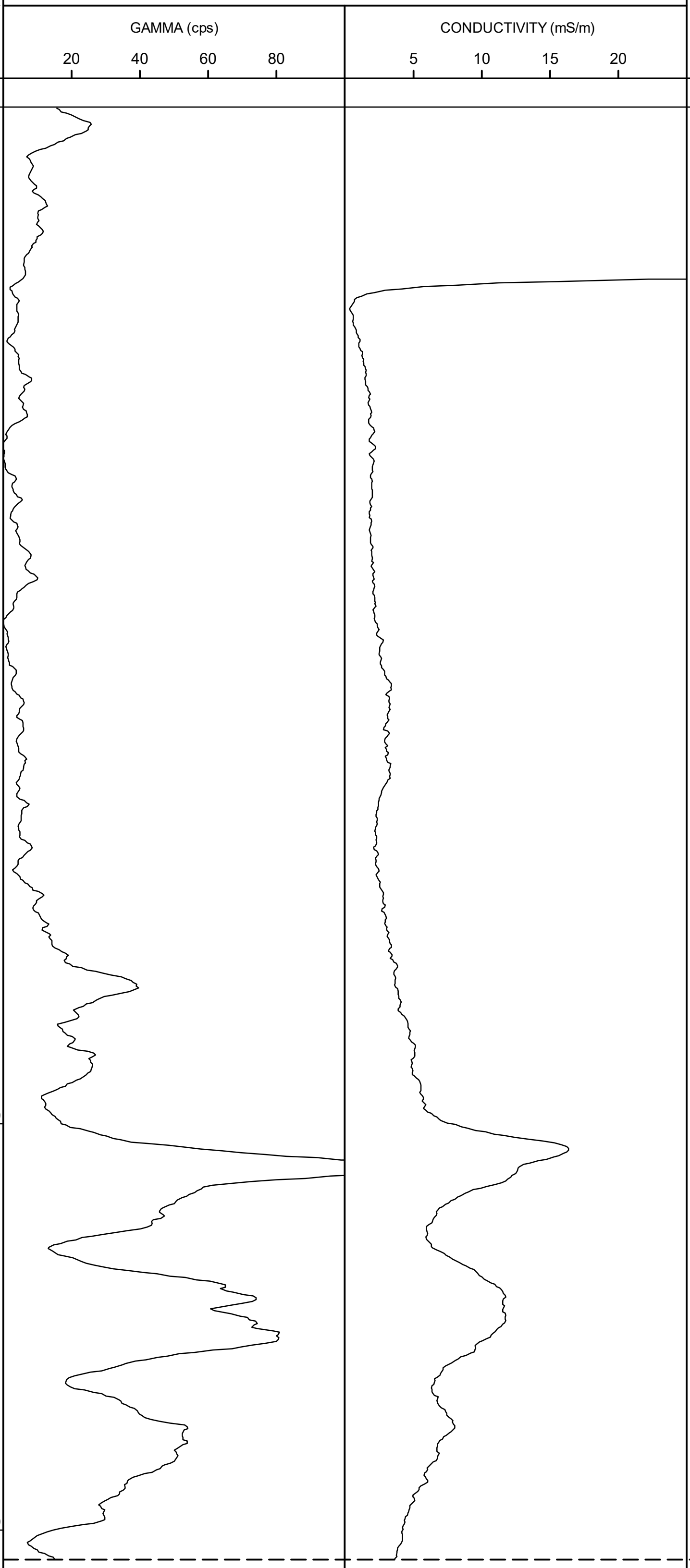
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

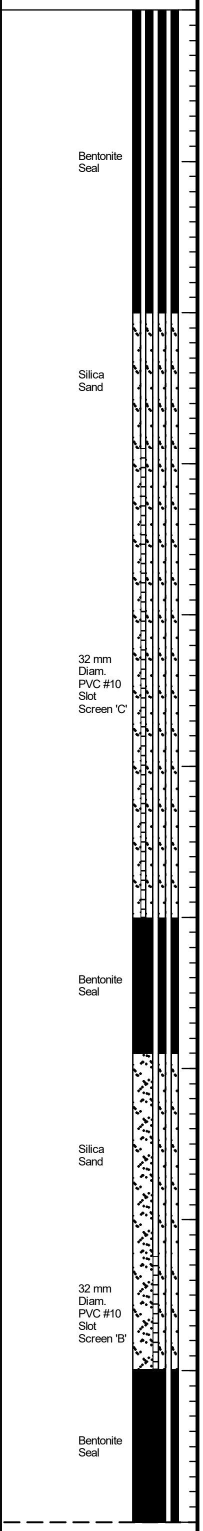
DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	143.99
0	**LOWER BOBCAYGEON FORMATION, 0.0 m to 23.4 m** **UNIT 3, 0.0 m to 14.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	0.00
14	**UNIT 2, 14.0 m to 19.6 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	129.99 14.00
		124.39 19.60
20	*CONTINUED NEXT PAGE*	

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH03-8

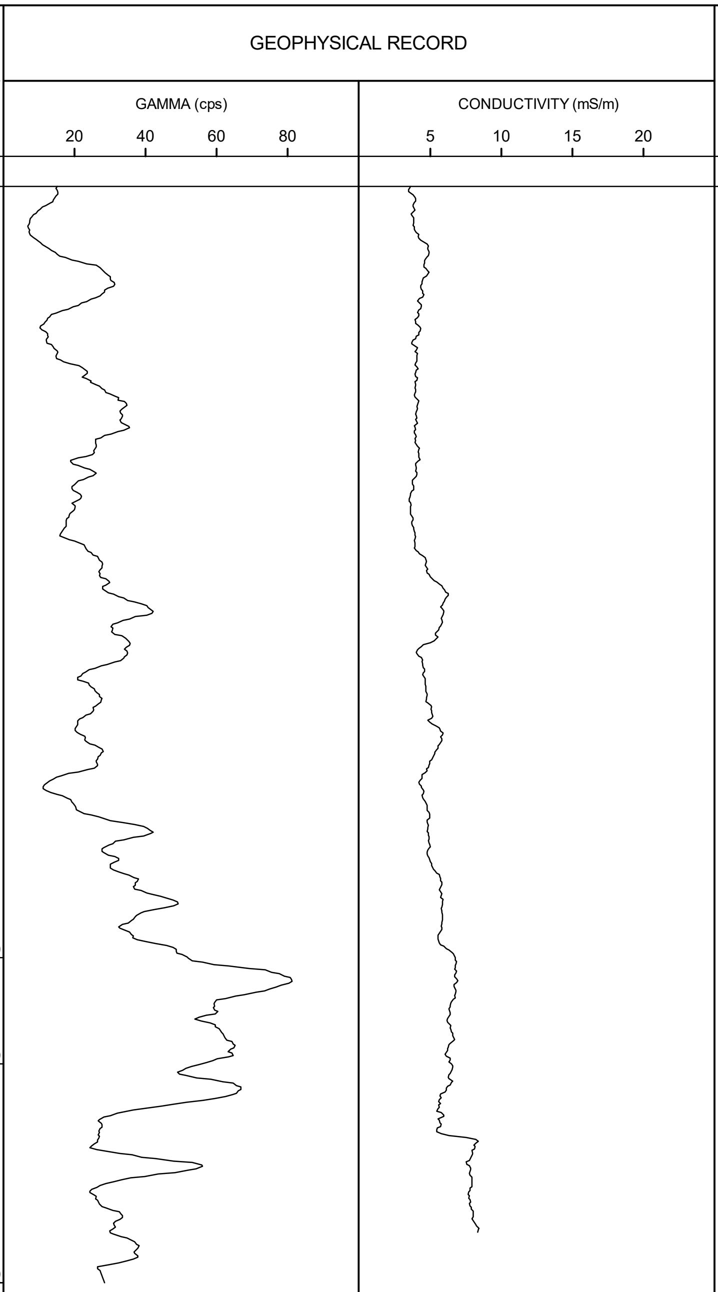
SHEET 2 OF 2

LOCATION: N 5009549.8 ;E 422706.5
INCLINATION: -90° AZIMUTH: ---

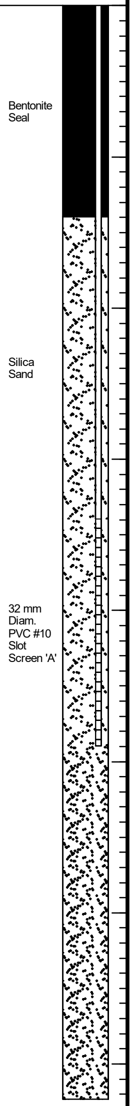
DRILLING DATE: 2003
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	--- CONTINUED FROM PREVIOUS PAGE ---	
20	**UNIT 1, 19.6 m to 30.2 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	
30	**UPPER GULL RIVER FORMATION, 30.2 m to 34.5 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 30.2 m to 31.6 m.	113.79 30.20 112.39 31.60 109.49
	End of Borehole, 34.5 m	34.50



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH03-9

SHEET 1 OF 2

LOCATION: N 5009966.1 ;E 423135.3

INCLINATION: -90° AZIMUTH: ---

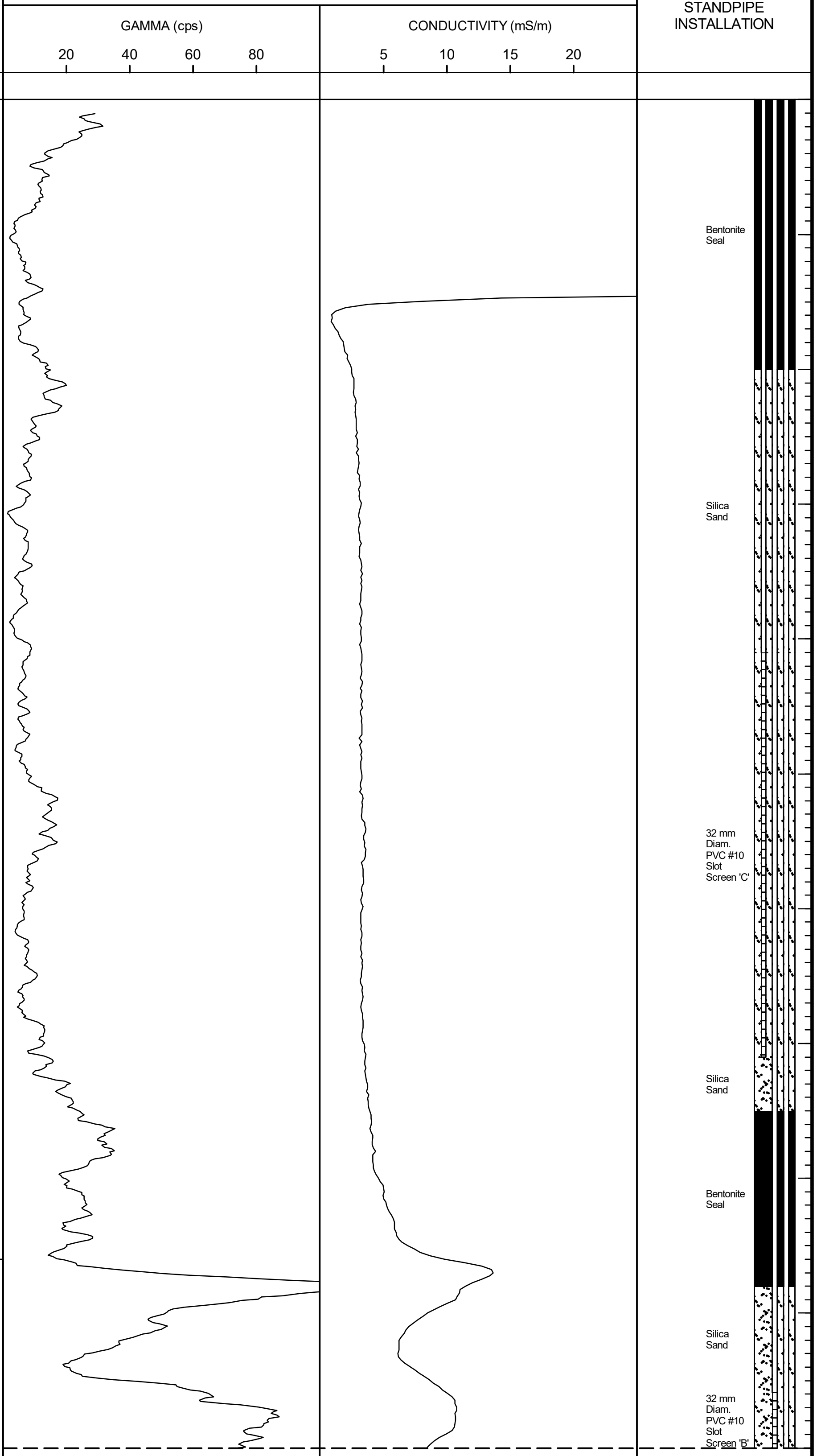
DRILLING DATE: 2003

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		140.41		
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 32.8 m** **UNIT 3, 0.0 m to 17.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00		
		UNIT 2, 17.2 m to 22.6 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		123.21 17.20		
20		*CONTINUED NEXT PAGE*				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH03-9

SHEET 2 OF 2

LOCATION: N 5009966.1 ;E 423135.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 2003

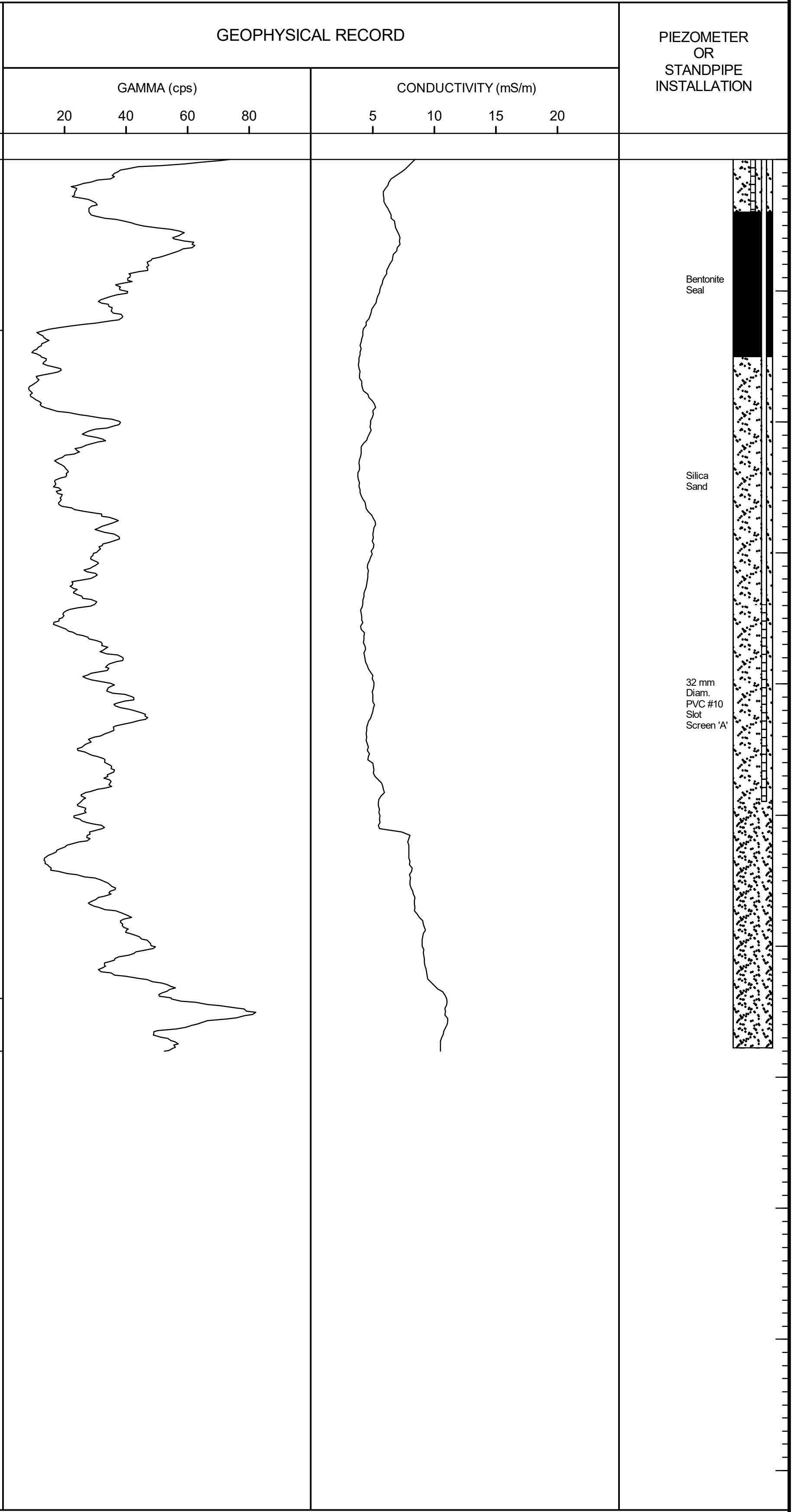
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		**UNIT 2, 17.2 m to 22.6 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	117.81 22.60
		UNIT 1, 22.6 m to 32.8 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	107.61 32.80
		UPPER GULL RIVER FORMATION, 32.8 m to 33.6 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 32.8 m to 33.6 m.	🟩	106.81 33.60
		End of Borehole, 33.6 m		

Depth scale marks: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH05-10

SHEET 1 OF 2

LOCATION: N 5008985.0 ;E 423191.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 2005

DRILL RIG: Air Rotary Percussion

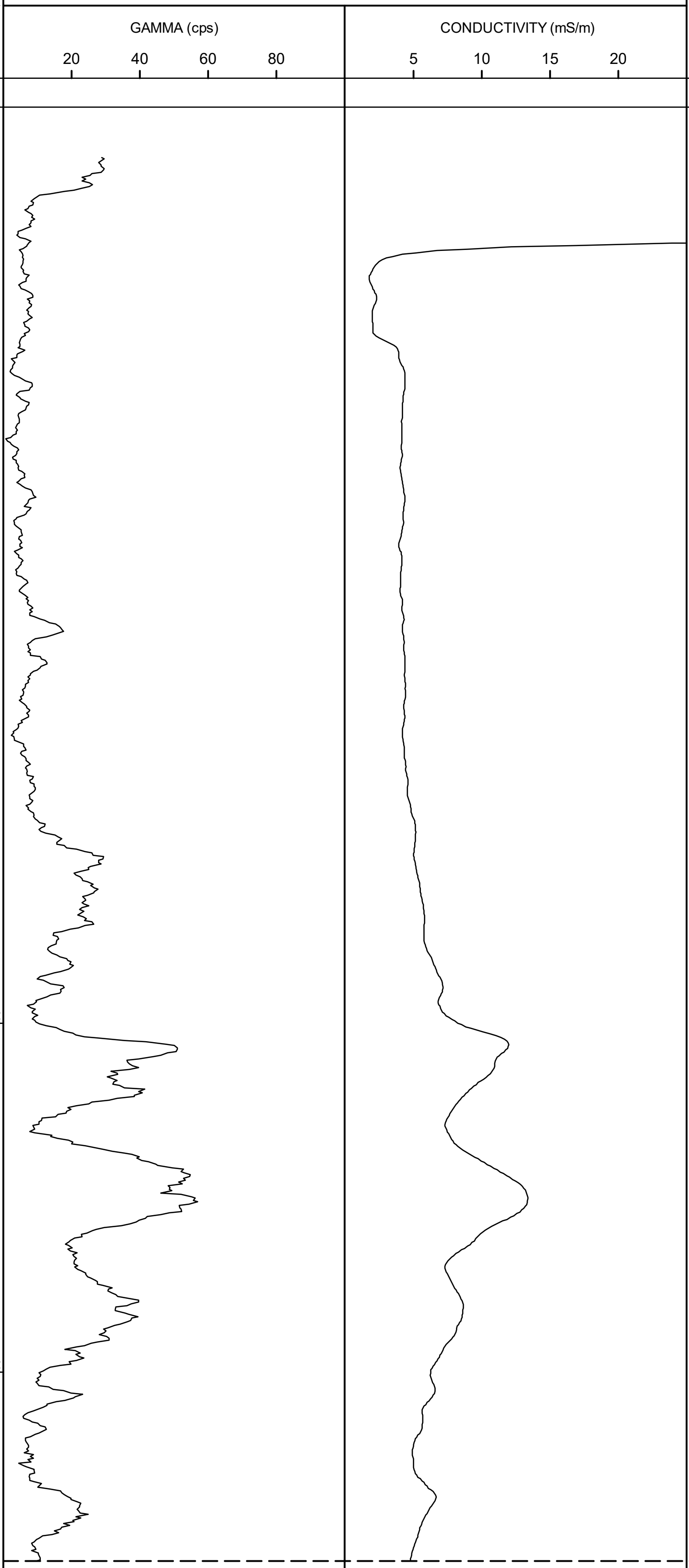
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

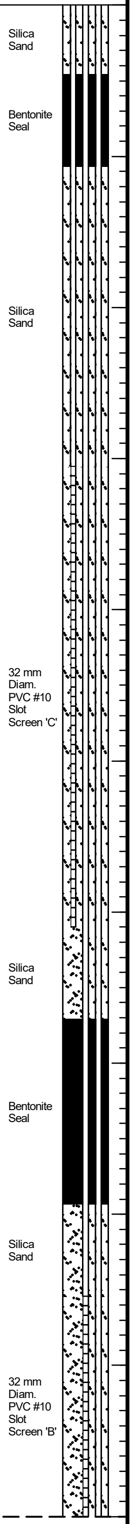
DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		142.32
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 28.2 m** **UNIT 3, 0.0 m to 12.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	0.00
		UNIT 2, 12.6 m to 17.4 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	129.72 12.60
		UNIT 1, 17.4 m to 28.2 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally	🟦	124.92 17.40
20				

Depth scale marks: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

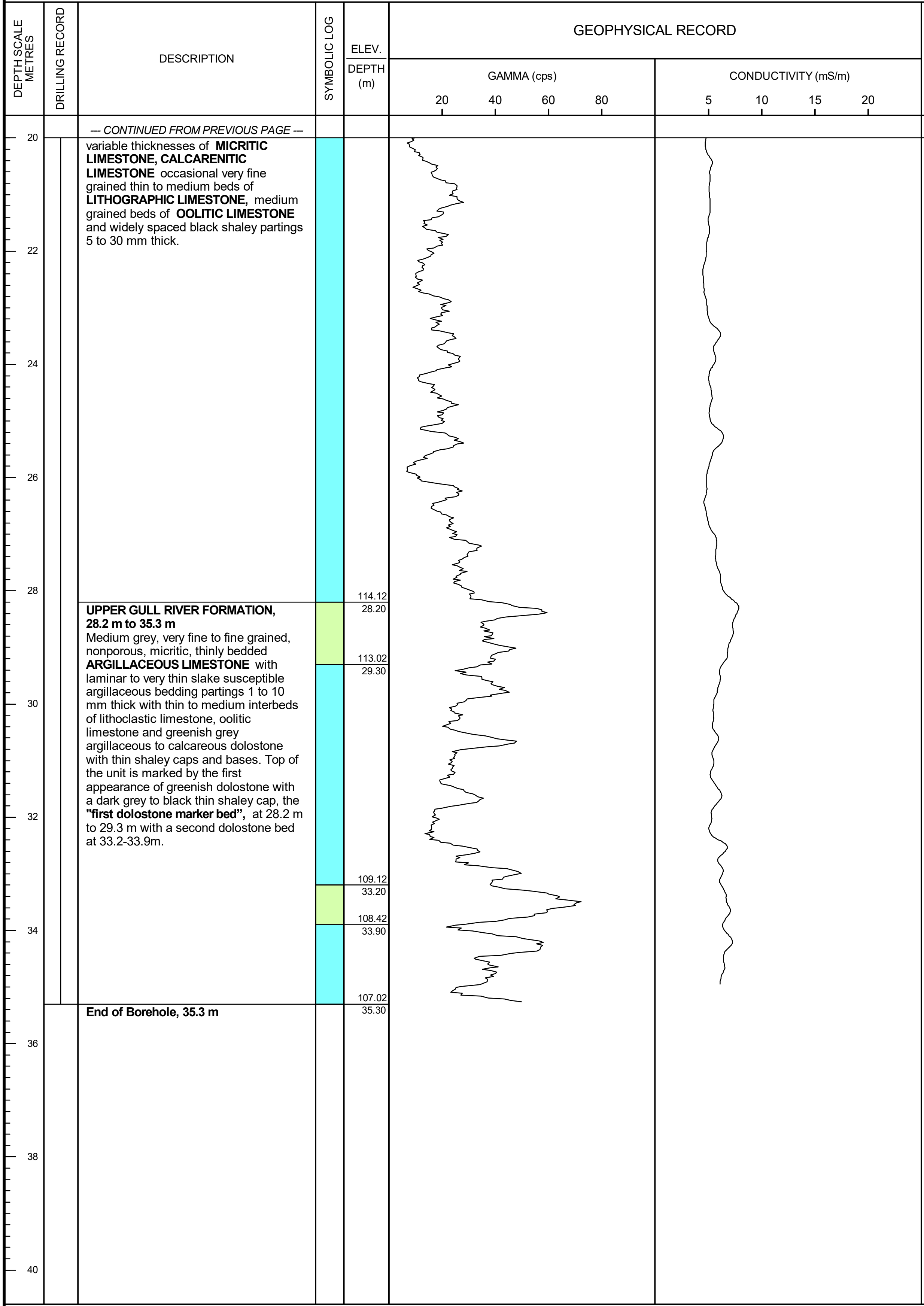
PROJECT: 18111853

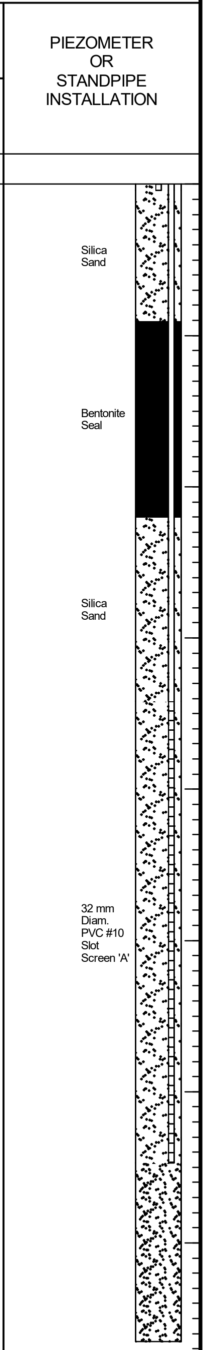
GEOPHYSICAL LOG OF: BH05-10

SHEET 2 OF 2

LOCATION: N 5008985.0 ;E 423191.0
DRILLING DATE: 2005
DATUM: Geodetic
DRILL RIG: Air Rotary Percussion
INCLINATION: -90° AZIMUTH: ---
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DESCRIPTION	ELEV. DEPTH (m)
--- CONTINUED FROM PREVIOUS PAGE ---	
variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	114.12 28.20
UPPER GULL RIVER FORMATION, 28.2 m to 35.3 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 28.2 m to 29.3 m with a second dolostone bed at 33.2-33.9m.	113.02 29.30 109.12 33.20 108.42 33.90 107.02 35.30
End of Borehole, 35.3 m	





DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH05-11

SHEET 1 OF 2

LOCATION: N 5008470.0 ;E 423626.0

DRILLING DATE: 2005

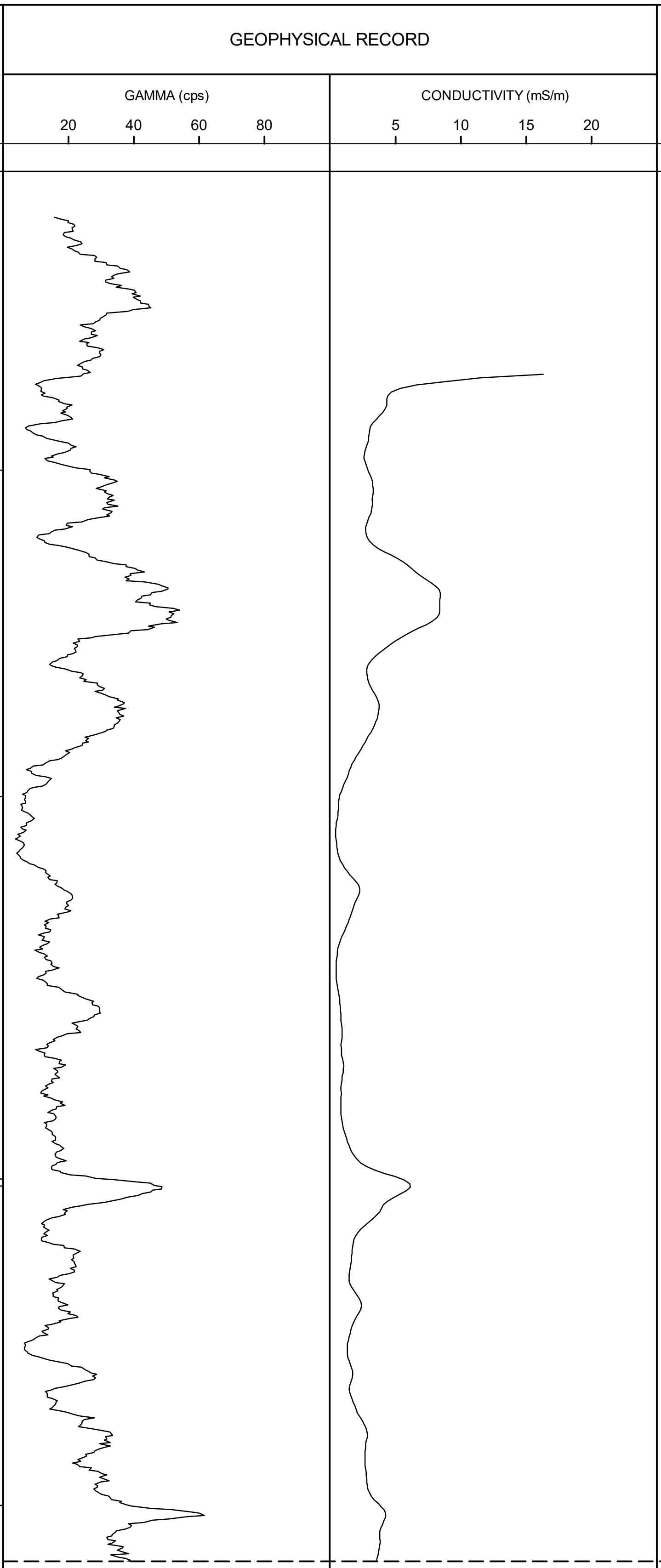
DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		142.51
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 19.2 m** **UNIT 3, 0.0 m to 4.3 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
4		**UNIT 2, 4.3 m to 9.0 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		138.21 4.30
9		**UNIT 1, 9.0 m to 19.2 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick. Soft, grey, 10 mm CLAY layer associated with strong natural gamma and conductivity spike at 14.5-14.6m.		133.51 9.00
14.5				128.01
14.6				14.60
19.2				123.31 19.20
20				



Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH05-11

SHEET 2 OF 2

LOCATION: N 5008470.0 ;E 423626.0

INCLINATION: -90° AZIMUTH: ---

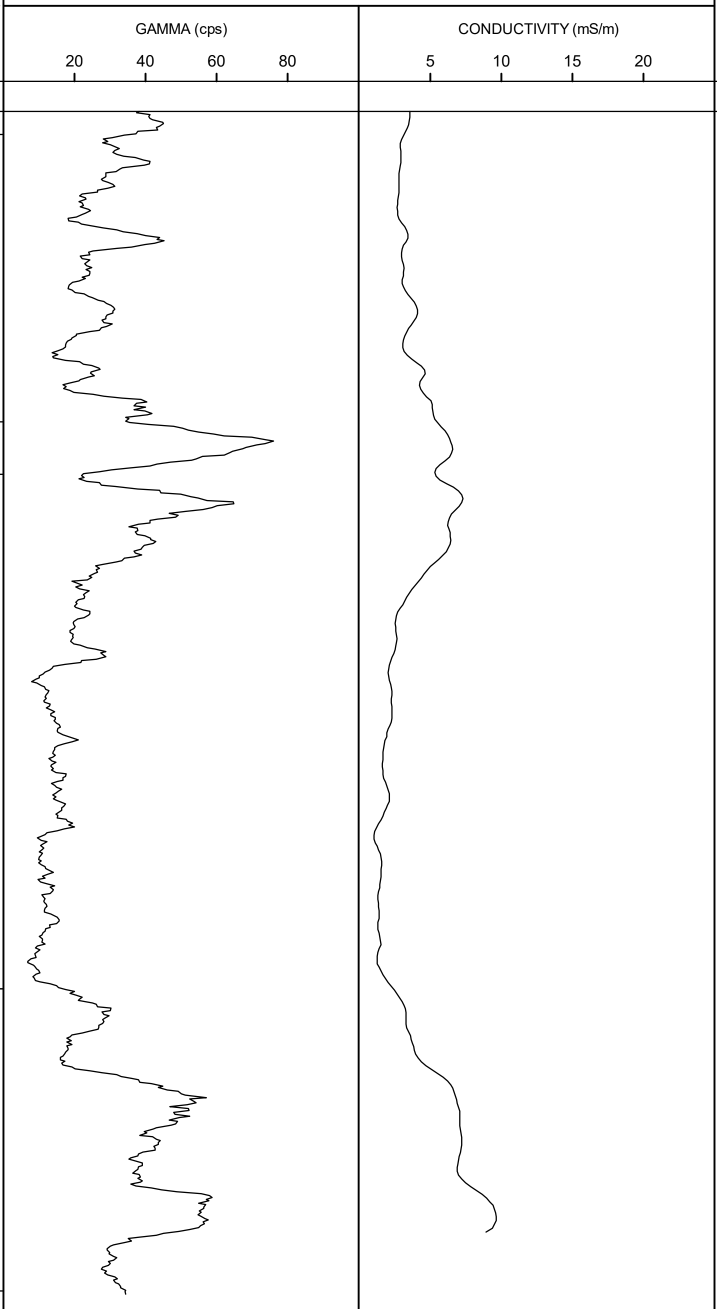
DRILLING DATE: 2005

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20 22 24		**GULL RIVER FORMATION, 19.2 m to 35.6 m** **UPPER GULL RIVER FORMATION, 19.2 m to 31.6 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 19.4 m to 20.3 m with a second dolostone bed at 24.1-24.8m.		122.21 20.30 118.41 24.10 117.71 24.80		
26 28 30						
32 34		**LOWER GULL RIVER FORMATION, 31.6 m to 35.6 m** **UNIT 5, 31.6 m to 35.6 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.		110.91 31.60 106.91 35.60		
36 38 40		**End of Borehole, 35.6 m**				



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: BH05-12

SHEET 1 OF 2

LOCATION: N 5009135.0 ;E 424176.0

INCLINATION: -90° AZIMUTH: ---

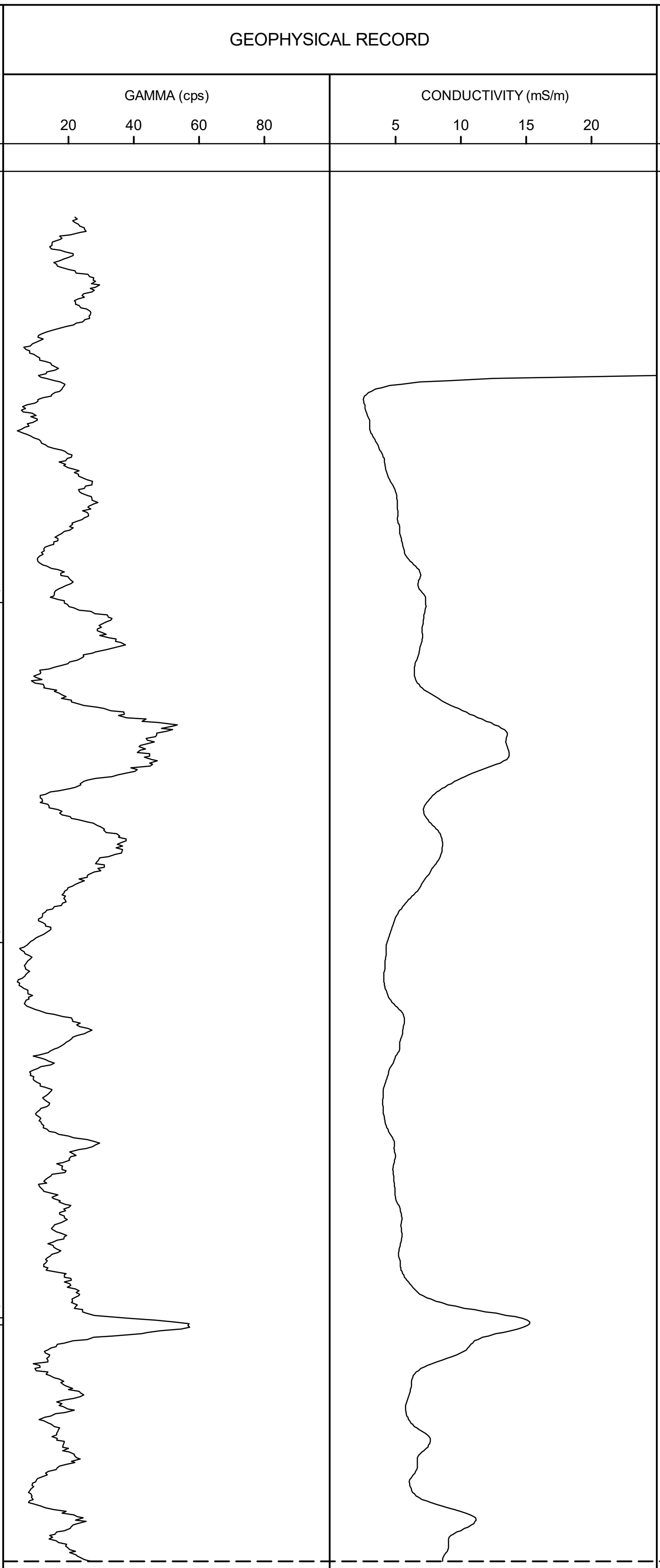
DRILLING DATE: 2005

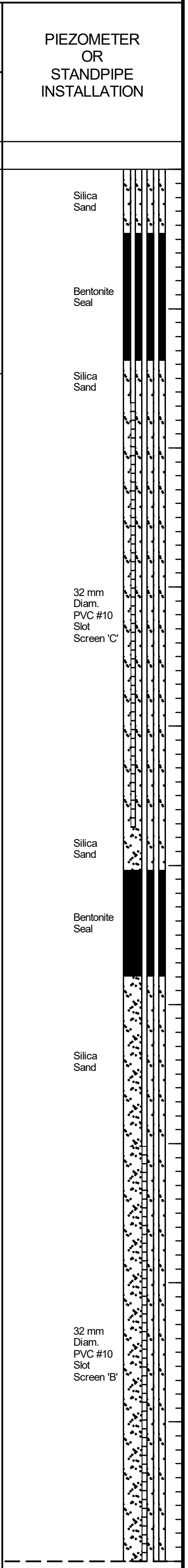
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		133.87
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 21.1 m** **UNIT 3, 0.0 m to 6.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
6		**UNIT 2, 6.2 m to 11.1 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		127.67 6.20
11		**UNIT 1, 11.1 m to 21.1 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick. Soft, grey, 10 mm CLAY layer associated with strong natural gamma and conductivity spike at 16.5-16.6m.		122.77 11.10
16.5				117.37 16.60
20				





CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

GEOPHYSICAL LOG OF: BH05-12

PROJECT: 18111853

SHEET 2 OF 2

LOCATION: N 5009135.0 ;E 424176.0

DRILLING DATE: 2005

DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m)

--- CONTINUED FROM PREVIOUS PAGE ---

GULL RIVER FORMATION, 21.1 m to 35.3 m

UPPER GULL RIVER FORMATION, 21.1 m to 33.8 m

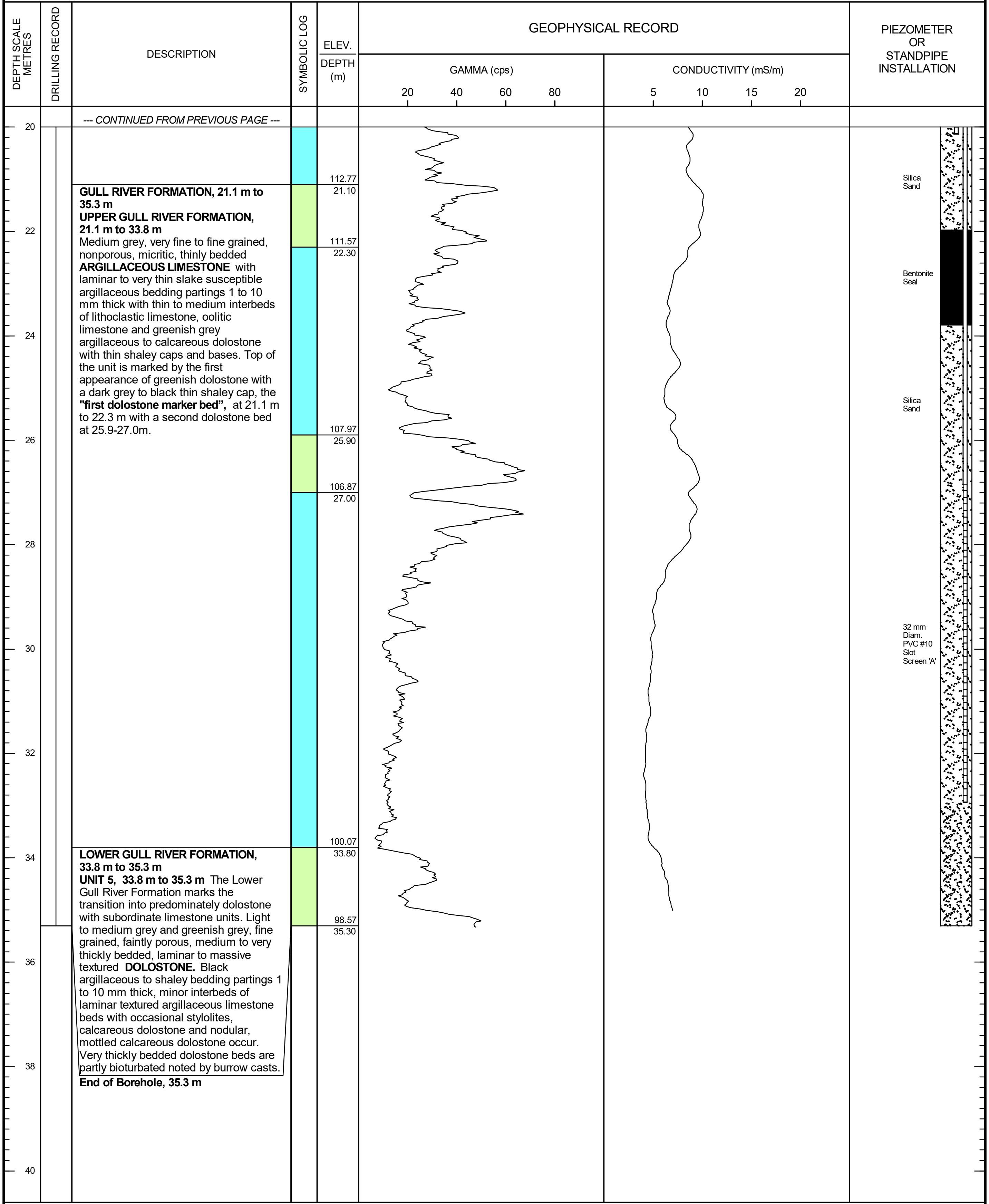
Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 21.1 m to 22.3 m with a second dolostone bed at 25.9-27.0m.

LOWER GULL RIVER FORMATION, 33.8 m to 35.3 m

UNIT 5, 33.8 m to 35.3 m The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.

End of Borehole, 35.3 m

ELEV.	DEPTH (m)
112.77	21.10
111.57	22.30
107.97	25.90
106.87	27.00
100.07	33.80
98.57	35.30



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH13-16

SHEET 1 OF 6

LOCATION: N 5009712.0 ;E 422599.0

DRILLING DATE: October 8, 2013

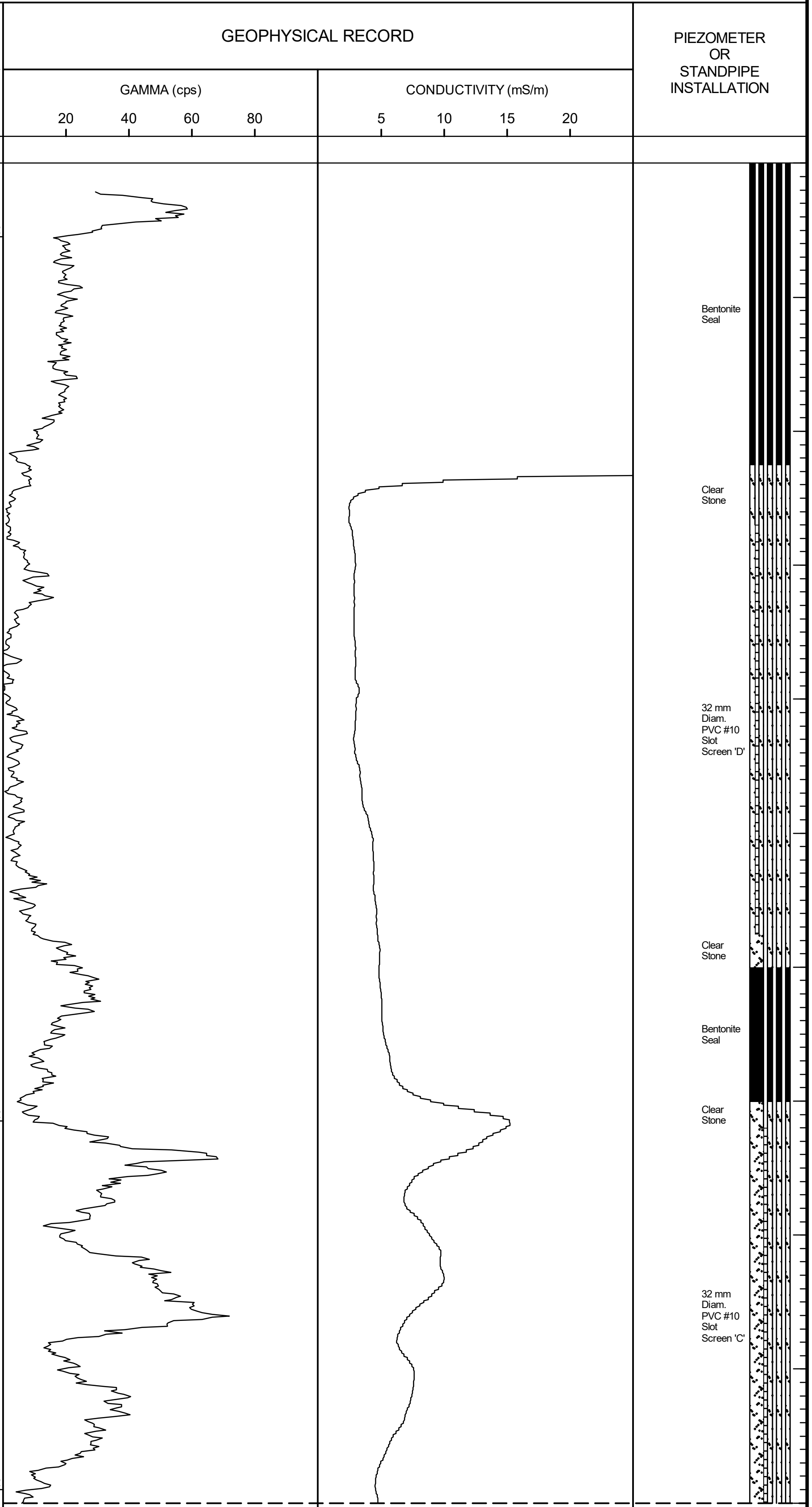
DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		143.32
0		**Overburden, 0.0 m to 1.1 m**	▨	0.00
		LOWER BOBCAYGEON FORMATION, 1.1 m to 30.3 m **UNIT 3, 1.1 m to 14.3 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		142.22 1.10
		UNIT 2, 14.3 m to 19.8 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		129.02 14.30
20				123.52 19.80



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

GEOPHYSICAL LOG OF: BH13-16

PROJECT: 18111892

SHEET 2 OF 6

LOCATION: N 5009712.0 ;E 422599.0

DRILLING DATE: October 8, 2013

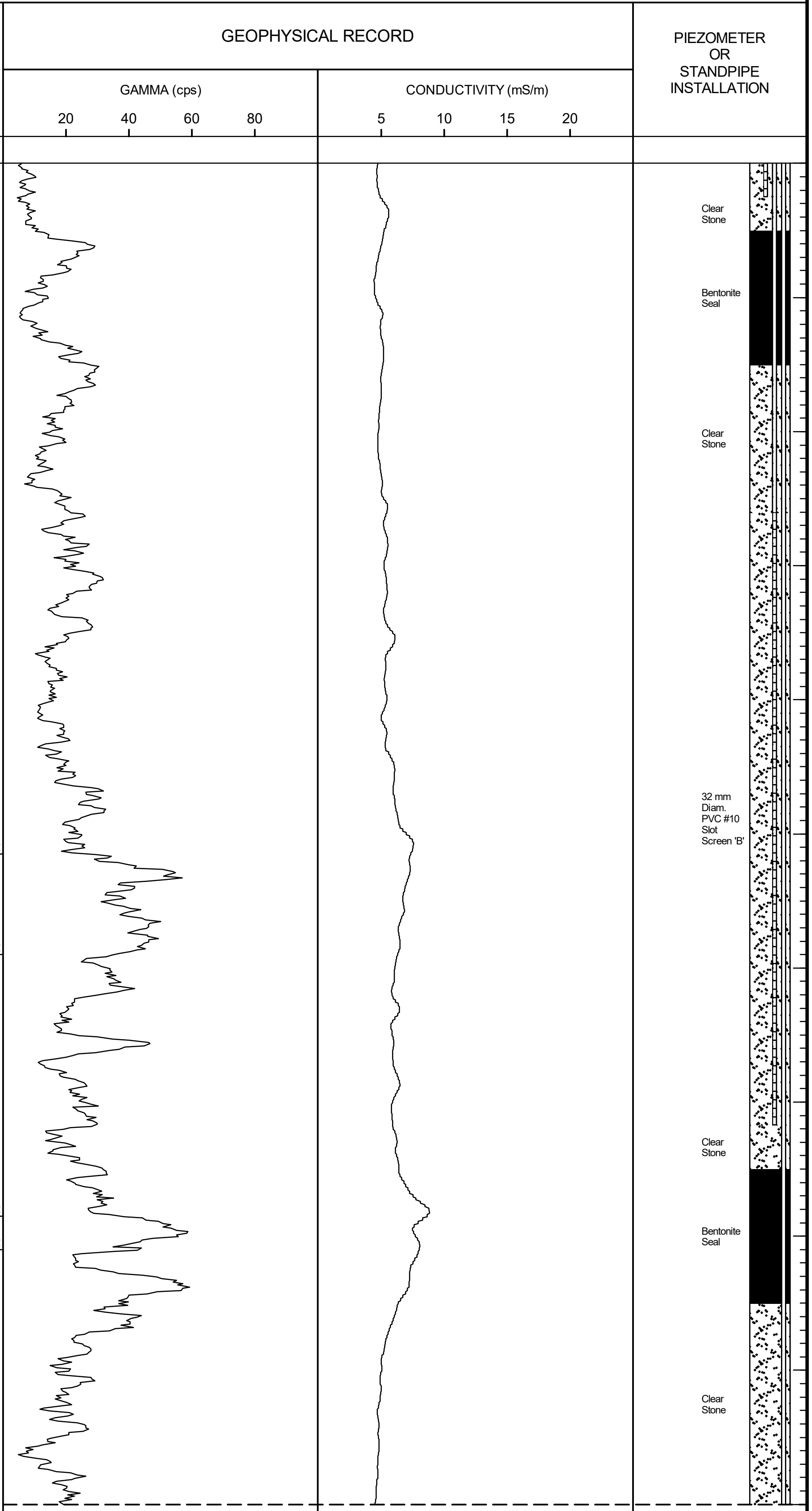
DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		**UNIT 1, 19.8 m to 30.3 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		
30				113.02 30.30
		GULL RIVER FORMATION, 30.3 m to 67.0 m **UPPER GULL RIVER FORMATION, 30.3 m to 43.3 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 30.3 m to 31.8 m with a second dolostone bed at 35.7-36.2m.		111.52 31.80
				107.62 35.70
36				107.12 36.20
40		*CONTINUED NEXT PAGE*		



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH13-16

SHEET 3 OF 6

LOCATION: N 5009712.0 ;E 422599.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: October 8, 2013

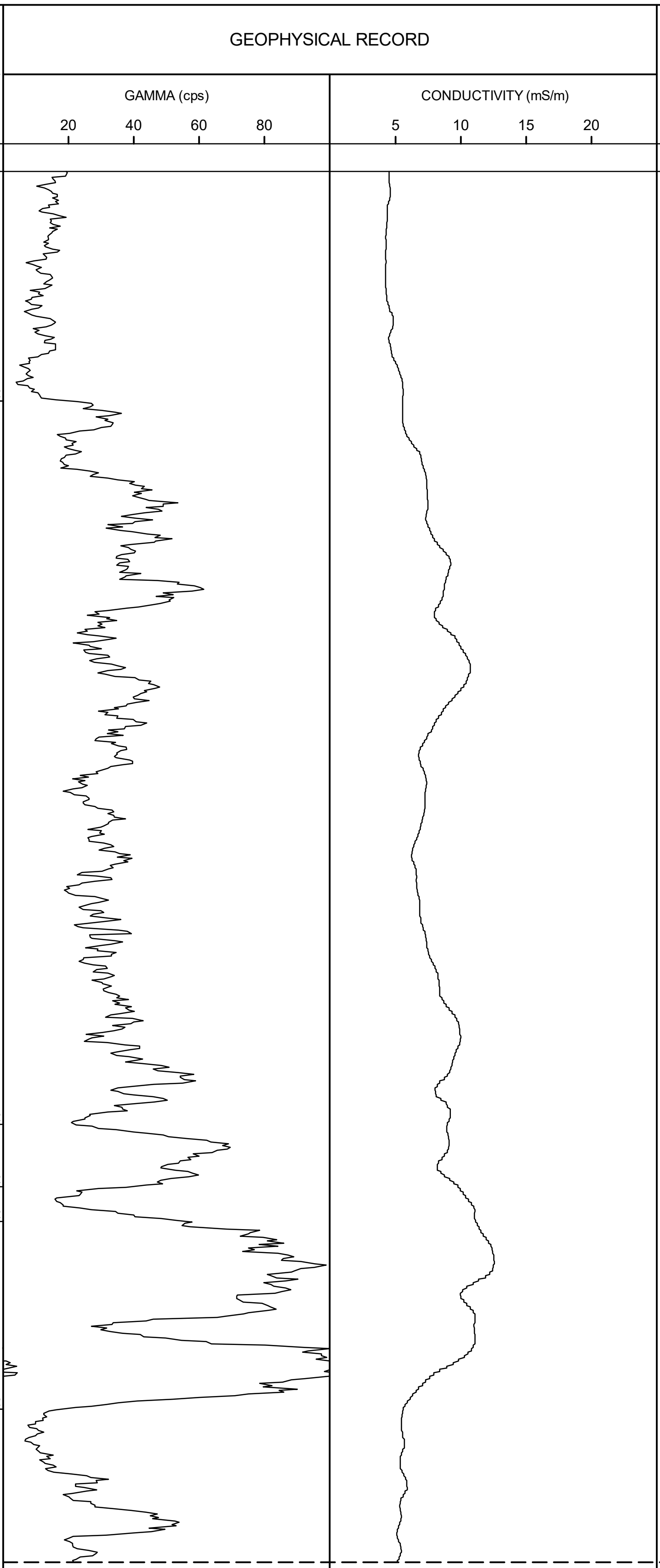
DRILL RIG: Air Rotary Percussion

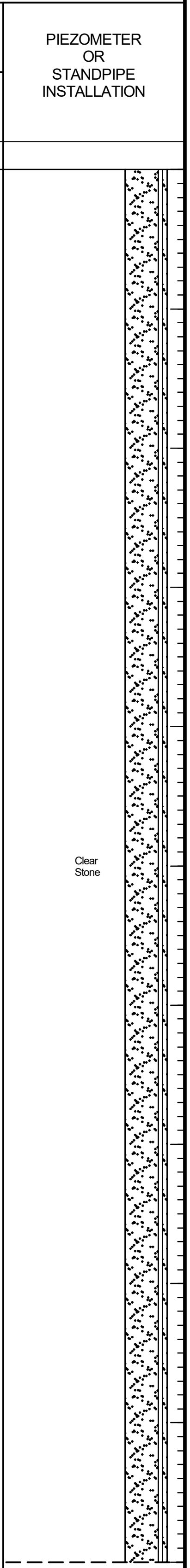
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
40		--- CONTINUED FROM PREVIOUS PAGE ---		
		LOWER GULL RIVER FORMATION, 43.3 m to 67.0 m **UNIT 5, 43.3 m to 53.7 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.		100.02 43.30
		UNIT 4, 53.7 m to 57.8 m interbedded sequence of light to medium grey to greenish grey and dark grey, fine grained, faintly porous, thinly to medium bedded, massive textured, argillaceous to shaley **DOLOSTONE** and medium grey **DOLOMITIC LIMESTONE.** Thin interbeds of laminar to nodular textured limestone and thin oolitic limestone beds occur with medium bed of limestone at 54.6-55.1. Unit also includes light to medium grey and greenish grey, medium grained, thinly to medium bedded, calcareous to dolomitic cemented, partly bioturbated **QUARTZ SANDSTONE** and minor black **SHALE.**		89.62 53.70 88.72 54.60 88.22 55.10
		UNIT 3, 57.8 m to 62.1 m medium grey to brownish grey, fine grained, non-porous, laminated to thinly bedded **ARGILLACEOUS LIMESTONE.** Unit includes interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings, thin beds of oolitic limestone, weakly developed lithoclastic		85.52 57.80
60		CONTINUED NEXT PAGE		

Depth scale: 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60





DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH13-16

SHEET 4 OF 6

LOCATION: N 5009712.0 ;E 422599.0

DRILLING DATE: October 8, 2013

DATUM: Geodetic

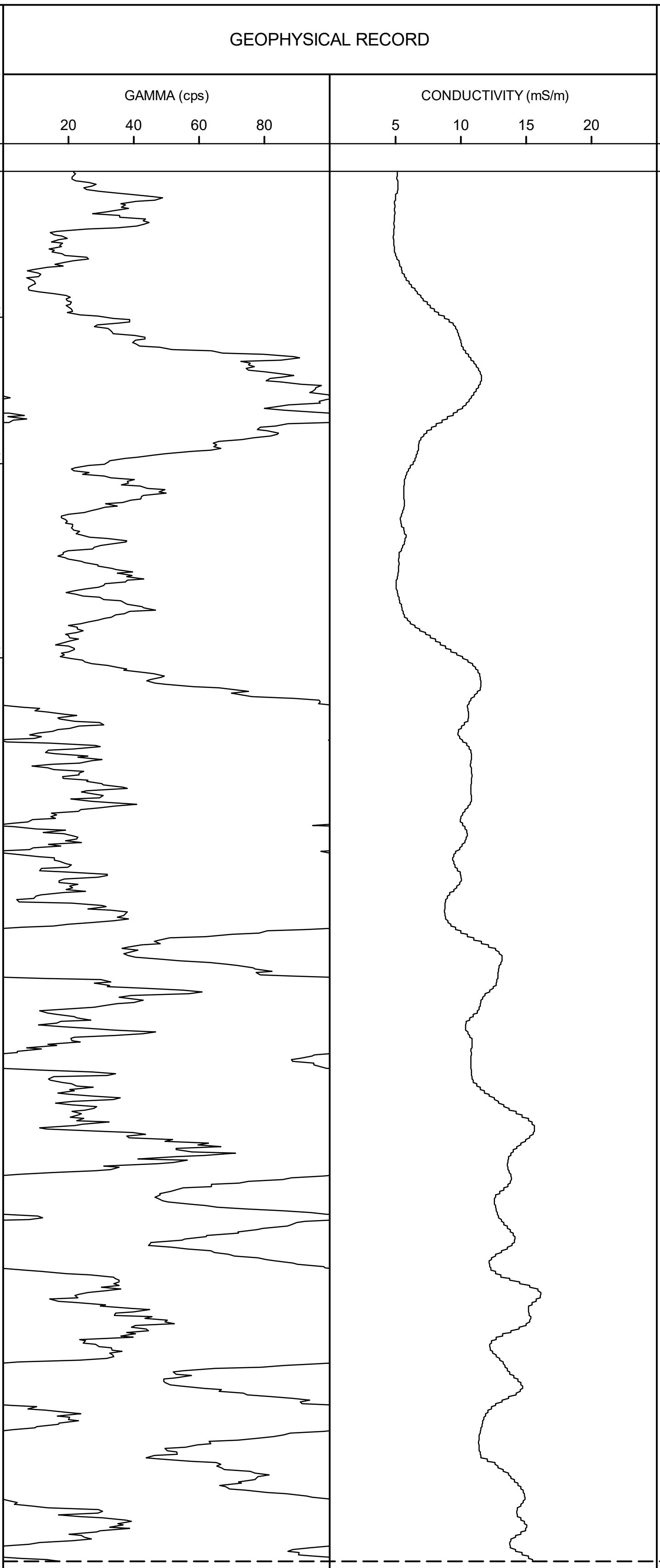
DRILL RIG: Air Rotary Percussion

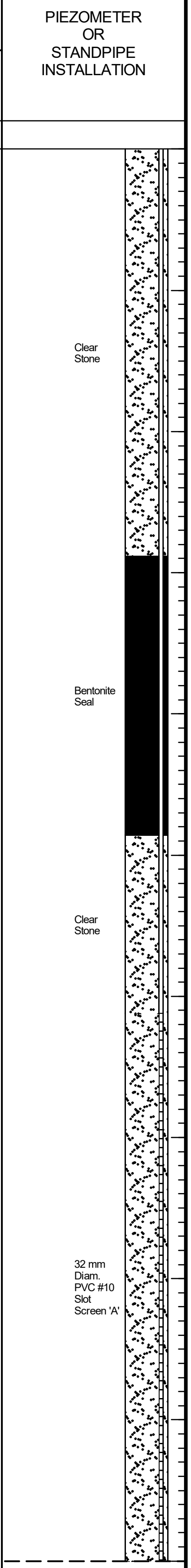
INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

--- CONTINUED FROM PREVIOUS PAGE ---

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
60		limestone, minor burrow bioturbated limestone, with lesser amounts of calcareous dolostone, dark grey dolomitic shale, shaley dolostone. Black argillaceous to shaley bedding partings occur.	🟦	81.22 62.10
62		**UNIT 2, 62.1 m to 64.2 m** interbedded sequence of medium grey to greenish grey, fine grained, faintly porous, thinly to medium bedded, argillaceous **DOLOSTONE and CALCAREOUS DOLOSTONE** with thinly interbedded black **SHALE, SHALEY DOLOSTONE and DOLOMITIC SILTSTONE** with localized burrowed bioturbation.	🟩	79.12 64.20
64		**UNIT 1, 64.2 m to 67.0 m** medium grey, fine grained, non-porous, thinly bedded **ARGILLACEOUS LIMESTONE** weakly nodular in part with interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings and very thin beds of black calcareous shale. Sharp basal contact locally marked by thin black shaley parting.	🟦	76.32 67.00
66		**ROCKCLIFFE FORMATION, 67.0 m to 100.6 m** **UPPER ROCKCLIFFE FORMATION, 67.0 m to 84.3 m** Interbedded sequence composed of medium grey, fine grained, non-porous to faintly porous, massive textured to mottled, medium to thick beds of **DOLOSTONE and CALCAREOUS DOLOSTONE,** dark grey to black, slake susceptible **SHALE,** medium grey, mottled to laminar textured, fine grained, thin to medium beds of **ARGILLACEOUS LIMESTONE** with light grey, fine grained, calcareous cemented, medium to thick beds of **QUARTZ SANDSTONE.** Individual lithological sequences such as shale beds typically vary in thickness from approximately 0.25 m to 2.0 m. Upper Rockcliffe Formation is transitional with the underlying Lower Rockcliffe Formation noted by transition from predominately dolostone and shale in the upper sequence to predominately sandstone in the lower sequence.	🟩	
68				
70				
72				
74				
76				
78				
80				





CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH13-16

SHEET 5 OF 6

LOCATION: N 5009712.0 ;E 422599.0

DRILLING DATE: October 8, 2013

DATUM: Geodetic

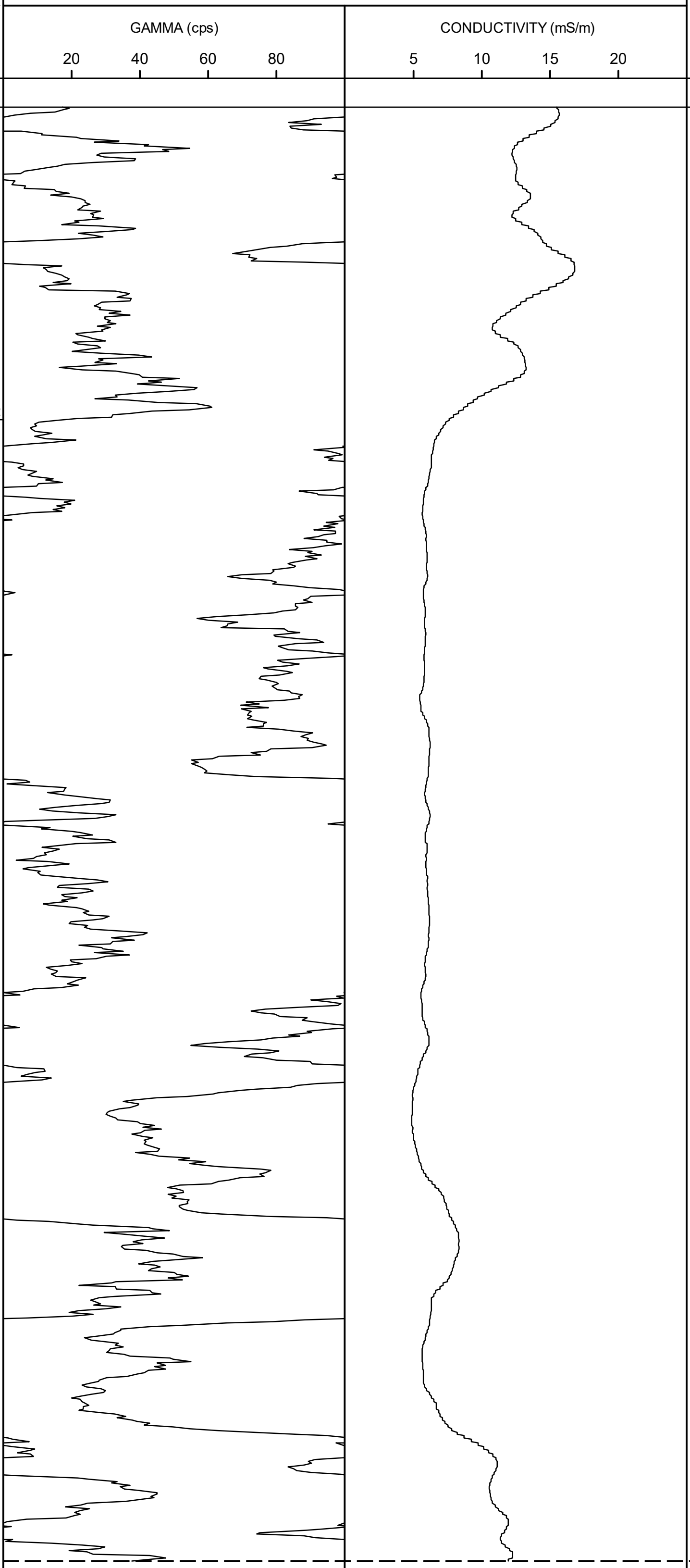
DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

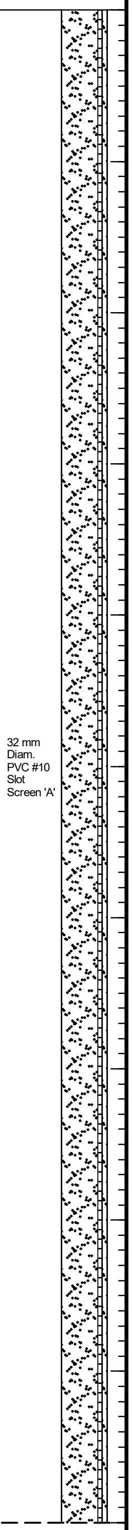
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
84		**LOWER ROCKCLIFFE FORMATION, 84.3 m to 100.6 m** Light whitish grey, fine grained (0.1-0.3 mm), laminar textured to rippled and cross bedded, thin to thick bedded **QUARTZ SANDSTONE** with thin to thick interbeds of medium to dark grey slake susceptible **SHALE** with fine laminations of siltstone and fine calcareous sandstone and light to medium grey, laminar textured, thin to medium beds of **SILTSTONE to SANDY SILTSTONE.** Sandstone is largely silica cemented subangular to subrounded quartz grains with minor beds having varying amounts of calcareous cement. Contact with the underlying Oxford Formation is transitional to sharp erosional.	🟨	59.02 84.30
		CONTINUED NEXT PAGE		

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH13-16

SHEET 6 OF 6

LOCATION: N 5009712.0 ;E 422599.0

INCLINATION: -90° AZIMUTH: ---

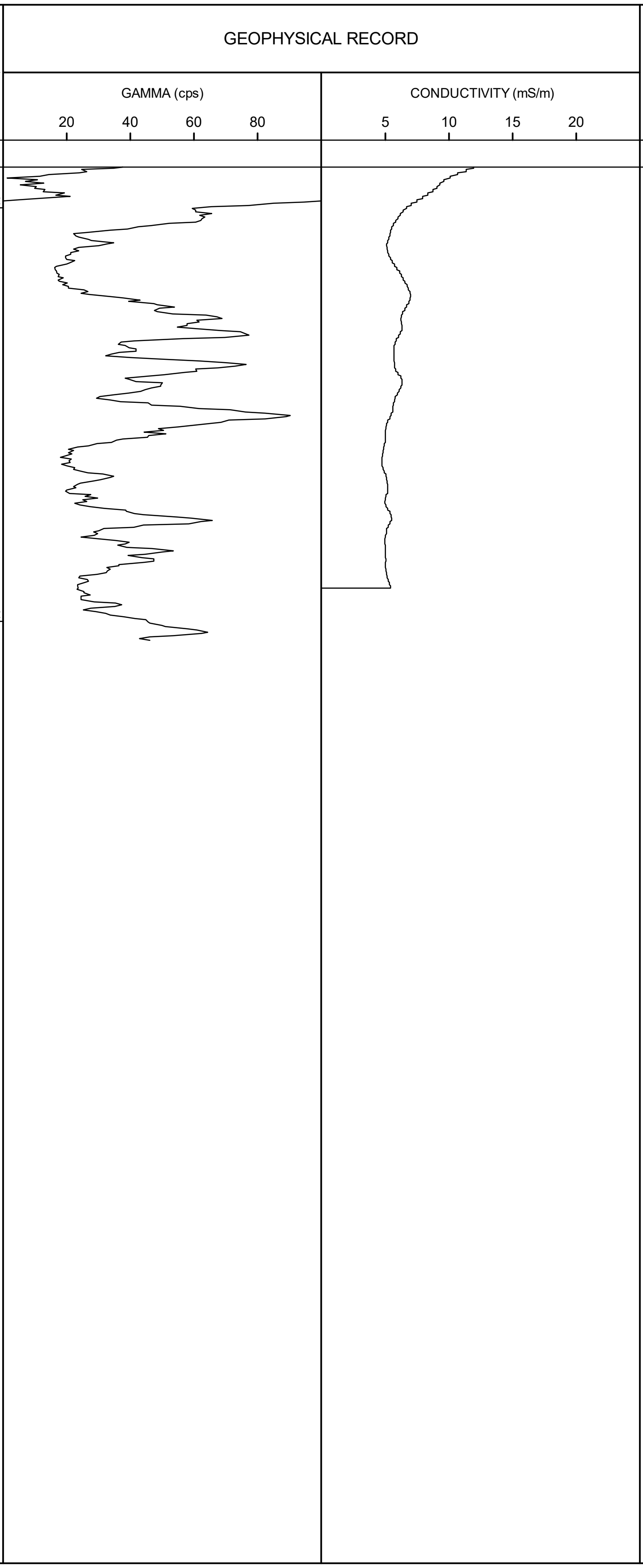
DRILLING DATE: October 8, 2013

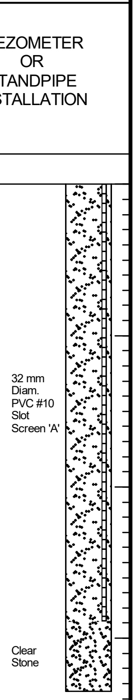
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
100			🟨	42.72 100.60
102 104 106		**UPPER OXFORD FORMATION 100.6 m to 106.7 m** Medium grey, fine grained micritic, medium bedded, argillaceous **DOLOSTONE and CALCAREOUS DOLOSTONE** with 0.01-0.50 m thick interbeds of dark grey to black, slake susceptible **SHALE and SHALEY DOLOSTONE.**	🟩	36.62 106.70
		End of Borehole, 106.7 m		
108 110 112 114 116 118 120				





DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: BH18-17

SHEET 1 OF 3

LOCATION: N 5010174.7 ;E 423380.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 18, 2018

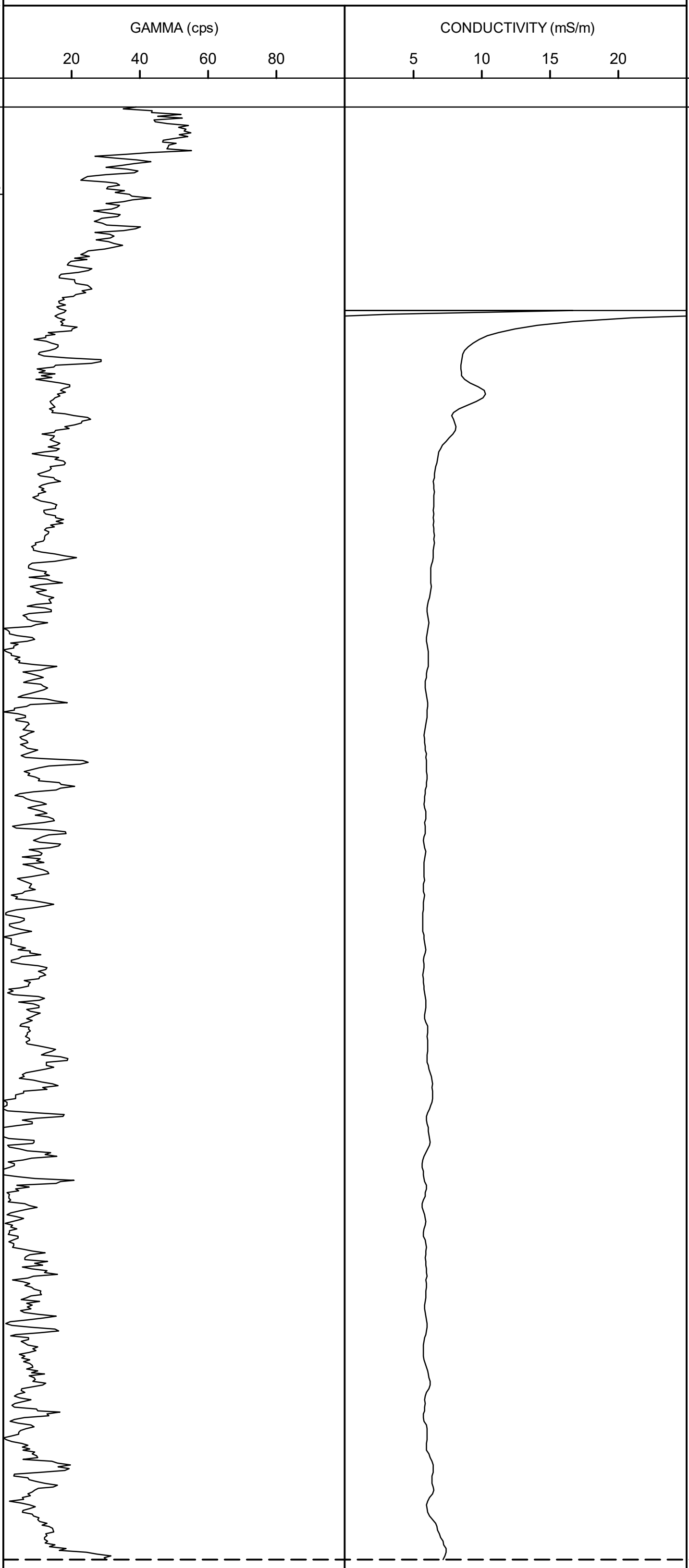
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

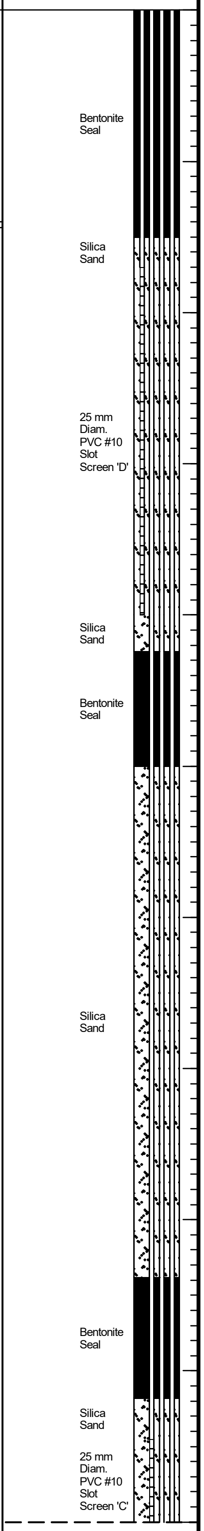
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		137.73
0		**Overburden, 0.0 m to 1.2 m**	▨	0.00
		Bedrock Surface, 1.2 m		136.53 1.20
2		**LOWER BOBCAYGEON FORMATION, 1.2 m to 37.4 m** **UNIT 3, 1.2 m to 22.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		
4				
6				
8				
10				
12				
14				
16				
18				
20		*CONTINUED NEXT PAGE*		

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: BH18-17

SHEET 2 OF 3

LOCATION: N 5010174.7 ;E 423380.0

INCLINATION: -90° AZIMUTH: ---

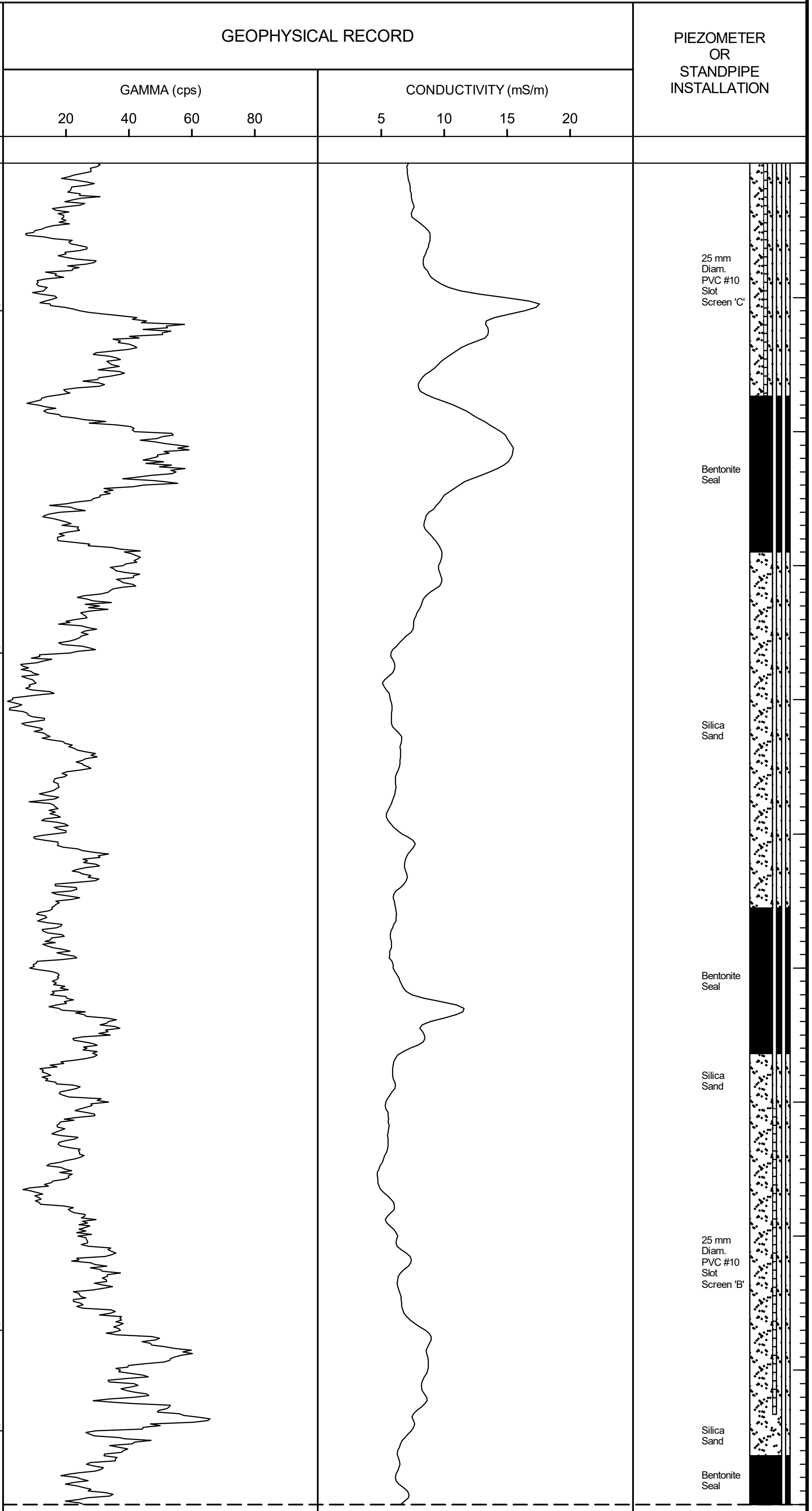
DRILLING DATE: June 18, 2018

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
20		*--- CONTINUED FROM PREVIOUS PAGE ---*		
22				115.53 22.20
		UNIT 2, 22.2 m to 27.3 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		110.43 27.30
		UNIT 1, 27.3 m to 37.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		100.33 37.40
		UPPER GULL RIVER FORMATION, 37.4 m to 45.7 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey		98.83 38.90
40		*CONTINUED NEXT PAGE*		



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: BH18-17

SHEET 3 OF 3

LOCATION: N 5010174.7 ;E 423380.0

DRILLING DATE: June 18, 2018

DATUM: Geodetic

DRILL RIG: Air Rotary Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
40		argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 37.5 m to 38.9 m with a second dolostone bed at 42.5-43.4m.	🟦	95.23 42.50
			🟩	94.33 43.40
			🟦	92.03 45.70
46		**End of Borehole, 45.7 m**		

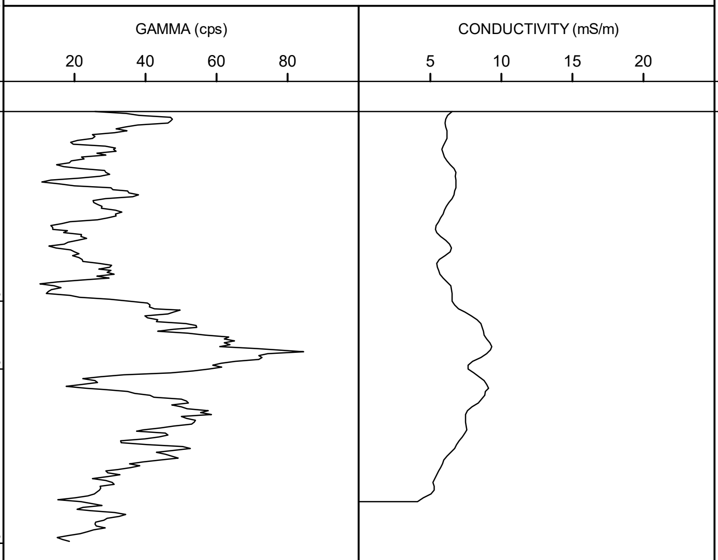
Note(s):

1. Casing installed to depth of 2.4 m, water found at 3.7 m and 21.3 m.

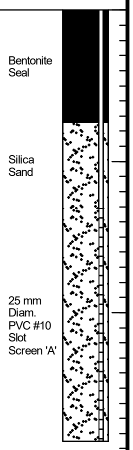
2. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.

Depth scale: 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION



OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 1 OF 10

LOCATION: N 5009914.0 ;E 423238.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: September 21, 2009

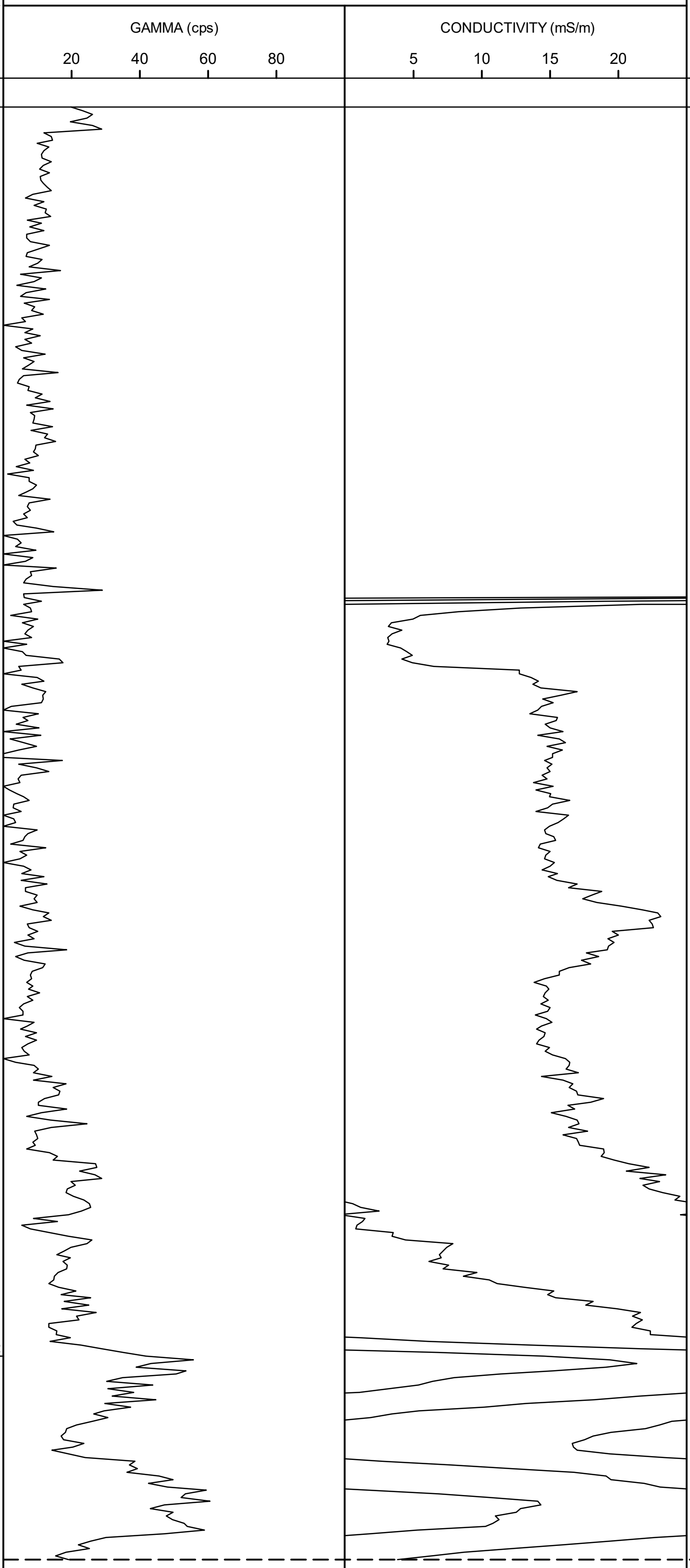
DRILL RIG: Air Percussion

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		141.12	
0		**Bedrock Surface 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 32.3 m** **UNIT 3, 0.0 m to 17.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00	
2					
4					
6					
8					
10					
12					
14					
16					
		UNIT 2, 17.2 m to 22.2 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		123.92 17.20	
18					
20					

GEOPHYSICAL RECORD



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 2 OF 10

LOCATION: N 5009914.0 ;E 423238.0

INCLINATION: -90° AZIMUTH: ---

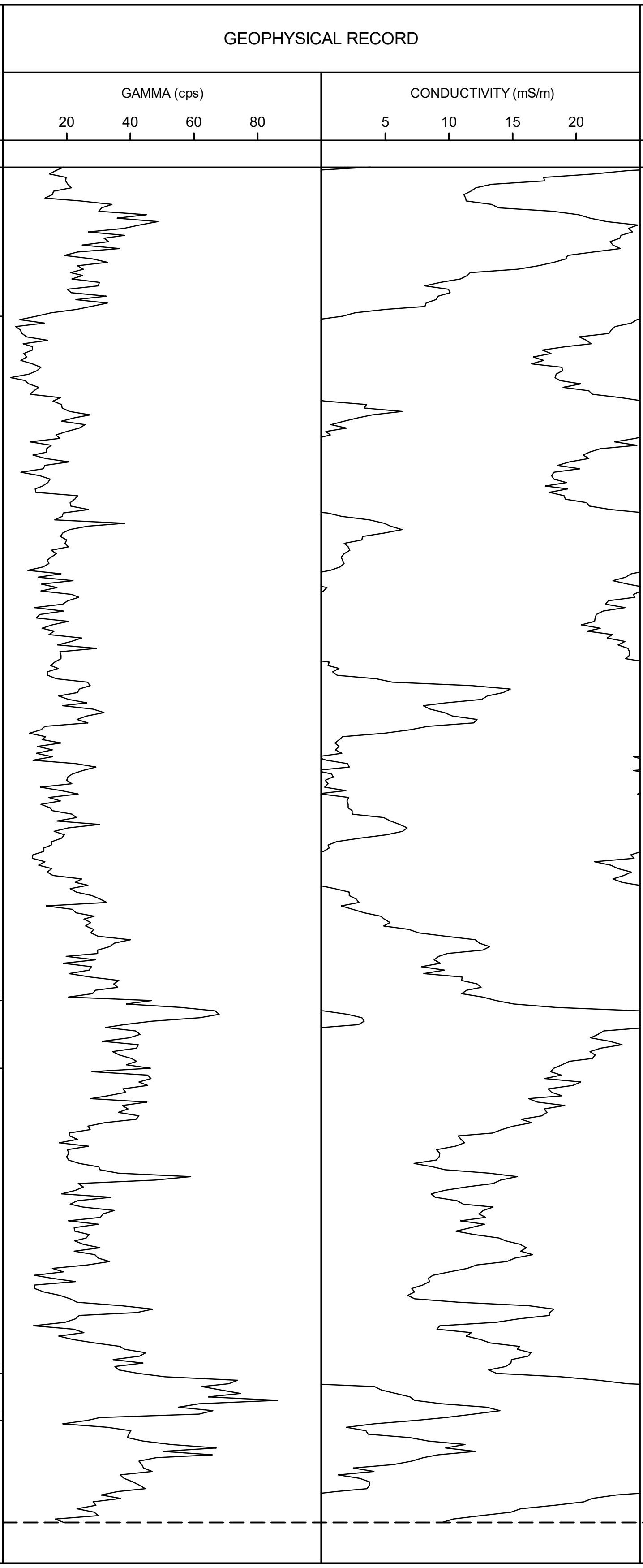
DRILLING DATE: September 21, 2009

DRILL RIG: Air Percussion

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20						
22				118.92 22.20		
		UNIT 1, 22.2 m to 32.3 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.				
24						
26						
28						
30						
32				108.82 32.30		
		GULL RIVER FORMATION, 32.3 m to 69.8 m **UPPER GULL RIVER FORMATION, 32.3 m to 45.4 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 32.3 m to 33.3 m with a second dolostone bed at 37.8-38.5m.		107.82 33.30		
34						
36						
				103.32 37.80		
38				102.62 38.50		
40						
		CONTINUED NEXT PAGE				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 3 OF 10

LOCATION: N 5009914.0 ;E 423238.0

DRILLING DATE: September 21, 2009

DATUM: Geodetic

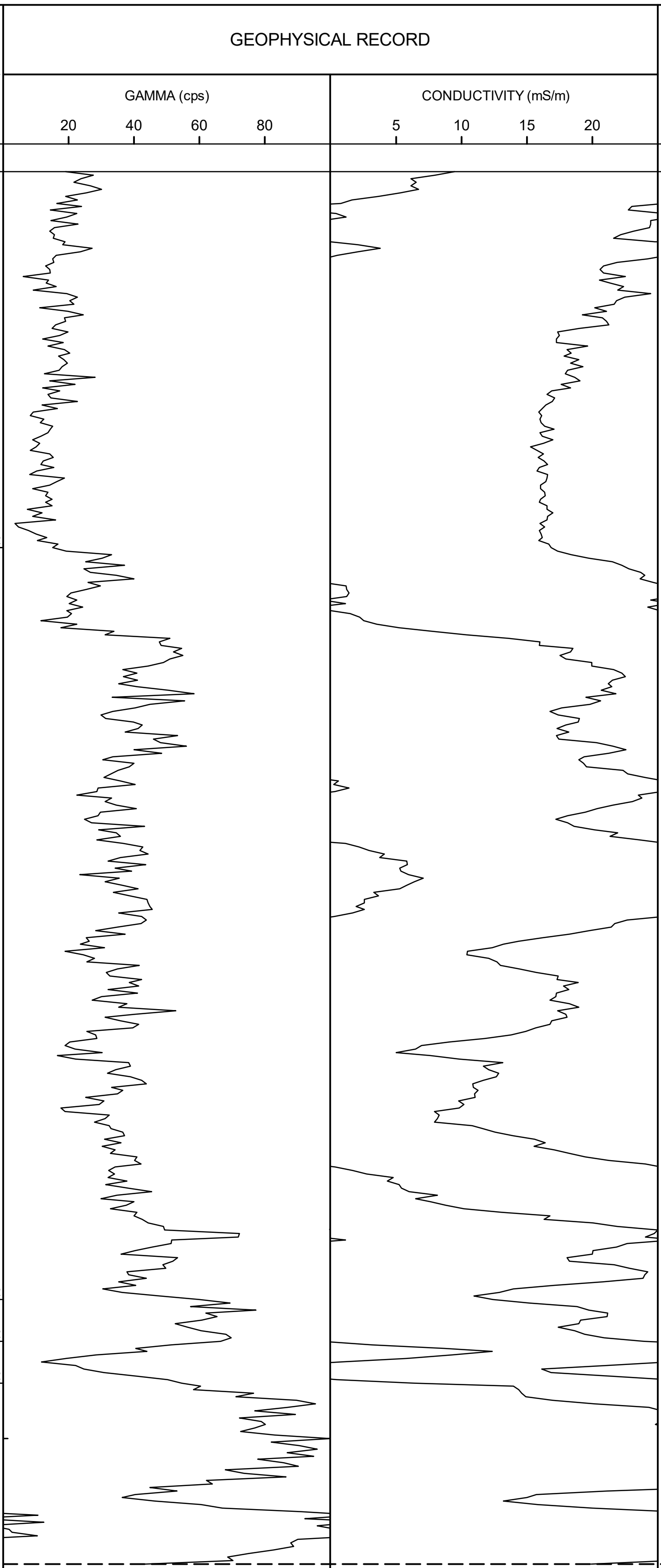
DRILL RIG: Air Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
40		*--- CONTINUED FROM PREVIOUS PAGE ---*				
40–45.4		**GULL RIVER FORMATION, 32.3 m to 69.8 m** **UPPER GULL RIVER FORMATION, 32.3 m to 45.4 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed"**, at 32.3 m to 33.3 m with a second dolostone bed at 37.8-38.5m.	🟦	95.72 45.40		
45.4–56.2		**LOWER GULL RIVER FORMATION, 45.4 m to 69.8 m** **UNIT 5, 45.4 m to 56.2 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.	🟩	84.92 56.20		
56.2–60		**UNIT 4, 56.2 m to 60.1 m** interbedded sequence of light to medium grey to greenish grey and dark grey, fine grained, faintly porous, thinly to medium bedded, massive textured, argillaceous to shaley **DOLOSTONE** and medium grey **DOLOMITIC LIMESTONE.** Thin interbeds of laminar to nodular textured limestone and thin oolitic limestone beds occur with medium bed of limestone at 56.8-57.4m. Unit also includes light to medium grey and greenish grey, medium grained, thinly to medium bedded, calcareous to dolomitic cemented, partly bioturbated	🟩 🟦 🟩	84.32 56.80 83.72 57.40		
60		*CONTINUED NEXT PAGE*				

Depth scale: 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 4 OF 10

LOCATION: N 5009914.0 ;E 423238.0

DRILLING DATE: September 21, 2009

DATUM: Geodetic

DRILL RIG: Air Percussion

INCLINATION: -90° AZIMUTH: ---

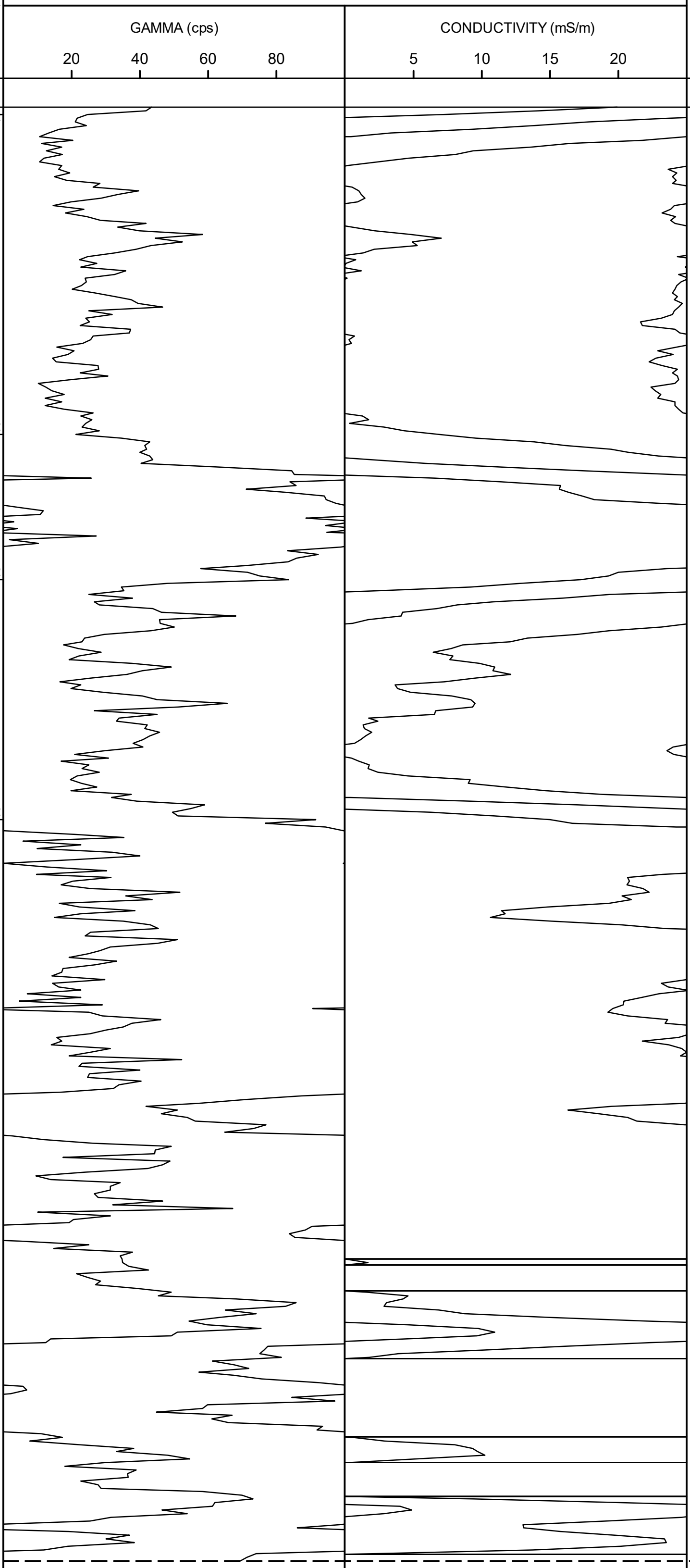
DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	--- CONTINUED FROM PREVIOUS PAGE ---	
60	**QUARTZ SANDSTONE** and minor black **SHALE.**	81.02 60.10
	UNIT 3, 60.1 m to 64.5 m medium grey to brownish grey, fine grained, non-porous, laminated to thinly bedded **ARGILLACEOUS LIMESTONE.** Unit includes interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings, thin beds of oolitic limestone, weakly developed lithoclastic limestone, minor burrow bioturbated limestone, with lesser amounts of calcareous dolostone, dark grey dolomitic shale, shaley dolostone. Black argillaceous to shaley bedding partings occur.	76.62 64.50
	UNIT 2, 64.5 m to 66.5 m interbedded sequence of medium grey to greenish grey, fine grained, faintly porous, thinly to medium bedded, argillaceous **DOLOSTONE and CALCAREOUS DOLOSTONE** with thinly interbedded black **SHALE, SHALEY DOLOSTONE and DOLOMITIC SILTSTONE** with localized burrowed bioturbation.	74.62 66.50
	UNIT 1, 66.5 m to 69.8 m medium grey, fine grained, non-porous, thinly bedded **ARGILLACEOUS LIMESTONE** weakly nodular in part with interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings and very thin beds of black calcareous shale. Sharp basal contact locally marked by thin black shaley parting.	71.32 69.80
70	**ROCKCLIFFE FORMATION, 69.8 m to 101.4 m** **UPPER ROCKCLIFFE FORMATION, 69.8 m to 86.0 m** Interbedded sequence composed of medium grey, fine grained, non-porous to faintly porous, massive textured to mottled, medium to thick beds of **DOLOSTONE and CALCAREOUS DOLOSTONE,** dark grey to black, slake susceptible **SHALE,** medium grey, mottled to laminar textured, fine grained, thin to medium beds of **ARGILLACEOUS LIMESTONE** with light grey, fine grained, calcareous cemented, medium to thick beds of **QUARTZ SANDSTONE.** Individual lithological sequences such as shale beds typically vary in thickness from approximately 0.25 m to 2.0 m. Upper Rockcliffe Formation is transitional with the underlying Lower Rockcliffe Formation noted by transition from predominately dolostone and shale in the upper sequence to predominately sandstone in the lower sequence.	
80		

DRILLING RECORD

SYMBOLIC LOG

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 5 OF 10

LOCATION: N 5009914.0 ;E 423238.0

DRILLING DATE: September 21, 2009

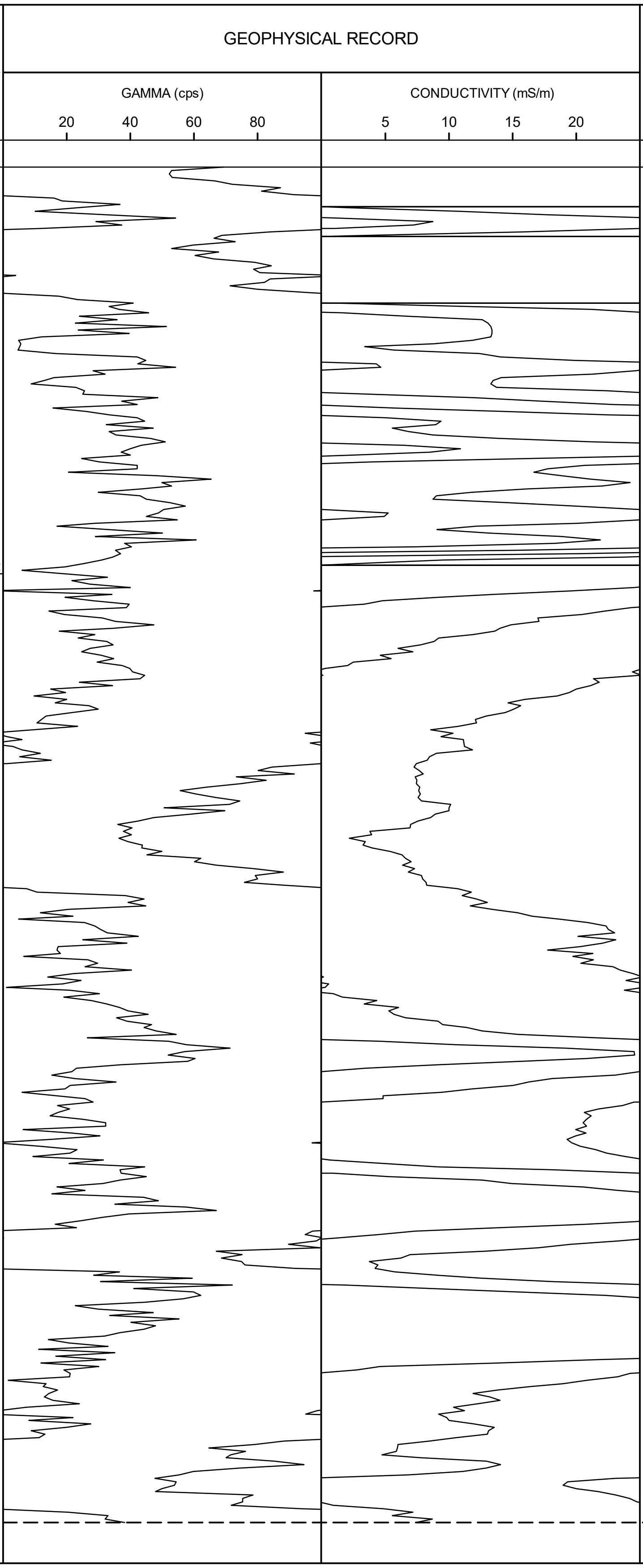
DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Air Percussion

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
80 82 84			🟩			
86 88 90 92 94 96 98 100		**LOWER ROCKCLIFFE FORMATION, 86.0 m to 101.4 m** Light whitish grey, fine grained (0.1-0.3 mm), laminar textured to rippled and cross bedded, thin to thick bedded **QUARTZ SANDSTONE** with thin to thick interbeds of medium to dark grey slake susceptible **SHALE** with fine laminations of siltstone and fine calcareous sandstone and light to medium grey, laminar textured, thin to medium beds of **SILTSTONE to SANDY SILTSTONE.** Sandstone is largely silica cemented subangular to subrounded quartz grains with minor beds having varying amounts of calcareous cement. Contact with the underlying Oxford Formation is transitional to sharp erosional.	🟨	55.12 86.00		
		CONTINUED NEXT PAGE				



OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 6 OF 10

LOCATION: N 5009914.0 ;E 423238.0

INCLINATION: -90° AZIMUTH: ---

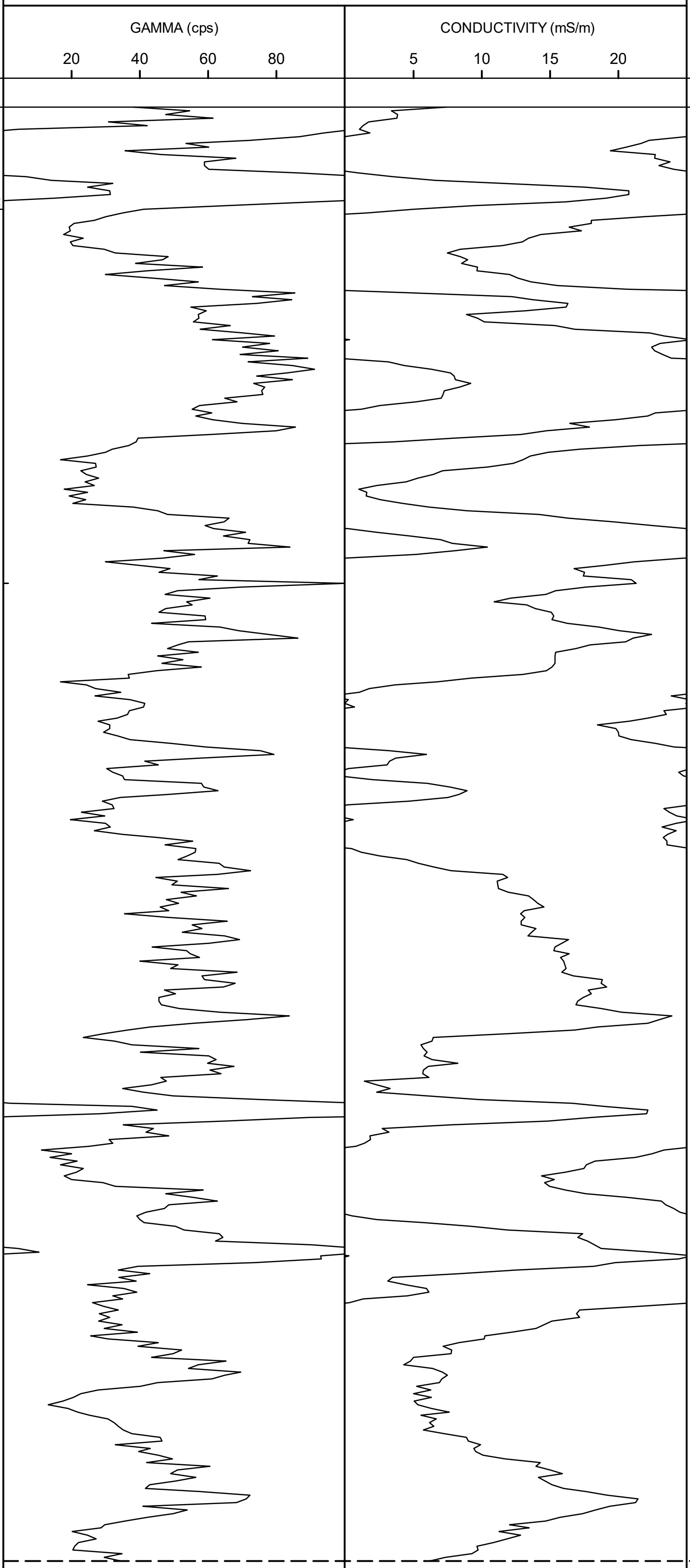
DRILLING DATE: September 21, 2009

DRILL RIG: Air Percussion

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
100			🟨			
		OXFORD FORMATION, 101.4 m to 142.8 m **UPPER OXFORD FORMATION, 101.4 m to 124.0 m** Medium grey, fine grained micritic, medium bedded, argillaceous DOLOSTONE and CALCAREOUS DOLOSTONE with 0.01-0.50 m thick interbeds of dark grey to black, slake susceptible SHALE and SHALEY DOLOSTONE set at regular intervals of approximately 0.5-1.0 m. Calcareous burrow casts occur in thicker shaley beds. Transitional lower contact noted by significant decrease in shaley content in the Lower Oxford Formation.	🟩	39.72 101.40		
102						
104						
106						
108						
110						
112						
114						
116						
118						
120		*CONTINUED NEXT PAGE*				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 7 OF 10

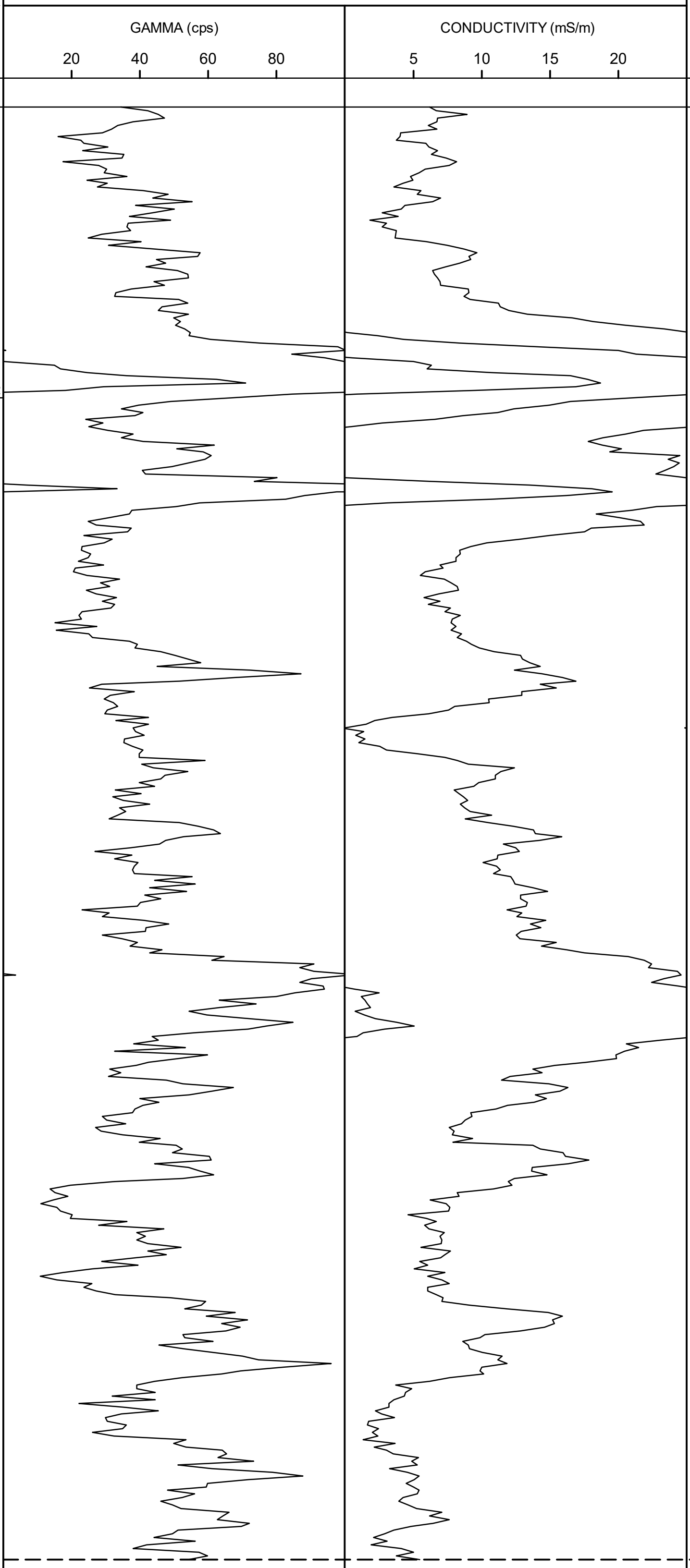
LOCATION: N 5009914.0 ;E 423238.0

INCLINATION: -90°   AZIMUTH: ---

DRILLING DATE: September 21, 2009
DRILL RIG: Air Percussion
DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
120 122		**OXFORD FORMATION, 101.4 m to 142.8 m** **UPPER OXFORD FORMATION, 101.4 m to 124.0 m** Medium grey, fine grained micritic, medium bedded, argillaceous DOLOSTONE and CALCAREOUS DOLOSTONE with 0.01-0.50 m thick interbeds of dark grey to black, slake susceptible SHALE and SHALEY DOLOSTONE set at regular intervals of approximately 0.5-1.0 m. Calcareous burrow casts occur in thicker shaley beds. Transitional lower contact noted by significant decrease in shaley content in the Lower Oxford Formation.	🟩			
124 126 128 130 132 134 136 138 140		**LOWER OXFORD FORMATION, 124.0 m to 142.8 m** Medium grey, fine grained micritic, faintly porous, laminar textured, medium bedded CALCAREOUS DOLOSTONE with minor (approx. 5-6%) very thin to medium beds of dark grey to black, slake susceptible shale and shaley dolostone that laterally varies into an interbedded sequence comprised of argillaceous NODULAR DOLOSTONE with subordinate beds of CALCAREOUS DOLOSTONE and LITHOCLASTIC DOLOSTONE with approximately 1% shale and shaley dolostone partings. Contact with the underlying March Formation is transitional.	🟩	17.12 124.00		
		CONTINUED NEXT PAGE				



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 8 OF 10

LOCATION: N 5009914.0 ;E 423238.0

INCLINATION: -90° AZIMUTH: ---

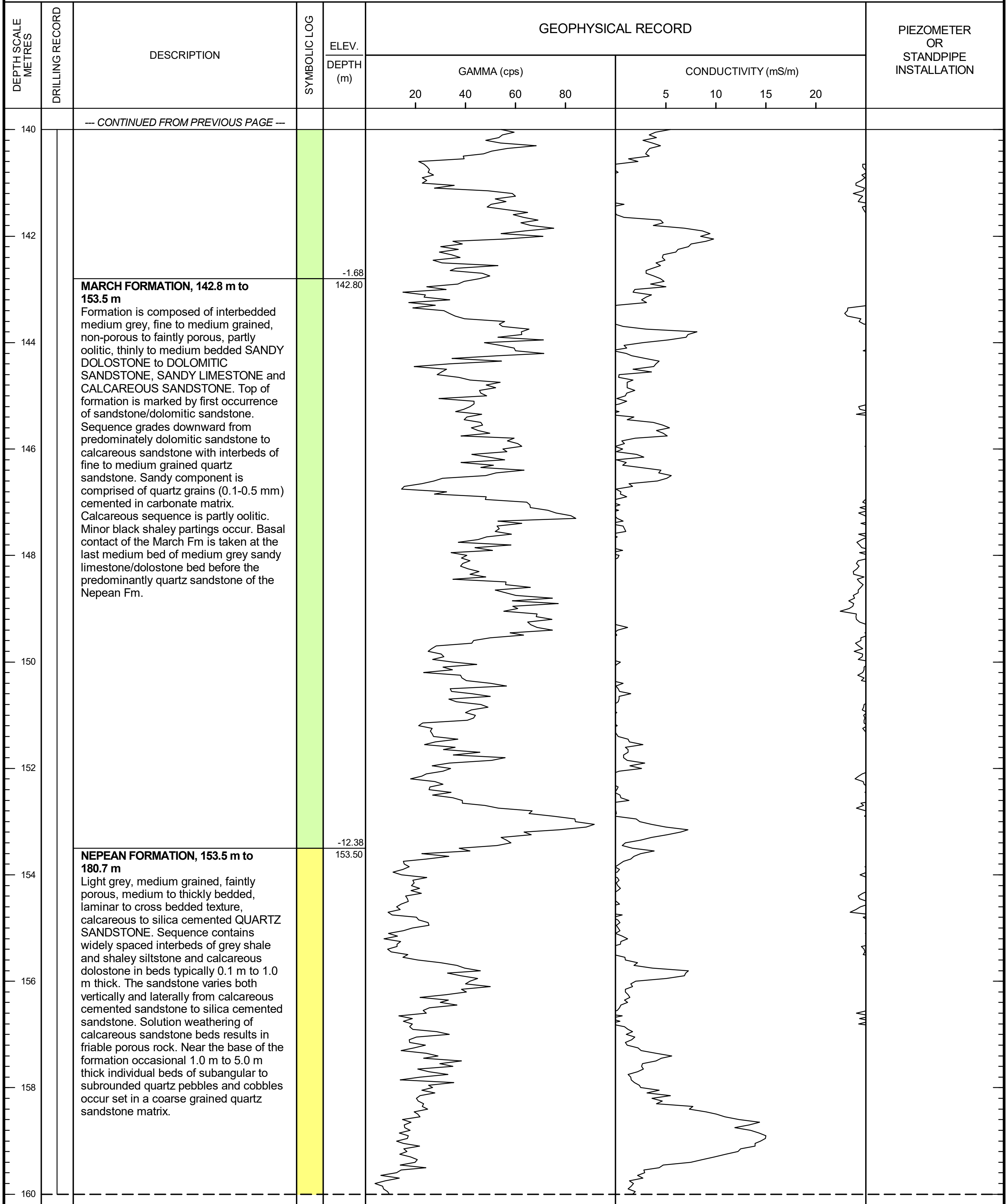
DRILLING DATE: September 21, 2009

DRILL RIG: Air Percussion

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
140		--- CONTINUED FROM PREVIOUS PAGE ---	🟩	
142.8		**MARCH FORMATION, 142.8 m to 153.5 m** Formation is composed of interbedded medium grey, fine to medium grained, non-porous to faintly porous, partly oolitic, thinly to medium bedded SANDY DOLOSTONE to DOLOMITIC SANDSTONE, SANDY LIMESTONE and CALCAREOUS SANDSTONE. Top of formation is marked by first occurrence of sandstone/dolomitic sandstone. Sequence grades downward from predominately dolomitic sandstone to calcareous sandstone with interbeds of fine to medium grained quartz sandstone. Sandy component is comprised of quartz grains (0.1-0.5 mm) cemented in carbonate matrix. Calcareous sequence is partly oolitic. Minor black shaley partings occur. Basal contact of the March Fm is taken at the last medium bed of medium grey sandy limestone/dolostone bed before the predominantly quartz sandstone of the Nepean Fm.	🟩	-1.68 142.80
153.5		**NEPEAN FORMATION, 153.5 m to 180.7 m** Light grey, medium grained, faintly porous, medium to thickly bedded, laminar to cross bedded texture, calcareous to silica cemented QUARTZ SANDSTONE. Sequence contains widely spaced interbeds of grey shale and shaley siltstone and calcareous dolostone in beds typically 0.1 m to 1.0 m thick. The sandstone varies both vertically and laterally from calcareous cemented sandstone to silica cemented sandstone. Solution weathering of calcareous sandstone beds results in friable porous rock. Near the base of the formation occasional 1.0 m to 5.0 m thick individual beds of subangular to subrounded quartz pebbles and cobbles occur set in a coarse grained quartz sandstone matrix.	🟨	-12.38 153.50
160		CONTINUED NEXT PAGE		



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 9 OF 10

LOCATION: N 5009914.0 ;E 423238.0

DRILLING DATE: September 21, 2009

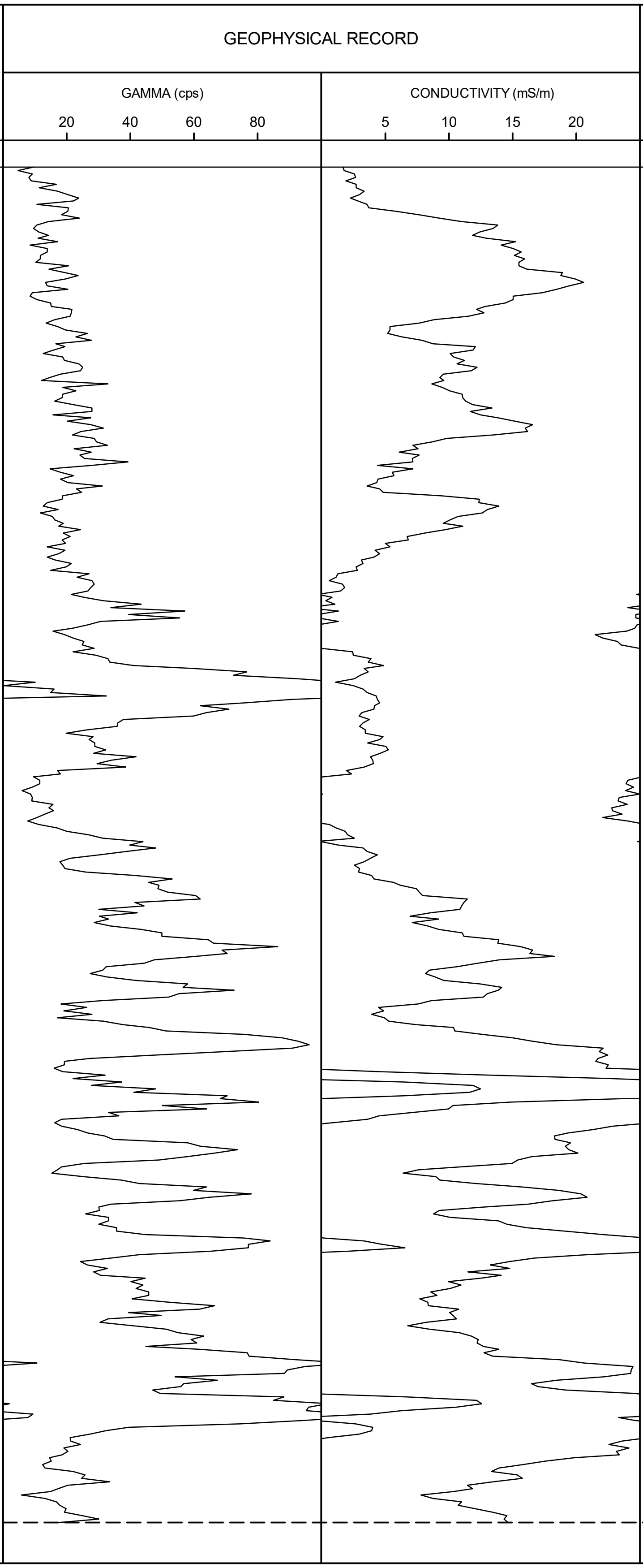
DATUM: Geodetic

DRILL RIG: Air Percussion

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
160		**NEPEAN FORMATION, 153.5 m to 180.7 m** Light grey, medium grained, faintly porous, medium to thickly bedded, laminar to cross bedded texture, calcareous to silica cemented QUARTZ SANDSTONE. Sequence contains widely spaced interbeds of grey shale and shaley siltstone and calcareous dolostone in beds typically 0.1 m to 1.0 m thick. The sandstone varies both vertically and laterally from calcareous cemented sandstone to silica cemented sandstone. Solution weathering of calcareous sandstone beds results in friable porous rock. Near the base of the formation occasional 1.0 m to 5.0 m thick individual beds of subangular to subrounded quartz pebbles and cobbles occur set in a coarse grained quartz sandstone matrix.				
162						
164						
166						
168						
170						
172						
174						
176						
178						
180		*CONTINUED NEXT PAGE*				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: TW09-1

SHEET 10 OF 10

LOCATION: N 5009914.0 ;E 423238.0

INCLINATION: -90° AZIMUTH: ---

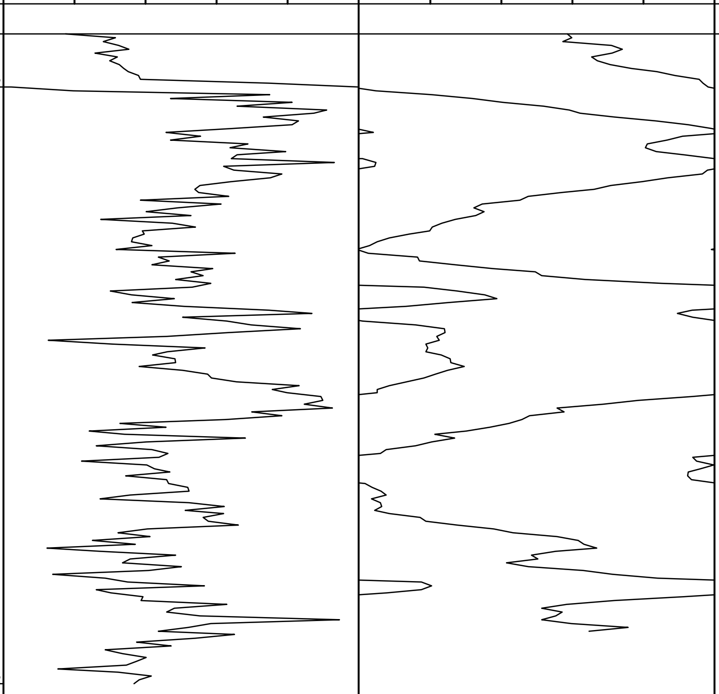
DRILLING DATE: September 21, 2009

DRILL RIG: Air Percussion

DRILLING CONTRACTOR: Air Rock Drilling Co. Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
180			🟨	-39.58 180.70		
181–188		**PRECAMBRIAN BASEMENT, 180.7 m to 188.6 m** Quartz feldspar biotite GNEISS or dolomitic MARBLE typically weathered near the unconformable surface with the overlying Covey Hill Formation or the Nepean Formation where the Covey Hill Formation is absent.	🟧	-47.48 188.60		
		End of Borehole, 188.6 m				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-01

SHEET 1 OF 2

LOCATION: N 5009261.6 ;E 422630.5

DRILLING DATE: June 2018

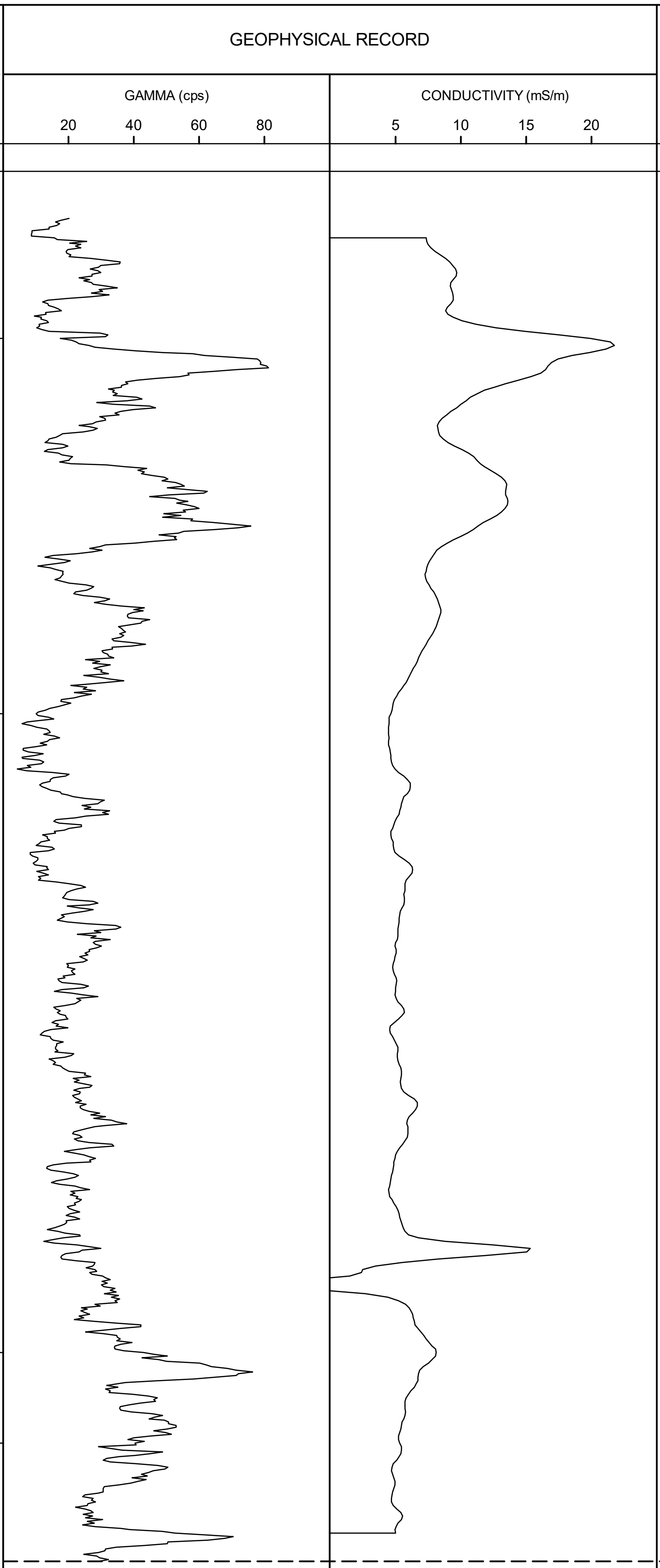
DATUM: Geodetic

DRILL RIG: Air Track Drill

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 17.0 m** **UNIT 3, 0.0 m to 2.4 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
2		**UNIT 2, 2.4 m to 7.8 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		2.40
8		**UNIT 1, 7.8 m to 17.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		7.80
17		**UPPER GULL RIVER FORMATION, 17.0 m to 20.1 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of		17.00 18.30
20		*CONTINUED NEXT PAGE*		



PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-01

SHEET 2 OF 2

LOCATION: N 5009261.6 ;E 422630.5

DRILLING DATE: June 2018

DATUM: Geodetic

DRILL RIG: Air Track Drill

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 17.0 m to 18.3 m.		20.10			
		End of Borehole, 20.1 m					
		Note(s):					
22		1. Quarry extraction carried out in area of borehole prior to R.W. Tomlinson 2020 survey.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-02

SHEET 1 OF 2

LOCATION: N 5009276.3 ;E 422647.8

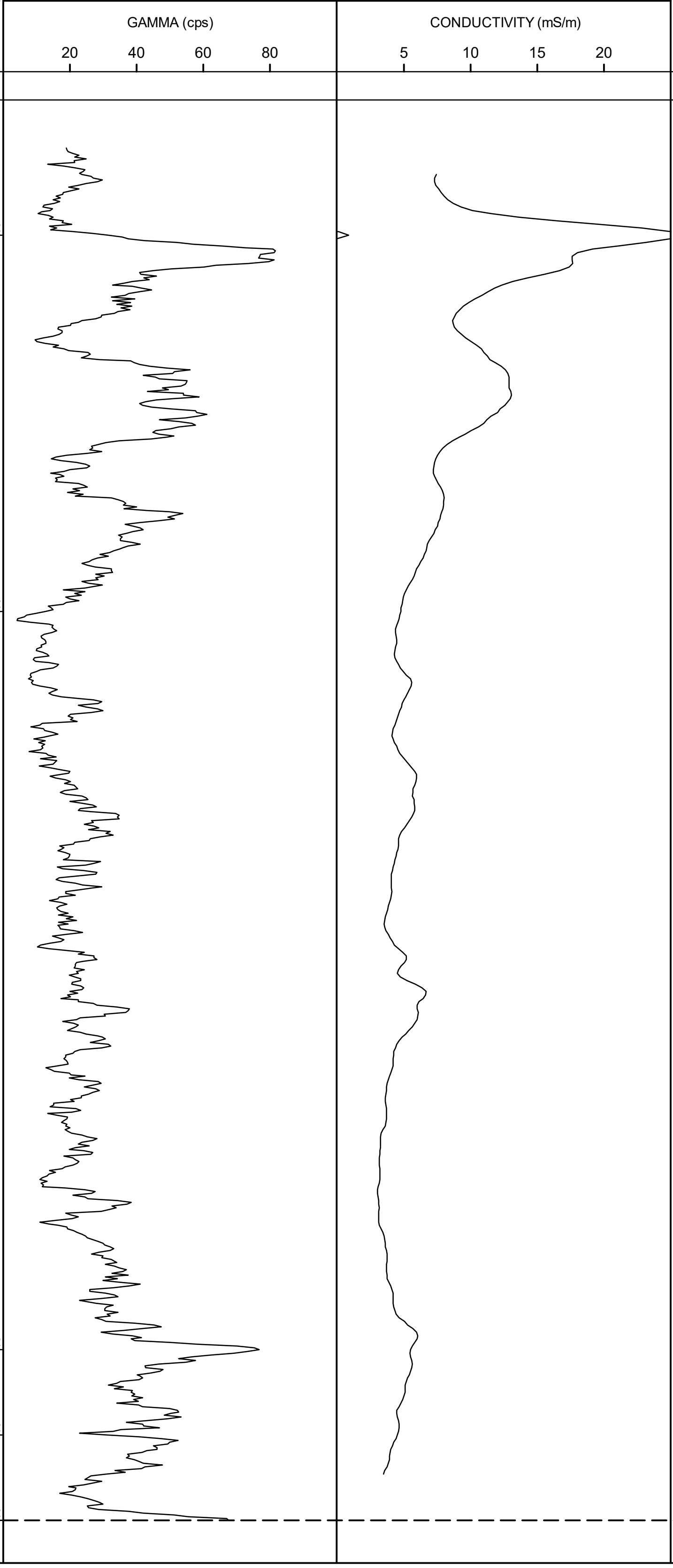
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	136.52
0	**LOWER BOBCAYGEON FORMATION, 0.0 m to 17.5 m** **UNIT 3, 0.0 m to 1.9 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	0.00
2	**UNIT 2, 1.9 m to 7.2 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	134.62 1.90
4		
6		
8	**UNIT 1, 7.2 m to 17.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	129.32 7.20
10		
12		
14		
16		
18	**UPPER GULL RIVER FORMATION, 17.6 m to 20.0 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey	118.92 17.60 117.72 18.80
20		116.52

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-02

SHEET 2 OF 2

LOCATION: N 5009276.3 ;E 422647.8

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 17.6 m to 18.8 m.		20.00			
		End of Borehole, 20.0 m					
22		**Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

GEOPHYSICAL LOG OF: SQAT18-03

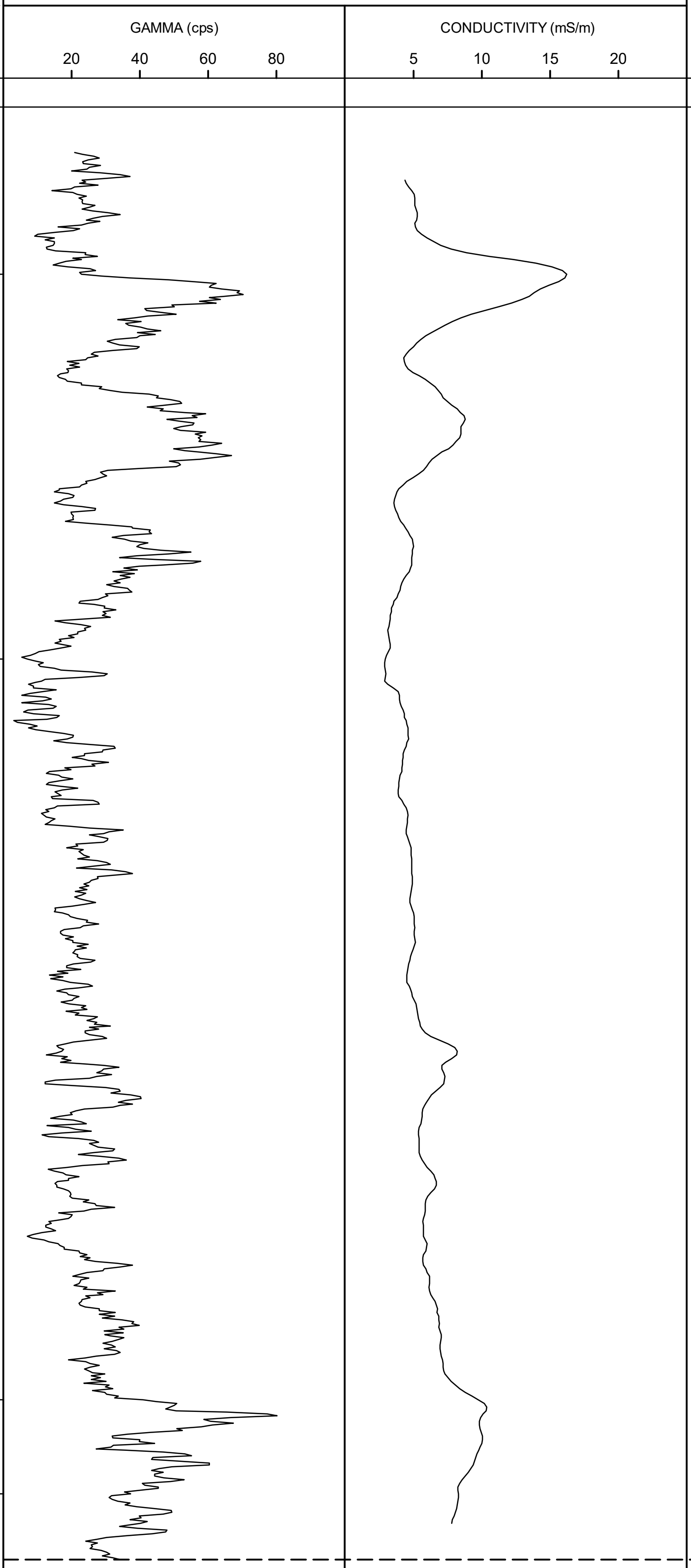
PROJECT: 18111853
LOCATION: N 5009346.7 ;E 422847.9
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

SHEET 1 OF 2
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE				
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 17.8 m** **UNIT 3, 0.0 m to 2.3 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00		
2		**UNIT 2, 2.3 m to 7.6 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		2.30		
4						
6						
8		**UNIT 1, 7.6 m to 17.8 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		7.60		
10						
12						
14						
16						
18		**UPPER GULL RIVER FORMATION, 17.8 m to 20.1 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic		17.80 19.10		
20						

CONTINUED NEXT PAGE



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-03

SHEET 2 OF 2

LOCATION: N 5009346.7 ;E 422847.9

INCLINATION: -90° AZIMUTH: ---

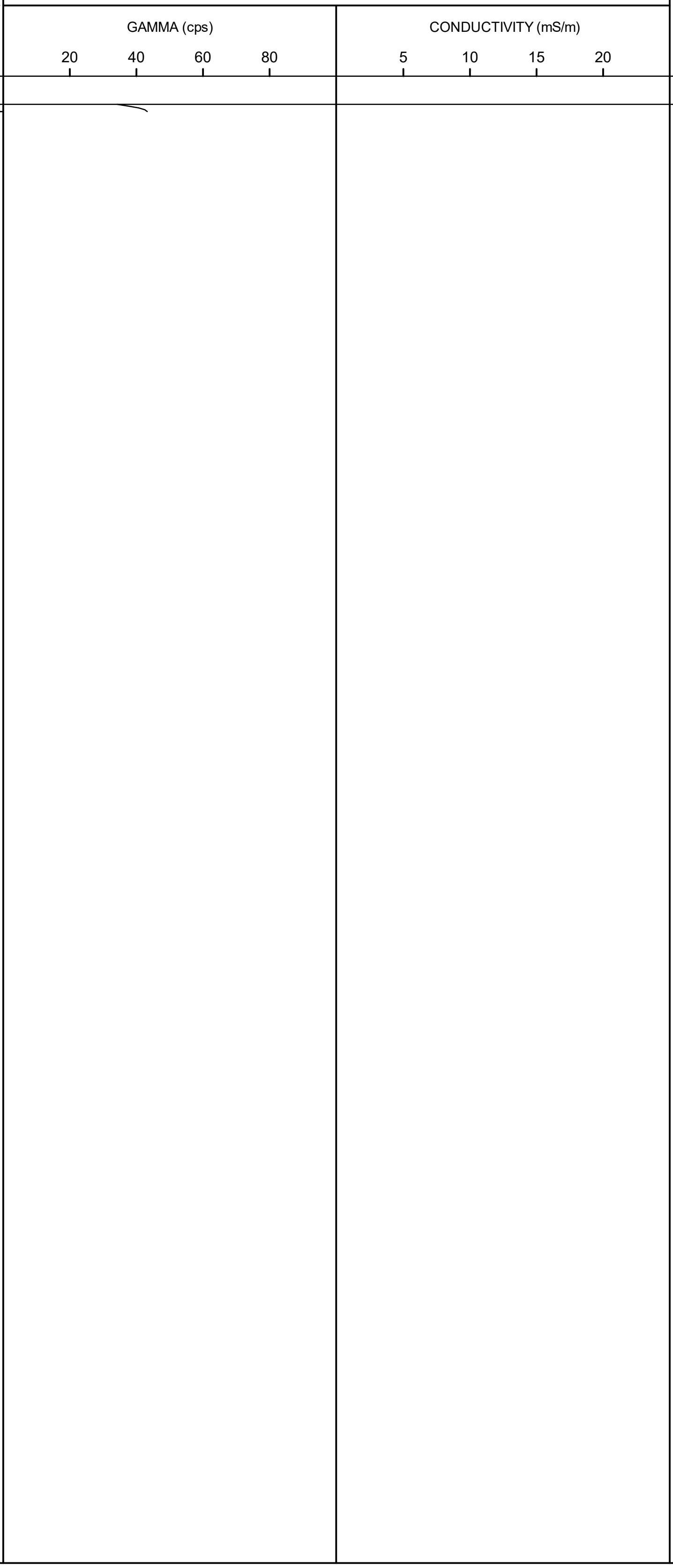
DRILLING DATE: June 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 17.8 m to 19.1 m.	🟦	20.10		
22		**End of Borehole, 20.1 m** **Note(s):** 1. Quarry extraction carried out in area of borehole prior to R.W. Tomlinson 2020 survey.				
24						
26						
28						
30						
32						
34						
36						
38						
40						



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-04

SHEET 1 OF 2

LOCATION: N 5009377.1 ;E 422562.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 2018

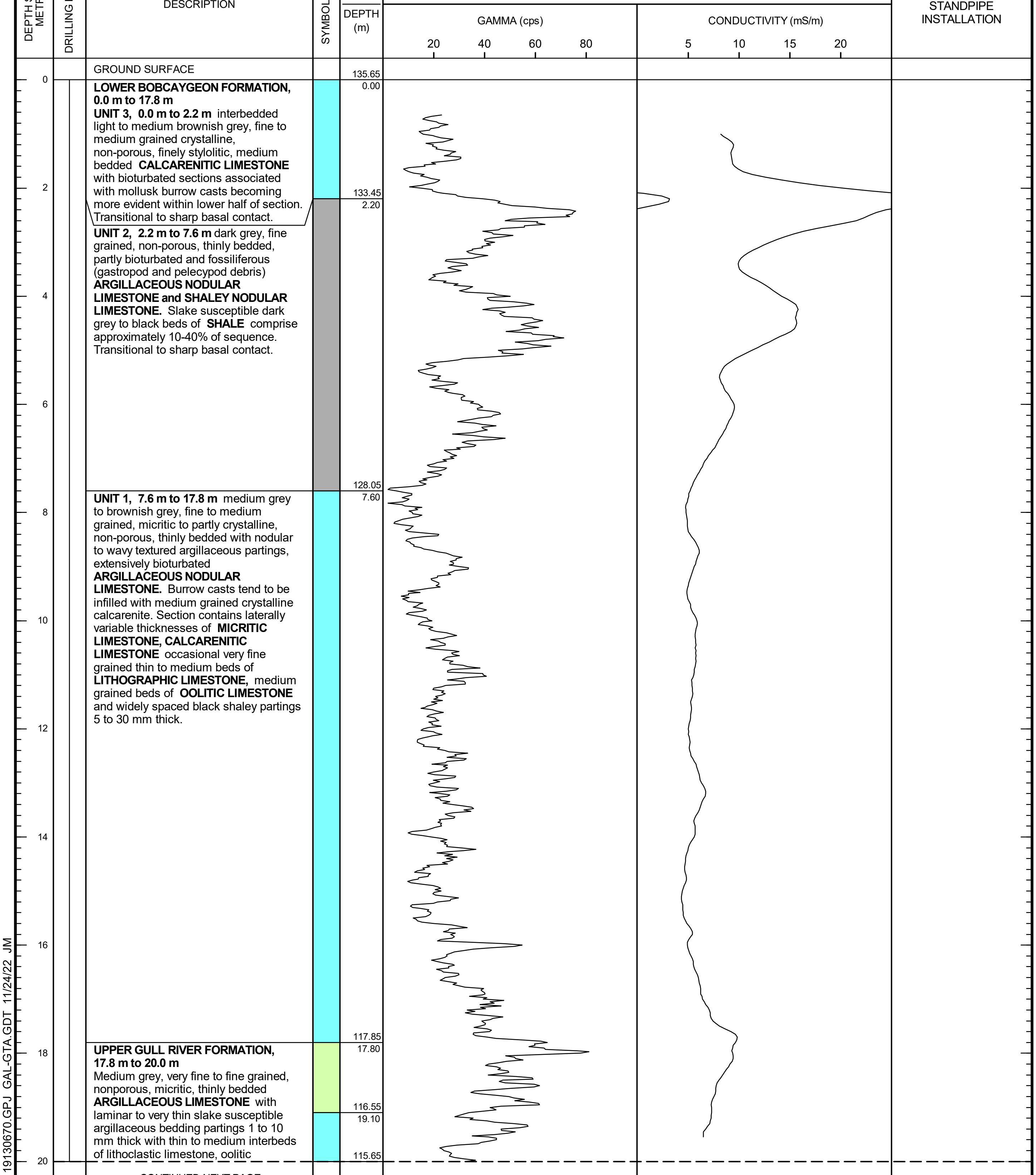
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
GROUND SURFACE		135.65
LOWER BOBCAYGEON FORMATION, 0.0 m to 17.8 m **UNIT 3, 0.0 m to 2.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
UNIT 2, 2.2 m to 7.6 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		133.45 2.20
UNIT 1, 7.6 m to 17.8 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		128.05 7.60
UPPER GULL RIVER FORMATION, 17.8 m to 20.0 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic		117.85 17.80
		116.55 19.10
		115.65

GEOPHYSICAL RECORD



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-04

SHEET 2 OF 2

LOCATION: N 5009377.1 ;E 422562.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: June 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 17.8 m to 19.1 m.		20.00			
22		**End of Borehole, 20.0 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

wsp GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-05

SHEET 1 OF 2

LOCATION: N 5009349.1 ;E 422496.3

INCLINATION: -90° AZIMUTH: ---

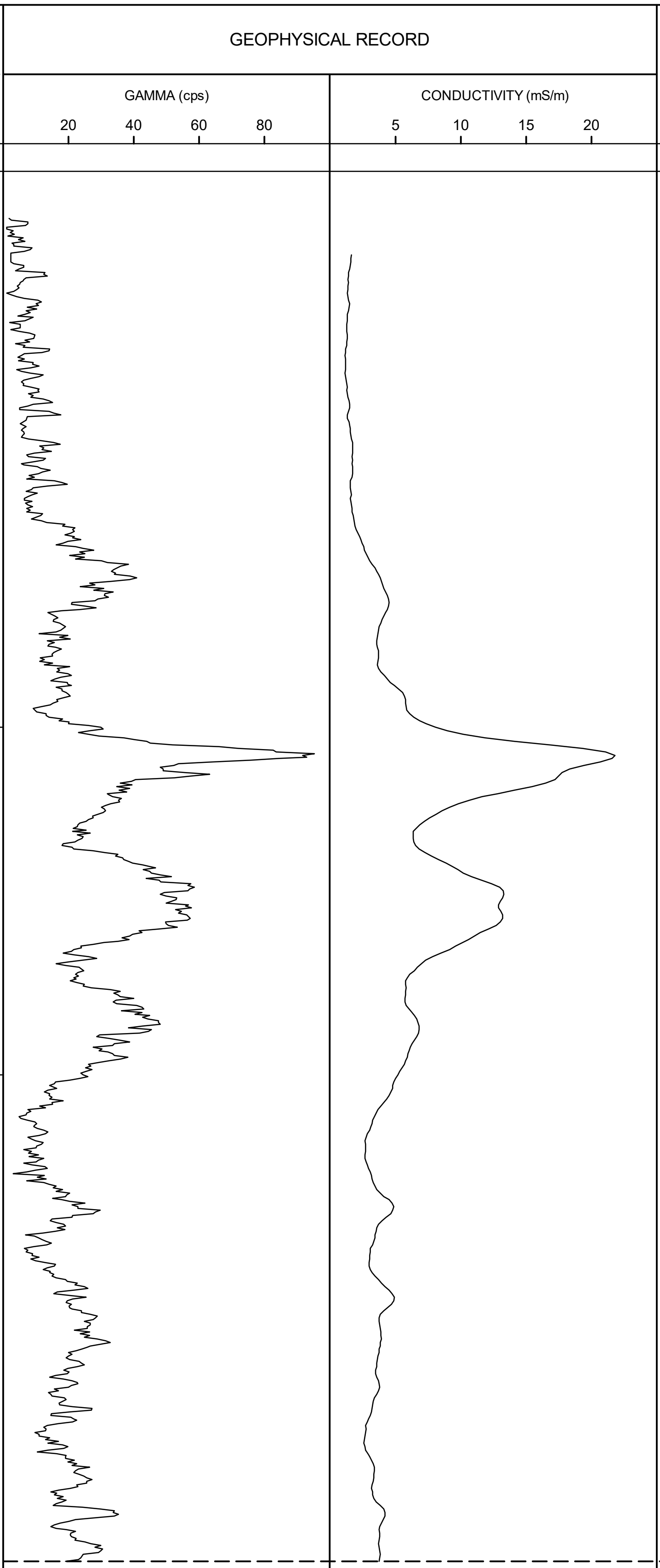
DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	
0	**LOWER BOBCAYGEON FORMATION, 0.0 m to 20.4 m** **UNIT 3, 0.0 m to 8.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	0.00
8	**UNIT 2, 8.0 m to 13.0 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	8.00
13	**UNIT 1 13.0 m to 20.4 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	13.00
20		



PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-05

SHEET 2 OF 2

LOCATION: N 5009349.1 ;E 422496.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018

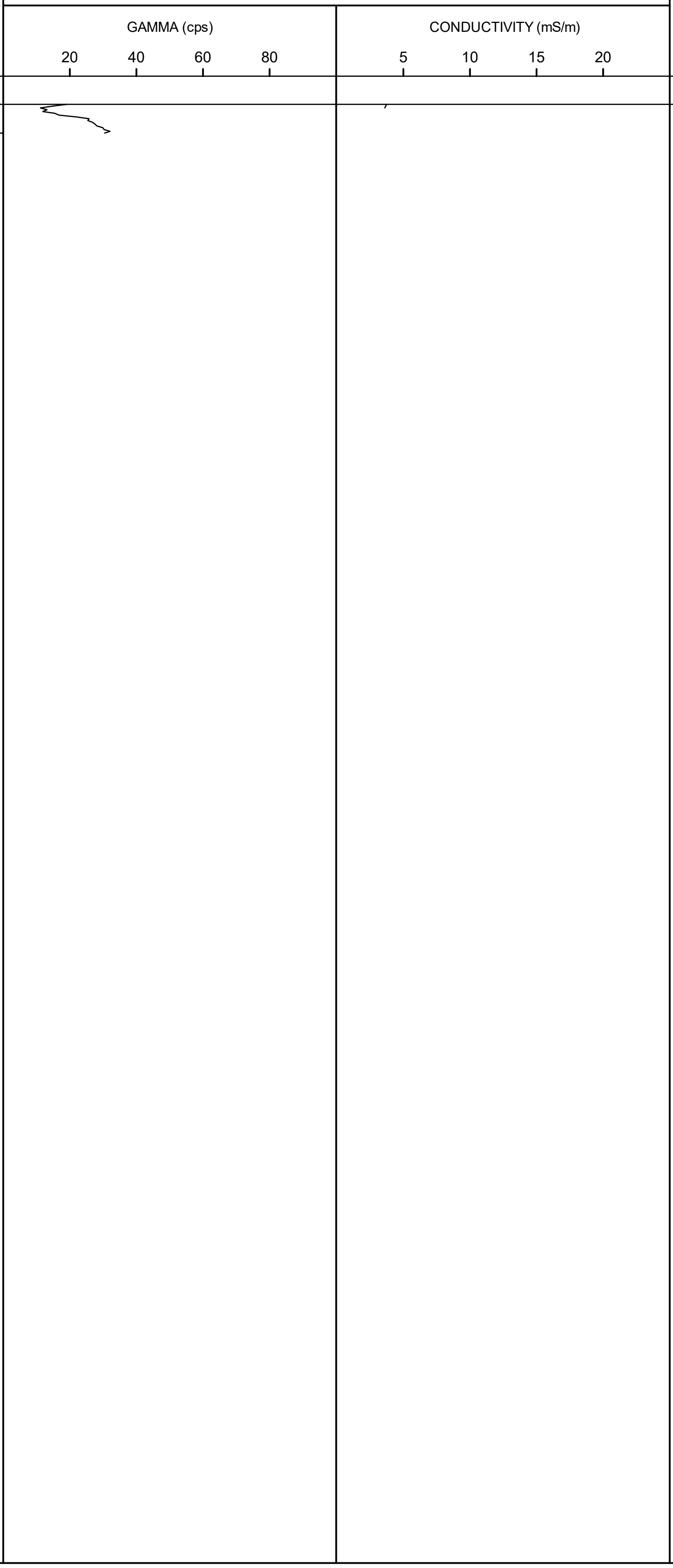
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
20			🟦		
		End of Borehole, 20.4 m **Note(s):** 1. Quarry extraction carried out in area of borehole prior to R.W. Tomlinson 2020 survey.		20.40	
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					

GEOPHYSICAL RECORD



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-06

SHEET 1 OF 2

LOCATION: N 5009268.0 ;E 422552.7

INCLINATION: -90° AZIMUTH: ---

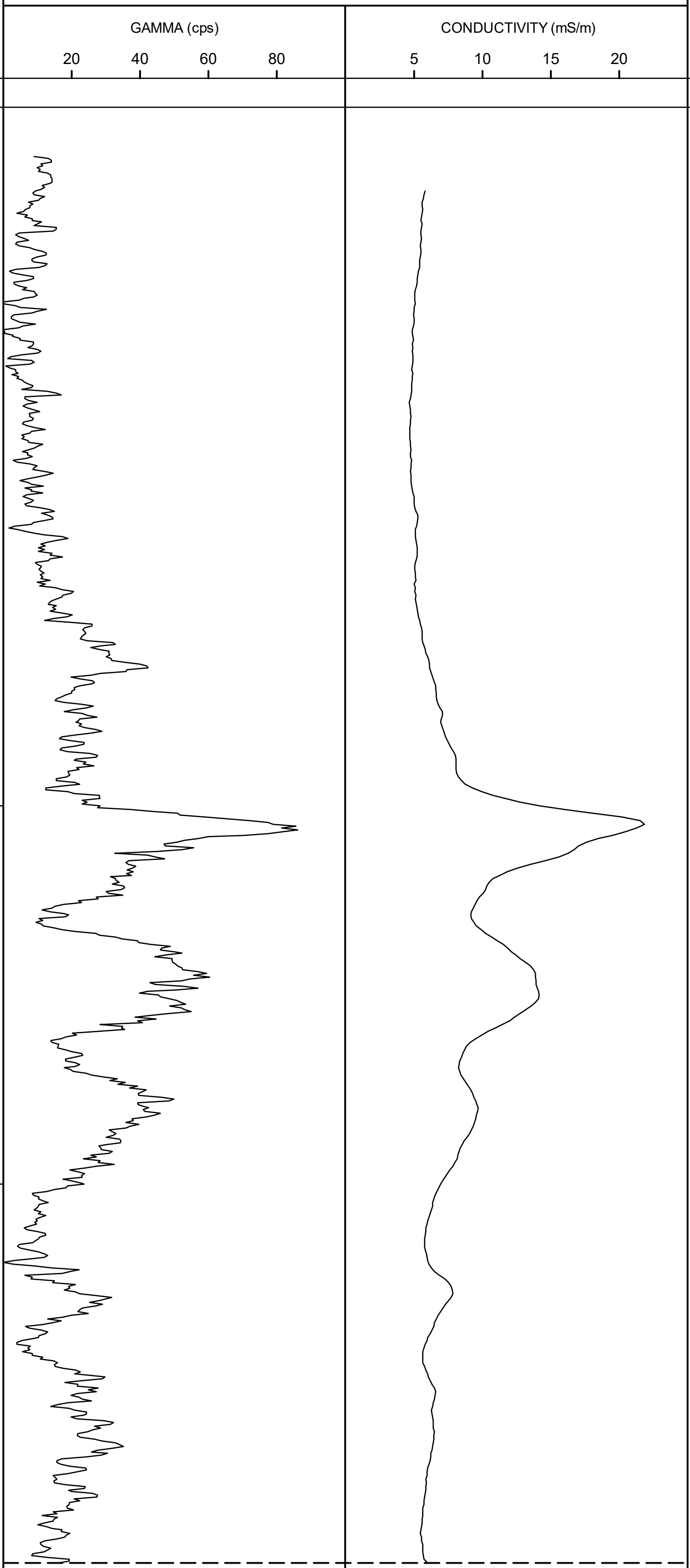
DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE				
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 20.4 m** **UNIT 3, 0.0 m to 9.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00		
		UNIT 2, 9.6 m to 14.8 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		9.60		
		UNIT 1, 14.8 m to 20.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		14.80		
20		*CONTINUED NEXT PAGE*				



Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-06

SHEET 2 OF 2

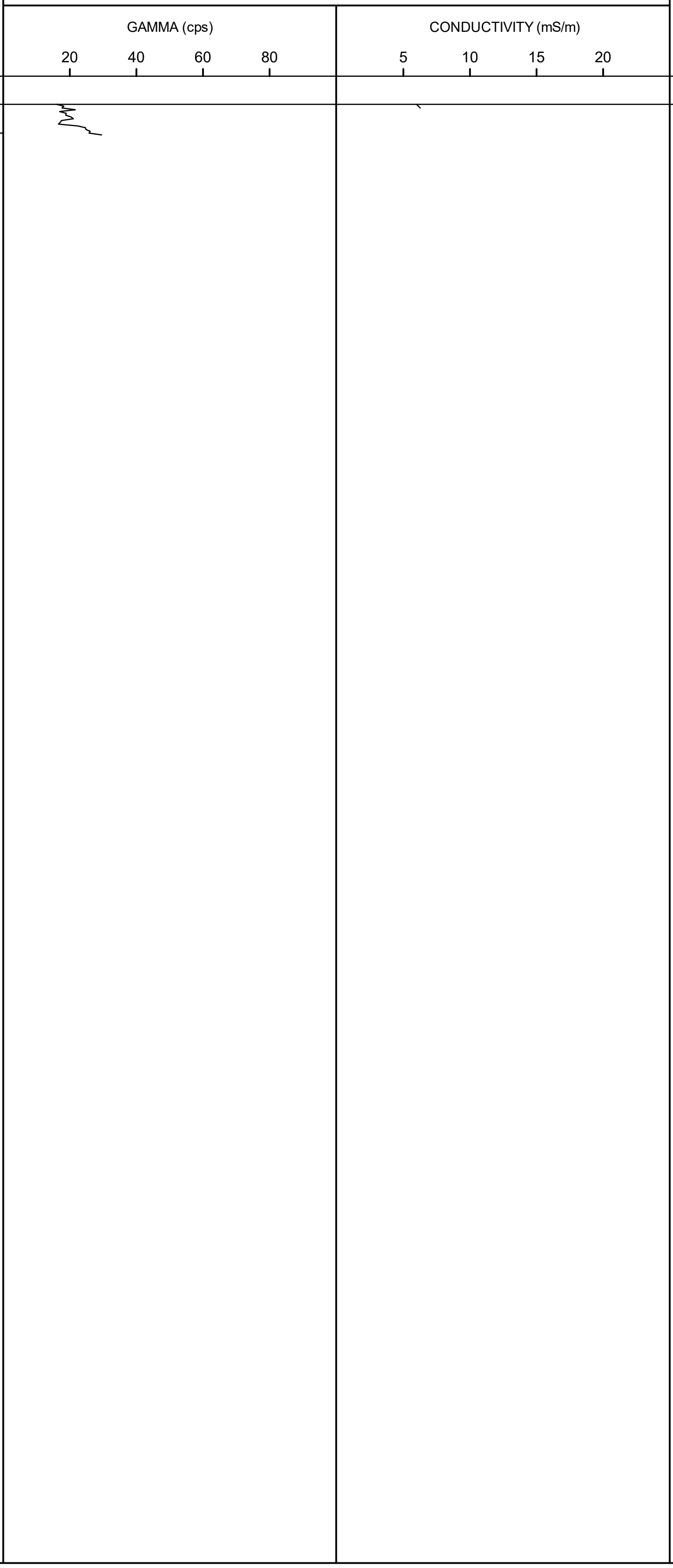
LOCATION: N 5009268.0 ;E 422552.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20			🟦			
		End of Borehole, 20.4 m **Note(s):** 1. Quarry extraction carried out in area of borehole prior to R.W. Tomlinson 2020 survey.		20.40		
22						
24						
26						
28						
30						
32						
34						
36						
38						
40						



DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-07

SHEET 1 OF 2

LOCATION: N 5009177.8 ;E 422634.2

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018

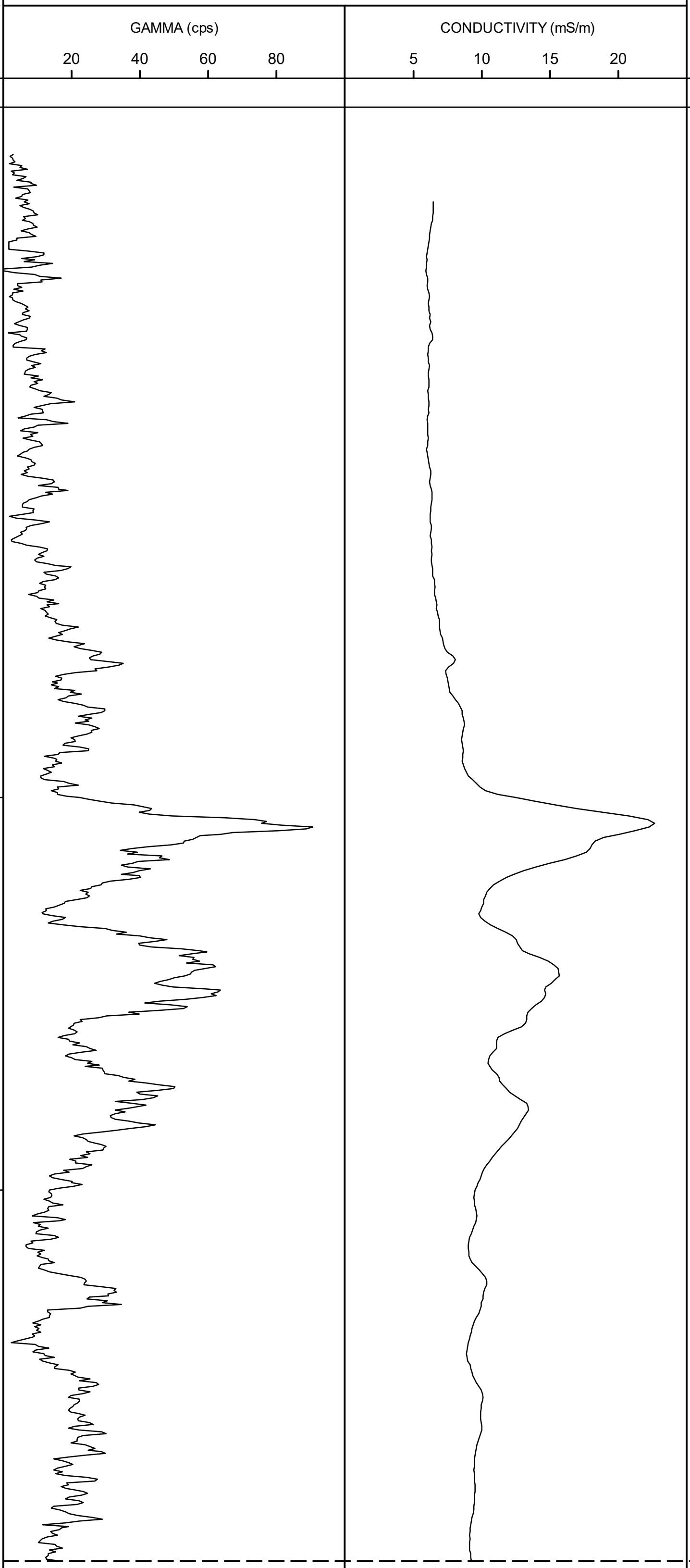
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 20.4 m** **UNIT 3, 0.0 m to 9.5 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
		UNIT 2, 9.5 m to 14.9 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		9.50
		UNIT 1, 14.9 m to 20.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		14.90
20		*CONTINUED NEXT PAGE*		

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-07

SHEET 2 OF 2

LOCATION: N 5009177.8 ;E 422634.2

DRILLING DATE: July 2018

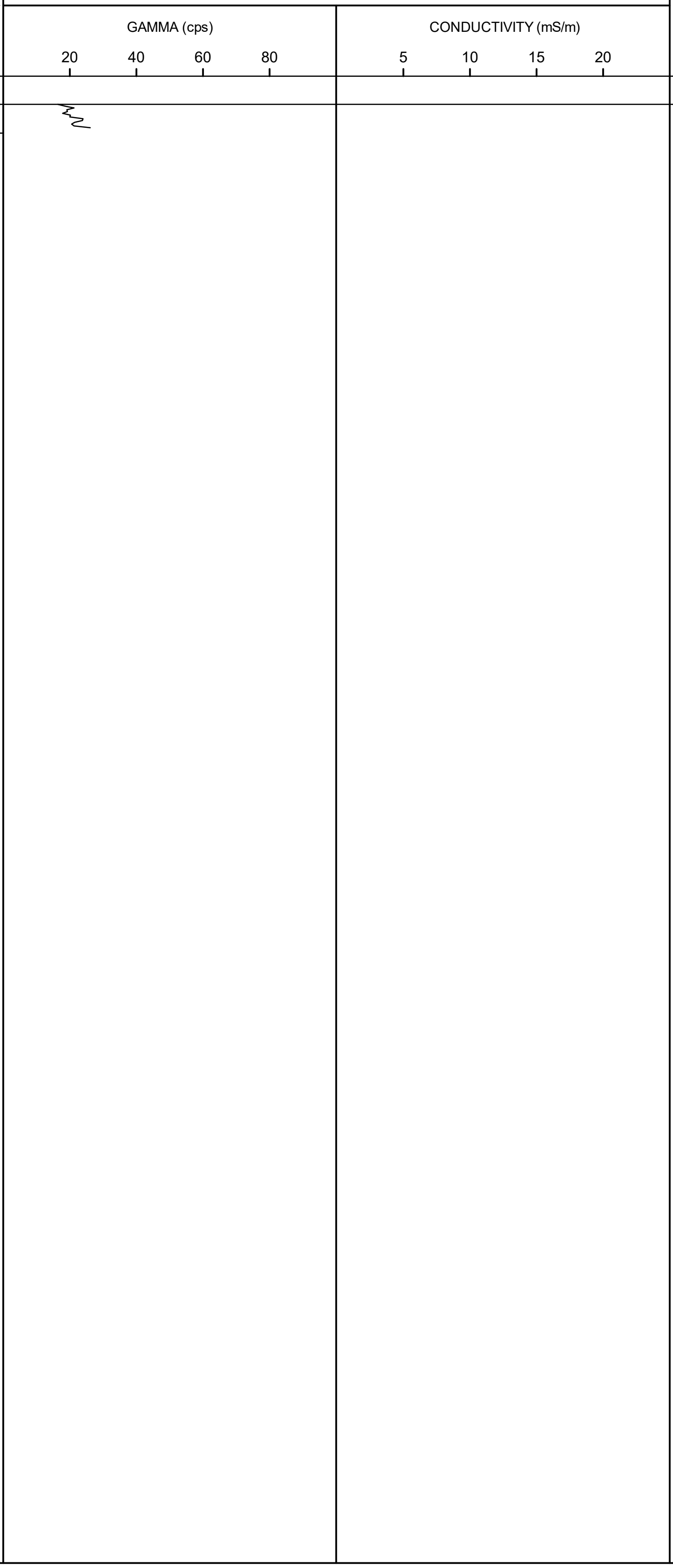
DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20						
		End of Borehole, 20.4 m **Note(s):** 1. Quarry extraction carried out in area of borehole prior to R.W. Tomlinson 2020 survey.		20.40		
22						
24						
26						
28						
30						
32						
34						
36						
38						
40						



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-08

SHEET 1 OF 2

LOCATION: N 5009213.3 ;E 422647.2

DRILLING DATE: July 2018

DATUM: Geodetic

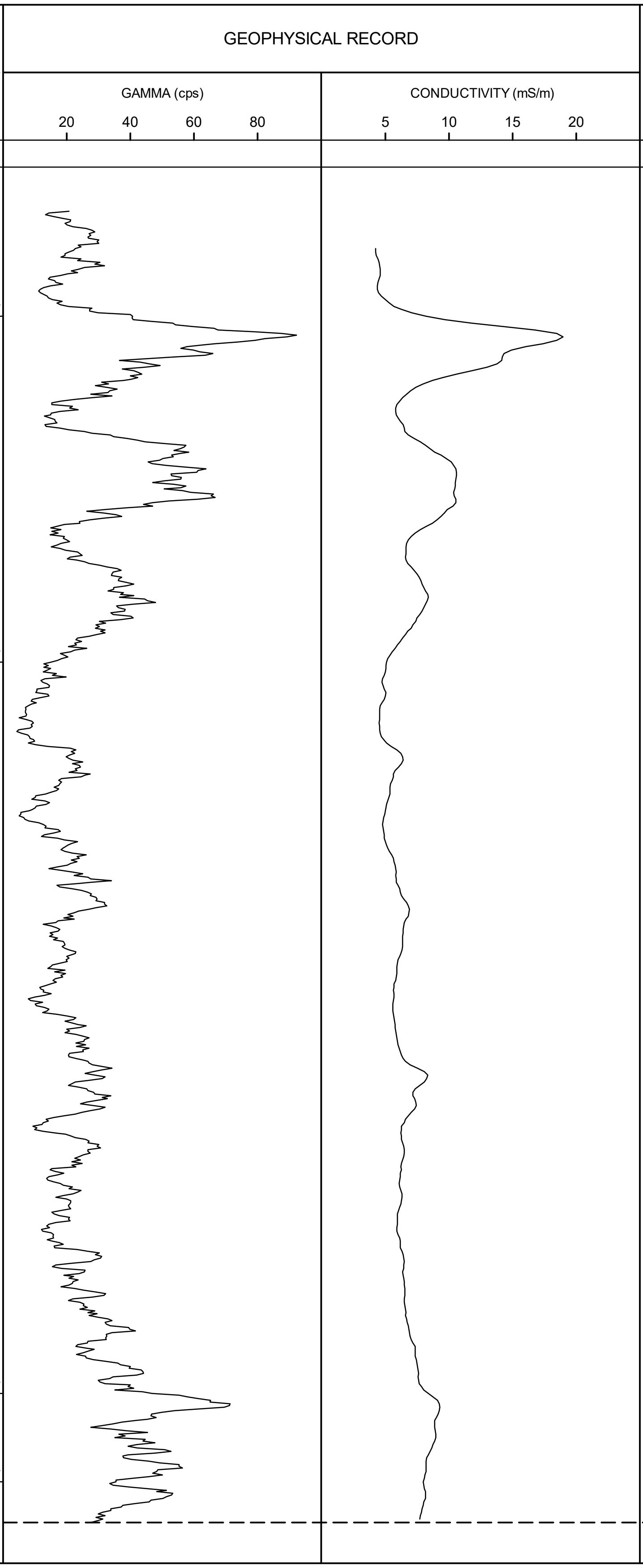
DRILL RIG: Air Track Drill

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		138.57
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 18.1 m** **UNIT 3, 0.0 m to 2.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	0.00
2		**UNIT 2, 2.2 m to 7.3 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	136.37 2.20
7.3		**UNIT 1, 7.3 m to 18.1 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	131.27 7.30
18		**UPPER GULL RIVER FORMATION, 18.1 m to 20.3 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds	🟩	120.47 18.10
			🟦	119.17 19.40
20				

Depth scale marks: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20



PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-08

SHEET 2 OF 2

LOCATION: N 5009213.3 ;E 422647.2

DRILLING DATE: July 2018

DATUM: Geodetic

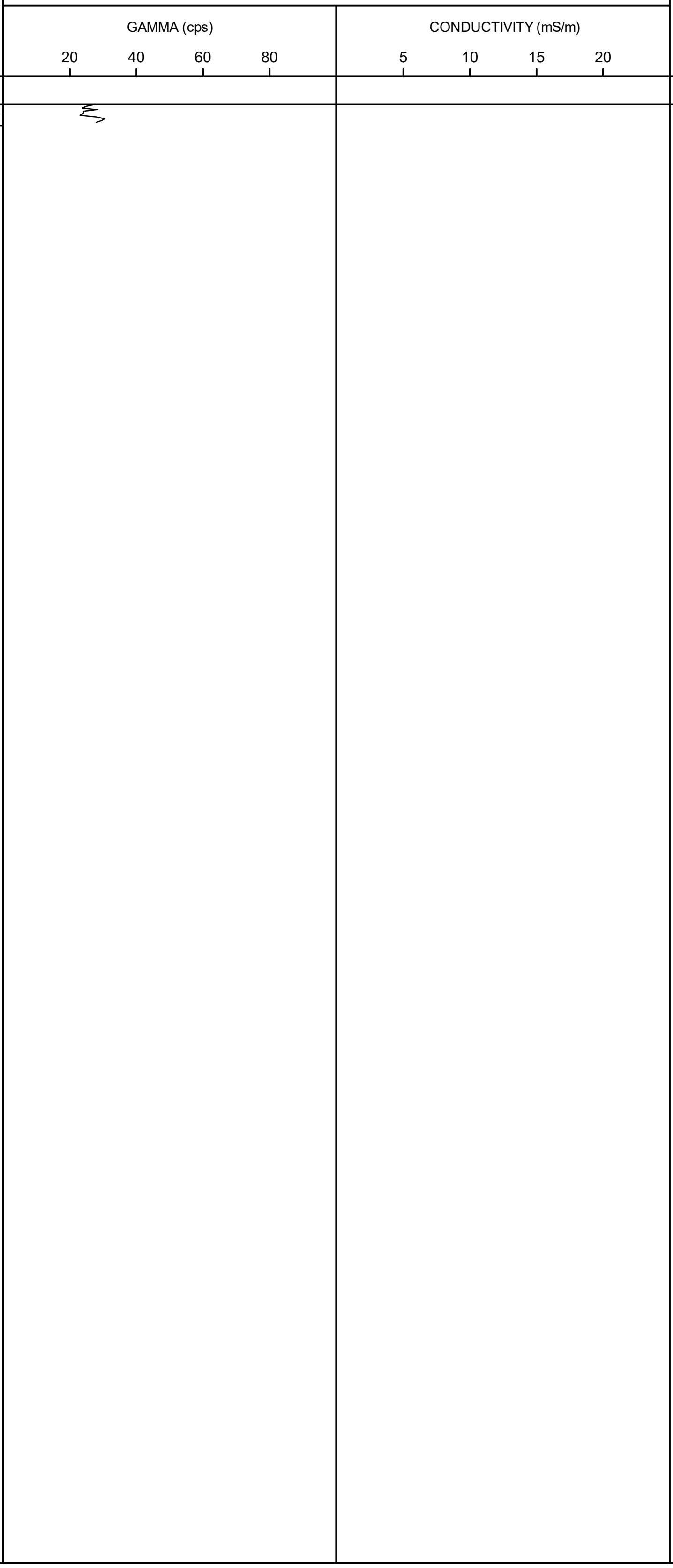
DRILL RIG: Air Track Drill

INCLINATION: -90°   AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
20		of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 18.1 m to 19.4 m.	🟦	118.27 20.30	
22		**End of Borehole, 20.3 m**			
		Note(s):			
		1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.			
24					
26					
28					
30					
32					
34					
36					
38					
40					

GEOPHYSICAL RECORD



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-09

SHEET 1 OF 2

LOCATION: N 5009282.0 ;E 422569.4

INCLINATION: -90° AZIMUTH: ---

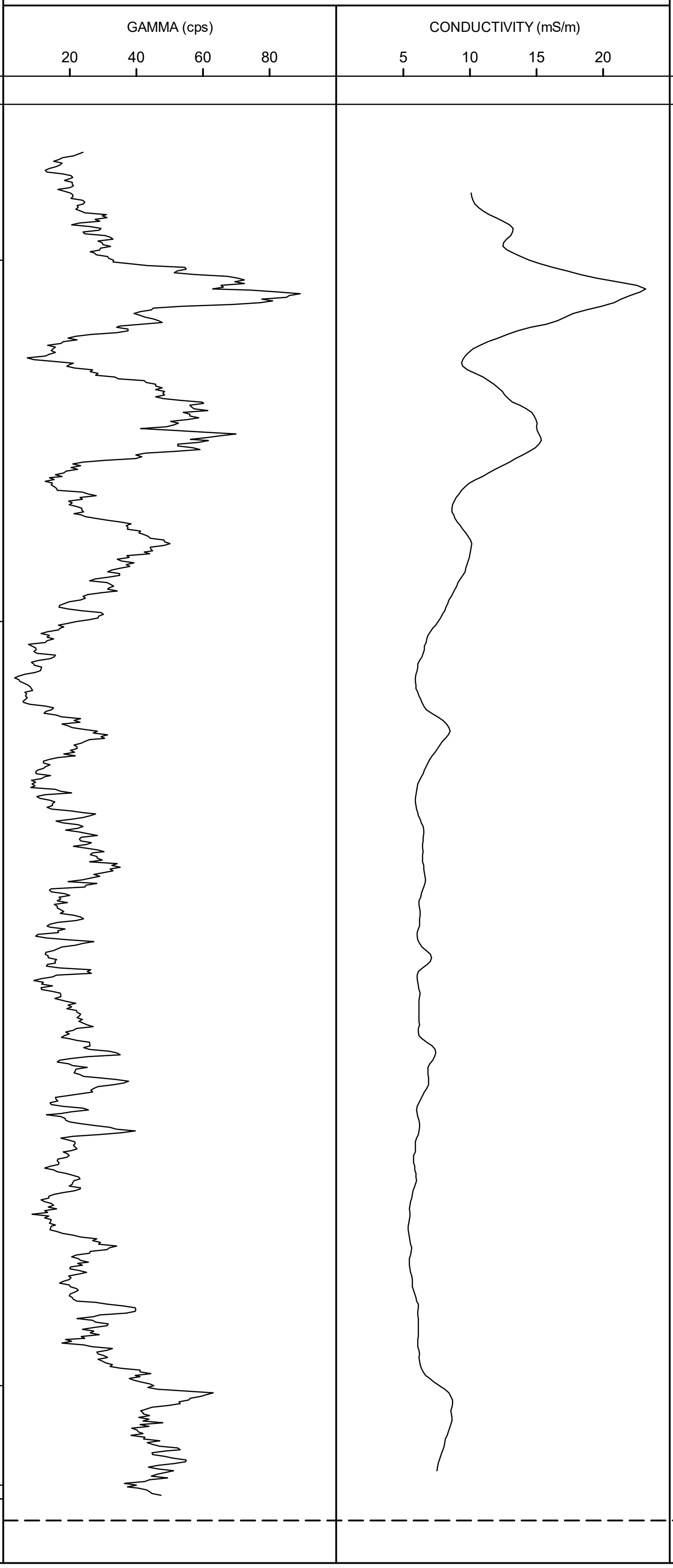
DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE				
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 18.1 m** **UNIT 3, 0.0 m to 2.2 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00		
2		**UNIT 2, 2.2 m to 7.3 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		2.20		
7.3		**UNIT 1, 7.3 m to 18.1 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		7.30		
18		**UPPER GULL RIVER FORMATION, 18.1 m to 19.7 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds		18.10 19.50 19.70		



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-09

SHEET 2 OF 2

LOCATION: N 5009282.0 ;E 422569.4

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed"**, at 18.1 m to 19.5 m.					
22		**End of Borehole, 19.7 m** **Note(s):** 1. Stockpile placed in area of borehole prior to R.W. Tomlinson 2020 survey.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-10

SHEET 1 OF 2

LOCATION: N 5009354.8 ;E 422521.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

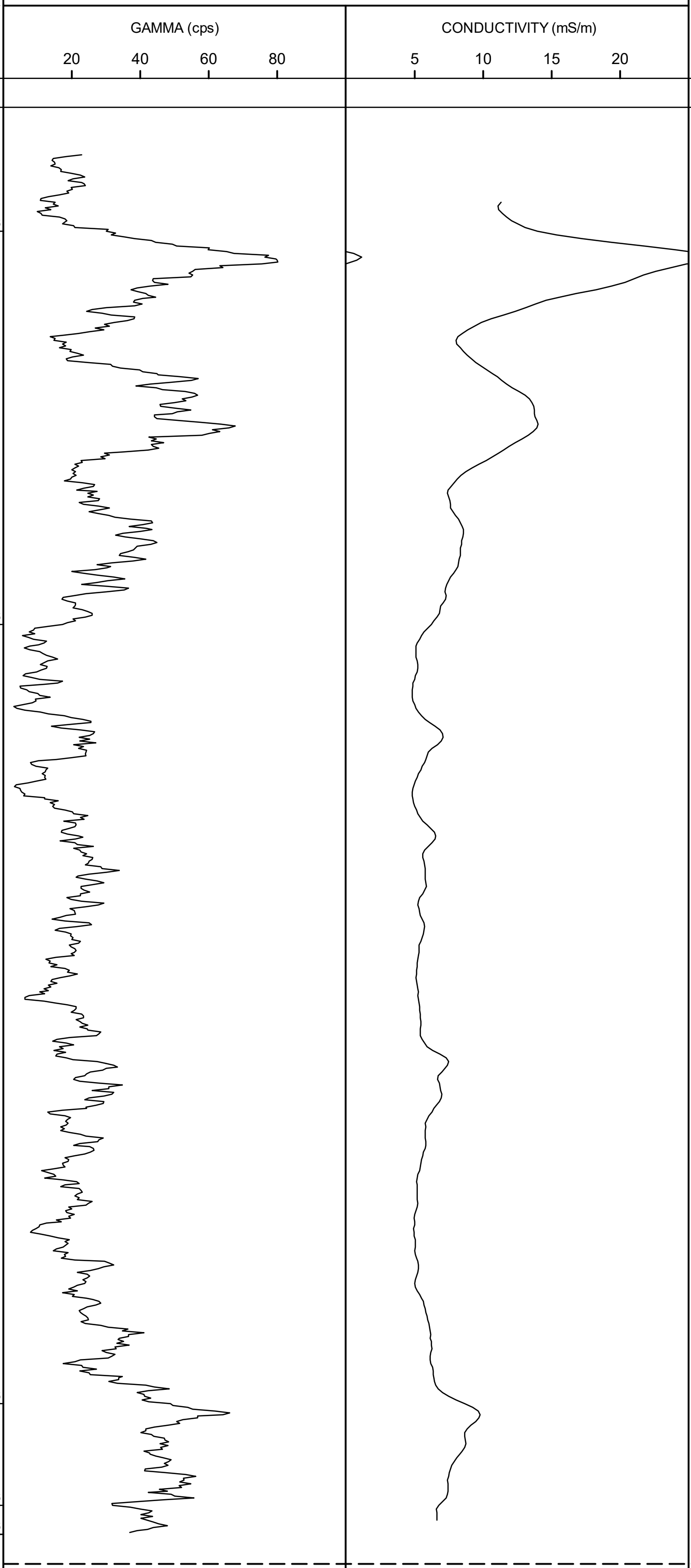
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		136.36
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 17.8 m** **UNIT 3, 0.0 m to 1.7 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00
2		**UNIT 2, 1.7 m to 7.1 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		134.66 1.70
4				
6				
8		**UNIT 1, 7.1 m to 17.8 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		129.26 7.10
10				
12				
14				
16				
18		**UPPER GULL RIVER FORMATION, 17.8 m to 19.6 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic		118.56 17.80 117.16 19.20 116.76 19.60
20				

CONTINUED NEXT PAGE

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-10

SHEET 2 OF 2

LOCATION: N 5009354.8 ;E 422521.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 17.8 m to 19.2 m.					
22		**End of Borehole, 19.6 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-11

SHEET 1 OF 2

LOCATION: N 5009310.2 ;E 422969.9

INCLINATION: -90° AZIMUTH: ---

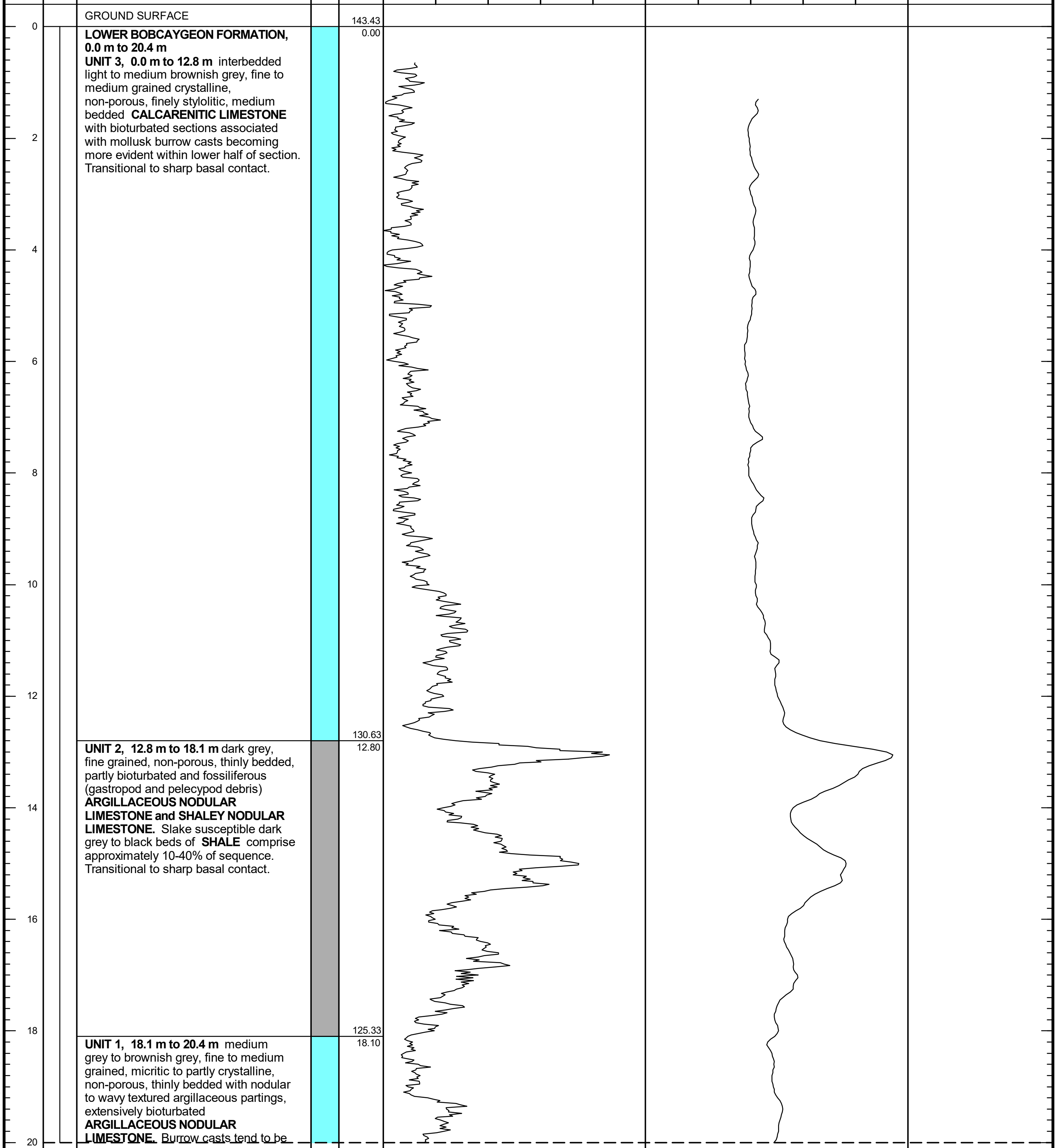
DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		143.43		
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 20.4 m** **UNIT 3, 0.0 m to 12.8 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00		
		UNIT 2, 12.8 m to 18.1 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		130.63 12.80		
		UNIT 1, 18.1 m to 20.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be		125.33 18.10		



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-11

SHEET 2 OF 2

LOCATION: N 5009310.2 ;E 422969.9

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	123.03 20.40			
		End of Borehole, 20.4 m					
		Note(s):					
		1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-12

SHEET 1 OF 2

LOCATION: N 5009623.9 ;E 422785.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: July 2018

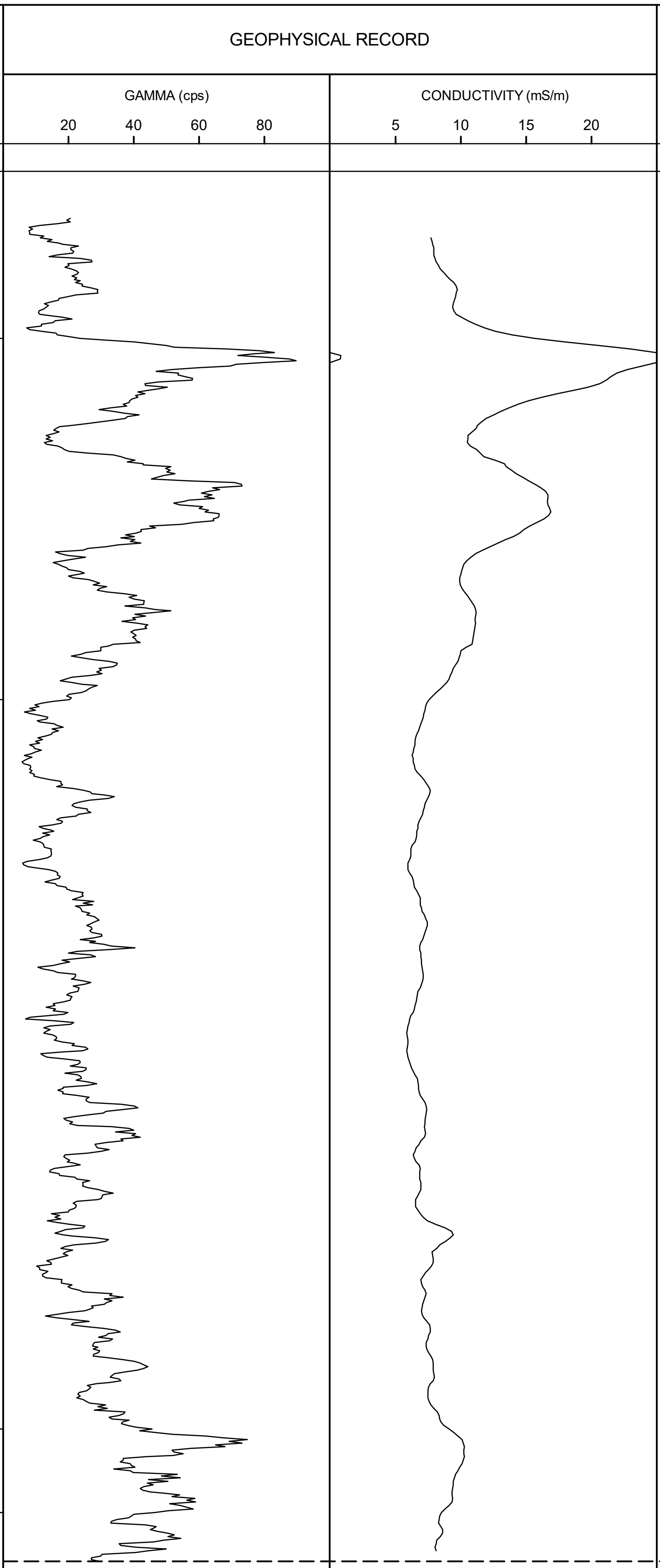
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE			
0		**LOWER BOBCAYGEON FORMATION, 0.0 m to 18.1 m** **UNIT 3, 0.0 m to 2.4 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		0.00	
		UNIT 2, 2.4 m to 7.6 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		2.40	
		UNIT 1, 7.6 m to 18.1 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		7.60	
		UPPER GULL RIVER FORMATION, 18.1 m to 20.2 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds		18.10 19.30	

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 18111853

GEOPHYSICAL LOG OF: SQAT18-12

SHEET 2 OF 2

LOCATION: N 5009623.9 ;E 422785.3

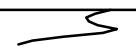
DRILLING DATE: July 2018

DATUM: Geodetic

INCLINATION: -90°   AZIMUTH: ---

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 18.1 m to 19.3 m.		20.20			
22		**End of Borehole, 20.2 m** **Note(s):** 1. Quarry rehabilitation in area of borehole prior to R.W. Tomlinson 2020 survey.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-13

SHEET 1 OF 2

LOCATION: N 5009024.9 ;E 422537.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

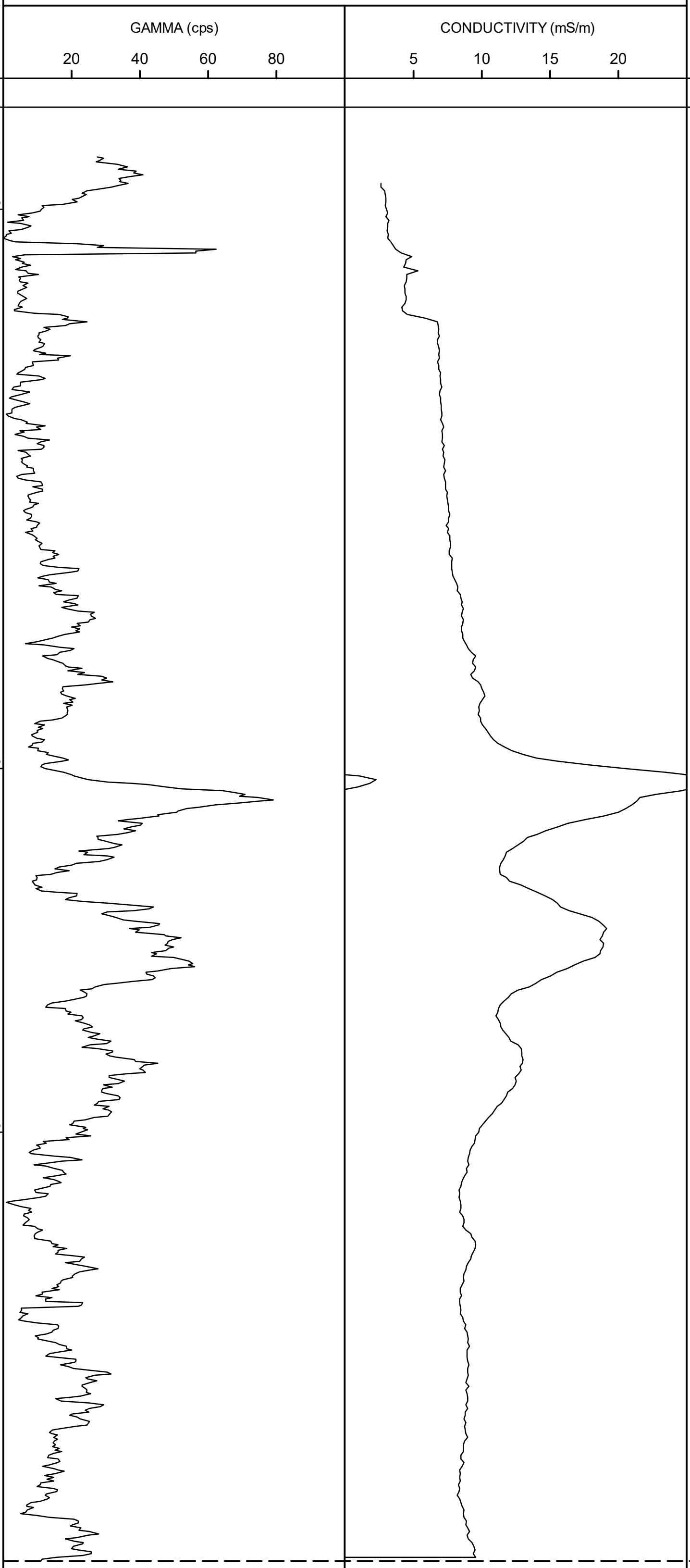
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		150.85		
0		**Overburden, 0.0 m to 1.4 m** **Bedrock Surface, 1.4 m** **LOWER BOBCAYGEON FORMATION, 1.4 m to 20.5 m** **UNIT 3, 1.4 m to 9.1 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	▨	0.00 149.45 1.40		
9.1		**UNIT 2, 9.1 m to 14.2 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		141.75 9.10		
14.1		**UNIT 1, 14.2 m to 20.5 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		136.75 14.10		
20		*CONTINUED NEXT PAGE*				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-13

SHEET 2 OF 2

LOCATION: N 5009024.9 ;E 422537.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20			🟦	130.35 20.50			
		End of Borehole, 20.5 m **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-14

SHEET 1 OF 2

LOCATION: N 5008777.1 ;E 422647.7

INCLINATION: -90° AZIMUTH: ---

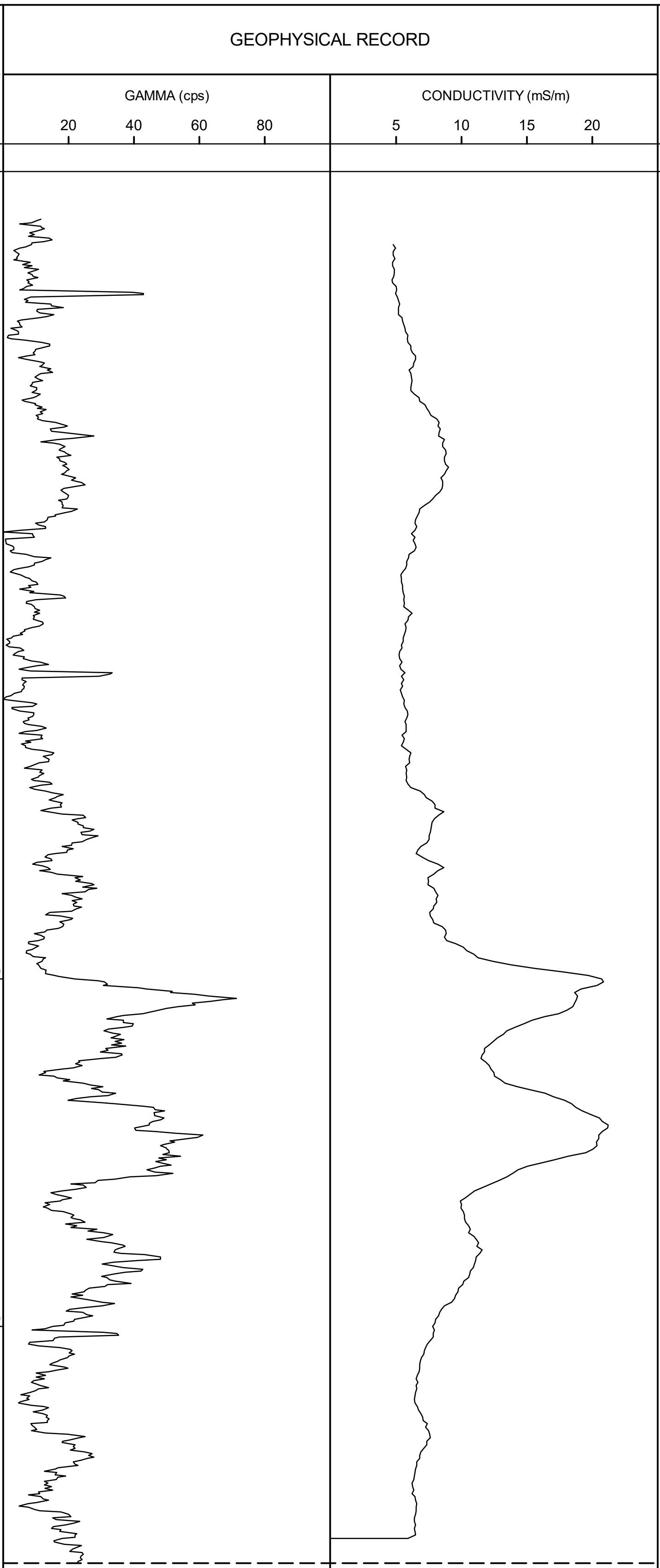
DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		151.20	
0		**Bedrock Surface, 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 20.3 m** **UNIT 3, 0.0 m to 11.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	0.00	
11.6		**UNIT 2, 11.6 m to 16.6 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	139.60 11.60	
16.6			🟦	134.60 16.60	



Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-14

SHEET 2 OF 2

LOCATION: N 5008777.1 ;E 422647.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		**UNIT 1, 16.6 m to 20.3 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	130.90 20.30			
		End of Borehole, 20.3 m					
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							

Note(s):

1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-15

SHEET 1 OF 2

LOCATION: N 5009198.6 ;E 422850.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

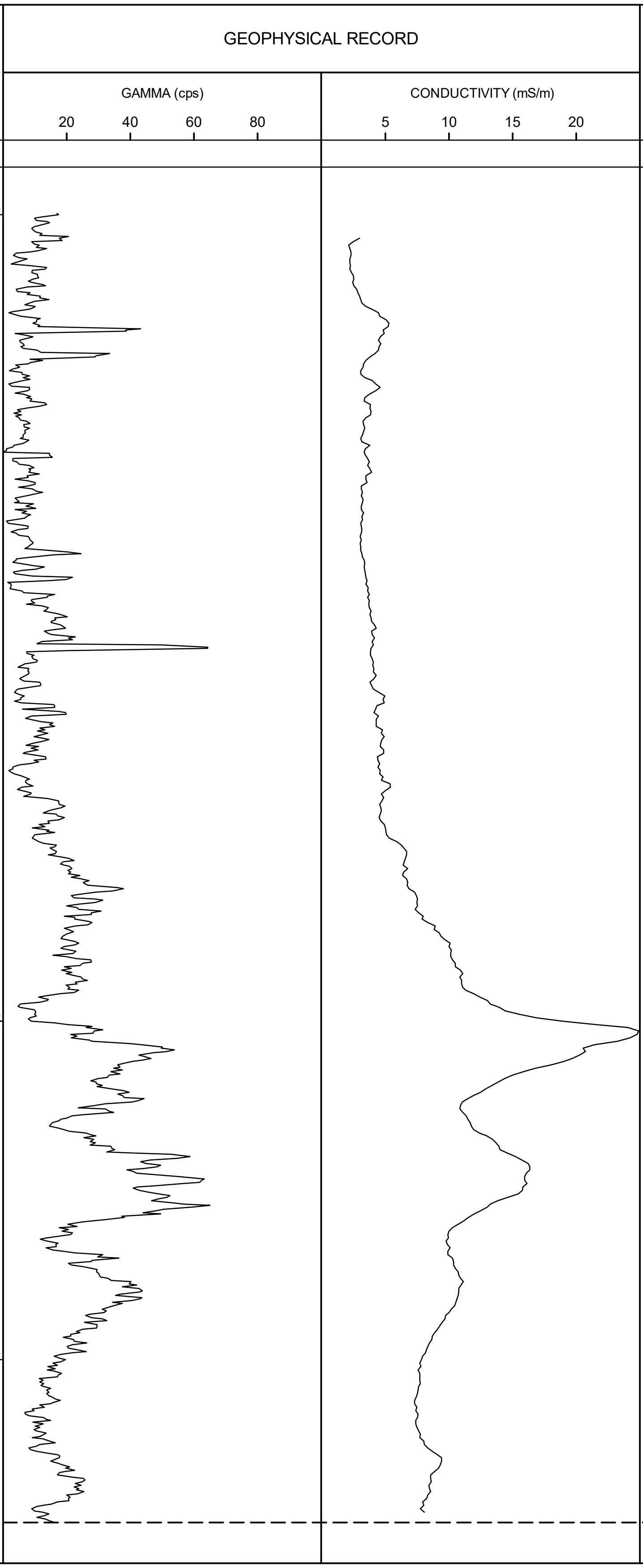
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		146.54	
0		**Overburden, 0.0 m to 0.3 m**	▨	0.00	
		Bedrock Surface, 0.3 m **LOWER BOBCAYGEON FORMATION, 0.3 m to 20.4 m** **UNIT 3, 0.3 m to 12.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		145.84 0.70	
12.6		**UNIT 2, 12.6 m to 17.6 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		133.94 12.60	
17.6		**UNIT 1, 17.6 m to 20.4 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally		128.94 17.60	

CONTINUED NEXT PAGE



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-15

SHEET 2 OF 2

LOCATION: N 5009198.6 ;E 422850.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD: GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD: CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		126.14 20.40			
22		**End of Borehole, 20.4 m**					
24							
26							
28							
30							
32							
34							
36							
38							
40							

Note(s):

1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-16

SHEET 1 OF 2

LOCATION: N 5008865.6 ;E 422772.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

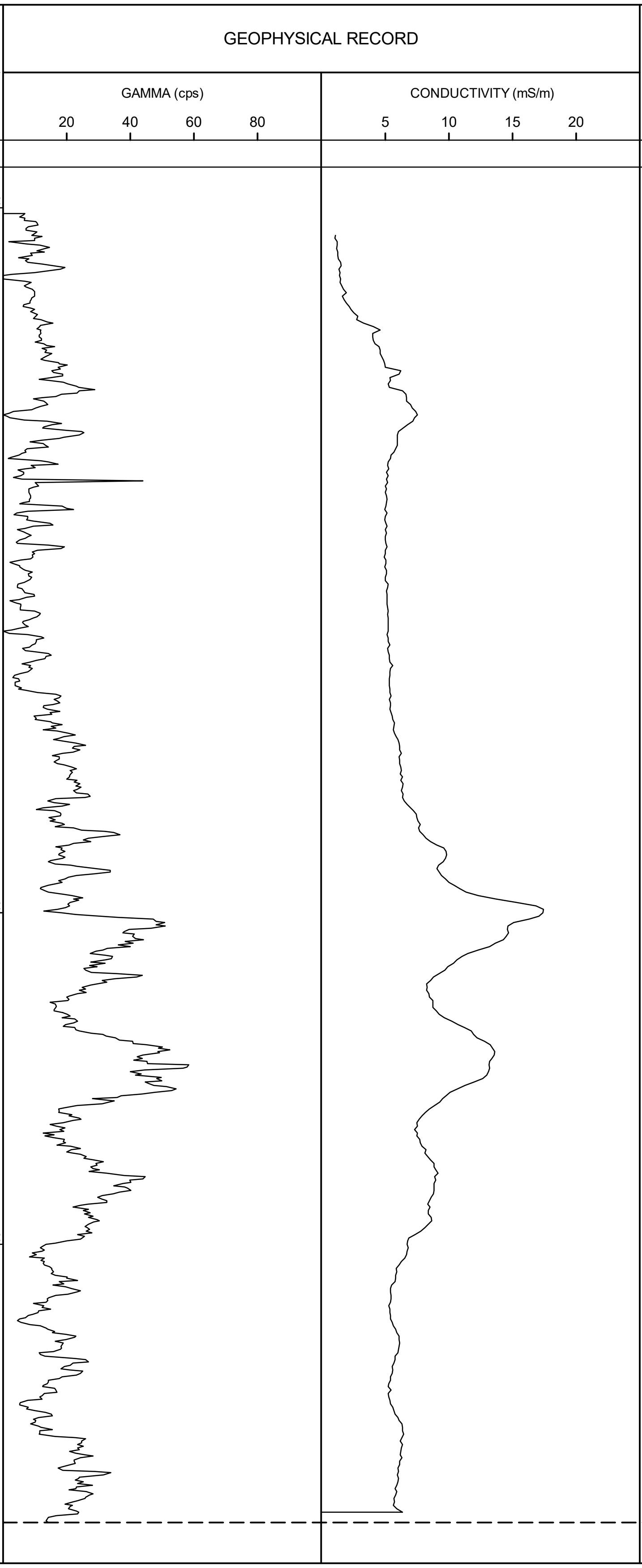
DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		150.42	
0		**Overburden, 0.0 m to 0.4 m**	▨	0.00	
		Bedrock Surface, 0.4 m **LOWER BOBCAYGEON FORMATION, 0.4 m to 20.6 m** **UNIT 3, 0.4 m to 11.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	149.82 0.60	
11		**UNIT 2, 11.0 m to 15.9 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	⬜	139.42 11.00	
15.9		**UNIT 1, 15.9 m to 20.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings	🟦	134.52 15.90	

CONTINUED NEXT PAGE



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-16

SHEET 2 OF 2

LOCATION: N 5008865.6 ;E 422772.3

DRILLING DATE: December 2018

DATUM: Geodetic

DRILL RIG: Air Track Drill

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		5 to 30 mm thick.	🟦	129.82 20.60			
		End of Borehole, 20.6 m **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-17

SHEET 1 OF 2

LOCATION: N 5009028.1 ;E 422958.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

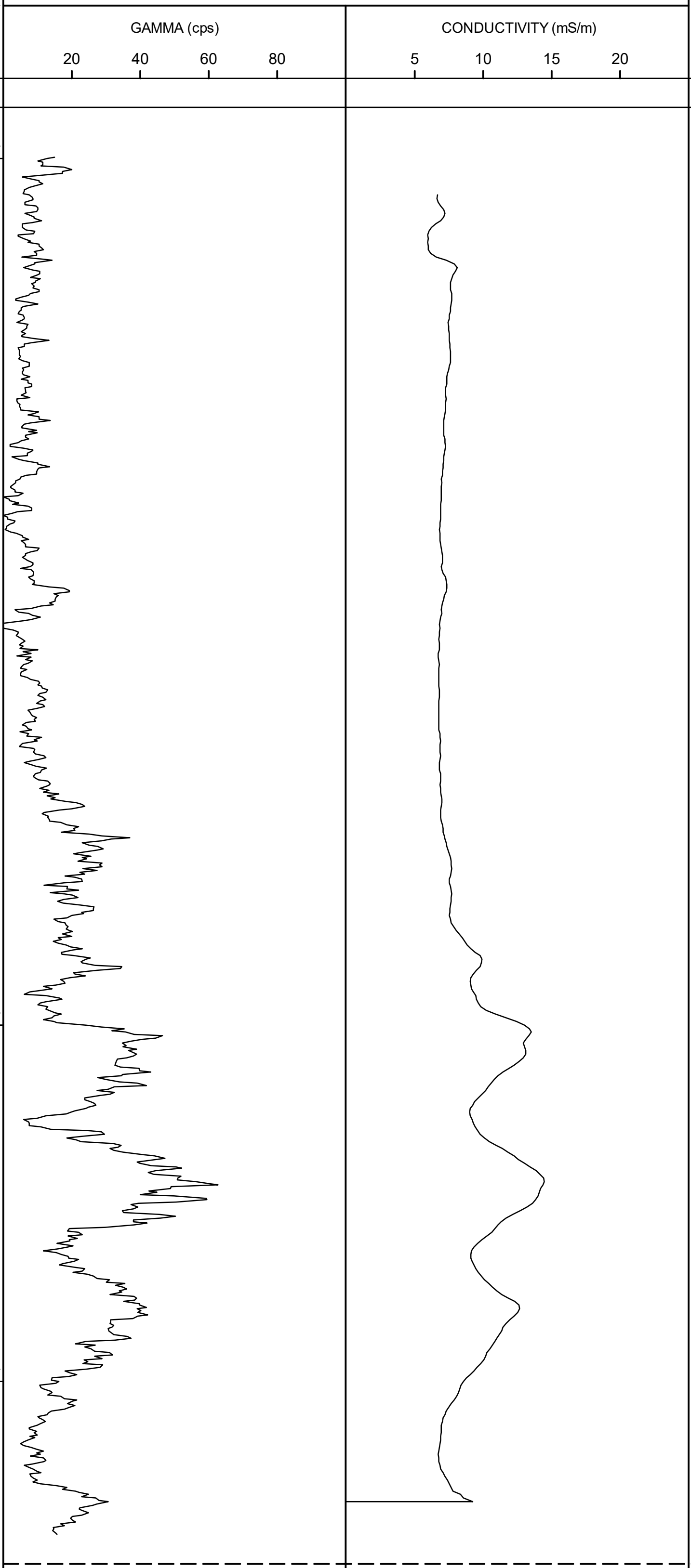
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		148.47
0		**Overburden, 0.0 m to 0.3 m** **Bedrock Surface, 0.3 m** **LOWER BOBCAYGEON FORMATION, 0.3 m to 20.4 m**	▨	0.00
		UNIT 3, 0.3 m to 12.6 m interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		147.77 0.70
		UNIT 2, 12.6 m to 17.5 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		135.87 12.60
		UNIT 1, 17.5 m to 20.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally		130.97 17.50

0
2
4
6
8
10
12
14
16
18
20

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-17

SHEET 2 OF 2

LOCATION: N 5009028.1 ;E 422958.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	128.07 20.40			
22		**End of Borehole, 20.4 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-18

SHEET 1 OF 2

LOCATION: N 5009219.4 ;E 423061.5

DRILLING DATE: December 2018

DATUM: Geodetic

DRILL RIG: Air Track Drill

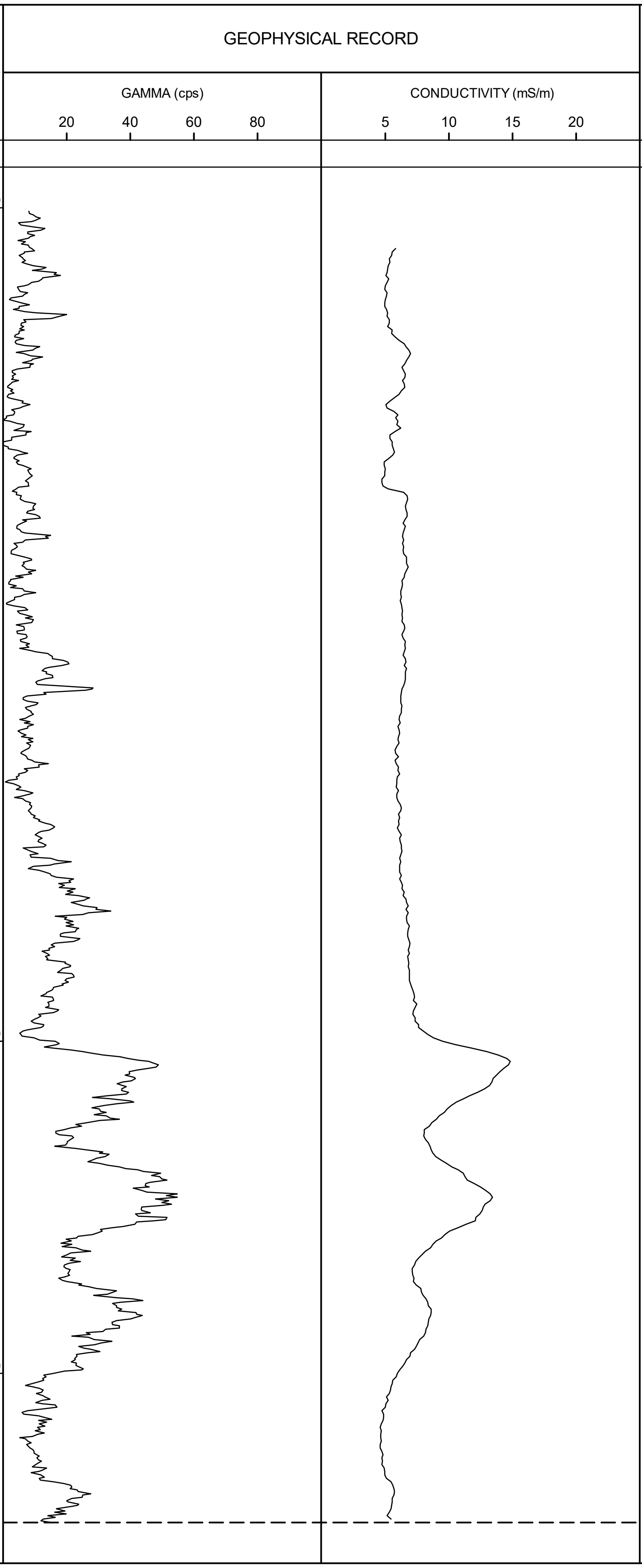
INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		143.59
0		**Overburden, 0.0 m to 0.6 m**	▨	0.00
		Bedrock Surface, 0.6 m **LOWER BOBCAYGEON FORMATION, 0.6 m to 20.5 m** **UNIT 3, 0.6 m to 12.9 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		142.99 0.60
		UNIT 2, 12.9 m to 17.8 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		130.69 12.90
		UNIT 1, 17.8 m to 20.5 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline		125.79 17.80

Depth scale marks: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE



PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-18

SHEET 2 OF 2

LOCATION: N 5009219.4 ;E 423061.5

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---					
20		calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	123.09 20.50			
22		**End of Borehole, 20.5 m**					
		Note(s):					
		1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.					
24							
26							
28							
30							
32							
34							
36							
38							
40							

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 11/24/22 JM

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-19

SHEET 1 OF 1

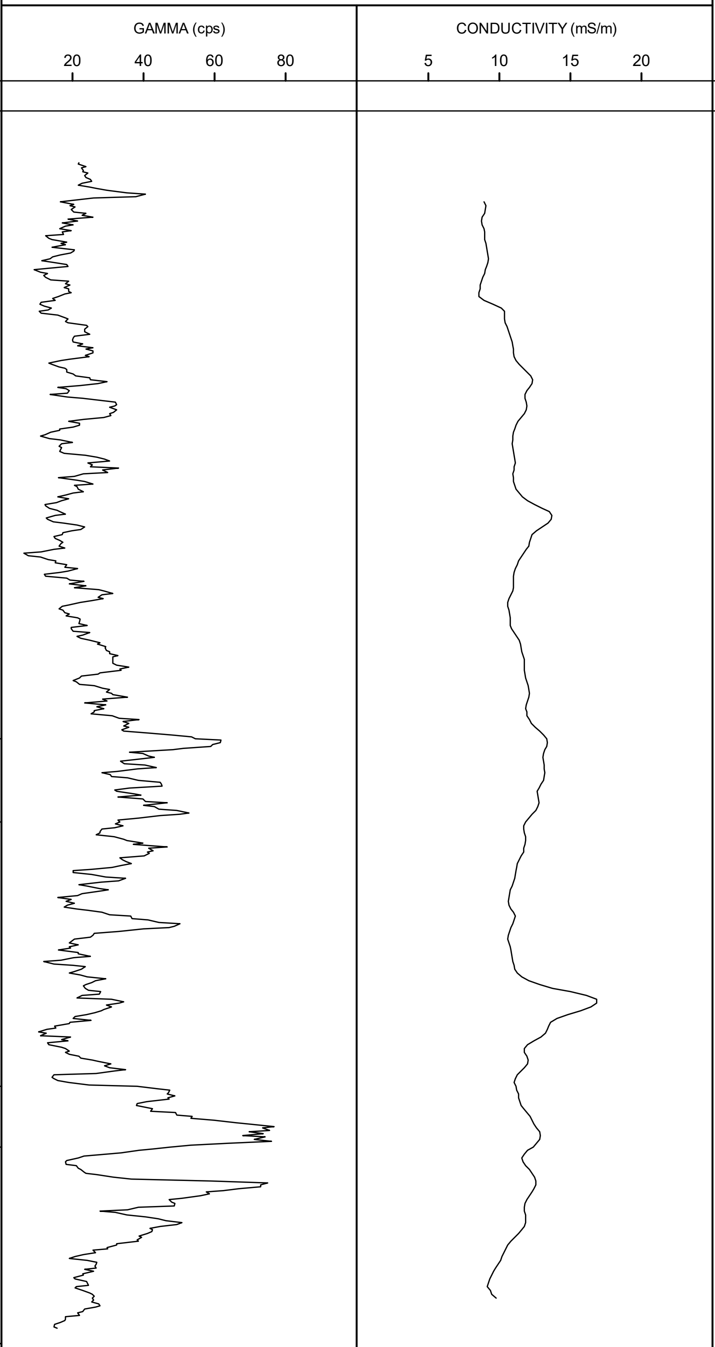
LOCATION: N 5009462.1 ;E 422861.2

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		122.25		
0		**Bedrock Surface, 0.0 m** **LOWER BOBCAYGEON FORMATION, 0.0 m to 8.3 m** **UNIT 1, 0.0 m to 8.3 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	0.00		
8		**UPPER GULL RIVER FORMATION, 8.3 m to 16.3 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 8.3 m to 9.4 m with a second dolostone bed at 12.9-13.7m.	🟩	113.95 8.30		
			🟦	112.85 9.40		
			🟩	109.35 12.90		
			🟦	108.55 13.70		
16		**End of Borehole, 16.3 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.		105.95 16.30		



Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-20

SHEET 1 OF 2

LOCATION: N 5009755.1 ;E 423007.7

DRILLING DATE: December 2018

DATUM: Geodetic

DRILL RIG: Air Track Drill

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

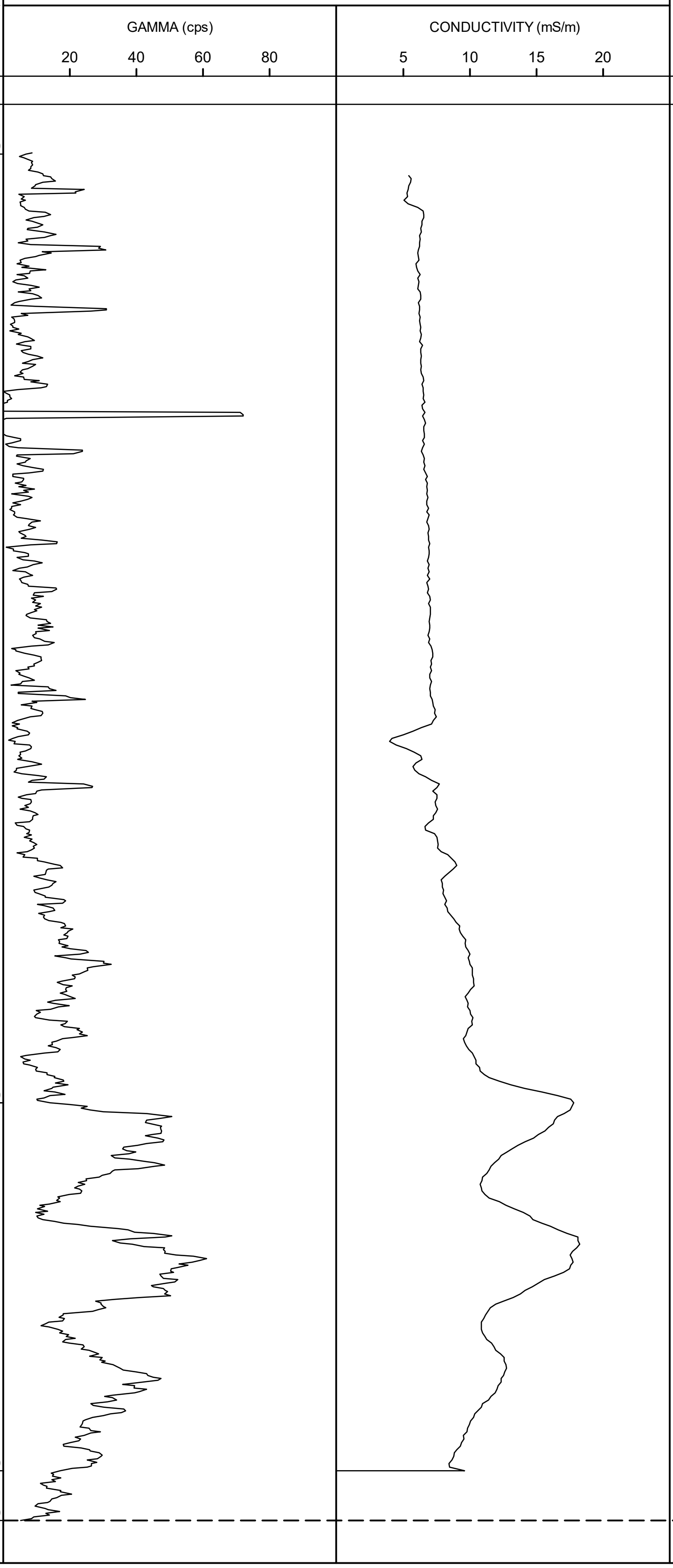
DRILLING RECORD

SYMBOLIC LOG

DESCRIPTION	ELEV. DEPTH (m)
GROUND SURFACE	141.00
Overburden, 0.0 m to 1.0 m	0.00
Bedrock Surface, 1.0 m **LOWER BOBCAYGEON FORMATION, 1.0 m to 20.0 m** **UNIT 3, 1.0 m to 14.1 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	140.30 0.70
UNIT 2, 14.1 m to 19.3 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	126.90 14.10
UNIT 1, 19.3 m to 20.0 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline.	121.70 19.30
	121.00

CONTINUED NEXT PAGE

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT18-20

SHEET 2 OF 2

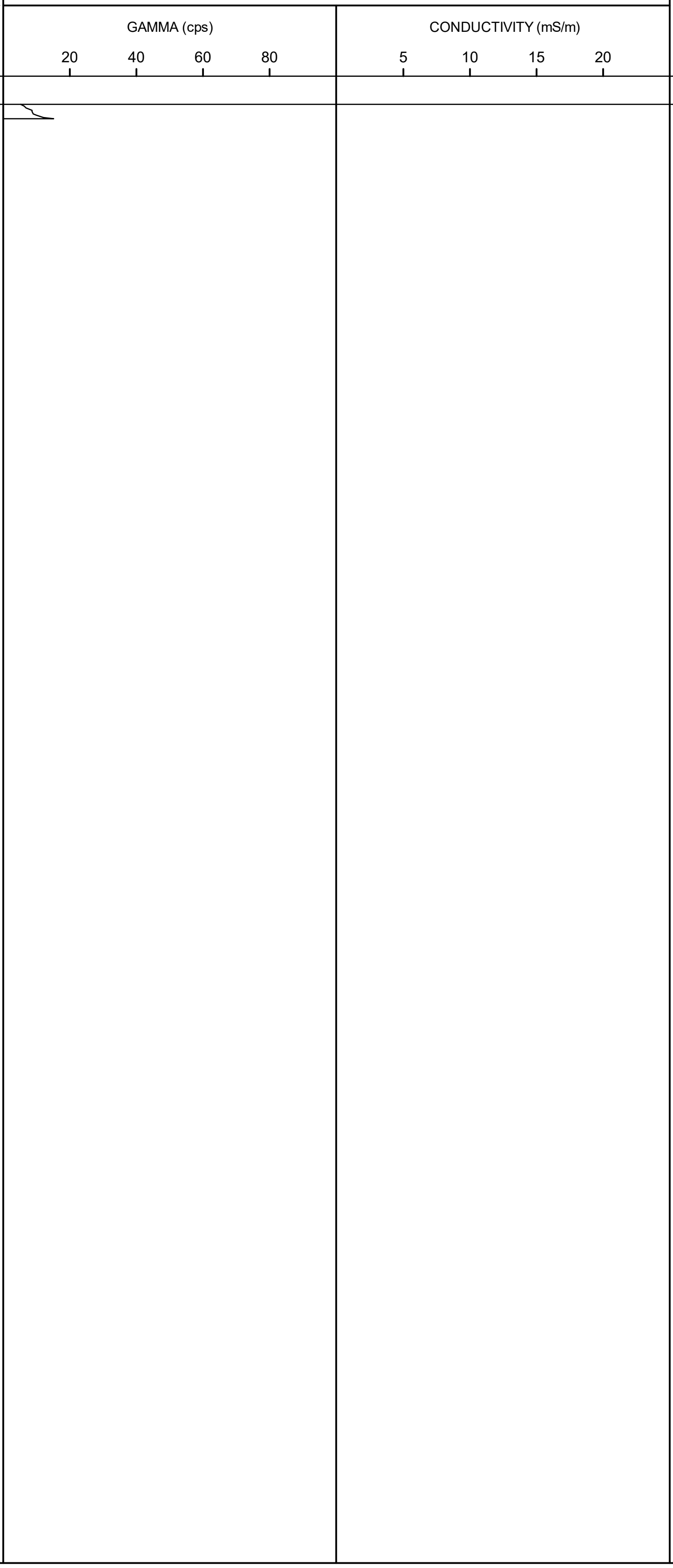
LOCATION: N 5009755.1 ;E 423007.7

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		20.00		
22						
24		**End of Borehole, 20.0 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.				
26						
28						
30						
32						
34						
36						
38						
40						



DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-21

SHEET 1 OF 2

LOCATION: N 5009932.0 ;E 423281.8

DRILLING DATE: March 2020

DATUM: Geodetic

DRILL RIG: Air Track

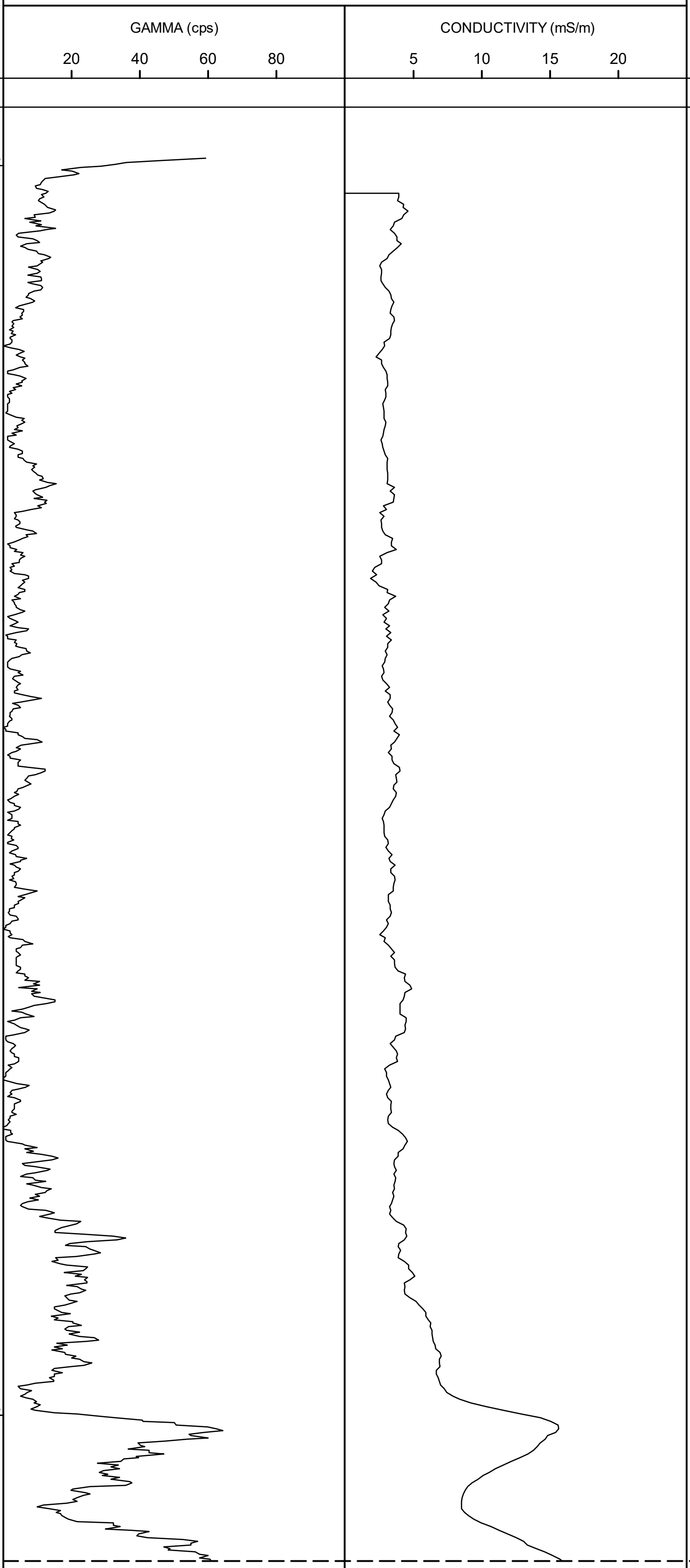
INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		140.43	
0		**Overburden, 0.0 m to 0.8 m**	▩	0.00	
		LOWER BOBCAYGEON FORMATION, 0.8 m to 29.0 m **UNIT 3, 0.8 m to 18.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	139.63 0.80	
2					
4					
6					
8					
10					
12					
14					
16					
18			▒	122.43 18.00	
20					

CONTINUED NEXT PAGE

GEOPHYSICAL RECORD



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-21

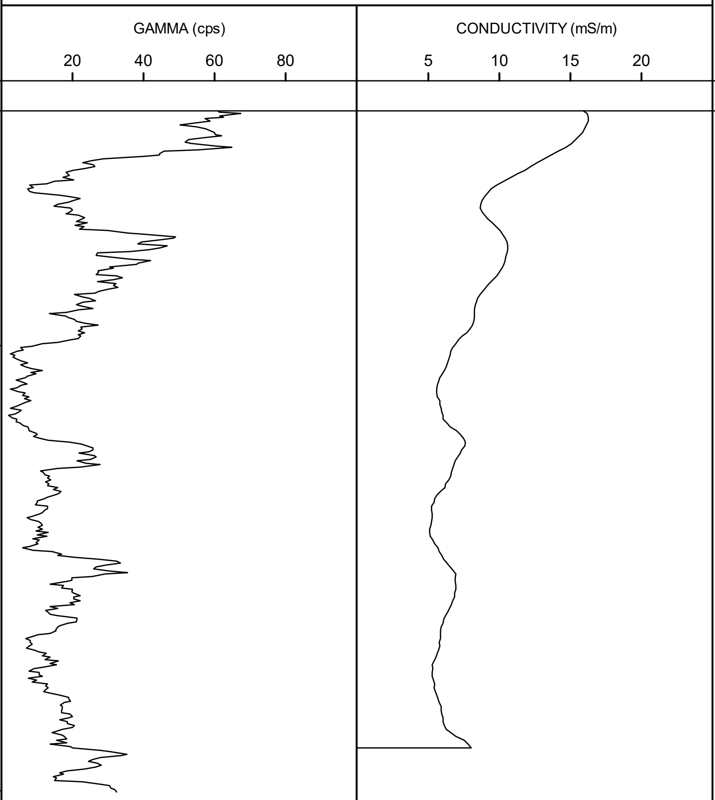
SHEET 2 OF 2

LOCATION: N 5009932.0 ;E 423281.8
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020
DRILL RIG: Air Track
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20 22		**UNIT 2, 18.0 m to 23.1 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		117.33 23.10		
24 26 28		**UNIT 1, 23.1 m to 29.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		111.43 29.00		
30 32 34 36 38 40		**End of Borehole, 29.0 m** **Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.				



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-22

SHEET 1 OF 2

LOCATION: N 5009991.8 ;E 423361.9

INCLINATION: -90° AZIMUTH: ---

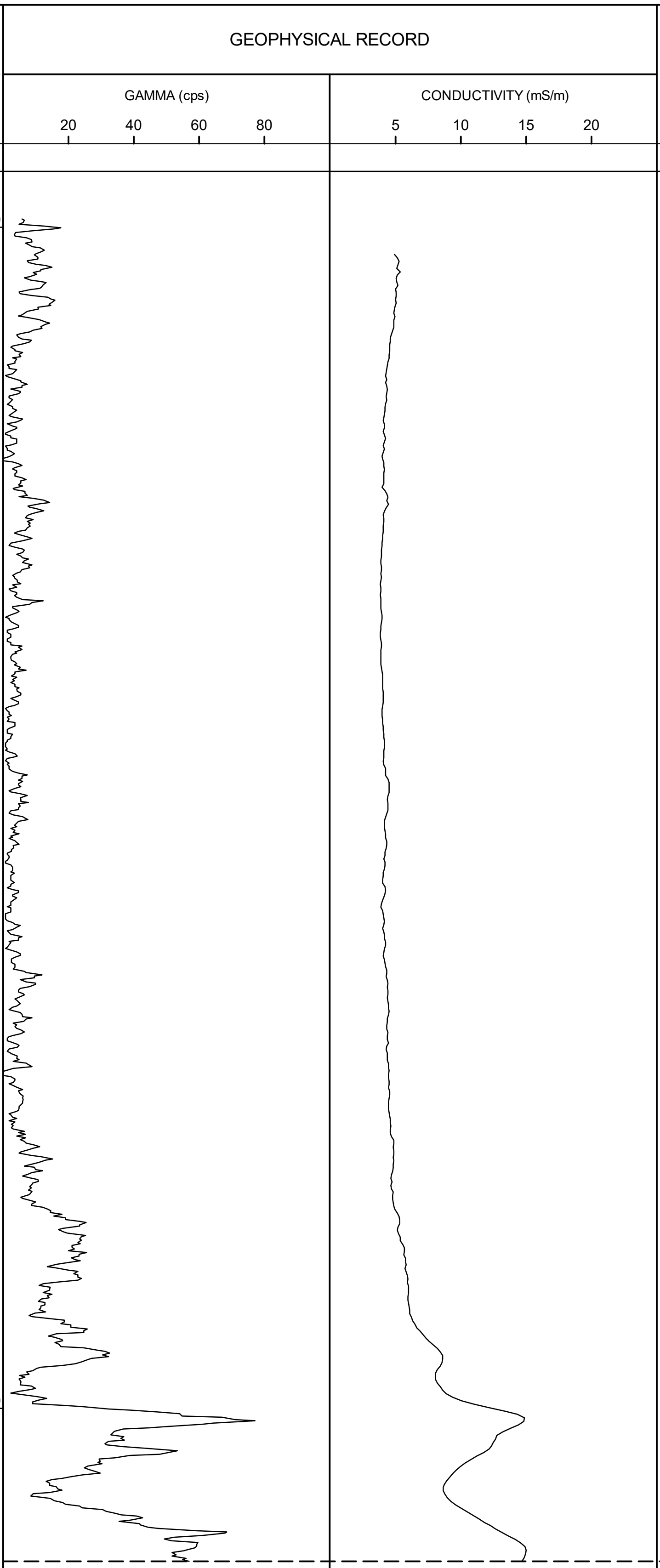
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		138.19		
0		**Overburden, 0.0 m to 0.8 m**	▨	0.00		
		LOWER BOBCAYGEON FORMATION, 0.8 m to 29.0 m **UNIT 3, 0.8 m to 17.8 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		137.39 0.80		
2						
4						
6						
8						
10						
12						
14						
16						
18				120.39 17.80		
20						



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-22

SHEET 2 OF 2

LOCATION: N 5009991.8 ;E 423361.9

INCLINATION: -90° AZIMUTH: ---

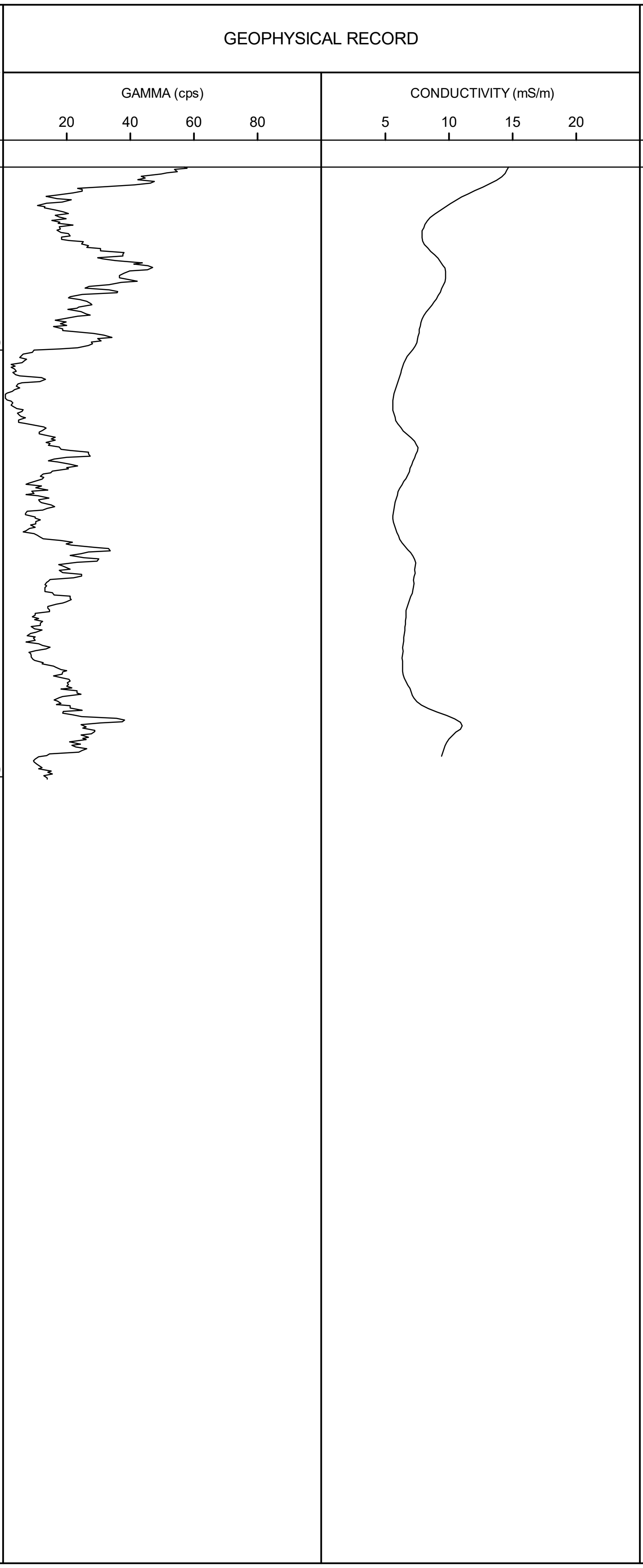
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
20		**UNIT 2, 17.8 m to 22.7 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		115.49 22.70	
22		**UNIT 1, 22.7 m to 29.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		109.19 29.00	
24					
26					
28					
		End of Borehole, 29.0 m **Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.			
30					
32					
34					
36					
38					
40					



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-23

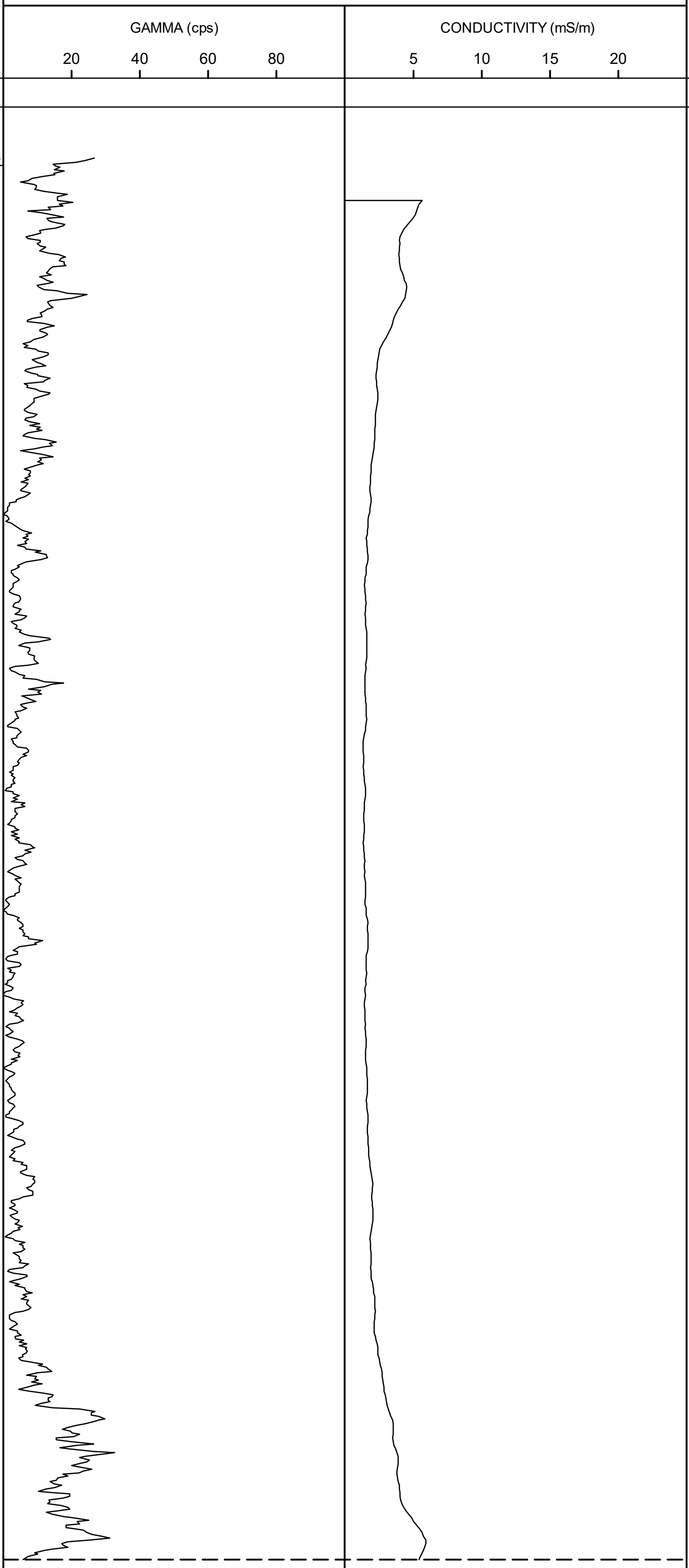
SHEET 1 OF 2

LOCATION: N 5010066.4 ;E 423437.0
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020
DRILL RIG: Air Track
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		136.96		
0		**Overburden, 0.0 m to 0.8 m**	▨	0.00		
		LOWER BOBCAYGEON FORMATION, 0.8 m to 27.8 m **UNIT 3, 0.8 m to 20.6 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		136.16 0.80		



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-23

SHEET 2 OF 2

LOCATION: N 5010066.4 ;E 423437.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020

DRILL RIG: Air Track

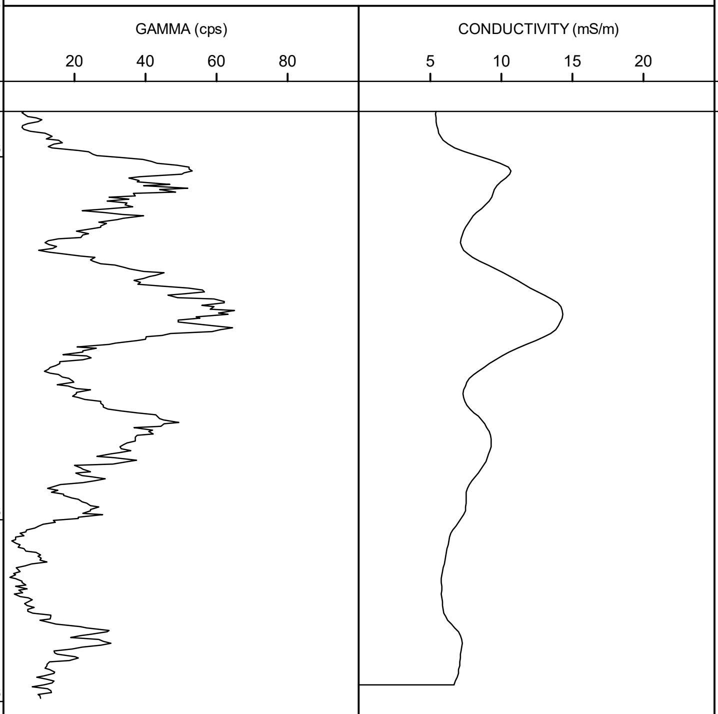
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
20		*--- CONTINUED FROM PREVIOUS PAGE ---*				
		UNIT 2, 20.6 m to 25.4 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		116.36 20.60		
		UNIT 1, 25.4 m to 27.8 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		111.56 25.40		
		End of Borehole, 27.8 m		109.16 27.80		

Note(s):

1. Survey carried out by R.W. Tomlinson in 2020.



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

GEOPHYSICAL LOG OF: SQAT20-24

PROJECT: 19130670

SHEET 1 OF 2

LOCATION: N 5009651.6 ;E 423187.1

DRILLING DATE: March 2020

DATUM: Geodetic

DRILL RIG: Air Track

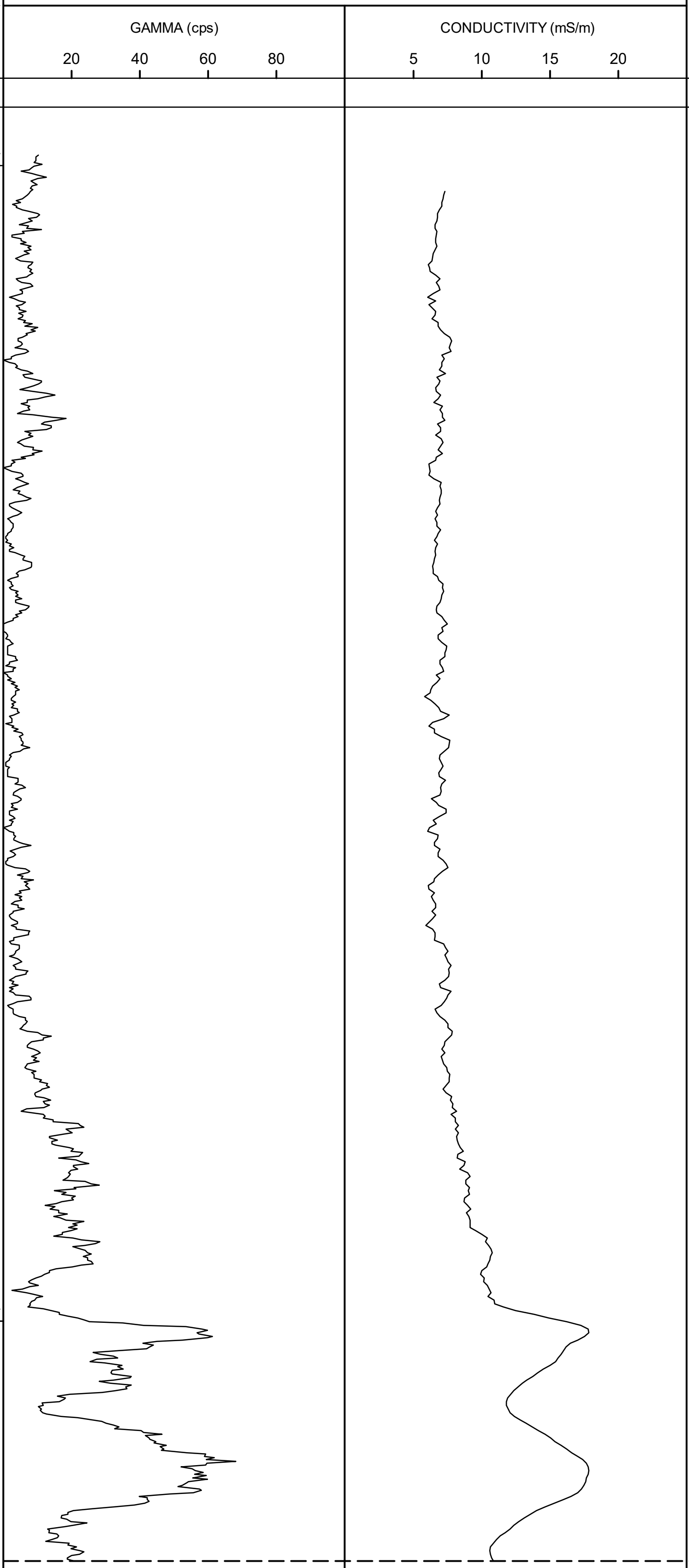
INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		142.47	
0		**Overburden, 0.0 m to 0.8 m**	▨	0.00	
		LOWER BOBCAYGEON FORMATION, 0.8 m to 28.3 m **UNIT 3, 0.8 m to 16.7 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	🟦	141.67 0.80	
		UNIT 2, 16.7 m to 25.4 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▩	125.77 16.70	
20					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

GEOPHYSICAL RECORD



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-24

SHEET 2 OF 2

LOCATION: N 5009651.6 ;E 423187.1

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020

DRILL RIG: Air Track

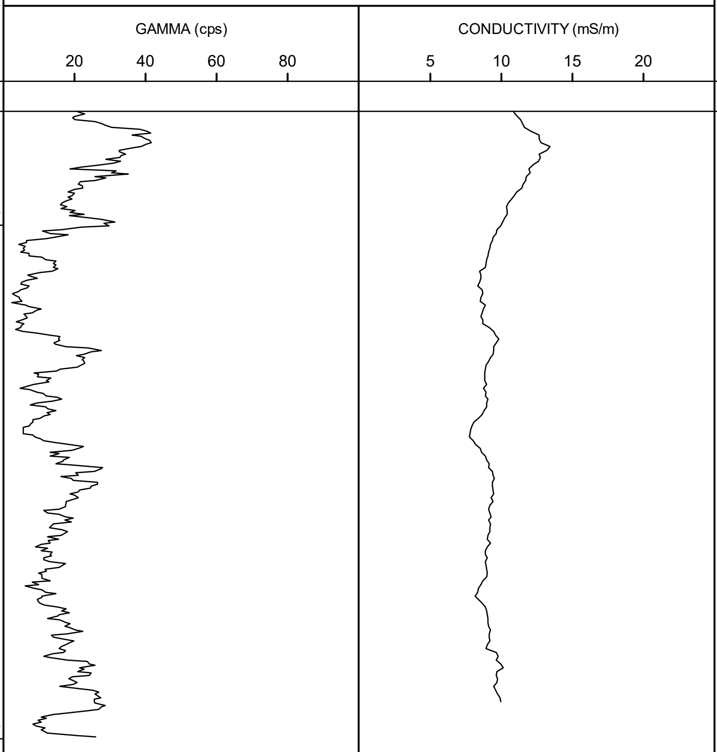
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	--- CONTINUED FROM PREVIOUS PAGE ---	
20		120.97 21.50
22–28	**UNIT 1, 25.4 m to 28.3 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	114.17 28.30
	End of Borehole, 28.3 m **Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.	

DEPTH SCALE METRES: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-25

SHEET 1 OF 2

LOCATION: N 5009657.8 ;E 423458.0

INCLINATION: -90° AZIMUTH: ---

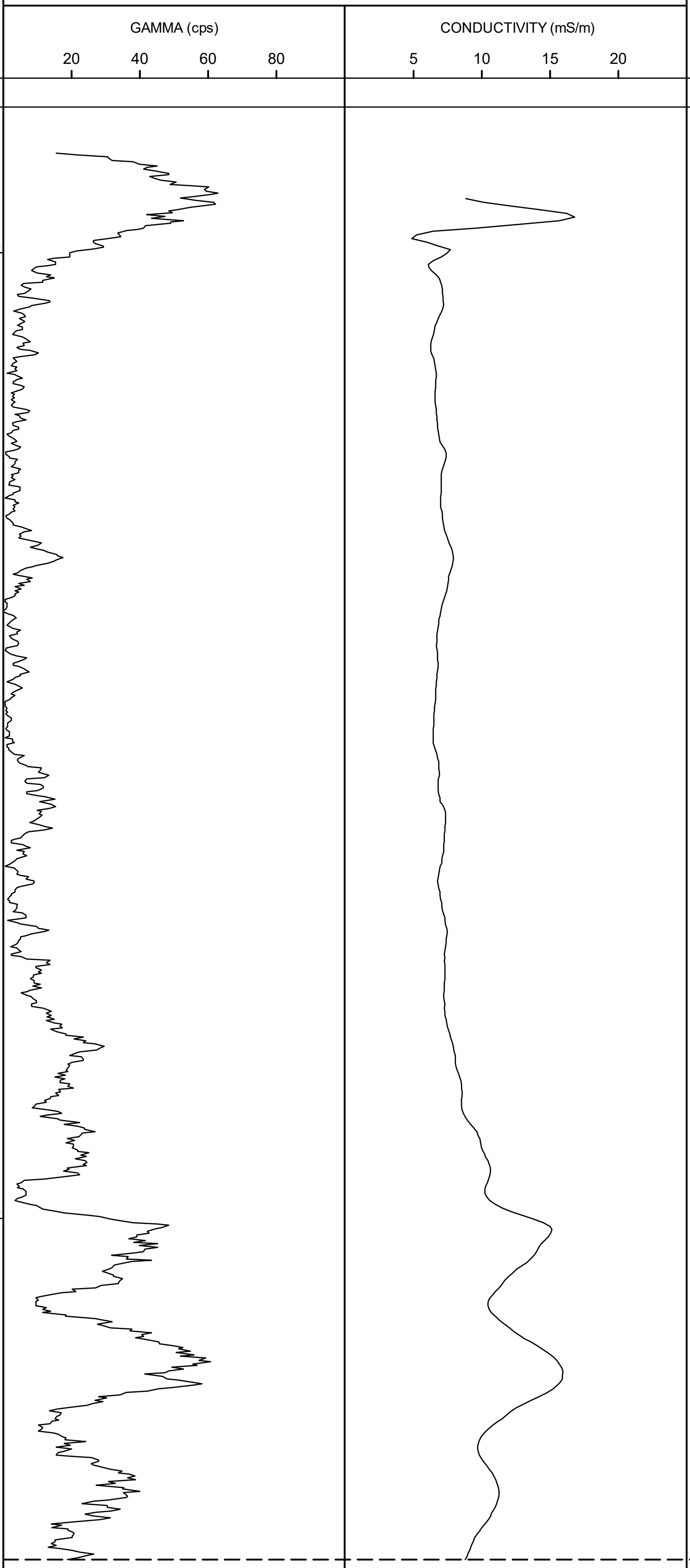
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		138.34		
0		**Overburden, 0.0 m to 2.0 m**		0.00		
2		**LOWER BOBCAYGEON FORMATION, 2.0 m to 28.4 m** **UNIT 3, 2.0 m to 15.3 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		136.34 2.00		Open Hole
15.3		**UNIT 2, 15.3 m to 20.1 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		123.04 15.30		



Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-25

SHEET 2 OF 2

LOCATION: N 5009657.8 ;E 423458.0

DRILLING DATE: March 2020

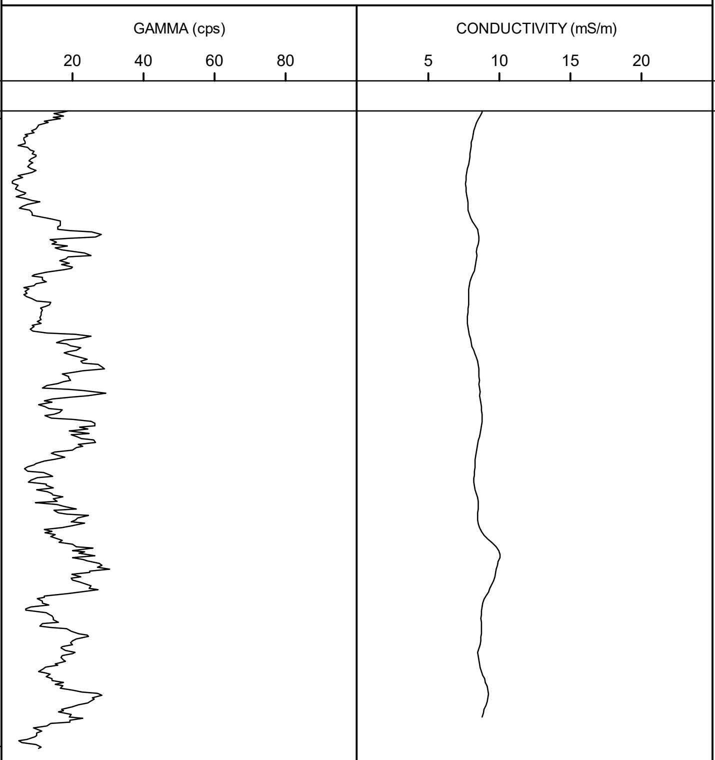
DATUM: Geodetic

DRILL RIG: Air Track

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		**UNIT 1, 20.1 m to 28.4 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		118.24 20.10		Open Hole
28		**End of Borehole, 28.4 m**		109.94 28.40		



Note(s):

1. Survey carried out by R.W. Tomlinson in 2020.

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-26

SHEET 1 OF 2

LOCATION: N 5009493.8 ;E 423689.7

INCLINATION: -90° AZIMUTH: ---

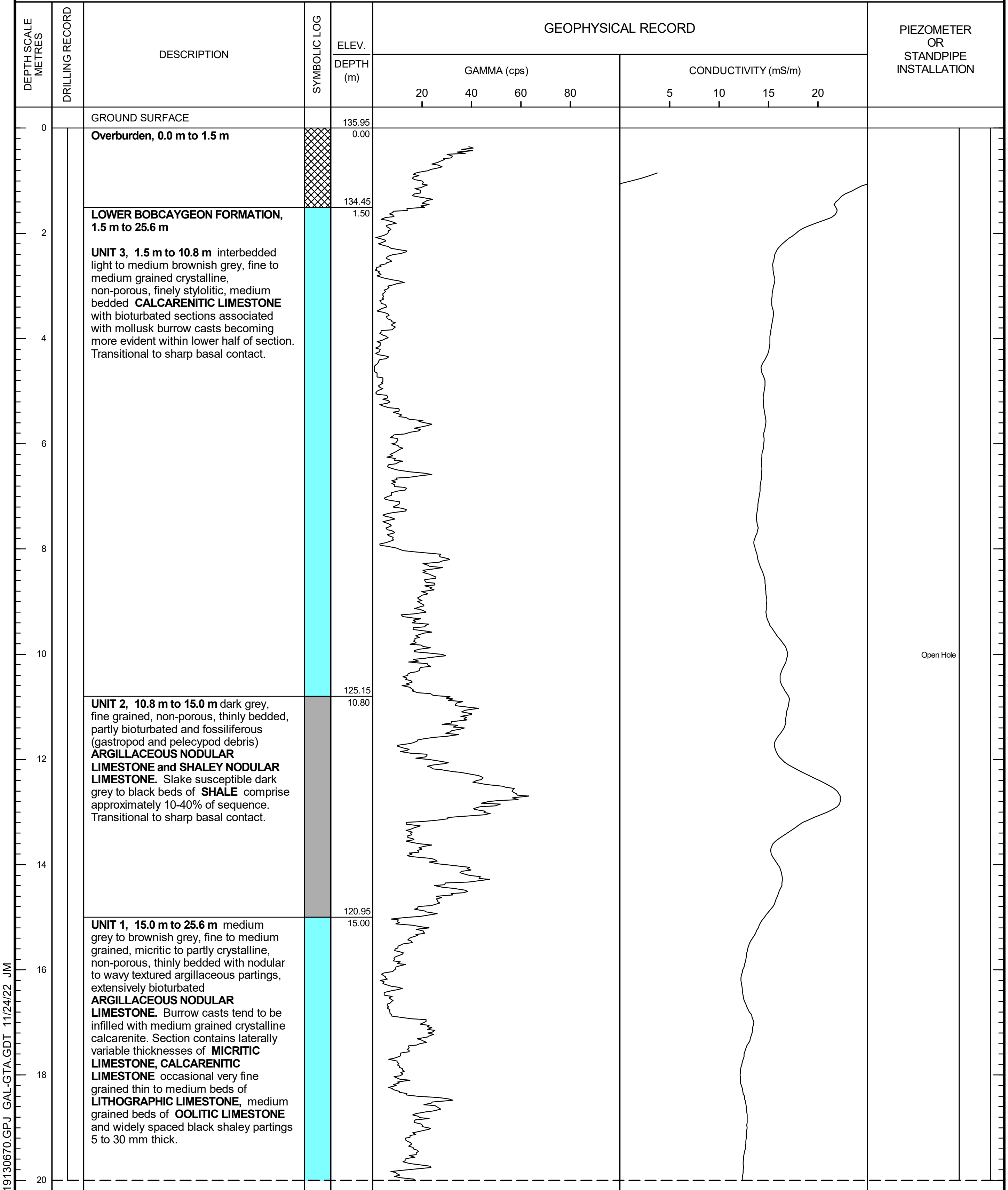
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	135.95
0	**Overburden, 0.0 m to 1.5 m**	0.00
	LOWER BOBCAYGEON FORMATION, 1.5 m to 25.6 m **UNIT 3, 1.5 m to 10.8 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	134.45 1.50
	UNIT 2, 10.8 m to 15.0 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	125.15 10.80
	UNIT 1, 15.0 m to 25.6 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	120.95 15.00
20		



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

LOCATION: N 5009493.8 ;E 423689.7

INCLINATION: -90° AZIMUTH: ---

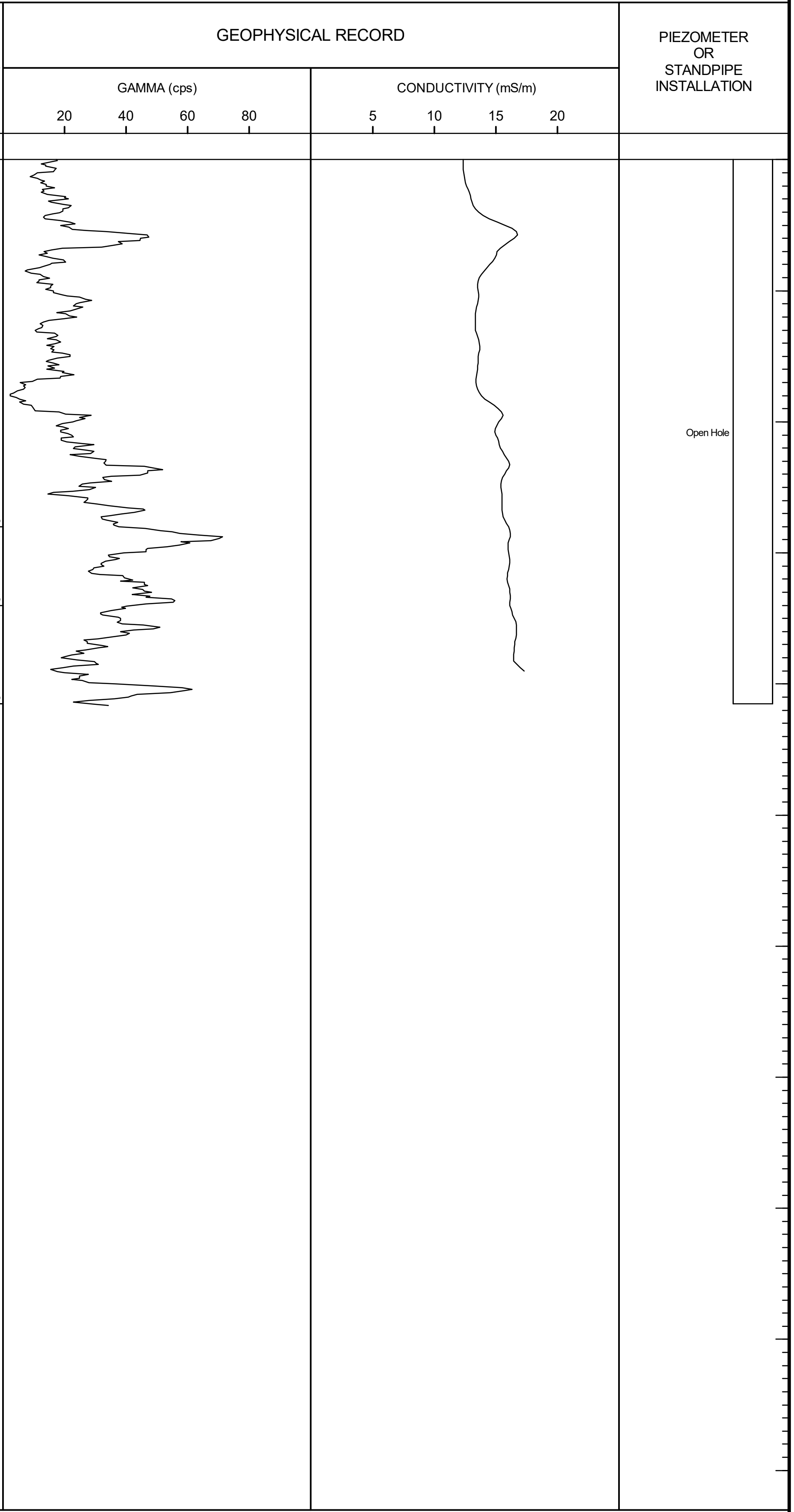
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		**UNIT 1, 15.0 m to 25.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	110.35 25.60
26		**UPPER GULL RIVER FORMATION, 25.6 m to 28.3 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **first dolostone marker bed",** at 25.6 m to 26.8 m.	🟩	109.15 26.80
28			🟦	107.65 28.30
30		**End of Borehole, 28.3 m** **Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.		
32				
34				
36				
38				
40				



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-27

SHEET 1 OF 2

LOCATION: N 5009745.3 ;E 423687.1

DRILLING DATE: March 2020

DATUM: Geodetic

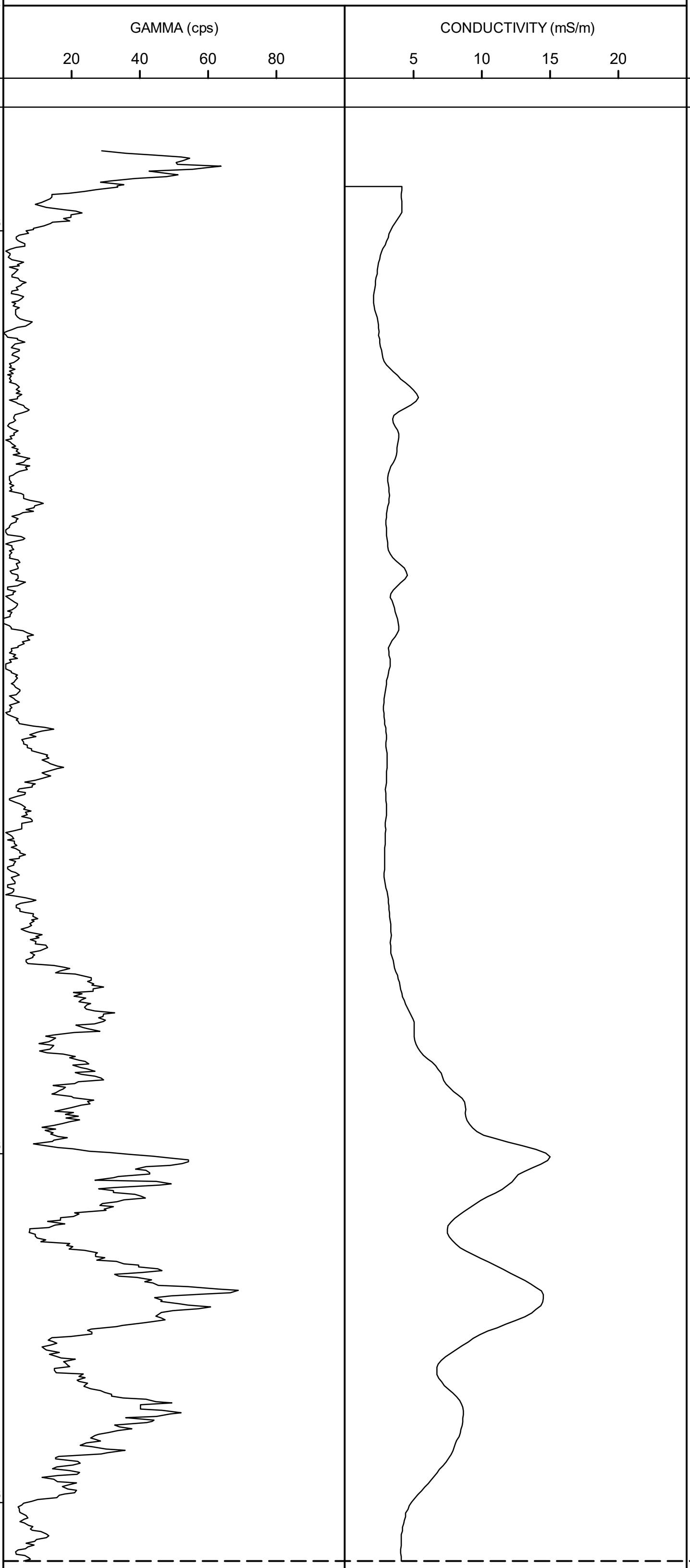
DRILL RIG: Air Track

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		136.46	
0		**Overburden, 0.0 m to 1.7 m**	▨	0.00	
2		**LOWER BOBCAYGEON FORMATION, 1.7 m to 24.8 m** **UNIT 3, 1.7 m to 14.4 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		134.76 1.70	Open Hole
14		**UNIT 2, 14.4 m to 19.2 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		122.06 14.40	
				117.26 19.20	
20		*CONTINUED NEXT PAGE*			

GEOPHYSICAL RECORD



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-27

SHEET 2 OF 2

LOCATION: N 5009745.3 ;E 423687.1

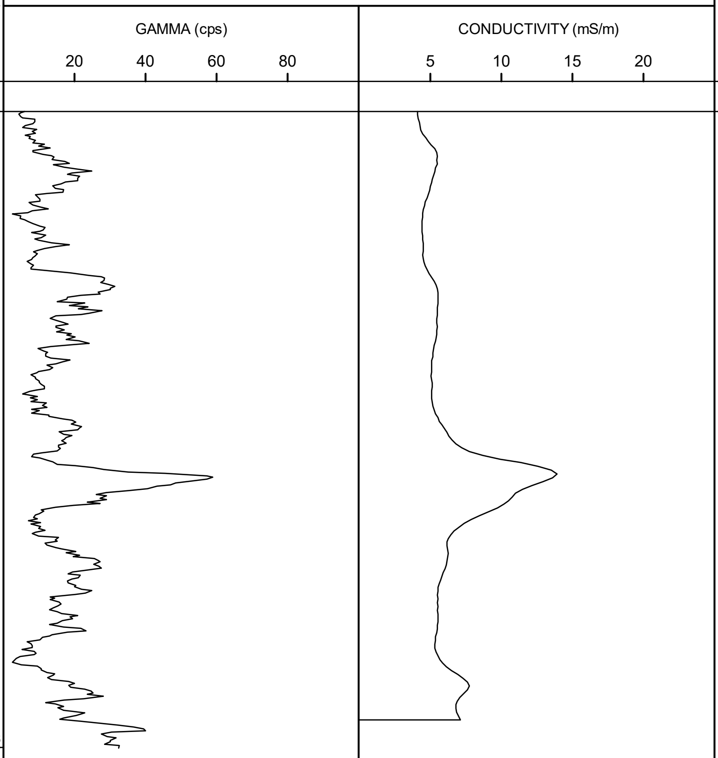
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020
DRILL RIG: Air Track
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		**UNIT 1, 19.2 m to 28.4 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	108.06 28.40		Open Hole
		End of Borehole, 28.4 m **Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.				

Depth scale marks: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-28

SHEET 1 OF 2

LOCATION: N 5009128.6 ;E 423644.0

DRILLING DATE: March 2020

DATUM: Geodetic

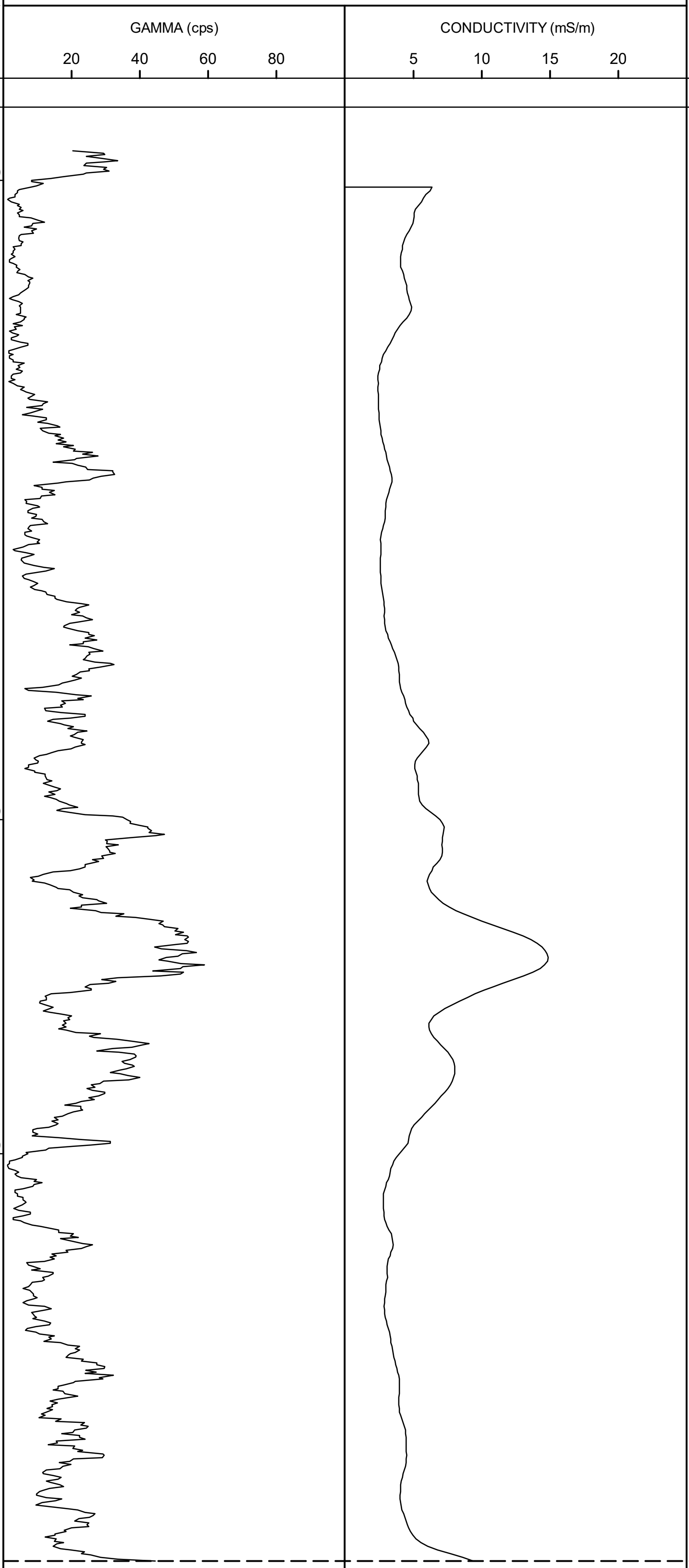
DRILL RIG: Air Track

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		139.19	
0		**Overburden, 0.0 m to 1.0 m**	▨	0.00	
2 4 6 8		**LOWER BOBCAYGEON FORMATION, 1.7 m to 24.8 m** **UNIT 3, 1.0 m to 9.8 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		138.19 1.00	
10 12 14		**UNIT 2, 9.8 m to 14.4 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		129.39 9.80	
16 18 20		**UNIT 1, 14.4 m to 24.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		124.79 14.40	

GEOPHYSICAL RECORD



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-28

SHEET 2 OF 2

LOCATION: N 5009128.6 ;E 423644.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020

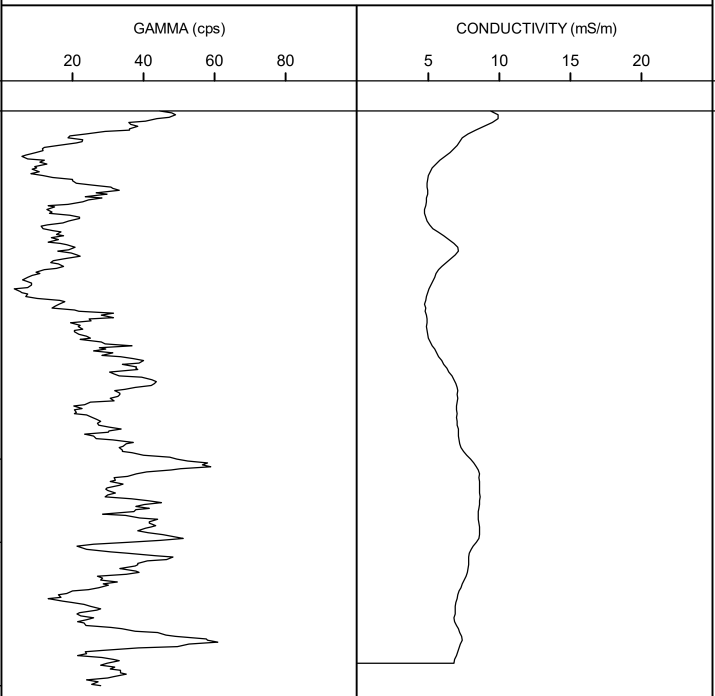
DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20 22 24		**UNIT 1, 14.4 m to 24.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	114.59 24.60
26 28		**UPPER GULL RIVER FORMATION, 24.6 m to 27.6 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **first dolostone marker bed",** at 24.6 m to 25.7 m.	🟩 🟦	113.49 25.70 111.59 27.60
		End of Borehole, 27.6 m		
30		**Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.		
32 34 36 38 40				

GEOPHYSICAL RECORD



PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-29

SHEET 1 OF 2

LOCATION: N 5008814.6 ;E 423653.5

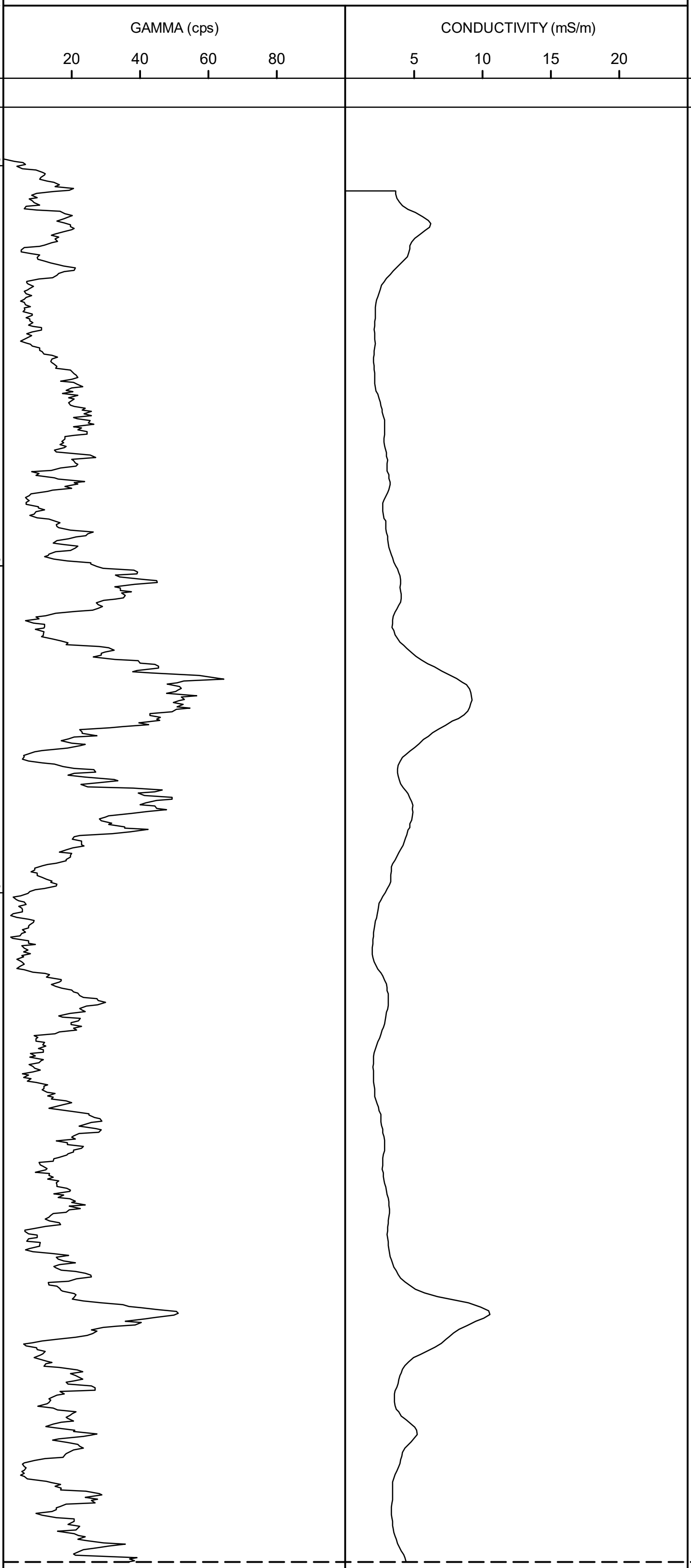
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020
DRILL RIG: Air Track
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		139.98	
0		**Overburden, 0.0 m to 0.8 m**	▨	0.00	
		LOWER BOBCAYGEON FORMATION, 0.8 m to 21.0 m			
2 4 6		**UNIT 3, 0.8 m to 6.3 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		139.18 0.80	
8 10		**UNIT 2, 6.3 m to 10.8 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		133.68 6.30	Open Hole
12 14 16 18 20		**UNIT 1, 10.8 m to 21.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		129.18 10.80	

GEOPHYSICAL RECORD



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-29

SHEET 2 OF 2

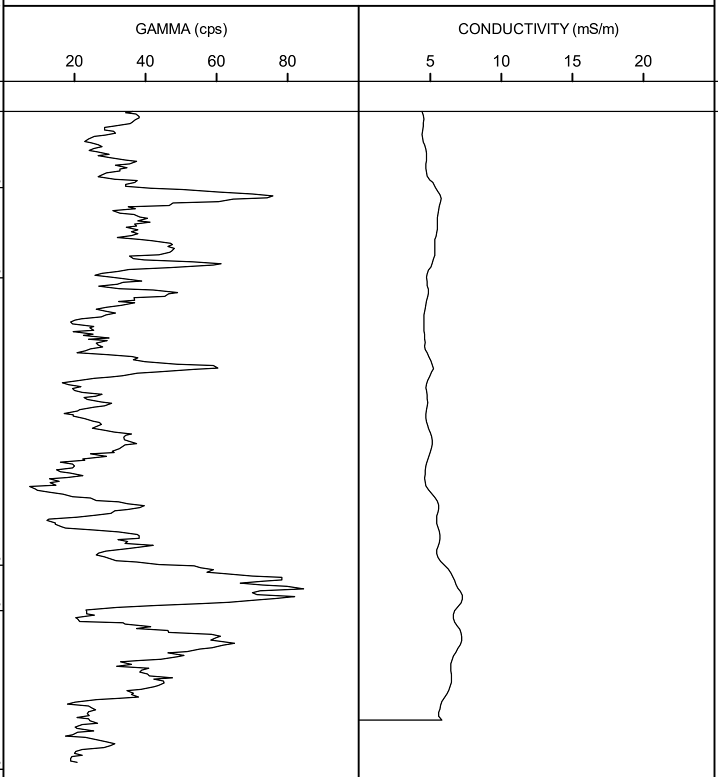
LOCATION: N 5008814.6 ;E 423653.5
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: March 2020
DRILL RIG: Air Track
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
20 22 24 26 28 30 32 34 36 38 40			🟦	118.98 21.00	
		UPPER GULL RIVER FORMATION, 21.0 m to 28.7 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **first dolostone marker bed",** at 21.0 m to 22.2 m with second dolostone bed at 26.0-26.6m.	🟩	117.78 22.20	
			🟦	113.98 26.00	Open Hole
			🟩	113.38 26.60	
			🟦	111.28 28.70	
		End of Borehole, 28.7 m **Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.			

GEOPHYSICAL RECORD



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-30

SHEET 1 OF 2

LOCATION: N 5008834.0 ;E 423331.8

INCLINATION: -90° AZIMUTH: ---

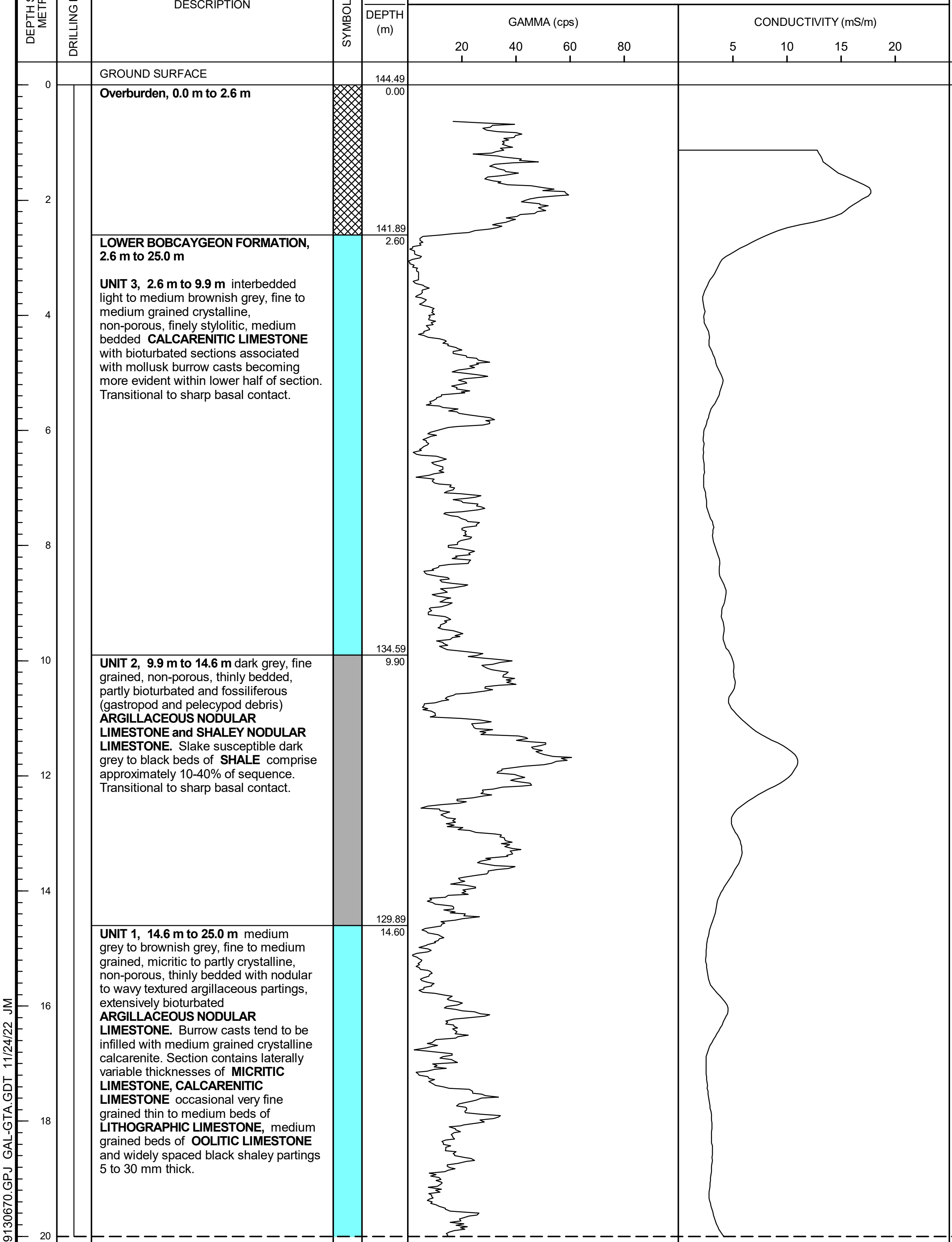
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	144.49 0.00
0	**Overburden, 0.0 m to 2.6 m**	
2	**LOWER BOBCAYGEON FORMATION, 2.6 m to 25.0 m** **UNIT 3, 2.6 m to 9.9 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.	141.89 2.60
10	**UNIT 2, 9.9 m to 14.6 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	134.59 9.90
14	**UNIT 1, 14.6 m to 25.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	129.89 14.60



CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-30

SHEET 2 OF 2

LOCATION: N 5008834.0 ;E 423331.8

DRILLING DATE: March 2020

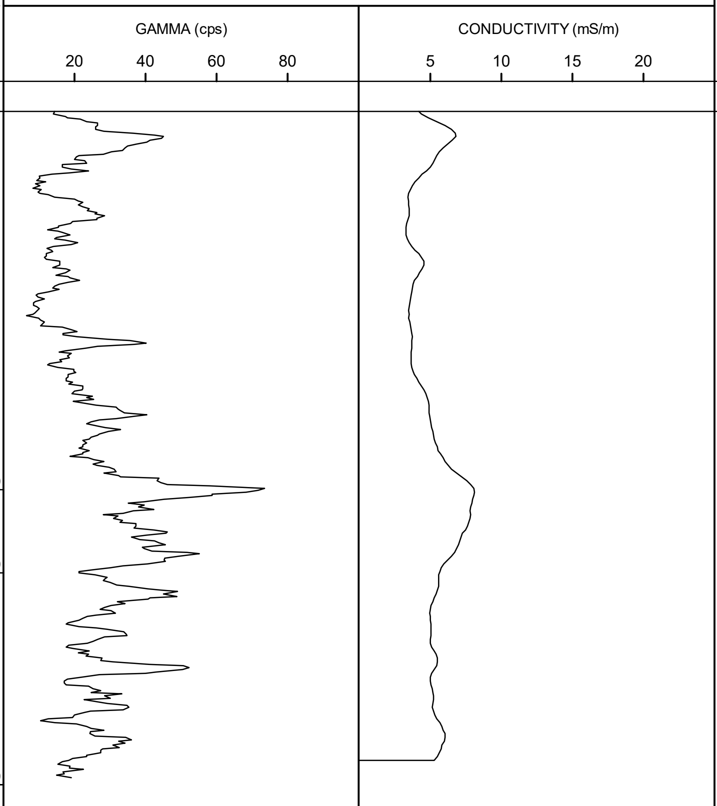
DATUM: Geodetic

DRILL RIG: Air Track

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		**UNIT 1, 14.6 m to 25.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		119.49 25.00		
		UPPER GULL RIVER FORMATION, 25.0 m to 28.9 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **first dolostone marker bed",** at 25.0 m to 26.1 m.		118.39 26.10 115.59 28.90		
		End of Borehole, 28.9 m				
		Note(s): 1. Survey carried out by R.W. Tomlinson in 2020.				



Depth scale: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-31

SHEET 1 OF 2

LOCATION: N 5008676.9 ;E 423526.6

INCLINATION: -90° AZIMUTH: ---

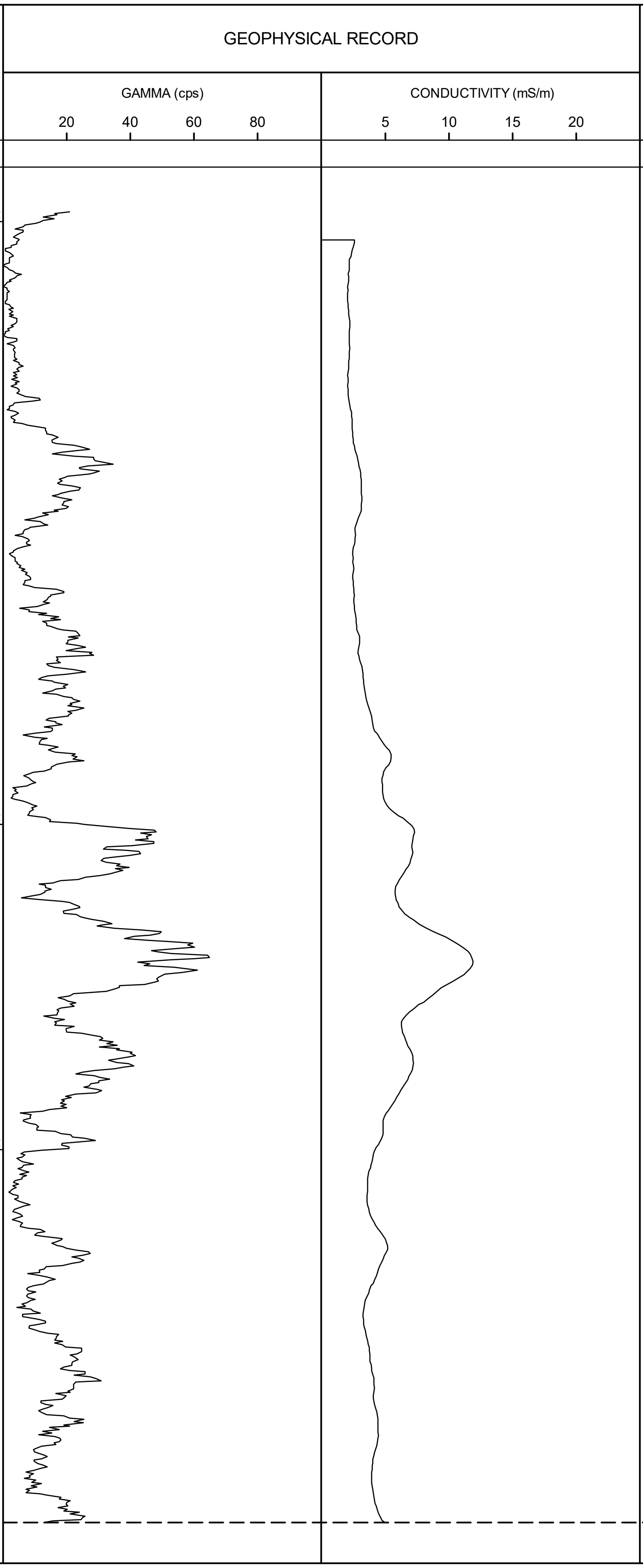
DRILLING DATE: March 2020

DRILL RIG: Air Track

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		144.72		
0		**Overburden, 0.0 m to 0.8 m**	▩	0.00		
		LOWER BOBCAYGEON FORMATION, 0.8 m to 25.0 m **UNIT 3, 0.8 m to 9.7 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		143.92 0.80		
2						
4						
6						
8						
		UNIT 2, 9.7 m to 14.5 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		135.02 9.70		
10						
12						
14						
		UNIT 1, 14.5 m to 25.0 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		130.22 14.50		
16						
18						
20						



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: SQAT20-31

SHEET 2 OF 2

LOCATION: N 5008676.9 ;E 423526.6

DRILLING DATE: March 2020

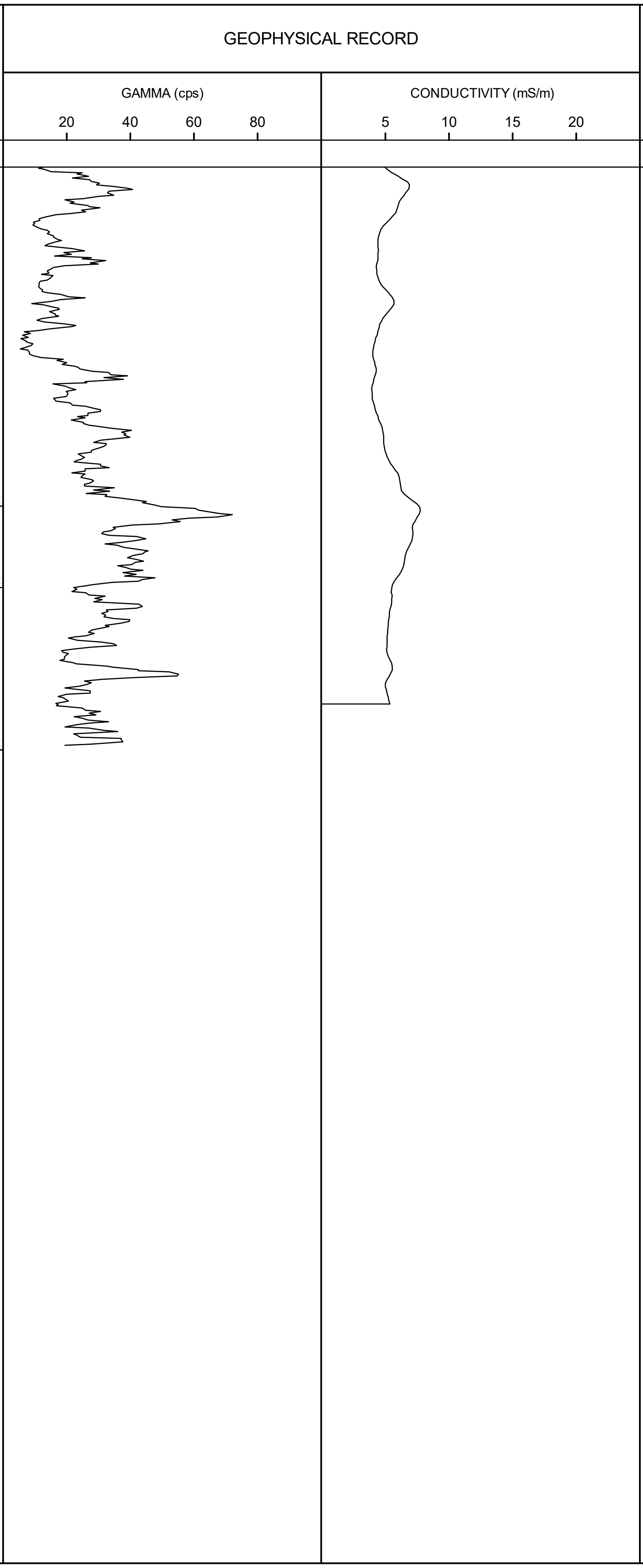
DATUM: Geodetic

DRILL RIG: Air Track

INCLINATION: -90° AZIMUTH: ---

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20		**UNIT 1, 14.5 m to 25.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		
22				
24				119.72 25.00
26		**UPPER GULL RIVER FORMATION, 25.0 m to 28.6 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **first dolostone marker bed",** at 25.0 m to 26.2 m.		118.52 26.20
28				116.12 28.60
		End of Borehole, 28.6 m		
30		**Note(s):** 1. Survey carried out by R.W. Tomlinson in 2020.		
32				
34				
36				
38				
40				



PIEZOMETER OR STANDPIPE INSTALLATION

Moore Quarry

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH05-13

SHEET 1 OF 2

LOCATION: N 5009969.7 ;E 422303.0

INCLINATION: -90° AZIMUTH: ---

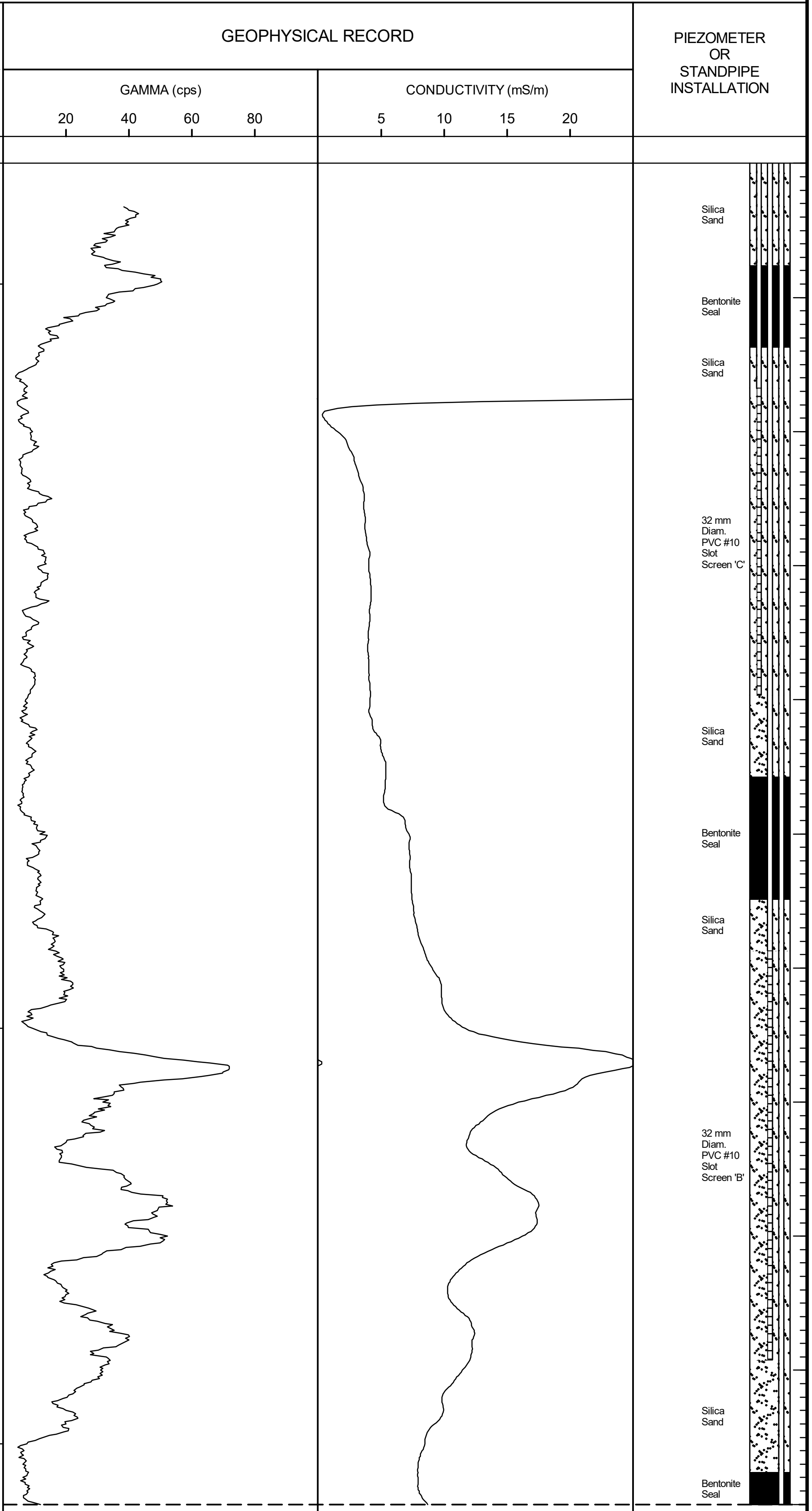
DRILLING DATE: 2005

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		142.91
0		**Overburden, 0.0 m to 1.8 m**		0.00
2		**LOWER BOBCAYGEON FORMATION, 1.8 m to 29.2 m** **UNIT 3, 1.8 m to 13.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		141.11 1.80
13		**UNIT 2, 13.0 m to 19.1 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		130.01 12.90
19				123.81 19.10
20		*CONTINUED NEXT PAGE*		



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH05-13

SHEET 2 OF 2

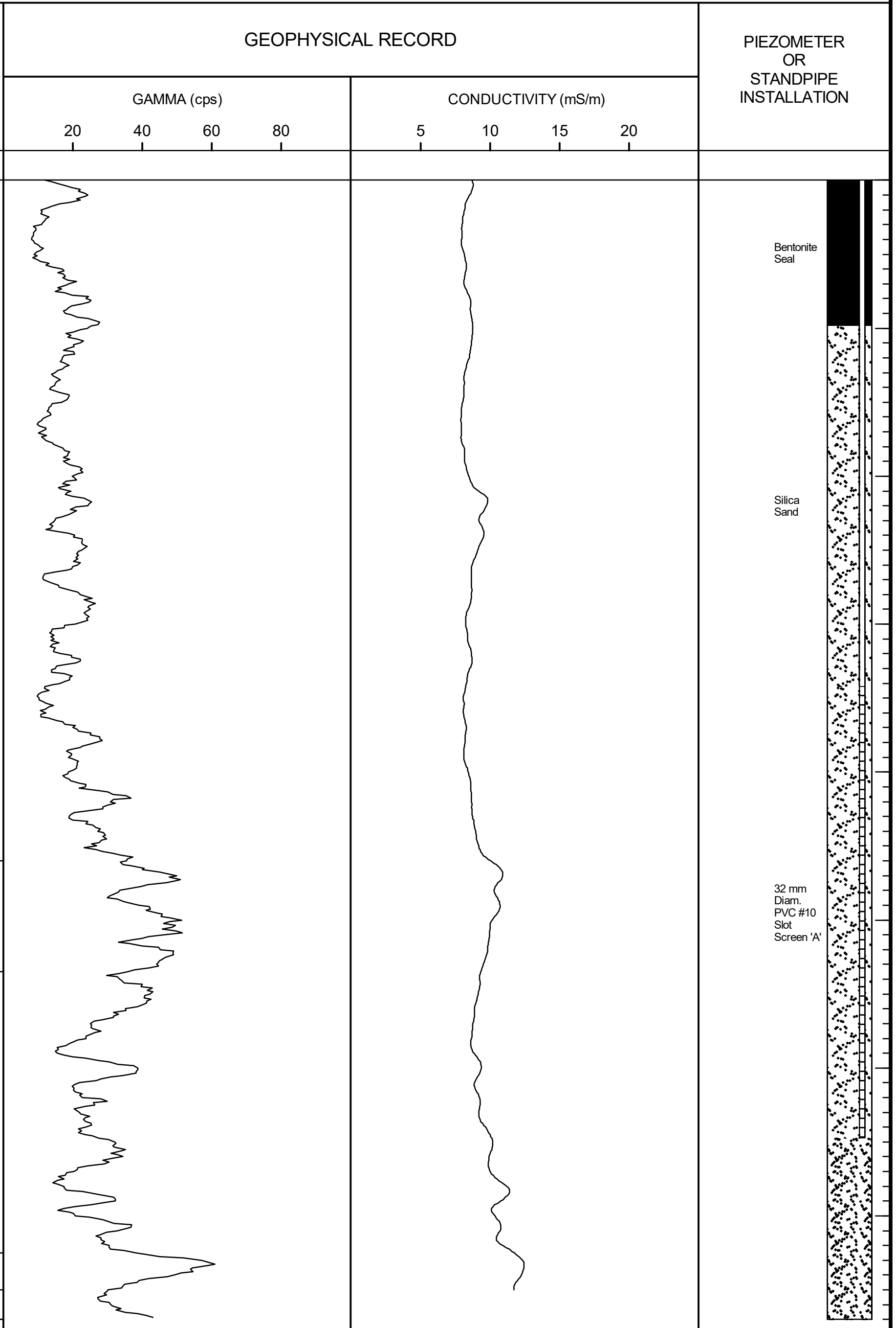
LOCATION: N 5009969.7 ;E 422303.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 2005
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20 22 24 26 28		**UNIT 1, 19.1 m to 29.2 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		113.71
30 32 34		**UPPER GULL RIVER FORMATION, 29.2 m to 35.4 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 29.2 m to 30.7 m with a second dolostone bed at 34.5-35.0m.		29.20 112.21 30.70 108.41 34.50 107.91 35.00 107.51
36 38 40		**End of Borehole, 35.4 m**		35.40



DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH05-14

SHEET 1 OF 2

LOCATION: N 5009962.1 ;E 421964.4

INCLINATION: -90° AZIMUTH: ---

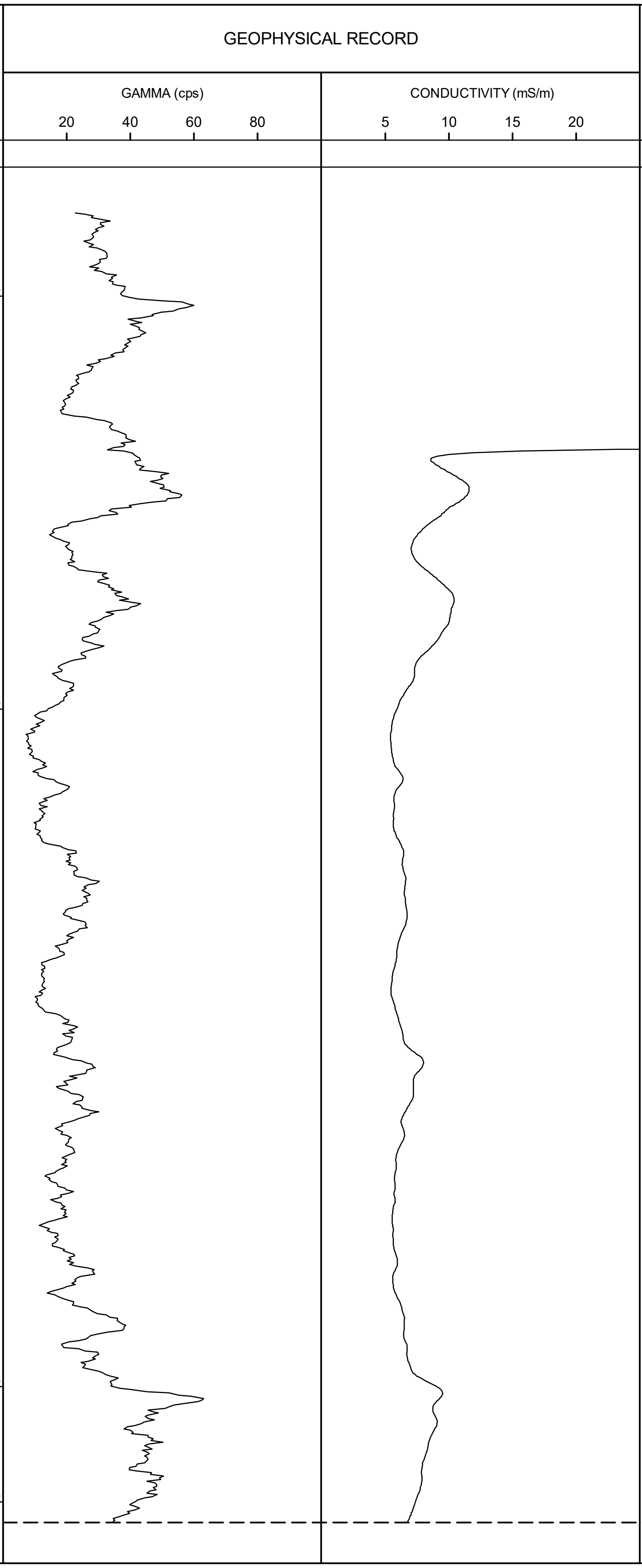
DRILLING DATE: 2005

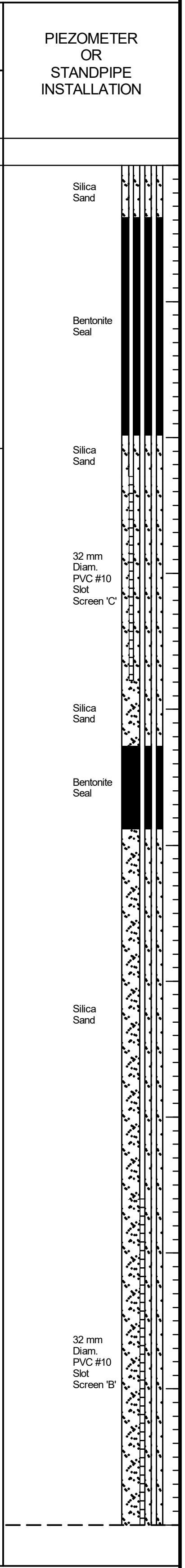
DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		137.03
0		**Overburden, 0.0 m to 1.9 m**	▨	0.00
2		**LOWER BOBCAYGEON FORMATION, 1.9 m to 18.0 m** **UNIT 2, 1.9 m to 8.0 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	■	135.13 1.90
8		**UNIT 1, 8.0 m to 18.0 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	129.03 8.00
18			🟩	119.03 18.00
			🟦	117.33 19.70
20				





CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH05-14

SHEET 2 OF 2

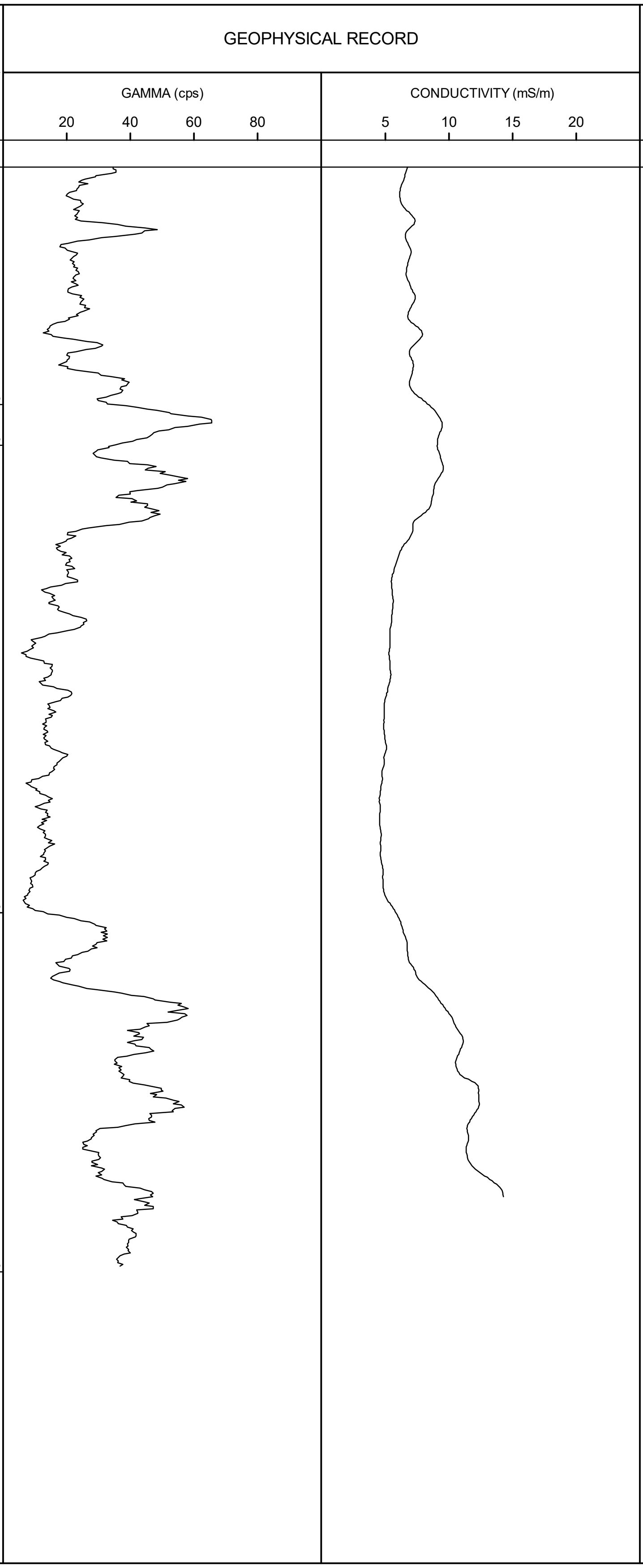
LOCATION: N 5009962.1 ;E 421964.4

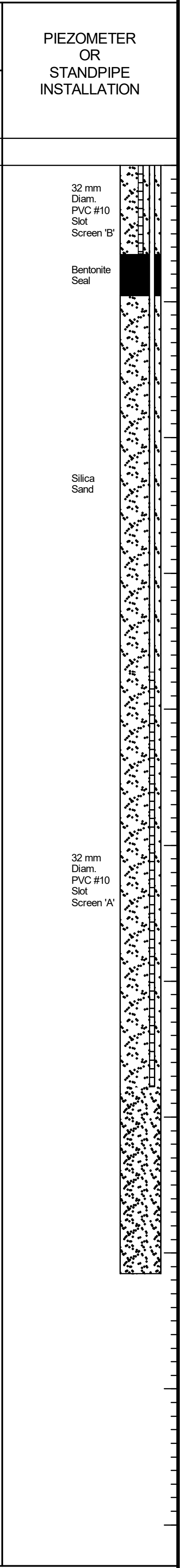
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 2005
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
	--- CONTINUED FROM PREVIOUS PAGE ---		
20	**GULL RIVER FORMATION, 18.0 m to 36.3 m** **UPPER GULL RIVER FORMATION, 18.0 m to 31.0 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 18.0 m to 19.7 m with a second dolostone bed at 23.5-24.1.		113.53 23.50 112.93 24.10 106.03 31.00
22			
24			
26			
28			
30			
	LOWER GULL RIVER FORMATION, 31.0 m to 36.3 m **UNIT 5, 31.0 m to 36.3 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.		100.73 36.30
32			
34			
36			
	End of Borehole, 36.3 m		
38			
40			





DEPTH SCALE
1 : 100

WSP GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH05-15

SHEET 1 OF 2

LOCATION: N 5009426.6 ;E 421663.1

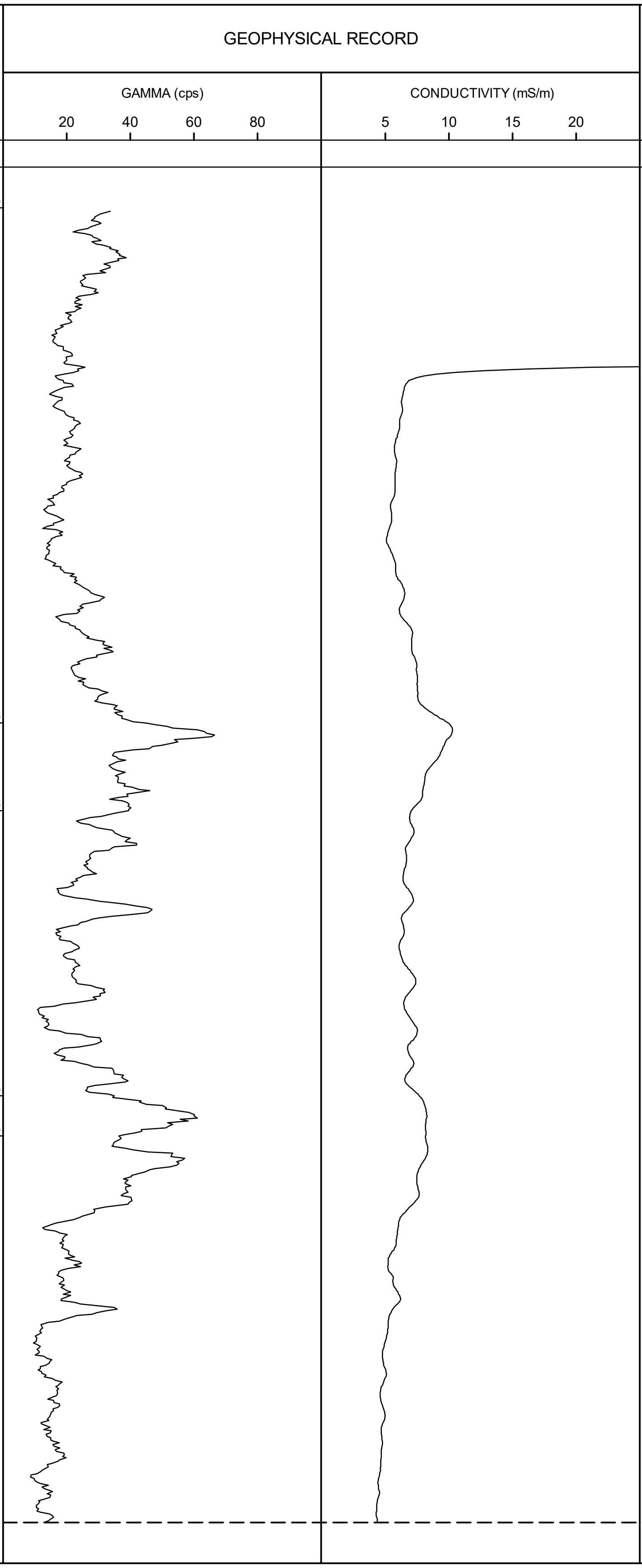
INCLINATION: -90°   AZIMUTH: ---

DRILLING DATE: 2005
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

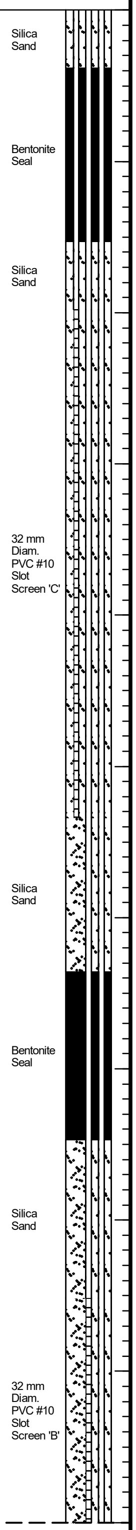
DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	GROUND SURFACE	134.36
0	**Overburden, 0.0 m to 0.6 m**	0.00
	LOWER BOBCAYGEON FORMATION, 0.6 m to 8.2 m **UNIT 1, 0.6 m to 8.2 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	133.76 0.60
8	**GULL RIVER FORMATION, 8.2 m to 35.7 m** **UPPER GULL RIVER FORMATION, 8.2 m to 21.2 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 8.2 m to 9.5 m with a second dolostone bed at 13.7-14.3m.	126.16 8.20
		124.86 9.50
		120.66 13.70
		120.06 14.30

CONTINUED NEXT PAGE



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: BH05-15

SHEET 2 OF 2

LOCATION: N 5009426.6 ;E 421663.1

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: 2005

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

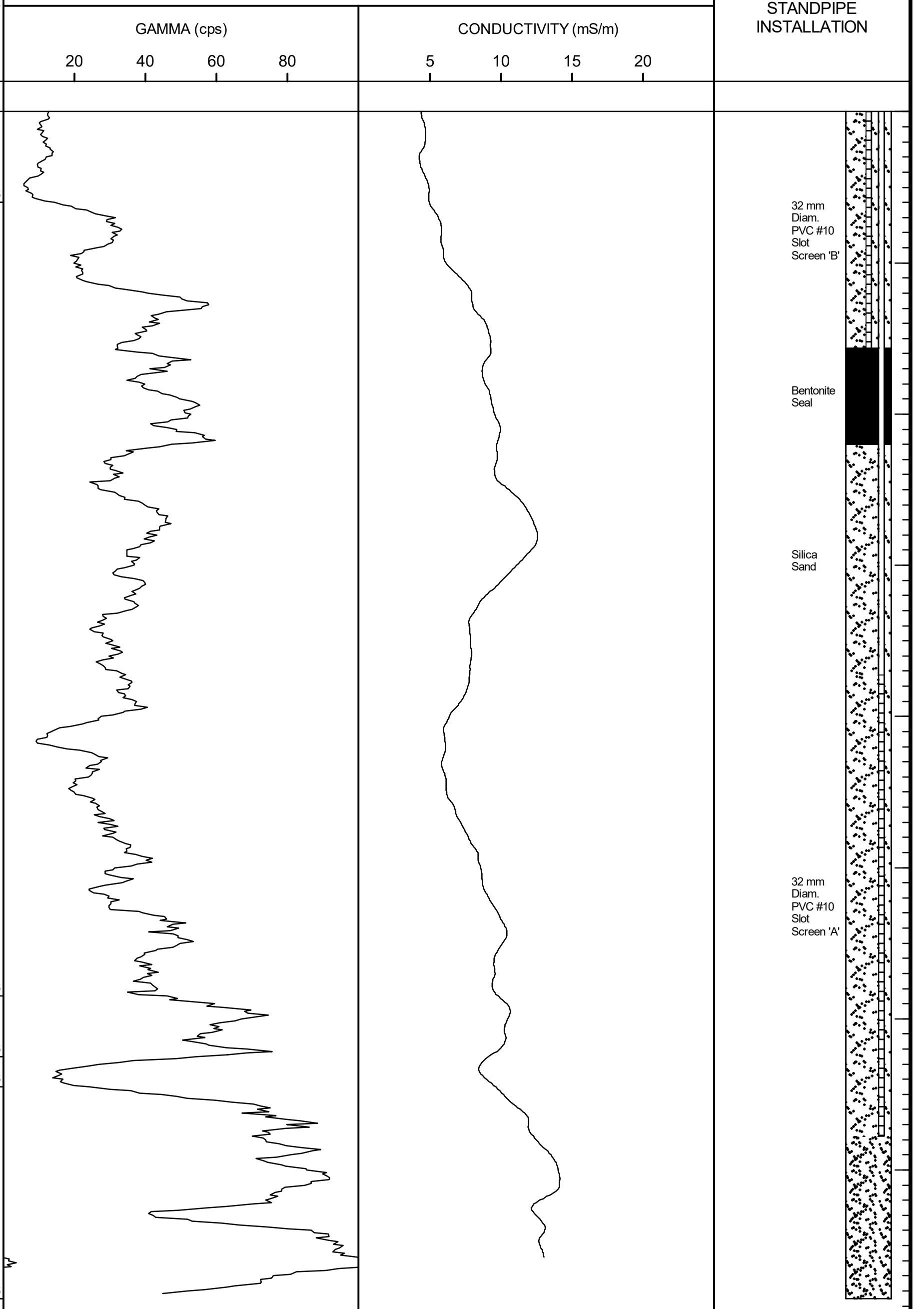
DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		--- CONTINUED FROM PREVIOUS PAGE ---		
20			🟦	113.16 21.20
21.2		**LOWER GULL RIVER FORMATION, 21.2 m to 35.7 m** **UNIT 5, 21.2 m to 31.7 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.	🟩	102.66 31.70
31.7		**UNIT 4, 31.7 m to 35.7 m** interbedded sequence of light to medium grey to greenish grey and dark grey, fine grained, faintly porous, thinly to medium bedded, massive textured, argillaceous to shaley **DOLOSTONE** and medium grey **DOLOMITIC LIMESTONE.** Thin interbeds of laminar to nodular textured limestone and thin oolitic limestone beds occur with medium bed of limestone at 32.5-32.9m. Unit also includes light to medium grey and greenish grey, medium grained, thinly to medium bedded, calcareous to dolomitic cemented, partly bioturbated **QUARTZ SANDSTONE** and minor black **SHALE.**	🟩 🟦 🟩	101.86 32.50 101.46 32.90 98.66 35.70
35.7		**End of Borehole, 35.7 m**		

Depth scale marks: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

GEOPHYSICAL RECORD

PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 05-1120-0981

RECORD OF BOREHOLE: 14-17

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: July 4, 2014

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80 SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Power Auger 200 mm Diam. (Hollow Stem)	(PT) Amorphous PEAT		0.00							
		(SP) SAND, fine, trace non-plastic fines; brown; non-cohesive, wet, loose		0.28							
1		(CL/CI) SILTY CLAY; grey; cohesive, w>PL, firm to stiff		0.99	1	SS	5				
		(CL-ML and SM) CLAYEY SILT and SILTY SAND; grey, thinly to thickly laminated; cohesive, w>PL, firm		1.22	2	SS	2				
2		Borehole continued on RECORD OF DRILLHOLE 14-17									
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: HEC

CHECKED: CAMC

PROJECT: 05-1120-0981

RECORD OF DRILLHOLE: 14-17

SHEET 2 OF 2

LOCATION: See Site Plan

DRILLING DATE: July 4, 2014

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

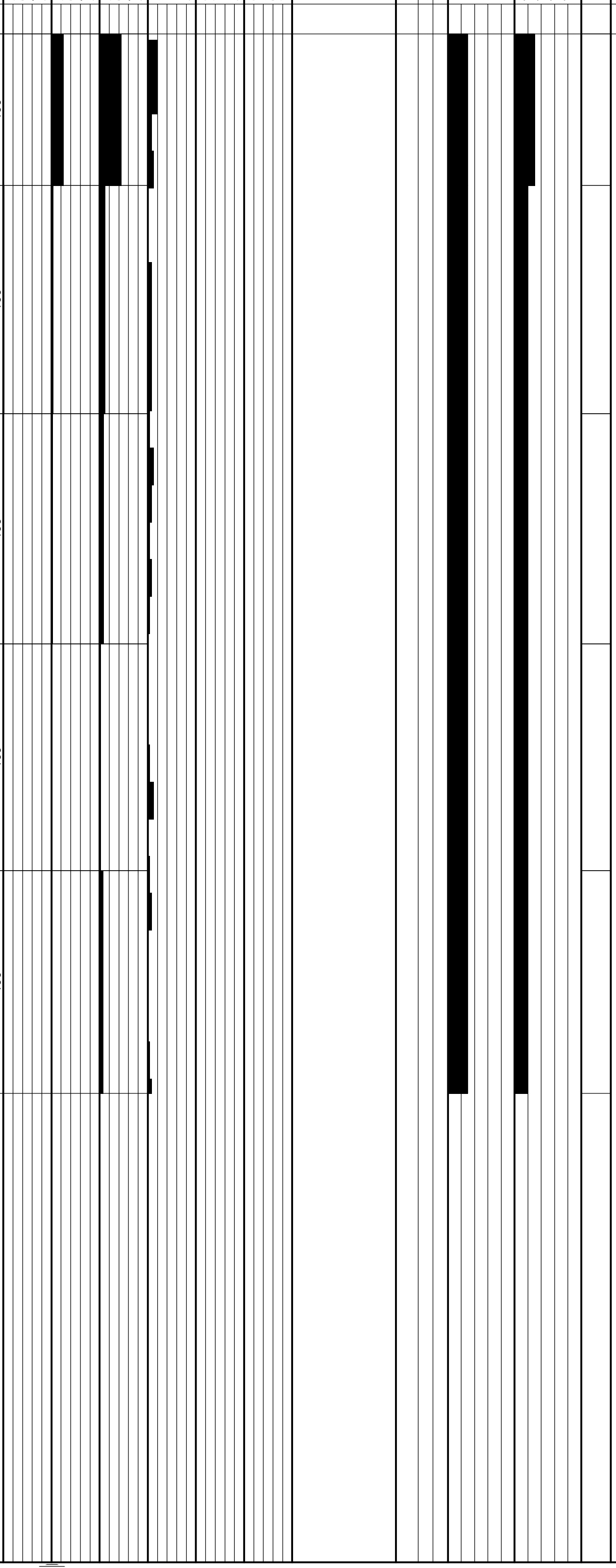
DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling

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

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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	FLUSH COLOUR % RETURN
		BEDROCK SURFACE			
2	Rotary Drill HQ Core	Fresh, thinly to medium bedded, grey, fine grained, non-porous, medium strong to strong LIMESTONE, with black shale partings and laminated interbeds - Broken core from 2.10 m to 2.32 m	1.96	1	100
3				2	100
4					
5				3	100
6					
7				4	100
8				5	100
9		End of Drillhole	9.10		
10					
11					



DEPTH SCALE
1 : 50

LOGGED: HEC
CHECKED: CAMC

PROJECT: 05-1120-0981

RECORD OF BOREHOLE: 14-17A

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: July 4, 2014

DATUM: Geodetic

BORING METHOD: Rotary Drill, HQ Core (0 to approx. 2.06 m)

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

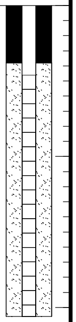
SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp ⊢—○W—⊣ Wl; 20 40 60 80

SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.30m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
GROUND SURFACE						
(PT) Amorphous PEAT	0.00					Bentonite Seal
(SP) SAND, fine, trace non-plastic fines; brown; non-cohesive, wet, loose	0.28					Silica Sand
(CL/CI) SILTY CLAY; grey; cohesive, w>PL, firm to stiff	0.99					32 mm Diam. PVC #10 Slot Screen
(CL-ML and SM) CLAYEY SILT and SILTY SAND; grey, thinly to thickly laminated; cohesive, w>PL, firm	1.22					
Fresh, thinly to medium bedded, grey, fine grained, non-porous, medium strong to strong LIMESTONE, with black shale partings and laminated interbeds	1.96					
End of Borehole	2.06					

Note:
Stratigraphy inferred from RECORD OF BOREHOLE 14-17



DEPTH SCALE METRES: 0 1 2 3 4 5 6 7 8 9 10

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: HEC
CHECKED: CAMC

PROJECT: 05-1120-0981

RECORD OF BOREHOLE: 14-18

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: July 7, 2014

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80 SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	PA (HS)	TOPSOIL - (SM) SILTY SAND; brown; non-cohesive		0.00							
		Moderately to highly weathered LIMESTONE		0.15	1	SS	>50				
		Borehole continued on RECORD OF DRILLHOLE 14-18									
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: DWM

CHECKED: CAMC

PROJECT: 05-1120-0981

RECORD OF DRILLHOLE: 14-18

SHEET 2 OF 2

LOCATION: See Site Plan

DRILLING DATE: July 7, 2014

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 850

DRILLING CONTRACTOR: Marathon Drilling

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

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

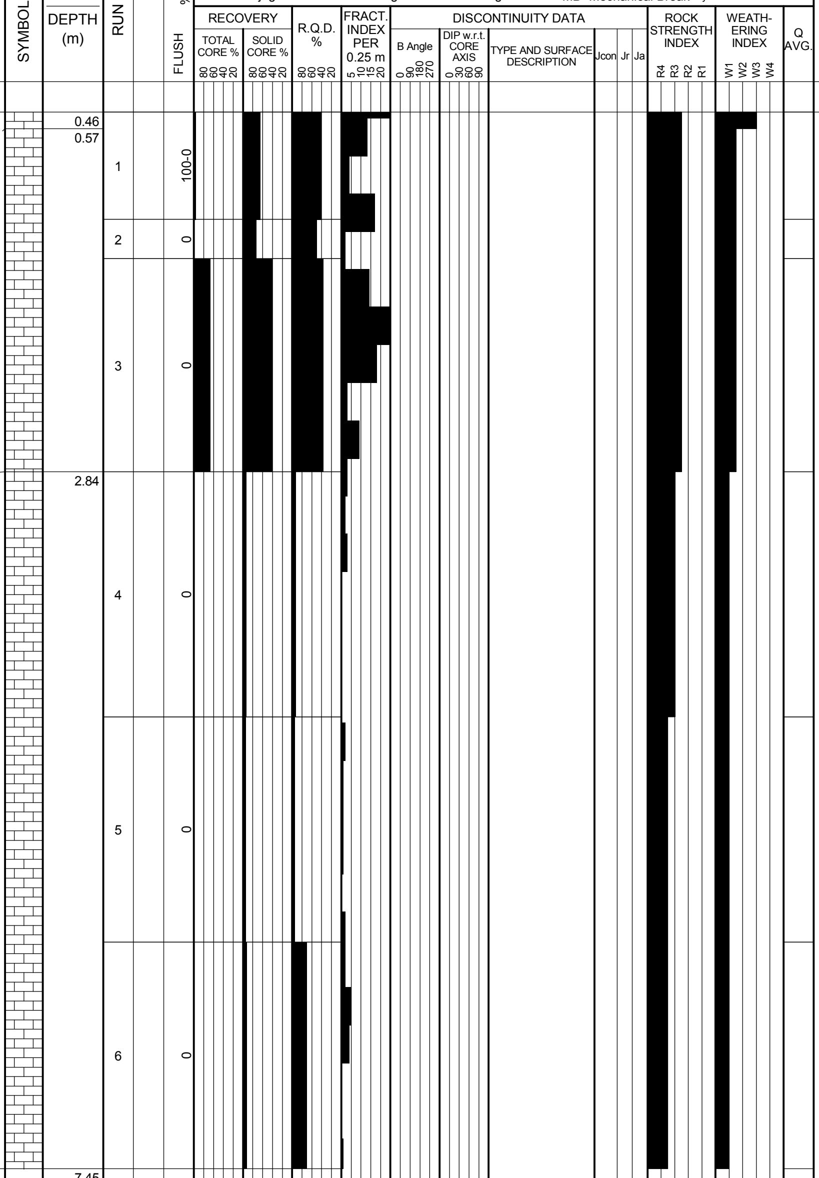
PL - Planar
CU- Curved
UN- Undulating
ST - Stepped
IR - Irregular

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

BR - Broken Rock

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

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	ELEV. DEPTH (m)	RUN No.	FLUSH COLOUR % RETURN
		BEDROCK SURFACE			
	Rotary Drill HQ Core	Moderately to highly weathered LIMESTONE - Broken core from 0.46 m to 0.57 m	0.46		
1		Fresh to slightly weathered, thinly to medium bedded, dark grey, fine to medium grained, non-porous, medium strong to weak, nodular LIMESTONE - Broken core from 1.08 m to 1.20 m - Broken core from 1.27 m to 1.32 m - Broken core from 1.61 m to 2.15 m	0.57	1	100-0
				2	0
2		- Broken core from 2.54 m to 2.60 m - Broken core from 2.70 m to 2.73 m		3	0
3		Fresh, thinly to medium bedded, dark grey, fine to medium grained, non-porous, medium strong, nodular LIMESTONE	2.84		
4				4	0
5				5	0
6				6	0
7					
		End of Drillhole	7.45		
8					
9					
10					



DEPTH SCALE

1 : 50

LOGGED: DWM

CHECKED: CAMC

TABLE 1

RECORD OF AUGERHOLES

Augerhole Number (Elevation)	Depth (metres)	Description
MP14-19	0.00 – 0.30	PEAT
	0.30 – 1.07	SILTY SAND
	1.07	END OF AUGERHOLE – Auger refusal
		51 mm diameter PVC screen installed from 0.15 to 1.07 m depth
		Bentonite seal placed from ground surface to 0.15 m depth
MP14-20	0.00 – 0.23	PEAT
	0.23 – 0.51	SILTY SAND
	0.51	END OF AUGERHOLE – Auger refusal
		51 mm diameter PVC screen installed from 0.10 to 0.51 m depth
		Bentonite seal placed from ground surface to 0.10 m depth
MP14-21	0.00 – 0.15	PEAT
	0.15 – 0.56	SILTY SAND
	0.56	END OF AUGERHOLE – Auger refusal
		51 mm diameter PVC screen installed from 0.10 to 0.56 m depth
		Bentonite seal placed from ground surface to 0.10 m depth
MP14-22	0.00 – 0.51	SILTY SAND
	0.51	END OF AUGERHOLE – Auger refusal
		51 mm diameter PVC screen installed from 0.10 to 0.51 m depth
		Bentonite seal placed from ground surface to 0.15 m depth

PROJECT: 19130670

GEOPHYSICAL LOG OF: BH18-18

SHEET 1 OF 3

LOCATION: N 5010231.5 ;E 422153.9

INCLINATION: -90° AZIMUTH: ---

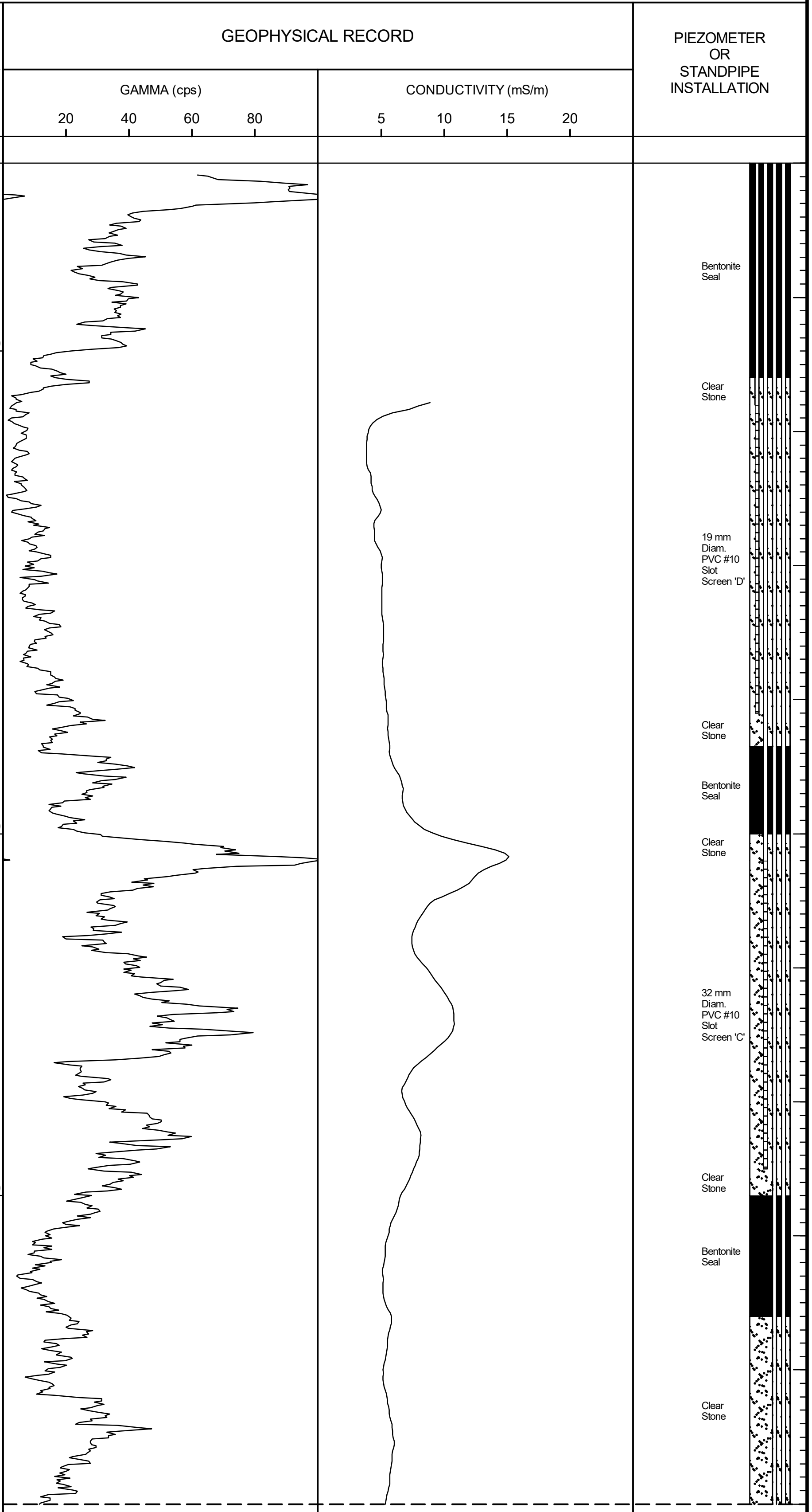
DRILLING DATE: September 2018

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)
		GROUND SURFACE		139.39
0		**Overburden, 0.0 m to 2.8 m**	▩	0.00
2		**Bedrock Surface, 2.8 m**	▩	
		LOWER BOBCAYGEON FORMATION, 2.8 m to 26.0 m **UNIT 3, 2.8 m to 10.0 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		136.59 2.80
4				
6				
8				
10		**UNIT 2, 10.0 m to 15.4 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		129.39 10.00
12				
14				
		UNIT 1, 15.4 m to 26.0 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.		123.99 15.40
16				
18				
20				



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

WSP GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: BH18-18

SHEET 2 OF 3

LOCATION: N 5010231.5 ;E 422153.9

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: September 2018

DRILL RIG: Air Rotary Percussion

DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

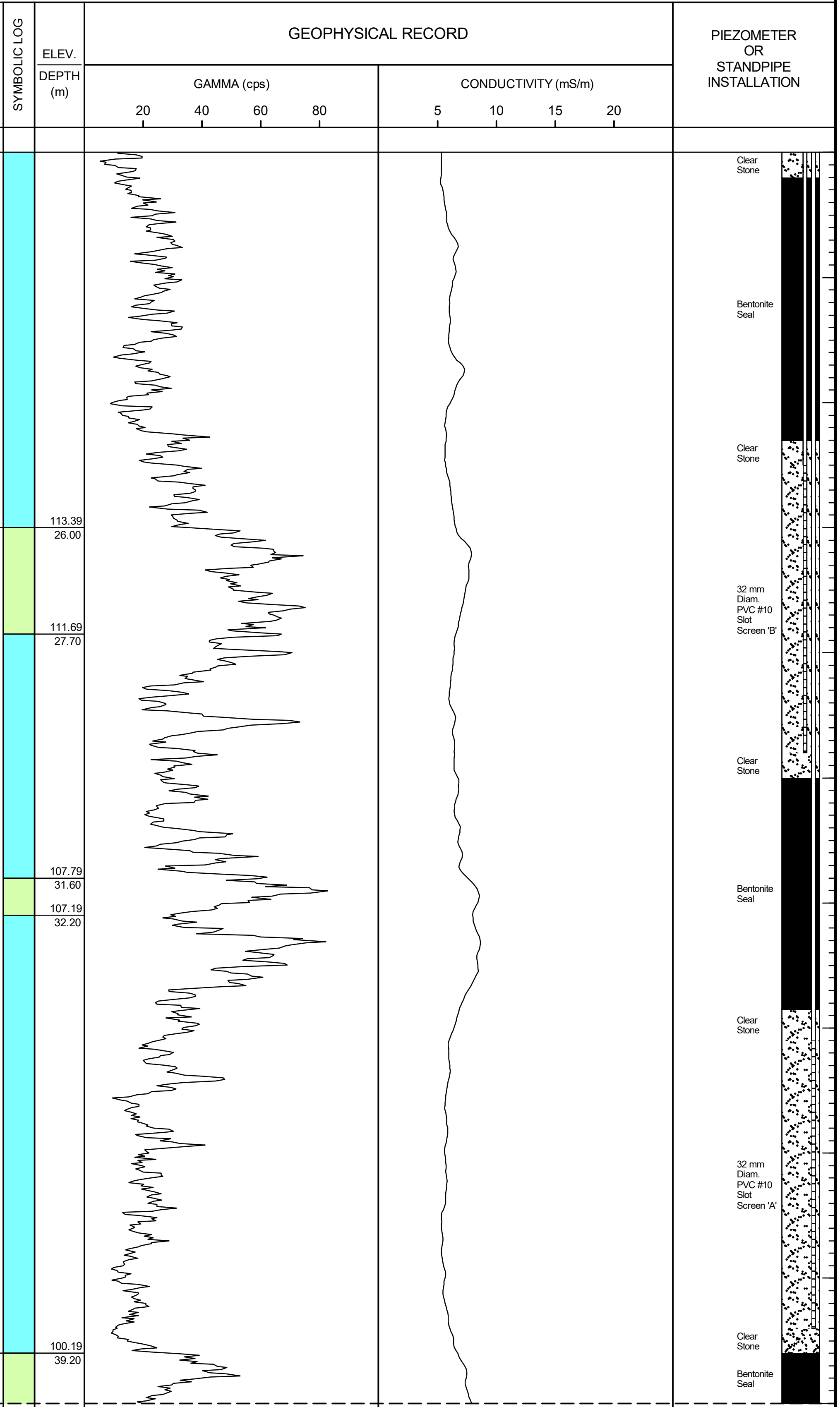
DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION

--- CONTINUED FROM PREVIOUS PAGE ---

UNIT 1, 15.4 m to 26.0 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.

UPPER GULL RIVER FORMATION, 26.0 m to 39.2 m

Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 26.0 m to 27.7 m with a second dolostone bed at 31.6-32.2m.



CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: BH18-18

SHEET 3 OF 3

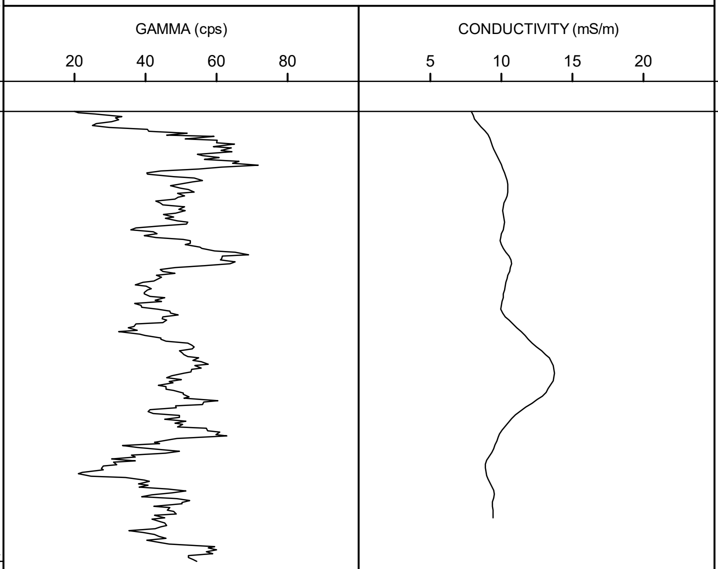
LOCATION: N 5010231.5 ;E 422153.9

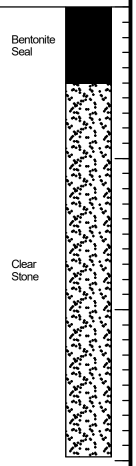
INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: September 2018
DRILL RIG: Air Rotary Percussion
DRILLING CONTRACTOR: Capital Water Supply Ltd.

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
40		**LOWER GULL RIVER FORMATION, 39.2 m to 45.95 m** **UNIT 5, 39.2 m to 45.95 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.	🟩	93.44 45.95		Bentonite Seal Clear Stone
46		**End of Borehole, 45.95 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.				
48						
50						
52						
54						
56						
58						
60						





DEPTH SCALE
1 : 100

LOGGED: RB
CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: MQAT18-01

SHEET 1 OF 2

LOCATION: N ;E

DRILLING DATE: December 2018

DATUM: Geodetic

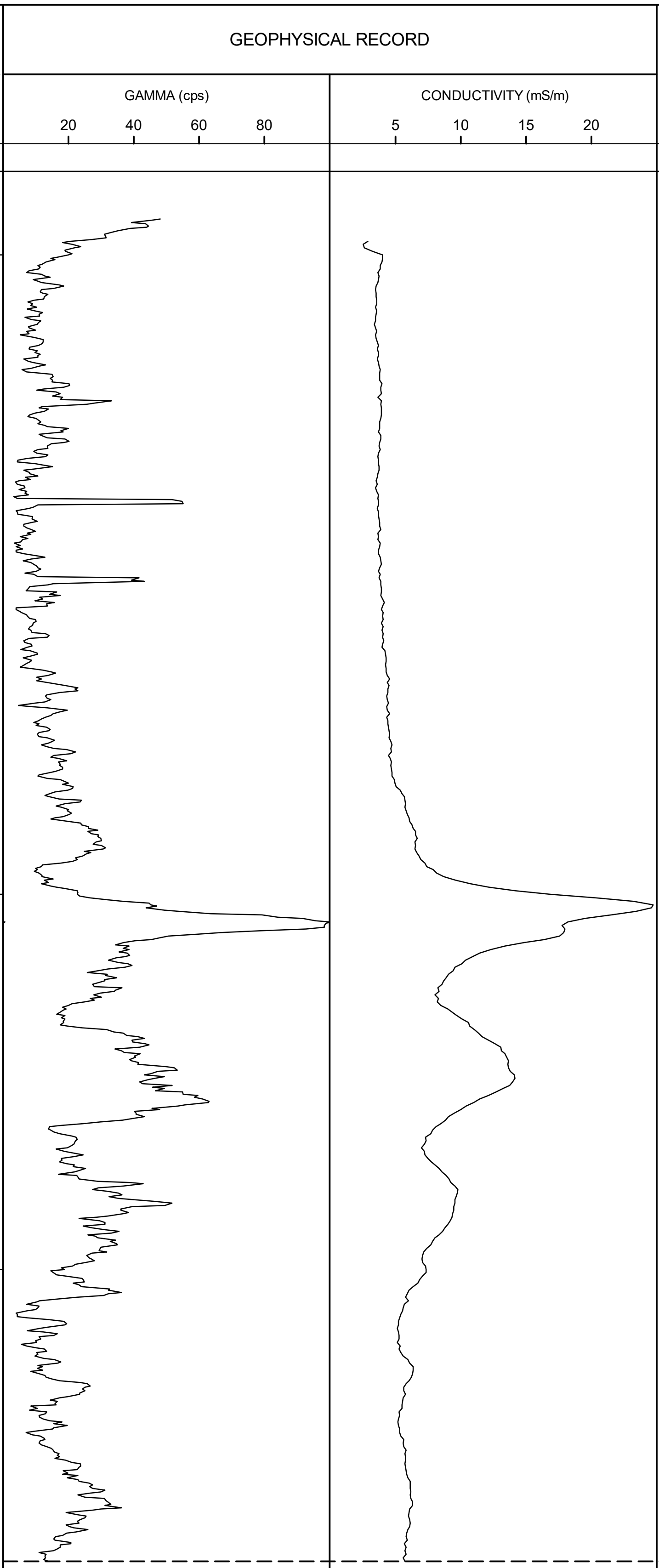
INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE				
0		**Overburden, 0.0 m to 1.2 m** **Bedrock Surface, 1.2 m**	▨	0.00		
		LOWER BOBCAYGEON FORMATION, 1.2 m to 26.6 m **UNIT 3, 1.2 m to 10.4 m** interbedded light to medium brownish grey, fine to medium grained crystalline, non-porous, finely stylolitic, medium bedded **CALCARENITIC LIMESTONE** with bioturbated sections associated with mollusk burrow casts becoming more evident within lower half of section. Transitional to sharp basal contact.		1.20		
		UNIT 2, 10.4 m to 15.8 m dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.		10.40		
				15.80		
20						
		CONTINUED NEXT PAGE				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20



DEPTH SCALE

1 : 100

GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 18111892

GEOPHYSICAL LOG OF: MQAT18-01

SHEET 2 OF 2

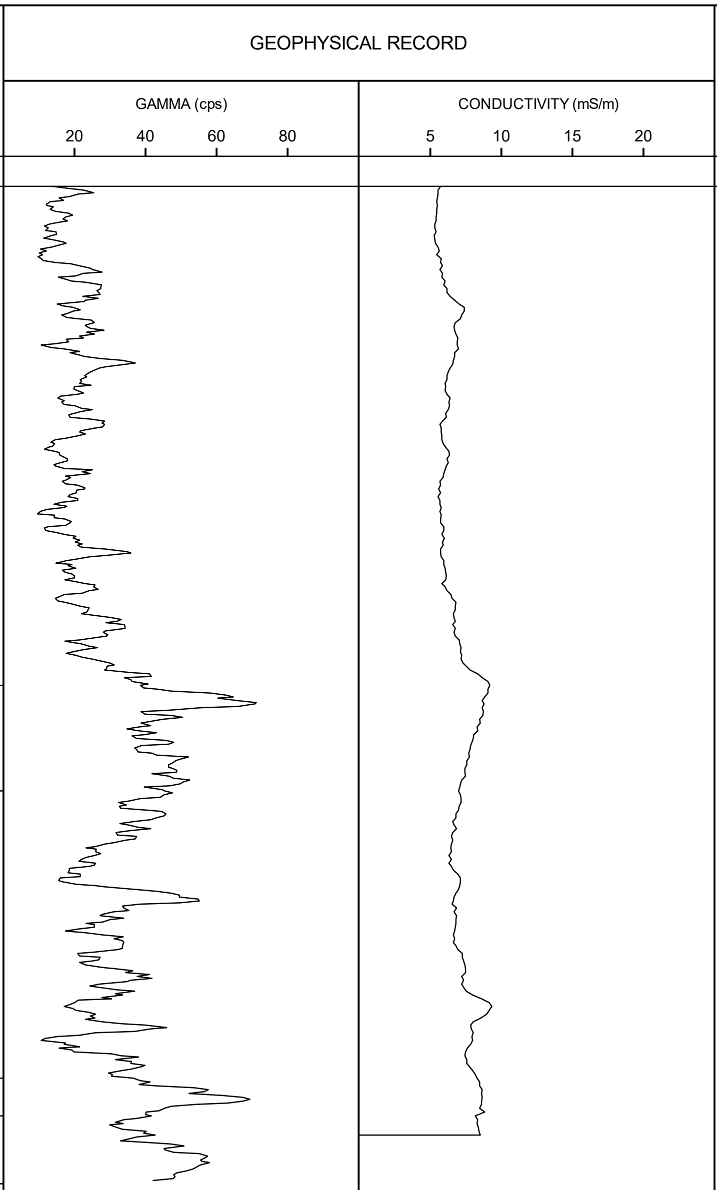
LOCATION: N ;E

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018
DRILL RIG: Air Track Drill
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---			
20		**UNIT 1, 15.8 m to 26.6 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.			
22					
24					
26					
		UPPER GULL RIVER FORMATION, 26.6 m to 33.2 m Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 26.6 m to 28.0 m with a second dolostone bed at 31.8-32.3m.		26.60	
28				28.00	
30					
32				31.80	
				32.30	
		End of Borehole, 33.2 m **Note(s):** 1. Borehole not located during survey carried out by R.W. Tomlinson in 2020.		33.20	
34					
36					
38					
40					



DEPTH SCALE
1 : 100

GOLDER

LOGGED: RB
CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-02

SHEET 1 OF 1

LOCATION: N 5009791.1 ;E 421825.1

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		135.23			
0		**Overburden, 0.0 m to 1.32 m**	▨	0.00 133.93			
		Bedrock, 1.3 m to 33.0 m not geophysically logged, hole collapsed. **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.		1.30			
2							
4							
6							
8							
10							
12							
14							
16							
18							
20							

DEPTH SCALE

1 : 100

GOLDER

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 3/16/21 JM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-03

SHEET 1 OF 1

LOCATION: N 5009555.6 ;E 422044.2

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD GAMMA (cps) 20 40 60 80	GEOPHYSICAL RECORD CONDUCTIVITY (mS/m) 5 10 15 20	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		137.29			
0		**Overburden, 0.0 m to 0.8 m**	▨	0.00			
		Bedrock, 0.8 m to 33.0 m, not geophysically logged, hole collapsed **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.		136.49 0.80			
2							
4							
6							
8							
10							
12							
14							
16							
18							
20							

DEPTH SCALE

1 : 100

GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-04

SHEET 1 OF 2

LOCATION: N 5009401.9 ;E 422140.3

INCLINATION: -90° AZIMUTH: ---

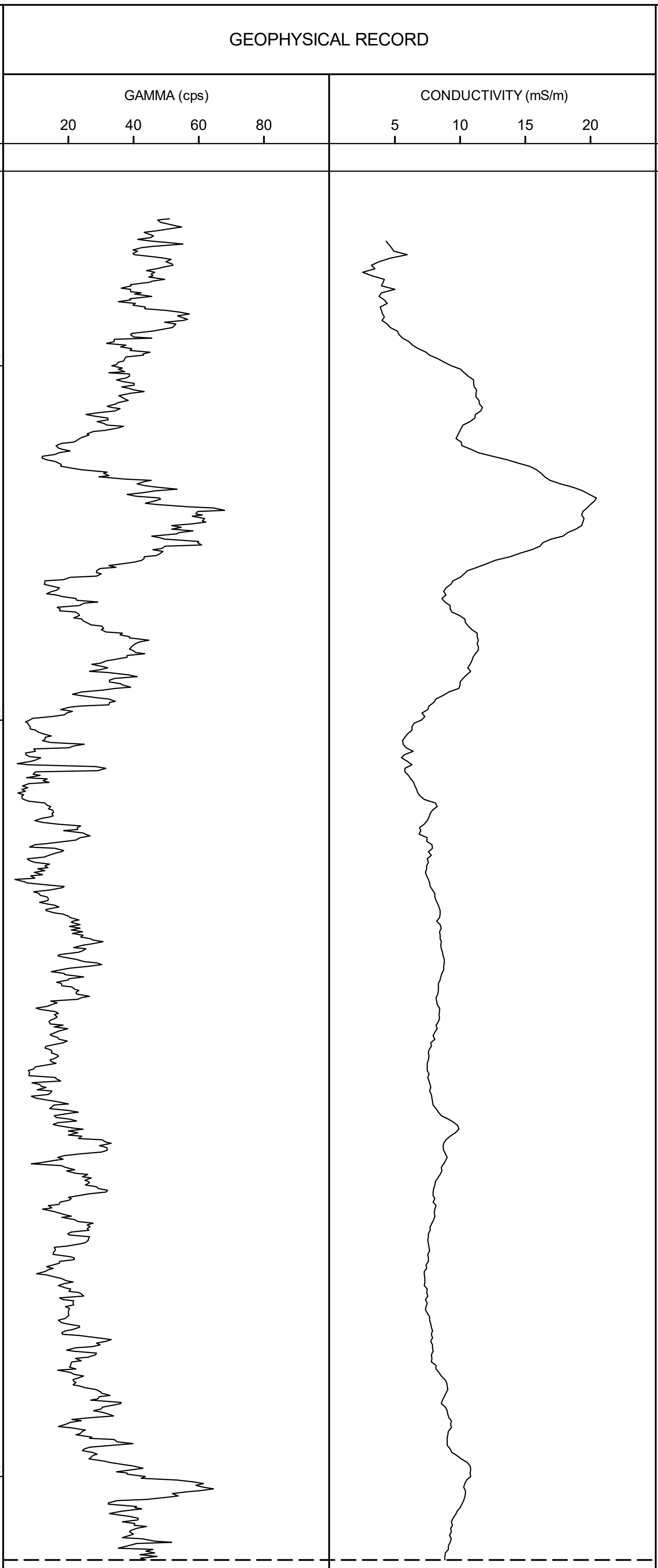
DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		143.82	
0		**Overburden, 0.0 m to 2.8 m** **Bedrock Surface, 2.8 m** **LOWER BOBCAYGEON FORMATION, 2.8 m to 18.8 m** **UNIT 2, 2.8 m to 7.9 m** dark grey, fine grained, non-porous, thinly bedded, partly bioturbated and fossiliferous (gastropod and pelecypod debris) **ARGILLACEOUS NODULAR LIMESTONE and SHALEY NODULAR LIMESTONE.** Slake susceptible dark grey to black beds of **SHALE** comprise approximately 10-40% of sequence. Transitional to sharp basal contact.	▨	0.00 141.02 2.80	
8		**UNIT 1, 7.9 m to 18.8 m** medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.	🟦	135.92 7.90	
			🟩	125.02 18.80	
20		*CONTINUED NEXT PAGE*			



DEPTH SCALE

1 : 100

GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-04

SHEET 2 OF 2

LOCATION: N 5009401.9 ;E 422140.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

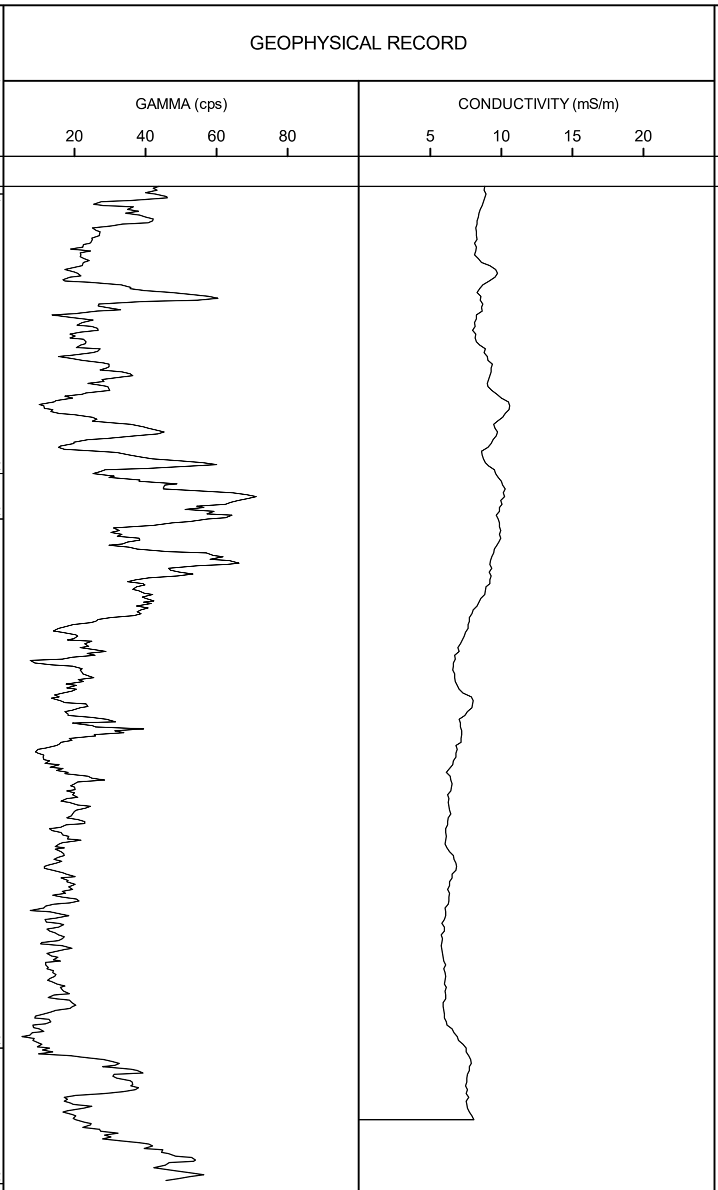
DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)
	--- CONTINUED FROM PREVIOUS PAGE ---	
20	**UPPER GULL RIVER FORMATION, 18.8 m to 31.4 m** Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 18.8 m to 20.1 m with a second dolostone bed at 23.8-24.4m.	123.72 20.10
		120.02 23.80
		119.42 24.40
31.4	**LOWER GULL RIVER FORMATION, 31.4 m to 33.2 m** **UNIT 5, 31.4 m to 33.2 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.	112.42 31.40
		110.62 33.20
	End of Borehole, 33.2 m	

Note(s):

1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.



DEPTH SCALE

1 : 100

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-05

SHEET 1 OF 2

LOCATION: N 5009146.1 ;E 421582.0

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | GEOPHYSICAL RECORD | PIEZOMETER OR STANDPIPE INSTALLATION

GROUND SURFACE

Overburden, 0.0 m to 0.9 m
Bedrock Surface, 0.9 m
LOWER BOBCAYGEON FORMATION, 0.9 m to 6.4 m

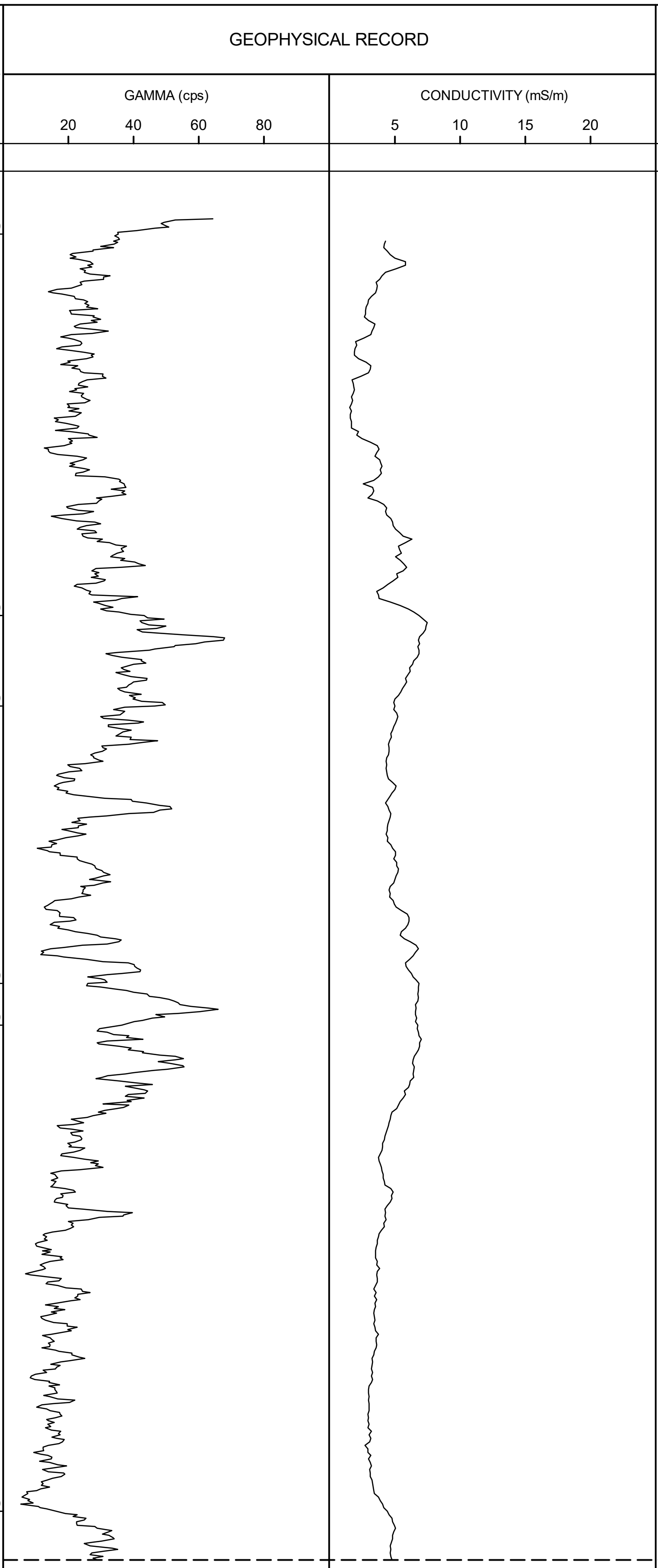
UNIT 1, 0.9 m to 6.4 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.

UPPER GULL RIVER FORMATION, 6.4 m to 19.3 m
Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 6.4 m to 7.7 m with a second dolostone bed at 11.7-12.3m.

CONTINUED NEXT PAGE

ELEV.	DEPTH (m)
134.99	0.00
134.09	0.90
128.59	6.40
127.29	7.70
123.29	11.70
122.69	12.30
115.69	19.30

Depth scale: 0 2 4 6 8 10 12 14 16 18 20



DEPTH SCALE
1 : 100

GOLDER

LOGGED: RB
CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 3/16/21 JM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-05

SHEET 2 OF 2

LOCATION: N 5009146.1 ;E 421582.0

INCLINATION: -90° AZIMUTH: ---

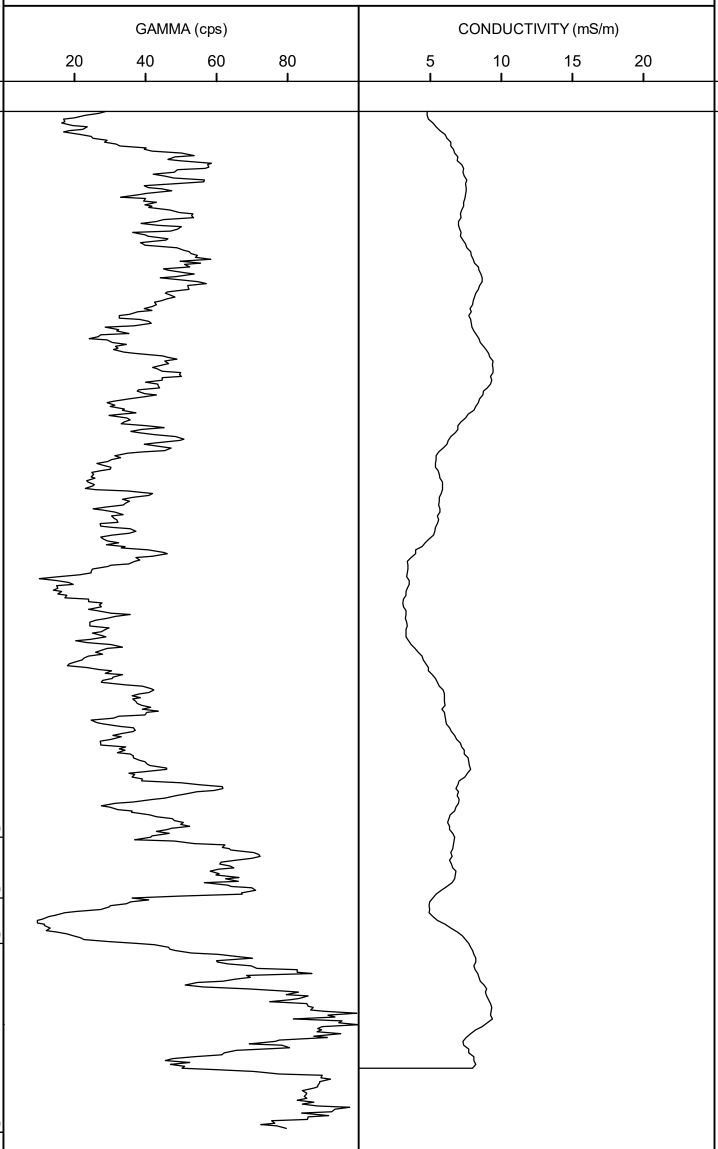
DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20		**LOWER GULL RIVER FORMATION, 19.3 m to 33.5 m** **UNIT 5, 19.3 m to 29.6 m** The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.	🟩			
22						
24						
26						
28						
				105.39 29.60		
30		**UNIT 4, 29.6 m to 33.5 m** interbedded sequence of light to medium grey to greenish grey and dark grey, fine grained, faintly porous, thinly to medium bedded, massive textured, argillaceous to shaley **DOLOSTONE** and medium grey **DOLOMITIC LIMESTONE.** Thin interbeds of laminar to nodular textured limestone and thin oolitic limestone beds occur with medium bed of limestone at 30.4-31.0m. Unit also includes light to medium grey and greenish grey, medium grained, thinly to medium bedded, calcareous to dolomitic cemented, partly bioturbated **QUARTZ SANDSTONE** and minor black **SHALE.**	🟩	104.59 30.40		
			🟦	103.99 31.00		
32			🟩			
				101.49 33.50		
34		**End of Borehole, 33.5 m** **Note(s):** 1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.				
36						
38						
40						



DEPTH SCALE

1 : 100

GOLDER

LOGGED: RB

CHECKED: KAM

OTTAWA-GEO 19130670.GPJ GAL-GTA.GDT 3/16/21 JM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-06

SHEET 1 OF 2

LOCATION: N 5008978.1 ;E 421721.3

INCLINATION: -90° AZIMUTH: ---

DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | GEOPHYSICAL RECORD | PIEZOMETER OR STANDPIPE INSTALLATION

GROUND SURFACE

Overburden, 0.0 m to 1.8 m
Bedrock Surface, 1.8 m
LOWER BOBCAYGEON FORMATION, 1.8 m to 5.2 m

UNIT 1, 1.8 m to 5.2 m medium grey to brownish grey, fine to medium grained, micritic to partly crystalline, non-porous, thinly bedded with nodular to wavy textured argillaceous partings, extensively bioturbated **ARGILLACEOUS NODULAR LIMESTONE.** Burrow casts tend to be infilled with medium grained crystalline calcarenite. Section contains laterally variable thicknesses of **MICRITIC LIMESTONE, CALCARENITIC LIMESTONE** occasional very fine grained thin to medium beds of **LITHOGRAPHIC LIMESTONE,** medium grained beds of **OOLITIC LIMESTONE** and widely spaced black shaley partings 5 to 30 mm thick.

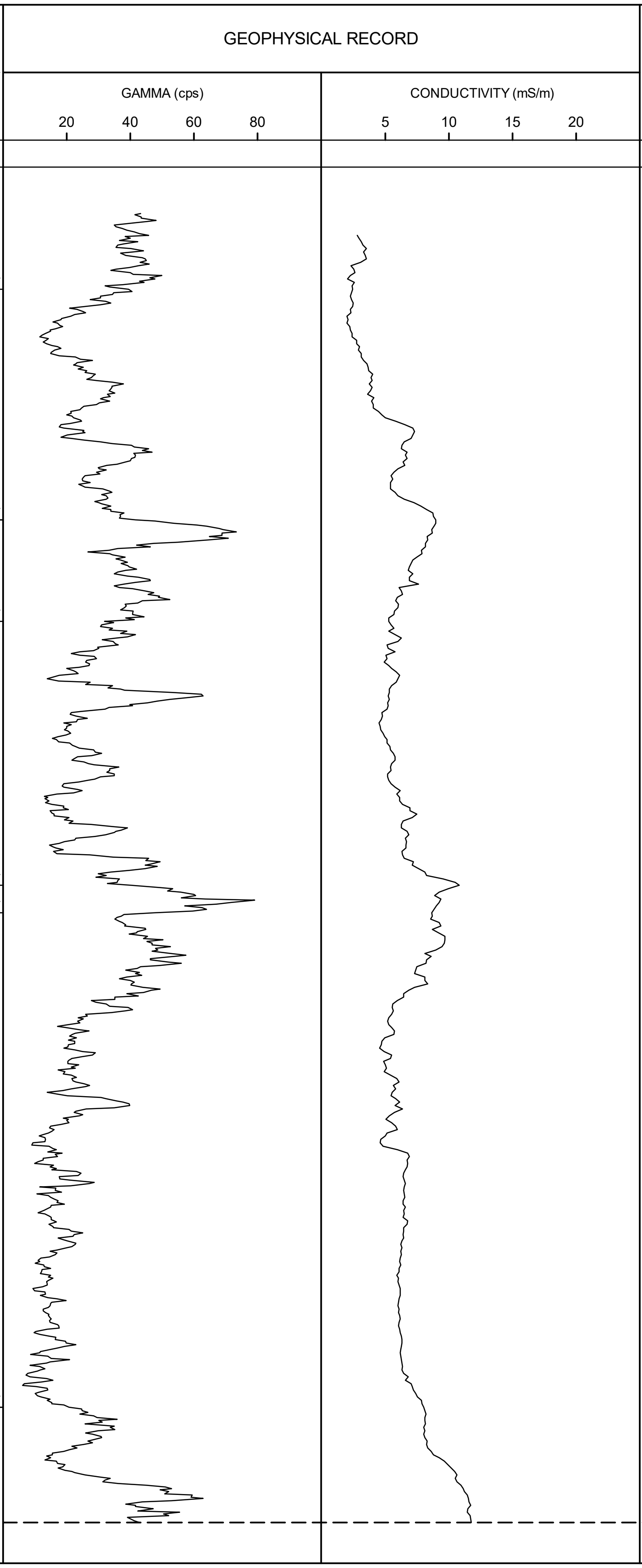
UPPER GULL RIVER FORMATION, 5.2 m to 18.3 m
Medium grey, very fine to fine grained, nonporous, micritic, thinly bedded **ARGILLACEOUS LIMESTONE** with laminar to very thin slake susceptible argillaceous bedding partings 1 to 10 mm thick with thin to medium interbeds of lithoclastic limestone, oolitic limestone and greenish grey argillaceous to calcareous dolostone with thin shaley caps and bases. Top of the unit is marked by the first appearance of greenish dolostone with a dark grey to black thin shaley cap, the **"first dolostone marker bed",** at 5.2 m to 6.7 m with a second dolostone bed at 10.6-11.0m.

LOWER GULL RIVER FORMATION, 18.3 m to 33.4 m

UNIT 5, 18.3 m to 28.8 m The Lower Gull River Formation marks the transition into predominately dolostone with subordinate limestone units. Light

CONTINUED NEXT PAGE

ELEV.	DEPTH (m)
136.97	0.00
135.17	1.80
131.77	5.20
130.27	6.70
126.37	10.60
125.97	11.00
118.67	18.30



DEPTH SCALE

1 : 100

GOLDER

LOGGED: RB

CHECKED: KAM

PROJECT: 19130670

GEOPHYSICAL LOG OF: MQAT18-06

SHEET 2 OF 2

LOCATION: N 5008978.1 ;E 421721.3

INCLINATION: -90° AZIMUTH: ---

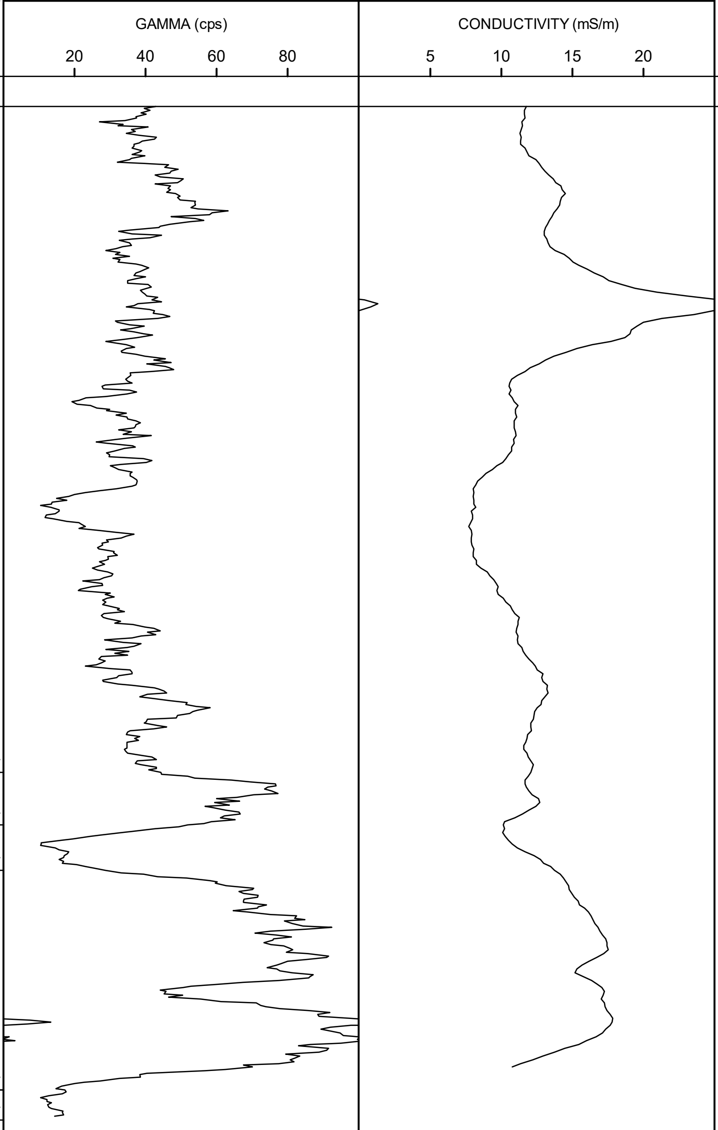
DRILLING DATE: December 2018

DRILL RIG: Air Track Drill

DRILLING CONTRACTOR: Stittsville Quarry

DATUM: Geodetic

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	GEOPHYSICAL RECORD	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---				
20–28		to medium grey and greenish grey, fine grained, faintly porous, medium to very thickly bedded, laminar to massive textured **DOLOSTONE.** Black argillaceous to shaley bedding partings 1 to 10 mm thick, minor interbeds of laminar textured argillaceous limestone beds with occasional stylolites, calcareous dolostone and nodular, mottled calcareous dolostone occur. Very thickly bedded dolostone beds are partly bioturbated noted by burrow casts.	🟩			
		UNIT 4, 28.8 m to 33.0 m interbedded sequence of light to medium grey to greenish grey and dark grey, fine grained, faintly porous, thinly to medium bedded, massive textured, argillaceous to shaley **DOLOSTONE** and medium grey **DOLOMITIC LIMESTONE.** Thin interbeds of laminar to nodular textured limestone and thin oolitic limestone beds occur with medium bed of limestone at 29.5-30.1m. Unit also includes light to medium grey and greenish grey, medium grained, thinly to medium bedded, calcareous to dolomitic cemented, partly bioturbated **QUARTZ SANDSTONE** and minor black **SHALE.**	🟩 🟦 🟩	108.17 28.80 107.47 29.50 106.87 30.10		
		UNIT 3, 33.0 m to 33.4 m medium grey to brownish grey, fine grained, non-porous, laminated to thinly bedded **ARGILLACEOUS LIMESTONE.** Unit includes interbeds of medium brownish grey, very fine grained lithographic limestone with numerous fine argillaceous partings, thin beds of oolitic limestone, weakly developed lithoclastic limestone, minor burrow bioturbated limestone, with lesser amounts of calcareous dolostone, dark grey dolomitic shale, shaley dolostone. Black argillaceous to shaley bedding partings occur.	🟩	103.97 33.00 103.57 33.40		
		End of Borehole, 33.4 m				
		Note(s):				
		1. Borehole updated in 2021 to reflect the R.W. Tomlinson survey carried out in 2020.				



Depth scale: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

DEPTH SCALE

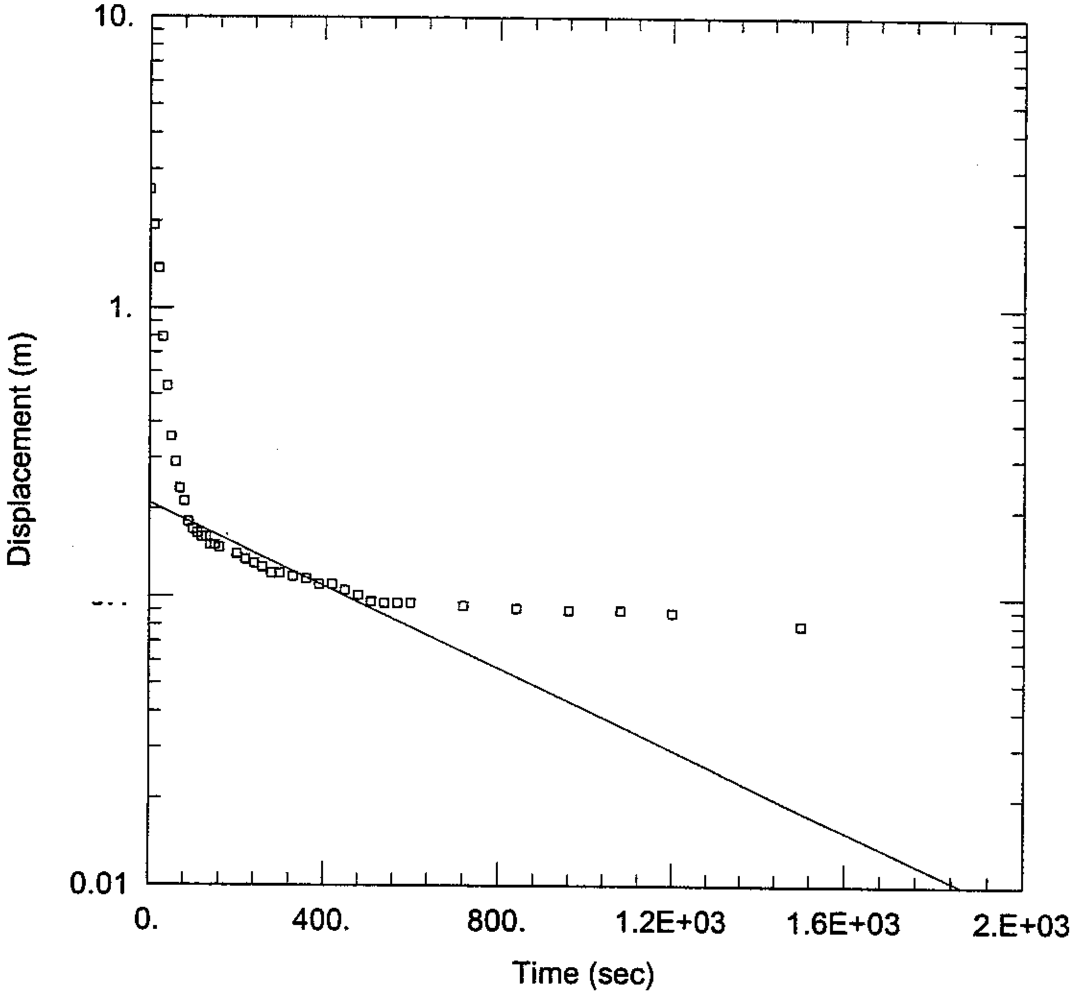
1 : 100

LOGGED: RB

CHECKED: KAM

APPENDIX C

Well Response Test Analyses



DH2A

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH2A.AQT
Date: 04/07/00 Time: 12:04:47

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Location: Goulbourn
Test Well: DH 2A
Test Date: 1/24/00

AQUIFER DATA

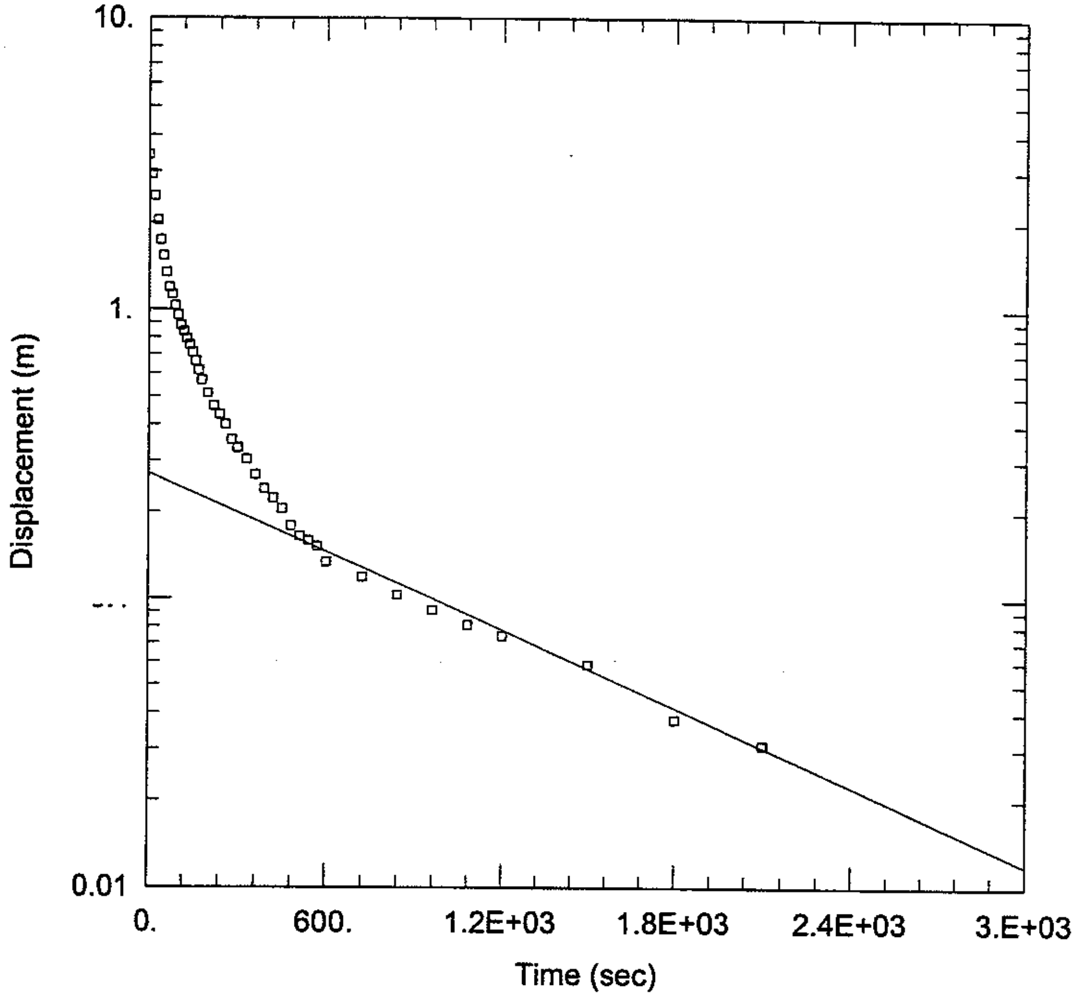
Saturated Thickness: 20.75 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.56 m
Casing Radius: 0.017 m
Screen Length: 12.3 m
Water Column Height: 20.75 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.607E-05 cm/sec
y0 = 0.2092 m



DH2B

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH2B.AQT
Date: 04/07/00 Time: 12:07:46

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Location: Goulbourn
Test Well: DH 2B
Test Date: 1/24/00

AQUIFER DATA

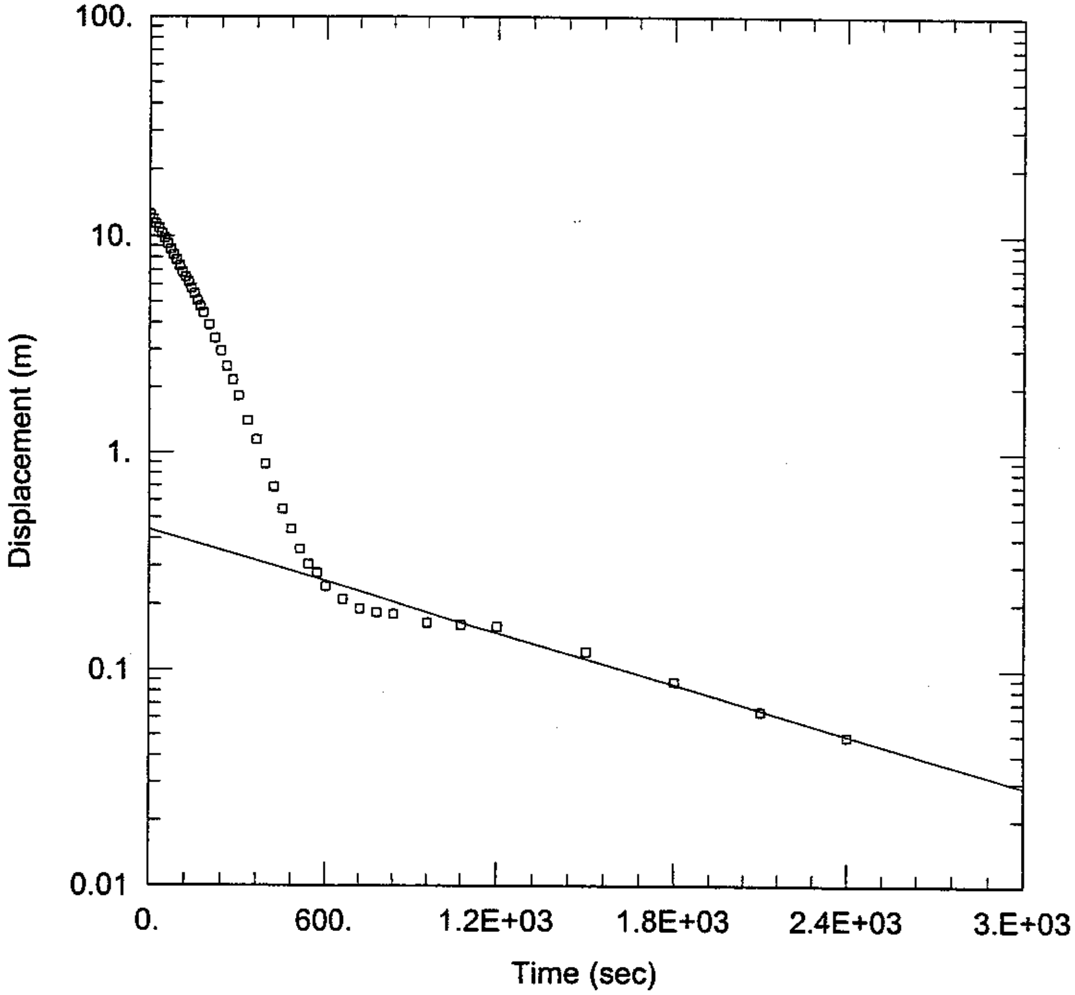
Saturated Thickness: 5.05 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.42 m
Casing Radius: 0.0317 m
Screen Length: 5.6 m
Water Column Height: 5.05 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001041 cm/sec
y0 = 0.2721 m



DH3A

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH3A.AQT
Date: 04/07/00 Time: 12:08:48

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Well: DH 3a
Test Date: 1/24/00

AQUIFER DATA

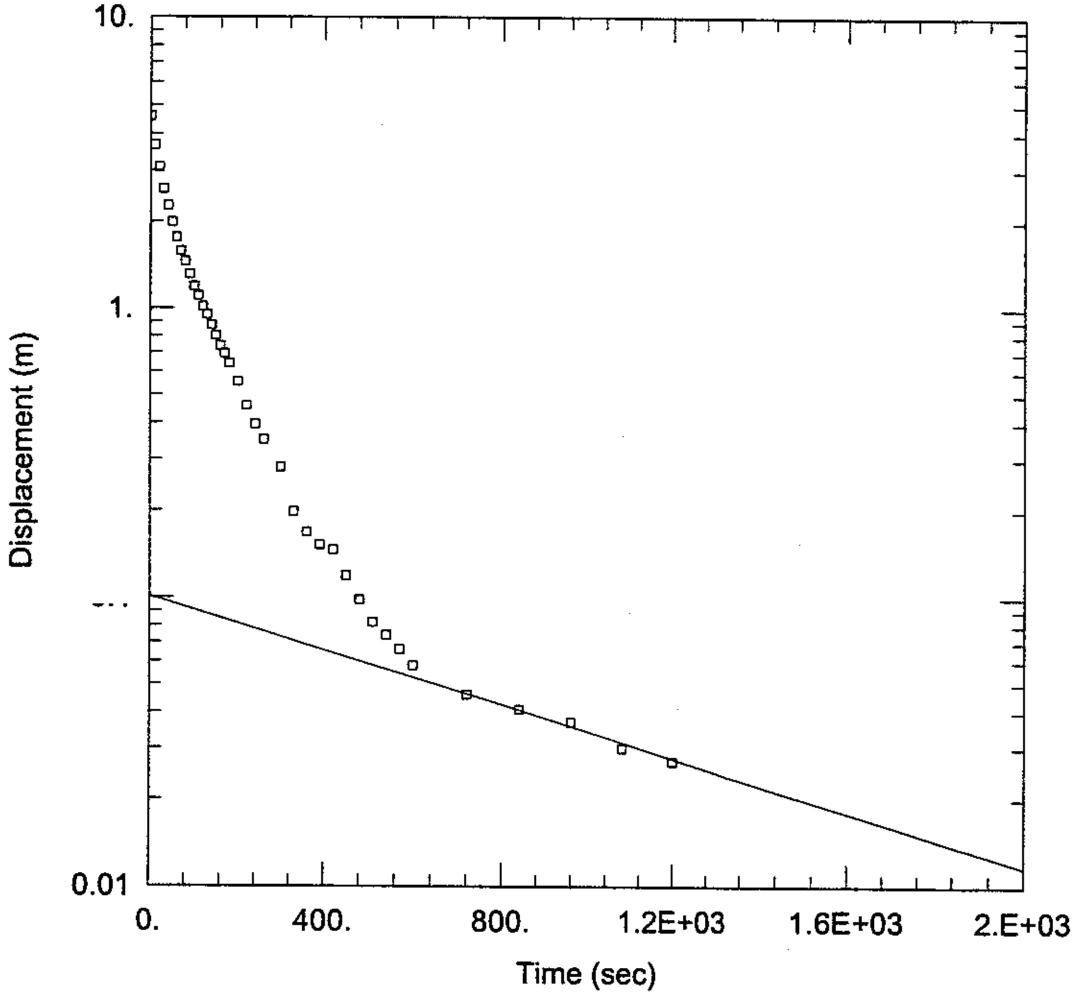
Saturated Thickness: 29.51 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 12.56 m
Casing Radius: 0.0317 m
Screen Length: 4.07 m
Water Column Height: 29.51 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001655 cm/sec
y0 = 0.44 m



DH3B

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH3B.AQT
Date: 04/07/00 Time: 12:12:12

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Well: DH 3B
Test Date: 1/24/00

AQUIFER DATA

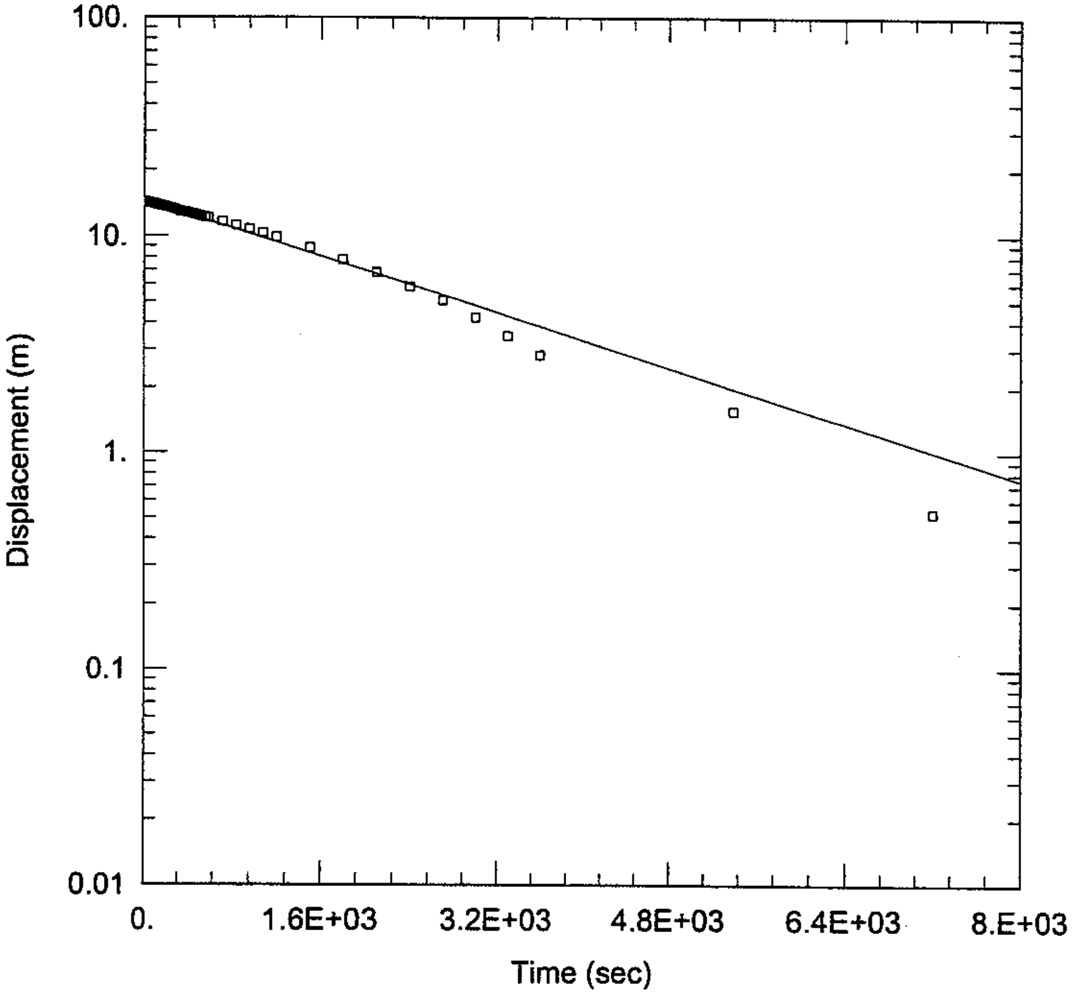
Saturated Thickness: 20.24 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 4.588 m
Casing Radius: 0.0317 m
Screen Length: 5.77 m
Water Column Height: 20.24 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001348 cm/sec
y0 = 0.101 m



DH4A

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH4A.AQT
Date: 04/07/00 Time: 12:14:46

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Well: DH 4A
Test Date: 1/24/00

AQUIFER DATA

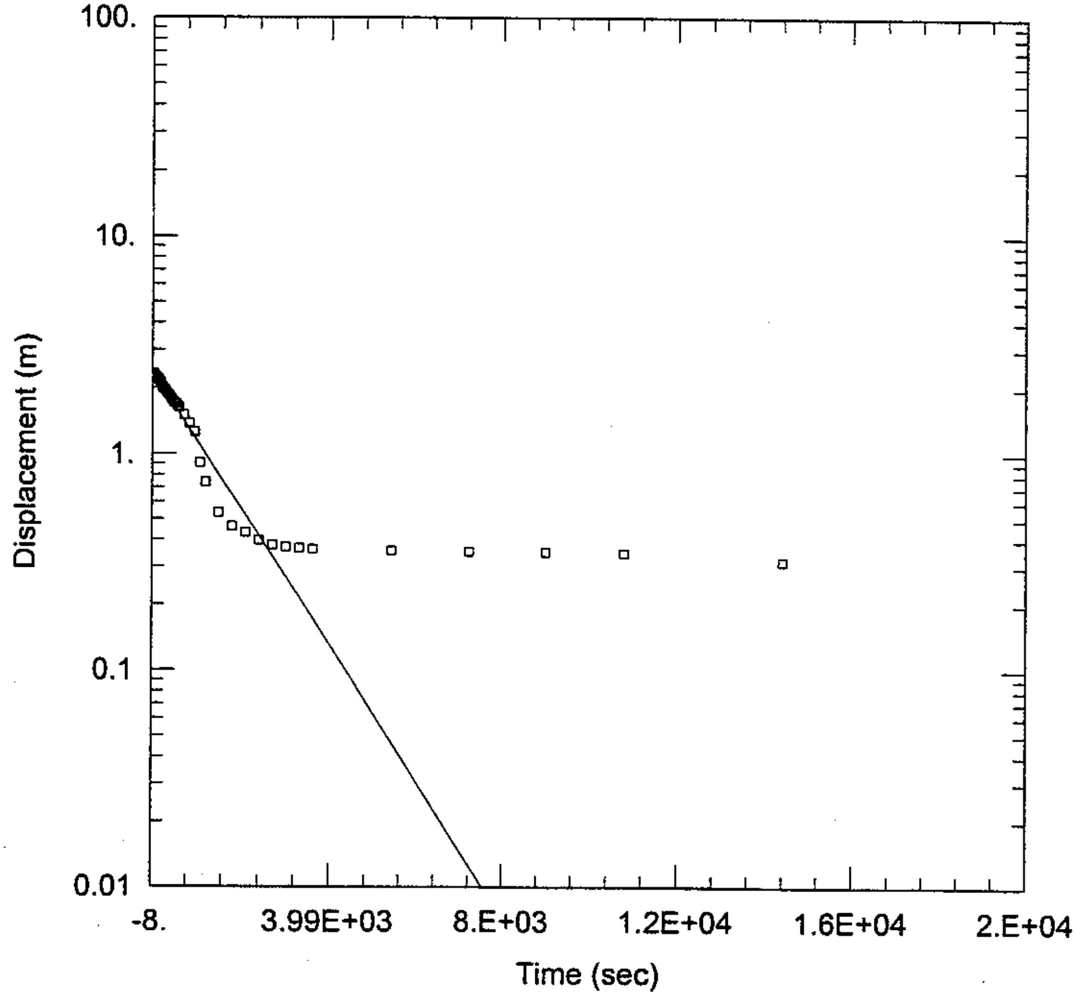
Saturated Thickness: 22.28 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 14.34 m
Casing Radius: 0.0317 m
Screen Length: 5.82 m
Water Column Height: 22.28 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.659E-05 cm/sec
y0 = 14.66 m



DH4C

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH4C.AQT
Date: 04/07/00 Time: 12:16:11

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Location: Goulbourn
Test Well: DH 4C
Test Date: 1/24/00

AQUIFER DATA

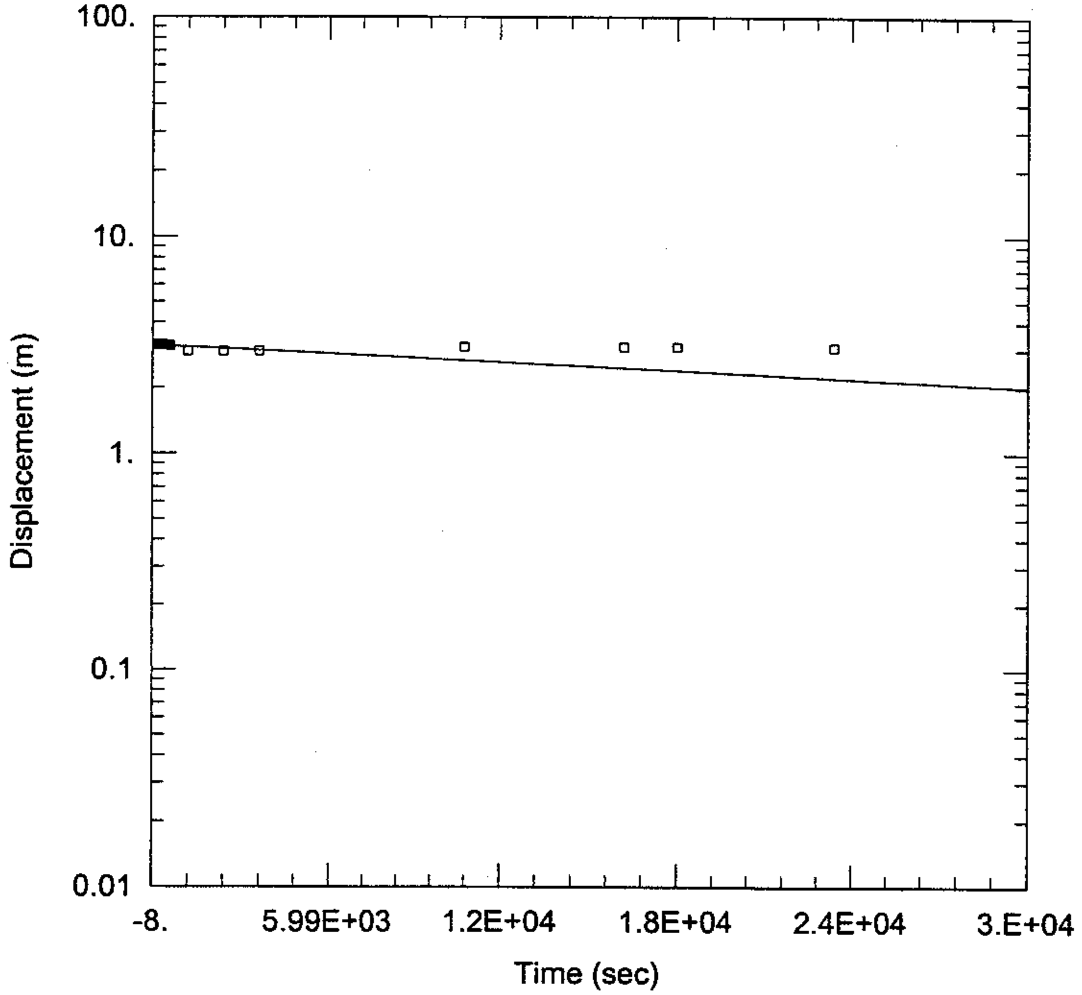
Saturated Thickness: 3.12 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.342 m
Casing Radius: 0.0317 m
Screen Length: 3.12 m
Water Column Height: 2.99 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001063 cm/sec
y0 = 2.392 m



DH4D

Data Set: S:\GRP_EA\991-2900\AQTSOLVR\DH4D.AQT
Date: 04/07/00 Time: 12:17:30

PROJECT INFORMATION

Company: Golder Associates
Client: Tomlinson
Project: 992-2900
Test Location: Goulbourn
Test Well: DH 4D
Test Date: 1/24/00

AQUIFER DATA

Saturated Thickness: 3.34 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 3.17 m
Casing Radius: 0.0317 m
Screen Length: 2.99 m
Water Column Height: 3.34 m
Wellbore Radius: 0.1 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.413E-06 cm/sec
y0 = 3.136 m

Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-10A**
Date: 23-Jun-06

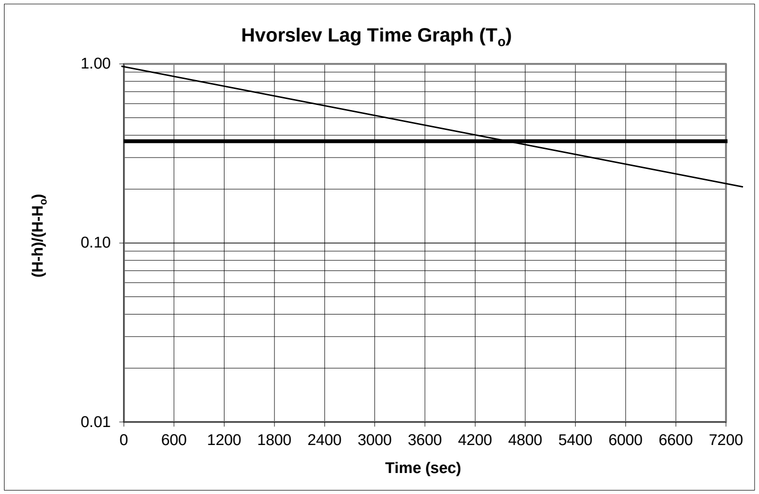
Hvorslev Formula: $K = [r^2 \ln(L/R)]/ [2LT_o]$

Initial WL (H_o) = 2.05 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 6.100 m
$H-H_o$ = -2.050 m
Lag time (T_o) = (time at $(H-h)/(H-H_o) = 0.37$ on graph)

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Hydraulic Cond.(K) = #DIV/0!
#DIV/0!

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00
		-2.05	1.00



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-10B**
Date: 23-Jun-06

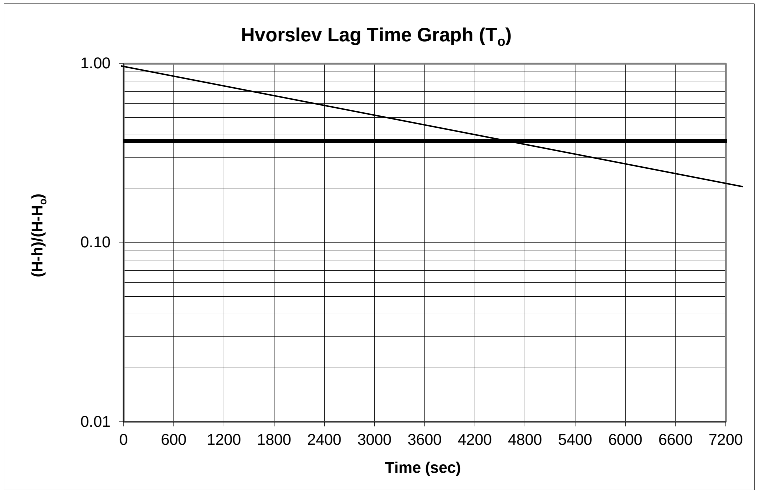
Hvorslev Formula: $K = [\ r^2 \ln(L/R)\ ]/\ [\ 2LT_o\ ]$

Initial WL (H_o) = 2.07 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 3.000 m
$H-H_o$ = -2.065 m
Lag time (T_o) = (time at $(H-h)/(H-H_o)$ = 0.37 on graph)

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Hydraulic Cond.(K) = #DIV/0!
#DIV/0!

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00
		-2.07	1.00



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-10C**

Date: 23-Jun-06

Hvorslev Formula: $K = [r^2 \ln(L/R)] / [2LT_o]$

Initial WL (H_o) = 1.01 m (Static)

Radius of pipe (r) = 0.016 m (1.25 inch diameter)

Radius of hole (R) = 0.076 m (6 inch diameter)

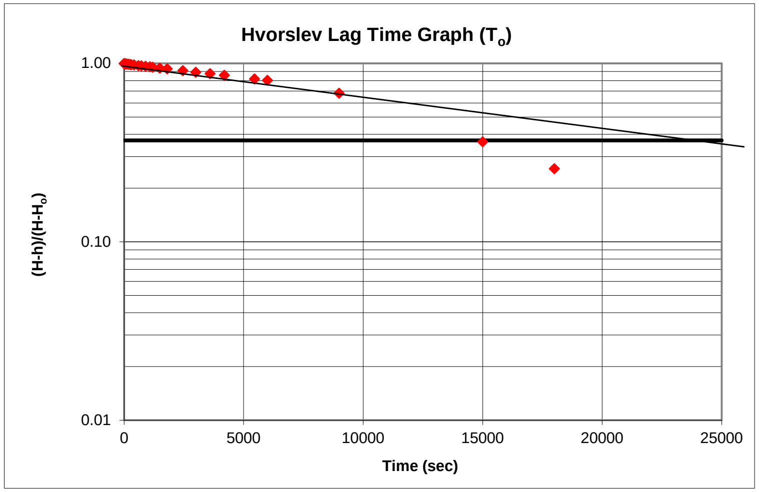
Length of screen (L) = 6.100 m

$H-H_o$ = 7.660 m

Lag time (T_o) = 24000 sec (time at $(H-h)/(H-H_o)$ = 0.37 on graph)

Hydraulic Cond.(K) = **3.83E-09 m/s**
3.83E-07 cm/s

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
0	8.67	7.66	1.00
30	8.64	7.63	1.00
60	8.63	7.62	0.99
90	8.62	7.61	0.99
120	8.61	7.60	0.99
180	8.59	7.58	0.99
240	8.57	7.56	0.99
300	8.56	7.55	0.98
420	8.52	7.51	0.98
600	8.47	7.46	0.97
720	8.44	7.43	0.97
900	8.40	7.39	0.96
1080	8.36	7.35	0.96
1200	8.32	7.31	0.95
1500	8.22	7.21	0.94
1800	8.16	7.15	0.93
2460	8.00	6.99	0.91
3000	7.85	6.84	0.89
3600	7.72	6.71	0.88
4200	7.59	6.58	0.86
5460	7.29	6.28	0.82
6000	7.17	6.16	0.80
9000	6.23	5.22	0.68
15000	3.80	2.79	0.36
18000	2.98	1.97	0.26



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-12C**
Date: 24-Jun-06

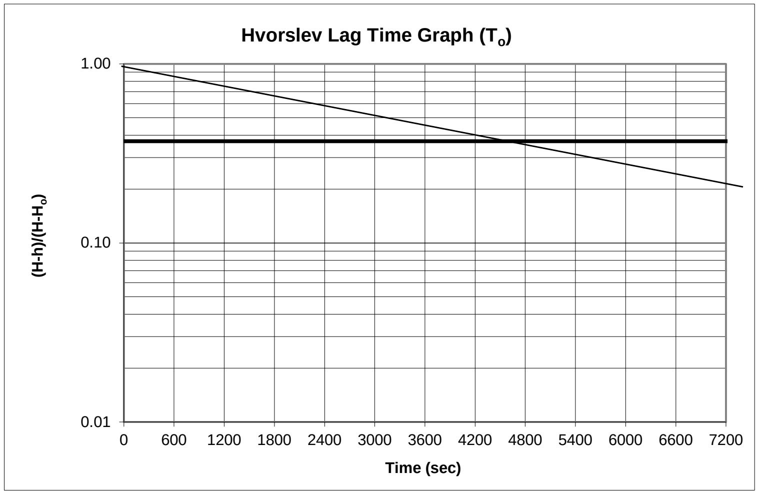
Hvorslev Formula: $K = [r^2 \ln(L/R)]/ [2LT_o]$

Initial WL (H_o) = 1.72 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 6.100 m
$H-H_o$ = -1.720 m
Lag time (T_o) = (time at $(H-h)/(H-H_o) = 0.37$ on graph)

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Hydraulic Cond.(K) = **#DIV/0!**
#DIV/0!

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00
		-1.72	1.00



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-13A**
Date: 24-Jun-06

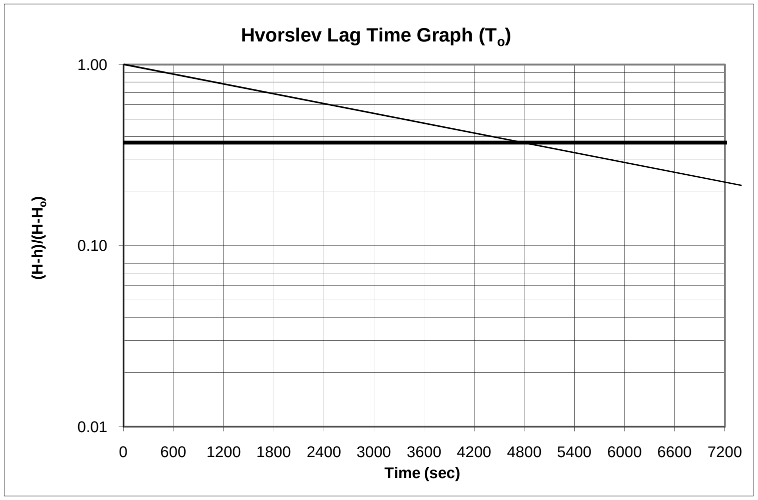
Hvorslev Formula: $K = [r^2 \ln(L/R)] / [2LT_o]$

Initial WL (H_o) = 8.92 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 6.100 m
$H-H_o$ = -8.920 m
Lag time (T_o) = (time at $(H-h)/(H-H_o) = 0.37$ on graph)

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Hydraulic Cond.(K) = #DIV/0!
#DIV/0!

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00
		-8.92	1.00



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

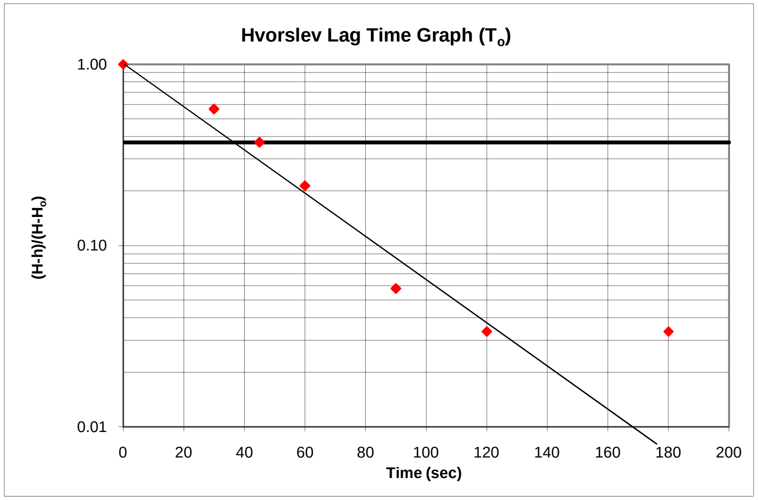
Well Name = **05-13B**
Date: 24-Jun-06

Hvorslev Formula: K = [r^2 ln(L/R)]/ [$2LT_o$]

Initial WL (H_o) =	8.89 m	(Static)
Radius of pipe (r) =	0.016 m	(1.25 inch diameter)
Radius of hole (R) =	0.076 m	(6 inch diameter)
Length of screen (L) =	6.100 m	
$H-H_o$ =	3.280 m	
Lag time (T_o) =	35 sec	(time at (H-h)/($H-H_o$) = 0.37 on graph)

Hydraulic Cond.(K) = **2.63E-06 m/s**
2.63E-04 cm/s

Time (sec)	WL (m)	H-h (m)	(H-h)/($H-H_o$)
0	12.17	3.28	1.00
30	10.75	1.86	0.57
45	10.11	1.22	0.37
60	9.59	0.70	0.21
90	9.08	0.19	0.06
120	9.00	0.11	0.03
180	9.00	0.11	0.03



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-13C**
Date: 24-Jun-06

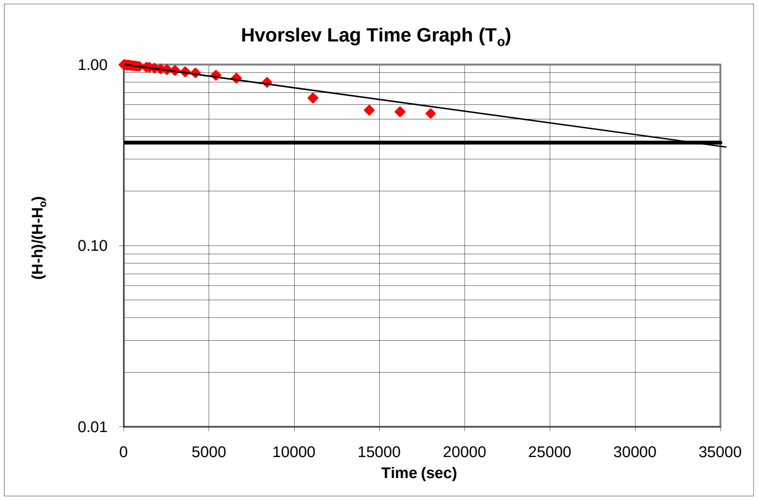
Hvorslev Formula: $K = [\ r^2 \ln(L/R)\ ]/\ [\ 2LT_o\ ]$

Initial WL (H_o) = 1.72 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 4.600 m
$H-H_o$ = 5.220 m
Lag time (T_o) = 33000 sec (time at $(H-h)/(H-H_o) = 0.37$ on graph)

RECOVERY DID NOT ACHIEVE 37%, EXTRAPOLATION REQUIRED

Hydraulic Cond.(K) = 3.46E-09 m/s
3.46E-07 cm/s

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
0	6.94	5.22	1.00
15	6.93	5.21	1.00
30	6.93	5.21	1.00
60	6.93	5.21	1.00
120	6.92	5.20	1.00
180	6.91	5.19	0.99
240	6.91	5.19	0.99
300	6.90	5.18	0.99
360	6.89	5.17	0.99
480	6.87	5.15	0.99
600	6.86	5.14	0.98
720	6.84	5.12	0.98
900	6.82	5.10	0.98
1320	6.77	5.05	0.97
1500	6.76	5.04	0.96
1800	6.71	4.99	0.96
2160	6.66	4.94	0.95
2520	6.62	4.90	0.94
3000	6.56	4.84	0.93
3600	6.49	4.77	0.91
4200	6.42	4.70	0.90
5400	6.27	4.55	0.87
6600	6.11	4.39	0.84
8400	5.89	4.17	0.80
11100	5.13	3.41	0.65
14400	4.64	2.92	0.56
16200	4.58	2.86	0.55
18000	4.52	2.80	0.54



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

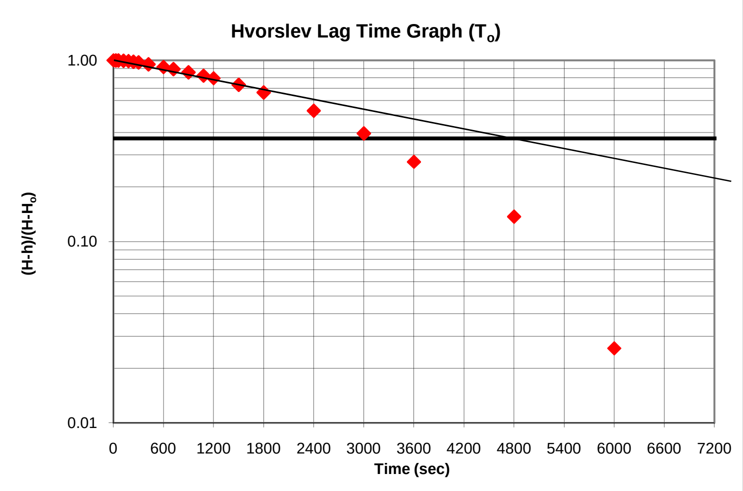
Well Name = **05-14A**
Date: 22-Jun-06

Hvorslev Formula: $K = [r^2 \ln(L/R)]/ [2LT_o]$

Initial WL (H_o) = 2.62 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 6.100 m
$H-H_o$ = 25.630 m
Lag time (T_o) = 4700 sec (time at $(H-h)/(H-H_o) = 0.37$ on graph)

Hydraulic Cond.(K) = **1.96E-08 m/s**
1.96E-06 cm/s

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
0	28.25	25.63	1.00
30	28.22	25.60	1.00
60	28.18	25.56	1.00
120	28.11	25.49	0.99
180	28.03	25.41	0.99
240	27.79	25.17	0.98
300	27.56	24.94	0.97
420	27.00	24.38	0.95
600	26.15	23.53	0.92
720	25.53	22.91	0.89
900	24.65	22.03	0.86
1080	23.70	21.08	0.82
1200	23.03	20.41	0.80
1500	21.38	18.76	0.73
1800	19.66	17.04	0.66
2400	16.13	13.51	0.53
3000	12.73	10.11	0.39
3600	9.68	7.06	0.28
4800	6.14	3.52	0.14
6000	3.28	0.66	0.03



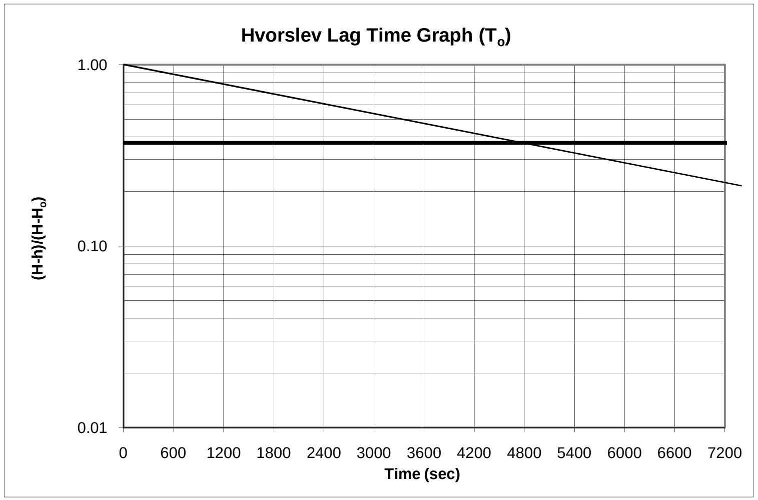
Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Hvorslev Formula: K = [r^2 ln(L/R)]/ [$2LT_o$]

Well Name =	**05-14B**	
Date:	22-Jun-06	
Initial WL (H_o) =	2.74 m	(Static)
Radius of pipe (r) =	0.016 m	(1.25 inch diameter)
Radius of hole (R) =	0.076 m	(6 inch diameter)
Length of screen (L) =	6.100 m	
H-H_o =	-2.740 m	
Lag time (T_o) =		(time at (H-h)/(H-H_o) = 0.37 on graph)
Hydraulic Cond.(K) =	**#DIV/0!** **#DIV/0!**	

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Time (sec)	WL (m)	H-h (m)	(H-h)/(H-H_o)
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00
		-2.74	1.00



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-14C**

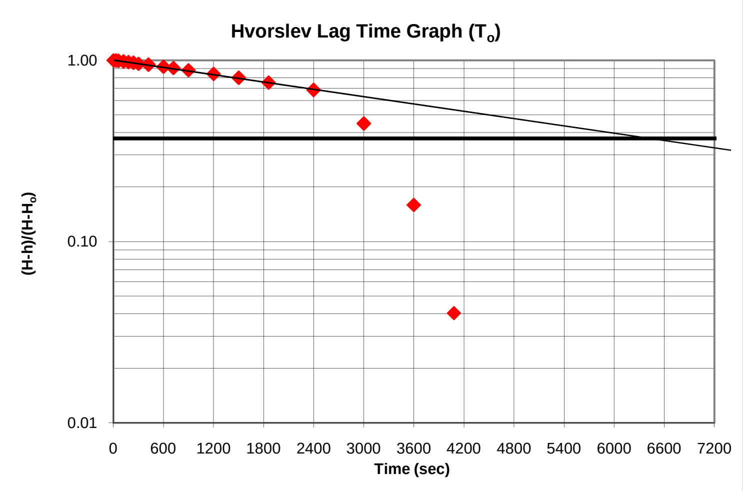
Date: 22-Jun-06

Hvorslev Formula: $K = [r^2 \ln(L/R)]/ [2LT_o]$

Initial WL (H_o) =	1.78 m	(Static)
Radius of pipe (r) =	0.016 m	(1.25 inch diameter)
Radius of hole (R) =	0.076 m	(6 inch diameter)
Length of screen (L) =	3.000 m	
$H-H_o$ =	5.470 m	
Lag time (T_o) =	6300 sec	(time at $(H-h)/(H-H_o) = 0.37$ on graph)

Hydraulic Cond.(K) = **2.49E-08 m/s**
2.49E-06 cm/s

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
0	7.25	5.47	1.00
30	7.24	5.46	1.00
60	7.22	5.44	0.99
120	7.17	5.39	0.99
180	7.13	5.35	0.98
240	7.08	5.30	0.97
300	7.01	5.23	0.96
420	6.95	5.17	0.95
600	6.82	5.04	0.92
720	6.74	4.96	0.91
900	6.60	4.82	0.88
1200	6.38	4.60	0.84
1500	6.16	4.38	0.80
1860	5.90	4.12	0.75
2400	5.53	3.75	0.69
3000	4.23	2.45	0.45
3600	2.65	0.87	0.16
4080	2.00	0.22	0.04



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-15A**

Date: 23-Jun-06

Hvorslev Formula: $K = [\ r^2 \ln(L/R)\ ] / [\ 2LT_o\ ]$

Initial WL (H_o) = 0.88 m (Static)

Radius of pipe (r) = 0.016 m (1.25 inch diameter)

Radius of hole (R) = 0.076 m (6 inch diameter)

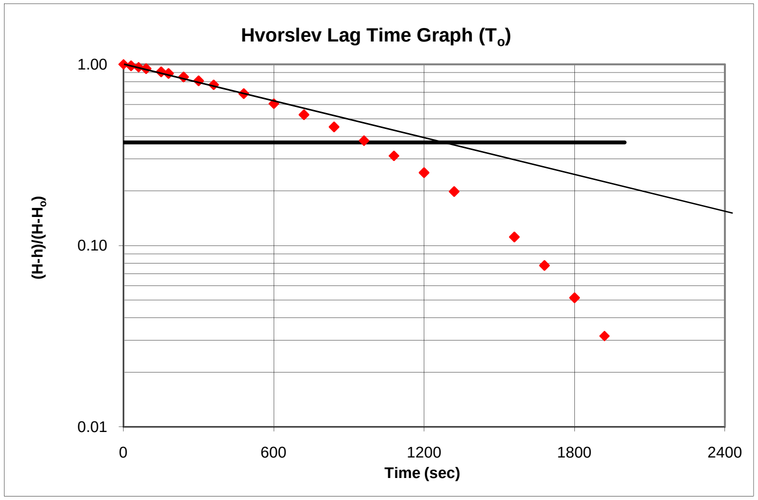
Length of screen (L) = 6.100 m

$H-H_o$ = 25.240 m

Lag time (T_o) = 1250 sec (time at $(H-h)/(H-H_o) = 0.37$ on graph)

Hydraulic Cond.(K) = 7.36E-08 m/s
7.36E-06 cm/s

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
0	26.12	25.24	1.00
30	25.66	24.78	0.98
60	25.22	24.34	0.96
90	24.76	23.88	0.95
150	23.83	22.95	0.91
180	23.34	22.46	0.89
240	22.35	21.47	0.85
300	21.34	20.46	0.81
360	20.33	19.45	0.77
480	18.29	17.41	0.69
600	16.19	15.31	0.61
720	14.20	13.32	0.53
840	12.28	11.40	0.45
960	10.45	9.57	0.38
1080	8.77	7.89	0.31
1200	7.25	6.37	0.25
1320	5.89	5.01	0.20
1560	3.70	2.82	0.11
1680	2.84	1.96	0.08
1800	2.18	1.30	0.05
1920	1.68	0.80	0.03
2040	1.08	0.20	0.01



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Well Name = **05-15B**
Date: 23-Jun-06

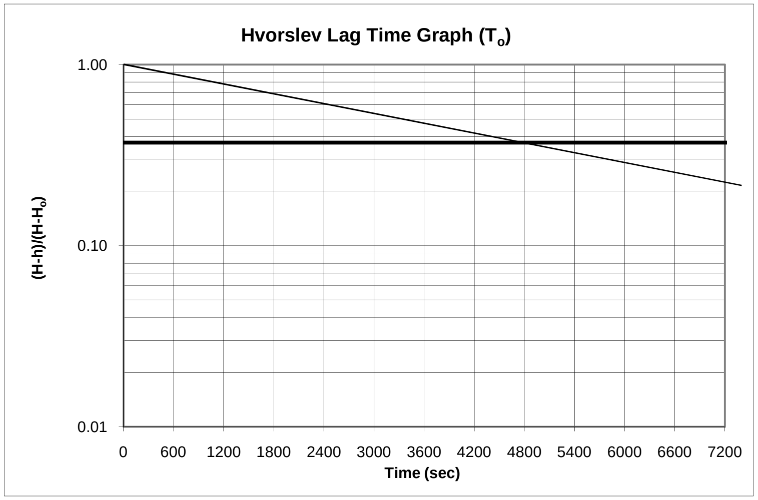
Hvorslev Formula: $K = [r^2 \ln(L/R)] / [2LT_o]$

Initial WL (H_o) = 0.88 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 6.100 m
$H-H_o$ = -0.880 m
Lag time (T_o) = (time at $(H-h)/(H-H_o)$ = 0.37 on graph)

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Hydraulic Cond.(K) = #DIV/0!
#DIV/0!

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00
		-0.88	1.00



Hvorslev Calculation
(for Hydraulic Conductivity from Rising Head Tests)

Hvorslev Formula: $K = [r^2 \ln(L/R)] / [2LT_o]$

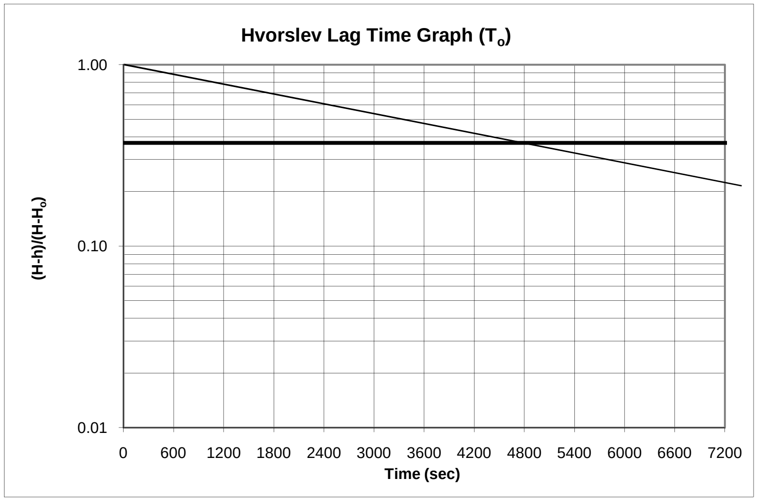
Well Name = **05-15C**
Date: 23-Jun-06

Initial WL (H_o) = 0.61 m (Static)
Radius of pipe (r) = 0.016 m (1.25 inch diameter)
Radius of hole (R) = 0.076 m (6 inch diameter)
Length of screen (L) = 6.700 m
$H-H_o$ = -0.605 m
Lag time (T_o) = (time at $(H-h)/(H-H_o)$ = 0.37 on graph)

COULD NOT PUMP FAST ENOUGH TO DRAW DOWN WATER LEVEL

Hydraulic Cond.(K) = #DIV/0!
#DIV/0!

Time (sec)	WL (m)	H-h (m)	$(H-h)/(H-H_o)$
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00
		-0.61	1.00



APPENDIX D

Groundwater Elevations

Stittsville Quarry Properties

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	28-Jan-00	4-Feb-00	11-Feb-00	18-Feb-00	26-Feb-00	4-Mar-00	11-Mar-00	18-Mar-00	25-Mar-00	1-Apr-00	15-Apr-00	30-Apr-00	12-May-00	27-May-00	10-Jun-00	24-Jun-00	8-Jul-00	22-Jul-00	12-Aug-00
BH99-1	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	149.36	149.44	149.40	148.94	148.88	148.83	148.84	148.84	148.53	148.14	146.43
BH99-2A	140.12	140.03	140.05	140.10	140.35	140.47	140.53	140.56	140.90	141.19	141.38	141.28	141.31	141.29	141.33	141.37	141.29	141.19	141.02
BH99-2B	144.03	140.21	140.25	140.29	140.46	140.61	140.66	140.68	145.40	146.09	146.71	146.28	146.03	146.01	146.22	146.38	146.25	146.15	146.08
BH99-3A	Frozen	Frozen	Frozen	Frozen	Frozen	140.42	Frozen	Frozen	140.25	140.74	140.68	140.61	140.65	140.58	140.44	140.70	140.63	140.56	140.42
BH99-3B	Frozen	Frozen	Frozen	Frozen	Frozen	140.25	Frozen	Frozen	140.18	140.78	140.74	140.25	140.25	140.22	140.23	140.25	140.18	140.13	140.01
BH99-3C	Frozen	Frozen	Frozen	Frozen	Frozen	140.23	Frozen	Frozen	140.34	141.00	140.96	140.45	140.31	140.27	140.39	140.47	140.38	140.26	140.23
BH99-3D	--	--	--	--	--	--	--	--	--	--	--	--	140.54	140.45	140.52	140.60	140.44	140.37	140.34
BH99-4A	140.21	140.11	140.04	140.08	140.34	140.55	140.72	140.79	141.00	141.31	141.53	141.46	141.65	141.50	141.54	141.59	141.53	141.36	141.17
BH99-4B	139.92	139.84	139.75	139.88	140.06	140.22	140.33	140.29	140.53	140.74	140.91	140.79	140.93	140.81	140.83	140.85	140.80	140.69	140.55
BH99-4C	140.61	140.63	140.75	140.81	140.97	141.18	141.29	141.24	141.38	141.69	141.86	141.83	142.11	142.02	142.19	142.62	142.61	141.59	142.12
BH99-4D	142.52	143.84	145.09	145.13	145.42	145.88	146.00	145.91	145.33	146.05	146.17	146.36	146.45	146.34	146.32	146.32	146.24	146.08	145.85
BH99-5A	115.13	115.29	115.40	115.44	115.45	115.48	115.54	115.58	115.52	115.52	115.53	115.53	115.55	115.56	115.57	115.58	115.60	115.61	115.62
BH99-5B	133.49	138.73	140.55	140.58	141.06	141.41	141.47	141.50	141.75	141.72	142.05	141.76	141.71	141.72	141.71	141.68	141.70	141.68	141.63
BH99-5C	133.48	133.68	140.39	130.43	136.00	136.51	141.60	136.58	135.32	135.40	135.89	136.33	137.04	137.41	137.75	137.99	138.90	139.77	141.05
BH99-6A	114.33	114.95	115.50	115.52	116.17	116.85	116.91	116.98	119.26	120.89	122.14	123.91	125.29	127.30	128.10	129.26	131.14	132.09	133.48
BH99-6B	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	121.05	121.15	121.63	127.81	129.17	131.96	132.12	132.55	133.62	134.19	135.36
BH99-6C	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	129.04	129.97	130.68	129.57	130.45	130.60	131.51	133.49	134.48	135.13	135.92
BH03-7A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	26-Aug-00	9-Sep-00	23-Sep-00	15-Oct-00	29-Oct-00	11-Nov-00	27-Nov-00	9-Dec-00	22-Dec-00	29-Jan-01	15-Feb-01	5-Mar-01	16-Mar-01	16-Apr-01	30-Apr-01	14-May-01	18-Jun-01	3-Jul-01	16-Jul-01
BH99-1	146.37	145.60	145.56	145.73	147.71	146.95	148.43	148.55	148.66	Frozen	Frozen	Frozen	Frozen	148.28	149.03	148.48	146.66	146.31	146.50
BH99-2A	140.95	140.70	140.76	140.82	140.78	140.72	140.83	140.92	140.94	140.98	137.71	140.61	140.17	141.42	141.67	141.42	141.10	141.10	141.10
BH99-2B	146.03	144.74	144.70	144.78	144.73	144.67	145.96	146.05	146.07	145.77	142.70	146.02	145.09	146.00	146.05	144.97	144.81	144.81	144.81
BH99-3A	140.33	140.14	140.23	140.40	140.67	140.93	140.31	140.38	140.37	140.34	140.50	140.49	139.75	140.39	140.79	140.48	140.26	140.24	140.06
BH99-3B	139.93	139.80	139.88	140.03	140.19	140.75	139.85	140.00	139.97	139.94	140.08	140.02	139.41	139.98	140.28	140.12	139.95	139.80	139.67
BH99-3C	140.14	139.95	140.10	140.26	140.43	140.91	140.26	140.30	140.31	140.38	139.73	140.39	139.89	139.85	140.47	140.20	139.97	139.91	139.78
BH99-3D	140.38	140.13	140.28	140.55	140.84	141.15	140.32	140.39	140.44	140.47	139.88	140.48	139.97	140.16	140.51	140.29	140.05	140.11	139.89
BH99-4A	140.96	140.83	140.86	140.71	140.81	140.93	140.86	141.15	141.12	141.11	139.41	140.79	140.66	141.52	141.80	141.60	141.19	140.56	140.94
BH99-4B	140.40	140.29	140.35	140.37	140.33	140.31	140.25	140.44	140.46	140.42	140.58	140.58	140.58	140.58	140.92	140.69	140.40	139.80	140.23
BH99-4C	141.52	141.51	141.42	141.15	141.08	141.01	140.95	141.13	141.15	141.07	141.52	141.77	140.87	141.61	141.68	141.63	145.17	144.92	145.31
BH99-4D	145.69	145.44	145.55	145.48	145.44	145.41	145.48	145.87	145.90	146.00	146.03	146.19	145.54	145.99	146.45	146.22	144.68	144.75	144.80
BH99-5A	115.63	115.64	115.71	115.69	115.69	115.68	115.69	115.73	115.74	115.70	--	115.73	115.16	115.21	115.27	115.80	115.79	115.84	115.97
BH99-5B	141.61	141.64	141.64	141.61	141.59	141.60	141.03	141.46	141.44	141.61	--	141.77	141.24	141.96	141.45	141.97	141.97	141.96	141.98
BH99-5C	141.37	141.54	141.66	141.76	141.77	141.91	141.85	142.00	142.02	142.21	--	142.36	141.75	142.62	142.03	142.51	142.28	142.28	142.23
BH99-6A	134.89	135.59	136.26	137.45	138.04	138.29	138.47	138.75	138.77	138.40	137.49	138.57	138.78	139.68	139.87	139.87	128.87	131.18	132.93
BH99-6B	136.77	137.09	137.72	137.93	138.43	139.22	139.28	139.38	139.39	139.93	139.78	139.95	139.97	139.90	139.98	139.92	133.19	134.75	135.63
BH99-6C	137.83	138.92	139.54	139.98	140.09	140.20	140.15	138.24	138.27	140.21	140.11	140.23	140.63	140.32	140.31	140.18	136.04	137.44	138.37
BH03-7A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	30-Jul-01	13-Aug-01	26-Aug-01	17-Sep-01	3-Oct-01	15-Oct-01	29-Oct-01	12-Nov-01	4-Dec-01	31-Dec-01	18-Jan-02	15-Feb-02	1-Mar-02	15-Mar-02	2-Apr-02	15-Apr-02	1-May-02	14-May-02	31-May-02
BH99-1	146.35	146.24	147.79	149.40	147.28	148.12	148.18	148.35	149.26	148.89	148.42	148.42	148.42	148.42	148.35	149.48	149.18	149.81	148.90
BH99-2A	140.75	140.65	140.65	140.81	141.09	141.38	141.29	141.44	141.71	141.62	141.60	141.43	141.83	142.21	142.37	142.46	142.31	142.30	142.13
BH99-2B	144.68	144.69	144.69	145.98	146.48	146.68	146.53	146.65	146.79	146.27	145.90	145.70	146.38	146.47	146.77	146.64	146.53	146.55	145.97
BH99-3A	139.89	139.77	139.85	139.86	140.10	140.39	140.29	140.39	140.57	140.47	140.43	140.24	140.47	140.69	140.89	140.98	140.80	140.85	140.65
BH99-3B	139.49	139.36	139.43	139.54	139.80	140.00	139.71	139.80	139.98	139.86	139.81	139.67	139.78	140.00	140.16	140.24	140.08	140.12	139.98
BH99-3C	139.69	139.62	139.80	139.93	140.23	140.36	140.24	140.27	140.34	140.39	140.49	140.31	140.48	140.58	140.64	140.61	140.55	140.61	140.40
BH99-3D	139.80	139.75	140.00	140.22	140.41	140.55	140.45	140.51	140.39	140.45	140.49	140.34	140.51	140.51	140.71	140.68	140.59	140.64	140.31
BH99-4A	140.76	140.66	140.67	140.71	140.97	141.34	141.34	141.51	141.81	141.64	141.55	141.38	141.61	141.92	142.02	142.11	141.99	142.02	141.85
BH99-4B	140.02	139.92	139.97	140.04	140.28	140.58	140.45	140.56	140.82	140.67	140.57	140.45	140.56	140.87	141.06	141.11	140.95	141.01	140.80
BH99-4C	145.12	145.07	145.54	145.71	146.06	146.22	146.24	146.25	146.03	146.32	146.24	146.07	146.17	146.38	146.51	146.50	146.41	146.38	146.22
BH99-4D	145.04	144.95	145.62	144.70	145.55	145.91	146.05	146.15	142.98	145.87	146.10	146.16	142.78	144.75	146.00	146.35	146.40	146.43	143.05
BH99-5A	115.88	115.88	115.89	115.93	115.93	115.91	115.93	115.95	115.96	115.97	115.96	115.99	116.02	116.00	116.05	116.04	116.05	116.06	116.05
BH99-5B	141.96	141.97	141.91	141.96	141.95	141.95	141.97	141.96	142.04	142.11	142.11	142.05	142.00	142.17	142.11	142.14	142.25	142.28	142.23
BH99-5C	142.13	142.08	142.00	142.10	142.22	142.35	142.35	142.39	142.49	142.63	142.52	142.50	142.44	142.53	142.61	142.73	142.70	142.74	142.73
BH99-6A	134.39	135.56	136.34	126.40	129.04	130.81	132.59	134.14	116.04	119.64	122.35	126.52	115.84	117.77	121.29	122.24	124.95	126.97	119.74
BH99-6B	136.26	137.46	138.09	132.86	134.33	135.15	136.13	137.03	124.30	127.35	129.20	132.73	128.19	129.58	131.31	132.26	134.22	135.37	132.15
BH99-6C	136.27	137.48	138.25	133.81	135.15	135.92	136.43	138.21	127.44	129.55	130.93	132.91	127.89	129.08	130.51	131.56	132.91	134.51	131.44
BH03-7A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	14-Jun-02	28-Jun-02	16-Jul-02	2-Aug-02	12-Aug-02	30-Aug-02	16-Sep-02	2-Oct-02	15-Oct-02	22-Nov-02	18-Dec-02	15-Jan-03	12-Feb-03	18-Mar-03	17-Apr-03	28-Apr-03	24-May-03	21-Jun-03	16-Jul-03
BH99-1	149.32	149.90	149.77	149.61	149.19	149.64	148.91	148.50	148.49	150.13	149.33	149.33	149.80	149.88	147.82	147.82	148.45	148.56	147.83
BH99-2A	142.27	142.38	142.00	141.83	141.66	141.62	141.53	141.45	141.44	141.72	141.77	141.63	141.39	141.48	142.56	142.56	142.54	141.68	140.12
BH99-2B	146.67	147.04	146.24	145.81	145.47	145.81	145.30	145.52	145.22	145.68	145.97	145.58	145.45	145.56	145.70	145.70	147.10	146.02	145.12
BH99-3A	140.76	140.85	140.57	140.41	140.21	140.22	139.98	139.88	139.91	140.25	140.13	139.98	139.84	139.90	140.59	140.59	140.51	139.71	139.34
BH99-3B	140.05	140.13	139.90	139.75	139.64	139.69	139.70	139.53	139.49	139.79	139.58	139.42	139.21	139.28	139.96	139.96	139.99	140.11	139.43
BH99-3C	140.56	140.63	140.37	140.14	139.95	139.96	139.80	139.47	139.47	140.22	139.98	139.74	139.37	139.49	140.41	140.41	140.56	140.36	140.06
BH99-3D	140.61	140.67	140.36	140.20	140.01	140.03	139.91	139.60	139.38	140.38	140.05	139.81	139.33	139.45	140.37	140.37	140.58	140.28	140.08
BH99-4A	141.94	142.08	141.71	141.45	141.30	141.20	141.10	141.02	140.99	141.47	141.39	141.20	141.03	138.09	141.91	141.91	141.90	141.27	139.92
BH99-4B	140.92	141.48	140.73	140.55	140.42	140.35	140.21	140.10	140.12	140.46	140.37	140.10	140.07	140.10	140.75	140.75	140.70	140.27	139.46
BH99-4C	146.36	146.44	146.17	145.92	145.66	145.65	145.41	145.62	145.47	146.15	146.00	145.99	145.83	145.97	146.45	146.45	146.42	146.14	145.71
BH99-4D	145.12	146.02	146.22	146.06	145.87	143.03	144.61	145.14	145.33	146.05	144.71	145.86	145.85	146.00	146.33	146.33	146.37	144.87	145.63
BH99-5A	116.07	116.08	116.07	116.11	117.13	116.13	116.15	116.15	116.15	116.19	116.21	116.23	116.21	116.35	116.29	116.29	116.82	117.12	116.34
BH99-5B	142.28	142.23	142.30	142.30	142.28	142.26	142.20	142.23	142.14	142.19	142.18	142.21	142.11	142.18	142.28	142.28	142.29	142.26	142.27
BH99-5C	142.68	142.74	142.73	142.59	142.49	142.33	142.26	142.06	141.87	141.97	141.92	141.90	141.80	141.55	142.17	142.17	141.81	141.79	142.00
BH99-6A	121.72	123.78	126.33	128.69	129.95	122.93	125.40	127.45	129.07	133.53	123.88	127.91	132.15	122.97	123.58	--	132.34	132.46	131.94
BH99-6B	133.04	134.37	135.74	136.63	137.13	134.79	136.04	136.89	137.43	138.25	135.87	137.55	138.88	135.07	135.49	--	138.57	138.51	138.41
BH99-6C	132.56	133.96	135.06	135.74	136.16	134.61	135.34	135.81	136.30	139.38	135.48	136.46	139.14	134.48	134.82	--	138.89	138.82	138.77
BH03-7A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	7-Aug-03	8-Sep-03	23-Sep-03	3-Oct-03	10-Oct-03	27-Nov-03	16-Dec-03	27-Jan-04	20-Feb-04	24-Mar-04	16-Apr-04	15-May-04	10-Jun-04	12-Jul-04	17-Aug-04	8-Sep-04	7-Oct-04	21-Nov-04	18-Dec-04
BH99-1	147.52	--	144.02	--	147.64	149.23	148.97	Frozen	Frozen	Frozen	149.02	148.84	148.64	147.93	148.92	148.96	148.97	148.90	Frozen
BH99-2A	140.07	--	139.38	--	139.65	141.34	141.28	141.10	140.95	141.39	141.49	141.29	141.23	140.83	141.38	141.48	141.56	141.52	141.71
BH99-2B	146.14	--	145.36	--	145.75	146.99	147.30	145.23	145.07	145.90	145.98	145.74	145.63	145.03	145.41	145.46	145.44	145.40	145.50
BH99-3A	139.42	--	139.15	--	139.32	140.14	140.06	Frozen	140.21	140.01	139.95	138.22	138.07	137.86	137.46	138.17	138.00	138.08	138.69
BH99-3B	139.56	--	139.13	--	139.30	139.68	139.57	Frozen	139.92	139.57	139.54	135.74	136.91	136.62	135.01	135.02	135.76	135.70	136.40
BH99-3C	140.39	--	139.55	--	139.89	140.36	140.33	Frozen	140.46	140.34	140.25	139.80	139.49	139.33	138.86	138.42	139.17	139.26	140.04
BH99-3D	140.38	--	139.57	--	140.09	140.51	140.31	Frozen	140.52	140.27	140.19	139.76	139.58	139.33	138.78	138.55	139.44	139.52	140.07
BH99-4A	139.86	--	139.22	--	139.46	141.04	141.01	140.62	140.43	140.97	141.07	140.29	140.22	140.04	139.48	Monitoring wells decommissioned August 18, 2004			--
BH99-4B	139.54	--	139.21	--	139.46	140.31	140.23	139.93	139.72	140.15	140.24	138.74	138.98	138.61	138.50				--
BH99-4C	145.92	--	145.28	--	145.75	146.52	146.43	146.20	145.95	146.30	146.33	146.34	146.28	146.11	145.84				--
BH99-4D	145.71	--	145.09	--	145.43	146.32	145.24	146.10	146.00	145.13	145.10	146.32	146.23	146.05	145.79				--
BH99-5A	116.35	--	116.37	--	116.45	117.71	119.29	119.53	119.31	116.52	116.73	116.44	116.55	116.37	116.57				--
BH99-5B	142.28	--	142.16	--	142.17	142.22	142.25	142.27	142.04	142.15	142.29	142.14	142.22	141.68	142.19				--
BH99-5C	141.95	--	141.83	--	141.87	141.92	141.98	141.99	141.80	142.03	142.11	141.97	142.17	141.37	141.86				--
BH99-6A	130.90	127.65	112.24	119.56	119.63	128.37	123.60	128.59	132.91	128.57	128.26	135.02	128.97	128.63	135.86				--
BH99-6B	137.51	134.80	120.83	131.52	131.54	135.56	133.91	135.92	137.47	134.71	134.74	137.23	135.34	134.50	138.13				--
BH99-6C	137.12	134.68	138.26	131.46	131.49	135.51	134.08	135.85	138.12	134.59	134.64	137.88	135.32	135.17	139.07				--
BH03-7A	139.90	--	139.29	--	139.49	141.05	141.01	140.68	140.33	140.99	141.16	140.86	140.77	140.10	139.79	139.87	140.22	140.18	140.27
BH03-7B	139.61	--	139.28	--	139.52	140.37	140.29	140.08	139.78	140.21	140.24	138.63	138.70	138.37	138.20	138.30	138.52	138.56	138.76
BH03-7C	145.59	--	145.08	--	145.70	146.18	146.15	Frozen	145.55	146.01	146.11	146.09	146.00	145.38	145.17	145.20	145.67	145.72	145.83
BH03-7D	145.67	--	145.27	--	146.14	146.51	Frozen	Frozen	146.05	Frozen	146.33	146.03	145.94	145.30	145.14	145.18	146.31	146.35	146.41
BH03-8A	121.54	--	138.58	--	138.68	138.74	139.34	139.02	138.81	139.30	139.36	138.74	136.60	135.51	135.60	135.22	136.10	136.15	136.80
BH03-8B	126.19	--	126.43	--	126.97	129.04	131.22	140.59	140.33	140.77	140.81	140.19	139.09	138.24	140.19	140.40	140.91	140.91	141.52
BH03-8C	Dry	--	133.86	--	Dry	Dry	140.26	141.28	141.02	141.66	141.77	141.46	141.47	140.87	141.52	141.23	141.47	141.51	141.77
BH03-9A	130.72	--	130.50	--	112.35	113.63	114.42	114.18	116.07	117.29	117.98	123.62	126.01	124.67	131.78	132.84	130.77	130.85	130.88
BH03-9B	137.32	--	130.62	--	120.77	121.11	121.36	125.02	123.23	124.12	124.55	125.83	126.35	125.87	129.03	129.84	128.84	128.73	128.81
BH03-9C	136.92	--	117.88	--	138.96	140.02	139.95	Frozen	139.48	139.86	139.77	139.76	139.64	139.12	139.59	139.47	139.79	139.86	139.78
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	7-Jan-05	3-Feb-05	27-Mar-05	15-Apr-05	10-May-05	12-Jun-05	12-Jul-05	10-Aug-05	11-Sep-05	24-Oct-05	12-Nov-05	10-Dec-05	19-Jan-06	21-Feb-06	10-Mar-06	14-Apr-06	12-May-06	19-Jun-06	20-Jun-06
BH99-1	Frozen	Frozen	Frozen	149.33	149.16	148.45	148.47	148.10	148.76	148.65	148.55	Frozen	Frozen	Frozen	149.15	149.26	149.10	--	149.02
BH99-2A	141.19	140.85	141.72	141.84	141.49	141.35	141.31	141.23	141.57	141.48	141.55	141.63	142.03	141.75	141.83	141.92	141.98	--	141.91
BH99-2B	145.93	145.82	146.09	146.13	146.02	145.42	145.37	145.17	145.63	145.56	145.57	145.63	146.97	146.67	146.74	146.81	146.85	--	146.77
BH99-3A	138.66	138.59	139.14	139.79	138.94	139.64	139.66	139.30	139.82	139.71	139.76	139.82	140.46	140.12	140.17	140.21	140.67	--	140.65
BH99-3B	136.38	136.46	137.12	138.21	136.46	138.53	138.52	138.41	138.69	138.60	138.64	138.69	140.10	140.30	140.34	140.38	140.79	--	140.76
BH99-3C	140.02	139.54	140.54	140.40	140.13	139.90	139.87	139.31	140.05	139.97	139.99	140.04	140.43	140.11	140.18	140.28	140.59	--	140.54
BH99-3D	140.04	139.56	140.51	140.40	140.10	139.93	139.91	139.36	140.05	139.99	140.06	140.10	140.51	140.17	140.25	140.33	140.64	--	140.59
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	140.22	140.64	141.16	141.27	140.37	141.10	141.06	140.89	141.34	141.24	141.28	141.36	141.67	141.55	141.64	141.69	141.73	--	141.67
BH03-7B	138.81	138.60	139.57	139.71	138.97	139.97	139.93	139.81	140.18	140.10	140.13	140.24	140.62	140.50	140.59	140.67	140.71	--	140.69
BH03-7C	145.86	145.41	146.37	146.32	145.98	145.11	145.08	144.99	145.30	145.24	145.26	145.32	145.36	145.35	145.46	145.51	146.01	--	145.97
BH03-7D	146.43	Frozen	146.47	146.41	146.47	146.22	146.19	145.77	--	146.32	146.35	Frozen	Dry	Frozen	146.32	146.38	146.31	--	146.30
BH03-8A	136.75	136.93	137.43	138.14	136.85	138.46	138.42	137.78	138.74	138.63	138.62	138.69	139.33	139.24	139.33	139.41	140.20	--	140.16
BH03-8B	141.53	141.55	141.58	141.54	141.61	141.73	141.69	141.66	141.91	141.84	141.87	141.93	141.78	141.69	141.80	141.85	142.09	--	142.02
BH03-8C	141.76	141.42	141.87	141.87	141.86	141.39	141.35	141.06	141.59	141.50	141.55	141.64	141.76	141.68	141.75	141.80	142.15	--	142.08
BH03-9A	131.11	131.18	131.95	129.81	131.23	129.06	129.00	130.97	129.38	129.17	129.21	129.27	127.48	127.45	127.71	127.80	129.69	--	129.63
BH03-9B	128.99	129.03	129.97	126.02	129.05	124.56	124.51	127.80	124.91	124.62	124.66	130.74	123.39	123.35	123.57	123.62	125.42	--	125.47
BH03-9C	139.87	139.77	140.07	140.01	140.02	139.69	139.62	139.16	139.90	139.77	139.79	129.87	139.98	139.88	139.97	140.07	139.14	--	139.27
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	140.98	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	140.98	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	142.16	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-12A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	133.00	--
BH05-12B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	131.97	--
BH05-12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	132.95	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	12-Jul-06	20-Aug-06	15-Sep-06	18-Oct-06	11-Nov-06	28-Dec-06	15-Jan-07	1-Feb-07	15-Feb-07	8-Mar-07	22-Apr-07	18-May-07	14-Jun-07	11-Jul-07	27-Jul-07	15-Aug-07	7-Sep-07	18-Oct-07	29-Oct-07
BH99-1	148.84	148.73	148.85	149.15	149.26	149.35	149.02	--	Frozen	Frozen	148.59	148.42	Blocked	Blocked	--	148.90	148.89	148.82	--
BH99-2A	141.85	141.76	141.67	141.74	141.85	141.88	141.83	--	141.76	140.53	139.88	139.79	Buried	138.61	--	138.67	138.53	138.53	--
BH99-2B	146.66	146.59	146.44	146.53	146.60	146.74	146.67	--	146.58	145.00	144.53	144.41	Buried	145.82	--	145.85	145.61	145.61	--
BH99-3A	140.25	137.26	137.16	137.26	137.28	137.37	137.30	--	137.22	135.49	135.12	135.95	135.75	135.63	--	135.84	135.51	135.52	--
BH99-3B	139.97	135.62	135.56	135.63	135.59	135.62	135.48	--	135.42	130.66	132.36	130.47	130.17	130.11	--	131.24	129.59	129.76	--
BH99-3C	140.35	138.96	138.86	139.04	139.09	139.27	139.23	--	139.18	Frozen	139.16	137.53	137.65	136.54	--	136.50	136.42	136.38	--
BH99-3D	140.34	138.86	138.76	138.98	139.03	139.22	139.17	--	139.10	Frozen	139.08	137.81	138.00	Dry	--	Dry	Dry	Dry	--
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	141.60	141.27	141.14	141.22	141.20	141.26	141.15	--	141.05	138.01	138.40	138.71	138.56	138.43	--	138.50	137.33	137.39	--
BH03-7B	140.65	140.41	140.36	140.41	140.39	140.49	140.41	--	140.35	136.24	136.51	136.87	136.55	137.52	--	136.66	136.42	136.51	--
BH03-7C	145.80	145.69	145.56	145.68	145.82	145.81	145.82	--	Frozen	144.30	144.41	144.60	144.61	144.34	--	144.29	144.24	144.30	--
BH03-7D	146.24	146.05	146.07	146.27	146.39	146.36	Frozen	--	Frozen	144.41	144.55	144.78	144.75	144.51	--	144.66	144.69	144.74	--
BH03-8A	139.62	135.96	135.90	135.96	135.92	136.03	135.96	--	135.85	132.50	132.85	128.41	127.90	127.83	--	127.76	127.19	127.23	--
BH03-8B	141.91	141.80	141.71	141.79	141.82	141.81	141.73	--	141.70	141.56	141.75	141.68	141.84	141.20	--	141.76	140.47	140.52	--
BH03-8C	141.57	141.18	141.11	141.25	141.32	141.32	141.28	--	141.24	141.22	141.06	141.78	141.63	141.58	--	141.35	141.50	141.53	--
BH03-9A	129.51	129.37	129.41	129.47	129.62	129.53	129.48	--	129.39	118.49	118.82	127.01	128.35	131.27	--	133.24	133.88	133.96	--
BH03-9B	125.43	125.33	125.32	125.41	125.63	125.45	125.35	--	125.27	123.17	124.54	124.69	125.39	126.22	--	127.09	127.91	127.94	--
BH03-9C	139.19	139.12	139.17	139.37	139.75	139.64	139.56	--	Frozen	138.71	138.78	139.17	139.16	139.22	--	139.13	139.21	139.30	--
BH05-10A	--	--	--	--	--	--	137.65	136.96	--	--	--	--	--	--	137.07	--	--	--	136.67
BH05-10B	--	--	--	--	--	--	137.65	136.96	--	--	--	--	--	--	137.04	--	--	--	136.78
BH05-10C	--	--	--	--	--	--	139.68	139.03	--	--	--	--	--	--	139.38	--	--	--	139.42
BH05-11	--	--	--	--	--	--	140.94	140.45	--	--	--	--	--	--	140.23	--	--	--	138.94
BH05-12A	--	--	--	--	--	--	133.66	133.32	--	--	--	--	--	--	133.19	--	--	--	132.97
BH05-12B	--	--	--	--	--	--	133.68	133.33	--	--	--	--	--	--	133.18	--	--	--	132.89
BH05-12C	--	--	--	--	--	--	132.93	132.72	--	--	--	--	--	--	132.61	--	--	--	132.48
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	15-Nov-07	11-Dec-07	9-Jan-08	6-Feb-08	27-Mar-08	24-Apr-08	12-May-08	23-May-08	23-Jun-08	8-Jul-08	19-Aug-08	23-Sep-08	22-Oct-08	26-Nov-08	3-Dec-08	7-Jan-09	12-Jan-09	5-Feb-09	4-Mar-09
BH99-1	148.96	148.88	147.33	147.14	146.52	148.02	147.93	--	147.93	147.94	147.93	147.00	--	--	147.24	--	--	--	Frozen
BH99-2A	138.66	138.58	139.59	139.78	144.99	136.54	136.52	--	136.72	136.67	136.58	142.81	--	--	143.37	--	--	--	Frozen
BH99-2B	145.73	145.61	146.58	146.73	Frozen	144.66	144.63	--	144.84	144.78	144.74	144.28	--	--	144.99	--	--	--	Frozen
BH99-3A	135.66	135.43	137.22	137.26	136.06	135.75	135.71	--	135.59	135.54	135.50	135.18	--	--	136.90	--	--	--	136.96
BH99-3B	129.84	129.47	132.55	132.72	129.92	129.30	129.28	--	129.91	129.86	129.75	128.73	--	--	129.23	--	--	--	129.32
BH99-3C	136.56	136.54	140.70	140.66	138.37	137.66	137.64	--	138.16	138.16	138.09	138.00	--	--	138.17	--	--	--	138.03
BH99-3D	Dry	Dry	140.40	140.38	139.66	138.71	138.69	--	139.29	139.26	139.27	137.33	--	--	137.62	--	--	--	139.36
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	137.43	137.36	138.86	138.99	137.90	137.45	137.43	--	137.69	137.66	137.59	135.64	--	--	136.13	--	--	--	136.17
BH03-7B	136.55	136.43	137.00	136.98	137.02	136.53	136.51	--	136.69	136.62	136.56	135.94	--	--	136.46	--	--	--	136.71
BH03-7C	144.34	144.31	144.88	144.90	144.74	144.87	144.84	--	144.71	144.68	144.52	144.40	--	--	144.47	--	--	--	144.23
BH03-7D	144.87	144.79	144.95	144.99	145.05	145.51	145.47	--	146.32	146.31	146.26	145.48	--	--	146.36	--	--	--	Frozen
BH03-8A	127.32	127.20	128.55	128.56	127.65	126.65	126.61	--	126.85	126.80	126.68	125.85	--	--	127.78	--	--	--	129.18
BH03-8B	140.59	140.50	140.84	140.94	141.36	141.62	141.60	--	141.64	141.63	141.58	141.66	--	--	141.77	--	--	--	141.71
BH03-8C	141.62	141.52	142.62	142.67	142.15	141.67	141.64	--	142.00	141.96	141.96	141.45	--	--	142.11	--	--	--	141.96
BH03-9A	134.07	133.90	134.77	134.67	130.69	133.31	133.28	--	134.58	134.38	134.27	136.04	136.59	137.02	137.10	137.09	--	138.35	138.57
BH03-9B	128.03	128.10	129.12	129.27	124.69	126.33	126.28	--	127.69	127.43	127.13	130.84	131.53	132.28	132.37	132.39	--	133.30	133.65
BH03-9C	139.46	139.25	139.53	139.59	139.54	139.46	139.41	--	139.52	139.54	139.47	139.31	139.31	139.36	139.42	139.46	--	139.20	139.46
BH05-10A	--	--	136.87	--	--	--	--	136.99	--	--	--	--	--	--	--	--	136.10	--	--
BH05-10B	--	--	136.87	--	--	--	--	136.98	--	--	--	--	--	--	--	--	136.13	--	--
BH05-10C	--	--	138.93	--	--	--	--	139.04	--	--	--	--	--	--	--	--	138.50	--	--
BH05-11	--	--	140.38	--	--	--	--	140.43	--	--	--	--	--	--	--	--	138.70	--	--
BH05-12A	--	--	133.24	--	--	--	--	133.34	--	--	--	--	--	--	--	--	132.89	--	--
BH05-12B	--	--	133.14	--	--	--	--	133.36	--	--	--	--	--	--	--	--	132.80	--	--
BH05-12C	--	--	132.59	--	--	--	--	132.75	--	--	--	--	--	--	--	--	132.43	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	8-Apr-09	6-May-09	3-Jun-09	14-Jul-09	21-Jul-09	10-Aug-09	3-Sep-09	4-Oct-09	6-Oct-09	10-Nov-09	10-Dec-09	20-Jan-10	3-Feb-10	23-Feb-10	12-Mar-10	1-Apr-10	4-May-10	2-Jun-10	5-Jul-10
BH99-1	147.71	147.28	147.23	147.05	--	147.00	146.73	146.70	--	146.70	146.90	146.12	147.58	--	147.82	147.59	147.30	147.05	146.87
BH99-2A	144.71	135.77	135.73	134.93	--	134.85	134.52	134.68	--	134.57	134.41	134.53	134.48	--	135.35	134.89	134.71	133.42	133.61
BH99-2B	145.23	144.63	144.61	--	--	144.49	144.53	144.83	--	144.56	144.77	144.75	144.84	--	145.24	144.89	144.65	143.90	143.98
BH99-3A	136.76	135.62	135.56	135.46	--	135.34	135.22	134.99	--	134.95	135.06	134.50	134.46	--	136.10	135.42	135.37	134.35	134.53
BH99-3B	130.59	127.56	127.48	127.48	--	127.38	128.04	127.15	--	127.51	126.98	127.26	127.25	--	129.65	127.45	127.30	126.96	127.70
BH99-3C	140.26	137.94	137.89	138.51	--	138.39	138.22	138.53	--	138.31	138.50	137.71	137.70	--	140.05	139.04	138.95	136.78	137.36
BH99-3D	140.49	139.01	138.95	138.58	--	138.43	139.22	140.15	--	139.63	139.51	139.09	139.08	--	140.64	139.64	139.61	137.71	138.88
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	137.35	136.10	136.03	135.85	--	135.77	135.35	135.61	--	134.82	135.33	134.38	134.40	--	136.29	135.82	135.00	134.22	134.48
BH03-7B	137.56	136.43	136.40	136.28	--	136.18	135.98	135.89	--	136.01	135.94	135.24	135.25	--	136.85	136.33	135.80	135.08	135.32
BH03-7C	144.73	144.43	144.38	144.44	--	144.36	144.30	144.41	--	144.31	144.39	143.97	143.98	--	144.35	144.25	143.98	143.72	143.80
BH03-7D	146.63	146.29	146.26	146.45	--	146.36	146.34	146.42	--	146.38	146.46	146.32	146.31	--	146.53	146.39	146.28	146.02	146.10
BH03-8A	128.45	125.22	125.15	125.52	--	125.41	125.04	124.02	--	124.57	123.62	124.47	124.46	--	126.57	123.93	123.40	122.06	122.95
BH03-8B	142.04	142.00	141.95	141.55	--	141.44	141.91	141.77	--	141.04	141.13	140.84	140.86	--	141.19	141.30	141.01	140.71	140.50
BH03-8C	142.51	141.59	141.55	141.86	--	141.79	141.29	141.38	--	141.01	141.22	140.91	140.92	--	141.96	141.60	140.88	140.59	140.58
BH03-9A	138.83	138.93	138.85	139.07	--	138.93	139.17	139.16	--	139.14	139.18	139.11	139.12	--	139.08	139.08	139.10	139.06	139.01
BH03-9B	134.19	134.41	134.37	135.68	--	135.55	135.47	135.74	--	135.97	136.23	136.40	136.40	--	135.76	135.93	136.15	136.32	137.46
BH03-9C	139.68	139.44	139.33	139.51	--	139.45	139.40	139.38	--	139.36	139.40	139.13	139.12	--	139.56	139.45	139.26	139.12	139.17
BH05-10A	137.41	--	--	--	136.44	--	--	--	135.80	--	--	--	--	135.38	--	136.22	--	135.11	--
BH05-10B	137.38	--	--	--	136.42	--	--	--	135.78	--	--	--	--	135.36	--	136.20	--	135.10	--
BH05-10C	139.48	--	--	--	138.89	--	--	--	138.38	--	--	--	--	138.06	--	138.82	--	137.90	--
BH05-11	141.57	--	--	--	141.05	--	--	--	140.64	--	--	--	--	140.45	--	140.61	--	140.13	--
BH05-12A	133.61	--	--	--	132.38	--	--	--	131.83	--	--	--	--	131.67	--	132.91	--	131.33	--
BH05-12B	133.56	--	--	--	132.38	--	--	--	131.83	--	--	--	--	131.64	--	132.77	--	131.35	--
BH05-12C	132.70	--	--	--	132.89	--	--	--	132.91	--	--	--	--	132.62	--	132.49	--	132.59	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	29-Aug-10	22-Sep-10	12-Oct-10	9-Nov-10	2-Dec-10	5-Jan-11	1-Feb-11	7-Mar-11	14-Apr-11	5-May-11	6-Jun-11	14-Jul-11	4-Aug-11	27-Sep-11	24-Oct-11	8-Nov-11	1-Dec-11	4-Jan-12	5-Feb-12
BH99-1	147.14	146.92	147.29	147.19	147.19	146.87	146.90	147.04	147.18	147.27	146.92	146.58	146.26	145.98	--	146.06	146.37	146.22	146.28
BH99-2A	134.66	133.91	134.49	135.49	135.49	134.22	134.24	134.10	135.44	135.28	134.12	133.74	132.69	132.32	134.25	133.16	134.65	133.42	133.97
BH99-2B	143.94	144.90	144.71	145.10	145.10	144.62	144.61	144.91	144.34	144.48	144.44	144.48	143.84	143.42	144.88	144.06	145.12	144.74	144.94
BH99-3A	134.52	134.93	135.18	135.81	135.81	135.13	135.16	134.91	135.78	135.57	135.13	134.65	133.82	133.79	135.01	133.94	135.02	134.30	134.71
BH99-3B	127.72	127.88	127.98	128.33	128.33	126.74	126.79	127.46	127.83	126.86	126.97	126.82	126.48	126.46	127.01	126.36	127.42	126.32	127.29
BH99-3C	137.39	138.27	137.92	140.37	140.37	138.57	138.63	139.85	140.22	139.14	137.62	137.53	136.48	136.46	139.60	137.85	140.24	137.53	139.25
BH99-3D	138.90	140.68	139.40	140.86	140.86	139.88	139.99	140.64	140.64	140.56	138.84	138.41	137.67	137.66	140.22	139.01	140.66	139.21	140.08
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	134.46	134.88	135.28	135.36	136.44	135.16	135.17	135.09	136.06	135.85	134.78	134.16	133.26	132.52	134.50	133.06	135.03	133.64	134.08
BH03-7B	135.30	135.68	135.97	136.15	136.71	135.97	135.99	135.71	136.64	136.50	134.91	135.36	134.40	133.83	135.72	134.50	135.82	134.97	135.41
BH03-7C	143.78	144.00	144.16	144.34	144.49	144.11	144.11	144.18	144.04	144.02	144.98	Damaged	Damaged	Damaged	145.73	144.99	145.10	144.99	145.02
BH03-7D	146.05	146.34	146.43	146.45	146.53	Frozen	Frozen	Frozen	146.54	146.48	Blocked	145.03	145.03	145.04	145.07	145.01	145.12	144.89	145.02
BH03-8A	123.04	123.29	123.78	123.72	123.15	123.04	123.08	123.49	123.53	121.92	122.82	122.71	122.42	120.42	122.55	122.38	122.27	122.63	122.52
BH03-8B	140.52	140.27	140.24	140.62	140.48	140.60	140.57	140.39	140.63	140.45	140.18	139.82	139.68	139.42	139.40	138.84	139.26	139.38	139.31
BH03-8C	140.58	140.43	140.55	140.89	141.05	141.04	141.09	141.09	141.01	143.12	140.37	140.14	139.92	139.80	140.38	139.98	140.30	140.00	139.97
BH03-9A	138.97	139.02	139.03	139.04	139.02	139.07	139.10	138.92	139.05	139.08	139.06	139.00	138.98	138.74	138.66	138.62	138.57	138.59	138.57
BH03-9B	137.37	133.87	136.95	137.01	137.13	137.31	137.39	137.46	137.63	137.71	137.78	137.89	137.93	138.00	138.02	138.40	137.99	138.04	138.07
BH03-9C	139.19	139.42	139.41	139.48	139.60	139.36	139.37	139.44	139.50	139.49	139.32	139.27	139.05	138.22	138.58	138.38	138.56	138.40	138.36
BH05-10A	--	--	135.95	--	--	--	--	135.68	--	--	135.86	--	--	135.82	--	--	135.77	--	--
BH05-10B	--	--	135.95	--	--	--	--	135.61	--	--	135.85	--	--	135.82	--	--	135.77	--	--
BH05-10C	--	--	138.56	--	--	--	--	138.20	--	--	138.79	--	--	138.75	--	--	138.18	--	--
BH05-11	--	--	140.44	--	--	--	--	140.67	--	--	141.05	--	--	141.00	--	--	140.94	--	--
BH05-12A	--	--	132.77	--	--	--	--	131.33	--	--	131.42	--	--	131.34	--	--	131.27	--	--
BH05-12B	--	--	132.54	--	--	--	--	131.41	--	--	131.44	--	--	131.37	--	--	131.29	--	--
BH05-12C	--	--	132.26	--	--	--	--	132.93	--	--	132.78	--	--	132.71	--	--	132.63	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	8-Mar-12	9-Apr-12	4-May-12	21-Jun-12	11-Jul-12	9-Aug-12	17-Sep-12	10-Oct-12	16-Nov-12	12-Dec-12	4-Jan-13	25-Feb-13	13-Mar-13	3-Apr-13	13-May-13	4-Jun-13	12-Jun-13	10-Jul-13	20-Aug-13
BH99-1	Frozen	146.56	146.44	146.53	146.29	145.77	146.38	146.42	146.33	146.30	146.24	146.22	147.14	146.20	146.27	--	146.21	146.20	146.05
BH99-2A	134.17	133.91	133.88	133.09	132.34	131.98	133.58	133.54	133.17	132.88	132.96	133.04	135.71	134.27	134.34	--	134.08	134.05	133.76
BH99-2B	145.67	144.15	144.13	144.10	143.62	143.35	144.80	144.81	144.76	144.77	144.56	144.08	145.46	144.71	144.78	--	144.77	144.74	144.83
BH99-3A	134.79	134.68	134.64	133.97	133.26	133.08	134.51	134.49	134.24	133.80	133.83	133.89	135.79	134.86	134.90	--	134.51	134.51	134.32
BH99-3B	126.64	126.09	126.11	125.81	125.70	125.73	126.42	126.40	126.44	125.91	126.73	125.90	129.12	127.05	127.08	--	126.04	126.02	126.20
BH99-3C	139.60	137.68	137.67	137.44	139.16	136.95	139.16	139.17	138.54	138.38	138.46	137.21	140.53	139.52	139.57	--	138.14	138.13	138.88
BH99-3D	139.74	138.86	138.78	138.36	138.08	137.35	140.54	140.59	139.81	140.18	138.83	138.23	140.75	140.04	140.12	--	139.15	139.14	139.53
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	134.42	134.01	134.15	133.24	132.48	132.26	133.81	133.77	133.37	133.09	134.39	133.28	136.27	134.28	134.32	--	134.01	133.99	133.72
BH03-7B	135.62	135.47	135.40	134.62	133.86	133.68	135.23	135.20	134.81	135.05	135.06	134.50	136.80	135.56	135.60	--	--	135.05	134.97
BH03-7C	144.98	145.02	145.04	144.99	144.00	144.99	144.99	145.00	145.01	145.00	144.41	145.11	145.07	145.14	145.20	--	145.12	145.11	145.09
BH03-7D	145.03	145.04	145.05	144.93	144.00	144.06	144.98	144.99	145.03	145.04	145.15	145.12	145.10	145.16	145.22	--	145.13	145.12	145.11
BH03-8A	122.54	122.29	122.22	121.77	121.91	122.32	122.43	122.40	123.15	121.60	121.82	122.52	122.50	123.52	123.57	--	121.84	121.83	122.28
BH03-8B	139.61	139.84	139.81	139.74	139.40	139.23	139.26	139.22	138.99	138.94	139.02	139.02	139.23	139.34	139.37	--	139.39	139.37	139.22
BH03-8C	141.06	140.39	140.39	139.90	139.58	139.45	140.05	140.08	139.36	139.58	139.87	140.34	141.10	140.37	140.43	--	139.82	139.80	139.35
BH03-9A	138.58	138.64	138.59	138.52	138.40	138.19	138.21	138.19	138.37	138.76	138.61	138.55	138.58	138.59	138.64	--	138.59	138.55	138.53
BH03-9B	138.10	138.13	138.09	138.12	138.13	138.14	138.14	138.13	138.14	138.29	138.04	138.20	138.23	138.23	138.26	--	138.25	138.20	138.28
BH03-9C	138.76	138.42	138.45	138.31	138.11	137.96	138.53	138.54	138.45	138.40	138.41	138.40	138.56	138.48	138.49	--	138.48	138.45	138.46
BH05-10A	136.11	--	--	134.72	--	--	--	--	--	136.02	--	--	136.57	--	--	135.28	--	--	--
BH05-10B	136.10	--	--	134.72	--	--	--	--	--	136.02	--	--	136.58	--	--	135.27	--	--	--
BH05-10C	138.53	--	--	137.90	--	--	--	--	--	138.56	--	--	138.54	--	--	138.43	--	--	--
BH05-11	140.96	--	--	140.54	--	--	--	--	--	140.99	--	--	141.16	--	--	140.38	--	--	--
BH05-12A	131.70	--	--	131.12	--	--	--	--	--	131.36	--	--	131.35	--	--	131.24	--	--	--
BH05-12B	131.64	--	--	131.16	--	--	--	--	--	131.38	--	--	131.36	--	--	131.27	--	--	--
BH05-12C	132.94	--	--	132.63	--	--	--	--	--	132.69	--	--	132.71	--	--	132.64	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	23-Sep-13	21-Oct-13	8-Nov-13	6-Dec-13	9-Jan-14	4-Feb-14	10-Mar-14	2-Apr-14	5-May-14	27-Jun-14	28-Jul-14	21-Aug-14	17-Sep-14	3-Oct-14	14-Nov-14	7-Dec-14	21-Jan-15	10-Feb-15	11-Mar-15
BH99-1	146.14	146.20	146.14	146.04	146.06	146.04	146.00	145.98	145.97	146.57	145.97	146.48	146.36	146.12	145.92	146.03	144.61	143.63	143.43
BH99-2A	135.42	135.08	135.17	135.15	135.07	135.06	134.18	134.20	134.17	136.24	133.50	134.93	134.45	133.58	133.52	133.69	133.25	132.80	132.96
BH99-2B	145.30	145.30	145.35	145.24	145.29	145.27	144.88	144.86	144.83	146.30	144.39	145.21	144.95	144.52	144.51	144.56	144.05	143.54	144.44
BH99-3A	135.52	135.39	134.97	134.35	134.13	134.11	134.06	134.08	134.05	136.09	133.93	135.08	134.75	134.16	134.15	134.20	133.92	133.50	133.39
BH99-3B	127.96	127.94	127.59	126.84	126.39	126.38	126.17	126.20	126.19	127.20	125.87	126.57	126.21	126.01	126.02	126.04	126.11	126.06	125.98
BH99-3C	140.34	140.32	139.77	139.10	138.75	138.73	137.89	137.84	137.81	140.29	137.06	138.82	138.54	137.47	137.65	137.73	137.12	136.53	136.62
BH99-3D	140.63	140.62	140.66	140.68	140.12	140.10	139.11	139.07	139.05	140.59	138.28	140.62	139.89	138.79	139.07	139.09	138.10	137.44	137.30
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	135.61	135.13	134.48	133.74	133.36	133.33	133.26	133.22	133.23	136.57	133.25	134.73	134.33	133.42	133.33	133.38	133.06	132.68	132.70
BH03-7B	136.52	136.27	135.56	134.97	134.60	134.58	134.55	134.59	134.56	137.20	134.52	--	--	134.66	134.59	134.61	137.29	133.83	133.81
BH03-7C	145.38	145.27	145.38	145.60	145.50	145.43	145.31	145.29	145.23	145.07	145.01	145.06	145.02	145.03	145.07	145.08	Frozen	Frozen	Frozen
BH03-7D	145.41	145.29	145.47	145.54	145.68	145.63	145.32	145.30	145.30	145.06	145.04	145.08	145.05	145.06	145.10	145.09	145.05	144.22	145.01
BH03-8A	123.32	123.66	123.45	122.13	123.18	123.15	123.25	123.23	123.21	Monitoring wells no longer accessible due to proximity to quarry edge.			--	--	--	--	--	--	--
BH03-8B	138.75	138.67	138.51	138.20	138.12	138.09	138.02	138.06	138.05				--	--	--	--	--	--	--
BH03-8C	137.57	138.82	--	138.80	138.81	138.80	138.93	138.99	138.96				--	--	--	--	--	--	--
BH03-9A	138.55	138.58	138.60	138.59	139.56	139.53	138.65	138.67	138.63	138.68	138.64	138.64	138.66	138.65	138.61	138.57	138.08	138.54	138.40
BH03-9B	138.29	138.31	138.30	138.33	138.34	138.31	138.46	138.45	138.41	138.40	138.38	138.41	138.42	138.43	138.43	138.42	138.43	138.44	138.46
BH03-9C	138.64	138.60	138.57	138.56	138.46	138.43	138.72	138.51	138.48	138.78	138.46	138.67	138.55	138.48	138.47	138.48	138.38	138.24	138.20
BH05-10A	--	136.15	135.77	135.04	--	--	135.06	--	--	136.93	--	--	135.48	--	--	135.42	--	--	--
BH05-10B	--	136.16	135.77	135.02	--	--	134.98	--	--	136.94	--	--	135.50	--	--	135.42	--	--	--
BH05-10C	--	138.74	138.39	138.02	--	--	138.11	--	--	139.78	--	--	138.80	--	--	138.62	--	--	--
BH05-11	--	141.41	141.36	141.30	--	--	141.32	--	--	141.91	--	--	141.30	--	--	141.23	--	--	--
BH05-12A	--	Damaged	Damaged	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	--
BH05-12B	--	Damaged	Damaged	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	--
BH05-12C	--	133.72	133.52	133.46	--	--	Frozen	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	--
BH13-16A	--	--	--	130.36	130.81	130.78	131.09	131.04	131.00	129.86	130.23	129.60	129.77	129.58	129.67	133.55	130.68	130.45	130.48
BH13-16B	--	--	--	133.65	133.59	133.47	133.59	133.63	133.60	134.80	133.16	133.95	133.96	133.56	133.47	133.57	133.26	132.99	131.85
BH13-16C	--	--	--	138.20	139.51	139.48	140.59	140.56	140.53	141.40	141.00	141.41	141.66	141.66	141.67	141.68	141.70	141.38	141.17
BH13-16D	--	--	--	136.49	142.21	142.15	142.54	142.53	142.50	142.67	141.78	142.47	142.26	142.01	142.00	142.04	141.94	141.60	141.53
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	25-Mar-15	6-Apr-15	6-May-15	24-Jun-15	16-Jul-15	21-Aug-15	18-Sep-15	9-Oct-15	6-Nov-15	7-Dec-15	13-Jan-16	3-Feb-16	18-Mar-16	13-Apr-16	10-May-16	3-Jun-16	4-Jul-16	3-Aug-16	19-Sep-16
BH99-1	--	144.74	144.77	145.26	144.52	145.21	145.87	145.27	145.58	145.60	145.64	145.61	145.93	145.60	145.57	145.56	145.54	146.03	146.34
BH99-2A	--	134.87	134.16	134.14	133.31	135.16	134.73	133.33	134.18	134.28	134.31	134.26	135.96	135.23	135.29	135.26	135.21	134.87	134.34
BH99-2B	--	145.61	144.68	144.80	144.13	145.31	144.94	144.20	144.29	144.25	144.27	144.30	145.53	145.24	145.17	145.02	144.97	144.86	144.73
BH99-3A	--	135.13	134.53	134.61	133.87	135.23	135.05	133.94	134.37	134.36	134.42	134.37	135.72	135.34	135.26	135.14	135.16	136.38	137.48
BH99-3B	--	127.11	126.28	126.27	126.09	127.74	127.00	126.39	126.70	126.89	126.92	126.90	128.84	127.48	127.37	127.30	127.35	127.08	126.54
BH99-3C	--	140.10	137.59	138.07	136.68	138.90	139.53	137.36	137.67	137.66	137.69	137.71	140.80	140.23	140.22	140.16	140.13	139.81	138.67
BH99-3D	--	140.61	138.80	139.04	138.21	140.70	140.06	138.81	139.22	139.16	139.18	139.20	140.86	140.66	140.77	140.59	140.58	140.57	140.60
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	--	134.76	134.05	134.05	133.22	135.13	134.60	133.18	133.31	133.29	133.32	133.29	136.49	135.50	135.47	135.43	135.30	135.14	134.34
BH03-7B	--	135.79	135.22	135.20	134.28	136.10	135.72	134.34	134.74	134.72	134.75	134.74	136.80	136.36	136.30	136.26	135.96	135.81	135.49
BH03-7C	--	145.42	145.11	145.98	145.70	145.93	145.84	145.58	145.72	145.75	145.75	145.65	145.03	144.99	144.96	144.90	144.79	144.84	144.97
BH03-7D	--	145.44	145.14	146.00	145.73	145.96	145.86	145.60	145.73	145.75	145.76	145.76	145.06	144.71	144.76	144.75	144.71	144.86	145.01
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	--	138.49	138.57	138.59	138.55	138.50	138.51	138.50	138.49	138.51	138.54	138.52	138.69	138.63	138.62	138.60	138.55	138.53	138.55
BH03-9B	--	138.45	138.46	138.49	138.48	138.50	138.52	138.52	138.53	138.54	138.58	138.57	138.57	138.54	138.57	138.59	138.59	138.61	138.60
BH03-9C	--	138.79	138.56	138.51	138.42	138.65	138.55	138.50	138.53	138.59	138.63	138.61	138.83	138.70	138.66	138.65	138.65	138.61	138.58
BH05-10A	133.94	--	--	135.26	--	--	135.72	--	135.51	--	--	--	136.46	--	135.62	--	--	135.33	135.25
BH05-10B	133.95	--	--	135.27	--	--	135.73	--	135.51	--	--	--	136.48	--	135.62	--	--	135.36	135.27
BH05-10C	137.19	--	--	138.41	--	--	138.75	--	138.64	--	--	--	139.30	--	138.64	--	--	138.00	137.88
BH05-11	140.39	--	--	141.17	--	--	141.43	--	141.34	--	--	--	142.45	--	141.32	--	--	141.00	140.91
BH05-12A	Damaged	--	--	Damaged	--	--	Damaged	--	Damaged	--	--	--	Damaged	--	Damaged	--	--	Damaged	Damaged
BH05-12B	Damaged	--	--	Damaged	--	--	Damaged	--	Damaged	--	--	--	Damaged	--	Damaged	--	--	Damaged	Damaged
BH05-12C	Damaged	--	--	Damaged	--	--	Damaged	--	Damaged	--	--	--	Damaged	--	Damaged	--	--	Damaged	Damaged
BH13-16A	--	130.54	129.79	129.96	129.38	129.00	129.11	128.89	129.00	129.01	129.04	129.00	130.48	130.26	130.19	130.16	130.10	129.89	129.24
BH13-16B	--	134.15	133.64	133.59	133.00	133.64	133.84	133.11	133.42	133.38	133.42	133.40	134.46	134.21	134.13	134.03	133.92	133.72	133.16
BH13-16C	--	142.46	142.11	142.23	141.75	141.94	142.04	141.67	141.78	141.72	141.75	141.74	142.46	142.45	142.47	142.41	142.40	142.23	141.45
BH13-16D	--	142.80	142.36	142.43	141.99	142.51	142.47	141.88	142.19	142.16	142.14	142.16	142.83	142.78	142.80	142.75	142.73	142.42	142.03
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	12-Oct-16	8-Nov-16	9-Dec-16	4-Jan-17	3-Feb-17	14-Mar-17	7-Apr-17	5-May-17	2-Jun-17	20-Jul-17	2-Aug-17	5-Sep-17	2-Oct-17	2-Nov-17	1-Dec-17	4-Jan-18	2-Feb-18	2-Mar-18	22-Mar-18
BH99-1	146.20	146.27	146.25	146.32	145.87	145.82	146.70	146.26	145.57	145.70	145.63	145.73	145.70	145.75	145.58	145.14	145.43	145.56	--
BH99-2A	134.45	134.39	134.40	134.60	133.88	134.82	136.44	135.80	134.85	134.88	134.83	134.86	134.87	134.89	134.47	133.40	133.68	135.29	--
BH99-2B	144.78	144.77	144.97	145.34	144.76	144.87	145.71	145.43	144.95	144.90	144.90	144.87	144.84	144.92	145.00	143.91	144.17	145.17	--
BH99-3A	137.25	137.39	137.44	137.54	137.43	137.45	137.62	137.56	137.45	137.34	137.39	137.55	137.46	137.59	137.51	135.48	136.27	--	137.12
BH99-3B	126.88	126.77	126.84	127.01	126.38	126.45	128.53	127.82	126.49	126.70	126.68	126.52	126.61	126.67	126.44	125.60	126.65	--	125.82
BH99-3C	138.93	138.78	139.77	139.42	138.82	139.74	140.92	140.49	139.80	139.75	139.73	139.77	139.68	139.74	140.18	137.63	138.49	--	138.76
BH99-3D	140.58	140.56	140.60	140.64	139.91	140.03	141.09	140.69	140.41	140.38	140.30	140.36	140.28	140.32	140.65	138.37	138.69	--	139.78
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	134.83	134.61	134.36	134.52	133.72	134.86	137.01	136.09	134.84	134.87	134.89	134.98	134.88	135.02	134.31	133.10	133.30	135.06	--
BH03-7B	135.60	135.59	135.56	135.75	134.97	135.99	136.96	136.41	135.90	135.97	135.89	136.03	135.92	135.98	135.48	134.31	135.30	136.12	--
BH03-7C	144.96	144.95	144.97	144.99	144.99	144.99	145.02	144.94	145.02	144.98	144.95	144.97	144.95	144.92	144.99	Frozen	Frozen	144.98	--
BH03-7D	145.01	145.02	145.01	145.02	145.01	145.07	145.04	145.05	145.04	145.01	144.97	144.99	145.03	144.96	145.01	145.00	145.01	145.02	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	138.54	138.54	138.51	138.61	138.62	138.63	138.76	138.69	138.76	138.71	138.67	138.69	138.69	138.71	138.67	138.69	138.65	138.70	--
BH03-9B	138.60	138.59	138.61	138.67	138.56	138.64	138.62	138.65	138.68	138.61	138.63	138.63	138.67	138.77	138.70	138.72	138.68	138.73	--
BH03-9C	138.61	138.61	138.65	138.74	138.67	138.72	139.18	139.07	138.73	138.72	138.70	138.71	138.72	138.79	138.67	138.54	138.67	138.78	--
BH05-10A	--	--	135.48	--	--	135.80	--	--	135.74	--	--	135.78	--	135.76	--	--	--	135.91	--
BH05-10B	--	--	135.51	--	--	135.82	--	--	135.77	--	--	135.78	--	135.88	--	--	--	135.94	--
BH05-10C	--	--	138.65	--	--	138.97	--	--	139.12	--	--	139.09	--	139.05	--	--	--	139.20	--
BH05-11	--	--	141.71	--	--	142.06	--	--	142.03	--	--	142.07	--	142.02	--	--	--	Frozen	--
BH05-12A	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	Damaged	--	--	--	Damaged	--
BH05-12B	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	Damaged	--	--	--	Damaged	--
BH05-12C	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	--	Damaged	--	Damaged	--	--	--	Damaged	--
BH13-16A	129.50	129.39	129.11	130.75	130.50	130.11	130.33	130.10	129.64	129.37	129.33	129.74	129.38	129.62	128.57	130.53	130.51	129.45	--
BH13-16B	133.40	133.29	133.54	133.55	133.11	133.94	133.76	133.43	133.16	132.79	132.74	132.48	131.43	132.62	132.40	131.57	131.56	132.52	--
BH13-16C	141.76	141.62	142.13	142.18	142.29	142.37	142.39	142.33	142.22	142.23	142.20	141.98	141.53	142.14	142.27	141.82	141.84	142.39	--
BH13-16D	142.18	142.14	142.54	142.70	142.57	142.65	142.88	142.74	142.68	142.52	142.49	142.35	141.71	142.45	142.56	142.06	142.26	142.79	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	3-Apr-18	1-May-18	15-Jun-18	9-Jul-18	18-Jul-18	22-Aug-18	23-Aug-18	11-Sep-18	17-Sep-18	5-Oct-18	18-Oct-18	22-Nov-18	23-Nov-18	11-Dec-18	11-Jan-19	15-Feb-19	27-Feb-19	27-Mar-19	4-Apr-19
BH99-1	145.82	145.90	145.17	142.30	--	--	146.11	--	145.66	--	145.89	--	145.69	145.78	145.59	145.73	--	145.65	--
BH99-2A	133.78	133.83	134.44	132.94	--	--	134.87	--	132.93	--	133.48	--	133.76	134.33	133.61	133.04	--	135.20	--
BH99-2B	144.20	144.25	144.20	143.33	--	--	144.88	--	143.22	--	144.03	--	144.54	144.76	144.15	144.47	--	145.11	--
BH99-3A	136.25	136.14	137.46	135.17	--	--	137.46	--	135.74	--	137.44	--	137.45	137.45	137.45	137.46	--	137.54	--
BH99-3B	126.75	126.95	125.93	125.62	--	--	125.47	--	125.78	--	125.93	--	125.98	126.15	125.76	125.91	--	126.92	--
BH99-3C	138.46	138.48	139.49	137.20	--	--	137.94	--	138.10	--	139.17	--	138.71	139.58	138.38	138.52	--	140.61	--
BH99-3D	138.45	138.59	140.57	137.93	--	--	140.38	--	138.25	--	139.55	--	140.07	139.92	138.97	140.23	--	140.66	--
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	133.29	133.39	133.98	132.63	--	--	134.68	--	132.90	--	133.42	--	133.72	134.68	134.05	134.16	--	135.65	--
BH03-7B	135.27	135.29	Danaged	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	144.67	144.70	Dry	Dry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	145.00	145.04	145.02	145.01	--	--	145.00	--	144.97	--	144.92	--	144.88	145.00	144.98	144.97	--	145.00	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	138.73	138.79	138.71	138.64	--	--	138.63	--	138.66	--	138.55	--	138.60	138.64	138.64	138.63	--	138.63	--
BH03-9B	138.77	138.84	138.77	138.76	--	--	138.77	--	138.76	--	138.71	--	138.76	138.78	138.74	138.78	--	138.79	--
BH03-9C	138.81	138.84	138.68	138.44	--	--	138.64	--	138.56	--	138.69	--	138.62	138.67	138.62	138.64	--	138.91	--
BH05-10A	--	--	135.40	--	134.01	135.66	--	134.37	--	135.46	--	135.04	--	135.63	135.11	--	134.51	136.12	136.46
BH05-10B	--	--	135.44	--	134.04	135.69	--	134.39	--	135.48	--	135.05	--	135.66	135.15	--	134.55	136.14	136.47
BH05-10C	--	--	138.78	--	137.46	138.38	--	137.53	--	138.15	--	137.09	--	138.67	138.33	--	138.09	139.31	139.71
BH05-11	--	--	141.68	--	141.11	141.72	--	--	--	141.73	--	--	--	142.26	--	--	--	Frozen	Frozen
BH05-12A	--	--	Damaged	--	Damaged	Damaged	--	Damaged	--	Damaged	--	Damaged	--	Damaged	Damaged	--	Damaged	Damaged	Damaged
BH05-12B	--	--	Damaged	--	Damaged	Damaged	--	Damaged	--	Damaged	--	Damaged	--	Damaged	Damaged	--	Damaged	Damaged	Damaged
BH05-12C	--	--	Damaged	--	Damaged	Damaged	--	Damaged	--	Damaged	--	Damaged	--	Damaged	Damaged	--	Damaged	Damaged	Damaged
BH13-16A	129.80	129.71	128.73	128.86	--	--	128.36	--	128.46	--	128.22	--	128.12	128.37	129.62	129.73	--	129.17	--
BH13-16B	132.51	132.70	132.17	131.23	--	--	132.15	--	131.29	--	131.61	--	131.80	132.13	131.66	131.30	--	132.29	--
BH13-16C	142.41	142.50	142.17	141.57	--	--	141.96	--	141.63	--	142.08	--	142.18	142.32	142.17	141.79	--	142.47	--
BH13-16D	142.79	142.79	142.43	141.76	--	--	142.35	--	141.86	--	142.30	--	142.43	142.55	142.45	142.10	--	142.78	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	136.70	--	136.42	136.42	136.37	136.23	--	136.23	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	136.63	--	136.81	136.92	136.79	136.66	--	137.02	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	136.63	--	136.84	136.95	136.83	136.72	--	137.05	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	137.80	--	Frozen	Frozen	Frozen	Frozen	--	Frozen	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	16-Apr-19	13-May-19	22-May-19	14-Jun-19	27-Jun-19	16-Jul-19	25-Jul-19	30-Aug-19	20-Sep-19	7-Oct-19	18-Oct-19	8-Nov-19	6-Dec-19	10-Jan-20	3-Feb-20	5-Feb-20	12-Mar-20	24-Mar-20	2-Apr-20
BH99-1	145.05	145.61	--	145.04	--	144.62	--	145.58	145.77	--	146.65	146.28	145.81	145.68	--	144.74	145.89	--	145.52
BH99-2A	136.12	135.39	--	135.05	--	Monitoring wells decommissioned.			--	--	--	--	--	--	--	--	--	--	--
BH99-2B	145.20	144.74	--	145.44	--				--	--	--	--	--	--	--	--	--	--	--
BH99-3A	137.52	137.43	--	137.90	--	137.13	--	136.92	136.67	--	137.49	137.40	137.41	137.43	--	137.32	137.56	--	137.46
BH99-3B	127.84	125.48	--	126.13	--	125.00	--	124.72	124.53	--	125.76	124.95	124.60	124.62	--	124.56	126.22	--	125.76
BH99-3C	140.82	140.27	--	139.55	--	138.00	--	139.41	137.50	--	140.02	139.95	138.83	138.77	--	138.79	140.74	--	140.63
BH99-3D	140.78	140.57	--	140.63	--	138.67	--	140.61	138.49	--	140.58	140.56	139.72	139.70	--	139.52	140.74	--	140.61
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	136.75	135.68	--	135.46	--	133.96	--	133.95	133.14	--	135.42	135.09	134.12	133.98	--	133.89	136.32	--	135.85
BH03-7B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	144.97	144.94	--	144.99	--	144.94	--	144.99	144.67	--	144.95	144.94	144.93	144.08	--	143.80	144.99	--	144.93
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	138.70	138.74	--	138.71	--	138.65	--	138.70	138.48	--	138.47	138.48	138.55	138.74	--	138.60	138.59	--	138.68
BH03-9B	138.82	138.83	--	138.85	--	138.81	--	138.83	138.78	--	138.80	138.81	138.78	138.78	--	138.84	138.84	--	138.84
BH03-9C	139.04	138.74	--	138.79	--	138.60	--	138.63	138.51	--	138.71	138.69	138.60	138.59	--	138.54	138.95	--	138.85
BH05-10A	--	--	136.06	--	135.43	--	134.42	--	--	134.23	--	--	--	--	135.06	--	--	--	--
BH05-10B	--	--	136.08	--	135.32	--	134.44	--	--	134.24	--	--	--	--	135.09	--	--	--	--
BH05-10C	--	--	139.40	--	138.81	--	137.97	--	--	137.70	--	--	--	--	138.45	--	--	--	--
BH05-11	--	--	141.89	--	--	--	141.57	--	--	141.10	--	--	--	--	142.05	--	--	--	--
BH05-12A	--	--	Damaged	--	Damaged	--	Damaged	--	--	Damaged	--	--	--	--	Damaged	--	--	--	--
BH05-12B	--	--	Damaged	--	Damaged	--	Damaged	--	--	Damaged	--	--	--	--	Damaged	--	--	--	--
BH05-12C	--	--	Damaged	--	Damaged	--	Damaged	--	--	Damaged	--	--	--	--	Damaged	--	--	--	--
BH13-16A	129.21	129.46	--	128.27	--	128.71	--	127.85	126.84	--	128.25	128.15	128.08	129.54	--	128.71	129.22	--	129.00
BH13-16B	132.50	132.21	--	132.12	--	131.42	--	131.20	130.91	--	131.64	131.99	131.49	131.39	--	131.47	132.37	--	132.25
BH13-16C	142.51	142.43	--	142.22	--	142.08	--	141.70	141.60	--	141.51	142.28	142.14	142.18	--	142.12	142.46	--	142.44
BH13-16D	142.83	142.73	--	142.70	--	142.24	--	142.04	141.92	--	142.49	142.55	142.40	142.57	--	142.41	142.79	--	142.79
BH18-17A	136.39	136.42	--	136.35	--	136.23	--	135.97	135.85	--	135.74	136.00	136.11	136.12	--	136.23	136.19	--	136.34
BH18-17B	137.32	137.03	--	136.87	--	136.64	--	136.34	136.25	--	136.63	136.88	136.81	136.66	--	136.75	137.00	--	137.13
BH18-17C	137.34	137.07	--	136.91	--	136.69	--	136.43	136.29	--	136.59	136.94	136.82	136.72	--	136.75	137.08	--	137.25
BH18-17D	137.92	137.85	--	137.88	--	137.82	--	137.82	137.74	--	137.84	137.92	Frozen	Frozen	--	Frozen	Frozen	--	137.86
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	135.67	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	135.22	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	134.29	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	139.64	--

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	8-May-20	28-May-20	2-Jun-20	22-Jul-20	10-Aug-20	24-Aug-20	10-Sep-20	29-Oct-20	24-Nov-20	10-Dec-20	11-Jan-21	24-Feb-21	23-Mar-21	7-Apr-21	27-May-21	10-Jun-21	12-Jul-21	19-Aug-21	20-Sep-21
BH99-1	144.88	--	145.63	132.91	--	134.84	134.99	134.29	133.54	134.50	134.07	132.79	133.84	135.14	133.98	133.36	134.80	131.85	132.89
BH99-2A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-2B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-3A	137.38	--	137.40	134.08	--	137.44	137.46	137.44	137.44	137.43	137.45	134.69	137.46	137.46	137.21	137.04	137.44	137.66	136.42
BH99-3B	125.16	--	125.07	124.49	--	125.35	125.38	125.26	124.78	125.56	124.81	124.66	125.76	125.47	124.72	124.58	125.16	125.38	125.58
BH99-3C	139.81	--	138.09	137.92	--	138.97	138.71	139.54	139.04	140.32	138.77	137.58	140.11	140.32	138.22	138.92	139.56	138.87	137.95
BH99-3D	139.99	--	138.83	138.80	--	140.61	140.61	140.57	140.59	140.63	139.66	137.90	140.63	140.60	138.81	139.10	140.08	139.27	138.96
BH99-4A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7A	134.86	--	134.20	Monitoring wells decommissioned.			--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7B	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--				--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-7D	144.91	--	143.82				--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9A	138.72	--	138.70	138.42	--	138.40	138.47	138.50	138.41	138.50	138.53	138.46	138.54	138.58	138.68	138.57	138.48	138.49	138.48
BH03-9B	138.89	--	138.83	138.79	--	138.85	138.92	138.86	138.83	138.78	138.87	138.99	138.84	138.78	138.81	138.82	138.91	138.52	138.13
BH03-9C	138.73	--	138.60	138.30	--	138.64	138.60	138.61	138.52	138.58	138.54	138.48	138.74	138.36	138.48	138.46	138.55	138.51	138.48
BH05-10A	--	135.12	--	--	135.60	--	--	--	134.38	--	--	--	135.78	--	--	134.33	--	--	134.95
BH05-10B	--	135.15	--	--	135.63	--	--	--	134.40	--	--	--	135.79	--	--	134.34	--	--	134.98
BH05-10C	--	138.83	--	--	138.78	--	--	--	137.90	--	--	--	139.14	--	--	138.05	--	--	138.13
BH05-11	--	142.13	--	--	141.98	--	--	--	141.61	--	--	--	142.30	--	--	141.37	--	--	141.22
BH05-12A	--	Damaged	--	--	Damaged	--	--	--	Damaged	--	--	--	Damaged	--	--	Damaged	--	--	Damaged
BH05-12B	--	Damaged	--	--	Damaged	--	--	--	Damaged	--	--	--	Damaged	--	--	Damaged	--	--	Damaged
BH05-12C	--	Damaged	--	--	Damaged	--	--	--	Damaged	--	--	--	Damaged	--	--	Damaged	--	--	Damaged
BH13-16A	128.37	--	128.55	127.74	--	128.72	128.74	127.08	127.95	128.13	128.50	128.38	128.04	128.05	128.49	128.00	128.96	128.70	128.39
BH13-16B	131.86	--	131.54	130.60	--	131.70	127.94	131.66	130.83	131.67	131.28	131.47	131.71	131.83	131.33	130.99	131.88	131.81	131.53
BH13-16C	142.34	--	142.05	141.04	--	142.19	142.16	142.19	141.76	142.26	142.18	142.12	142.32	142.38	142.04	141.67	141.97	141.94	141.69
BH13-16D	142.73	--	143.31	142.07	--	142.51	142.44	142.54	142.06	142.58	142.44	142.30	142.73	142.65	142.24	141.88	142.44	142.40	142.10
BH18-17A	136.37	--	136.32	135.86	--	135.98	136.12	136.23	136.23	136.29	136.35	136.21	136.25	136.29	136.38	136.31	136.18	136.16	--
BH18-17B	136.97	--	136.72	136.09	--	136.84	136.93	136.98	136.80	137.01	136.91	136.68	137.02	137.08	136.79	136.63	136.49	136.40	--
BH18-17C	136.96	--	136.76	137.32	--	136.89	136.98	137.02	136.85	137.04	136.97	136.73	137.07	137.12	136.84	136.67	136.73	136.72	--
BH18-17D	137.84	--	137.83	137.70	--	137.87	137.87	137.87	137.84	Frozen	Frozen	Frozen	137.86	137.83	137.79	137.75	137.83	137.83	--
SQAT20-25	135.26	--	134.56	134.73	--	135.02	134.86	135.11	134.50	135.20	134.80	134.57	135.55	135.20	134.47	134.16	135.00	134.49	134.26
SQAT20-26	135.15	--	134.63	128.82	--	134.91	134.78	135.09	134.60	135.31	135.16	134.69	135.39	135.17	133.80	133.58	135.13	133.85	133.62
SQAT20-27	134.23	--	134.09	134.47	--	134.25	134.23	134.25	134.12	134.24	134.17	134.11	134.27	134.29	130.31	129.22	134.19	133.57	131.95
SQAT20-29	139.39	--	139.20	136.50	--	138.62	138.61	138.82	138.56	138.74	138.50	138.14	138.69	138.63	138.41	137.45	138.53	138.23	137.73

STITTSVILLE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	28-Oct-21	19-Nov-21	13-Dec-21	18-Jan-22	18-Feb-22	16-Mar-22	22-Apr-22	12-May-22	22-Jun-22	27-Jul-22
BH99-1	134.09	134.89	135.12	132.21	133.50	135.10	Damaged	--	--	--
BH99-2A	--	--	--	--	--	--	--	--	--	--
BH99-2B	--	--	--	--	--	--	--	--	--	--
BH99-3A	137.45	137.30	137.37	135.99	135.86	135.49	Blocked	133.92	135.27	135.32
BH99-3B	125.38	125.36	125.41	124.38	124.76	Blocked	Blocked	Blocked	Blocked	Blocked
BH99-3C	140.14	140.37	140.26	137.72	138.86	140.13	140.33	140.07	139.38	140.30
BH99-3D	140.57	140.73	140.58	138.39	139.35	140.59	140.59	140.58	140.61	140.63
BH99-4A	--	--	--	--	--	--	--	--	--	--
BH99-4B	--	--	--	--	--	--	--	--	--	--
BH99-4C	--	--	--	--	--	--	--	--	--	--
BH99-4D	--	--	--	--	--	--	--	--	--	--
BH99-5A	--	--	--	--	--	--	--	--	--	--
BH99-5B	--	--	--	--	--	--	--	--	--	--
BH99-5C	--	--	--	--	--	--	--	--	--	--
BH99-6A	--	--	--	--	--	--	--	--	--	--
BH99-6B	--	--	--	--	--	--	--	--	--	--
BH99-6C	--	--	--	--	--	--	--	--	--	--
BH03-7A	--	--	--	--	--	--	--	--	--	--
BH03-7B	--	--	--	--	--	--	--	--	--	--
BH03-7C	--	--	--	--	--	--	--	--	--	--
BH03-7D	--	--	--	--	--	--	--	--	--	--
BH03-8A	--	--	--	--	--	--	--	--	--	--
BH03-8B	--	--	--	--	--	--	--	--	--	--
BH03-8C	--	--	--	--	--	--	--	--	--	--
BH03-9A	138.43	138.57	138.57	138.64	138.59	138.60	138.64	138.65	138.64	138.63
BH03-9B	138.86	138.82	138.87	138.91	139.32	139.23	138.90	138.93	138.90	138.95
BH03-9C	138.64	138.75	138.73	138.53	138.80	138.78	138.78	138.59	138.78	138.74
BH05-10A	--	--	136.20	--	--	--	135.02	--	--	136.07
BH05-10B	--	--	136.19	--	--	--	135.03	--	--	136.07
BH05-10C	--	--	139.10	--	--	--	138.75	--	--	138.91
BH05-11	--	--	140.79	--	--	--	141.04	--	--	141.27
BH05-12A	--	--	Damaged	--	--	--	Damaged	--	--	Damaged
BH05-12B	--	--	Damaged	--	--	--	Damaged	--	--	Damaged
BH05-12C	--	--	Damaged	--	--	--	Damaged	--	--	Damaged
BH13-16A	127.62	127.81	128.78	129.97	129.00	128.95	128.60	127.55	128.69	128.12
BH13-16B	131.95	132.26	132.13	130.53	131.03	132.18	132.27	131.02	131.60	131.49
BH13-16C	142.21	142.24	142.27	141.91	141.53	142.20	142.43	142.22	142.05	142.07
BH13-16D	142.58	142.69	142.72	142.16	142.41	142.79	142.78	142.43	142.66	142.60
BH18-17A	136.05	136.30	136.34	136.91	136.14	136.23	136.40	136.43	136.26	136.32
BH18-17B	136.86	137.12	137.06	136.68	136.80	136.98	137.15	136.90	136.85	136.99
BH18-17C	136.90	137.16	137.10	136.70	136.83	137.01	137.16	136.97	136.91	137.03
BH18-17D	137.87	137.93	137.81	Frozen	Frozen	137.83	137.90	137.82	137.91	137.93
SQAT20-25	134.26	135.89	135.92	134.45	134.94	135.34	135.77	134.96	135.50	135.70
SQAT20-26	133.62	135.55	135.50	Frozen	Frozen	135.45	135.40	134.60	134.89	135.36
SQAT20-27	131.95	133.76	134.37	134.14	134.19	134.21	134.27	134.09	134.24	133.99
SQAT20-29	137.73	139.07	139.03	Frozen	Frozen	138.99	138.92	138.52	138.78	137.46

Moore Quarry

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	19-Jun-06	29-Sep-06	15-Jan-07	1-Feb-07	27-Jul-07	29-Oct-07	9-Jan-08	23-May-08	12-Jan-09	8-Apr-09	21-Jul-09	6-Oct-09	23-Feb-10	1-Apr-10	2-Jun-10	12-Oct-10	7-Mar-11	6-Jun-11	27-Sep-11
BH05-13A	134.50	134.30	134.75	134.42	134.19	133.82	134.51	134.61	134.27	134.71	134.17	134.00	133.98	134.58	132.92	134.23	134.37	134.14	134.06
BH05-13B	135.09	134.37	135.09	134.57	134.72	134.59	134.36	134.46	135.35	135.70	135.57	135.13	135.21	135.68	135.45	135.28	135.96	135.65	135.61
BH05-13C	141.94	141.66	142.11	141.84	141.63	141.53	138.73	138.89	141.93	142.27	141.89	141.56	141.66	141.94	141.52	141.58	141.84	141.85	141.79
BH05-14A	135.23	134.98	134.80	134.97	134.90	134.56	134.90	135.01	134.79	135.21	134.89	134.59	134.34	135.01	134.09	134.49	134.43	134.27	134.20
BH05-14B	135.07	134.78	134.67	134.87	134.63	134.22	134.81	134.91	134.70	135.12	134.61	134.42	134.37	134.91	134.26	134.62	134.69	134.57	134.53
BH05-14C	136.16	135.45	135.83	135.92	135.39	135.37	135.87	135.94	135.71	136.16	135.82	135.44	135.42	135.93	135.32	135.78	135.89	135.66	135.62
BH05-15A	134.19	134.26	133.83	Frozen	134.02	133.63	Frozen	133.47	132.45	132.71	132.37	132.21	131.56	133.59	131.41	131.28	131.22	130.88	130.77
BH05-15B	134.18	134.27	133.81	Frozen	134.02	133.62	Frozen	133.42	132.45	132.71	132.39	132.20	131.55	133.48	130.40	131.30	131.24	130.89	130.79
BH05-15C	134.83	134.39	133.09	132.97	134.15	133.76	132.89	134.10	133.81	134.14	133.81	133.67	133.30	134.20	133.20	133.46	133.59	133.34	133.29
BH14-17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH14-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH14-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	1-Dec-11	8-Mar-12	21-Jun-12	17-Sep-12	10-Oct-12	16-Nov-12	12-Dec-12	4-Jan-13	25-Feb-13	13-Mar-13	3-Apr-13	13-May-13	4-Jun-13	10-Jul-13	20-Aug-13	23-Sep-13	21-Oct-13	8-Nov-13	6-Dec-13
BH05-13A	134.02	134.17	133.48	133.46	133.42	133.75	133.66	133.78	133.86	133.63	134.11	134.13	134.05	134.05	133.70	134.45	134.53	134.48	134.52
BH05-13B	135.58	135.92	135.45	135.14	135.28	135.62	136.14	136.43	136.59	136.10	136.07	136.10	136.10	136.09	135.12	136.66	136.77	136.72	136.75
BH05-13C	141.74	141.90	141.58	141.29	141.34	141.81	141.77	141.84	141.92	141.74	141.89	141.94	141.86	141.84	141.66	142.01	141.94	141.89	141.87
BH05-14A	134.22	134.21	133.67	133.76	133.99	133.90	134.06	134.05	134.05	134.04	134.31	134.33	134.02	134.01	133.96	134.63	134.61	134.57	134.53
BH05-14B	134.51	134.61	133.93	133.90	133.86	134.19	134.10	134.22	134.29	134.08	134.53	134.55	134.07	134.07	134.12	134.88	134.97	134.92	134.89
BH05-14C	135.55	136.26	135.23	135.03	135.04	135.42	135.63	135.61	135.57	135.59	135.77	135.80	135.47	135.45	135.38	136.03	136.07	136.04	135.98
BH05-15A	130.74	130.91	130.62	130.71	130.66	130.77	130.83	130.75	130.69	130.80	130.81	130.84	130.78	130.76	130.60	131.15	131.08	131.04	130.99
BH05-15B	130.78	130.94	130.63	130.73	130.70	130.80	130.82	130.76	130.71	130.79	130.83	130.86	130.78	130.76	130.60	131.17	131.09	131.04	130.99
BH05-15C	133.18	132.72	133.02	133.09	133.12	133.35	133.38	133.36	133.38	133.35	133.53	133.58	133.32	133.26	133.27	133.85	133.85	133.81	133.78
BH14-17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH14-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH14-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MP14-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	9-Jan-14	4-Feb-14	10-Mar-14	2-Apr-14	5-May-14	27-Jun-14	28-Jul-14	22-Aug-14	17-Sep-14	3-Oct-14	14-Nov-14	7-Dec-14	21-Jan-15	27-Feb-15	25-Mar-15	6-Apr-15	6-May-15	24-Jun-15	16-Jul-15
BH05-13A	134.56	134.53	134.56	134.59	134.53	134.61	134.53	134.38	134.23	133.94	133.95	133.97	133.77	133.38	134.00	134.57	134.27	134.05	133.46
BH05-13B	136.77	136.75	136.77	136.80	136.72	141.73	136.58	141.34	141.41	141.42	141.41	141.21	141.32	141.11	141.25	141.40	141.60	141.36	141.07
BH05-13C	141.93	141.91	141.53	141.57	141.51	142.10	141.54	141.83	141.82	141.74	141.79	141.69	141.73	141.50	141.51	141.75	141.93	141.75	141.46
BH05-14A	134.55	134.50	134.40	134.37	134.31	134.99	134.22	134.54	134.43	134.20	134.07	134.17	133.92	133.40	134.14	134.74	134.46	134.36	133.74
BH05-14B	134.92	134.90	134.92	134.91	134.87	135.09	134.83	134.83	134.70	134.42	134.42	134.44	134.23	133.84	134.49	134.98	134.69	134.50	133.93
BH05-14C	136.03	136.00	136.03	136.06	136.02	136.06	135.89	135.99	135.84	135.54	135.81	135.62	135.45	135.22	135.36	136.01	135.79	135.70	135.18
BH05-15A	131.01	130.99	130.96	130.92	130.88	131.43	130.81	131.16	130.82	130.69	130.65	130.63	130.67	130.57	130.84	131.20	130.98	130.75	130.41
BH05-15B	131.02	131.01	131.00	130.98	130.95	131.43	130.88	131.17	130.82	130.67	130.66	130.62	130.67	130.59	130.85	131.18	130.97	130.75	130.42
BH05-15C	133.77	133.74	133.73	133.71	133.66	133.98	133.58	133.92	133.67	133.43	133.44	133.39	133.26	132.90	133.52	133.93	133.68	133.51	133.04
BH14-17	--	--	--	--	--	--	133.51	--	--	--	--	133.49	--	Frozen	Frozen	Frozen	134.01	133.67	133.25
BH14-17A	--	--	--	--	--	--	133.73	--	--	--	--	133.70	--	133.15	133.51	133.80	133.60	133.82	133.39
BH14-18	--	--	--	--	--	--	133.14	--	--	--	--	133.09	--	Frozen	133.60	133.54	133.42	133.20	132.85
MP14-19	--	--	--	--	--	--	133.14	133.37	133.35	133.31	133.32	133.22	--	Frozen	Frozen	Frozen	133.19	133.17	Dry
MP14-20	--	--	--	--	--	--	133.54	--	--	--	--	133.61	--	Frozen	Frozen	Frozen	133.61	133.61	133.25
MP14-21	--	--	--	--	--	--	133.12	133.23	133.17	133.11	133.15	133.05	--	Frozen	Frozen	Frozen	133.04	133.06	132.79
MP14-22	--	--	--	--	--	--	133.46	--	--	--	--	133.41	--	Frozen	133.54	Frozen	133.39	Dry	Dry
BH18-18A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	21-Aug-15	18-Sep-15	9-Oct-15	6-Nov-15	7-Dec-15	13-Jan-16	3-Feb-16	18-Mar-16	13-Apr-16	10-May-16	3-Jun-16	4-Jul-16	3-Aug-16	19-Sep-16	12-Oct-16	8-Nov-16	9-Dec-16	4-Jan-17	3-Feb-17
BH05-13A	134.03	134.12	133.62	133.87	133.83	133.76	133.73	135.04	134.80	133.83	133.82	133.80	133.82	133.80	133.82	133.83	134.43	134.63	134.28
BH05-13B	141.05	141.25	141.11	141.20	141.23	141.21	141.18	141.88	141.76	141.22	141.18	141.12	141.08	141.00	141.06	141.03	141.61	141.72	141.61
BH05-13C	141.37	141.59	141.51	141.54	141.43	141.40	141.39	142.28	142.17	141.56	141.51	141.50	141.46	141.37	141.45	141.44	141.69	142.04	141.98
BH05-14A	134.00	134.48	133.75	133.96	133.89	133.82	133.79	135.23	134.96	133.89	133.78	133.74	133.70	133.65	133.67	133.66	134.66	134.73	134.42
BH05-14B	134.48	134.57	134.07	134.18	134.12	134.08	134.05	135.47	135.24	134.12	134.08	133.42	133.52	134.24	133.48	133.52	134.90	135.07	134.75
BH05-14C	135.02	135.42	135.06	135.23	135.18	135.16	135.19	136.17	136.10	135.23	135.19	136.05	135.62	134.80	135.29	135.27	135.95	136.07	135.95
BH05-15A	130.59	130.86	130.40	130.69	130.63	130.59	130.55	131.49	131.07	130.58	130.56	130.55	130.52	130.43	130.45	130.45	130.95	130.93	130.71
BH05-15B	130.61	130.87	130.42	130.69	130.66	130.62	130.58	131.50	131.06	130.66	130.65	130.58	130.51	130.44	130.47	130.48	130.96	130.94	130.74
BH05-15C	133.40	133.62	133.08	133.38	133.35	133.30	133.29	134.19	133.98	133.35	133.33	133.29	133.22	133.10	133.23	133.22	133.79	133.90	133.64
BH14-17	133.98	133.68	133.40	133.53	133.54	133.54	133.52	134.14	133.98	133.49	133.41	133.40	133.36	133.32	133.34	133.35	133.85	133.93	133.79
BH14-17A	133.44	133.74	133.74	133.73	133.69	133.69	133.68	133.96	133.97	133.69	133.65	133.63	133.58	133.47	133.53	133.50	133.90	133.95	133.88
BH14-18	133.20	133.26	132.97	133.11	133.13	133.08	133.04	133.60	133.40	133.08	133.02	133.03	133.02	133.02	133.03	133.03	133.32	133.37	133.25
MP14-19	133.23	133.16	133.20	133.18	133.16	133.14	133.12	Frozen	133.48	133.05	--	133.23	133.18	133.10	133.14	133.12	133.21	133.22	133.22
MP14-20	133.63	133.59	133.59	133.60	133.57	133.52	133.49	Frozen	133.65	133.53	133.48	133.52	133.47	133.43	133.47	133.46	133.64	133.65	133.65
MP14-21	133.09	133.11	133.07	133.09	133.06	133.04	132.96	Frozen	133.17	133.05	132.98	133.00	132.96	132.90	132.97	132.95	133.15	133.16	Frozen
MP14-22	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Frozen	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
BH18-18A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	14-Mar-17	7-Apr-17	5-May-17	2-Jun-17	20-Jul-17	1-Aug-17	5-Sep-17	2-Oct-17	2-Nov-17	1-Dec-17	2-Jan-18	2-Feb-18	2-Mar-18	3-Apr-18	15-Jun-18	18-Jul-18	22-Aug-18	11-Sep-18	5-Oct-18
BH05-13A	134.72	135.21	134.80	134.65	134.73	134.77	134.91	134.78	134.83	134.48	133.83	134.10	134.80	134.82	134.44	133.21	134.40	133.82	134.39
BH05-13B	141.79	142.17	142.01	141.71	141.81	141.79	141.99	141.79	141.82	141.65	141.48	141.58	141.72	141.71	141.36	140.84	141.44	141.11	141.18
BH05-13C	142.08	142.55	142.30	142.00	142.04	141.98	142.10	142.04	142.02	141.96	141.82	141.86	142.06	142.04	141.70	141.31	141.69	141.50	141.52
BH05-14A	134.88	135.35	135.08	134.83	134.90	134.89	135.09	134.92	134.90	134.70	134.01	134.31	134.93	134.90	134.53	133.32	134.40	133.94	134.42
BH05-14B	135.21	135.65	135.38	135.12	135.21	135.19	135.51	135.13	135.18	134.94	134.32	134.67	135.24	135.26	134.90	133.65	134.85	134.26	134.83
BH05-14C	135.89	136.22	136.13	136.01	136.05	136.04	136.14	135.95	135.99	136.05	135.67	135.84	136.10	136.08	135.74	134.94	135.62	135.22	135.57
BH05-15A	131.02	131.87	131.62	131.06	131.15	131.19	131.22	131.26	131.25	130.96	130.55	130.73	131.27	131.26	130.80	130.05	130.83	130.49	130.71
BH05-15B	131.05	131.88	131.61	131.08	131.15	131.16	131.15	131.24	131.30	130.96	130.57	130.84	131.28	131.28	130.83	130.06	130.83	130.49	130.75
BH05-15C	133.87	134.35	134.05	133.89	133.92	133.91	133.89	133.88	133.91	133.82	133.35	133.48	134.00	133.99	133.67	132.55	133.65	133.17	133.65
BH14-17	133.94	134.22	134.15	133.93	134.00	134.01	133.96	133.99	134.01	133.90	133.62	133.78	134.05	134.01	134.02	133.34	134.02	133.82	133.98
BH14-17A	133.88	134.02	133.96	133.91	133.96	133.98	133.92	133.94	133.96	133.95	133.81	133.80	Feozen	134.04	133.67	132.80	133.64	133.33	133.62
BH14-18	133.35	133.90	133.56	133.31	133.44	133.43	133.48	133.49	133.55	133.30	133.13	133.24	133.43	133.44	133.21	132.22	133.19	132.90	133.19
MP14-19	Frozen	Frozen	133.33	133.22	133.25	133.23	133.27	133.24	133.29	133.23	133.15	133.14	133.63	133.51	133.23	132.96	133.23	133.11	133.20
MP14-20	Frozen	133.69	133.67	133.60	133.64	133.66	133.64	133.65	133.63	133.63	133.58	133.59	Frozen	133.88	132.98	132.99	133.60	133.44	133.59
MP14-21	Frozen	133.39	133.17	133.13	133.17	133.15	133.14	133.15	133.15	133.16	133.05	133.05	Frozen	133.36	133.08	Dry	133.09	132.86	133.05
MP14-22	Dry	133.83	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	--
BH18-18A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-18D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	22-Nov-18	11-Dec-18	11-Jan-19	27-Feb-19	27-Mar-19	4-Apr-19	22-May-19	27-Jun-19	25-Jul-19	23-Aug-19	9-Sep-19	7-Oct-19	8-Nov-19	10-Dec-19	10-Jan-20	3-Feb-20	12-Mar-20	7-Apr-20	28-May-20
BH05-13A	134.33	134.67	134.26	134.33	134.88	134.97	134.77	134.36	133.68	134.03	133.86	133.43	134.73	134.47	134.31	134.40	--	134.80	134.03
BH05-13B	141.58	141.65	141.44	141.46	141.60	141.71	141.61	141.29	141.05	140.94	140.88	140.91	141.50	141.49	141.49	141.45	--	141.87	141.37
BH05-13C	141.89	142.02	141.90	141.91	141.58	142.20	141.93	141.77	141.50	141.30	141.35	141.29	141.92	141.86	141.87	141.90	--	142.19	141.81
BH05-14A	134.52	134.85	134.56	134.43	135.13	135.18	135.02	134.59	133.81	133.96	133.13	133.46	133.94	134.60	134.43	134.56	135.27	135.05	134.31
BH05-14B	134.80	135.11	134.72	134.78	135.33	135.30	135.26	134.83	134.13	134.45	133.15	133.89	135.16	134.91	134.78	134.86	135.52	135.26	134.49
BH05-14C	135.94	135.98	135.83	135.92	136.15	136.22	136.03	135.66	134.22	135.11	135.84	134.86	135.96	134.86	135.91	135.95	136.22	136.12	135.62
BH05-15A	130.84	130.98	130.90	130.87	131.58	131.67	131.01	130.72	130.34	130.52	131.28	130.33	131.15	130.85	130.60	130.87	131.72	131.27	130.75
BH05-15B	130.85	130.99	130.91	130.86	131.56	131.66	131.05	130.72	130.35	130.47	131.56	130.30	131.12	130.90	130.87	130.90	131.77	131.29	130.76
BH05-15C	133.67	133.84	133.72	133.65	134.20	134.27	133.94	133.55	132.98	133.25	132.23	132.77	133.87	133.69	133.66	133.68	134.33	134.01	133.48
BH14-17	134.02	134.02	133.84	133.48	Frozen	Frozen	134.04	133.74	133.21	133.61	133.37	133.44	134.02	133.89	133.93	133.94	134.22	134.02	133.63
BH14-17A	133.66	133.76	Frozen	Frozen	133.98	134.04	133.86	133.78	133.29	133.06	133.39	133.02	133.80	133.70	133.67	133.64	133.91	133.85	133.46
BH14-18	133.24	133.29	133.41	133.32	133.69	133.61	133.31	133.16	132.69	133.00	133.71	132.77	133.35	133.30	133.36	133.35	133.64	133.39	133.16
MP14-19	133.22	133.22	Frozen	Frozen	Frozen	Frozen	133.19	133.16	Dry	133.04	Dry	Dry	133.19	133.11	Frozen	Frozen	Frozen	133.19	133.02
MP14-20	133.59	133.59	133.53	Frozen	Frozen	133.59	133.54	133.49	133.05	133.41	133.27	133.14	133.55	133.46	Frozen	Frozen	Frozen	133.52	133.28
MP14-21	--	Frozen	Frozen	Frozen	Frozen	Frozen	133.04	133.03	Dry	132.84	132.85	Dry	133.12	Frozen	Frozen	Frozen	Frozen	Frozen	133.00
MP14-22	--	Frozen	Frozen	Frozen	133.63	Dry	Dry	Dry	Dry	--	Dry	Dry	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Dry
BH18-18A	136.46	135.45	Frozen	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79
BH18-18B	134.28	134.62	Frozen	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70
BH18-18C	138.78	138.81	Frozen	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79
BH18-18D	138.82	138.85	Frozen	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	15-Jun-20	13-Jul-20	10-Aug-20	10-Sep-20	9-Oct-20	24-Nov-20	10-Dec-20	11-Jan-21	24-Feb-21	23-Mar-21	7-Apr-21	27-May-21	10-Jun-21	12-Jul-21	19-Aug-21	20-Sep-21	6-Oct-21	30-Nov-21	13-Dec-21
BH05-13A	133.96	133.02	134.34	134.04	134.30	133.80	134.52	134.24	133.40	134.65	134.70	133.97	133.94	134.27	133.84	133.56	134.32	134.44	134.86
BH05-13B	141.20	140.83	141.35	141.31	141.13	141.33	141.53	141.50	141.24	141.59	142.01	141.28	141.17	141.40	141.16	140.84	141.19	141.42	141.70
BH05-13C	141.51	141.30	141.64	141.74	141.52	141.79	141.95	141.92	141.68	142.04	141.68	141.71	141.62	141.06	141.30	141.21	141.60	141.78	142.07
BH05-14A	134.07	133.19	134.56	134.52	134.20	133.92	134.72	134.49	133.60	134.78	134.89	134.08	134.04	134.38	133.11	133.58	134.46	134.60	135.05
BH05-14B	134.42	132.48	134.79	134.76	134.49	134.27	134.94	134.69	133.92	135.08	135.16	134.42	134.22	134.69	133.40	133.98	134.77	134.96	135.32
BH05-14C	135.36	134.91	135.50	135.78	135.65	135.76	135.95	135.83	135.48	136.09	136.02	135.51	135.43	135.18	134.79	134.67	135.35	135.59	136.13
BH05-15A	130.55	130.12	131.02	130.88	130.69	130.64	131.00	130.85	130.52	131.19	131.06	130.63	130.56	130.64	130.35	130.31	130.88	131.01	131.20
BH05-15B	130.56	130.12	131.02	130.88	130.69	130.64	131.04	130.89	130.55	131.20	131.10	130.67	130.63	130.73	130.14	130.35	130.88	130.96	131.22
BH05-15C	133.28	132.54	133.65	133.68	133.44	133.29	133.79	133.62	133.02	133.92	133.88	133.34	133.29	132.50	132.47	132.81	133.65	133.87	134.07
BH14-17	133.56	133.29	133.80	133.97	133.93	133.96	133.95	Frozen	133.84	134.16	133.97	133.58	133.59	133.64	132.95	133.30	133.82	133.90	Frozen
BH14-17A	133.35	132.78	133.58	133.64	133.54	133.48	133.76	133.64	133.33	133.85	133.84	133.37	133.36	133.48	133.15	132.98	133.60	133.79	133.93
BH14-18	133.06	132.56	133.23	133.22	133.18	133.10	133.68	133.23	132.88	133.37	133.30	133.08	133.01	133.09	132.35	132.69	133.23	133.39	133.45
MP14-19	132.97	Dry	133.05	133.15	133.13	133.15	133.16	133.11	Frozen	Frozen	133.15	Dry	133.11	133.38	Dry	Dry	133.04	132.83	133.08
MP14-20	133.21	Dry	133.41	133.51	133.49	133.50	133.51	Frozen	Frozen	Frozen	133.79	133.19	133.23	133.29	Dry	Dry	133.40	133.41	133.41
MP14-21	132.93	Dry	Dry	133.03	133.00	132.99	Frozen	Frozen	Frozen	Frozen	133.07	132.92	133.01	132.88	Dry	Dry	132.99	133.05	Dry
MP14-22	Dry			Dry	Dry	Dry	Dry	Frozen	Frozen	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
BH18-18A	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.79	133.88	133.74	133.26	133.66	133.96	134.36
BH18-18B	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.70	134.19	133.99	133.48	134.25	134.00	134.81
BH18-18C	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.79	138.55	138.39	138.22	138.70	138.74	138.82
BH18-18D	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.82	138.64	138.43	138.28	138.53	138.63	138.75

MOORE QUARRY GROUNDWATER ELEVATIONS (metres above sea level)

	18-Jan-22	18-Feb-22	16-Mar-22	22-Apr-22	12-May-22	22-Jun-22	27-Jul-22
BH05-13A	134.68	134.36	134.79	134.85	134.13	134.09	134.27
BH05-13B	141.62	141.41	141.57	141.85	141.60	141.34	141.40
BH05-13C	141.73	141.71	141.87	142.14	141.90	141.80	141.06
BH05-14A	133.82	134.23	134.90	135.02	134.42	134.61	134.38
BH05-14B	133.98	134.83	135.22	135.29	134.59	135.08	134.69
BH05-14C	135.47	135.53	135.88	136.12	135.77	136.06	135.18
BH05-15A	130.41	130.69	130.96	131.07	130.66	130.86	130.64
BH05-15B	130.43	130.70	130.97	131.05	130.65	130.86	130.73
BH05-15C	133.07	133.73	133.97	133.99	133.62	133.81	133.50
BH14-17	Frozen	Frozen	Frozen	134.03	133.69	133.88	133.63
BH14-17A	133.20	133.74	Frozen	133.91	133.64	133.88	133.49
BH14-18	133.44	133.44	133.51	134.13	133.22	133.24	133.09
MP14-19	133.12	133.18	133.15	133.17	133.05	133.14	133.02
MP14-20	Frozen	Frozen	Frozen	133.47	133.36	133.46	133.29
MP14-21	Frozen	Frozen	Frozen	133.08	132.98	133.04	132.88
MP14-22	Frozen	Frozen	Frozen	Dry	Dry	Dry	Dry
BH18-18A	133.68	133.52	133.79	134.04	134.05	134.31	133.88
BH18-18B	134.61	134.30	134.70	134.33	134.46	134.01	134.19
BH18-18C	138.75	138.73	138.79	138.75	138.73	138.68	138.55
BH18-18D	138.73	138.70	138.82	138.79	138.79	138.78	138.64

APPENDIX E

Results of Field and Laboratory Chemical and Physical Analyses

Parameter	Unit	PWQO (1)	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			20-Jan-2000	15-May-2000	17-Sep-2000	28-May-2001	29-Jun-2001	23-Jul-2001	18-Aug-2001 (2)	26-Aug-2001 (2)	21-Sep-2001 (2)	20-Oct-2001	17-Nov-2001	13-Dec-2001	07-Jan-2002 (3)	01-Feb-2002 (3)
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	460000	--	190000	140000	162000	159000	--	--	--	180000	218000	189000	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	<20	<20	<20	--	--	--	<20	<20	<20	--	--
Ammonia Nitrogen	ug/l	--	3170	--	30	30	<20	400	--	--	--	90	50	30	--	--
Bicarbonate	ug/l	--	--	--	--	139000	161000	158000	--	--	--	179000	217000	187000	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	50000	--	2000	2000	3000	9000	--	--	--	2000	2000	<1000	--	--
Carbonate (CO3)	ug/l	--	--	--	--	<2000	<2000	<2000	--	--	--	<2000	<2000	<2000	--	--
Chemical Oxygen Demand	ug/l	--	90000	--	54000	37000	47000	88000	--	--	--	27000	20000	46000	--	--
Chloride	ug/l	--	8000	--	2000	<1000	1000	5000	--	--	--	2000	2000	2000	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	43	22	33	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	280	370	--	280	295	225	--	--	--	200	210	520	--	--
Dissolved Organic Carbon	ug/l	--	28300	--	19100	14000	12600	28300	--	--	--	7600	11300	10700	--	--
Hardness, Calcium Carbonate	ug/l	--	507000	--	175000	121000	157000	151000	--	--	--	198000	243000	213000	--	--
Nitrate as N	ug/l	--	<100	--	<100	<100	<100	<100	--	--	--	<100	<100	<100	--	--
Nitrite as N	ug/l	--	<100	--	<100	<100	<100	<100	--	--	--	<100	<100	<100	--	--
Nitrogen, Total Kjeldahl	ug/l	--	12900	--	890	690	790	3050	--	--	--	430	590	360	--	--
Nitrogen, Organic	ug/l	--	--	--	--	660	790	2650	--	--	--	340	540	330	--	--
pH (Field)	-	6.5 - 8.5	6.9	7.2	7.84	7.64	7.65	7.4	--	--	--	7.3	7.4	7.7	--	--
Phosphate	ug/l	--	--	--	--	<30	<30	<30	--	--	--	<30	<30	<30	--	--
Phosphorus	ug/l	-- (23)	1000	--	30	20	30	180	--	--	--	20	<10	10	--	--
Sulphate	ug/l	--	3000	--	4000	<1000	3000	4000	--	--	--	23000	14000	11000	--	--
Temperature (Field)	deg c	-- (24)	1	--	--	16	21	25	--	--	--	10	4	2	--	--
Total Dissolved Solids	ug/l	--	504000	--	244000	164000	200000	200000	--	--	--	272000	292000	211000	--	--
Total Suspended Solids	ug/l	--	630000	18000	6000	38000	82000	78000	--	--	--	5000	49000	2000	--	--
Turbidity	ntu	-- (25)	>100	4.9	2.1	4.3	6.2	21	--	--	--	3.5	6.1	1	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	50	--	<50	<50	<50	<50	--	--	--	<50	<50	<50	--	--
Barium	ug/l	--	30	--	10	<10	20	20	--	--	--	10	10	<10	--	--
Beryllium	ug/l	-- (27)	<10	--	<2	<2	<2	<2	--	--	--	<2	<2	<2	--	--
Boron	ug/l	200 (28)	<10	--	<10	<10	10	20	--	--	--	<10	<50	<50	--	--
Cadmium	ug/l	0.2 (29)	<0.15	--	<0.1	**0.3**	<0.1	<0.1	--	--	--	0.1	<0.1	<0.1	--	--
Calcium	ug/l	--	198000	--	70000	45000	61000	57000	--	--	--	76000	94000	85000	--	--
Chromium	ug/l	-- (30)	<10	--	<1	3	<1	5	--	--	--	2	1	<1	--	--
Cobalt	ug/l	0.9	0.5	--	<0.2	<0.2	<0.2	<0.2	--	--	--	<0.2	<0.2	<0.2	--	--
Copper	ug/l	5	<5	--	**<10**	<1	<1	<1	--	--	--	<1	<1	3	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	**500**	--	60	110	**530**	**480**	--	--	--	140	100	70	--	--
Lead	ug/l	-- (31)	3	--	<1	<1	<1	<1	--	--	--	1	<1	1	--	--
Magnesium	ug/l	--	3000	--	<1000	2000	1000	2000	--	--	--	2000	2000	<1000	--	--
Manganese	ug/l	--	280	--	<10	40	90	20	--	--	--	40	90	40	--	--
Mercury	ug/l	0.2 (32)	<0.2	--	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--
Molybdenum	ug/l	40	<10	--	<10	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Nickel	ug/l	25	<10	--	<10	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Potassium	ug/l	--	<1000	--	<1000	<1000	<1000	2000	--	--	--	<1000	<1000	<1000	--	--
Silicon	ug/l	--	3800	--	1400	300	1040	1060	--	--	--	790	850	990	--	--
Silver	ug/l	0.1	<0.1	--	<0.1	**0.5**	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--
Sodium	ug/l	--	3000	--	8000	5000	<2000	4000	--	--	--	<2000	3000	<2000	--	--
Strontium	ug/l	--	158	--	93	75	107	116	--	--	--	86	87	78	--	--
Sulfur	ug/l	--	<3000	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	**<2**	--	**<1**	**<1**	**<1**	**<1**	--	--	--	**<1**	**<1**	**<1**	--	--
Tin	ug/l	--	<50	--	<10	<10	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<10	--	<10	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Vanadium	ug/l	6	**<10**	--	<1	<1	<1	<1	--	--	--	1	<1	<1	--	--
Zinc	ug/l	30 (29)	<10	--	<10	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	<1	--	<1	<1	<1	<1	--	--	--	<1	<1	<1	--	--

Parameter	Unit	PWQO (1)	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			23-Mar-2002 (3)	21-Apr-2002	18-May-2002	10-Jun-2002	27-Jul-2002	12-Aug-2002	25-Sep-2002 (2)	31-Oct-2002	25-Nov-2002	15-Jan-2003 (4)	12-Feb-2003 (4)	15-Mar-2003 (4)	28-Apr-2003 (4)	24-May-2003 (4)
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	168000	155000	176000	184000	153000	--	209000	144000	--	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	<20	<20	<20	--	<20	<20	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	130	30	100	50	20	--	3230	120	--	--	--	--	--
Bicarbonate	ug/l	--	--	168000	155000	176000	184000	153000	--	209000	144000	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	2000	2000	<1000	4000	<1000	--	<1000	<1000	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	<2000	<2000	<2000	<5000	<2000	--	<2000	<2000	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	39000	45000	39000	34000	52000	--	19000	30000	--	--	--	--	--
Chloride	ug/l	--	--	2000	1000	<1000	1000	<1000	--	28000	8000	--	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	390	320	280	370	290	--	390	390	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	12000	14600	15600	15900	18600	--	6700	10300	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	160000	167000	181000	180000	154000	--	401000	203000	--	--	--	--	--
Nitrate as N	ug/l	--	--	<100	<100	<100	<100	<100	--	11200	660	--	--	--	--	--
Nitrite as N	ug/l	--	--	<100	<100	<100	<100	<100	--	1380	<100	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	650	580	550	770	750	--	6590	640	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	520	550	450	720	730	--	3360	520	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	7.6	7.5	7.3	7.7	7.3	--	7.4	7.3	--	--	--	--	--
Phosphate	ug/l	--	--	<30	<30	<30	<30	60	--	<30	40	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	30	<10	40	30	110	--	10	20	--	--	--	--	--
Sulphate	ug/l	--	--	9000	5000	3000	3000	2000	--	145000	48000	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	16	10	19	22	26	--	4	0	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	214000	200000	221000	220000	183000	--	552000	257000	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	3000	44000	9000	30000	13000	--	6000	<2000	--	--	--	--	--
Turbidity	ntu	-- (25)	--	1.2	1.5	1.8	3.9	1.8	--	1	1.5	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	<50	<50	<50	<10	<10	--	<10	<10	--	--	--	--	--
Barium	ug/l	--	--	10	<10	<10	10	<10	--	50	10	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	<2	<2	<2	<1	<1	--	<1	<1	--	--	--	--	--
Boron	ug/l	200 (28)	--	<50	<50	<50	<20	40	--	130	<50	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	--	--	--
Calcium	ug/l	--	--	64000	67000	71000	72000	60000	--	106000	73000	--	--	--	--	--
Chromium	ug/l	-- (30)	--	<1	3	<1	2	<1	--	<1	<1	--	--	--	--	--
Cobalt	ug/l	0.9	--	<0.2	<0.2	<0.2	0.3	<0.2	--	0.4	<0.2	--	--	--	--	--
Copper	ug/l	5	--	<1	<1	2	<1	5	--	1	<1	--	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	100	30	130	140	110	--	<10	10	--	--	--	--	--
Lead	ug/l	-- (31)	--	<1	<1	<1	<1	<1	--	<1	<1	--	--	--	--	--
Magnesium	ug/l	--	--	<1000	<1000	1000	<1000	1000	--	33000	5000	--	--	--	--	--
Manganese	ug/l	--	--	40	<10	20	35	26	--	12	11	--	--	--	--	--
Mercury	ug/l	0.2 (32)	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	--	--	--
Molybdenum	ug/l	40	--	<10	<10	<10	<5	7	--	5	<5	--	--	--	--	--
Nickel	ug/l	25	--	<10	<10	<10	<5	<5	--	<5	<5	--	--	--	--	--
Potassium	ug/l	--	--	<1000	<1000	<1000	<1000	<1000	--	11000	1000	--	--	--	--	--
Silicon	ug/l	--	--	340	610	150	890	440	--	2200	1400	--	--	--	--	--
Silver	ug/l	0.1	--	**<10**	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	--	--	--
Sodium	ug/l	--	--	<2000	<2000	<2000	<2000	<2000	--	19000	4000	--	--	--	--	--
Strontium	ug/l	--	--	71	66	86	92	89	--	3260	353	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	**<1**	**<1**	**<1**	**<1**	**<1**	--	**<1**	**<1**	--	--	--	--	--
Tin	ug/l	--	--	--	--	--	<10	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	<10	<10	<10	<10	<10	--	<10	<10	--	--	--	--	--
Vanadium	ug/l	6	--	<1	<1	<1	<1	<1	--	<1	<1	--	--	--	--	--
Zinc	ug/l	30 (29)	--	<10	<10	<10	<5	<5	--	<5	<5	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	<1	<1	<1	<1	<1	--	<1	<1	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			24-Jun-2003 (4)	16-Jul-2003 (4)	14-Aug-2003	30-Sep-2003 (4)	30-Oct-2003	19-Nov-2003	23-Dec-2003 (4)	27-Jan-2004 (4)	20-Feb-2004 (4)	24-Mar-2004 (4)	12-Apr-2004	12-May-2004	28-Jun-2004	19-Jul-2004
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	117000	--	125000	143000	--	--	--	--	160000	228000	238000	237000
Ammonia, unionized (Field)	ug/l	20	--	--	<20	--	<20	<20	--	--	--	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	<20	--	30	30	--	--	--	--	<30	2520	870	590
Bicarbonate	ug/l	--	--	--	117000	--	125000	143000	--	--	--	--	194000	272000	288000	284000
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	<1000	--	<1000	<1000	--	--	--	--	700	700	2800	11800
Carbonate (CO3)	ug/l	--	--	--	<2000	--	<2000	<2000	--	--	--	--	<1000	<1000	<1000	<1000
Chemical Oxygen Demand	ug/l	--	--	--	<5000	--	<5000	15000	--	--	--	--	10000	5000	28000	54000
Chloride	ug/l	--	--	--	31000	--	36000	8000	--	--	--	--	45200	30400	24500	38500
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	380	--	400	445	--	--	--	--	480	510	495	520
Dissolved Organic Carbon	ug/l	--	--	--	2200	--	1800	7200	--	--	--	--	2700	2400	6400	13000
Hardness, Calcium Carbonate	ug/l	--	--	--	232000	--	294000	190000	--	--	--	--	249994	321100	351670	329700
Nitrate as N	ug/l	--	--	--	3560	--	4210	<100	--	--	--	--	1200	4200	<200	<200
Nitrite as N	ug/l	--	--	--	<100	--	<100	<100	--	--	--	--	<200	<200	<200	<200
Nitrogen, Total Kjeldahl	ug/l	--	--	--	410	--	420	280	--	--	--	--	450	2370	1560	1700
Nitrogen, Organic	ug/l	--	--	--	410	--	390	250	--	--	--	--	420	0	690	1110
pH (Field)	-	6.5 - 8.5	--	--	7.3	--	7.4	7.2	--	--	--	--	7.2	7.2	7.1	7.2
Phosphate	ug/l	--	--	--	<30	--	<30	<30	--	--	--	--	<1000	<1000	<1000	<1000
Phosphorus	ug/l	-- (23)	--	--	<10	--	<10	<10	--	--	--	--	10	7	40	54
Sulphate	ug/l	--	--	--	97000	--	121000	39000	--	--	--	--	71800	124000	129000	113000
Temperature (Field)	deg c	-- (24)	--	--	21	--	3	4	--	--	--	--	3	8	16	20
Total Dissolved Solids	ug/l	--	--	--	333000	--	408000	247000	--	--	--	--	354000	508000	426000	466000
Total Suspended Solids	ug/l	--	--	--	<2000	--	<2000	2000	--	--	--	--	2000	2000	9000	11000
Turbidity	ntu	-- (25)	--	--	0.7	--	1.6	2.6	--	--	--	--	1.9	0.5	11.3	6.3
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	10	--	<10	20	--	--	--	--	<5	<5	<5	5
Barium	ug/l	--	--	--	90	--	90	30	--	--	--	--	62	152	111	137
Beryllium	ug/l	-- (27)	--	--	<1	--	<1	<1	--	--	--	--	<1	<1	<1	<1
Boron	ug/l	200 (28)	--	--	40	--	30	10	--	--	--	--	19	**298**	**262**	**364**
Cadmium	ug/l	0.2 (29)	--	--	<0.1	--	<0.1	<0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Calcium	ug/l	--	--	--	78000	--	103000	71000	--	--	--	--	85500	78000	89500	78100
Chromium	ug/l	-- (30)	--	--	1	--	<1	1	--	--	--	--	<5	<5	<5	<5
Cobalt	ug/l	0.9	--	--	<0.2	--	<0.2	<0.2	--	--	--	--	<0.1	0.2	0.1	0.2
Copper	ug/l	5	--	--	<1	--	1	<1	--	--	--	--	0.6	1.2	4.3	1.9
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	<10	--	20	40	--	--	--	--	90	<30	**690**	**310**
Lead	ug/l	-- (31)	--	--	<1	--	<1	<1	--	--	--	--	<0.5	<0.5	<0.5	<0.5
Magnesium	ug/l	--	--	--	9000	--	9000	3000	--	--	--	--	8840	30700	31200	32800
Manganese	ug/l	--	--	--	<5	--	<5	10	--	--	--	--	23	16	348	174
Mercury	ug/l	0.2 (32)	--	--	<0.1	--	<0.1	<0.1	--	--	--	--	<0.05	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	<5	--	<5	<5	--	--	--	--	<1	7	1	<1
Nickel	ug/l	25	--	--	1	--	<5	<5	--	--	--	--	<1	1	<1	2
Potassium	ug/l	--	--	--	2000	--	2000	1000	--	--	--	--	1500	7600	5700	10200
Silicon	ug/l	--	--	--	1300	--	900	1300	--	--	--	--	840	3370	3390	5590
Silver	ug/l	0.1	--	--	<0.1	--	<0.1	<0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	--	--	14000	--	19000	4000	--	--	--	--	21000	33300	27600	36800
Strontium	ug/l	--	--	--	1120	--	967	409	--	--	--	--	764	3880	3380	3380
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	**<1**	--	**<1**	**<1**	--	--	--	--	0.07	0.29	<0.05	<0.05
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	<10	--	<10	<10	--	--	--	--	<5	<5	<5	<5
Vanadium	ug/l	6	--	--	<1	--	<1	<1	--	--	--	--	<0.5	<0.5	<0.5	<0.5
Zinc	ug/l	30 (29)	--	--	<1	--	<10	<10	--	--	--	--	<5	24	11	**54**
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	<1	--	<1	<1	--	--	--	--	<1	<1	<1	**5**

Parameter	Unit	PWQO (1)	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			17-Aug-2004	30-Sep-2004	07-Oct-2004 (4)	23-Nov-2004 (4)	09-Dec-2004 (4)	14-Jan-2005 (4)	11-Feb-2005 (4)	14-Mar-2005 (4)	15-Apr-2005 (4)	29-May-2005 (4)	12-Jun-2005 (4)	12-Jul-2005 (4)	14-Aug-2005 (4)
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	134000	209000	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	100	380	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	159000	248000	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	1200	<500	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	1000	1000	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	20000	9000	--	--	--	--	--	--	--	--	--	--	--
Chloride	ug/l	--	63500	65300	--	--	--	--	--	--	--	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	600	823	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	4000	4100	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	429000	389000	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	2500	2000	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	<200	<200	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	820	600	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	720	220	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.3	7.9	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	<1000	<1000	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	8	5	--	--	--	--	--	--	--	--	--	--	--
Sulphate	ug/l	--	262000	159000	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	21	14.1	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	662000	598000	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	4000	9000	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	0.6	1.8	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	<5	<5	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	115	168	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	<1	<1	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**325**	**223**	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	108000	101000	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	<5	<5	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	0.1	0.3	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	0.9	<0.5	--	--	--	--	--	--	--	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	40	80	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	38900	33200	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	14	6	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	3	2	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	<1	2	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	7900	6100	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	1160	4200	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	35700	37400	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	4700	4370	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	0.16	0.13	--	--	--	--	--	--	--	--	--	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<5	<5	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	<5	<5	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
Parameter	**Unit**	**PWQO (1)**	**24-Sep-2005 (4)**	**24-Oct-2005 (4)**	**16-Nov-2005 (4)**	**29-Dec-2005 (4)**	**19-Jan-2006 (4)**	**15-Feb-2006 (4)**	**30-Mar-2006 (4)**	**11-Apr-2006 (4)**	**12-May-2006 (4)**	**20-Jun-2006 (4)**	**24-Jul-2006**	**14-Aug-2006**	**29-Sep-2006**	**25-Oct-2006**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	120000	154000	175000	179000
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	--	--	--	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	100	20	600	110
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	<1000	<1000	<1000	2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	5000	12000	<5000	19000
Chloride	ug/l	--	--	--	--	--	--	--	--	--	--	--	37000	35000	30000	25000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	500	395	470	485
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	2900	5500	3300	7100
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	285000	318000	363000	311000
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	1390	<100	4120	2420
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	<100	<100	240	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	350	300	940	630
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	7.3	7.5	7.5	7.3
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	50	<10	20	10
Sulphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	157000	157000	211000	157000
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	10	10	7	3
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	435000	465000	569000	493000
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	2000	3000	2000	<2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	<10	10	<10	<10
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	60	40	80	60
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	<1	<1	<1	<1
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	60	30	**230**	160
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	91000	106000	101000	90000
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	1	<1	<1	<1
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	<30	120	<30	<30
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	<1	<1	<1	<1
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	14000	13000	27000	21000
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	20	70	<10	<10
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	<5	<5	<5	<5
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	<5	<5	<5	<5
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	2000	2000	7000	5000
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	600	1200	2700	1400
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	20000	19000	31000	21000
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	1630	860	3820	2840
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	52333	52300	70300	52300
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	<0.1	<0.1	0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	<10	<10	<10	<10
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	<1	1	<1	<1
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	<10	<10	<10	<10
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	<1	<1	<1	<1

Parameter	Unit	PWQO (1)	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			14-Nov-2006	**12-Dec-2006**	**31-Jan-2007**	**27-Feb-2007**	**30-Mar-2007**	**26-Apr-2007**	**29-May-2007**	**26-Jun-2007**	**23-Jul-2007 (4)**	**28-Aug-2007**	**28-Sep-2007 (4)**	**25-Oct-2007**	**29-Nov-2007**	**18-Dec-2007**	**08-Jan-2008 (3)**
									T-2								
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	174000	204000	290000	271000	201000	175000	186000	189000	--	162000	--	211000	180000	275000	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	--	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	550	550	1380	1490	500	180	100	90	--	60	--	120	390	430	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	<1000	2000	1000	1000	<1000	<1000	2000	--	<1000	--	<1000	<1000	2000	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	<5000	7000	10000	11000	<5000	14000	20000	--	8000	--	10000	<5000	6000	--
Chloride	ug/l	--	32000	35000	47000	57000	39000	42000	42000	45000	--	44000	--	40000	49000	56000	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	500	490	450	595	565	360	610	600	--	750	--	475	480	395	--
Dissolved Organic Carbon	ug/l	--	3000	2800	4200	2600	2700	3400	7800	11400	--	6400	--	4400	3200	5200	--
Hardness, Calcium Carbonate	ug/l	--	381000	357000	463000	334000	363000	373000	361000	324000	--	431000	--	482000	444000	476000	--
Nitrate as N	ug/l	--	4540	2410	1420	3020	2140	2160	570	<100	--	2680	--	2900	3110	140	--
Nitrite as N	ug/l	--	170	160	260	2300	<100	<100	<100	<100	--	240	--	110	<100	<100	--
Nitrogen, Total Kjeldahl	ug/l	--	940	730	1550	2210	690	460	730	1040	--	910	--	480	560	800	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.3	7.4	7.3	7.4	7.3	7.3	7.4	7.3	--	7.3	--	7.4	7.4	7.3	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	30	20	20	40	20	30	20	20	--	50	--	<20	20	20	--
Sulphate	ug/l	--	188000	168000	198000	229000	171000	191000	235000	188000	--	364000	--	313000	339000	256000	--
Temperature (Field)	deg c	-- (24)	3	1	1	1	5	5	8	12	--	24	--	9	1	1	--
Total Dissolved Solids	ug/l	--	548000	538000	689000	728000	560000	556000	606000	565000	--	798000	--	777000	805000	754000	--
Total Suspended Solids	ug/l	--	<2000	6000	39000	31000	5000	<2000	2000	2000	--	5000	--	<2000	8000	10000	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	<10	<10	<10	<10	<10	<10	<10	<10	--	<10	--	<10	<10	<10	--
Barium	ug/l	--	80	90	120	90	100	80	90	70	--	110	--	80	110	170	--
Beryllium	ug/l	-- (27)	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<1	--
Boron	ug/l	200 (28)	**220**	180	**340**	**630**	**270**	160	**320**	**310**	--	**390**	--	**250**	**310**	**320**	--
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	0.1	<0.1	--
Calcium	ug/l	--	100000	90000	113000	76000	96000	100000	87000	82000	--	110000	--	132000	112000	123000	--
Chromium	ug/l	-- (30)	1	3	1	4	2	2	3	<1	--	1	--	2	1	2	--
Cobalt	ug/l	0.9	0.2	0.4	0.6	0.3	0.4	0.3	0.4	0.4	--	0.3	--	0.3	0.5	0.9	--
Copper	ug/l	5	<1	<1	1	1	<1	2	2	1	--	3	--	<1	1	1	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	50	110	200	80	40	30	120	170	--	40	--	80	40	170	--
Lead	ug/l	-- (31)	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	--	<1	<1	2	--
Magnesium	ug/l	--	32000	32000	44000	35000	30000	30000	35000	29000	--	38000	--	37000	40000	41000	--
Manganese	ug/l	--	10	<10	670	30	<10	<10	80	100	--	20	--	60	10	630	--
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--
Molybdenum	ug/l	40	<5	<5	<5	<5	<5	<5	<5	<5	--	7	--	<5	9	<5	--
Nickel	ug/l	25	<5	<5	<5	<5	6	6	<5	<5	--	<5	--	<5	5	<5	--
Potassium	ug/l	--	6000	6000	9000	8000	6000	6000	6000	5000	--	7000	--	6000	7000	6000	--
Silicon	ug/l	--	3500	3600	5100	5000	4500	2400	1000	500	--	2200	--	3000	4400	5300	--
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--
Sodium	ug/l	--	29000	26000	41000	98000	44000	42000	53000	50000	--	79000	--	63000	64000	59000	--
Strontium	ug/l	--	3800	3760	5280	5070	4800	3890	3690	2800	--	5000	--	3290	6360	5300	--
Sulfur	ug/l	--	62700	56000	66000	76300	57000	63700	78300	62700	--	121300	--	104300	113000	85300	--
Thallium	ug/l	0.3 (33)	<0.1	0.1	<0.1	0.1	0.3	**0.6**	**0.6**	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<10	<10	10	<10	<10	<10	<10	<10	--	<10	--	<10	<10	<10	--
Vanadium	ug/l	6	<1	<1	1	1	3	<1	<1	<1	--	2	--	2	1	1	--
Zinc	ug/l	30 (29)	<10	<10	<10	<10	<10	<10	<10	<10	--	10	--	<10	<10	**250**	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<1	--

Parameter	**Unit**	**PWQO (1)**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**
			06-Feb-2008 (4)	**31-Mar-2008**	**25-Apr-2008**	**22-May-2008**	**25-Jun-2008**	**09-Jul-2008**	**08-Aug-2008**	**26-Sep-2008 (5)**	**23-Oct-2008 (4)**	**20-Nov-2008 (4)**	**22-Dec-2008 (4)**	**20-Jan-2009 (4)**	**24-Feb-2009 (4)**	**31-Mar-2009**
														SS-1	SS-1	T-2
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	177000	166000	209000	155000	162000	156000	--	--	--	--	--	--	181000
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	<20	<20	<20	<20	--	--	--	--	--	--	<20
Ammonia Nitrogen	ug/l	--	--	130	50	<50	170	200	130	--	--	--	--	--	--	180
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<2000	<2000	<2000	<2000	2000	<2000	--	--	--	--	--	--	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	8000	10000	16000	6000	9000	8000	--	--	--	--	--	--	5000
Chloride	ug/l	--	--	76000	36000	38000	44000	38000	39000	--	--	--	--	--	--	59000
Chromium (III)	ug/l	8.9 (22)	--	<5	<5	<5	<5	<5	<5	--	--	--	--	--	--	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	490	420	470	600	495	490	--	--	--	--	--	--	810
Dissolved Organic Carbon	ug/l	--	--	2500	2800	3100	2700	2700	2300	--	--	--	--	--	--	2000
Hardness, Calcium Carbonate	ug/l	--	--	340000	330000	390000	400000	360000	360000	--	--	--	--	--	--	400000
Nitrate as N	ug/l	--	--	800	800	300	1800	1200	600	--	--	--	--	--	--	2600
Nitrite as N	ug/l	--	--	20	30	<10	60	20	30	--	--	--	--	--	--	30
Nitrogen, Total Kjeldahl	ug/l	--	--	600	800	800	700	800	500	--	--	--	--	--	--	600
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	7.3	7.4	7.3	7.6	7.4	7.3	--	--	--	--	--	--	8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	19	4	8	6	16	<2	--	--	--	--	--	--	4
Sulphate	ug/l	--	--	183000	184000	205000	239000	235000	286000	--	--	--	--	--	--	290000
Temperature (Field)	deg c	-- (24)	--	2	6	18	17	18	20	--	--	--	--	--	--	4
Total Dissolved Solids	ug/l	--	--	590000	520000	521000	610000	590000	580000	--	--	--	--	--	--	640000
Total Suspended Solids	ug/l	--	--	<10000	<10000	<10000	<10000	<10000	<10000	--	--	--	--	--	--	<10000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	84	99	120	110	120	120	--	--	--	--	--	--	87
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	160	190	**210**	**260**	**270**	**300**	--	--	--	--	--	--	**290**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	86000	87000	89000	94000	100000	95000	--	--	--	--	--	--	110000
Chromium	ug/l	-- (30)	--	<5	<5	<5	<5	<5	<5	--	--	--	--	--	--	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	<1	1	1	2	<1	<1	--	--	--	--	--	--	<1
Hexavalent Chromium	ug/l	1 (22)	--	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	--	--	--	--	--	--	**<5**
Iron	ug/l	300	--	<100	<100	<100	<100	<100	<100	--	--	--	--	--	--	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	27000	27000	33000	31000	35000	32000	--	--	--	--	--	--	37000
Manganese	ug/l	--	--	8	7	7	7	31	28	--	--	--	--	--	--	5
Mercury	ug/l	0.2 (32)	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	4400	5300	5300	6100	6300	6100	--	--	--	--	--	--	6800
Silicon	ug/l	--	--	3100	2400	3000	3000	3500	3600	--	--	--	--	--	--	3400
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	60000	40000	36000	47000	41000	42000	--	--	--	--	--	--	59000
Strontium	ug/l	--	--	3200	3600	4100	4900	4700	4800	--	--	--	--	--	--	5400
Sulfur	ug/l	--	--	55000	60000	71000	96000	91000	91000	--	--	--	--	--	--	86000
Thallium	ug/l	0.3 (33)	--	<0.05	0.06	0.06	0.1	0.08	0.07	--	--	--	--	--	--	0.08
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			20-Apr-2009	22-May-2009	23-Jun-2009	27-Jul-2009	13-Aug-2009	24-Sep-2009 (4)	15-Oct-2009 (6)	18-Nov-2009	10-Dec-2009	20-Jan-2010 (4)	03-Feb-2010 (4)	31-Mar-2010	06-Apr-2010	06-May-2010 (4)	02-Jun-2010
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	T-2	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	125000	66000	170000	116000	150000	--	208000	182000	166000	--	--	176000	168000	--	153000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	--	<20	<20	<20	--	--	<20	<20	--	<20
Ammonia Nitrogen	ug/l	--	190	<50	80	370	<50	--	560	720	690	--	--	100	200	--	180
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	5000	<2000	<2000	<2000	--	<2000	<2000	<2000	--	--	<2000	<2000	--	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	7000	27000	16000	11000	<4000	--	12000	6000	<4000	--	--	14000	9000	--	10000
Chloride	ug/l	--	59000	52000	77000	49000	53000	--	61000	59000	52000	--	--	52000	58000	--	81000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	--	<5	<5	<5	--	--	<5	<5	--	**13**
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	605	745	615	965	1000	--	1080	1105	985	--	--	980	955	--	1090
Dissolved Organic Carbon	ug/l	--	1900	7300	4700	1900	1800	--	2700	2300	1700	--	--	2400	1800	--	2300
Hardness, Calcium Carbonate	ug/l	--	280000	250000	420000	390000	400000	--	480000	410000	370000	--	--	350000	330000	--	430000
Nitrate as N	ug/l	--	2000	<100	200	<100	2200	--	2800	3700	4600	--	--	1100	1200	--	1100
Nitrite as N	ug/l	--	20	<10	10	<10	<10	--	100	250	110	--	--	50	50	--	10
Nitrogen, Total Kjeldahl	ug/l	--	1200	1400	800	800	600	--	1300	1300	900	--	--	900	700	--	600
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.9	8.2	7.8	7.8	8.0	--	7.9	7.9	8.0	--	--	7.9	7.9	--	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	12	44	18	4	11	--	14	<2	<2	--	--	<2	<2	--	<2
Sulphate	ug/l	--	180000	260000	300000	370000	310000	--	330000	360000	320000	--	--	260000	300000	--	370000
Temperature (Field)	deg c	-- (24)	9	13	17	20.0	19	--	7	4	2	--	--	5	10.1	--	18
Total Dissolved Solids	ug/l	--	510000	510000	695000	680000	665000	--	752000	745000	735000	--	--	580000	678000	--	780000
Total Suspended Solids	ug/l	--	<10000	10000	11000	2000	5000	--	3000	<1000	2000	--	--	5000	2000	--	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	57	56	99	57	66	--	84	83	47	--	--	71	61	--	63
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	130	**270**	**370**	**330**	**280**	--	**360**	**430**	**330**	--	--	**260**	**370**	--	**450**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	84000	52000	100000	92000	110000	--	110000	110000	86000	--	--	97000	100000	--	120000
Chromium	ug/l	-- (30)	<5	<5	<5	<5	<5	--	<5	<5	<5	--	--	<5	<5	--	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	<1	<1	1	<1	1	--	<1	<1	<1	--	--	<1	<1	--	<1
Hexavalent Chromium	ug/l	1 (22)	**<5**	**<5**	**<5**	**<5**	**<5**	--	**<5**	**<5**	**<5**	--	--	<0.5	**<5**	--	<0.5
Iron	ug/l	300	<100	<100	**400**	<100	<100	--	<100	200	<100	--	--	<100	<100	--	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	21000	28000	39000	29000	34000	--	44000	39000	32000	--	--	30000	35000	--	42000
Manganese	ug/l	--	5	2	210	<2	24	--	61	49	6	--	--	20	16	--	8
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	--	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	4300	5600	7800	8300	8300	--	8000	8200	6300	--	--	5400	6600	--	8000
Silicon	ug/l	--	1900	<50	2800	2200	2700	--	4100	3500	2800	--	--	2400	2800	--	2900
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	46000	60000	77000	89000	56000	--	75000	94000	79000	--	--	68000	86000	--	87000
Strontium	ug/l	--	3000	3300	5600	4400	4800	--	6700	6200	5800	--	--	4500	5800	--	7200
Sulfur	ug/l	--	59000	81000	99000	110000	100000	--	98000	110000	100000	--	--	85000	100000	--	130000
Thallium	ug/l	0.3 (33)	0.07	0.05	0.07	0.16	0.17	--	0.11	0.05	0.11	--	--	0.06	0.09	--	0.13
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**
			07-Jul-2010	**18-Aug-2010**	**19-Aug-2010**	**29-Sep-2010**	**28-Oct-2010**	**22-Nov-2010**	**09-Dec-2010**	**12-Jan-2011**	**23-Feb-2011 (7)**	**30-Mar-2011**	**14-Apr-2011 (8)**	**12-May-2011**	**20-Jun-2011**	**19-Jul-2011**	**26-Aug-2011 (4)**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS 1	S-2	SS-1	SS-1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	147000	152000	--	96000	142000	138000	145000	179000	141000	197000	162000	147000	147000	133000	--
Ammonia, unionized (Field)	ug/l	20	<20	--	--	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	<50	--	<50	<50	<50	<50	150	190	330	220	<50	<50	<50	390	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000	3000	<2000	4000	<2000	<2000	<2000	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	15000	--	14000	<4000	<4000	<4000	8000	11000	8000	10000	10000	13000	23000	9000	--
Chloride	ug/l	--	83000	66000	--	43000	63000	60000	44000	73000	57000	62000	22000	66000	70000	45000	--
Chromium (III)	ug/l	8.9 (22)	<5	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	885	970	--	805	980	950	54	685	785	1095	1100	1105	1147	1105	--
Dissolved Organic Carbon	ug/l	--	2200	3400	--	1900	2200	2400	3000	2600	2000	2100	3800	2500	3700	2500	--
Hardness, Calcium Carbonate	ug/l	--	450000	470000	--	330000	470000	430000	380000	450000	350000	470000	320000	440000	460000	430000	--
Nitrate as N	ug/l	--	1200	600	--	1700	1700	1700	1300	1000	1100	500	200	1200	800	700	--
Nitrite as N	ug/l	--	10	10	--	20	<10	10	20	10	20	<10	<10	10	10	<10	--
Nitrogen, Total Kjeldahl	ug/l	--	400	--	500	400	400	400	400	700	600	500	400	500	600	800	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.9	7.9	--	7.7	7.9	8	7.81	8.0	8.0	7.8	8.0	7.6	8.01	7.5	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	--	6	6	<2	5	17	13	11	9	12	12	28	12	--
Sulphate	ug/l	--	360000	320000	--	270000	340000	320000	260000	300000	230000	290000	130000	330000	380000	350000	--
Temperature (Field)	deg c	-- (24)	25	25	--	14	6	3	0.1	1	1	2	8	13	21.4	20	--
Total Dissolved Solids	ug/l	--	792000	710000	--	548000	726000	634000	550000	694000	548000	684000	402000	688000	838000	680000	--
Total Suspended Solids	ug/l	--	2000	<1000	--	<1000	3000	2000	11000	4000	1000	2000	4000	1000	1000	2000	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	74	76	--	50	56	54	60	74	61	74	46	58	74	63	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**450**	**300**	--	**210**	**290**	**230**	150	**300**	**220**	**290**	130	**260**	**290**	**270**	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	140000	130000	--	100000	140000	130000	120000	130000	91000	120000	89000	120000	140000	130000	--
Chromium	ug/l	-- (30)	<5	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	<0.50	<0.50	0.7	<0.5	<0.5	<0.5	<0.5	--
Copper	ug/l	5	<1	<1	--	<1	<1	<1	1	2	<1	<1	<1	1	<1	2	--
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	**<5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
Iron	ug/l	300	<100	200	--	<100	<100	<100	<100	<100	<100	100	<100	<100	<100	<100	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	47000	35000	--	26000	42000	35000	29000	42000	29000	45000	18000	35000	46000	35000	--
Manganese	ug/l	--	16	29	--	21	12	11	16	16	12	12	13	6	25	30	--
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	9200	7300	--	5800	7900	6100	5400	7100	5400	6500	3300	6600	8200	7600	--
Silicon	ug/l	--	3400	2000	--	1800	2700	2300	1800	3500	2400	3800	700	2200	2800	2300	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	--
Sodium	ug/l	--	82000	56000	--	49000	72000	60000	46000	72000	54000	60000	28000	71000	81000	65000	--
Strontium	ug/l	--	7600	6100	--	4800	6400	5600	4800	6800	5000	7300	3200	6100	7300	6000	--
Sulfur	ug/l	--	140000	120000	--	94000	140000	110000	91000	99000	80000	110000	52000	110000	130000	130000	--
Thallium	ug/l	0.3 (33)	0.15	0.12	--	0.09	0.09	0.06	0.06	0.07	0.07	0.08	0.06	0.10	0.08	0.10	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			21-Sep-2011	**28-Oct-2011**	**14-Nov-2011 (9)**	**08-Dec-2011 (9)**	**11-Jan-2012**	**06-Feb-2012**	**13-Mar-2012 (9)**	**10-Apr-2012**	**24-May-2012**	**29-Jun-2012**	**20-Jul-2012 (2)**	**29-Aug-2012**	**26-Sep-2012**	**10-Oct-2012**	**28-Nov-2012**
Parameter	**Unit**	**PWQO (1)**	S-2	SS-1	SS-1	SS - 1	SS -1	SS- 1	SS-1	SS-1	SS-1	T-3	s-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	122000	142000	157000	135000	186000	214000	110000	170000	150000	160000	--	140000	150000	170000	180000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	100	<50	710	200	70	140	190	<50	<50	<50	--	<50	180	330	80
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	10000	10000	6000	7000	10000	11000	13000	4000	8700	9700	--	8300	12000	10000	16000
Chloride	ug/l	--	87000	60000	71000	45000	66000	73000	42000	68000	42000	80000	--	74000	41000	58000	65000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1102	1050	1035	1080	1105	995	805	900	920	1102	--	1020	1125	1170	1180
Dissolved Organic Carbon	ug/l	--	1700	2300	2000	1700	1700	2000	2100	1900	3400	2500	--	2300	3000	2200	1900
Hardness, Calcium Carbonate	ug/l	--	550000	510000	540000	450000	540000	570000	290000	450000	470000	560000	--	540000	520000	600000	590000
Nitrate as N	ug/l	--	1200	1700	1300	2300	1200	500	1200	1200	580	490	--	320	910	840	810
Nitrite as N	ug/l	--	<10	20	<10	30	<10	<10	11	<10	<10	13	--	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	500	300	1000	500	300	400	800	360	230	530	--	240	780	830	360
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.51	7.6	7.5	7.5	7.8	7.8	7.7	7.7	7.7	8.08	--	7.8	7.8	8	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	23	6	11	12	14	5	19	<2	12	6	--	3	7	<2	11
Sulphate	ug/l	--	500000	380000	390000	330000	360000	340000	200000	330000	310000	400000	--	400000	400000	430000	420000
Temperature (Field)	deg c	-- (24)	17.3	12	5	2	1	0	1	7	15	21.8	--	23	9	8	2
Total Dissolved Solids	ug/l	--	1030000	872000	896000	780000	896000	906000	512000	774000	708000	874000	--	980000	908000	968000	1020000
Total Suspended Solids	ug/l	--	1000	2000	3000	<1000	<1000	1000	5000	<1000	3000	<1000	--	<1000	3000	<1000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	55	56	55	50	54	62	41	56	63	56	--	61	60	55	48
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**350**	**280**	**330**	**230**	**350**	**370**	120	**240**	190	**320**	--	**380**	**260**	**320**	**320**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	150000	150000	150000	130000	150000	160000	91000	120000	130000	140000	--	150000	150000	160000	160000
Chromium	ug/l	-- (30)	<5	<5	<5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.5	<0.5	<0.5	<0.50	0.54	0.87	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1	<1	<1	<1.0	<1.0	<1.0	5.0	**5.4**	<1.0	<1.0	--	<1.0	<1.0	<1.0	1.6
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	0.7	0.7	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5
Iron	ug/l	300	<100	<100	<100	<100	<100	150	<100	<100	140	<100	--	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	44000	41000	49000	38000	52000	55000	22000	38000	32000	46000	--	48000	38000	51000	55000
Manganese	ug/l	--	3	8	4	4.2	11	24	6.1	4.6	18	5.2	--	2.7	17	5.4	4.9
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	9400	7400	7800	6800	7300	7800	4700	6000	5400	7800	--	8500	7000	7700	7000
Silicon	ug/l	--	2700	2500	3200	2700	3700	4500	1800	2600	2100	3000	--	3200	2000	3200	3100
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	73000	63000	77000	59000	79000	84000	45000	59000	43000	67000	--	68000	56000	70000	81000
Strontium	ug/l	--	7200	6700	7800	6300	8000	7900	4000	6600	5200	7900	--	7800	7000	7700	8200
Sulfur	ug/l	--	170000	150000	140000	130000	150000	140000	70000	110000	110000	150000	--	150000	160000	160000	170000
Thallium	ug/l	0.3 (33)	0.15	0.08	0.06	0.080	0.073	0.058	0.065	0.068	0.064	0.090	--	0.14	0.090	0.070	<0.050
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**
			17-Dec-2012	**16-Jan-2013 (9)**	**26-Feb-2013**	**25-Mar-2013**	**01-Apr-2013 (4)**	**10-May-2013**	**21-Jun-2013**	**29-Jul-2013**	**14-Aug-2013**	**26-Sep-2013**	**25-Oct-2013**	**22-Nov-2013 (10)**	**23-Dec-2013**	**09-Jan-2014 (4)**	**04-Feb-2014 (4)**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	ss1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	s1	s1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	190000	140000	180000	170000	--	100000	120000	120000	130000	130000	140000	180000	180000	--	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20	<20	<20	--	--
Ammonia Nitrogen	ug/l	--	150	160	230	64	--	80	80	110	<50	<50	140	<50	140	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	8800	12000	8100	--	8900	4900	5100	5400	6900	4600	5300	<4000	--	--
Chloride	ug/l	--	67000	67000	72000	47000	--	43000	62000	57000	47000	46000	63000	64000	69000	--	--
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1190	920	982	897	--	880	1033	801	1043	1025	1010	1191	1277	--	--
Dissolved Organic Carbon	ug/l	--	2000	1700	2500	2700	--	1500	1700	2000	2000	1900	1500	2400	2200	--	--
Hardness, Calcium Carbonate	ug/l	--	670000	550000	540000	410000	--	330000	450000	450000	430000	410000	480000	530000	530000	--	--
Nitrate as N	ug/l	--	570	1100	510	850	--	1500	1800	1000	720	820	1400	610	690	--	--
Nitrite as N	ug/l	--	<10	<10	<10	19	--	11	<10	<10	<10	<10	<10	<10	<10	--	--
Nitrogen, Total Kjeldahl	ug/l	--	480	680	800	830	--	580	310	610	200	290	430	260	310	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.9	7.7	7.30	7.13	--	8.1	7.71	7.22	7.10	**3.93**	7.4	7.64	7.10	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	2	8	50	13	--	9	<2	7	3	2	<2	<2	7	--	--
Sulphate	ug/l	--	430000	380000	350000	270000	--	270000	350000	350000	340000	360000	370000	380000	390000	--	--
Temperature (Field)	deg c	-- (24)	1	1	2.5	1.6	--	20	17.8	20.2	17.6	13.2	6	3.0	0.4	--	--
Total Dissolved Solids	ug/l	--	1010000	874000	830000	560000	--	566000	758000	806000	734000	800000	852000	912000	916000	--	--
Total Suspended Solids	ug/l	--	1000	6000	8000	3000	--	<1000	2000	1000	2000	<1000	<1000	1000	8000	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	52	48	53	45	--	47	52	58	47	48	50	52	54	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**330**	**250**	**220**	140	--	140	**230**	**240**	**230**	**240**	**260**	**260**	**260**	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	180000	140000	140000	130000	--	97000	130000	140000	130000	130000	150000	150000	150000	--	--
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	--
Cobalt	ug/l	0.9	<0.50	0.52	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--
Copper	ug/l	5	<1.0	<1.0	<1.0	2.8	--	<1.0	<1.0	<1.0	<1.0	<1.0	2.6	<1.0	<1.0	--	--
Hexavalent Chromium	ug/l	1 (22)	<0.5	**1.3**	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--
Iron	ug/l	300	<100	260	**310**	250	--	<100	<100	<100	<100	<100	<100	<100	<100	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	64000	43000	40000	30000	--	24000	32000	36000	31000	33000	42000	43000	50000	--	--
Manganese	ug/l	--	5.1	10	52	52	--	<2.0	2.2	4.7	15	8.4	4.2	18	26	--	--
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	7900	6900	5800	5100	--	6100	7700	8100	6800	7200	7900	6500	7000	--	--
Silicon	ug/l	--	3700	2600	3200	2400	--	1500	2000	2500	2100	2300	2700	2700	3300	--	--
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--
Sodium	ug/l	--	92000	72000	60000	48000	--	45000	54000	52000	46000	47000	56000	59000	70000	--	--
Strontium	ug/l	--	9900	7100	6900	4500	--	4100	5900	6300	5600	5600	6600	7200	7400	--	--
Sulfur	ug/l	--	160000	150000	130000	95000	--	90000	120000	130000	120000	140000	140000	140000	160000	--	--
Thallium	ug/l	0.3 (33)	0.070	0.064	<0.050	<0.050	--	0.087	0.087	0.12	0.11	0.089	0.087	<0.050	<0.050	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			26-Mar-2014 (10)	**22-Apr-2014 (9)**	**21-May-2014**	**19-Jun-2014**	**15-Jul-2014**	**25-Aug-2014**	**23-Sep-2014**	**27-Oct-2014**	**20-Nov-2014 (10)**	**09-Dec-2014 (11)**	**16-Mar-2015**	**07-Apr-2015**	**21-May-2015 (10)**	**23-Jun-2015 (10)**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	190000	110000	130000	160000	130000	100000	150000	150000	150000	160000	140000	150000	150000	140000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	250	2300	<50	110	<50	<50	<50	72	73	<50	120	78	<50	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	11000	7300	5900	5500	4700	<4000	7100	<4000	<4000	6200	17000	7900	8400	13000
Chloride	ug/l	--	70000	36000	46000	71000	43000	35000	45000	47000	70000	67000	39000	58000	83000	85000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1293	1080	1130	1131	928	1220	1140	1046	1193	1233	785	967	1005	1181
Dissolved Organic Carbon	ug/l	--	2000	2000	2500	2100	2400	1400	2500	2200	1900	1800	4100	1700	2300	3100
Hardness, Calcium Carbonate	ug/l	--	530000	310000	420000	490000	420000	350000	460000	460000	520000	560000	320000	430000	540000	520000
Nitrate as N	ug/l	--	600	1450	1350	1400	1020	960	770	870	960	1320	430	960	1030	780
Nitrite as N	ug/l	--	<10	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	510	2300	510	600	490	510	600	240	260	190	340	290	350	520
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.60	7.6	7.8	7.58	7.91	7.9	7.8	7.67	8.24	7.46	8.19	7.24	7.8	8.11
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	20	<2	7	5	9	3	7	7	15	10	56	6	11	13
Sulphate	ug/l	--	370000	210000	280000	350000	300000	310000	340000	360000	380000	410000	190000	300000	360000	360000
Temperature (Field)	deg c	-- (24)	1.5	7	8	17.2	18.6	20	20	9.2	0.2	0.9	1.2	2.5	13	23.5
Total Dissolved Solids	ug/l	--	908000	492000	630000	1000000	652000	590000	762000	670000	798000	894000	474000	652000	898000	962000
Total Suspended Solids	ug/l	--	56000	5000	4000	2000	3000	2000	1000	2000	5000	3000	92000	4000	2000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	48	37	55	58	58	49	49	52	50	47	35	39	51	58
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**230**	96	140	**230**	190	160	**210**	200	**240**	**240**	97	160	**210**	**210**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	170000	87000	110000	150000	130000	110000	140000	160000	160000	160000	120000	120000	150000	160000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	0.58	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	280	<100	<100	<100	<100	<100	<100	<100	<100	<100	240	<100	<100	110
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	47000	19000	26000	38000	29000	26000	33000	36000	44000	47000	19000	32000	42000	40000
Manganese	ug/l	--	23	4.3	4.0	9.5	9.7	3.1	5.5	9.3	5.8	4.6	13	8.5	2.8	11
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6300	5000	6800	8000	8000	7900	8000	7600	8200	7800	3700	5300	8000	8700
Silicon	ug/l	--	3400	1300	1600	2300	2700	1800	2200	2400	2800	2800	1700	2200	2500	1800
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	58000	28000	41000	60000	43000	33000	45000	47000	61000	61000	27000	44000	60000	52000
Strontium	ug/l	--	6700	3100	4200	5800	4800	4000	5100	5900	6500	6600	2700	4600	5900	5700
Sulfur	ug/l	--	140000	77000	100000	120000	100000	110000	120000	130000	150000	150000	67000	97000	140000	--
Thallium	ug/l	0.3 (33)	0.063	<0.050	0.063	0.076	0.083	0.10	0.069	0.068	0.066	0.073	<0.050	0.054	0.079	0.11
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**
			22-Jul-2015 (12)	**28-Aug-2015 (10)**	**25-Sep-2015 (9)**	**27-Oct-2015 (10)**	**20-Nov-2015**	**10-Dec-2015 (10)**	**26-Jan-2016 (10)**	**23-Feb-2016**	**21-Mar-2016 (9)**	**26-Apr-2016 (9)**	**31-May-2016**	**30-Jun-2016 (13)**	**13-Jul-2016**	**04-Aug-2016**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	140000	110000	110000	140000	140000	140000	140000	170000	100000	140000	160000	160000	120000	110000
Ammonia, unionized (Field)	ug/l	20	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	<50	190	<50	<50	250	290	580	<50	<50	300	<50	85
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	3000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	4000	<4000	5100	7600	5400	<4000	9700	<4000	8000	7800	41000	12000	7200
Chloride	ug/l	--	94000	72000	58000	80000	67000	75000	74000	68000	46000	74000	110000	98000	84000	86000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1345	1100	1080	1267	1105	1262	1224	500	736	1068	1228	695	885	945
Dissolved Organic Carbon	ug/l	--	2000	1300	1400	1700	2000	1800	1400	2800	1400	2300	1800	8800	1700	2100
Hardness, Calcium Carbonate	ug/l	--	600000	500000	470000	580000	520000	540000	520000	490000	300000	440000	570000	720000	520000	540000
Nitrate as N	ug/l	--	810	960	1050	490	560	690	1130	810	1170	1200	750	<100	1150	1020
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	13	<10	13	<10	<10	<10	14	12
Nitrogen, Total Kjeldahl	ug/l	--	380	350	230	<500 (35)	330	200	600	520	860	170	210	1200	350	310
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.14	7.49	7.6	6.63	8.11	8.10	7.55	7.47	7.71	8.03	7.20	7.8	7.7	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	15	8	<4	<4	4	19	7	38	11	9	<4	100	8	6
Sulphate	ug/l	--	430000	380000	360000	420000	380000	380000	360000	360000	200000	320000	390000	450000	390000	420000
Temperature (Field)	deg c	-- (24)	22.1	20.2	15	7.9	6.6	5.4	2.4	0	3.7	7.8	20.9	24	23	21
Total Dissolved Solids	ug/l	--	944000	1060000	786000	968000	872000	958000	836000	802000	408000	642000	970000	1120000	974000	1050000
Total Suspended Solids	ug/l	--	1000	<2000	<1000	<1000	2000	2000	4000	43000	4000	2000	1000	10000	2000	2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	53	44	43	45	41	43	43	45	38	43	44	84	50	52
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**260**	**230**	170	**230**	160	190	180	150	82	130	190	**250**	**220**	**220**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	170000	150000	140000	160000	150000	160000	150000	160000	93000	130000	150000	200000	160000	160000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	0.62	0.58	<0.50	<0.50	<0.50	**1.3**	<0.50	**1.7**	0.95	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	<100	<100	<100	<100	**430**	<100	<100	<100	**550**	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	47000	39000	32000	45000	35000	40000	41000	37000	20000	31000	45000	44000	40000	41000
Manganese	ug/l	--	<2.0	2.8	2.2	3.0	5.7	6.1	5.9	18	3.2	3.6	2.1	23	<2.0	3.1
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	10000	9700	8800	8500	6400	7300	10000	6500	6800	7600	8700	8500	11000	12000
Silicon	ug/l	--	2700	2200	1900	2400	1900	2300	2400	2500	1500	1900	2600	2700	2300	2300
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	61000	46000	36000	53000	41000	51000	53000	47000	36000	46000	63000	62000	51000	49000
Strontium	ug/l	--	6800	5700	4500	6800	4700	5700	5600	4700	2700	4700	6600	6400	5700	5900
Sulfur	ug/l	--	160000	160000	130000	140000	110000	140000	140000	120000	72000	110000	150000	170000	140000	160000
Thallium	ug/l	0.3 (33)	0.12	0.14	0.079	0.067	0.051	0.055	0.067	<0.050	<0.050	0.056	0.080	0.10	0.14	0.11
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**
			20-Sep-2016	**26-Oct-2016 (9)**	**11-Nov-2016 (9)**	**14-Dec-2016**	**23-Jan-2017**	**14-Feb-2017**	**27-Mar-2017 (14)**	**21-Apr-2017 (14)**	**23-May-2017**	**26-Jun-2017**	**21-Jul-2017**	**11-Aug-2017**	**08-Sep-2017**	**17-Oct-2017 (15)**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	120000	150000	130000	160000	150000	180000	140000	120000	150000	140000	120000	130000	120000	130000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	<50	770	980	<50	250	84	<50	150	<50	340	<50	610 (36)
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	4200	11000	<4000	4000	4300	<4000	<4000	5800	5900	<4000	<4000	<4000	<4000	<4000
Chloride	ug/l	--	48000	45000	66000	47000	81000	98000	85000	74000	110000	120000	70000	98000	92000	97000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1049	1005	1167	985	1249	1060	970	1054	1287	1238	1099	1312	1165	1209
Dissolved Organic Carbon	ug/l	--	1700	2600	1300	2600	1500	1700	1600	1600	1600	1600	1400	1900	1500	1600
Hardness, Calcium Carbonate	ug/l	--	500000	470000	610000	580000	540000	590000	400000	430000	590000	600000	500000	570000	520000	520000
Nitrate as N	ug/l	--	660	720	1470	1020	910	710	1190	2420	1820	710	1720	1310	870	790
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	19	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	300	<100	230	1100	1300	220	310	310	440	610	340	640	150	600 (36)
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	8.06	7.8	7.60	7.6	6.60	7.7	7.66	7.24	7.36	7.15	7.53	7.82	7.41	7.71
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	14	<4	<4	33	9	<4	<4	<4	7	4	<4	<4	<4	<4
Sulphate	ug/l	--	350000	310000	420000	370000	390000	410000	270000	300000	370000	380000	380000	400000	360000	380000
Temperature (Field)	deg c	-- (24)	20.1	17	7.4	2	2.1	1	3.3	7.5	11.3	14.7	17.9	20.3	16.0	12.1
Total Dissolved Solids	ug/l	--	828000	798000	950000	816000	900000	1030000	678000	716000	962000	1080000	826000	1010000	882000	875000
Total Suspended Solids	ug/l	--	6000	3000	2000	17000	6000	<1000	2000	3000	2000	4000	2000	<1000	2000	6000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	44	43	36	44	43	42	37	43	45	48	46	46	47	44
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	190	150	190	140	190	**210**	130	120	190	200	160	**210**	200	**210**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	150000	140000	150000	160000	160000	170000	110000	130000	170000	170000	140000	150000	160000	150000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	0.63	0.56	<0.50	<0.50	<0.50	0.71	0.65	<0.50	<0.50	<0.50	<0.50	0.86	0.63
Iron	ug/l	300	<100	<100	**1500**	290	150	280	<100	<100	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	34000	32000	41000	35000	43000	48000	31000	30000	44000	45000	35000	41000	41000	40000
Manganese	ug/l	--	5.4	2.3	6.1	29	8.1	9.8	4.1	2.5	3.7	4.7	<2.0	<2.0	2.5	2.9
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	9900	9300	10000	7300	9100	8600	8700	9900	8400	8500	10000	12000	13000	13000
Silicon	ug/l	--	2100	2000	2300	2000	2800	3000	2100	2000	2500	2600	2200	2500	2500	2600
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	39000	39000	50000	41000	55000	63000	50000	43000	53000	49000	40000	54000	53000	55000
Strontium	ug/l	--	5000	4500	5800	4400	6000	6500	4400	4100	5800	6300	5000	5800	6000	5800
Sulfur	ug/l	--	130000	120000	160000	130000	150000	150000	88000	110000	140000	140000	130000	140000	140000	140000
Thallium	ug/l	0.3 (33)	0.096	0.052	0.082	<0.050	0.065	0.069	0.060	0.10	0.055	0.068	0.088	0.10	0.096	0.095
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**	**SS-1**
			17-Nov-2017	**07-Dec-2017 (14)**	**22-Jan-2018**	**16-Feb-2018**	**13-Mar-2018**	**24-Apr-2018**	**18-May-2018**	**22-Jun-2018**	**18-Jul-2018**	**24-Aug-2018**	**18-Sep-2018**	**24-Oct-2018**	**20-Nov-2018**	**18-Dec-2018**	**25-Jan-2019**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	130000	150000	190000	205000	148000	124000	136000	126000	133000	116000	130000	149000	159000	174000	201000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	70	100	160	1260	150	290	50	70	380	<20	80	50	1090
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<1000	<1000	<1000	<1000	<1000	<1000	2000	<1000	<1000	<1000	<1000	1000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	<4000	5000	<5000	<5000	<5000	5000	<5000	<5000	6000	<5000	<5000	<5000	<5000	<5000
Chloride	ug/l	--	73000	86000	75000	102000	91000	120000	105000	28000	164000	115000	127000	119000	113000	111000	111000
Chromium (III)	ug/l	8.9 (22)	<5	<5	**<10**	<1	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	<1
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1135	1257	1201	1343	1116	1100	1254	1333	1467	1258	1335	1314	1304	1315	1328
Dissolved Organic Carbon	ug/l	--	1600	1700	1900	1400	1600	1800	1500	2000	7200	1300	4800	1800	1900	1800	2400
Hardness, Calcium Carbonate	ug/l	--	500000	550000	566000	588000	475000	431000	536000	562000	543000	455000	568000	499000	615000	571000	526000
Nitrate as N	ug/l	--	1300	940	280	330	780	1010	1090	120	340	910	350	1160	1540	1230	440
Nitrite as N	ug/l	--	10	<10	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	220	160	300	200	300	1800	200	200	420	100	3400	200	1900	200	1300
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.33	7.06	**6.42**	6.6	7.75	7.96	7.81	8.05	7.72	7.03	7.49	7.28	6.80	7.03	6.59
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<4	7	<2	<2	12	54	5	6	4	6	3	<2	3	7	2
Sulphate	ug/l	--	340000	370000	389000	405000	305000	430000	371000	81000	425000	434000	452000	451000	450000	407000	352000
Temperature (Field)	deg c	-- (24)	5.2	4.6	1.1	1.2	1.9	7.8	12.1	18.0	23.2	18.9	20.2	8.3	3.9	2.8	1.3
Total Dissolved Solids	ug/l	--	735000	890000	780000	987000	748000	791000	903000	890000	1050000	945000	994000	1020000	994000	966000	959000
Total Suspended Solids	ug/l	--	<1000	6000	4000	4000	4000	5000	<1000	5000	2000	3000	2000	<1000	9000	29000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	40	39	50	40	40	40	40	50	50	60	50	<10	50	40	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	200	200	**270**	**280**	200	160	180	**210**	**260**	**260**	**270**	<10	**260**	**250**	**240**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	140000	150000	151000	158000	134000	118000	147000	156000	148000	126000	155000	134000	167000	151000	138000
Chromium	ug/l	-- (30)	<5.0	<5.0	<1	<1	1	3	2	6	2	1	<1	<1	<1	2	<1
Cobalt	ug/l	0.9	<0.50	<0.50	0.3	0.3	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5	0.5	0.9
Copper	ug/l	5	<1.0	<1.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	**1.4**	0.96	**<10**	<1	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	<1
Iron	ug/l	300	<100	<100	30	50	270	40	<30	40	<30	30	<30	<30	50	130	40
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	37000	41000	46000	47000	34000	33000	41000	42000	42000	34000	44000	40000	48000	47000	44000
Manganese	ug/l	--	<2.0	3.0	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	20
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	14000	12000	8000	10000	10000	11000	14000	19000	19000	16000	16000	16000	12000	13000	11000
Silicon	ug/l	--	2400	2600	3000	3200	2600	2500	2800	2700	2400	2200	2600	2400	2900	3200	3300
Silver	ug/l	0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	48000	55000	51000	69000	59000	55000	65000	66000	77000	66000	74000	78000	72000	65000	75000
Strontium	ug/l	--	4800	5900	6910	6990	5720	5770	5760	6140	7140	6640	6150	<1	9030	6790	6810
Sulfur	ug/l	--	130000	140000	130000	135000	96000	109000	112000	117000	144000	183000	157000	167000	158000	149000	132000
Thallium	ug/l	0.3 (33)	0.089	0.080	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			21-Feb-2019 (16)	**13-Mar-2019**	**17-Apr-2019**	**24-May-2019**	**21-Jun-2019**	**18-Jul-2019**	**21-Aug-2019**	**18-Sep-2019**	**29-Oct-2019**	**19-Nov-2019**	**18-Dec-2019**	**15-Jan-2020**	**19-Feb-2020**	**19-Mar-2020**	**03-Apr-2020**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS - 1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	209000	195000	74000	128000	116000	155000	160000	152000	74000	146000	123000	85000	205000	94000	93000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	50	70	160	46	14	50	50	20	100	<10	<10	18	35	97	24
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	2000	2000	<1000	<1000	<1000	2000	<1000	2000	4000	1000	2000	2000	2000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	7000	<5000	<5000	5000	7000	<5000	<5000	<5000	7000	<5000	8000	<5000	6000	<5000	<5000
Chloride	ug/l	--	145000	126000	49000	95000	157000	115000	129000	114000	60000	92000	66000	34000	90000	57000	72000
Chromium (III)	ug/l	8.9 (22)	<1	<1	3	2	<1	<1	<1	<1	3	1	2	3	**<10**	**<10**	**<10**
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1344	1347	698	1171	1288	1257	1351	1297	993	1467	1066	632	1275	770	974
Dissolved Organic Carbon	ug/l	--	1800	2300	800	<500	1000	600	11700	1600	1200	1800	1500	1300	1800	1600	1800
Hardness, Calcium Carbonate	ug/l	--	513000	487000	266000	507000	514000	510000	565000	678000	374000	561000	426000	269000	564000	335000	382000
Nitrate as N	ug/l	--	460	550	1370	3000	1810	630	720	740	1450	1680	690	590	180	1570	1800
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	200	<100	200	300	290	200	200	<100	200	<100	298	234	391	421	399
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	6.77	6.76	6.74	8 (37)	6.65	6.72	7.31	6.77	7.67	7.69	8.12	7.95	7.78	8.22	7.94
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	4	3	6	<2	<2	13	3	2	4	<2	5	16	<2	9	<2
Sulphate	ug/l	--	422000	377000	176000	367000	403000	386000	412000	448000	297000	440000	304000	187000	379000	214000	289000
Temperature (Field)	deg c	-- (24)	1.5	1.9	6.5	10.3	12.9	15.8	17.6	15.6	9.4	3.7	2.7	1.1	2.9	2.7	6.0
Total Dissolved Solids	ug/l	--	973000	966000	453000	763000	952000	786000	1030000	1020000	614000	1040000	728000	415000	959000	502000	648000
Total Suspended Solids	ug/l	--	2000	4000	14000	2000	2000	6000	3000	2000	9000	4000	7000	66000	3000	17000	2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	40	40	40	50	50	50	60	60	40	50	40	30	50	40	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**260**	**260**	60	180	**230**	**280**	**320**	**270**	120	**250**	160	100	**320**	90	120
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	138000	129000	80000	142000	140000	135000	152000	189000	107000	152000	116000	78000	145000	101000	110000
Chromium	ug/l	-- (30)	<1	<1	3	2	1	<1	<1	<1	3	1	2	3	<1	4	5
Cobalt	ug/l	0.9	0.8	0.5	0.2	0.2	0.4	0.3	0.4	0.4	0.2	0.4	0.3	0.7	0.7	0.3	0.2
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<10**	<1
Iron	ug/l	300	40	40	70	<30	<30	130	<30	<30	70	<30	60	**340**	60	160	40
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	41000	40000	16000	37000	40000	42000	45000	50000	26000	44000	33000	18000	49000	20000	26000
Manganese	ug/l	--	10	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	20	10	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	11000	10000	11000	14000	18000	12000	14000	18000	11000	17000	11000	6000	10000	10000	13000
Silicon	ug/l	--	3300	3200	1700	2400	2300	2700	3000	2700	2200	2800	2500	2700	3600	3300	2300
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	80000	79000	31000	59000	82000	63000	73000	74000	41000	70000	47000	26000	70000	40000	46000
Strontium	ug/l	--	7160	7410	2190	5270	6030	6860	8220	8130	3520	7000	5110	2590	8510	3520	3730
Sulfur	ug/l	--	134000	129000	74000	131000	150000	150000	159000	169000	106000	164000	119000	61700	165000	78000	107000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			08-May-2020	**01-Jun-2020**	**21-Jul-2020**	**25-Aug-2020**	**17-Sep-2020**	**23-Oct-2020**	**26-Nov-2020**	**11-Dec-2020**	**08-Jan-2021**	**18-Feb-2021**	**22-Mar-2021**	**09-Apr-2021 (17)**	**28-May-2021**	**28-Jun-2021**	**15-Jul-2021**
Parameter	**Unit**	**PWQO (1)**	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	149000	173000	153000	176000	120000	128000	156000	139000	141000	190000	176000	132000	181000	108000	137000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<10	26	16	50	<10	<10	870	<10	<10	80	28	<10	<10	<10	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	2000	9000	6000	5000	5000	6000	3000	1000	3000	6000	<1000	1000	<1000	2000	1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	16000	<5000	11000	6000	<5000	<5000	<5000	<5000	5000	<5000	<5000	<5000	7000	<5000	<5000
Chloride	ug/l	--	83000	98000	125000	88000	75000	84000	89000	74000	80000	108000	74000	100000	119000	108000	89000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1075	1294	1220	1154	1297	637	1210	1286	1256	1428	1183	1235	1348	1233	1199
Dissolved Organic Carbon	ug/l	--	2700	2600	3300	3400	1600	1500	2600	1300	1400	1700	1600	1400	2400	1200	1500
Hardness, Calcium Carbonate	ug/l	--	436000	522000	577000	485000	535000	488000	539000	564000	535000	629000	452000	529000	642000	511000	583000
Nitrate as N	ug/l	--	360	<100	320	320	670	1340	900	2340	1330	540	830	2750	660	1100	500
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<500	<100	<100	<100	<100	<100	<500	<500	<100	<500
Nitrogen, Total Kjeldahl	ug/l	--	422	2520	479	391	1970	637	341	302	193	379	<100	374	132	1070	462
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.61	7.80	8.09	8.10	7.77	7.47	7.75	7.38	7.34	7.51	7.28	7.46	7.74	7.81	7.50
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	6	16	8	34	3	3	10	3	6	8	2	2	<2	14	6
Sulphate	ug/l	--	278000	357000	382000	340000	480000	430000	442000	448000	482000	460000	367000	427000	498000	414000	444000
Temperature (Field)	deg c	-- (24)	5.1	10.8	15.9	17.4	15.5	11.0	0.9	4.8	4.1	3.5	5.2	8.1	13.4	17.4	17.0
Total Dissolved Solids	ug/l	--	689000	882000	1010000	854000	924000	903000	938000	903000	896000	1010000	854000	868000	1010000	868000	889000
Total Suspended Solids	ug/l	--	20000	52000	6000	15000	22000	5000	28000	9000	10000	22000	8000	4000	<1000	20000	11000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	50	60	60	50	40	40	40	40	30	40	50	40	40	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	150	**260**	**280**	**270**	**220**	**240**	**220**	190	**220**	**280**	170	170	**290**	**220**	**250**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	143000	160000	138000	145000	141000	150000	155000	145000	166000	120000	146000	168000	142000	161000
Chromium	ug/l	-- (30)	<1	<1	<1	<1	<1	1	<1	2	<1	<1	<1	2	<1	<1	<1
Cobalt	ug/l	0.9	<0.2	0.5	0.5	0.8	<0.2	0.3	0.2	0.3	0.7	0.6	0.4	0.2	0.3	0.6	0.2
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	<1	<0.5	<0.50	0.8	**1.5**	<1	**1.5**	0.54	<0.5	<0.5	**1.2**	<0.5	0.6	0.6
Iron	ug/l	300	70	140	50	**480**	<30	30	100	50	90	100	30	<30	<30	120	80
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	27000	40000	43000	34000	42000	33000	40000	43000	42000	52000	37000	40000	54000	38000	44000
Manganese	ug/l	--	<10	10	10	100	<10	<10	10	<10	<10	10	<10	<10	<10	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	12000	13000	15000	11000	16000	13000	15000	14000	13000	13000	8000	15000	13000	16000	14000
Silicon	ug/l	--	1000	3000	3900	5000	2600	3800	3200	3200	3300	2700	3500	3500	3800	3200	3200
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	52000	70000	85000	60000	58000	63000	68000	60000	67000	80000	54000	64000	75000	70000	59000
Strontium	ug/l	--	4100	7590	7890	6660	6100	6050	5920	5670	6170	6090	5920	5970	6590	4650	5680
Sulfur	ug/l	--	108000	149000	170000	122000	180000	145000	157000	179000	153000	180000	138000	152000	170000	149000	171000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1	SS-1
			11-Aug-2021	28-Sep-2021	27-Oct-2021	11-Nov-2021	19-Nov-2021	15-Dec-2021	25-Jan-2022 (18)	24-Feb-2022 (4)	17-Mar-2022 (19)	28-Apr-2022	26-May-2022 (20)	24-Jun-2022	25-Jul-2022
Parameter	**Unit**	**PWQO (1)**	SS-1	SS1	SS1	SS1	SS1	SS1	SS1	1	SW1	SS1	SS1	SS1	SS1
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	146000	164000	88000	--	110000	135000	197000	--	101000	122000	140000	108000	91000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<10	16	21	<10	81	<10	<10	--	137	26	34	156	<20
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	1000	1000	<1000	--	1000	3000	<1000	--	<1000	<1000	<1000	4000	1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	--	<5000	5000	11000	<5000	5000
Chloride	ug/l	--	90000	125000	48000	76000	69000	62000	83000	--	69000	107000	127000	90000	76000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	**<10**	<1	<1	--	<1	<1	<1	<1.0	<1
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	1307	1283	836	1278	1137	1152	1575	--	754	1171	1230	1060	1034
Dissolved Organic Carbon	ug/l	--	2200	2000	1300	2100	2000	2100	<500	--	2400	2500	1800	2100	1700
Hardness, Calcium Carbonate	ug/l	--	552000	590000	353000	--	495000	507000	585000	--	305000	569000	623000	519000	472000
Nitrate as N	ug/l	--	<500	<100	1310	1450	1520	800	600	--	850	1960	1390	2160	1430
Nitrite as N	ug/l	--	<500	<100	<100	<100	<100	<100	<500	--	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	232	1320	218	225	1950	505	208	--	225	243	386	348	379
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.37	7.73	8.21	8.07	8.07	7.71	7.69	--	8.48	7.87	7.71	7.42	7.70
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	3	5	6	<2	4	<2	<2	--	6	<2	<2	3	6
Sulphate	ug/l	--	422000	496000	264000	434000	371000	387000	443000	--	210000	405000	478000	440000	379000
Temperature (Field)	deg c	-- (24)	17.7	12.9	9.4	8.8	6.5	4.2	1.5	--	3.6	7.5	15.7	17.5	22
Total Dissolved Solids	ug/l	--	966000	1060000	593000	--	812000	767000	1010000	--	520000	910000	1020000	833000	728000
Total Suspended Solids	ug/l	--	3000	6000	12000	--	13000	3000	<1000	--	7000	6000	<1000	<1000	4000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	40	40	40	40	40	30	40	--	40	40	40	40	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**260**	**320**	100	150	140	170	**220**	--	80	160	**240**	**210**	190
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	152000	162000	105000	--	142000	137000	164000	--	89000	162000	172000	147000	138000
Chromium	ug/l	-- (30)	<1	<1	2	1	1	<1	<1	--	<1	1	<1	<1	<1
Cobalt	ug/l	0.9	0.4	**1.0**	<0.2	<0.2	0.2	<0.2	0.5	--	0.3	0.3	0.3	0.2	0.2
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	--	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	**1.5**	1	**1.1**	0.6	<0.50	--	0.7	**1.1**	<0.5	<0.50	<0.5
Iron	ug/l	300	50	70	110	<30	60	40	50	--	80	50	<30	40	60
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	42000	45000	22000	--	34000	40000	52000	--	20000	40000	47000	37000	31000
Manganese	ug/l	--	<10	20	<10	<10	<10	<10	10	--	10	<10	<10	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	16000	16000	12000	--	15000	13000	13000	--	7000	16000	15000	14000	12000
Silicon	ug/l	--	3800	3400	2200	2400	2200	2500	4000	--	1900	2700	3600	2700	2900
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	67000	94000	30000	--	51000	49000	63000	--	41000	64000	70000	53000	40000
Strontium	ug/l	--	6580	8340	2790	4800	3960	4680	6620	--	2760	5070	6740	5200	4900
Sulfur	ug/l	--	156000	170000	113000	167000	167000	151000	162000	--	70800	147000	155000	139000	144000
Thallium	ug/l	0.3 (33)	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	0.1	0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2
Parameter	**Unit**	**PWQO (1)**	**17-Sep-2000**	**28-May-2001**	**29-Jun-2001**	**23-Jul-2001 (2)**	**26-Aug-2001 (2)**	**21-Sep-2001 (2)**	**20-Oct-2001**	**17-Nov-2001**	**13-Dec-2001 (38)**	**07-Jan-2002 (3)**	**01-Feb-2002 (3)**	**23-Mar-2002 (3)**	**21-Apr-2002**	**18-May-2002**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	185000	180000	237000	--	--	--	139000	161000	--	--	--	--	147000	132000
Ammonia, unionized	ug/l	20	--	<20	<20	--	--	--	<20	<20	<20	--	--	--	<20	<20
Ammonia Nitrogen	ug/l	--	20	70	620	--	--	--	40	30	30	--	--	--	30	50
Bicarbonate	ug/l	--	--	180000	236000	--	--	--	139000	160000	--	--	--	--	147000	132000
Biochemical Oxygen Demand, 5 Day	ug/l	--	2000	2000	5000	--	--	--	1000	3000	1000	--	--	--	1000	1000
Carbonate (CO3)	ug/l	--	--	<2000	<2000	--	--	--	<2000	<2000	--	--	--	--	<2000	<2000
Chemical Oxygen Demand	ug/l	--	49000	40000	45000	--	--	--	27000	19000	15000	--	--	--	25000	28000
Chloride, dissolved	ug/l	--	46000	98000	252000	--	--	--	151000	132000	72000	--	--	--	96000	92000
Color	color unit	--	36	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	710	690	--	--	--	405	420	502	--	--	--	860	710
Dissolved Organic Carbon	ug/l	--	19100	14600	13900	--	--	--	8000	9800	8300	--	--	--	8800	10500
Hardness, Calcium Carbonate	ug/l	--	161000	184000	214000	--	--	--	231000	196000	196000	--	--	--	151000	152000
Nitrate as N	ug/l	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--	--	<100	<100
Nitrite as N	ug/l	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--	--	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	890	990	2230	--	--	--	740	510	330	--	--	--	590	800
Nitrogen, Organic	ug/l	--	--	920	1610	--	--	--	700	480	300	--	--	--	590	750
pH (Field)	-	6.5 - 8.5	7.88	7.38	7.4	--	--	--	7.6	7.7	7.3	--	--	--	7.4	7.3
Phosphate	ug/l	--	--	<30	<30	--	--	--	30	<30	<30	--	--	--	<30	<30
Phosphorus	ug/l	-- (23)	60	60	140	--	--	--	20	10	<10	--	--	--	30	30
Sulphate, dissolved	ug/l	--	5000	4000	6000	--	--	--	71000	27000	24000	--	--	--	17000	10000
Temperature (Field)	deg c	-- (24)	--	15	23	--	--	--	11	4	3	--	--	--	17	12
Total Dissolved Solids	ug/l	--	320000	436000	724000	--	--	--	564000	520000	--	--	--	--	420000	397000
Total Suspended Solids	ug/l	--	19000	6000	31000	--	--	--	6000	10000	33000	--	--	--	6000	<2000
Turbidity	ntu	-- (25)	13.4	3.9	3.3	--	--	--	0.9	1.2	1.2	--	--	--	1.4	0.7
Metals																
Aluminum, dissolved	ug/l	-- (26)	250	<50	<50	--	--	--	<50	<50	<50	--	--	--	<50	180
Barium	ug/l	--	20	40	60	--	--	--	30	20	20	--	--	--	20	20
Beryllium	ug/l	-- (27)	<2	<2	<2	--	--	--	<2	<2	<2	--	--	--	<2	<2
Boron	ug/l	200 (28)	10	<10	20	--	--	--	<10	<50	<50	--	--	--	<50	<50
Cadmium	ug/l	0.2 (29)	<0.1	**0.3**	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1
Calcium	ug/l	--	61000	67000	79000	--	--	--	84000	72000	72000	--	--	--	59000	56000
Chromium	ug/l	-- (30)	<1	3	2	--	--	--	1	2	1	--	--	--	<1	2
Cobalt	ug/l	0.9	<0.2	0.2	<0.2	--	--	--	<0.2	<0.2	<0.2	--	--	--	<0.2	0.3
Copper	ug/l	5	**<10**	<1	<1	--	--	--	<1	2	<1	--	--	--	<1	1
Iron	ug/l	300	**570**	**680**	**1710**	--	--	--	60	70	30	--	--	--	40	**430**
Lead	ug/l	-- (31)	<1	<1	<1	--	--	--	<1	<1	<1	--	--	--	<1	2
Magnesium	ug/l	--	2000	4000	4000	--	--	--	5000	4000	4000	--	--	--	1000	3000
Manganese	ug/l	--	30	110	320	--	--	--	<10	<10	<10	--	--	--	<10	120
Mercury, dissolved	ug/l	0.2 (32)	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1
Molybdenum	ug/l	40	<10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Nickel	ug/l	25	<10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Potassium	ug/l	--	<1000	<1000	<1000	--	--	--	<1000	<1000	1000	--	--	--	<1000	<1000
Silicon	ug/l	--	2070	400	1070	--	--	--	1480	1040	1020	--	--	--	20	200
Silver	ug/l	0.1	<0.1	**0.6**	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	**<10**	<0.1
Sodium	ug/l	--	40000	58000	171000	--	--	--	85000	77000	57000	--	--	--	55000	60000
Strontium	ug/l	--	207	510	1830	--	--	--	295	265	218	--	--	--	296	265
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	**<1**	**<1**	**<1**	--	--	--	**<1**	**<1**	**<1**	--	--	--	**<1**	**<1**
Tin	ug/l	--	<10	<10	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Vanadium	ug/l	6	<1	2	<1	--	--	--	<1	<1	<1	--	--	--	<1	2
Zinc	ug/l	30 (29)	<10	**280**	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	<1	--	--	--	<1	<1	<1	--	--	--	<1	<1

Parameter	Unit	PWQO (1)	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2
			10-Jun-2002	27-Jul-2002	12-Aug-2002 (2)	25-Sep-2002 (2)	31-Oct-2002	25-Nov-2002	15-Jan-2003 (4)	12-Feb-2003 (4)	15-Mar-2003 (4)	28-Apr-2003 (4)	24-May-2003 (4)	24-Jun-2003 (4)	16-Jul-2003 (4)	14-Aug-2003
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	129000	202000	--	--	139000	129000	--	--	--	--	--	--	--	163000
Ammonia, unionized	ug/l	20	<20	<20	--	--	<20	<20	--	--	--	--	--	--	--	<20
Ammonia Nitrogen	ug/l	--	90	330	--	--	90	<20	--	--	--	--	--	--	--	30
Bicarbonate	ug/l	--	129000	202000	--	--	139000	129000	--	--	--	--	--	--	--	163000
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	2000	--	--	<1000	<1000	--	--	--	--	--	--	--	<1000
Carbonate (CO3)	ug/l	--	<2000	<5000	--	--	<2000	<2000	--	--	--	--	--	--	--	<2000
Chemical Oxygen Demand	ug/l	--	37000	46000	--	--	39000	27000	--	--	--	--	--	--	--	50000
Chloride, dissolved	ug/l	--	81000	94000	--	--	115000	68000	--	--	--	--	--	--	--	59000
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	720	700	--	--	530	610	--	--	--	--	--	--	--	420
Dissolved Organic Carbon	ug/l	--	16100	18800	--	--	14600	13300	--	--	--	--	--	--	--	18000
Hardness, Calcium Carbonate	ug/l	--	137000	200000	--	--	360000	191000	--	--	--	--	--	--	--	202000
Nitrate as N	ug/l	--	<100	<100	--	--	590	130	--	--	--	--	--	--	--	<100
Nitrite as N	ug/l	--	<100	<100	--	--	<100	<100	--	--	--	--	--	--	--	<100
Nitrogen, Total Kjeldahl	ug/l	--	920	1190	--	--	1660	680	--	--	--	--	--	--	--	1200
Nitrogen, Organic	ug/l	--	830	860	--	--	1570	660	--	--	--	--	--	--	--	1170
pH (Field)	-	6.5 - 8.5	7.1	7.5	--	--	7.4	7.1	--	--	--	--	--	--	--	7.5
Phosphate	ug/l	--	40	190	--	--	<30	<30	--	--	--	--	--	--	--	50
Phosphorus	ug/l	-- (23)	20	30	--	--	40	10	--	--	--	--	--	--	--	20
Sulphate, dissolved	ug/l	--	5000	9000	--	--	172000	60000	--	--	--	--	--	--	--	38000
Temperature (Field)	deg c	-- (24)	20	20	--	--	4	2	--	--	--	--	--	--	--	20
Total Dissolved Solids	ug/l	--	350000	448000	--	--	608000	378000	--	--	--	--	--	--	--	362000
Total Suspended Solids	ug/l	--	7000	10000	--	--	5000	<2000	--	--	--	--	--	--	--	3000
Turbidity	ntu	-- (25)	5.1	2.8	--	--	1.2	0.7	--	--	--	--	--	--	--	0.9
Metals																
Aluminum, dissolved	ug/l	-- (26)	190	<10	--	--	<10	<10	--	--	--	--	--	--	--	20
Barium	ug/l	--	20	40	--	--	60	30	--	--	--	--	--	--	--	30
Beryllium	ug/l	-- (27)	<2	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1
Boron	ug/l	200 (28)	<50	<20	--	--	<50	<50	--	--	--	--	--	--	--	20
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	--	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1
Calcium	ug/l	--	50000	75000	--	--	136000	70000	--	--	--	--	--	--	--	76000
Chromium	ug/l	-- (30)	<1	7	--	--	<1	<1	--	--	--	--	--	--	--	3
Cobalt	ug/l	0.9	<0.2	0.5	--	--	0.5	<0.2	--	--	--	--	--	--	--	<0.2
Copper	ug/l	5	2	1	--	--	3	<1	--	--	--	--	--	--	--	<1
Iron	ug/l	300	**490**	**370**	--	--	160	50	--	--	--	--	--	--	--	140
Lead	ug/l	-- (31)	<1	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1
Magnesium	ug/l	--	3000	3000	--	--	5000	4000	--	--	--	--	--	--	--	3000
Manganese	ug/l	--	40	175	--	--	66	<5	--	--	--	--	--	--	--	5
Mercury, dissolved	ug/l	0.2 (32)	<0.1	<0.1	--	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1
Molybdenum	ug/l	40	<10	<5	--	--	<5	<5	--	--	--	--	--	--	--	<5
Nickel	ug/l	25	<10	<5	--	--	<5	<5	--	--	--	--	--	--	--	1
Potassium	ug/l	--	<1000	<1000	--	--	1000	<1000	--	--	--	--	--	--	--	<1000
Silicon	ug/l	--	530	2530	--	--	800	1400	--	--	--	--	--	--	--	2500
Silver	ug/l	0.1	<0.1	<0.1	--	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1
Sodium	ug/l	--	48000	65000	--	--	67000	41000	--	--	--	--	--	--	--	37000
Strontium	ug/l	--	248	388	--	--	562	244	--	--	--	--	--	--	--	343
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	**<1**	**<1**	--	--	**<1**	**<1**	--	--	--	--	--	--	--	**<1**
Tin	ug/l	--	--	<10	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<10	<10	--	--	<10	<10	--	--	--	--	--	--	--	<10
Vanadium	ug/l	6	<1	3	--	--	1	<1	--	--	--	--	--	--	--	2
Zinc	ug/l	30 (29)	<10	<5	--	--	<5	<5	--	--	--	--	--	--	--	1
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1

Parameter	Unit	PWQO (1)	SS-2 30-Sep-2003 (4)	SS-2 30-Oct-2003	SS-2 19-Nov-2003	SS-2 23-Dec-2003 (4)	SS-2 27-Jan-2004 (4)	SS-2 20-Feb-2004 (4)	SS-2 24-Mar-2004 (4)	SS-2 12-Apr-2004	SS-2 12-May-2004	SS-2 28-Jun-2004	SS-2 19-Jul-2004	SS-2 17-Aug-2004	SS-2 30-Sep-2004	SS-2 07-Oct-2004 (4)
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	136000	138000	--	--	--	--	157000	172000	220000	166000	198000	190000	--
Ammonia, unionized	ug/l	20	--	<20	<20	--	--	--	--	<20	<20	<20	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	--	30	30	--	--	--	--	30	420	130	40	60	40	--
Bicarbonate	ug/l	--	--	136000	138000	--	--	--	--	190000	205000	266000	198000	234000	227000	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<1000	<1000	--	--	--	--	1400	2400	1400	3400	6600	600	--
Carbonate (CO3)	ug/l	--	--	<2000	<2000	--	--	--	--	<1000	<1000	<1000	<1000	2000	<1000	--
Chemical Oxygen Demand	ug/l	--	--	31000	24000	--	--	--	--	11000	51000	42000	74000	69000	41000	--
Chloride, dissolved	ug/l	--	--	65000	55000	--	--	--	--	61600	88600	166000	704000	331000	63600	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	540	600	--	--	--	--	710	880	610	600	710	539	--
Dissolved Organic Carbon	ug/l	--	--	11600	10000	--	--	--	--	8400	19000	14400	19400	17000	16100	--
Hardness, Calcium Carbonate	ug/l	--	--	177000	167000	--	--	--	--	179014	202700	254384	220500	279000	190000	--
Nitrate as N	ug/l	--	--	<100	<100	--	--	--	--	<200	<200	<200	<200	<200	<200	--
Nitrite as N	ug/l	--	--	<100	<100	--	--	--	--	<200	<200	<200	<2000	<200	<200	--
Nitrogen, Total Kjeldahl	ug/l	--	--	560	600	--	--	--	--	500	6020	850	1430	1490	720	--
Nitrogen, Organic	ug/l	--	--	530	570	--	--	--	--	470	5600	720	1390	1430	680	--
pH (Field)	-	6.5 - 8.5	--	7.1	6.9	--	--	--	--	6.9	7	7	6.9	7.1	7.4	--
Phosphate	ug/l	--	--	<30	<30	--	--	--	--	<1000	<1000	<1000	<1000	<1000	<1000	--
Phosphorus	ug/l	-- (23)	--	20	<10	--	--	--	--	19	353	32	52	38	25	--
Sulphate, dissolved	ug/l	--	--	36000	51000	--	--	--	--	20500	12600	9300	12300	35800	7300	--
Temperature (Field)	deg c	-- (24)	--	3	5	--	--	--	--	5	9	13	19	23	9.1	--
Total Dissolved Solids	ug/l	--	--	263000	335000	--	--	--	--	310000	390000	492000	1438000	814000	346000	--
Total Suspended Solids	ug/l	--	--	2000	3000	--	--	--	--	1000	6000	9000	8000	11000	4000	--
Turbidity	ntu	-- (25)	--	1.4	1.3	--	--	--	--	0.7	1.6	1.1	2.2	5.8	1.3	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	<10	10	--	--	--	--	<5	13	18	14	13	13	--
Barium	ug/l	--	--	20	20	--	--	--	--	27	32	38	63	58	23	--
Beryllium	ug/l	-- (27)	--	<1	<1	--	--	--	--	<1	<1	<1	<1	<1	<1	--
Boron	ug/l	200 (28)	--	<10	<10	--	--	--	--	<5	10	11	11	11	<5	--
Cadmium	ug/l	0.2 (29)	--	<0.1	<0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Calcium	ug/l	--	--	66000	62000	--	--	--	--	65800	74900	94800	76600	103000	71100	--
Chromium	ug/l	-- (30)	--	1	1	--	--	--	--	<5	<5	<5	<5	<5	<5	--
Cobalt	ug/l	0.9	--	<0.2	<0.2	--	--	--	--	<0.1	<0.1	<0.1	0.3	0.3	<0.1	--
Copper	ug/l	5	--	1	1	--	--	--	--	<0.5	2.6	2.2	3.4	2.2	**14.7**	--
Iron	ug/l	300	--	50	40	--	--	--	--	30	90	170	**900**	**550**	110	--
Lead	ug/l	-- (31)	--	<1	<1	--	--	--	--	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	--
Magnesium	ug/l	--	--	3000	3000	--	--	--	--	3540	3840	4240	7070	5230	2870	--
Manganese	ug/l	--	--	<5	<10	--	--	--	--	<5	18	56	101	312	6	--
Mercury, dissolved	ug/l	0.2 (32)	--	<0.1	<0.1	--	--	--	--	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	--
Molybdenum	ug/l	40	--	<5	<5	--	--	--	--	<1	<1	<1	<1	<1	<1	--
Nickel	ug/l	25	--	<5	<5	--	--	--	--	<1	<1	<1	1	<1	<1	--
Potassium	ug/l	--	--	1000	1000	--	--	--	--	500	700	400	500	500	300	--
Silicon	ug/l	--	--	1100	1200	--	--	--	--	<50	260	1290	2210	1520	1220	--
Silver	ug/l	0.1	--	<0.1	<0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Sodium	ug/l	--	--	46000	35000	--	--	--	--	28700	47900	97800	476000	208000	34500	--
Strontium	ug/l	--	--	252	250	--	--	--	--	233	292	647	1480	734	236	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	**<1**	**<1**	--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	<10	<10	--	--	--	--	<5	<5	<5	19	<5	<5	--
Vanadium	ug/l	6	--	<1	<1	--	--	--	--	<0.5	0.6	<0.5	<5	0.7	<0.5	--
Zinc	ug/l	30 (29)	--	<10	10	--	--	--	--	<5	<5	11	**39**	28	<5	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	<1	<1	--	--	--	--	<1	<1	<1	<1	1	<1	--

Parameter	Unit	PWQO (1)	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2
			23-Nov-2004 (4)	09-Dec-2004 (4)	14-Jan-2005 (4)	11-Feb-2005 (4)	14-Mar-2005 (4)	15-Apr-2005 (4)	29-May-2005 (4)	12-Jun-2005 (4)	12-Jul-2005 (4)	14-Aug-2005 (4)	24-Sep-2005 (4)	24-Oct-2005 (4)	16-Nov-2005 (4)
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride, dissolved	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate, dissolved	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury, dissolved	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2
Parameter	**Unit**	**PWQO (1)**	**29-Dec-2005 (4)**	**19-Jan-2006 (4)**	**15-Feb-2006 (4)**	**30-Mar-2006 (4)**	**11-Apr-2006 (4)**	**12-May-2006 (4)**	**20-Jun-2006 (4)**	**24-Jul-2006**	**14-Aug-2006 (2)**	**29-Sep-2006**	**25-Oct-2006**	**14-Nov-2006**	**12-Dec-2006 (39)**	**31-Jan-2007 (39)**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	211000	--	175000	169000	156000	--	--
Ammonia, unionized	ug/l	20	--	--	--	--	--	--	--	<20	--	<20	<20	<20	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	110	--	<20	<20	<20	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	1000	--	<1000	<1000	<1000	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	33000	--	29000	20000	16000	--	--
Chloride, dissolved	ug/l	--	--	--	--	--	--	--	--	96000	--	50000	37000	23000	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	495	--	480	445	705	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	13500	--	12800	11300	8900	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	202000	--	187000	160000	165000	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	<100	--	<100	<100	<100	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	<100	--	<100	<100	<100	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	990	--	740	370	290	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	7.3	--	7.5	7.2	7.2	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	90	--	20	20	<10	--	--
Sulphate, dissolved	ug/l	--	--	--	--	--	--	--	--	5000	--	26000	14000	16000	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	13	--	8	4	3	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	474000	--	361000	305000	257000	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	5000	--	9000	2000	6000	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	<10	--	<10	<10	<10	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	30	--	20	20	20	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	<1	--	<1	<1	<1	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	10	--	20	<10	<10	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	76000	--	70000	59000	61000	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	3	--	1	<1	<1	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	<0.2	--	<0.2	<0.2	<0.2	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	1	--	<1	<1	<1	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	**400**	--	130	40	90	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	<1	--	<1	<1	<1	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	3000	--	3000	3000	3000	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	210	--	50	<10	<10	--	--
Mercury, dissolved	ug/l	0.2 (32)	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	<5	--	<5	<5	<5	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	<5	--	<5	<5	<5	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	<1000	--	<1000	<1000	<1000	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	2500	--	1800	1600	1300	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	64000	--	39000	28000	24000	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	357	--	237	212	185	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	1667	--	8700	4700	5300	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	<10	--	<10	<10	<10	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	1	--	2	<1	<1	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	<10	--	<10	<10	<10	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	<1	--	<1	<1	<1	--	--

			SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2	SS-2
			27-Feb-2007 (39)	30-Mar-2007 (39)	26-Apr-2007 (39)	29-May-2007 (2)	26-Jun-2007 (2)	23-Jul-2007 (4)	28-Aug-2007 (2)	28-Sep-2007 (4)	25-Oct-2007 (2)	29-Nov-2007 (2)	18-Dec-2007 (2)	08-Jan-2008 (2)	06-Feb-2008 (4)
Parameter	**Unit**	**PWQO (1)**				SS-2									
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride, dissolved	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate, dissolved	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury, dissolved	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-2	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**	**SS-2**
			31-Mar-2008 (2)	**25-Apr-2008 (2)**	**22-May-2008 (2)**	**25-Jun-2008 (2)**	**09-Jul-2008 (2)**	**08-Aug-2008 (2)**	**26-Sep-2008 (5)**	**23-Oct-2008 (4)**	**20-Nov-2008 (4)**	**23-Dec-2008 (4)**	**20-Jan-2009 (4)**	**24-Feb-2009 (4)**
Parameter	**Unit**	**PWQO (1)**											SS-2	SS-2
General Chemistry														
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride, dissolved	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate, dissolved	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--
Metals														
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury, dissolved	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--
Phenols														
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO [1]	SS-3 17-Sep-2000	SS-3 28-May-2001	SS-3 29-Jun-2001	SS-3 23-Jul-2001 [2]	SS-3 26-Aug-2001 [2]	SS-3 21-Sep-2001 [2]	SS-3 20-Oct-2001	SS-3 17-Nov-2001	SS-3 13-Dec-2001	SS-3 07-Jan-2002 [3]	SS-3 01-Feb-2002 [3]	SS-3 23-Mar-2002 [3]	SS-3 21-Apr-2002	SS-3 18-May-2002
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	--[21]	224000	204000	274000	--	--	--	171000	179000	158000	--	--	--	167000	156000
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	--	--	--	<20	<20	<20	--	--	--	<20	<20
Ammonia Nitrogen	ug/l	--	<20	30	30	--	--	--	50	30	<20	--	--	--	30	280
Bicarbonate	ug/l	--	--	203000	273000	--	--	--	170000	178000	156000	--	--	--	167000	156000
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	<1000	2000	--	--	--	<1000	<1000	1000	--	--	--	<1000	1000
Carbonate (CO3)	ug/l	--	--	<2000	<2000	--	--	--	<2000	<2000	2000	--	--	--	<2000	<2000
Chemical Oxygen Demand	ug/l	--	38000	32000	37000	--	--	--	13000	19000	28000	--	--	--	27000	30000
Chloride	ug/l	--	16000	37000	50000	--	--	--	82000	46000	52000	--	--	--	23000	29000
Chromium (III)	ug/l	8.9 [22]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	30	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	500	213	--	--	--	410	510	390	--	--	--	650	600
Dissolved Organic Carbon	ug/l	--	12500	12500	12000	--	--	--	7200	8500	7700	--	--	--	9800	10100
Hardness, Calcium Carbonate	ug/l	--	232000	187000	237000	--	--	--	251000	230000	199000	--	--	--	159000	167000
Nitrate as N	ug/l	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--	--	<100	<100
Nitrite as N	ug/l	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--	--	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	580	460	790	--	--	--	580	400	340	--	--	--	480	770
Nitrogen, Organic	ug/l	--	--	430	760	--	--	--	530	370	340	--	--	--	450	490
pH (Field)	-	6.5 - 8.5	8.02	7.58	7.1	--	--	--	7.2	7.4	7.8	--	--	--	7.4	7.3
Phosphate	ug/l	--	--	<30	<30	--	--	--	<30	<30	<30	--	--	--	<30	<30
Phosphorus	ug/l	--[23]	20	<10	30	--	--	--	10	<10	10	--	--	--	10	20
Sulphate	ug/l	--	17000	7000	7000	--	--	--	76000	45000	36000	--	--	--	9000	8000
Temperature (Field)	deg c	--[24]	--	14	23	--	--	--	11	5	2	--	--	--	12	10
Total Dissolved Solids	ug/l	--	312000	292000	420000	--	--	--	504000	340000	282000	--	--	--	268000	269000
Total Suspended Solids	ug/l	--	<2000	11000	8000	--	--	--	<2000	3000	<2000	--	--	--	<2000	3000
Turbidity	ntu	--[25]	0.5	0.5	5.9	--	--	--	0.8	1.8	0.4	--	--	--	0.5	0.9
Metals																
Aluminum, dissolved	ug/l	--[26]	<50	<50	<50	--	--	--	<50	<50	<50	--	--	--	<50	<50
Barium	ug/l	--	40	40	100	--	--	--	40	30	30	--	--	--	20	30
Beryllium	ug/l	--[27]	<2	<2	<2	--	--	--	<2	<2	<2	--	--	--	<2	<2
Boron	ug/l	200 [28]	<10	<10	10	--	--	--	<10	<50	<50	--	--	--	<50	<50
Cadmium	ug/l	0.2 [29]	<0.1	0.2	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1
Calcium	ug/l	--	88000	70000	90000	--	--	--	92000	87000	78000	--	--	--	62000	62000
Chromium	ug/l	--[30]	<1	5	2	--	--	--	1	2	<1	--	--	--	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	--	--	--	<0.2	<0.2	<0.2	--	--	--	<0.2	0.2
Copper	ug/l	5	**<10**	<1	<1	--	--	--	1	1	<1	--	--	--	1	2
Hexavalent Chromium	ug/l	1 [22]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	110	160	**1520**	--	--	--	30	30	30	--	--	--	40	170
Lead	ug/l	--[31]	<1	<1	<1	--	--	--	<1	<1	<1	--	--	--	<1	<1
Magnesium	ug/l	--	3000	3000	3000	--	--	--	5000	3000	1000	--	--	--	1000	3000
Manganese	ug/l	--	<10	30	1520	--	--	--	10	<10	<10	--	--	--	10	330
Mercury	ug/l	0.2 [32]	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1
Molybdenum	ug/l	40	<10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Nickel	ug/l	25	<10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Potassium	ug/l	--	<1000	<1000	<1000	--	--	--	<1000	<1000	<1000	--	--	--	<1000	<1000
Silicon	ug/l	--	2410	1500	4630	--	--	--	2350	1790	1450	--	--	--	820	1010
Silver	ug/l	0.1	<0.1	**0.5**	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	**<10**	<0.1
Sodium	ug/l	--	11000	25000	38000	--	--	--	42000	24000	20000	--	--	--	14000	19000
Strontium	ug/l	--	170	202	251	--	--	--	210	158	147	--	--	--	117	123
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 [33]	**<1**	**<1**	**<1**	--	--	--	**<1**	**<1**	**<1**	--	--	--	**<1**	**<1**
Tin	ug/l	--	<10	<10	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Vanadium	ug/l	6	<1	1	<1	--	--	--	<1	<1	<1	--	--	--	<1	<1
Zinc	ug/l	30 [29]	<10	<10	<10	--	--	--	<10	<10	<10	--	--	--	<10	<10
Phenols																
Phenolics, Total Recoverable	ug/l	1 [34]	<1	<1	<1	--	--	--	<1	<1	<1	--	--	--	<1	<1

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
Parameter	**Unit**	**PWQO (1)**	**10-Jun-2002**	**27-Jul-2002**	**12-Aug-2002 (2)**	**25-Sep-2002 (2)**	**31-Oct-2002**	**25-Nov-2002**	**15-Jan-2003 (4)**	**12-Feb-2003 (4)**	**15-Mar-2003 (4)**	**28-Apr-2003 (4)**	**24-May-2003 (4)**	**24-Jun-2003 (4)**	**16-Jul-2003 (4)**	**14-Aug-2003**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	209000	221000	--	--	190000	164000	--	--	--	--	--	--	--	98000
Ammonia, unionized (Field)	ug/l	20	<20	<20	--	--	<20	<20	--	--	--	--	--	--	--	<20
Ammonia Nitrogen	ug/l	--	100	30	--	--	<20	<20	--	--	--	--	--	--	--	80
Bicarbonate	ug/l	--	209000	221000	--	--	190000	164000	--	--	--	--	--	--	--	98000
Biochemical Oxygen Demand, 5 Day	ug/l	--	1000	1000	--	--	<1000	<1000	--	--	--	--	--	--	--	<1000
Carbonate (CO3)	ug/l	--	<2000	<5000	--	--	<2000	<2000	--	--	--	--	--	--	--	<2000
Chemical Oxygen Demand	ug/l	--	35000	35000	--	--	30000	13000	--	--	--	--	--	--	--	<5000
Chloride	ug/l	--	38000	73000	--	--	52000	49000	--	--	--	--	--	--	--	32000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	450	450	--	--	380	410	--	--	--	--	--	--	--	510
Dissolved Organic Carbon	ug/l	--	13700	14000	--	--	9700	8300	--	--	--	--	--	--	--	2100
Hardness, Calcium Carbonate	ug/l	--	215000	212000	--	--	310000	223000	--	--	--	--	--	--	--	241000
Nitrate as N	ug/l	--	<100	<100	--	--	<100	<100	--	--	--	--	--	--	--	3520
Nitrite as N	ug/l	--	<100	<100	--	--	<100	<100	--	--	--	--	--	--	--	<100
Nitrogen, Total Kjeldahl	ug/l	--	780	770	--	--	620	410	--	--	--	--	--	--	--	500
Nitrogen, Organic	ug/l	--	680	740	--	--	600	390	--	--	--	--	--	--	--	420
pH (Field)	-	6.5 - 8.5	7	7.7	--	--	7.3	7	--	--	--	--	--	--	--	7.2
Phosphate	ug/l	--	40	<30	--	--	<30	50	--	--	--	--	--	--	--	<30
Phosphorus	ug/l	-- (23)	10	30	--	--	30	20	--	--	--	--	--	--	--	<10
Sulphate	ug/l	--	9000	4000	--	--	94000	53000	--	--	--	--	--	--	--	89000
Temperature (Field)	deg c	-- (24)	17	19	--	--	4	3	--	--	--	--	--	--	--	21
Total Dissolved Solids	ug/l	--	351000	422000	--	--	441000	366000	--	--	--	--	--	--	--	265000
Total Suspended Solids	ug/l	--	8000	5000	--	--	3000	<2000	--	--	--	--	--	--	--	14000
Turbidity	ntu	-- (25)	1.8	1.1	--	--	0.9	0.5	--	--	--	--	--	--	--	1.4
Metals																
Aluminum, dissolved	ug/l	-- (26)	<50	<10	--	--	<10	<10	--	--	--	--	--	--	--	20
Barium	ug/l	--	50	50	--	--	40	30	--	--	--	--	--	--	--	110
Beryllium	ug/l	-- (27)	<2	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1
Boron	ug/l	200 (28)	<50	<20	--	--	<50	<50	--	--	--	--	--	--	--	40
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	--	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1
Calcium	ug/l	--	81000	80000	--	--	116000	86000	--	--	--	--	--	--	--	85000
Chromium	ug/l	-- (30)	<1	2	--	--	2	<1	--	--	--	--	--	--	--	2
Cobalt	ug/l	0.9	<0.2	0.3	--	--	0.3	<0.2	--	--	--	--	--	--	--	<0.2
Copper	ug/l	5	<1	1	--	--	2	<1	--	--	--	--	--	--	--	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	**360**	**350**	--	--	60	20	--	--	--	--	--	--	--	40
Lead	ug/l	-- (31)	<1	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1
Magnesium	ug/l	--	3000	3000	--	--	5000	2000	--	--	--	--	--	--	--	7000
Manganese	ug/l	--	220	89	--	--	28	7	--	--	--	--	--	--	--	8
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1
Molybdenum	ug/l	40	<10	<5	--	--	<5	<5	--	--	--	--	--	--	--	<5
Nickel	ug/l	25	<10	<5	--	--	<5	<5	--	--	--	--	--	--	--	2
Potassium	ug/l	--	<1000	<1000	--	--	1000	<1000	--	--	--	--	--	--	--	2000
Silicon	ug/l	--	1980	1560	--	--	1900	1500	--	--	--	--	--	--	--	1400
Silver	ug/l	0.1	<0.1	<0.1	--	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1
Sodium	ug/l	--	22000	52000	--	--	27000	27000	--	--	--	--	--	--	--	14000
Strontium	ug/l	--	194	257	--	--	204	168	--	--	--	--	--	--	--	1160
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	**<1**	**<1**	--	--	**<1**	**<1**	--	--	--	--	--	--	--	**<1**
Tin	ug/l	--	--	<10	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<10	<10	--	--	<10	<10	--	--	--	--	--	--	--	<10
Vanadium	ug/l	6	<1	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1
Zinc	ug/l	30 (29)	<10	<5	--	--	<5	<5	--	--	--	--	--	--	--	<1
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	--	--	<1	<1	--	--	--	--	--	--	--	<1

Parameter	Unit	PWQO (1)	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			30-Sep-2003 (4)	30-Oct-2003	19-Nov-2003	23-Dec-2003 (4)	27-Jan-2004 (4)	20-Feb-2004 (4)	24-Mar-2004 (4)	12-Apr-2004	12-May-2004	28-Jun-2004	19-Jul-2004	17-Aug-2004	30-Sep-2004	07-Oct-2004 (4)
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	202000	155000	--	--	--	--	136000	213000	264000	265000	212000	231000	--
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	--	--	--	--	<20	<20	<20	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	--	40	<20	--	--	--	--	<30	70	80	60	30	30	--
Bicarbonate	ug/l	--	--	202000	155000	--	--	--	--	165000	254000	319000	317000	253000	275000	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<1000	<1000	--	--	--	--	800	<500	5500	3700	1100	<500	--
Carbonate (CO3)	ug/l	--	--	<2000	<2000	--	--	--	--	<1000	<1000	<1000	<1000	<1000	1000	--
Chemical Oxygen Demand	ug/l	--	--	24000	14000	--	--	--	--	17000	14000	50000	46000	41000	31000	--
Chloride	ug/l	--	--	12000	34000	--	--	--	--	31500	3700	47800	47300	50700	41700	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	500	495	--	--	--	--	300	405	540	455	490	520	--
Dissolved Organic Carbon	ug/l	--	--	10000	6500	--	--	--	--	4700	5700	15600	14800	11500	13300	--
Hardness, Calcium Carbonate	ug/l	--	--	256000	210000	--	--	--	--	170821	219200	286442	273100	256000	272000	--
Nitrate as N	ug/l	--	--	500	<100	--	--	--	--	400	<200	<200	<200	<200	<200	--
Nitrite as N	ug/l	--	--	<100	<100	--	--	--	--	<200	<200	<200	<200	<200	<200	--
Nitrogen, Total Kjeldahl	ug/l	--	--	150	280	--	--	--	--	340	290	900	870	750	790	--
Nitrogen, Organic	ug/l	--	--	110	260	--	--	--	--	340	220	820	810	720	760	--
pH (Field)	-	6.5 - 8.5	--	7.2	7.1	--	--	--	--	7.3	7.2	7.3	7	7	7.9	--
Phosphate	ug/l	--	--	60	40	--	--	--	--	<1000	<1000	<1000	<1000	<1000	<1000	--
Phosphorus	ug/l	-- (23)	--	20	20	--	--	--	--	27	15	84	22	33	14	--
Sulphate	ug/l	--	--	39000	50000	--	--	--	--	32000	6900	2800	600	20800	32800	--
Temperature (Field)	deg c	-- (24)	--	3	4	--	--	--	--	5	8	16	19	20	11	--
Total Dissolved Solids	ug/l	--	--	310000	325000	--	--	--	--	242000	264000	342000	386000	340000	386000	--
Total Suspended Solids	ug/l	--	--	2000	3000	--	--	--	--	3000	1000	7000	7000	6000	4000	--
Turbidity	ntu	-- (25)	--	0.9	0.7	--	--	--	--	1.1	0.3	2.3	1.4	2.2	3	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	<10	<10	--	--	--	--	7	<5	67	14	6	<5	--
Barium	ug/l	--	--	120	30	--	--	--	--	23	26	65	74	63	46	--
Beryllium	ug/l	-- (27)	--	<1	<1	--	--	--	--	<1	<1	<1	<1	<1	<1	--
Boron	ug/l	200 (28)	--	20	<10	--	--	--	--	<5	10	10	8	14	<5	--
Cadmium	ug/l	0.2 (29)	--	<0.1	<0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Calcium	ug/l	--	--	86000	79000	--	--	--	--	62900	81100	107000	102000	95700	102000	--
Chromium	ug/l	-- (30)	--	1	1	--	--	--	--	<5	<5	<5	<5	<5	<5	--
Cobalt	ug/l	0.9	--	<0.2	<0.2	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Copper	ug/l	5	--	2	<1	--	--	--	--	**11.6**	2.3	1.2	0.7	1.1	4.2	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	60	30	--	--	--	--	70	<30	**1450**	**820**	**460**	240	--
Lead	ug/l	-- (31)	--	<1	<1	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
Magnesium	ug/l	--	--	10000	3000	--	--	--	--	3310	4070	4620	4420	4140	4170	--
Manganese	ug/l	--	--	19	<10	--	--	--	--	7	39	627	978	182	134	--
Mercury	ug/l	0.2 (32)	--	<0.1	<0.1	--	--	--	--	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	--
Molybdenum	ug/l	40	--	<5	<5	--	--	--	--	<1	<1	<1	<1	<1	<1	--
Nickel	ug/l	25	--	<5	<5	--	--	--	--	<1	<1	<1	<1	<1	<1	--
Potassium	ug/l	--	--	1000	<1000	--	--	--	--	600	500	800	600	500	500	--
Silicon	ug/l	--	--	1500	1300	--	--	--	--	730	1060	3680	4470	3700	2100	--
Silver	ug/l	0.1	--	<0.1	<0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Sodium	ug/l	--	--	8000	19000	--	--	--	--	15300	3300	24100	24000	27500	20200	--
Strontium	ug/l	--	--	1560	179	--	--	--	--	144	167	259	250	224	227	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	**<1**	**<1**	--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	<10	<10	--	--	--	--	<5	<5	<5	<5	<5	<5	--
Vanadium	ug/l	6	--	<1	<1	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
Zinc	ug/l	30 (29)	--	<10	<10	--	--	--	--	<5	<5	8	9	16	7	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	<1	<1	--	--	--	--	<1	<1	**3**	<1	1	<1	--

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
Parameter	Unit	PWQO (1)	23-Nov-2004 (4)	09-Dec-2004 (4)	14-Jan-2005 (4)	11-Feb-2005 (4)	14-Mar-2005 (4)	15-Apr-2005 (4)	29-May-2005 (4)	12-Jun-2005 (4)	12-Jul-2005 (4)	14-Aug-2005 (4)	24-Sep-2005 (4)	24-Oct-2005 (4)	16-Nov-2005 (4)
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			29-Dec-2005 (4)	19-Jan-2006 (4)	15-Feb-2006 (4)	30-Mar-2006 (4)	11-Apr-2006 (4)	12-May-2006 (4)	20-Jun-2006 (4)	24-Jul-2006	14-Aug-2006	29-Sep-2006	25-Oct-2006	14-Nov-2006	12-Dec-2006	31-Jan-2007
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	220000	125000	197000	181000	179000	188000	323000
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	--	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	120	110	<20	<20	<20	60	1450
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	<1000	<1000	<1000	<1000	<1000	<1000	4000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	27000	5000	21000	10000	20000	12000	7000
Chloride	ug/l	--	--	--	--	--	--	--	--	33000	39000	35000	16000	27000	22000	49000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	495	440	400	545	605	395	440
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	9100	2300	9300	6500	9700	8000	6600
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	313000	292000	267000	241000	216000	223000	510000
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	<100	1000	<100	<100	160	120	440
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	<100	<100	<100	<100	<100	<100	100
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	660	200	620	90	340	970	1940
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	7.4	7.4	7.3	7.3	7.2	7.3	7.3
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	30	<10	20	<10	<10	110	30
Sulphate	ug/l	--	--	--	--	--	--	--	--	82000	166000	59000	87000	37000	38000	205000
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	12	9	9	4	3	1	2
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	430000	458000	394000	363000	326000	327000	722000
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	5000	2000	36000	2000	3000	<2000	24000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	<10	20	<10	<10	<10	<10	<10
Barium	ug/l	--	--	--	--	--	--	--	--	60	70	40	20	40	30	140
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	10	130	10	40	10	<10	**290**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	ug/l	--	--	--	--	--	--	--	--	117000	84000	97000	80000	80000	81000	130000
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	1	<1	<1	<1	<1	2	1
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	0.8
Copper	ug/l	5	--	--	--	--	--	--	--	<1	<1	<1	<1	<1	1	2
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	190	40	100	40	110	30	290
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1
Magnesium	ug/l	--	--	--	--	--	--	--	--	5000	20000	6000	10000	4000	5000	45000
Manganese	ug/l	--	--	--	--	--	--	--	--	110	<10	30	20	20	<10	1280
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	<5
Nickel	ug/l	25	--	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	<5
Potassium	ug/l	--	--	--	--	--	--	--	--	<1000	4000	1000	2000	<1000	<1000	9000
Silicon	ug/l	--	--	--	--	--	--	--	--	3000	1700	2000	1200	1700	1100	5000
Silver	ug/l	0.1	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	--	--	--	--	--	--	--	15000	24000	22000	13000	24000	17000	41000
Strontium	ug/l	--	--	--	--	--	--	--	--	269	2510	261	625	285	258	5390
Sulfur	ug/l	--	--	--	--	--	--	--	--	27333	55300	19700	29000	12300	12700	68300
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	<10	<10	<10	<10	<10	<10	<10
Vanadium	ug/l	6	--	--	--	--	--	--	--	1	<1	<1	<1	<1	<1	1
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	<10	<10	<10	<10	<10	<10	20
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1

Parameter	Unit	PWQO (1)	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			27-Feb-2007	30-Mar-2007	26-Apr-2007	29-May-2007	26-Jun-2007	23-Jul-2007 (4)	28-Aug-2007	28-Sep-2007 (4)	25-Oct-2007	29-Nov-2007	18-Dec-2007	08-Jan-2008	06-Feb-2008 (4)	31-Mar-2008	25-Apr-2008
						T-4											
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	272000	155000	173000	217000	184000	--	207000	--	225000	181000	263000	129000	--	131000	165000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	--	<20	--	<20	--	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	1790	<20	<20	50	30	--	<20	--	20	50	910	<20	--	50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	1000	<1000	2000	2000	<1000	--	2000	--	2000	<1000	2000	1000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	7000	8000	9000	30000	19000	--	38000	--	61000	<5000	10000	10000	--	24000	21000
Chloride	ug/l	--	54000	16000	38000	43000	84000	--	85000	--	82000	32000	57000	40000	--	130000	19000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	620	395	500	395	395	--	695	--	605	480	490	605	--	535	530
Dissolved Organic Carbon	ug/l	--	2400	3800	7600	12900	14700	--	16200	--	11900	6500	5600	6000	--	6000	7000
Hardness, Calcium Carbonate	ug/l	--	341000	206000	227000	239000	211000	--	247000	--	304000	310000	462000	171000	--	210000	200000
Nitrate as N	ug/l	--	3130	590	600	<100	<100	--	<100	--	<100	<100	2230	120	--	1000	<100
Nitrite as N	ug/l	--	2210	<100	<100	<100	<100	--	<100	--	<100	<100	<100	<100	--	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	2400	200	610	880	960	--	1150	--	860	290	1270	240	--	1000	700
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.2	7.5	7.5	7.3	7.3	--	7.2	--	7.2	7.1	7.3	7	--	7.2	7.3
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	40	<10	<10	120	30	--	70	--	30	30	30	<10	--	21	13
Sulphate	ug/l	--	216000	59000	38000	16000	11000	--	42000	--	83000	147000	260000	38000	--	47000	27000
Temperature (Field)	deg c	-- (24)	1	4	4	10	13	--	24	--	11	1	2	3	--	1	7
Total Dissolved Solids	ug/l	--	728000	299000	346000	375000	421000	--	488000	--	548000	486000	761000	291000	--	530000	280000
Total Suspended Solids	ug/l	--	35000	2000	<2000	<2000	<2000	--	4000	--	<2000	54000	40000	<2000	--	<10000	<10000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	<10	<10	<10	<10	<10	--	<10	--	<10	20	<10	<10	--	--	--
Barium	ug/l	--	100	30	40	60	60	--	90	--	80	30	150	20	--	48	29
Beryllium	ug/l	-- (27)	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<1	<1	--	--	--
Boron	ug/l	200 (28)	**750**	80	10	20	30	--	20	--	40	30	**320**	10	--	<10	30
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	--	--
Calcium	ug/l	--	77000	66000	81000	86000	73000	--	89000	--	110000	106000	119000	62000	--	78000	71000
Chromium	ug/l	-- (30)	3	<1	1	3	1	--	4	--	3	1	2	4	--	<5	<5
Cobalt	ug/l	0.9	0.4	<0.2	<0.2	0.3	<0.2	--	<0.2	--	<0.2	0.2	0.9	<0.2	--	--	--
Copper	ug/l	5	1	<1	2	1	1	--	<1	--	<1	<1	2	<1	--	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	**<50**	--	**<5**	**<5**
Iron	ug/l	300	130	<30	70	**370**	230	--	**360**	--	260	<30	40	50	--	<100	100
Lead	ug/l	-- (31)	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<1	<1	--	--	--
Magnesium	ug/l	--	36000	10000	6000	6000	7000	--	6000	--	7000	11000	40000	4000	--	5700	4800
Manganese	ug/l	--	20	10	20	200	280	--	690	--	180	<10	530	30	--	32	48
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	<5	<5	<5	<5	<5	--	<5	--	<5	<5	<5	<5	--	--	--
Nickel	ug/l	25	<5	<5	<5	<5	<5	--	<5	--	<5	<5	<5	<5	--	--	--
Potassium	ug/l	--	8000	2000	1000	<1000	<1000	--	2000	--	2000	<1000	6000	<1000	--	1000	1000
Silicon	ug/l	--	5300	1200	200	2600	7300	--	6400	--	3900	1500	5100	1800	--	1900	840
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	--	--
Sodium	ug/l	--	93000	18000	26000	30000	56000	--	58000	--	60000	26000	57000	23000	--	81000	17000
Strontium	ug/l	--	5560	700	347	295	319	--	398	--	401	850	5410	180	--	430	360
Sulfur	ug/l	--	72000	19700	12700	5300	3700	--	14000	--	27700	49000	86700	12700	--	15000	8400
Thallium	ug/l	0.3 (33)	0.1	0.1	**0.5**	**0.4**	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	<0.05	<0.05
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	<10	<10	<10	<10	<10	--	<10	--	<10	<10	<10	<10	--	--	--
Vanadium	ug/l	6	1	1	<1	2	<1	--	3	--	3	<1	2	2	--	--	--
Zinc	ug/l	30 (29)	<10	<10	<10	<10	<10	--	<10	--	<10	<10	**390**	<10	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<1	<1	--	--	--

			SS-3	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**
			22-May-2008	**25-Jun-2008**	**09-Jul-2008**	**08-Aug-2008**	**26-Sep-2008 (5)**	**23-Oct-2008 (4)**	**20-Nov-2008 (4)**	**22-Dec-2008 (4)**	**20-Jan-2009 (4)**	**24-Feb-2009 (4)**	**31-Mar-2009**	**20-Apr-2009**	**22-May-2009**	**23-Jun-2009**	**27-Jul-2009**
Parameter	**Unit**	**PWQO (1)**									SS-3	SS-3	T-6	SS-3	SS-3	T-3	SS-3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	196000	232000	238000	272000	--	--	--	--	--	--	157000	163000	213000	272000	214000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	--	--	--	--	--	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	70	110	190	--	--	--	--	--	--	<50	<50	<50	80	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	2000	<2000	--	--	--	--	--	--	<2000	<2000	<2000	3000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	31000	31000	33000	17000	--	--	--	--	--	--	16000	16000	29000	20000	31000
Chloride	ug/l	--	33000	43000	33000	19000	--	--	--	--	--	--	4000	43000	79000	39000	14000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	--	--	--	--	--	--	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	425	480	590	535	--	--	--	--	--	--	715	560	695	605	725
Dissolved Organic Carbon	ug/l	--	9000	12900	12500	5600	--	--	--	--	--	--	5400	5300	10500	6200	10600
Hardness, Calcium Carbonate	ug/l	--	220000	250000	270000	310000	--	--	--	--	--	--	170000	270000	250000	410000	240000
Nitrate as N	ug/l	--	<100	<100	<100	<100	--	--	--	--	--	--	<100	<100	<100	<100	5500
Nitrite as N	ug/l	--	<10	<10	<10	<10	--	--	--	--	--	--	<10	<10	<10	<10	190
Nitrogen, Total Kjeldahl	ug/l	--	900	900	900	700	--	--	--	--	--	--	500	900	800	800	700
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.8	7.5	7.3	7	--	--	--	--	--	--	7.8	7.8	8.1	7.7	7.5
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	25	23	22	11	--	--	--	--	--	--	9	19	24	42	10
Sulphate	ug/l	--	17000	12000	11000	88000	--	--	--	--	--	--	19000	120000	42000	160000	21000
Temperature (Field)	deg c	-- (24)	17	19	20	24	--	--	--	--	--	--	6	9	12	18	23.0
Total Dissolved Solids	ug/l	--	319000	390000	366000	460000	--	--	--	--	--	--	225000	420000	455000	560000	292000
Total Suspended Solids	ug/l	--	<10000	<10000	<10000	<10000	--	--	--	--	--	--	<10000	<10000	<10000	<10000	2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	49	53	48	58	--	--	--	--	--	--	20	43	49	85	39
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	<10	10	20	100	--	--	--	--	--	--	<10	50	30	160	30
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	72000	83000	86000	110000	--	--	--	--	--	--	66000	95000	93000	130000	80000
Chromium	ug/l	-- (30)	<5	<5	<5	<5	--	--	--	--	--	--	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	<1	1	<1	<1	--	--	--	--	--	--	1	<1	<1	1	<1
Hexavalent Chromium	ug/l	1 (22)	**<5**	**<5**	**<5**	**<5**	--	--	--	--	--	--	**<5**	**<5**	**<5**	**<5**	**<5**
Iron	ug/l	300	100	200	100	100	--	--	--	--	--	--	<100	100	<100	**1200**	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	4400	4600	5500	13000	--	--	--	--	--	--	4600	11000	6700	20000	4700
Manganese	ug/l	--	7	130	170	140	--	--	--	--	--	--	16	34	19	560	34
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	600	600	900	2200	--	--	--	--	--	--	700	2100	1100	4100	500
Silicon	ug/l	--	860	2400	2700	2100	--	--	--	--	--	--	1100	180	350	2000	1900
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	20000	28000	27000	22000	--	--	--	--	--	--	5800	31000	51000	37000	12000
Strontium	ug/l	--	310	340	360	1300	--	--	--	--	--	--	220	790	550	2000	420
Sulfur	ug/l	--	5300	4200	3700	30000	--	--	--	--	--	--	8800	38000	14000	52000	5200
Thallium	ug/l	0.3 (33)	<0.05	<0.05	<0.05	<0.05	--	--	--	--	--	--	<0.05	<0.05	0.06	0.06	<0.05
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			13-Aug-2009	24-Sep-2009 (4)	15-Oct-2009	18-Nov-2009	10-Dec-2009	20-Jan-2010 (4)	03-Feb-2010 (4)	31-Mar-2010	06-Apr-2010 (40)	06-May-2010 (4)	02-Jun-2010	07-Jul-2010	18-Aug-2010	29-Sep-2010	28-Oct-2010
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	247000	--	215000	256000	208000	--	--	159000	160000	--	168000	142000	245000	208000	210000
Ammonia, unionized (Field)	ug/l	20	<20	--	<20	<20	<20	--	--	<20	<20	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	--	<50	50	<50	--	--	<50	<50	--	<50	<50	<50	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	<2000	<2000	<2000	--	--	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	33000	--	24000	25000	4000	--	--	20000	21000	--	45000	19000	36000	20000	16000
Chloride	ug/l	--	42000	--	19000	51000	18000	--	--	38000	27000	--	99000	150000	79000	49000	64000
Chromium (III)	ug/l	8.9 (22)	<5	--	<5	<5	<5	--	--	<5	<5	--	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	760	--	1100	1045	880	--	--	960	858	--	842	980	890	510	905
Dissolved Organic Carbon	ug/l	--	12200	--	6500	11100	5200	--	--	5000	5800	--	15800	6400	11700	9300	5500
Hardness, Calcium Carbonate	ug/l	--	300000	--	280000	290000	250000	--	--	260000	340000	--	190000	540000	350000	320000	440000
Nitrate as N	ug/l	--	<100	--	<100	<100	<100	--	--	<100	<100	--	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	--	<10	<10	<10	--	--	<10	<10	--	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	800	--	400	900	400	--	--	700	600	--	1100	600	700	500	400
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.6	--	7.9	7.8	7.8	--	--	7.7	8.2	--	7.6	7.7	7.6	7.5	7.5
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	26	--	<2	21	6	--	--	15	7	--	24	7	17	11	2
Sulphate	ug/l	--	120000	--	79000	52000	46000	--	--	100000	79000	--	17000	17000	110000	110000	240000
Temperature (Field)	deg c	-- (24)	22	--	7	5	2	--	--	7	11.6	--	18	28	27	14	7
Total Dissolved Solids	ug/l	--	505000	--	392000	480000	335000	--	--	348000	360000	--	420000	500000	570000	508000	638000
Total Suspended Solids	ug/l	--	7000	--	<1000	3000	<1000	--	--	6000	<1000	--	2000	2000	1000	<1000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	86	--	32	64	32	--	--	46	41	--	68	110	97	60	67
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	60	--	10	10	10	--	--	60	50	--	30	**240**	50	60	120
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	110000	--	100000	110000	83000	--	--	91000	78000	--	78000	180000	130000	110000	150000
Chromium	ug/l	-- (30)	<5	--	<5	<5	<5	--	--	<5	<5	--	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	<1	--	<1	2	<1	--	--	<1	<1	--	<1	1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	**<5**	--	**<5**	**<5**	**<5**	--	--	<0.5	**<5**	--	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	ug/l	300	**900**	--	<100	**600**	<100	--	--	200	100	--	200	200	200	<100	**700**
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	11000	--	9200	6700	6300	--	--	10000	8400	--	6600	26000	12000	13000	26000
Manganese	ug/l	--	610	--	31	160	90	--	--	33	38	--	110	180	770	53	610
Mercury	ug/l	0.2 (32)	<0.1	--	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	2300	--	1700	1300	800	--	--	2300	1900	--	900	5300	1700	2900	4600
Silicon	ug/l	--	3200	--	1800	2400	1500	--	--	550	480	--	3900	1500	4800	2300	1300
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	43000	--	22000	44000	16000	--	--	36000	24000	--	65000	64000	59000	44000	59000
Strontium	ug/l	--	910	--	520	470	370	--	--	840	680	--	470	3000	940	1000	3000
Sulfur	ug/l	--	38000	--	26000	16000	16000	--	--	34000	26000	--	6200	95000	38000	42000	94000
Thallium	ug/l	0.3 (33)	0.07	--	<0.05	0.24	<0.05	--	--	<0.05	<0.05	--	<0.05	0.05	<0.05	<0.05	<0.05
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**
			22-Nov-2010	**09-Dec-2010**	**12-Jan-2011**	**23-Feb-2011 $^{(7)}$**	**30-Mar-2011**	**14-Apr-2011**	**12-May-2011**	**20-Jun-2011**	**19-Jul-2011**	**26-Aug-2011 $^{(4)}$**	**21-Sep-2011**	**28-Oct-2011**	**14-Nov-2011**	**08-Dec-2011**	**11-Jan-2012**
Parameter	**Unit**	**PWQO $^{(1)}$**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS 3	S-5	SS-3	SS-3	S-4	SS-3	SS-3	SS - 3	SS -3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- $^{(21)}$	185000	213000	255000	240000	164000	151000	191000	146000	159000	--	195000	194000	233000	191000	264000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	60	150	<50	<50	<50	<50	<50	--	90	<50	<50	<50	60
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	29000	16000	26000	77000	16000	20000	33000	47000	42000	--	53000	29000	30000	28000	21000
Chloride	ug/l	--	42000	59000	120000	290000	21000	69000	76000	110000	65000	--	99000	69000	86000	58000	100000
Chromium (III)	ug/l	8.9 $^{(22)}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	830	347	590	540	790	595	620	717	685	--	632	605	605	680	810
Dissolved Organic Carbon	ug/l	--	7300	6800	7500	6600	3500	7100	10400	13600	13000	--	17300	8500	8100	7600	6400
Hardness, Calcium Carbonate	ug/l	--	220000	320000	400000	430000	190000	200000	250000	180000	180000	--	230000	380000	420000	340000	440000
Nitrate as N	ug/l	--	<100	<100	<100	200	<100	<100	<100	<100	<100	--	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	--	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	400	300	500	1000	400	600	600	800	1100	--	1400	500	600	500	500
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.4	7.77	7.6	7.8	7.6	7.9	7.5	8.09	7.3	--	7.46	7.4	7.38	7.5	7.7
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- $^{(23)}$	9	9	24	89	23	24	34	22	18	--	43	16	44	26	26
Sulphate	ug/l	--	32000	99000	95000	75000	23000	38000	58000	49000	39000	--	47000	180000	190000	140000	140000
Temperature (Field)	deg c	-- $^{(24)}$	3	0.3	1	1	3	10	15	24.4	26	--	20.2	14	6	1	0
Total Dissolved Solids	ug/l	--	342000	502000	644000	990000	242000	350000	454000	410000	372000	--	592000	594000	590000	512000	656000
Total Suspended Solids	ug/l	--	3000	1000	2000	16000	3000	<1000	<1000	2000	2000	--	5000	<1000	3000	4000	1000
Turbidity	ntu	-- $^{(25)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- $^{(26)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	27	48	78	110	22	46	63	54	42	--	74	57	67	56	66
Beryllium	ug/l	-- $^{(27)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 $^{(28)}$	10	40	30	20	<10	30	40	30	50	--	50	60	40	33	29
Cadmium	ug/l	0.2 $^{(29)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	85000	120000	140000	150000	73000	76000	95000	70000	61000	--	77000	130000	150000	120000	160000
Chromium	ug/l	-- $^{(30)}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5.0	<5.0
Cobalt	ug/l	0.9	--	--	<0.50	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.50	<0.50
Copper	ug/l	5	<1	<1	<1	2	<1	<1	2	1	<1	--	<1	<1	<1	1.8	<1.0
Hexavalent Chromium	ug/l	1 $^{(22)}$	<0.5	<0.5	**<5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	ug/l	300	<100	<100	300	**1300**	<100	<100	300	100	100	--	**500**	<100	100	270	**320**
Lead	ug/l	-- $^{(31)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	5700	11000	13000	11000	4600	6500	7900	8200	9200	--	11000	13000	14000	12000	13000
Manganese	ug/l	--	6	51	210	220	38	20	110	26	42	--	140	19	38	110	250
Mercury	ug/l	0.2 $^{(32)}$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1300	1800	1800	1400	700	1500	1500	600	900	--	4800	2900	2300	1700	1600
Silicon	ug/l	--	1300	1200	2800	2800	910	410	440	1500	3800	--	1100	2000	2000	2200	3100
Silver	ug/l	0.1	--	--	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.10	<0.10
Sodium	ug/l	--	24000	49000	76000	160000	11000	48000	54000	86000	55000	--	67000	54000	68000	51000	74000
Strontium	ug/l	--	350	1000	1000	950	250	610	750	620	740	--	770	1100	1100	920	940
Sulfur	ug/l	--	12000	35000	34000	28000	7200	17000	22000	16000	13000	--	17000	65000	61000	51000	52000
Thallium	ug/l	0.3 $^{(33)}$	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	<0.050
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 $^{(29)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 $^{(34)}$	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			06-Feb-2012	**13-Mar-2012**	**10-Apr-2012**	**24-May-2012**	**29-Jun-2012**	**20-Jul-2012**	**29-Aug-2012**	**26-Sep-2012**	**10-Oct-2012**	**28-Nov-2012**	**17-Dec-2012**	**16-Jan-2013**	**26-Feb-2013**	**25-Mar-2013**	**01-Apr-2013 (4)**
Parameter	**Unit**	**PWQO (1)**	SS- 3	SS-3	SS-3	SS-3	T-1	S-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-6	SS-3	ss3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	242000	140000	190000	180000	130000	150000	260000	190000	220000	250000	280000	190000	230000	210000	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	70	<50	<50	<50	<50	<50	1600	170	<50	72	78	58	250	140	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	2000	3000	8000	<2000	2000	<2000	2000	<2000	<2000	<2000	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	24000	21000	26000	36000	41000	53000	100000	26000	36000	31000	23000	17000	19000	22000	--
Chloride	ug/l	--	140000	77000	120000	72000	150000	150000	180000	100000	110000	110000	120000	83000	120000	150000	--
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	620	605	810	790	789	860	690	1010	990	840	805	790	996	932	--
Dissolved Organic Carbon	ug/l	--	5400	5400	7500	16000	14000	17000	27000	11000	12000	8500	9000	6900	6100	7600	--
Hardness, Calcium Carbonate	ug/l	--	490000	230000	290000	240000	200000	170000	290000	460000	450000	390000	490000	330000	460000	350000	--
Nitrate as N	ug/l	--	100	260	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	--
Nitrogen, Total Kjeldahl	ug/l	--	500	530	730	700	1200	1700	4700	1400	870	1000	690	690	820	920	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.6	7.5	7.7	7.8	8.05	7.7	7.3	7.8	7.8	7.6	7.5	7.6	7.38	7.42	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	22	25	11	20	21	6	240	15	13	18	16	10	35	28	--
Sulphate	ug/l	--	190000	83000	94000	48000	61000	38000	36000	310000	250000	180000	230000	93000	220000	110000	--
Temperature (Field)	deg c	-- (24)	1	2	11	17	21.7	24	25	10	8	2	2	1	1.0	1.32	--
Total Dissolved Solids	ug/l	--	804000	434000	566000	390000	532000	488000	726000	840000	778000	708000	818000	538000	702000	594000	--
Total Suspended Solids	ug/l	--	3000	3000	<1000	2000	<1000	9000	15000	<1000	<1000	<1000	1000	<1000	5000	2000	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	76	45	67	60	56	61	110	75	68	62	77	48	72	63	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	55	34	41	31	47	55	89	86	57	26	25	15	50	31	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	180000	88000	110000	88000	60000	55000	100000	170000	150000	140000	190000	120000	150000	130000	--
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--
Copper	ug/l	5	<1.0	<1.0	1.3	<1.0	1.4	2.7	1.8	<1.0	<1.0	1.8	<1.0	1.1	<1.0	1.6	--
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	--
Iron	ug/l	300	220	170	<100	<100	<100	220	**2900**	<100	<100	300	110	<100	**390**	160	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	19000	8000	10000	7400	12000	11000	14000	16000	15000	13000	16000	9400	16000	12000	--
Manganese	ug/l	--	87	74	20	28	8.7	230	560	53	34	170	210	9.3	250	160	--
Mercury	ug/l	0.2 (32)	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	2500	1400	1600	990	720	2700	11000	2300	2500	2000	1900	1000	2200	1600	--
Silicon	ug/l	--	2900	1500	160	740	2100	5900	12000	2600	2700	2300	2700	2400	2500	2100	--
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--
Sodium	ug/l	--	100000	53000	82000	54000	110000	110000	130000	86000	94000	93000	110000	65000	83000	100000	--
Strontium	ug/l	--	1500	790	920	610	850	750	870	1600	1200	1100	1300	480	1500	1000	--
Sulfur	ug/l	--	75000	29000	33000	100000	23000	13000	13000	110000	85000	64000	73000	36000	78000	40000	--
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**
			10-May-2013	**21-Jun-2013**	**29-Jul-2013**	**14-Aug-2013**	**26-Sep-2013**	**25-Oct-2013**	**22-Nov-2013**	**23-Dec-2013**	**09-Jan-2014 (4)**	**04-Feb-2014 (4)**	**26-Mar-2014**	**22-Apr-2014**	**21-May-2014**	**19-Jun-2014**	**15-Jul-2014**
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	s3	s3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	230000	200000	210000	180000	170000	210000	210000	250000	--	--	240000	160000	180000	200000	190000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	--	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	74	69	73	280	55	70	<50	170	--	--	1600	1700	<50	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	3000	<2000	<2000	<2000	<2000	<2000	<2000	3000	--	--	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	42000	35000	35000	35000	56000	35000	31000	20000	--	--	25000	17000	23000	30000	31000
Chloride	ug/l	--	93000	70000	82000	83000	37000	35000	35000	37000	--	--	130000	47000	86000	78000	60000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	--	--	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	835	712	541	697	466	740	609	-- (42)	--	--	936	730	695	724	633
Dissolved Organic Carbon	ug/l	--	13000	13000	13000	12000	21000	11000	11000	11000	--	--	9500	5800	8800	11000	11000
Hardness, Calcium Carbonate	ug/l	--	300000	260000	230000	200000	150000	240000	230000	270000	--	--	320000	200000	230000	240000	220000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	--	--	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	--	--	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	920	700	930	2500	1000	760	560	560	--	--	1900	2200	600	580	980
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.4	7.20	7.64	7.63	6.95	7.8	7.45	8.49	--	--	7.59	7.7	7.5	7.82	7.59
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	31	19	26	20	9	22	18	25	--	--	36	5	11	14	11
Sulphate	ug/l	--	57000	59000	45000	48000	<1000	51000	39000	36000	--	--	55000	51000	53000	55000	50000
Temperature (Field)	deg c	-- (24)	20	18.6	20.5	18.3	14.7	5	2.8	0	--	--	0.5	8	10	18.1	19.3
Total Dissolved Solids	ug/l	--	462000	416000	432000	412000	306000	378000	356000	400000	--	--	562000	320000	432000	494000	374000
Total Suspended Solids	ug/l	--	1000	<1000	2000	2000	<1000	<1000	<1000	<1000	--	--	5000	<1000	1000	<1000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	72	53	56	62	33	43	33	46	--	--	58	38	39	58	60
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	42	41	43	52	30	23	17	10	--	--	17	29	34	44	46
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	120000	92000	83000	73000	63000	90000	81000	110000	--	--	130000	69000	72000	90000	87000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	150	<100	130	150	130	<100	<100	190	--	--	**750**	<100	<100	100	140
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	9200	8000	8800	10000	3800	8400	5700	7500	--	--	9900	6200	7500	9700	8700
Manganese	ug/l	--	140	47	350	410	31	22	19	440	--	--	220	27	25	78	150
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1900	1200	1500	1600	670	1900	850	930	--	--	1600	1500	1400	1300	1300
Silicon	ug/l	--	1900	1600	2900	2100	2300	1400	1400	2700	--	--	3200	210	220	1900	2800
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	68000	56000	64000	66000	30000	37000	35000	37000	--	--	78000	34000	56000	60000	54000
Strontium	ug/l	--	860	790	780	910	290	750	400	470	--	--	690	590	750	990	860
Sulfur	ug/l	--	20000	20000	71000	17000	5000	20000	15000	12000	--	--	20000	21000	18000	21000	18000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	<0.050
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			25-Aug-2014	23-Sep-2014	27-Oct-2014	20-Nov-2014	09-Dec-2014	16-Mar-2015	07-Apr-2015	21-May-2015	23-Jun-2015	22-Jul-2015	28-Aug-2015	25-Sep-2015	27-Oct-2015	20-Nov-2015	10-Dec-2015	26-Jan-2016
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-7	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	200000	210000	230000	250000	310000	120000	180000	190000	170000	150000	200000	220000	220000	220000	210000	270000
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	<20	<20	<20	<20	<20	<20	20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	190	<50	120	<50	<50	610	72	<50	--	<50	<50	180	<50	<50	<50	200
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	3000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	25000	22000	20000	24000	24000	40000	20000	32000	31000	27000	36000	31000	28000	23000	16000	13000
Chloride	ug/l	--	42000	39000	44000	58000	49000	140000	100000	140000	82000	100000	73000	70000	99000	45000	58000	39000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	790	692	752	790	940	741	905	716	760	658	730	901	725	772	772
Dissolved Organic Carbon	ug/l	--	7700	8100	7800	8100	7400	10000	5400	12000	11000	13000	12000	10000	9600	7500	6800	5700
Hardness, Calcium Carbonate	ug/l	--	250000	260000	280000	290000	350000	190000	240000	270000	230000	220000	240000	320000	300000	310000	260000	310000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	1450	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	680	650	1700	560	540	1700	350	690	530	750	710	720	550	370	350	490
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	7.6	8.02	7.42	7.48	8.20	7.76	7.7	7.61	6.56	7.77	7.6	7.05	8.34	7.88	7.89
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	8	10	26	31	25	90	14	36	16	26	27	18	7	12	12	26
Sulphate	ug/l	--	85000	80000	76000	67000	55000	38000	53000	60000	71000	86000	59000	140000	99000	98000	83000	75000
Temperature (Field)	deg c	-- (24)	--	18	9.6	1.3	0.3	2.0	2.5	15	24.8	22.6	21.8	17	6.2	6.2	7.0	0.4
Total Dissolved Solids	ug/l	--	386000	430000	412000	394000	446000	444000	412000	588000	450000	454000	476000	550000	558000	504000	450000	474000
Total Suspended Solids	ug/l	--	<1000	<1000	<1000	8000	8000	14000	1000	6000	2000	1000	<1000	3000	1000	<1000	2000	5000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	38	47	50	52	52	45	52	65	52	63	64	67	55	40	38	34
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	50	45	42	25	23	13	20	37	44	50	56	56	26	23	13	17
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	77000	94000	100000	120000	130000	66000	89000	100000	82000	75000	85000	110000	100000	100000	96000	110000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	2.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	180	210	**370**	180	160	<100	<100	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	9300	10000	11000	9800	10000	7200	6800	9600	9300	12000	11000	13000	11000	11000	8900	8500
Manganese	ug/l	--	19	27	9.5	160	430	750	170	18	21	120	39	46	17	7.4	26	150
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1700	2000	2800	2300	1800	2400	1700	1600	890	740	810	2400	2500	2400	1900	1400
Silicon	ug/l	--	1900	1600	1000	1300	2700	1700	1700	520	1400	3200	4400	3200	450	960	910	2500
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	38000	41000	47000	54000	49000	89000	57000	92000	59000	71000	57000	51000	67000	43000	43000	41000
Strontium	ug/l	--	1000	970	980	800	750	470	570	860	780	970	1000	1300	990	830	740	520
Sulfur	ug/l	--	30000	30000	30000	26000	21000	14000	20000	20000	--	30000	22000	44000	32000	32000	29000	25000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																		
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**
			23-Feb-2016	**21-Mar-2016**	**26-Apr-2016**	**31-May-2016**	**30-Jun-2016**	**13-Jul-2016**	**04-Aug-2016**	**20-Sep-2016**	**26-Oct-2016**	**11-Nov-2016**	**14-Dec-2016**	**23-Jan-2017**	**14-Feb-2017**	**27-Mar-2017**	**21-Apr-2017**	**23-May-2017**
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	270000	140000	150000	150000	140000	140000	160000	180000	190000	210000	230000	220000	250000	230000	160000	180000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	150	820	<50	59	<50	<50	<50	<50	<50	<50	<50	<50	630	64	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	22000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	17000	20000	25000	46000	57000	52000	49000	35000	33000	28000	21000	45000	39000	16000	20000	25000
Chloride	ug/l	--	100000	28000	67000	72000	91000	85000	83000	80000	90000	78000	100000	130000	130000	31000	64000	40000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	100	370	573	568	540	505	620	825	640	828	665	1042	790	725	669	566
Dissolved Organic Carbon	ug/l	--	7700	5500	9100	13000	16000	14000	14000	12000	11000	9400	9600	6800	13000	4800	6700	9300
Hardness, Calcium Carbonate	ug/l	--	340000	140000	180000	190000	170000	150000	180000	310000	240000	350000	320000	320000	310000	290000	190000	220000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	220	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	450	1100	270	710	990	700	920	790	310	460	460	350	1000	310	300	470
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.78	7.49	7.64	7.57	7.7	7.7	7.6	7.16	7.6	7.37	7.5	6.88	7.5	7.26	6.70	7.88
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	42	32	14	46	33	49	31	19	10	8	15	110	25	14	10	19
Sulphate	ug/l	--	90000	14000	32000	47000	29000	26000	28000	140000	72000	130000	100000	93000	50000	74000	52000	66000
Temperature (Field)	deg c	-- (24)	0	1.2	8.2	25.0	26	24	24	19.7	20	5.2	1	0	1	1.9	8.3	17.4
Total Dissolved Solids	ug/l	--	594000	220000	332000	362000	382000	338000	402000	560000	478000	576000	560000	618000	634000	428000	326000	358000
Total Suspended Solids	ug/l	--	2000	2000	<1000	4000	5000	3000	3000	1000	2000	1000	3000	44000	3000	1000	1000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	65	24	34	51	52	41	47	69	43	48	47	82	72	31	36	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	24	<10	12	39	38	42	52	68	29	31	30	28	15	15	31	43
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	120000	54000	64000	64000	56000	52000	61000	100000	84000	100000	110000	140000	110000	110000	73000	78000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.95**	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.6**	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	110	160	110	<100	<100	<100	<100	<100	<100	<100	<100	**2100**	**460**	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	11000	2800	4600	8500	8000	8200	9100	15000	9200	11000	10000	13000	9300	8800	7200	8300
Manganese	ug/l	--	280	47	42	200	200	49	79	42	7.6	12	47	320	590	40	10	48
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	2200	650	1100	1100	1000	1100	860	1500	2500	2500	2000	2500	2000	1300	2300	2200
Silicon	ug/l	--	2600	1100	330	2900	3000	3300	6800	5300	1500	1000	1900	4300	3800	2100	140	730
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	71000	21000	44000	52000	61000	60000	56000	59000	58000	55000	64000	96000	83000	37000	45000	37000
Strontium	ug/l	--	870	170	360	670	600	580	680	1300	740	1000	810	1000	740	470	800	780
Sulfur	ug/l	--	30000	4100	9700	18000	9200	9000	8700	47000	26000	48000	37000	35000	16000	28000	21000	21000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																		
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			26-Jun-2017	**21-Jul-2017**	**11-Aug-2017**	**08-Sep-2017**	**17-Oct-2017**	**17-Nov-2017**	**07-Dec-2017**	**22-Jan-2018**	**16-Feb-2018**	**13-Mar-2018**	**24-Apr-2018**	**18-May-2018**	**22-Jun-2018**	**18-Jul-2018**	**24-Aug-2018**	**18-Sep-2018**
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	190000	180000	170000	210000	240000	240000	270000	267000	298000	230000	176000	187000	159000	163000	210000	175000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**90**
Ammonia Nitrogen	ug/l	--	75	<50	300	240	<50	<50	80	140	240	170	180	140	90	250	80	3420
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	6000	<2000	<2000	<2000	<2000	<2000	3000	1000	<1000	1000	2000	3000	4000	1000	2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	25000	57000	32000	24000	24000	21000	17000	16000	12000	13000	7000	25000	31000	42000	35000	33000
Chloride	ug/l	--	47000	34000	37000	20000	49000	22000	23000	25000	132000	93000	63000	66000	15000	117000	68000	74000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	**<10**	<1	**<10**	**<10**	**<10**	**<10**	**<10**	<0.1	**<10**
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	661	564	548	484	683	628	692	669	679	784	608	638	636	684	672	659
Dissolved Organic Carbon	ug/l	--	11000	12000	12000	8000	10000	5300	5600	5400	7800	4900	4900	9000	12000	24100	13900	18000
Hardness, Calcium Carbonate	ug/l	--	240000	230000	190000	200000	250000	290000	290000	318000	387000	313000	209000	241000	226000	162000	213000	228000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	140	<100	<100	<100	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	670	690	810	550	450	210	260	600	900	400	14200	500	900	1180	1200	6800
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.81	7.72	7.29	7.96	7.34	7.45	6.52	7.30	7.31	7.24	8.08	7.78	7.52	7.76	7.78	7.75
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	22	170	40	29	11	54	37	32	5	23	67	23	19	41	20	16
Sulphate	ug/l	--	87000	57000	42000	39000	38000	70000	58000	65000	74000	60000	71000	39000	10000	19000	46000	64000
Temperature (Field)	deg c	-- (24)	23.0	26.2	20.9	13.6	9.0	0.6	2.6	0	0	1.3	11.1	16.1	21.2	23.3	24.2	21.9
Total Dissolved Solids	ug/l	--	476000	352000	422000	298000	405000	365000	300000	435000	715000	546000	400000	426000	417000	434000	450000	444000
Total Suspended Solids	ug/l	--	3000	51000	11000	4000	<1000	2000	3000	11000	3000	<1000	3000	<1000	4000	4000	5000	23000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	43	54	43	31	46	32	29	30	70	40	40	40	50	50	60	50
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	40	49	45	28	31	27	17	20	20	20	30	30	50	60	40	60
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	85000	77000	60000	73000	81000	100000	100000	111000	137000	112000	72000	85000	74000	50000	72000	73000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1.0	<1.0	<1.0	1.3	<1.0	1.5	<1.0	<1	<1	1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**<10**	<1	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**
Iron	ug/l	300	160	**410**	170	190	<100	270	<100	100	100	60	60	120	50	110	80	50
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	10000	9100	10000	8800	9400	10000	9100	10000	11000	8000	7000	7000	10000	9000	8000	11000
Manganese	ug/l	--	110	180	110	58	12	30	13	100	120	60	40	120	30	260	100	100
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1800	2400	1800	1700	2900	2300	1500	1000	3000	2000	3000	2000	1000	2000	2000	3000
Silicon	ug/l	--	5300	3200	3400	3300	3600	2100	1900	2200	3000	1900	300	900	2800	14900	4300	4300
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	42000	31000	38000	25000	42000	26000	24000	29000	81000	60000	36000	44000	45000	61000	46000	51000
Strontium	ug/l	--	710	970	960	510	860	750	500	358	913	668	873	654	949	821	1030	1080
Sulfur	ug/l	--	23000	22000	16000	12000	13000	26000	21000	24000	26300	15600	21400	13500	17300	6600	18000	21800
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																		
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
			24-Oct-2018	**20-Nov-2018 (41)**	**18-Dec-2018**	**25-Jan-2019**	**21-Feb-2019**	**13-Mar-2019**	**17-Apr-2019**	**24-May-2019**	**21-Jun-2019**	**18-Jul-2019**	**21-Aug-2019**	**18-Sep-2019**	**29-Oct-2019**	**19-Nov-2019**	**18-Dec-2019**
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS - 3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	237000	251000	266000	281000	151000	273000	73000	185000	207000	179000	170000	156000	192000	253000	272000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<20	70	300	1030	750	2410	40	25	<10	70	660	30	190	<10	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	3000	2000	<1000	5000	2000	4000	2000	1000	6000	4000	1000	2000	3000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	15000	88000	9000	16000	22000	16000	17000	24000	160000	26000	43000	24000	18000	21000	13000
Chloride	ug/l	--	82000	13000	15000	88000	70000	159000	28000	58000	64000	67000	88000	92000	66000	54000	83000
Chromium (III)	ug/l	8.9 (22)	**<10**	**<10**	**<10**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	824	368	56	1040	617	1160	246	633	697	606	645	712	824	819	294
Dissolved Organic Carbon	ug/l	--	8700	5200	4400	6300	7200	7500	4500	7500	8800	10700	19300	10600	6900	7600	6900
Hardness, Calcium Carbonate	ug/l	--	283000	304000	298000	397000	185000	342000	78000	254000	278000	191000	195000	294000	331000	291000	391000
Nitrate as N	ug/l	--	<100	<100	<100	<100	2350	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	500	2200	1900	2400	1400	2500	200	490	670	800	1500	500	600	400	646
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.68	7.93	7.32	6.85	7.53	**6.33**	**6.17**	8.2 (37)	7.04	7.13	7.16	7.29	7.57	7.68	**8.94**
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	6	38	5	15	6	32	10	13	19	22	22	10	8	15	6
Sulphate	ug/l	--	106000	55000	62000	142000	72000	103000	6000	75000	86000	42000	30000	98000	126000	89000	119000
Temperature (Field)	deg c	-- (24)	6.0	0	0	0	0	0.7	4.0	15.5	21.3	26.5	24.4	18.8	11.5	0.7	-0.3
Total Dissolved Solids	ug/l	--	599000	378000	411000	676000	380000	754000	150000	372000	793000	364000	437000	508000	528000	530000	646000
Total Suspended Solids	ug/l	--	<1000	55000	5000	22000	10000	7000	<1000	<1000	2000	2000	2000	3000	<1000	8000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	30	30	60	40	70	20	40	60	50	60	60	50	50	60
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	30	<10	<10	30	20	30	<10	40	50	60	70	40	40	30	30
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	95000	112000	108000	136000	66000	119000	28000	87000	95000	60000	60000	98000	111000	100000	135000
Chromium	ug/l	-- (30)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1	1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	**<10**	**<10**	**<10**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	ug/l	300	<30	**390**	<30	190	250	180	120	40	70	80	70	<30	30	110	60
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	11000	6000	7000	14000	5000	11000	2000	9000	10000	10000	11000	12000	13000	10000	13000
Manganese	ug/l	--	<10	200	10	230	480	150	30	40	850	300	330	30	20	100	110
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	4000	<1000	<1000	4000	2000	4000	<1000	3000	2000	2000	2000	3000	5000	3000	4000
Silicon	ug/l	--	1000	2000	1800	2900	1500	3000	700	300	2300	6400	9000	3200	1700	2000	2400
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	57000	15000	16000	59000	37000	92000	16000	41000	34000	44000	55000	58000	37000	46000	61000
Strontium	ug/l	--	1160	341	302	1340	554	1250	135	987	1180	1070	1060	1210	1380	1030	1350
Sulfur	ug/l	--	40300	23300	24300	55700	22100	40800	2200	25700	31800	14400	11300	36300	44600	29600	49100
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**
			15-Jan-2020	**19-Feb-2020**	**19-Mar-2020**	**03-Apr-2020**	**08-May-2020**	**01-Jun-2020**	**21-Jul-2020**	**25-Aug-2020**	**17-Sep-2020**	**23-Oct-2020**	**26-Nov-2020**	**11-Dec-2020**	**08-Jan-2021**	**18-Feb-2021**	**22-Mar-2021**	**09-Apr-2021**
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3	SS-3
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	218000	287000	192000	126000	193000	193000	165000	174000	211000	218000	239000	263000	222000	336000	164000	161000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<10	112	<10	<10	<10	<10	<10	60	<10	<10	973	248	<10	113	<10	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	2000	4000	6000	<1000	<1000	9000	8000	5000	5000	6000	2000	1000	2000	21000	<1000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	30000	18000	23000	8000	24000	22000	60000	16000	23000	13000	13000	10000	6000	164000	11000	9000
Chloride	ug/l	--	96000	153000	85000	42000	63000	52000	106000	59000	65000	40000	66000	68000	67000	129000	64000	68000
Chromium (III)	ug/l	8.9 (22)	1	**<10**	**<10**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	827	953	723	492	696	624	716	808	800	751	736	842	980	1169	678	605
Dissolved Organic Carbon	ug/l	--	6700	7100	4700	4200	6700	10400	19100	10100	9600	6900	6700	5500	5500	8900	4400	5600
Hardness, Calcium Carbonate	ug/l	--	293000	377000	259000	180000	264000	232000	179000	323000	293000	315000	280000	322000	391000	424000	194000	224000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<500	<100	<100	300	<100	<100	<100
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<500	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	1070	698	855	444	439	1060	1390	868	972	928	1350	344	1020	3260	401	325
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.28	7.62	7.60	7.70	7.64	7.69	8.23	7.92	7.78	7.74	7.45	7.44	7.59	7.03	7.16	7.80
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	22	8	45	6	8	12	30	30	10	6	11	4	6	83	13	10
Sulphate	ug/l	--	74000	86000	52000	47000	82000	50000	11000	148000	107000	126000	73000	98000	181000	69000	54000	65000
Temperature (Field)	deg c	-- (24)	0.8	1.8	1.2	3.8	6.2	14.1	25.8	23.8	16.9	14.5	0.8	1.5	0.2	0.2	5.1	16.7
Total Dissolved Solids	ug/l	--	538000	774000	457000	318000	449000	391000	441000	521000	518000	494000	493000	541000	610000	754000	401000	393000
Total Suspended Solids	ug/l	--	37000	2000	75000	<1000	5000	4000	8000	7000	<1000	<1000	6000	2000	3000	108000	18000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	60	80	50	30	50	40	50	70	50	50	40	50	70	80	30	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	20	30	30	20	30	60	70	90	70	50	30	40	50	50	<10	30
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	104000	133000	92000	62000	91000	78000	57000	108000	96000	108000	99000	111000	132000	150000	68000	78000
Chromium	ug/l	-- (30)	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	<1	**<10**	<1	<1	<1	<0.5	<0.50	<0.50	<0.50	<1	<0.5	<0.50	<0.5	<0.5	<0.5
Iron	ug/l	300	**340**	130	**360**	60	60	40	160	80	<30	<30	110	30	50	**950**	100	40
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	8000	11000	7000	6000	9000	9000	9000	13000	13000	11000	8000	11000	15000	12000	6000	7000
Manganese	ug/l	--	90	100	120	30	80	30	380	180	20	10	50	20	40	470	70	30
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	2000	3000	2000	2000	4000	2000	3000	4000	5000	4000	3000	3000	5000	3000	2000	3000
Silicon	ug/l	--	2100	2900	1600	1000	300	2700	16000	5300	2500	2300	1300	2400	3200	3400	1300	100
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	59000	94000	56000	28000	44000	42000	76000	38000	47000	29000	47000	50000	48000	87000	39000	41000
Strontium	ug/l	--	785	1280	859	605	881	941	743	1800	1570	1560	825	1150	1600	1170	530	845
Sulfur	ug/l	--	23700	34200	18300	16800	29600	18900	5900	57700	40800	46300	24100	39400	64800	30900	18700	21000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																		
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-3	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**	**SS-3**
			28-May-2021	**28-Jun-2021**	**15-Jul-2021**	**11-Aug-2021**	**28-Sep-2021**	**27-Oct-2021**	**11-Nov-2021**	**15-Dec-2021**	**25-Jan-2022 (18)**	**24-Feb-2022 (4)**	**17-Mar-2022**	**28-Apr-2022**	**26-May-2022**	**24-Jun-2022**	**25-Jul-2022**
Parameter	**Unit**	**PWQO (1)**	SS-3	SS-3	SS-3	SS-3	SS3	SS3	SS3	SS3	SS3	3	SW3	SS3	SS3	SS3	SS3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	167000	147000	171000	153000	189000	200000	221000	234000	387000	--	114000	168000	184000	185000	191000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	311	--	461	120	40	84	<20
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	2000	2000	2000	2000	<1000	3000	3000	1000	--	2000	<1000	1000	3000	1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	7000	10000	8000	<5000	10000	19000	17000	18000	19000	--	14000	19000	43000	18000	27000
Chloride	ug/l	--	111000	11000	32000	16000	64000	65000	79000	70000	149000	--	25000	70000	80000	52000	46000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1	<1	<1.0	<1
Color	color unit	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	824	458	551	448	822	669	1107	798	115	--	357	621	666	595	623
Dissolved Organic Carbon	ug/l	--	12300	5100	7700	7900	8100	8200	9700	9300	9500	--	4400	7200	10200	9300	11800
Hardness, Calcium Carbonate	ug/l	--	324000	220000	252000	208000	421000	267000	265000	302000	500000	--	153000	262000	278000	294000	250000
Nitrate as N	ug/l	--	<500	<100	<100	<100	<100	<100	<100	<100	<500	--	480	<100	<100	<100	<100
Nitrite as N	ug/l	--	<500	<100	<100	<100	<100	<100	<100	<100	<500	--	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	2120	1110	539	726	1470	547	579	685	811	--	650	627	858	706	1050
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.72	7.96	7.39	7.40	7.62	7.68	7.81	7.47	8.08	--	8.12	7.94	7.92	7.80	7.84
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	20	8	10	10	7	7	4	5	8	--	7	<2	8	10	15
Sulphate	ug/l	--	151000	73000	74000	55000	233000	81000	64000	78000	195000	--	53000	83000	84000	110000	64000
Temperature (Field)	deg c	-- (24)	17.0	26.5	23.9	27.0	17.0	10.8	4.0	2.0	0	--	5.8	11.5	20.3	30.3	26.1
Total Dissolved Solids	ug/l	--	564000	283000	361000	289000	607000	487000	511000	523000	897000	--	204000	452000	482000	454000	398000
Total Suspended Solids	ug/l	--	2000	<1000	<1000	<1000	<1000	<1000	<1000	1000	3000	--	6000	<1000	<1000	<1000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	30	40	30	90	40	50	40	80	--	30	40	50	50	60
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	70	30	40	30	90	30	20	20	30	--	10	30	50	60	70
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	105000	80000	86000	70000	139000	92000	93000	106000	186000	--	53000	90000	95000	98000	82000
Chromium	ug/l	-- (30)	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1	<1	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.5	<0.50	<0.5
Iron	ug/l	300	70	<30	40	30	40	50	50	50	70	--	130	60	60	50	40
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	15000	5000	9000	8000	18000	9000	8000	9000	20000	--	5000	9000	10000	12000	11000
Manganese	ug/l	--	120	30	80	100	110	10	10	10	170	--	40	40	40	140	420
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	5000	<1000	2000	2000	6000	4000	3000	2000	5000	--	2000	3000	3000	2000	3000
Silicon	ug/l	--	1900	2000	2600	2200	3700	2100	1600	2300	5600	--	1600	200	400	2000	5800
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	66000	9000	25000	11000	40000	46000	56000	52000	103000	--	22000	46000	55000	35000	33000
Strontium	ug/l	--	1360	268	631	447	2010	826	672	612	1590	--	406	906	1100	1350	1290
Sulfur	ug/l	--	48600	24800	25500	19200	77900	28700	20900	28400	47000	--	17600	30200	27600	34500	25200
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
Parameter	**Unit**	**PWQO (1)**	**25-Sep-2002 (2)**	**31-Oct-2002**	**28-Nov-2002**	**15-Jan-2003 (4)**	**12-Feb-2003 (4)**	**15-Mar-2003 (4)**	**28-Apr-2003 (4)**	**24-May-2003 (4)**	**24-Jun-2003 (4)**	**16-Jul-2003 (4)**	**14-Aug-2003**	**30-Sep-2003 (4)**	**30-Oct-2003**	**24-Nov-2003**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	203000	167000	--	--	--	--	--	--	--	133000	--	126000	165000
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	--	--	--	--	--	--	--	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	--	4390	780	--	--	--	--	--	--	--	60	--	60	50
Bicarbonate	ug/l	--	--	203000	167000	--	--	--	--	--	--	--	133000	--	126000	165000
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<1000	<1000	--	--	--	--	--	--	--	<1000	--	<1000	<1000
Carbonate (CO3)	ug/l	--	--	<2000	<5000	--	--	--	--	--	--	--	<2000	--	<2000	<2000
Chemical Oxygen Demand	ug/l	--	--	6000	5000	--	--	--	--	--	--	--	<5000	--	<5000	8000
Chloride	ug/l	--	--	42000	29000	--	--	--	--	--	--	--	31000	--	36000	45000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	780	810	--	--	--	--	--	--	--	460	--	420	741
Dissolved Organic Carbon	ug/l	--	--	1500	3500	--	--	--	--	--	--	--	2100	--	2000	2800
Hardness, Calcium Carbonate	ug/l	--	--	417000	271000	--	--	--	--	--	--	--	240000	--	297000	349000
Nitrate as N	ug/l	--	--	17400	7660	--	--	--	--	--	--	--	3710	--	4500	4230
Nitrite as N	ug/l	--	--	1300	<100	--	--	--	--	--	--	--	<100	--	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	8150	1000	--	--	--	--	--	--	--	460	--	420	570
Nitrogen, Organic	ug/l	--	--	3760	220	--	--	--	--	--	--	--	400	--	360	520
pH (Field)	-	6.5 - 8.5	--	7	6.8	--	--	--	--	--	--	--	7.5	--	7.3	8.01
Phosphate	ug/l	--	--	50	60	--	--	--	--	--	--	--	<30	--	50	<30
Phosphorus	ug/l	-- (23)	--	20	20	--	--	--	--	--	--	--	<10	--	<10	<10
Sulphate	ug/l	--	--	175000	95000	--	--	--	--	--	--	--	95000	--	126000	145000
Temperature (Field)	deg c	-- (24)	--	4	3	--	--	--	--	--	--	--	14	--	4	4
Total Dissolved Solids	ug/l	--	--	612000	404000	--	--	--	--	--	--	--	346000	--	413000	482000
Total Suspended Solids	ug/l	--	--	6000	<2000	--	--	--	--	--	--	--	<2000	--	<2000	6000
Turbidity	ntu	-- (25)	--	3	2.5	--	--	--	--	--	--	--	0.8	--	1.6	2.6
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	<10	20	--	--	--	--	--	--	--	10	--	10	10
Barium	ug/l	--	--	90	80	--	--	--	--	--	--	--	100	--	90	80
Beryllium	ug/l	-- (27)	--	<1	<1	--	--	--	--	--	--	--	<1	--	<1	<1
Boron	ug/l	200 (28)	--	170	<50	--	--	--	--	--	--	--	30	--	40	30
Cadmium	ug/l	0.2 (29)	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1
Calcium	ug/l	--	--	101000	92000	--	--	--	--	--	--	--	83000	--	104000	120000
Chromium	ug/l	-- (30)	--	<1	1	--	--	--	--	--	--	--	2	--	3	3
Cobalt	ug/l	0.9	--	0.9	0.4	--	--	--	--	--	--	--	<0.2	--	<0.2	0.2
Copper	ug/l	5	--	1	<1	--	--	--	--	--	--	--	<1	--	<1	1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	60	20	--	--	--	--	--	--	--	<10	--	20	30
Lead	ug/l	-- (31)	--	1	<1	--	--	--	--	--	--	--	<1	--	<1	<1
Magnesium	ug/l	--	--	40000	10000	--	--	--	--	--	--	--	8000	--	9000	12000
Manganese	ug/l	--	--	7	<5	--	--	--	--	--	--	--	<5	--	6	<10
Mercury	ug/l	0.2 (32)	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	--	8	<5	--	--	--	--	--	--	--	<5	--	<5	<5
Nickel	ug/l	25	--	<5	<5	--	--	--	--	--	--	--	2	--	<5	<5
Potassium	ug/l	--	--	14000	2000	--	--	--	--	--	--	--	2000	--	2000	3000
Silicon	ug/l	--	--	2700	1500	--	--	--	--	--	--	--	1200	--	1100	1700
Silver	ug/l	0.1	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1
Sodium	ug/l	--	--	24000	15000	--	--	--	--	--	--	--	14000	--	20000	24000
Strontium	ug/l	--	--	5540	1680	--	--	--	--	--	--	--	1040	--	981	1050
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	**<1**	**<1**	--	--	--	--	--	--	--	**<1**	--	**<1**	**<1**
Titanium	ug/l	--	--	<10	<10	--	--	--	--	--	--	--	<10	--	<10	<10
Vanadium	ug/l	6	--	<1	<1	--	--	--	--	--	--	--	<1	--	<1	1
Zinc	ug/l	30 (29)	--	<5	<5	--	--	--	--	--	--	--	10	--	<10	<10
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	<1	<1	--	--	--	--	--	--	--	<1	--	<1	<1

Parameter	Unit	PWQO (1)	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			23-Dec-2003 (4)	27-Jan-2004 (4)	20-Feb-2004 (4)	24-Mar-2004 (4)	12-Apr-2004	12-May-2004	28-Jun-2004	19-Jul-2004	26-Jul-2004	17-Aug-2004	30-Sep-2004	07-Oct-2004 (4)	23-Nov-2004 (4)	09-Dec-2004 (4)
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	156000	232000	246000	269000	--	226000	205000	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	<20	<20	<20	<20	--	<20	<20	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	60	3290	990	1130	--	1050	360	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	189000	277000	298000	321000	--	268000	243000	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	<500	<500	600	1000	--	<500	<500	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	<1000	<1000	<1000	<1000	--	2000	1000	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	7000	<5000	10000	9000	--	11000	9000	--	--	--
Chloride	ug/l	--	--	--	--	--	50400	28600	24800	29400	--	64500	66300	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	510	640	580	510	--	560	809	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	2300	1800	3800	2500	--	2500	3700	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	239089	332200	385770	328500	--	427000	370000	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	1400	4800	1300	2300	--	3700	2100	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	<200	<200	<200	<200	--	<200	<200	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	400	3090	1410	1270	--	1240	550	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	280	0	420	140	--	190	190	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	7.3	7.3	7.2	7.4	--	7.2	7.4	--	--	--
Phosphate	ug/l	--	--	--	--	--	<1000	<1000	<1000	<1000	--	<1000	<1000	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	7	9	8	190	--	2	<2	--	--	--
Sulphate	ug/l	--	--	--	--	--	69400	128000	128000	95600	--	189000	162000	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	2	7	14	15	--	16	14.3	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	328000	480000	436000	446000	--	654000	610000	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	2000	4000	2000	36000	1000	4000	1000	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	2.3	1.3	2	5.7	--	0.6	0.6	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	<5	5	9	<5	--	10	<5	--	--	--
Barium	ug/l	--	--	--	--	--	67	136	165	250	--	186	151	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	<1	<1	<1	<1	--	<1	<1	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	23	**329**	**292**	**266**	--	**340**	**206**	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	--
Calcium	ug/l	--	--	--	--	--	80400	76300	97400	78900	--	106000	96500	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	<5	<5	<5	<5	--	<5	<5	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	<0.1	0.3	0.3	0.7	--	0.4	0.3	--	--	--
Copper	ug/l	5	--	--	--	--	<0.5	<0.5	**27**	<0.5	--	<0.5	<0.5	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	30	<30	**630**	**490**	--	<30	<30	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	<0.5	<0.5	1.1	0.7	--	0.5	<0.5	--	--	--
Magnesium	ug/l	--	--	--	--	--	9290	34400	34700	32000	--	39500	31500	--	--	--
Manganese	ug/l	--	--	--	--	--	5	5	40	11	--	6	<5	--	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	<0.05	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	--
Molybdenum	ug/l	40	--	--	--	--	<1	8	3	1	--	2	2	--	--	--
Nickel	ug/l	25	--	--	--	--	<1	3	2	4	--	3	3	--	--	--
Potassium	ug/l	--	--	--	--	--	1300	8100	6600	6900	--	8100	5900	--	--	--
Silicon	ug/l	--	--	--	--	--	1230	4230	4920	6060	--	4570	3950	--	--	--
Silver	ug/l	0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	--	--	--
Sodium	ug/l	--	--	--	--	--	22700	34200	29100	30900	--	41400	33400	--	--	--
Strontium	ug/l	--	--	--	--	--	867	4640	4210	3840	--	5110	4340	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	<0.05	**0.46**	0.22	0.25	--	0.2	0.12	--	--	--
Titanium	ug/l	--	--	--	--	--	<5	<5	14	20	--	<5	<5	--	--	--
Vanadium	ug/l	6	--	--	--	--	<0.5	<0.5	0.8	0.7	--	<0.5	<0.5	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	<5	<5	10	12	--	<5	<5	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	<1	<1	<1	<1	--	<1	<1	--	--	--

Parameter	Unit	PWQO (1)	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			14-Jan-2005 (4)	11-Feb-2005 (4)	14-Mar-2005 (4)	15-Apr-2005 (4)	29-May-2005 (4)	12-Jun-2005 (4)	12-Jul-2005 (4)	14-Aug-2005 (4)	24-Sep-2005 (4)	24-Oct-2005 (4)	16-Nov-2005 (4)	29-Dec-2005 (4)	19-Jan-2006 (4)
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			15-Feb-2006 (4)	30-Mar-2006 (4)	11-Apr-2006 (4)	12-May-2006 (4)	20-Jun-2006 (4)	24-Jul-2006	14-Aug-2006	29-Sep-2006	25-Oct-2006	14-Nov-2006	12-Dec-2006	31-Jan-2007	27-Feb-2007	30-Mar-2007	26-Apr-2007
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	115000	124000	158000	206000	174000	205000	244000	268000	208000	180000
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	140	40	1070	40	730	460	1220	1550	770	580
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	<1000	<1000	<1000	2000	<1000	<1000	<1000	1000	<1000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	<5000	6000	<5000	24000	<5000	<5000	<5000	10000	9000	<5000
Chloride	ug/l	--	--	--	--	--	--	37000	39000	37000	16000	32000	35000	43000	55000	53000	42000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	395	395	395	370	520	510	605	490	660	440
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	2000	3100	1800	11000	2600	2700	2300	2600	2400	2700
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	272000	287000	382000	288000	376000	406000	429000	352000	388000	363000
Nitrate as N	ug/l	--	--	--	--	--	--	1630	1020	5890	730	4370	2410	2900	3080	2140	1870
Nitrite as N	ug/l	--	--	--	--	--	--	<100	<100	340	<100	220	160	470	2280	270	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	360	270	1280	440	1070	730	1300	2100	860	790
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	7.5	7.5	7.4	7.5	7.4	7.3	7.3	7.3	7.3	7.3
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	90	20	20	<10	10	170	100	20	20	20
Sulphate	ug/l	--	--	--	--	--	--	157000	163000	248000	112000	190000	164000	186000	220000	198000	177000
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	10	8	7	3	3	1	1	2	5	4
Total Dissolved Solids	ug/l	--	--	--	--	--	--	430000	458000	608000	426000	549000	539000	623000	728000	624000	558000
Total Suspended Solids	ug/l	--	--	--	--	--	--	<2000	6000	7000	8000	16000	8000	122000	15000	3000	<2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium	ug/l	--	--	--	--	--	--	60	70	80	40	90	90	100	90	140	100
Beryllium	ug/l	-- (27)	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron	ug/l	200 (28)	--	--	--	--	--	70	110	**250**	80	**210**	180	**420**	**610**	**310**	180
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	ug/l	--	--	--	--	--	--	86000	82000	102000	89000	98000	108000	101000	80000	96000	96000
Chromium	ug/l	-- (30)	--	--	--	--	--	<1	<1	<1	<1	2	2	<1	6	3	1
Cobalt	ug/l	0.9	--	--	--	--	--	<0.2	<0.2	0.5	<0.2	0.4	0.4	0.6	0.2	**1.2**	**1.1**
Copper	ug/l	5	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1	2	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	<30	<30	50	50	80	100	180	70	60	40
Lead	ug/l	-- (31)	--	--	--	--	--	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Magnesium	ug/l	--	--	--	--	--	--	14000	20000	31000	16000	32000	33000	43000	37000	36000	30000
Manganese	ug/l	--	--	--	--	--	--	<10	<10	<10	10	<10	<10	20	30	10	<10
Mercury	ug/l	0.2 (32)	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	<5	<5	<5	<5	<5	<5	<5	<5	5	<5
Nickel	ug/l	25	--	--	--	--	--	<5	<5	<5	<5	<5	<5	<5	<5	10	8
Potassium	ug/l	--	--	--	--	--	--	2000	4000	8000	3000	6000	8000	9000	8000	7000	6000
Silicon	ug/l	--	--	--	--	--	--	500	1400	3000	2100	3500	3400	4800	5100	5200	3600
Silver	ug/l	0.1	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	--	--	--	--	--	20000	22000	37000	15000	30000	26000	42000	101000	50000	41000
Strontium	ug/l	--	--	--	--	--	--	1800	2200	4620	1730	3950	3860	5680	4750	5490	4260
Sulfur	ug/l	--	--	--	--	--	--	52333	54300	82700	37300	63300	54700	62000	73300	66000	59000
Thallium	ug/l	0.3 (33)	--	--	--	--	--	<0.1	<0.1	0.2	<0.1	<0.1	0.1	0.1	0.1	**0.5**	**0.6**
Titanium	ug/l	--	--	--	--	--	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vanadium	ug/l	6	--	--	--	--	--	<1	<1	<1	<1	<1	<1	1	1	3	<1
Zinc	ug/l	30 (29)	--	--	--	--	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Parameter	Unit	PWQO (1)	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			29-May-2007	**26-Jun-2007**	**23-Jul-2007 (4)**	**28-Aug-2007**	**28-Sep-2007 (4)**	**25-Oct-2007**	**29-Nov-2007**	**18-Dec-2007**	**08-Jan-2008 (4)**	**06-Feb-2008 (4)**	**31-Mar-2008**	**25-Apr-2008**	**22-May-2008**	**25-Jun-2008**	**09-Jul-2008**
			T-1														
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	225000	234000	--	175000	--	172000	174000	233000	--	--	177000	162000	212000	156000	155000
Ammonia, unionized (Field)	ug/l	20	--	<20	--	<20	--	<20	<20	<20	--	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	360	310	--	320	--	770	410	150	--	--	180	120	70	240	180
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	2000	<1000	--	<1000	--	<1000	<1000	<1000	--	--	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	<5000	--	<5000	--	<5000	<5000	<5000	--	--	8000	<4000	7000	5000	6000
Chloride	ug/l	--	40000	40000	--	44000	--	44000	49000	50000	--	--	84000	36000	38000	44000	38000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	535	520	--	720	--	580	450	485	--	--	540	410	525	635	540
Dissolved Organic Carbon	ug/l	--	2900	3100	--	3600	--	2600	2600	2700	--	--	2300	2200	1900	2000	1800
Hardness, Calcium Carbonate	ug/l	--	404000	364000	--	425000	--	468000	469000	420000	--	--	350000	330000	390000	380000	360000
Nitrate as N	ug/l	--	950	550	--	4120	--	5830	3070	570	--	--	900	1400	400	2000	1500
Nitrite as N	ug/l	--	110	<100	--	420	--	220	<100	<100	--	--	20	40	10	70	20
Nitrogen, Total Kjeldahl	ug/l	--	490	500	--	660	--	860	540	410	--	--	500	700	400	700	600
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.5	7.4	--	7.4	--	7.4	7.4	7.4	--	--	7.4	7.4	7.6	7.7	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	50	30	--	50	--	<20	<10	<10	--	--	6	8	<2	6	9
Sulphate	ug/l	--	213000	176000	--	329000	--	350000	335000	227000	--	--	189000	191000	215000	242000	240000
Temperature (Field)	deg c	-- (24)	6	8	--	21	--	8	3	2	--	--	2	5	14	15	15
Total Dissolved Solids	ug/l	--	619000	590000	--	770000	--	812000	805000	663000	--	--	630000	510000	553000	610000	590000
Total Suspended Solids	ug/l	--	5000	<2000	--	17000	--	3000	13000	5000	--	--	<10000	<10000	<10000	<10000	<10000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	<10	<10	--	<10	--	<10	<10	<10	--	--	--	--	--	--	--
Barium	ug/l	--	140	140	--	110	--	120	110	180	--	--	84	110	140	130	110
Beryllium	ug/l	-- (27)	<1	<1	--	<1	--	<1	<1	<1	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**320**	**280**	--	**390**	--	**420**	**310**	**290**	--	--	170	**210**	**230**	**270**	**260**
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--	--	--	--	--	--	--
Calcium	ug/l	--	94000	88000	--	106000	--	115000	117000	104000	--	--	93000	94000	91000	94000	98000
Chromium	ug/l	-- (30)	2	<1	--	<1	--	1	1	2	--	--	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	**1.0**	0.5	--	0.3	--	0.6	0.6	0.5	--	--	--	--	--	--	--
Copper	ug/l	5	<1	<1	--	**68**	--	<1	1	1	--	--	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	**<5**	**<5**	**<5**	**<5**	**<5**
Iron	ug/l	300	80	40	--	<30	--	30	40	190	--	--	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	<1	<1	--	<1	--	2	<1	<1	--	--	--	--	--	--	--
Magnesium	ug/l	--	41000	35000	--	39000	--	44000	43000	39000	--	--	27000	30000	34000	32000	33000
Manganese	ug/l	--	10	10	--	10	--	<10	10	20	--	--	9	8	16	9	8
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	<5	<5	--	8	--	12	9	<5	--	--	--	--	--	--	--
Nickel	ug/l	25	6	<5	--	<5	--	6	6	<5	--	--	--	--	--	--	--
Potassium	ug/l	--	7000	6000	--	7000	--	9000	6000	6000	--	--	4600	5800	5600	6300	6700
Silicon	ug/l	--	5600	4900	--	2100	--	4100	4300	5800	--	--	3100	3400	4400	3300	3700
Silver	ug/l	0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--	--	--	--	--	--	--
Sodium	ug/l	--	48000	42000	--	73000	--	77000	63000	48000	--	--	65000	44000	36000	49000	41000
Strontium	ug/l	--	4690	4250	--	5030	--	6500	6020	5000	--	--	3600	4100	4400	5100	4700
Sulfur	ug/l	--	71000	58700	--	109700	--	116700	111700	75700	--	--	61000	60000	72000	96000	93000
Thallium	ug/l	0.3 (33)	**0.5**	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	--	--	0.06	0.05	0.07	0.08	0.1
Titanium	ug/l	--	<10	<10	--	<10	--	<10	<10	<10	--	--	--	--	--	--	--
Vanadium	ug/l	6	1	<1	--	1	--	1	<1	<1	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	<10	<10	--	<10	--	<10	<10	<10	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	--	<1	--	<1	<1	<1	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			08-Aug-2008	**26-Sep-2008 (5)**	**23-Oct-2008 (4)**	**20-Nov-2008 (4)**	**22-Dec-2008 (4)**	**20-Jan-2009 (4)**	**24-Feb-2009 (4)**	**31-Mar-2009**	**20-Apr-2009**	**22-May-2009**	**23-Jun-2009**	**27-Jul-2009**	**13-Aug-2009**	**24-Sep-2009 (4)**	**15-Oct-2009**
Parameter	**Unit**	**PWQO (1)**						SS-4	SS-4	T-1	SS-4	SS-4	T-1	SS-4	SS-4	SS-4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	145000	--	--	--	--	--	--	182000	125000	166000	174000	117000	143000	--	205000
Ammonia, unionized (Field)	ug/l	20	<20	--	--	--	--	--	--	<20	<20	<20	<20	<20	<20	--	<20
Ammonia Nitrogen	ug/l	--	290	--	--	--	--	--	--	230	240	270	290	480	<50	--	570
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	--	--	--	--	--	<2000	<2000	<2000	<2000	<2000	<2000	--	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	6000	--	--	--	--	--	--	5000	7000	5000	6000	11000	5000	--	17000
Chloride	ug/l	--	39000	--	--	--	--	--	--	57000	59000	72000	80000	49000	53000	--	61000
Chromium (III)	ug/l	8.9 (22)	<5	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	--	<5
Conductivity (Field)	uS/cm	--	625	--	--	--	--	--	--	820	785	685	805	985	970	--	1090
Dissolved Organic Carbon	ug/l	--	1800	--	--	--	--	--	--	1900	1800	1700	1900	1500	1300	--	2300
Hardness, Calcium Carbonate	ug/l	--	370000	--	--	--	--	--	--	390000	280000	390000	430000	390000	390000	--	480000
Nitrate as N	ug/l	--	700	--	--	--	--	--	--	2600	2000	4300	3200	<100	3000	--	2900
Nitrite as N	ug/l	--	40	--	--	--	--	--	--	40	20	50	150	<10	<10	--	100
Nitrogen, Total Kjeldahl	ug/l	--	700	--	--	--	--	--	--	600	800	600	600	900	400	--	900
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.4	--	--	--	--	--	--	7.9	8.2	8.0	8.2	8.0	8.1	--	8.0
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	--	--	--	--	--	--	5	9	12	6	<2	2	--	<2
Sulphate	ug/l	--	270000	--	--	--	--	--	--	290000	160000	310000	310000	370000	320000	--	340000
Temperature (Field)	deg c	-- (24)	13	--	--	--	--	--	--	4	8	13	14	18.0	18	--	6
Total Dissolved Solids	ug/l	--	580000	--	--	--	--	--	--	660000	480000	695000	695000	700000	650000	--	750000
Total Suspended Solids	ug/l	--	<10000	--	--	--	--	--	--	<10000	<10000	<10000	<10000	1000	<1000	--	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	110	--	--	--	--	--	--	90	56	85	110	48	59	--	86
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**280**	--	--	--	--	--	--	**300**	130	**330**	**400**	**340**	**290**	--	**390**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	96000	--	--	--	--	--	--	110000	81000	100000	110000	88000	110000	--	110000
Chromium	ug/l	-- (30)	<5	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	--	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	<1	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	--	<1
Hexavalent Chromium	ug/l	1 (22)	**<5**	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5
Iron	ug/l	300	<100	--	--	--	--	--	--	<100	<100	<100	<100	<100	<100	--	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	32000	--	--	--	--	--	--	39000	20000	36000	42000	28000	35000	--	47000
Manganese	ug/l	--	13	--	--	--	--	--	--	6	11	7	9	2	<2	--	14
Mercury	ug/l	0.2 (32)	<0.1	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6100	--	--	--	--	--	--	7100	4200	7700	8800	8100	8900	--	8000
Silicon	ug/l	--	3500	--	--	--	--	--	--	3600	1900	3500	4000	2100	2900	--	4400
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	41000	--	--	--	--	--	--	61000	44000	70000	83000	85000	57000	--	76000
Strontium	ug/l	--	4700	--	--	--	--	--	--	5700	2900	5400	6600	4300	4600	--	7000
Sulfur	ug/l	--	93000	--	--	--	--	--	--	86000	57000	93000	100000	110000	100000	--	100000
Thallium	ug/l	0.3 (33)	0.09	--	--	--	--	--	--	0.09	0.08	0.08	0.13	0.16	0.24	--	0.14
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			18-Nov-2009	**10-Dec-2009**	**20-Jan-2010 (4)**	**03-Feb-2010 (4)**	**31-Mar-2010**	**06-Apr-2010**	**15-Apr-2010**	**06-May-2010 (4)**	**02-Jun-2010**	**07-Jul-2010**	**18-Aug-2010**	**29-Sep-2010**	**28-Oct-2010**	**22-Nov-2010**	**09-Dec-2010**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	177000	171000	--	--	157000	174000	--	--	153000	145000	127000	90000	130000	137000	135000
Ammonia, unionized (Field)	ug/l	20	<20	<20	--	--	<20	<20	--	--	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	800	690	--	--	140	330	--	--	270	<50	<50	<50	<50	60	180
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	--	--	<2000	<2000	--	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	6000	5000	--	--	11000	6000	--	--	10000	11000	8000	<4000	6000	18000	4000
Chloride	ug/l	--	68000	52000	--	--	56000	61000	--	--	81000	83000	71000	44000	69000	63000	47000
Chromium (III)	ug/l	8.9 (22)	<5	<5	--	--	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	1135	1005	--	--	1060	1090	--	--	1120	1035	1010	825	1045	1020	928
Dissolved Organic Carbon	ug/l	--	1700	1600	--	--	1600	1600	--	--	1800	1600	1600	1400	1600	1900	2300
Hardness, Calcium Carbonate	ug/l	--	420000	370000	--	--	400000	340000	--	--	420000	470000	470000	340000	470000	430000	390000
Nitrate as N	ug/l	--	4900	4500	--	--	1600	1300	--	--	1300	1500	1600	1800	2100	1900	1700
Nitrite as N	ug/l	--	190	110	--	--	50	60	--	--	<10	<10	10	20	<10	10	20
Nitrogen, Total Kjeldahl	ug/l	--	1300	1000	--	--	700	800	--	--	600	300	300	400	400	1400	500
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	8.1	8	--	--	7.9	7.9	--	--	7.9	8.1	8.0	7.8	8.1	8.2	7.85
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	<2	--	--	5	<2	--	--	<2	<2	<2	11	<2	5	22
Sulphate	ug/l	--	380000	320000	--	--	330000	320000	--	--	370000	380000	360000	280000	350000	330000	290000
Temperature (Field)	deg c	-- (24)	5	3	--	--	5	9	--	--	14	22	23	12	5	4	2.0
Total Dissolved Solids	ug/l	--	835000	730000	--	--	672000	714000	--	--	774000	774000	740000	546000	732000	686000	618000
Total Suspended Solids	ug/l	--	4000	2000	--	--	42000	<1000	<1000	--	<1000	1000	<1000	4000	3000	1000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	62	44	--	--	89	47	--	--	51	58	56	45	52	53	70
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**490**	**320**	--	--	**300**	**430**	--	--	**490**	**420**	**360**	190	**330**	**240**	170
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	100000	82000	--	--	190000	98000	--	--	110000	130000	120000	96000	140000	120000	120000
Chromium	ug/l	-- (30)	<5	<5	--	--	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	<1	<1	--	--	<1	<1	--	--	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	--	--	<0.5	**<5**	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	ug/l	300	<100	<100	--	--	**900**	<100	--	--	<100	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	42000	32000	--	--	37000	37000	--	--	45000	46000	38000	25000	44000	36000	32000
Manganese	ug/l	--	7	5	--	--	29	6	--	--	3	5	5	4	3	5	13
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	--	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	8700	5900	--	--	6900	6900	--	--	8300	8900	8000	5600	8500	6300	6200
Silicon	ug/l	--	3600	2700	--	--	4200	3200	--	--	3200	3200	2400	1600	2900	2400	2200
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	110000	77000	--	--	72000	100000	--	--	95000	80000	63000	48000	77000	61000	49000
Strontium	ug/l	--	6800	5500	--	--	5500	6400	--	--	7900	7600	6900	4300	6700	5800	5100
Sulfur	ug/l	--	110000	100000	--	--	100000	110000	--	--	130000	130000	130000	89000	150000	110000	95000
Thallium	ug/l	0.3 (33)	0.16	0.11	--	--	0.13	0.10	--	--	0.12	0.14	0.14	0.09	0.12	0.07	0.11
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			12-Jan-2011	**23-Feb-2011 (7)**	**30-Mar-2011**	**14-Apr-2011**	**12-May-2011**	**20-Jun-2011**	**19-Jul-2011**	**26-Aug-2011 (4)**	**21-Sep-2011**	**28-Oct-2011**	**14-Nov-2011**	**08-Dec-2011 (9)**	**11-Jan-2012**	**06-Feb-2012**	**13-Mar-2012 (9)**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS 4	SW-1	SS-4	SS-4	S-1	SS-4	SS-4	SS - 4	SS -4	SS- 4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	180000	141000	198000	105000	157000	160000	123000	--	123000	135000	156000	133000	187000	213000	110000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	220	330	260	340	130	<50	<50	--	<50	<50	510	280	70	110	270
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	3000	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	14000	7000	14000	8000	8000	15000	11000	--	8000	7000	9000	5000	7000	12000	11000
Chloride	ug/l	--	74000	57000	63000	40000	71000	70000	45000	--	87000	61000	70000	45000	66000	73000	48000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	895	905	1240	1195	1185	1167	1015	--	1097	1060	985	1105	1095	1105	862
Dissolved Organic Carbon	ug/l	--	2300	3000	2100	1800	1900	1900	1800	--	1400	1500	1800	1600	1700	2100	2000
Hardness, Calcium Carbonate	ug/l	--	450000	330000	480000	320000	440000	470000	420000	--	550000	510000	540000	450000	520000	560000	300000
Nitrate as N	ug/l	--	1000	1000	500	1600	1300	1000	800	--	1200	2000	1400	2400	1300	500	1400
Nitrite as N	ug/l	--	20	20	<10	40	10	<10	<10	--	<10	20	<10	40	<10	<10	17
Nitrogen, Total Kjeldahl	ug/l	--	500	700	600	700	500	300	400	--	400	300	700	600	400	400	600
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	8.1	8.2	7.9	8.2	7.7	7.90	7.6	--	7.32	7.7	7.5	7.5	7.9	7.9	7.6
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	5	11	7	7	19	13	3	--	11	5	3	12	<2	6	13
Sulphate	ug/l	--	300000	230000	290000	250000	360000	370000	360000	--	450000	360000	380000	330000	360000	340000	240000
Temperature (Field)	deg c	-- (24)	2	2	3	7	10	20.4	21	--	17.1	12	6	2	1	2	2
Total Dissolved Solids	ug/l	--	708000	554000	692000	494000	702000	840000	698000	--	1010000	874000	910000	788000	896000	814000	552000
Total Suspended Solids	ug/l	--	1000	<1000	1000	2000	<1000	2000	1000	--	2000	<1000	2000	1000	<1000	1000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	70	60	73	55	53	65	58	--	49	50	53	50	55	62	44
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**290**	**210**	**280**	160	**270**	**310**	**280**	--	**400**	**300**	**340**	**230**	**350**	**360**	130
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	120000	87000	120000	92000	120000	150000	130000	--	150000	140000	150000	130000	150000	160000	91000
Chromium	ug/l	-- (30)	<5	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	0.7	0.6	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.50	0.58	0.78	<0.50
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	--	<1	<1	<1	1.4	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	**<5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	**1.2**
Iron	ug/l	300	<100	<100	<100	<100	<100	<100	100	--	<100	<100	<100	<100	<100	160	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	41000	29000	43000	24000	37000	47000	36000	--	48000	41000	51000	39000	52000	57000	23000
Manganese	ug/l	--	17	11	12	8	4	4	4	--	3	5	6	7.8	12	24	7.9
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6600	5100	6400	5700	6600	8400	8000	--	10000	7600	8000	6900	7300	8000	4900
Silicon	ug/l	--	3300	2200	3700	1600	2600	2900	2300	--	3000	2600	3500	2700	3700	4600	1900
Silver	ug/l	0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	70000	52000	57000	47000	70000	83000	67000	--	79000	63000	78000	61000	80000	86000	46000
Strontium	ug/l	--	6600	4800	7000	4600	6400	7500	6500	--	7600	6900	8100	6600	8000	8000	4300
Sulfur	ug/l	--	100000	79000	100000	90000	120000	130000	130000	--	170000	140000	140000	130000	140000	140000	75000
Thallium	ug/l	0.3 (33)	0.07	0.06	0.07	0.11	0.11	0.11	0.11	--	0.17	0.11	0.08	0.11	0.071	0.060	0.084
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			10-Apr-2012	**24-May-2012**	**29-Jun-2012**	**20-Jul-2012**	**29-Aug-2012**	**26-Sep-2012**	**10-Oct-2012**	**28-Nov-2012**	**17-Dec-2012**	**16-Jan-2013 (9)**	**26-Feb-2013**	**25-Mar-2013**	**01-Apr-2013 (4)**	**10-May-2013**	**21-Jun-2013 (43)**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	T-2	S-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	ss4	SS-4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	170000	130000	160000	170000	140000	130000	160000	170000	190000	140000	190000	140000	--	97000	120000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	54	<50	<50	<50	<50	170	73	90	170	160	91	83	--	100	65
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	7900	<4000	6300	<4000	7800	7500	6600	12000	<4000	5200	7700	6700	--	6600	<4000
Chloride	ug/l	--	70000	46000	80000	82000	77000	43000	60000	67000	72000	69000	81000	72000	--	43000	65000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--	<5	<5
Conductivity (Field)	uS/cm	--	940	1010	1087	1045	1104	1150	1190	1225	1205	950	1062	941	--	886	1040
Dissolved Organic Carbon	ug/l	--	1800	2000	1800	1800	1700	1700	1600	1500	1700	1600	1800	2000	--	1300	1500
Hardness, Calcium Carbonate	ug/l	--	450000	480000	540000	500000	550000	510000	600000	580000	690000	540000	560000	440000	--	330000	450000
Nitrate as N	ug/l	--	1300	920	500	210	370	1600	950	940	670	1100	580	2000	--	1700	1800
Nitrite as N	ug/l	--	<10	<10	13	<10	<10	<10	<10	<10	<10	<10	<10	26	--	14	<10
Nitrogen, Total Kjeldahl	ug/l	--	360	<100	920	260	620	360	340	430	420	740	720	420	--	660	370
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.8	7.9	8.21	7.8	7.8	7.9	8.0	8.1	8.0	7.9	6.97	6.92	--	8.2	7.75
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	4	<2	3	<2	<2	5	5	9	<2	5	<2	--	4	<4 (35)
Sulphate	ug/l	--	320000	360000	390000	350000	400000	410000	440000	440000	450000	370000	390000	330000	--	270000	330000
Temperature (Field)	deg c	-- (24)	6	13	21.1	22	20	9	9	3	2	2	2.2	2.0	--	19	17.0
Total Dissolved Solids	ug/l	--	784000	718000	854000	864000	998000	902000	984000	998000	1010000	874000	670000	710000	--	530000	742000
Total Suspended Solids	ug/l	--	2000	<1000	<1000	<1000	<1000	2000	1000	<1000	1000	2000	1000	1000	--	2000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	54	56	49	50	60	49	51	42	50	47	49	43	--	42	56
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**280**	190	**320**	**360**	**420**	**300**	**330**	**350**	**350**	**240**	**280**	170	--	130	110
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	130000	140000	130000	150000	150000	150000	150000	170000	140000	140000	130000	--	97000	140000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	--	<0.50	<0.50
Copper	ug/l	5	1.1	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**1.3**	<0.50	0.55	--	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	40000	33000	45000	45000	51000	41000	52000	54000	62000	43000	47000	36000	--	24000	19000
Manganese	ug/l	--	5.5	5.8	2.0	7.6	6.0	3.9	5.3	5.3	9.4	8.1	13	5.6	--	<2.0	15
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6600	6100	7800	7800	9000	7700	7700	7100	7600	6900	6100	7000	--	6300	3300
Silicon	ug/l	--	2900	2200	3000	3300	3300	2600	3300	3100	3700	2500	3100	2300	--	1500	1400
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10
Sodium	ug/l	--	64000	47000	66000	63000	73000	61000	72000	81000	89000	71000	67000	62000	--	46000	46000
Strontium	ug/l	--	7300	5600	7900	8200	8400	7500	7900	8400	10000	7100	8200	5500	--	4100	2500
Sulfur	ug/l	--	120000	110000	150000	140000	150000	160000	160000	160000	160000	140000	140000	110000	--	88000	68000
Thallium	ug/l	0.3 (33)	0.070	0.078	0.10	0.10	0.15	0.11	0.090	<0.050	0.050	0.053	<0.050	0.081	--	0.073	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			29-Jul-2013	**14-Aug-2013**	**26-Sep-2013**	**25-Oct-2013**	**22-Nov-2013 (10)**	**23-Dec-2013**	**09-Jan-2014 (4)**	**04-Feb-2014 (4)**	**26-Mar-2014 (10)**	**22-Apr-2014 (9)**	**21-May-2014**	**19-Jun-2014**	**15-Jul-2014**	**25-Aug-2014**	**23-Sep-2014**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	s4	s4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	120000	110000	120000	150000	170000	180000	--	--	190000	110000	120000	150000	120000	96000	130000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	--	--	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	62	<50	<50	65	<50	60	--	--	250	280	52	<50	<50	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	--	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	<4000	7800	4000	7300	<4000	--	--	4600	5100	<4000	<4000	<4000	<4000	<4000
Chloride	ug/l	--	59000	48000	46000	49000	74000	81000	--	--	82000	38000	49000	75000	45000	35000	49000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	800	1044	1047	1025	1297	1370	--	--	1344	1285	1305	1136	967	1210	1170
Dissolved Organic Carbon	ug/l	--	1400	1400	1600	2100	1900	1500	--	--	1700	1300	1400	1500	1200	1000	1500
Hardness, Calcium Carbonate	ug/l	--	450000	440000	460000	480000	580000	560000	--	--	540000	300000	410000	490000	440000	350000	450000
Nitrate as N	ug/l	--	1100	880	930	1000	790	670	--	--	660	1710	1940	1880	1200	1090	1050
Nitrite as N	ug/l	--	<10	<10	<10	14	<10	<10	--	--	<10	<10	10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	280	400	460	340	280	220	--	--	620	530	630	490	360	300	300
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.00	6.97	6.85	7.5	7.60	7.61	--	--	7.00	7.8	7.9	7.65	7.97	7.9	7.9
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	<2	<2	6	<4 (35)	<2	--	--	<10 (35)	<2	<2	80	<2	<2	<2
Sulphate	ug/l	--	350000	340000	380000	360000	410000	440000	--	--	380000	230000	320000	370000	330000	310000	370000
Temperature (Field)	deg c	-- (24)	20.9	18.5	14.0	6	6.0	3.3	--	--	4.5	6	8	13.6	19.1	19	19
Total Dissolved Solids	ug/l	--	822000	754000	790000	818000	920000	994000	--	--	924000	504000	662000	942000	674000	582000	802000
Total Suspended Solids	ug/l	--	1000	8000	2000	6000	<1000	<1000	--	--	<1000	2000	<1000	2000	1000	1000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	41	44	70	45	45	--	--	44	36	53	49	49	47	43
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**240**	**260**	**250**	**240**	**290**	**330**	--	--	**280**	97	150	**240**	**210**	150	**250**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	130000	130000	150000	150000	160000	--	--	160000	87000	120000	140000	130000	110000	140000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	6.5	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	0.76	<0.50	0.53	--	--	0.53	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	1.2	**22**	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	1.2	<1.0	1.7	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	0.75	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	**2900**	<100	<100	--	--	<100	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	35000	32000	36000	40000	49000	55000	--	--	53000	21000	29000	41000	32000	26000	37000
Manganese	ug/l	--	2.5	4.1	3.0	30	5.0	11	--	--	12	2.4	2.3	3.4	<2.0	2.7	2.2
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	7800	7400	7800	7700	7100	7400	--	--	7100	5800	7300	8500	8600	8000	9100
Silicon	ug/l	--	2400	2200	2500	2500	2900	3400	--	--	3500	1500	2000	2600	2200	1700	2300
Silver	ug/l	0.1	<0.10	<0.10	<0.10	**0.13**	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	50000	50000	50000	54000	67000	79000	--	--	71000	31000	45000	62000	47000	34000	51000
Strontium	ug/l	--	6200	6000	5900	6300	8100	8800	--	--	7900	3500	4500	6200	5300	3900	5700
Sulfur	ug/l	--	130000	120000	140000	130000	160000	180000	--	--	140000	86000	110000	130000	110000	100000	130000
Thallium	ug/l	0.3 (33)	0.15	0.15	0.093	0.090	0.062	0.055	--	--	0.057	0.052	0.074	0.091	0.097	0.12	0.094
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			27-Oct-2014 (10)	**20-Nov-2014 (10)**	**09-Dec-2014 (11)**	**21-Jan-2015 (4)**	**10-Feb-2015 (4)**	**16-Mar-2015**	**07-Apr-2015**	**21-May-2015 (10)**	**23-Jun-2015 (10)**	**22-Jul-2015 (12)**	**28-Aug-2015 (10)**	**25-Sep-2015 (9)**	**27-Oct-2015 (10)**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	ss4	ss4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	140000	150000	170000	--	--	180000	140000	160000	130000	130000	110000	100000	140000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	--	--	<20	<20	<20	<20	20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	<50	--	--	150	81	<50	--	<50	<50	<50	510
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	--	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	6600	<4000	--	--	6300	10000	7400	8400	<4000	6400	<4000	4600
Chloride	ug/l	--	57000	71000	71000	--	--	79000	60000	83000	89000	97000	72000	59000	83000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	1123	1214	1245	--	--	1277	986	1080	1174	685	1103	1115	1265
Dissolved Organic Carbon	ug/l	--	1500	1600	1600	--	--	1800	1300	1500	1400	1800	1200	1200	1400
Hardness, Calcium Carbonate	ug/l	--	520000	530000	560000	--	--	580000	420000	530000	550000	600000	500000	460000	590000
Nitrate as N	ug/l	--	1060	1000	1300	--	--	860	970	1050	1280	860	960	1160	550
Nitrite as N	ug/l	--	<10	<10	<10	--	--	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	190	170	170	--	--	430	270	290	430	320	350	250	1100
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.54	8.24	6.65	--	--	7.82	7.01	7.9	7.96	6.67	7.51	7.5	**6.31**
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	2	<4	<4	--	--	7	<4	4	<4	<4	<4	<4	6
Sulphate	ug/l	--	380000	390000	410000	--	--	380000	310000	360000	380000	430000	390000	380000	430000
Temperature (Field)	deg c	-- (24)	9.9	2.8	3.5	--	--	5.1	4.6	12	20.6	21.0	20.2	15	9.4
Total Dissolved Solids	ug/l	--	750000	830000	902000	--	--	848000	636000	914000	1000000	986000	994000	772000	986000
Total Suspended Solids	ug/l	--	<1000	1000	1000	--	--	<1000	<2000	2000	<2000	1000	<2000	<1000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	47	44	46	--	--	46	36	41	44	48	43	42	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**240**	**270**	**270**	--	--	**240**	170	**220**	**230**	**260**	**230**	170	**230**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	160000	160000	160000	--	--	150000	110000	150000	160000	160000	150000	140000	150000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.70	<0.50
Iron	ug/l	300	<100	<100	<100	--	--	<100	<100	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	42000	46000	48000	--	--	43000	31000	44000	43000	47000	39000	33000	44000
Manganese	ug/l	--	<2.0	3.0	5.2	--	--	14	7.6	2.3	2.3	2.0	<2.0	2.3	3.1
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	8900	8500	8000	--	--	6700	5300	8000	9400	9900	9500	9100	8300
Silicon	ug/l	--	2600	2900	3100	--	--	2700	2100	2700	2200	2600	2200	1900	2300
Silver	ug/l	0.1	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	56000	64000	64000	--	--	56000	44000	60000	56000	61000	46000	37000	53000
Strontium	ug/l	--	6700	7000	7000	--	--	6300	4600	6200	6100	6600	5500	4600	6700
Sulfur	ug/l	--	150000	160000	150000	--	--	150000	99000	140000	--	160000	150000	130000	150000
Thallium	ug/l	0.3 (33)	0.10	0.079	0.072	--	--	0.063	0.053	0.080	0.10	0.11	0.13	0.10	0.10
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			20-Nov-2015	**10-Dec-2015 (10)**	**26-Jan-2016 (10)**	**23-Feb-2016**	**21-Mar-2016 (9)**	**26-Apr-2016 (9)**	**31-May-2016**	**30-Jun-2016**	**13-Jul-2016**	**04-Aug-2016**	**20-Sep-2016**	**26-Oct-2016 (9)**	**11-Nov-2016 (9)**	**14-Dec-2016**	**23-Jan-2017**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	130000	140000	140000	150000	100000	140000	160000	150000	120000	110000	100000	110000	130000	150000	150000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	98	<50	120	<50	<50	<50	<50	<50	<50	<50	<50	190	160
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	5100	<4000	<4000	<4000	4700	6400	<4000	14000	14000	6000	<4000	6700	4100	<4000	<4000
Chloride	ug/l	--	72000	79000	76000	78000	49000	79000	110000	100000	83000	84000	49000	48000	65000	68000	82000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	1136	1304	1230	1220	749	1039	1251	725	855	1005	1027	1120	1171	1035	1280
Dissolved Organic Carbon	ug/l	--	1300	1300	1400	1500	1300	1600	1600	1600	1400	1500	1100	1400	1300	1500	1500
Hardness, Calcium Carbonate	ug/l	--	600000	550000	510000	510000	310000	470000	600000	660000	530000	530000	480000	480000	600000	580000	540000
Nitrate as N	ug/l	--	830	740	1150	1010	1300	1360	790	650	1150	1080	770	1330	1450	1200	920
Nitrite as N	ug/l	--	<10	<10	15	<10	15	<10	<10	<10	15	12	<10	15	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	320	240	590	230	360	300	240	270	270	400	300	<100	160	430	250
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.87	8.00	7.31	7.08	7.69	8.02	6.86	7.9	7.9	7.8	8.06	7.8	7.52	7.7	6.65
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<4	<4	<4	4	<4	<4	<4	<4	<4	<4	4	<4	<4	<4	<4
Sulphate	ug/l	--	400000	410000	370000	360000	210000	340000	380000	430000	390000	420000	390000	360000	420000	390000	390000
Temperature (Field)	deg c	-- (24)	7.3	5.4	3.2	3.3	3.7	9.0	21.0	21	21	20	20.6	16	7.0	2	2.6
Total Dissolved Solids	ug/l	--	924000	960000	864000	860000	466000	702000	992000	1180000	986000	1040000	788000	846000	938000	936000	912000
Total Suspended Solids	ug/l	--	2000	<1000	<2000	1000	12000	<1000	1000	3000	2000	2000	4000	2000	<1000	<1000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	38	38	42	37	39	40	45	43	45	47	41	40	35	38	49
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	190	**220**	180	180	83	140	190	**260**	**230**	**220**	200	190	190	200	**210**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	150000	150000	140000	150000	90000	140000	150000	170000	160000	160000	140000	130000	150000	160000	180000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	0.63	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	**1.4**	<0.50	**1.8**	**1.2**	<0.50	<0.50	<0.50	<0.50	<0.50	**1.2**	0.58	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	41000	44000	39000	42000	20000	33000	44000	48000	42000	40000	34000	36000	41000	43000	50000
Manganese	ug/l	--	3.3	3.5	5.4	5.8	4.6	3.1	2.2	2.0	2.0	<2.0	3.6	2.2	<2.0	3.4	6.7
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	7800	7900	9900	7300	7000	8000	8500	10000	11000	12000	9600	12000	10000	9200	10000
Silicon	ug/l	--	2200	2400	2300	2400	1500	2200	2500	2800	2400	2200	1900	2100	2300	2500	3000
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	50000	56000	51000	53000	36000	48000	61000	65000	53000	48000	42000	47000	51000	50000	62000
Strontium	ug/l	--	5600	6200	5400	5400	2700	5100	6400	7000	5900	5800	5000	5100	5900	5600	6800
Sulfur	ug/l	--	140000	150000	140000	130000	75000	120000	140000	160000	150000	150000	130000	140000	160000	150000	150000
Thallium	ug/l	0.3 (33)	0.066	0.070	0.055	0.060	0.072	0.068	0.088	0.12	0.14	0.12	0.11	0.082	0.070	0.078	0.070
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			14-Feb-2017	27-Mar-2017 (14)	21-Apr-2017 (14)	23-May-2017	26-Jun-2017	21-Jul-2017	11-Aug-2017	08-Sep-2017	17-Oct-2017 (14)	17-Nov-2017	07-Dec-2017 (14)	22-Jan-2018	16-Feb-2018	13-Mar-2018	24-Apr-2018
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	180000	140000	120000	150000	140000	120000	130000	120000	130000	130000	160000	190000	215000	149000	131000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	68	83	<50	83	220	80	<50	74	<50	<50	110	110	70	200
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<1000	<1000	<1000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	6200	5400	6600	4400	4100	<4000	<4000	6000	4000	<4000	6000	<5000	<5000	<5000
Chloride	ug/l	--	96000	82000	77000	110000	110000	66000	100000	92000	96000	75000	86000	74000	104000	91000	114000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**<10**	<1	**<10**	**<10**
Conductivity (Field)	uS/cm	--	1098	971	1068	1289	1342	1118	1318	1164	1202	1143	1257	1242	1379	1108	1120
Dissolved Organic Carbon	ug/l	--	1800	1600	1700	1600	1600	1300	1800	1500	1500	1600	1700	1800	1500	1800	1700
Hardness, Calcium Carbonate	ug/l	--	600000	400000	420000	590000	620000	500000	560000	510000	510000	510000	530000	566000	586000	477000	440000
Nitrate as N	ug/l	--	710	1170	2410	1790	710	1700	1320	870	760	1320	940	340	320	770	920
Nitrite as N	ug/l	--	<10	<10	18	<10	<10	<10	<10	<10	<10	10	<10	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	230	110	300	380	350	240	300	170	1300	220	130	200	200	200	300
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.8	7.63	7.21	7.08	6.88	7.30	7.71	6.68	7.58	6.63	6.78	**6.15**	**6.37**	7.72	7.52
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<4	<4	<4	<4	4	<4	<4	<4	<4	<4	6	<2	<2	14	54
Sulphate	ug/l	--	420000	270000	300000	370000	400000	380000	390000	360000	380000	360000	370000	378000	410000	321000	453000
Temperature (Field)	deg c	-- (24)	2	3.1	7.4	11.8	15.1	18.3	20.6	15.8	12.0	4.4	4.3	1.7	1.3	2.0	8.9
Total Dissolved Solids	ug/l	--	1030000	600000	714000	950000	1080000	872000	1010000	882000	970000	810000	840000	780000	973000	748000	805000
Total Suspended Solids	ug/l	--	<1000	1000	1000	1000	5000	<1000	<1000	2000	3000	<1000	5000	3000	2000	2000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	38	37	43	44	47	45	48	47	43	39	38	50	40	40	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	190	130	130	190	200	160	**220**	**210**	**210**	**210**	190	**280**	**260**	200	180
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	160000	120000	130000	170000	170000	140000	160000	160000	150000	140000	160000	151000	157000	135000	120000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1	<1	1	2
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.3	0.3	<0.2	0.2
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	0.56	0.66	<0.50	<0.50	<0.50	<0.50	0.86	0.65	**1.4**	0.96	**<10**	<1	**<10**	**<10**
Iron	ug/l	300	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	30	40	40	30
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	47000	31000	31000	44000	46000	35000	43000	42000	40000	36000	41000	46000	47000	34000	34000
Manganese	ug/l	--	6.1	3.8	2.3	4.0	5.2	<2.0	<2.0	2.4	3.0	<2.0	3.0	<10	<10	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	8300	8900	10000	8200	8100	9800	13000	14000	13000	13000	12000	8000	10000	10000	10000
Silicon	ug/l	--	2700	2200	1900	2500	2600	2200	2700	2700	2600	2400	2700	3000	3200	2600	2500
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	61000	51000	44000	52000	48000	39000	57000	54000	55000	47000	55000	52000	68000	61000	52000
Strontium	ug/l	--	6300	4400	4200	5800	6200	4900	5900	6100	5600	4600	5900	6820	7080	5940	5840
Sulfur	ug/l	--	150000	86000	110000	130000	150000	130000	140000	140000	140000	130000	140000	107000	142000	96700	109000
Thallium	ug/l	0.3 (33)	0.050	0.051	0.11	0.071	0.074	0.068	0.10	0.11	0.094	0.087	0.070	<0.1	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			18-May-2018	22-Jun-2018	18-Jul-2018	24-Aug-2018 (44)	18-Sep-2018 (45)	24-Oct-2018	20-Nov-2018	18-Dec-2018	02-Jan-2019	25-Jan-2019 (46)	21-Feb-2019	13-Mar-2019	17-Apr-2019	24-May-2019	21-Jun-2019
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4 (RESAMPLE)	SS-4	SS-4	SS-4	SS-4	SS - 4	SS-4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	137000	127000	133000	116000	131000	140000	158000	173000	--	202000	218000	197000	74000	128000	118000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	920	30	330	70	2340	30	60	130	--	250	900	60	160	53	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	<1000	2000	<1000	<1000	<1000	<1000	<1000	--	<1000	<1000	3000	3000	<1000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	<5000	<5000	<5000	6000	<5000	<5000	<5000	--	<5000	7000	<5000	<5000	<5000	7000
Chloride	ug/l	--	104000	28000	161000	114000	126000	119000	115000	111000	--	110000	141000	124000	49000	94000	154000
Chromium (III)	ug/l	8.9 (22)	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	--	<1	<1	<1	3	2	<1
Conductivity (Field)	uS/cm	--	1251	1337	1472	1257	1349	1337	1360	1354	--	1350	1393	1352	693	1222	1328
Dissolved Organic Carbon	ug/l	--	1500	2500	6900	1200	5200	1800	1800	1800	--	2600	1800	2200	1000	<500	800
Hardness, Calcium Carbonate	ug/l	--	538000	562000	540000	455000	568000	497000	616000	569000	--	526000	513000	487000	266000	507000	512000
Nitrate as N	ug/l	--	1110	120	340	920	490	1100	1530	1340	--	370	430	520	1380	2510	1830
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	3400	700	630	300	2100	200	3300	400	--	1600	1200	100	200	320	250
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.67	7.97	7.14	6.80	6.96	6.93	6.57	6.68	--	**6.46**	6.79	6.65	**6.4**	7.96 (37)	**6.30**
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	8	5	4	5	2	<2	3	8	--	2	3	3	5	<2	<2
Sulphate	ug/l	--	379000	81000	419000	432000	448000	449000	469000	408000	--	353000	414000	370000	177000	368000	400000
Temperature (Field)	deg c	-- (24)	11.9	19.1	23.9	19.1	20.6	8.7	3.3	3.5	--	1.5	3.2	1.7	6.6	10.4	14.1
Total Dissolved Solids	ug/l	--	903000	897000	1050000	952000	994000	1020000	994000	973000	--	959000	973000	959000	452000	784000	4540000
Total Suspended Solids	ug/l	--	<1000	1000	1000	3000	<1000	<1000	4000	33000	<1000	1000	2000	6000	13000	2000	2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	40	50	50	60	50	<10	50	50	--	50	40	40	40	50	50
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	180	**230**	**260**	**240**	**280**	<10	**260**	**250**	--	**260**	**260**	**250**	60	180	**240**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	148000	156000	147000	126000	155000	133000	166000	152000	--	138000	138000	129000	80000	142000	139000
Chromium	ug/l	-- (30)	2	6	2	1	<1	<1	<1	2	--	<1	<1	<1	3	2	1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5	0.5	--	0.9	0.8	0.5	0.2	0.3	0.4
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	--	<1	<1	<1	<1	<1	<1
Iron	ug/l	300	<30	<30	<30	40	<30	<30	40	130	--	40	40	50	70	<30	<30
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	41000	42000	42000	34000	44000	40000	49000	46000	--	44000	41000	40000	16000	37000	40000
Manganese	ug/l	--	<10	<10	<10	<10	<10	<10	<10	10	--	20	10	10	<10	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	14000	19000	19000	16000	16000	16000	12000	14000	--	11000	11000	10000	11000	14000	17000
Silicon	ug/l	--	2800	2700	2400	2200	2600	2300	2900	3200	--	3300	3300	3200	1700	2400	2300
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	63000	69000	76000	64000	74000	77000	74000	65000	--	74000	80000	78000	31000	56000	78000
Strontium	ug/l	--	6130	6230	7200	6590	6150	<1	9080	7150	--	7110	7060	7380	2190	5220	6260
Sulfur	ug/l	--	120000	107000	148000	176000	157000	167000	157000	148000	--	130000	133000	130000	73900	132000	148000
Thallium	ug/l	0.3 (33)	<0.1	0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			18-Jul-2019	**21-Aug-2019**	**18-Sep-2019**	**29-Oct-2019**	**19-Nov-2019**	**18-Dec-2019**	**15-Jan-2020**	**19-Feb-2020**	**19-Mar-2020**	**03-Apr-2020**	**08-May-2020**	**01-Jun-2020**	**21-Jul-2020**	**25-Aug-2020**	**17-Sep-2020**	**23-Oct-2020**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	157000	140000	148000	79000	146000	124000	85000	205000	93000	91000	152000	168000	170000	138000	119000	128000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	50	40	30	100	<10	<10	18	35	94	27	26	16	<10	<50	32	28
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	<1000	<1000	2000	3000	<1000	1000	3000	3000	<1000	<1000	9000	5000	2000	6000	6000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	<5000	6000	<5000	<5000	<5000	<5000	5000	<5000	<5000	5000	<5000	11000	<5000	<5000	<5000
Chloride	ug/l	--	114000	130000	114000	60000	96000	67000	34000	90000	57000	71000	84000	101000	120000	81000	75000	84000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	3	1	1	1	**<10**	**<10**	**<10**	<1	<1	<1	<1	<1	<1
Conductivity (Field)	uS/cm	--	1239	1346	1298	1003	1495	1112	637	1347	778	982	1191	1184	1309	1222	1294	1262
Dissolved Organic Carbon	ug/l	--	<500	8700	1600	1400	1800	1400	1200	1900	1600	1700	1600	1600	2400	1400	1600	1500
Hardness, Calcium Carbonate	ug/l	--	513000	565000	689000	372000	563000	428000	264000	564000	337000	384000	489000	508000	543000	515000	544000	488000
Nitrate as N	ug/l	--	620	740	740	1460	1750	700	590	180	1570	1800	900	<100	240	570	670	1380
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<500
Nitrogen, Total Kjeldahl	ug/l	--	300	<100	<100	300	<100	146	280	259	352	393	318	256	229	219	1800	748
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	**6.23**	7.18	**6.26**	7.37	7.40	7.95	7.50	8.10	8.20	7.90	7.91	7.69	8.08	8.21	7.75	7.19
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	2	<2	4	<2	4	4	<2	9	<2	<2	<2	<2	4	3	3
Sulphate	ug/l	--	384000	418000	447000	300000	456000	307000	186000	382000	216000	288000	339000	355000	389000	397000	478000	429000
Temperature (Field)	deg c	-- (24)	15.9	17.6	15.6	9.3	3.9	2.7	1.5	0.6	2.9	6.5	8.2	10.1	15.5	17.5	15.5	10.9
Total Dissolved Solids	ug/l	--	800000	1030000	1020000	607000	1040000	735000	414000	959000	505000	648000	819000	889000	924000	868000	938000	903000
Total Suspended Solids	ug/l	--	4000	2000	2000	6000	2000	3000	13000	1000	15000	1000	4000	2000	1000	4000	3000	4000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	60	50	40	50	40	30	50	40	40	40	40	50	50	50	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**280**	**320**	**280**	120	**250**	150	90	**300**	90	120	**220**	**280**	**300**	**260**	**210**	**230**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	136000	152000	192000	106000	153000	117000	76000	145000	102000	111000	133000	136000	148000	142000	147000	141000
Chromium	ug/l	-- (30)	<1	<1	4	3	1	2	1	<1	4	5	<1	<1	<1	<1	<1	1
Cobalt	ug/l	0.9	0.3	0.4	0.4	0.2	0.4	0.3	0.2	0.6	0.3	0.2	0.5	0.7	0.5	0.3	<0.2	0.4
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	<1	<1	<1	<1	1	<1	<1	**<10**	<1	<1	<1	<0.5	<0.50	0.9	**1.5**
Iron	ug/l	300	<30	<30	40	60	<30	50	160	60	110	50	<30	30	30	40	<30	50
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	42000	45000	51000	26000	44000	33000	18000	49000	20000	26000	38000	41000	42000	39000	43000	33000
Manganese	ug/l	--	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	12000	14000	18000	11000	17000	11000	6000	10000	10000	14000	11000	12000	14000	12000	16000	13000
Silicon	ug/l	--	2600	3000	2800	2200	2800	2500	1900	3600	3100	2300	2700	2600	3700	4400	2600	3700
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	63000	74000	74000	41000	71000	51000	26000	69000	39000	44000	56000	72000	75000	53000	60000	63000
Strontium	ug/l	--	6870	8090	8050	3540	6960	5160	2450	8770	3530	3760	5910	8360	7140	6580	6190	6050
Sulfur	ug/l	--	152000	163000	171000	110000	164000	116000	61300	164000	77900	108000	130000	142000	162000	150000	179000	149000
Thallium	ug/l	0.3 (33)	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																		
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**	**SS-4**
			26-Nov-2020	**11-Dec-2020**	**08-Jan-2021**	**18-Feb-2021**	**22-Mar-2021**	**09-Apr-2021 (47)**	**28-May-2021**	**28-Jun-2021**	**15-Jul-2021**	**11-Aug-2021**	**28-Sep-2021**	**27-Oct-2021**	**11-Nov-2021**	**15-Dec-2021**	**25-Jan-2022 (18)**
Parameter	**Unit**	**PWQO (1)**	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS-4	SS4	SS4	SS4	SS4	SS4
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	177000	140000	141000	189000	175000	131000	179000	109000	139000	148000	170000	87000	128000	139000	199000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	10	124	<10	<10	<10	<10	<10	<10	<10	<10	41	20	<10	<10	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	1000	1000	2000	8000	<1000	3000	<1000	<1000	<1000	3000	<1000	<1000	<1000	2000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	<5000	7000	9000	5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	6000	<5000
Chloride	ug/l	--	99000	74000	80000	112000	74000	101000	121000	109000	88000	93000	126000	48000	74000	64000	108000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Conductivity (Field)	uS/cm	--	1391	1329	1288	1459	1221	1230	1344	1228	1208	1318	1307	929	1290	1246	1653
Dissolved Organic Carbon	ug/l	--	1500	1300	1500	1700	1500	1400	2300	1000	1500	2000	2000	1400	2200	2200	2600
Hardness, Calcium Carbonate	ug/l	--	581000	555000	528000	631000	454000	527000	656000	514000	581000	550000	592000	350000	509000	523000	592000
Nitrate as N	ug/l	--	1010	2340	1330	550	840	2640	720	1060	<500	<500	<100	1310	1450	800	530
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<500	<500	<100	<500	<500	<100	<100	<100	<100	<500
Nitrogen, Total Kjeldahl	ug/l	--	224	145	192	145	300	357	678	125	<100	314	620	430	219	346	141
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.60	7.10	7.05	7.45	7.10	7.18	7.66	7.64	7.47	7.07	7.63	8.19	8.03	7.72	7.52
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	2	5	<2	<2	<2	32	5	<2	2	<2	6	<2	<2	<2
Sulphate	ug/l	--	477000	455000	441000	468000	367000	433000	460000	423000	444000	435000	500000	268000	443000	417000	560000
Temperature (Field)	deg c	-- (24)	4.2	5.4	4.6	2.3	6.2	9.0	12.8	18.0	17.2	17.8	11.5	9.9	9.2	3.5	1.4
Total Dissolved Solids	ug/l	--	1020000	903000	889000	1020000	854000	861000	1000000	868000	889000	966000	1080000	590000	917000	780000	1000000
Total Suspended Solids	ug/l	--	1000	3000	10000	<1000	4000	<1000	23000	14000	2000	<1000	4000	18000	<1000	4000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	40	40	40	40	40	50	40	40	40	40	40	40	40	30	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	**270**	190	**220**	**290**	180	170	**280**	**210**	**240**	**260**	**350**	100	140	180	**210**
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	160000	153000	144000	167000	121000	145000	172000	143000	160000	151000	158000	104000	141000	140000	164000
Chromium	ug/l	-- (30)	<1	2	<1	<1	<1	2	<1	<1	<1	<1	<1	2	1	<1	<1
Cobalt	ug/l	0.9	0.3	0.3	0.7	0.5	0.4	0.2	0.5	0.5	0.2	0.5	**1.6**	<0.2	<0.2	<0.2	0.5
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	**1.4**	0.60	<0.5	<0.5	**1.3**	<0.5	0.7	0.6	<0.50	<0.50	**1.5**	**1.1**	0.6	<0.50
Iron	ug/l	300	30	30	80	40	50	<30	**400**	60	40	50	80	80	<30	40	50
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	44000	42000	41000	52000	37000	40000	55000	38000	44000	42000	48000	22000	38000	42000	52000
Manganese	ug/l	--	<10	<10	<10	<10	<10	<10	20	<10	<10	<10	10	<10	<10	<10	10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	16000	14000	13000	14000	8000	15000	14000	16000	14000	16000	16000	12000	17000	14000	13000
Silicon	ug/l	--	3600	3200	3500	2600	3200	3200	3700	3000	3200	3800	3700	2100	2400	2300	4100
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	75000	59000	66000	81000	56000	63000	77000	69000	57000	68000	101000	30000	56000	50000	63000
Strontium	ug/l	--	7070	5780	6180	6300	5990	5760	6740	4670	5660	6570	9050	2780	4800	4820	6790
Sulfur	ug/l	--	179000	177000	154000	179000	137000	152000	169000	149000	150000	156000	176000	111000	164000	157000	161000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-4	SS-4	SS-4	SS-4	SS-4	SS-4
			24-Feb-2022 (4)	**17-Mar-2022 (19)**	**28-Apr-2022**	**26-May-2022 (20)**	**24-Jun-2022**	**25-Jul-2022**
Parameter	**Unit**	**PWQO (1)**	4	SW4	SS4	SS4	SS4	SS4
General Chemistry								
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	100000	123000	144000	108000	92000
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	--	141	33	54	137	<20
Bicarbonate	ug/l	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<1000	<1000	<1000	2000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	6000	6000	14000	<5000	<5000
Chloride	ug/l	--	--	68000	106000	136000	87000	78000
Chromium (III)	ug/l	8.9 (22)	--	<1	<1	<1	<1.0	<1
Conductivity (Field)	uS/cm	--	--	350	1166	1237	1053	1032
Dissolved Organic Carbon	ug/l	--	--	2300	2400	1800	1900	1800
Hardness, Calcium Carbonate	ug/l	--	--	305000	567000	623000	522000	481000
Nitrate as N	ug/l	--	--	840	1960	1330	2140	1400
Nitrite as N	ug/l	--	--	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	272	451	320	374	345
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	7.80	7.64	7.82	7.72	7.72
Phosphate	ug/l	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	6	<2	<2	2	6
Sulphate	ug/l	--	--	209000	403000	461000	428000	383000
Temperature (Field)	deg c	-- (24)	--	2.2	8.0	13.2	17.8	22
Total Dissolved Solids	ug/l	--	--	512000	903000	1030000	833000	742000
Total Suspended Solids	ug/l	--	--	7000	5000	2000	1000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--
Metals								
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--
Barium	ug/l	--	--	40	40	40	40	50
Beryllium	ug/l	-- (27)	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	80	160	**250**	200	190
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--
Calcium	ug/l	--	--	89000	161000	172000	148000	140000
Chromium	ug/l	-- (30)	--	<1	1	<1	<1	<1
Cobalt	ug/l	0.9	--	0.2	0.3	0.3	0.2	0.2
Copper	ug/l	5	--	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	0.8	**1.1**	<0.5	<0.50	<0.5
Iron	ug/l	300	--	80	50	<30	40	60
Lead	ug/l	-- (31)	--	--	--	--	--	--
Magnesium	ug/l	--	--	20000	40000	47000	37000	32000
Manganese	ug/l	--	--	10	<10	<10	<10	<10
Mercury	ug/l	0.2 (32)	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--
Potassium	ug/l	--	--	7000	16000	15000	14000	12000
Silicon	ug/l	--	--	2200	2700	3600	2000	2900
Silver	ug/l	0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	--	41000	64000	69000	54000	41000
Strontium	ug/l	--	--	2710	5040	6670	5120	4890
Sulfur	ug/l	--	--	70100	152000	149000	138000	147000
Thallium	ug/l	0.3 (33)	--	<0.1	<0.1	<0.1	0.1	0.1
Titanium	ug/l	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--
Phenols								
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
Parameter	**Unit**	**PWQO (1)**	**29-Jun-2001**	**23-Jul-2001**	**26-Aug-2001 (2)**	**21-Sep-2001 (2)**	**20-Oct-2001**	**17-Nov-2001**	**13-Dec-2001**	**07-Jan-2002 (3)**	**01-Feb-2002 (3)**	**23-Mar-2002 (3)**	**21-Apr-2002**	**18-May-2002**	**10-Jun-2002**	**27-Jul-2002 (2)**	**12-Aug-2002 (2)**
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	238000	231000	--	--	180000	215000	170000	--	--	--	166000	172000	174000	--	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	--	--	<20	<20	<20	--	--	--	<20	<20	<20	--	--
Ammonia Nitrogen	ug/l	--	<20	230	--	--	30	30	50	--	--	--	<20	30	90	--	--
Bicarbonate	ug/l	--	237000	230000	--	--	179000	214000	169000	--	--	--	166000	172000	174000	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	5000	--	--	1000	1000	2000	--	--	--	<1000	1000	1000	--	--
Carbonate (CO3)	ug/l	--	<2000	<2000	--	--	<2000	<2000	<2000	--	--	--	<2000	<2000	<2000	--	--
Chemical Oxygen Demand	ug/l	--	21000	40000	--	--	29000	22000	30000	--	--	--	13000	47000	38000	--	--
Chloride	ug/l	--	3000	6000	--	--	2000	2000	2000	--	--	--	4000	1000	1000	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	200	180	--	--	160	180	480	--	--	--	350	370	210	--	--
Dissolved Organic Carbon	ug/l	--	6400	11900	--	--	7500	11200	8800	--	--	--	6400	17500	16100	--	--
Hardness, Calcium Carbonate	ug/l	--	218000	222000	--	--	188000	203000	205000	--	--	--	158000	160000	181000	--	--
Nitrate as N	ug/l	--	<100	<100	--	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--
Nitrite as N	ug/l	--	<100	<100	--	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--
Nitrogen, Total Kjeldahl	ug/l	--	460	590	--	--	450	400	380	--	--	--	290	520	590	--	--
Nitrogen, Organic	ug/l	--	460	360	--	--	420	370	330	--	--	--	270	490	500	--	--
pH (Field)	-	6.5 - 8.5	7.5	7.3	--	--	7.2	7	7.6	--	--	--	7.2	7.4	7.3	--	--
Phosphate	ug/l	--	90	<30	--	--	<30	<30	<30	--	--	--	<30	<30	<30	--	--
Phosphorus	ug/l	-- (23)	20	370	--	--	<10	<10	10	--	--	--	60	<10	<10	--	--
Sulphate	ug/l	--	6000	4000	--	--	23000	14000	14000	--	--	--	8000	5000	3000	--	--
Temperature (Field)	deg c	-- (24)	19	24	--	--	10	4	2	--	--	--	13	11	18	--	--
Total Dissolved Solids	ug/l	--	256000	264000	--	--	244000	280000	198000	--	--	--	219000	222000	221000	--	--
Total Suspended Solids	ug/l	--	5000	75000	--	--	5000	3000	12000	--	--	--	2000	2000	5000	--	--
Turbidity	ntu	-- (25)	1	30	--	--	1.6	1.2	2.5	--	--	--	0.4	0.8	1.1	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	<50	<50	--	--	<50	<50	<50	--	--	--	<50	<50	<50	--	--
Barium	ug/l	--	30	120	--	--	10	10	<10	--	--	--	20	<10	<10	--	--
Beryllium	ug/l	-- (27)	<2	<2	--	--	<2	<2	<2	--	--	--	<2	<2	<2	--	--
Boron	ug/l	200 (28)	10	20	--	--	<10	<50	<50	--	--	--	<50	<50	<50	--	--
Cadmium	ug/l	0.2 (29)	<0.1	<0.1	--	--	0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--
Calcium	ug/l	--	79000	79000	--	--	72000	78000	77000	--	--	--	60000	64000	71000	--	--
Chromium	ug/l	-- (30)	<1	7	--	--	1	2	<1	--	--	--	<1	1	<1	--	--
Cobalt	ug/l	0.9	<0.2	0.3	--	--	<0.2	<0.2	<0.2	--	--	--	<0.2	<0.2	<0.2	--	--
Copper	ug/l	5	<1	<1	--	--	<1	<1	2	--	--	--	<1	<1	<1	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	**830**	280	--	--	40	60	130	--	--	--	<10	30	120	--	--
Lead	ug/l	-- (31)	<1	<1	--	--	<1	<1	<1	--	--	--	<1	<1	<1	--	--
Magnesium	ug/l	--	5000	6000	--	--	2000	2000	3000	--	--	--	2000	<1000	1000	--	--
Manganese	ug/l	--	610	1050	--	--	20	30	30	--	--	--	<10	10	30	--	--
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--
Molybdenum	ug/l	40	<10	<10	--	--	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Nickel	ug/l	25	<10	<10	--	--	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Potassium	ug/l	--	<1000	<1000	--	--	<1000	<1000	<1000	--	--	--	<1000	<1000	<1000	--	--
Silicon	ug/l	--	1780	2510	--	--	750	800	1060	--	--	--	710	1210	170	--	--
Silver	ug/l	0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	--	--	--	**<10**	<0.1	<0.1	--	--
Sodium	ug/l	--	3000	3000	--	--	2000	9000	<2000	--	--	--	3000	2000	<2000	--	--
Strontium	ug/l	--	180	182	--	--	84	86	59	--	--	--	109	74	83	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	**<1**	**<1**	--	--	**<1**	**<1**	**<1**	--	--	--	**<1**	**<1**	**<1**	--	--
Titanium	ug/l	--	<10	<10	--	--	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Vanadium	ug/l	6	<1	**9**	--	--	<1	<1	<1	--	--	--	<1	<1	<1	--	--
Zinc	ug/l	30 (29)	<10	<10	--	--	<10	<10	<10	--	--	--	<10	<10	<10	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	<1	<1	--	--	<1	<1	<1	--	--	--	<1	<1	<1	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
Parameter	**Unit**	**PWQO (1)**	**25-Sep-2002 (2)**	**31-Oct-2002**	**28-Nov-2002 (3)**	**15-Jan-2003 (4)**	**12-Feb-2003 (4)**	**15-Mar-2003 (4)**	**28-Apr-2003 (4)**	**24-May-2003 (4)**	**24-Jun-2003 (4)**	**16-Jul-2003 (4)**	**14-Aug-2003**	**30-Sep-2003 (4)**	**30-Oct-2003**	**19-Nov-2003**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	161000	--	--	--	--	--	--	--	--	220000	--	156000	169000
Ammonia, unionized (Field)	ug/l	20	--	<20	--	--	--	--	--	--	--	--	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	--	<20	--	--	--	--	--	--	--	--	<20	--	30	<20
Bicarbonate	ug/l	--	--	161000	--	--	--	--	--	--	--	--	220000	--	156000	169000
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<1000	--	--	--	--	--	--	--	--	<1000	--	<1000	<1000
Carbonate (CO3)	ug/l	--	--	<2000	--	--	--	--	--	--	--	--	<2000	--	<2000	<2000
Chemical Oxygen Demand	ug/l	--	--	18000	--	--	--	--	--	--	--	--	19000	--	18000	14000
Chloride	ug/l	--	--	11000	--	--	--	--	--	--	--	--	12000	--	14000	11000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	290	--	--	--	--	--	--	--	--	380	--	395	420
Dissolved Organic Carbon	ug/l	--	--	7900	--	--	--	--	--	--	--	--	8500	--	6800	5800
Hardness, Calcium Carbonate	ug/l	--	--	294000	--	--	--	--	--	--	--	--	243000	--	199000	204000
Nitrate as N	ug/l	--	--	280	--	--	--	--	--	--	--	--	<100	--	<100	<100
Nitrite as N	ug/l	--	--	<100	--	--	--	--	--	--	--	--	<100	--	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	480	--	--	--	--	--	--	--	--	520	--	370	200
Nitrogen, Organic	ug/l	--	--	460	--	--	--	--	--	--	--	--	520	--	340	180
pH (Field)	-	6.5 - 8.5	--	7.2	--	--	--	--	--	--	--	--	7.4	--	7	7.2
Phosphate	ug/l	--	--	<30	--	--	--	--	--	--	--	--	<30	--	<30	60
Phosphorus	ug/l	-- (23)	--	<10	--	--	--	--	--	--	--	--	<10	--	30	20
Sulphate	ug/l	--	--	123000	--	--	--	--	--	--	--	--	17000	--	26000	32000
Temperature (Field)	deg c	-- (24)	--	3	--	--	--	--	--	--	--	--	20	--	2	4
Total Dissolved Solids	ug/l	--	--	357000	--	--	--	--	--	--	--	--	299000	--	250000	269000
Total Suspended Solids	ug/l	--	--	7000	--	--	--	--	--	--	--	--	<2000	--	<2000	<2000
Turbidity	ntu	-- (25)	--	7.2	--	--	--	--	--	--	--	--	0.3	--	0.9	0.4
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	<10	--	--	--	--	--	--	--	--	<10	--	<10	<10
Barium	ug/l	--	--	20	--	--	--	--	--	--	--	--	20	--	20	20
Beryllium	ug/l	-- (27)	--	<1	--	--	--	--	--	--	--	--	<1	--	<1	<1
Boron	ug/l	200 (28)	--	<50	--	--	--	--	--	--	--	--	20	--	<10	<10
Cadmium	ug/l	0.2 (29)	--	<0.1	--	--	--	--	--	--	--	--	<0.1	--	0.1	<0.1
Calcium	ug/l	--	--	108000	--	--	--	--	--	--	--	--	89000	--	73000	75000
Chromium	ug/l	-- (30)	--	1	--	--	--	--	--	--	--	--	4	--	<1	1
Cobalt	ug/l	0.9	--	0.3	--	--	--	--	--	--	--	--	<0.2	--	<0.2	<0.2
Copper	ug/l	5	--	<1	--	--	--	--	--	--	--	--	<1	--	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	50	--	--	--	--	--	--	--	--	<10	--	20	<10
Lead	ug/l	-- (31)	--	<1	--	--	--	--	--	--	--	--	<1	--	<1	<1
Magnesium	ug/l	--	--	6000	--	--	--	--	--	--	--	--	5000	--	4000	4000
Manganese	ug/l	--	--	23	--	--	--	--	--	--	--	--	7	--	12	<10
Mercury	ug/l	0.2 (32)	--	<0.1	--	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	--	<5	--	--	--	--	--	--	--	--	<5	--	<5	<5
Nickel	ug/l	25	--	<5	--	--	--	--	--	--	--	--	1	--	<5	<5
Potassium	ug/l	--	--	<1000	--	--	--	--	--	--	--	--	<1000	--	<1000	<1000
Silicon	ug/l	--	--	1100	--	--	--	--	--	--	--	--	1800	--	1000	1200
Silver	ug/l	0.1	--	<0.1	--	--	--	--	--	--	--	--	<0.1	--	<0.1	<0.1
Sodium	ug/l	--	--	6000	--	--	--	--	--	--	--	--	3000	--	8000	6000
Strontium	ug/l	--	--	151	--	--	--	--	--	--	--	--	239	--	132	175
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	**<1**	--	--	--	--	--	--	--	--	**<1**	--	**<1**	**<1**
Titanium	ug/l	--	--	<10	--	--	--	--	--	--	--	--	<10	--	<10	<10
Vanadium	ug/l	6	--	<1	--	--	--	--	--	--	--	--	1	--	<1	<1
Zinc	ug/l	30 (29)	--	<5	--	--	--	--	--	--	--	--	1	--	<10	<10
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	<1	--	--	--	--	--	--	--	--	<1	--	<1	<1

Parameter	Unit	PWQO [1]	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			23-Dec-2003 [4]	27-Jan-2004 [4]	20-Feb-2004 [4]	24-Mar-2004 [4]	12-Apr-2004	12-May-2004	28-Jun-2004	19-Jul-2004 [48]	17-Aug-2004 [2]	30-Sep-2004	07-Oct-2004 [4]	23-Nov-2004 [4]	09-Dec-2004 [4]	14-Jan-2005 [4]
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- [21]	--	--	--	--	156000	201000	147000	--	--	192000	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	<20	<20	<20	--	--	<20	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	<30	30	110	--	--	<30	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	189000	240000	178000	--	--	229000	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	800	<500	6900	--	--	<500	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	<1000	<1000	<1000	--	--	<1000	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	11000	11000	52000	--	--	23000	--	--	--	--
Chloride	ug/l	--	--	--	--	--	8100	6800	8100	--	--	19300	--	--	--	--
Chromium (III)	ug/l	8.9 [22]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	395	380	395	--	--	481	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	3300	4600	14700	--	--	9100	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	184658	212100	218379	--	--	233000	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	<200	200	<200	--	--	<200	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	<200	<200	<200	--	--	<200	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	310	210	760	--	--	400	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	240	180	650	--	--	370	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	7	7.3	7.1	--	--	7.5	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	<1000	<1000	<1000	--	--	<1000	--	--	--	--
Phosphorus	ug/l	-- [23]	--	--	--	--	5	3	53	--	--	39	--	--	--	--
Sulphate	ug/l	--	--	--	--	--	21400	11100	9400	--	--	45600	--	--	--	--
Temperature (Field)	deg c	-- [24]	--	--	--	--	4	9	12	--	--	14.2	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	214000	260000	224000	--	--	330000	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	1000	<1000	15000	--	--	4000	--	--	--	--
Turbidity	ntu	-- [25]	--	--	--	--	0.3	0.3	9.8	--	--	1.7	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- [26]	--	--	--	--	<5	<5	26	--	--	<5	--	--	--	--
Barium	ug/l	--	--	--	--	--	18	26	38	--	--	27	--	--	--	--
Beryllium	ug/l	-- [27]	--	--	--	--	<1	<1	<1	--	--	<1	--	--	--	--
Boron	ug/l	200 [28]	--	--	--	--	<5	9	8	--	--	29	--	--	--	--
Cadmium	ug/l	0.2 [29]	--	--	--	--	<0.1	<0.1	<0.1	--	--	<0.1	--	--	--	--
Calcium	ug/l	--	--	--	--	--	67500	78000	81300	--	--	80100	--	--	--	--
Chromium	ug/l	-- [30]	--	--	--	--	<5	<5	9	--	--	<5	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	<0.1	<0.1	0.2	--	--	<0.1	--	--	--	--
Copper	ug/l	5	--	--	--	--	<0.5	<0.5	2.9	--	--	**200**	--	--	--	--
Hexavalent Chromium	ug/l	1 [22]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	<30	<30	**530**	--	--	100	--	--	--	--
Lead	ug/l	-- [31]	--	--	--	--	<0.5	<0.5	1.4	--	--	<0.5	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	3880	4240	3690	--	--	8020	--	--	--	--
Manganese	ug/l	--	--	--	--	--	<5	9	260	--	--	94	--	--	--	--
Mercury	ug/l	0.2 [32]	--	--	--	--	<0.05	<0.1	<0.1	--	--	<0.1	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	<1	<1	<1	--	--	<1	--	--	--	--
Nickel	ug/l	25	--	--	--	--	<1	<1	<1	--	--	<1	--	--	--	--
Potassium	ug/l	--	--	--	--	--	500	500	900	--	--	1200	--	--	--	--
Silicon	ug/l	--	--	--	--	--	640	1000	1660	--	--	1260	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	0.1	<0.1	<0.1	--	--	<0.1	--	--	--	--
Sodium	ug/l	--	--	--	--	--	4400	4700	5300	--	--	11000	--	--	--	--
Strontium	ug/l	--	--	--	--	--	156	171	134	--	--	520	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 [33]	--	--	--	--	<0.05	<0.05	<0.05	--	--	<0.05	--	--	--	--
Titanium	ug/l	--	--	--	--	--	<5	<5	14	--	--	<5	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	<0.5	<0.5	0.5	--	--	<0.5	--	--	--	--
Zinc	ug/l	30 [29]	--	--	--	--	<5	<5	13	--	--	<5	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 [34]	--	--	--	--	<1	<1	<1	--	--	<1	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
Parameter	**Unit**	**PWQO (1)**	**11-Feb-2005 (4)**	**14-Mar-2005 (4)**	**15-Apr-2005 (4)**	**29-May-2005 (4)**	**12-Jun-2005 (4)**	**12-Jul-2005 (4)**	**14-Aug-2005 (4)**	**24-Sep-2005 (4)**	**24-Oct-2005 (4)**	**16-Nov-2005 (4)**	**29-Dec-2005 (4)**	**19-Jan-2006 (4)**	**15-Feb-2006 (4)**
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			30-Mar-2006 (4)	**11-Apr-2006 (4)**	**12-May-2006 (4)**	**20-Jun-2006 (4)**	**24-Jul-2006**	**14-Aug-2006**	**29-Sep-2006**	**25-Oct-2006**	**14-Nov-2006**	**12-Dec-2006**	**31-Jan-2007 (3)**	**27-Feb-2007 (3)**	**30-Mar-2007**	**26-Apr-2007**	**29-May-2007 (2)**
Parameter	**Unit**	**PWQO (1)**															SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	155000	151000	168000	177000	176000	174000	--	--	180000	171000	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	<20	<20	<20	<20	<20	<20	--	--	<20	<20	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	140	60	<20	20	<20	<20	--	--	30	<20	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	<1000	<1000	<1000	<1000	<1000	<1000	--	--	<1000	<1000	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	11000	11000	5000	8000	5000	<5000	--	--	13000	<5000	--
Chloride	ug/l	--	--	--	--	--	38000	36000	19000	19000	20000	25000	--	--	28000	22000	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	520	500	455	395	395	425	--	--	505	300	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	4500	5700	6500	6200	5200	4100	--	--	3500	4500	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	306000	313000	294000	255000	292000	286000	--	--	248000	281000	--
Nitrate as N	ug/l	--	--	--	--	--	<100	<100	<100	230	630	1080	--	--	880	<100	--
Nitrite as N	ug/l	--	--	--	--	--	<100	<100	<100	<100	<100	<100	--	--	<100	<100	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	490	340	190	130	250	270	--	--	90	190	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	7.2	7.3	7.4	7.3	7.2	7.3	--	--	7.5	7.5	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	30	20	20	<10	<10	<10	--	--	<10	<10	--
Sulphate	ug/l	--	--	--	--	--	147000	152000	121000	107000	104000	103000	--	--	79000	102000	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	11	10	8	3	3	2	--	--	3	3	--
Total Dissolved Solids	ug/l	--	--	--	--	--	455000	467000	403000	390000	386000	404000	--	--	380000	385000	--
Total Suspended Solids	ug/l	--	--	--	--	--	11000	4000	<2000	<2000	<2000	5000	--	--	63000	<2000	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	<10	30	<10	<10	<10	<10	--	--	<10	<10	--
Barium	ug/l	--	--	--	--	--	50	40	30	30	30	30	--	--	30	30	--
Beryllium	ug/l	-- (27)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	--
Boron	ug/l	200 (28)	--	--	--	--	40	30	40	50	70	40	--	--	90	70	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	--
Calcium	ug/l	--	--	--	--	--	106000	104000	98000	84000	94000	93000	--	--	81000	91000	--
Chromium	ug/l	-- (30)	--	--	--	--	1	<1	<1	<1	<1	2	--	--	2	<1	--
Cobalt	ug/l	0.9	--	--	--	--	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	--	--	<0.2	<0.2	--
Copper	ug/l	5	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	270	160	70	30	40	<30	--	--	50	<30	--
Lead	ug/l	-- (31)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	--
Magnesium	ug/l	--	--	--	--	--	10000	13000	12000	11000	14000	13000	--	--	11000	13000	--
Manganese	ug/l	--	--	--	--	--	100	110	40	10	<10	20	--	--	30	<10	--
Mercury	ug/l	0.2 (32)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	--
Molybdenum	ug/l	40	--	--	--	--	<5	<5	<5	<5	<5	<5	--	--	<5	<5	--
Nickel	ug/l	25	--	--	--	--	<5	<5	<5	<5	<5	<5	--	--	<5	<5	--
Potassium	ug/l	--	--	--	--	--	2000	2000	1000	2000	3000	2000	--	--	2000	3000	--
Silicon	ug/l	--	--	--	--	--	1300	1200	1300	1200	1000	800	--	--	1600	400	--
Silver	ug/l	0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	--
Sodium	ug/l	--	--	--	--	--	20000	18000	16000	15000	17000	16000	--	--	27000	22000	--
Strontium	ug/l	--	--	--	--	--	602	864	623	709	770	700	--	--	522	908	--
Sulfur	ug/l	--	--	--	--	--	49000	50700	40300	35700	34700	34300	--	--	26300	34000	--
Thallium	ug/l	0.3 (33)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	0.2	**0.5**	--
Titanium	ug/l	--	--	--	--	--	<10	<10	<10	<10	<10	<10	--	--	<10	<10	--
Vanadium	ug/l	6	--	--	--	--	1	1	<1	<1	<1	<1	--	--	2	<1	--
Zinc	ug/l	30 (29)	--	--	--	--	<10	<10	<10	<10	<10	<10	--	--	<10	<10	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	--

Parameter	Unit	PWQO (1)	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			26-Jun-2007 (2)	23-Jul-2007 (4)	28-Aug-2007	28-Sep-2007 (4)	25-Oct-2007 (2)	29-Nov-2007	18-Dec-2007 (3)	08-Jan-2008	06-Feb-2008 (4)	31-Mar-2008	25-Apr-2008	22-May-2008	25-Jun-2008	09-Jul-2008	08-Aug-2008
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	253000	--	--	178000	--	139000	--	167000	167000	212000	197000	223000	263000
Ammonia, unionized (Field)	ug/l	20	--	--	<20	--	--	<20	--	<20	--	<20	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	40	--	--	30	--	200	--	<50	--	<50	60	140	250
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	<1000	--	--	<1000	--	<1000	--	<2000	<2000	<2000	<2000	<2000	5000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	11000	--	--	7000	--	<5000	--	12000	--	11000	11000	15000	48000
Chloride	ug/l	--	--	--	24000	--	--	33000	--	34000	--	39000	19000	15000	23000	28000	53000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	--	--	665	--	--	505	--	435	--	490	460	505	570	490	520
Dissolved Organic Carbon	ug/l	--	--	--	7800	--	--	6400	--	2600	--	3600	--	3400	5900	6000	15400
Hardness, Calcium Carbonate	ug/l	--	--	--	432000	--	--	312000	--	365000	--	290000	250000	280000	330000	330000	240000
Nitrate as N	ug/l	--	--	--	<100	--	--	<100	--	1820	--	400	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	--	--	<100	--	--	<100	--	<100	--	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	--	--	650	--	--	240	--	380	--	500	--	400	400	700	1400
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	7.2	--	--	7.2	--	7.3	--	7.4	7.3	7.5	7.3	7.3	7.1
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	30	--	--	30	--	10	--	8	--	3	11	15	18
Sulphate	ug/l	--	--	--	168000	--	--	150000	--	204000	--	143000	85000	80000	131000	147000	<1000
Temperature (Field)	deg c	-- (24)	--	--	19	--	--	0	--	2	--	2	6	15	14	17	22
Total Dissolved Solids	ug/l	--	--	--	551000	--	--	482000	--	523000	--	460000	350000	358000	442000	500000	425000
Total Suspended Solids	ug/l	--	--	--	9000	--	--	<2000	--	10000	--	<10000	<10000	<10000	<10000	<10000	<10000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	<10	--	--	10	--	<10	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	60	--	--	30	--	90	--	32	31	45	51	51	64
Beryllium	ug/l	-- (27)	--	--	<1	--	--	<1	--	<1	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	140	--	--	30	--	160	--	80	100	80	110	120	20
Cadmium	ug/l	0.2 (29)	--	--	<0.1	--	--	<0.1	--	<0.1	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	145000	--	--	107000	--	95000	--	85000	82000	82000	110000	110000	91000
Chromium	ug/l	-- (30)	--	--	2	--	--	<1	--	5	--	<5	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	--	--	0.2	--	--	<0.2	--	0.5	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	1	--	--	<1	--	<1	--	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	**<50**	--	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**
Iron	ug/l	300	--	--	<30	--	--	<30	--	120	--	<100	<100	<100	<100	200	**600**
Lead	ug/l	-- (31)	--	--	<1	--	--	<1	--	<1	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	17000	--	--	11000	--	31000	--	15000	12000	11000	13000	15000	5600
Manganese	ug/l	--	--	--	10	--	--	<10	--	10	--	9	8	12	18	330	560
Mercury	ug/l	0.2 (32)	--	--	<0.1	--	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	<5	--	--	<5	--	<5	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	<5	--	--	<5	--	<5	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	3000	--	--	<1000	--	5000	--	2400	2600	1900	1800	2500	1000
Silicon	ug/l	--	--	--	1900	--	--	1400	--	2800	--	2000	1400	1300	1900	1700	4800
Silver	ug/l	0.1	--	--	<0.1	--	--	<0.1	--	<0.1	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	26000	--	--	27000	--	34000	--	35000	21000	19000	26000	30000	36000
Strontium	ug/l	--	--	--	1250	--	--	900	--	4020	--	1100	1200	1000	1800	1400	390
Sulfur	ug/l	--	--	--	56000	--	--	50000	--	68000	--	44000	28000	26000	44000	50000	1200
Thallium	ug/l	0.3 (33)	--	--	<0.1	--	--	<0.1	--	<0.1	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	ug/l	--	--	--	<10	--	--	<10	--	<10	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	4	--	--	<1	--	2	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	10	--	--	<10	--	<10	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	<1	--	--	<1	--	<1	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-5 26-Sep-2008 (5)	SS-5 23-Oct-2008 (4)	SS-5 20-Nov-2008 (4)	SS-5 22-Dec-2008 (4)	SS-5 20-Jan-2009 (4) SS-5	SS-5 24-Feb-2009 (4) SS-5	SS-5 31-Mar-2009 T-3	SS-5 20-Apr-2009 SS-5	SS-5 22-May-2009 SS-5	SS-5 23-Jun-2009 T-4	SS-5 27-Jul-2009 SS-5	SS-5 13-Aug-2009 SS-5	SS-5 24-Sep-2009 (4) SS-5	SS-5 15-Oct-2009 SS-5	SS-5 18-Nov-2009 SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	164000	128000	240000	276000	192000	199000	--	241000	180000
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	<20	<20	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	60	<50	<50	90	<50	60	--	210	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	<2000	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	9000	7000	20000	23000	<4000	22000	--	14000	10000
Chloride	ug/l	--	--	--	--	--	--	--	44000	61000	29000	39000	32000	41000	--	52000	50000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	--	<5	<5
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	750	750	800	760	875	910	--	990	975
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	3700	3400	7500	7100	8300	6900	--	6800	4100
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	330000	280000	300000	430000	330000	350000	--	500000	430000
Nitrate as N	ug/l	--	--	--	--	--	--	--	1600	1300	<100	<100	<100	<100	--	300	2100
Nitrite as N	ug/l	--	--	--	--	--	--	--	30	<10	<10	<10	<10	<10	--	<10	30
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	700	600	600	800	600	600	--	700	700
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	7.8	8	8.1	8.1	7.6	7.8	--	7.8	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	8	9	23	40	11	13	--	4	<2
Sulphate	ug/l	--	--	--	--	--	--	--	230000	180000	88000	160000	160000	240000	--	280000	290000
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	5	7	12	16	19.0	18	--	8	3
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	540000	490000	440000	565000	466000	586000	--	695000	670000
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	<10000	<10000	<10000	<10000	4000	4000	--	<1000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	55	52	50	86	51	55	--	78	51
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	180	120	80	150	110	150	--	150	140
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	98000	85000	110000	130000	97000	110000	--	160000	130000
Chromium	ug/l	-- (30)	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	--	<5	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	--	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	--	**<5**	**<5**
Iron	ug/l	300	--	--	--	--	--	--	<100	<100	**400**	**1100**	200	200	--	**2100**	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	25000	20000	14000	18000	14000	19000	--	28000	24000
Manganese	ug/l	--	--	--	--	--	--	--	3	4	330	600	78	210	--	1100	34
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	5000	4000	3400	4000	3000	5100	--	4300	4600
Silicon	ug/l	--	--	--	--	--	--	--	2600	740	1600	1800	2300	1200	--	2900	1900
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	43000	45000	27000	33000	27000	50000	--	61000	58000
Strontium	ug/l	--	--	--	--	--	--	--	3000	2700	1400	2000	1700	2100	--	3400	2600
Sulfur	ug/l	--	--	--	--	--	--	--	66000	58000	29000	51000	44000	69000	--	90000	85000
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	<0.05	<0.05	0.08	<0.05	<0.05	0.09	--	<0.05	<0.05
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			10-Dec-2009	**20-Jan-2010 [4]**	**03-Feb-2010 [4]**	**31-Mar-2010**	**06-Apr-2010 [40]**	**06-May-2010 [4]**	**02-Jun-2010 [2]**	**07-Jul-2010 [2]**	**18-Aug-2010**	**29-Sep-2010**	**28-Oct-2010**	**22-Nov-2010**	**09-Dec-2010**	**12-Jan-2011**
Parameter	**Unit**	**PWQO [1]**	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- [21]	161000	--	--	190000	162000	--	--	--	187000	154000	167000	146000	172000	190000
Ammonia, unionized (Field)	ug/l	20	<20	--	--	<20	<20	--	--	--	<20	<20	<20	<20	--	<20
Ammonia Nitrogen	ug/l	--	470	--	--	50	<50	--	--	--	<50	<50	<50	<50	<50	70
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	--	<2000	<2000	--	--	--	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	11000	--	--	15000	5000	--	--	--	20000	9000	10000	16000	6000	16000
Chloride	ug/l	--	52000	--	--	37000	32000	--	--	--	71000	43000	44000	40000	31000	62000
Chromium (III)	ug/l	8.9 [22]	<5	--	--	<5	<5	--	--	--	<5	<5	6	<5	<5	<5
Conductivity (Field)	uS/cm	--	960	--	--	930	795	--	--	--	950	680	970	880	795	540
Dissolved Organic Carbon	ug/l	--	2400	--	--	3400	4800	--	--	--	6400	5800	4500	4000	4600	3100
Hardness, Calcium Carbonate	ug/l	--	400000	--	--	340000	330000	--	--	--	490000	420000	320000	390000	360000	460000
Nitrate as N	ug/l	--	4200	--	--	600	300	--	--	--	<100	<100	300	600	400	900
Nitrite as N	ug/l	--	70	--	--	30	<10	--	--	--	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	800	--	--	600	500	--	--	--	500	600	400	400	300	400
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.7	--	--	7.7	7.8	--	--	--	7.8	7.6	7.8	7.7	7.8	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- [23]	4	--	--	5	<2	--	--	--	8	14	<2	5	19	6
Sulphate	ug/l	--	330000	--	--	200000	170000	--	--	--	290000	250000	260000	240000	190000	270000
Temperature (Field)	deg c	-- [24]	2	--	--	4	9.5	--	--	--	9.50	13	5	2	1	2
Total Dissolved Solids	ug/l	--	720000	--	--	588000	480000	--	--	--	684000	568000	618000	536000	44000	662000
Total Suspended Solids	ug/l	--	2000	--	--	2000	<1000	--	--	--	3000	<1000	<1000	<1000	<1000	<1000
Turbidity	ntu	-- [25]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- [26]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	--	--	78	48	--	--	--	73	54	55	45	38	55
Beryllium	ug/l	-- [27]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 [28]	**270**	--	--	**260**	150	--	--	--	**210**	190	140	120	90	170
Cadmium	ug/l	0.2 [29]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	110000	--	--	110000	97000	--	--	--	150000	120000	140000	120000	120000	140000
Chromium	ug/l	-- [30]	<5	--	--	<5	<5	--	--	--	<5	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.50
Copper	ug/l	5	<1	--	--	2	**8**	--	--	--	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 [22]	**<5**	--	--	<0.5	**<5**	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	**<5**
Iron	ug/l	300	<100	--	--	100	<100	--	--	--	200	<100	<100	<100	<100	<100
Lead	ug/l	-- [31]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	32000	--	--	31000	18000	--	--	--	31000	26000	26000	25000	22000	33000
Manganese	ug/l	--	16	--	--	24	16	--	--	--	120	15	<2	<2	4	<2
Mercury	ug/l	0.2 [32]	<0.1	--	--	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6500	--	--	5500	3700	--	--	--	6200	4900	4900	4500	3500	5200
Silicon	ug/l	--	2300	--	--	2500	1200	--	--	--	2700	1900	1000	960	1000	2800
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.10
Sodium	ug/l	--	75000	--	--	67000	37000	--	--	--	65000	48000	46000	40000	30000	59000
Strontium	ug/l	--	5000	--	--	4700	2200	--	--	--	3700	3200	3400	3400	2700	4100
Sulfur	ug/l	--	110000	--	--	80000	58000	--	--	--	100000	83000	100000	83000	69000	93000
Thallium	ug/l	0.3 [33]	0.06	--	--	0.08	<0.05	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 [29]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 [34]	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**
			23-Feb-2011 (7)	**30-Mar-2011**	**14-Apr-2011**	**12-May-2011**	**20-Jun-2011 (2)**	**19-Jul-2011**	**26-Aug-2011 (4)**	**21-Sep-2011**	**28-Oct-2011**	**14-Nov-2011 (9)**	**08-Dec-2011 (9)**	**11-Jan-2012**	**06-Feb-2012**	**13-Mar-2012 (9)**	**10-Apr-2012**
Parameter	**Unit**	**PWQO (1)**	SS-5	SS-5	SS-5	SS 5	SS-5	SS-5	SS-5	S-5	SS-5	SS-5	SS - 5	SS -5	SS- 5	SS-5	SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	162000	186000	161000	184000	--	139000	--	217000	131000	150000	126000	188000	214000	100000	140000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	--	<20	--	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	430	50	<50	<50	--	<50	--	<50	<50	560	<50	<50	<50	130	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	--	<2000	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	13000	19000	18000	25000	--	26000	--	13000	19000	9000	9000	10000	15000	12000	16000
Chloride	ug/l	--	53000	34000	20000	36000	--	44000	--	47000	44000	64000	42000	65000	48000	41000	34000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	--	<5	--	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	640	880	849	680	--	945	--	901	920	910	1005	940	795	780	755
Dissolved Organic Carbon	ug/l	--	3400	3900	5300	6200	--	5800	--	4600	4100	3500	2200	2600	3400	2200	4600
Hardness, Calcium Carbonate	ug/l	--	370000	350000	260000	350000	--	400000	--	480000	460000	540000	420000	540000	560000	260000	340000
Nitrate as N	ug/l	--	1000	200	<100	200	--	<100	--	1400	300	400	2000	1200	500	1100	150
Nitrite as N	ug/l	--	20	10	<10	<10	--	<10	--	<10	<10	<10	20	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	900	500	400	600	--	900	--	500	400	900	500	300	300	600	730
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	8.0	7.7	7.9	7.7	--	7.3	--	7.38	7.4	7.4	7.6	7.8	7.8	7.8	7.6
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	23	29	14	36	--	42	--	15	6	17	23	12	12	18	7
Sulphate	ug/l	--	220000	170000	100000	200000	--	320000	--	310000	310000	370000	300000	370000	310000	190000	210000
Temperature (Field)	deg c	-- (24)	1	2	9	12	--	23	--	14.8	11	4	1	2	1	2	7
Total Dissolved Solids	ug/l	--	550000	488000	330000	512000	--	656000	--	776000	754000	866000	722000	856000	826000	470000	534000
Total Suspended Solids	ug/l	--	4000	4000	2000	<1000	--	<1000	--	1000	<1000	3000	4000	1000	<1000	3000	2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	51	47	35	69	--	69	--	91	59	69	46	58	56	36	45
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	170	130	110	170	--	**210**	--	180	200	**240**	170	**260**	**220**	120	110
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	100000	110000	86000	120000	--	130000	--	160000	140000	160000	120000	160000	170000	87000	110000
Chromium	ug/l	-- (30)	<5	<5	<5	<5	--	<5	--	<5	<5	<5	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.5	<0.5	<0.5	--	<0.5	--	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1	2	1	1	--	<1	--	<1	<1	1	<1.0	<1.0	<1.0	2.1	1.0
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	<0.5	<0.5	0.6	0.6	<0.5	<0.5	0.8	<0.5
Iron	ug/l	300	100	100	<100	**1100**	--	**600**	--	<100	<100	<100	170	<100	<100	180	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	25000	21000	15000	22000	--	30000	--	28000	31000	40000	31000	46000	40000	19000	19000
Manganese	ug/l	--	77	35	10	350	--	140	--	16	3	8	35	5.4	5.0	77	10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	4700	3700	2900	4400	--	6500	--	4000	5600	6400	5800	6400	5800	4400	3200
Silicon	ug/l	--	2400	1400	430	1400	--	3100	--	2700	1500	1800	2000	3500	3100	1600	510
Silver	ug/l	0.1	<0.10	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	48000	35000	20000	37000	--	63000	--	46000	49000	67000	52000	72000	65000	38000	29000
Strontium	ug/l	--	3700	3200	2300	3500	--	4400	--	4400	4400	5300	4700	6200	5000	3400	2800
Sulfur	ug/l	--	77000	60000	40000	73000	--	110000	--	110000	120000	130000	120000	140000	120000	65000	74000
Thallium	ug/l	0.3 (33)	<0.05	<0.05	<0.05	0.09	--	<0.05	--	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**
			24-May-2012	**29-Jun-2012 (2)**	**20-Jul-2012 (2)**	**29-Aug-2012 (2)**	**26-Sep-2012**	**10-Oct-2012**	**28-Nov-2012 (2)**	**17-Dec-2012 (3)**	**16-Jan-2013 (9)**	**26-Feb-2013**	**25-Mar-2013**	**01-Apr-2013 (4)**	**10-May-2013**	**21-Jun-2013**	**24-Jun-2013**
Parameter	**Unit**	**PWQO (1)**	SS-5	SS-5	s-5	s-5	SS-5	SS-5	SS-5	s-5	SS-5	SS-5	SS-5	ss5	SS-5	SS-5	SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	120000	--	--	--	160000	180000	--	--	130000	200000	150000	--	130000	130000	--
Ammonia, unionized (Field)	ug/l	20	<20	--	--	--	<20	<20	--	--	<20	<20	<20	--	<20	<20	--
Ammonia Nitrogen	ug/l	--	<50	--	--	--	180	54	--	--	110	66	<50	--	60	58	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	--	--	<2000	2000	--	--	<2000	<2000	<2000	--	<2000	<2000	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	22000	--	--	--	13000	25000	--	--	4200	22000	11000	--	16000	9100	--
Chloride	ug/l	--	37000	--	--	--	35000	35000	--	--	65000	36000	37000	--	41000	48000	--
Chromium (III)	ug/l	8.9 (22)	<5	--	--	--	<5	<5	--	--	<5	<5	<5	--	<5	<5	--
Conductivity (Field)	uS/cm	--	765	--	--	--	1075	1080	--	--	860	856	797	--	844	986	--
Dissolved Organic Carbon	ug/l	--	8500	--	--	--	7200	6400	--	--	2100	4500	3600	--	3900	3600	--
Hardness, Calcium Carbonate	ug/l	--	350000	--	--	--	470000	520000	--	--	490000	520000	390000	--	360000	430000	--
Nitrate as N	ug/l	--	<100	--	--	--	<100	110	--	--	1100	250	790	--	590	260	--
Nitrite as N	ug/l	--	<10	--	--	--	<10	<10	--	--	11	<10	<10	--	<10	<10	--
Nitrogen, Total Kjeldahl	ug/l	--	660	--	--	--	670	840	--	--	910	530	770	--	710	480	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.8	--	--	--	7.7	7.8	--	--	7.9	7.31	7.34	--	7.8	7.57	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	20	--	--	--	11	33	--	--	5	22	4	--	11	6	--
Sulphate	ug/l	--	230000	--	--	--	350000	360000	--	--	360000	320000	240000	--	260000	320000	--
Temperature (Field)	deg c	-- (24)	14	--	--	--	10	8	--	--	1	1.0	1.2	--	18	19.3	--
Total Dissolved Solids	ug/l	--	504000	--	--	--	758000	768000	--	--	794000	640000	572000	--	574000	690000	--
Total Suspended Solids	ug/l	--	6000	--	--	--	<1000	<1000	--	--	<1000	2000	1000	--	<1000	2000	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	48	--	--	--	71	73	--	--	51	50	41	--	51	--	49
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	200	--	--	--	160	150	--	--	**210**	120	100	--	160	--	140
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	99000	--	--	--	150000	170000	--	--	140000	150000	130000	--	120000	--	110000
Chromium	ug/l	-- (30)	<5.0	--	--	--	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	--	<5.0	--	<5
Cobalt	ug/l	0.9	<0.50	--	--	--	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	--	<0.50	--	<0.5
Copper	ug/l	5	<1.0	--	--	--	<1.0	1.0	--	--	<1.0	<1.0	4.7	--	<1.0	--	1
Hexavalent Chromium	ug/l	1 (22)	<0.5	--	--	--	<0.5	<0.5	--	--	**1.1**	<0.50	<0.50	--	<0.50	<0.50	--
Iron	ug/l	300	<100	--	--	--	<100	140	--	--	<100	<100	<100	--	<100	--	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	22000	--	--	--	29000	33000	--	--	38000	26000	24000	--	22000	--	21000
Manganese	ug/l	--	30	--	--	--	21	72	--	--	6.1	15	9.1	--	9.2	--	33
Mercury	ug/l	0.2 (32)	<0.10	--	--	--	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	--	<0.10	<0.10	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	3800	--	--	--	5200	5000	--	--	6600	3800	4500	--	5500	--	4400
Silicon	ug/l	--	1300	--	--	--	2300	2400	--	--	2400	2300	1900	--	1500	--	1200
Silver	ug/l	0.1	<0.10	--	--	--	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	--	<0.10	--	<0.1
Sodium	ug/l	--	38000	--	--	--	35000	39000	--	--	67000	35000	37000	--	44000	--	30000
Strontium	ug/l	--	3300	--	--	--	4900	4500	--	--	5700	3900	3500	--	3600	--	3400
Sulfur	ug/l	--	75000	--	--	--	120000	130000	--	--	130000	110000	85000	--	88000	--	70000
Thallium	ug/l	0.3 (33)	<0.050	--	--	--	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	--	<0.050	--	<0.05
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			29-Jul-2013	**14-Aug-2013**	**26-Sep-2013**	**25-Oct-2013**	**22-Nov-2013**	**23-Dec-2013**	**09-Jan-2014 (4)**	**04-Feb-2014 (4)**	**26-Mar-2014**	**22-Apr-2014**	**21-May-2014**	**19-Jun-2014**	**15-Jul-2014 (2)**	**25-Aug-2014**	**23-Sep-2014**
			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	s5	s5	SS-5	SS-5	SS-5	SS-5	S5	SS-5	SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	180000	140000	130000	140000	200000	220000	--	--	210000	120000	160000	150000	--	180000	170000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	--	--	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	210	<50	68	130	<50	<50	--	--	240	110	<50	<50	--	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	<2000	--	--	<2000	<2000	<2000	<2000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	21000	8200	9000	12000	18000	11000	--	--	8200	11000	47000	8500	--	24000	16000
Chloride	ug/l	--	35000	56000	42000	48000	26000	27000	--	--	39000	33000	22000	64000	--	25000	28000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	--	--	<5	<5	<5	<5	--	<5	<5
Conductivity (Field)	uS/cm	--	584	1069	909	715	815	900	--	--	1007	890	795	1055	--	845	990
Dissolved Organic Carbon	ug/l	--	7600	4000	3300	2900	6100	4700	--	--	4000	2900	5700	3400	--	6700	5900
Hardness, Calcium Carbonate	ug/l	--	370000	440000	410000	470000	400000	450000	--	--	440000	300000	290000	460000	--	340000	340000
Nitrate as N	ug/l	--	<100	<100	250	770	<100	340	--	--	260	780	<100	330	--	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	--	--	<10	<10	<10	<10	--	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	710	340	340	480	590	520	--	--	730	400	2200	470	--	530	510
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.61	7.57	6.87	7.5	7.68	8.13	--	--	7.91	7.6	7.6	7.52	--	7.7	7.8
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	23	6	6	13	60	5	--	--	19	3	250	8	--	10	13
Sulphate	ug/l	--	200000	330000	340000	350000	220000	250000	--	--	270000	190000	160000	330000	--	200000	190000
Temperature (Field)	deg c	-- (24)	17.5	17.3	13.1	5	4.4	1.2	--	--	0.1	7	8	18.7	--	22	19
Total Dissolved Solids	ug/l	--	592000	762000	736000	804000	532000	606000	--	--	682000	454000	414000	904000	--	500000	538000
Total Suspended Solids	ug/l	--	<1000	1000	2000	4000	2000	1000	--	--	<1000	2000	14000	3000	--	3000	11000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	51	60	51	53	43	45	--	--	47	37	36	59	--	49	43
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	120	**240**	200	180	83	60	--	--	130	100	99	200	--	130	120
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	120000	130000	120000	140000	120000	150000	--	--	150000	89000	90000	140000	--	110000	110000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
Iron	ug/l	300	140	<100	<100	<100	**640**	<100	--	--	<100	<100	110	110	--	**390**	240
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	20000	32000	30000	35000	20000	24000	--	--	28000	18000	16000	34000	--	21000	20000
Manganese	ug/l	--	210	20	18	6.7	210	27	--	--	6.4	12	32	27	--	120	96
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	3400	6700	6500	6700	3000	2600	--	--	4100	4800	3100	7700	--	4100	4200
Silicon	ug/l	--	3300	2300	1600	2000	1600	1900	--	--	2800	660	850	1900	--	2600	2000
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10
Sodium	ug/l	--	31000	50000	43000	49000	21000	22000	--	--	35000	27000	20000	55000	--	23000	26000
Strontium	ug/l	--	3000	5200	4700	5200	2900	3200	--	--	3800	2900	2500	5100	--	3200	2900
Sulfur	ug/l	--	17000	110000	120000	130000	72000	85000	--	--	93000	73000	54000	120000	--	69000	69000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	0.054	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			27-Oct-2014	**20-Nov-2014**	**09-Dec-2014 (11)**	**16-Mar-2015**	**07-Apr-2015**	**21-May-2015 (2)**	**23-Jun-2015 (2)**	**22-Jul-2015 (2)**	**28-Aug-2015 (10)**	**25-Sep-2015**	**27-Oct-2015 (2)**	**20-Nov-2015**	**10-Dec-2015**	**26-Jan-2016 (10)**
Parameter	**Unit**	**PWQO (1)**	SS-5	SS-5	SS-5	SS-5	SS-5	5	5	5	SS-5	SS-5	5	SS-5	SS-5	SS-5
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	190000	190000	210000	180000	150000	--	--	--	140000	170000	--	170000	180000	150000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	--	--	--	<20	<20	--	<20	<20	<20
Ammonia Nitrogen	ug/l	--	69	<50	<50	160	<50	--	--	--	<50	<50	--	<50	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	--	--	--	<2000	<2000	--	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	15000	6600	11000	4600	11000	--	--	--	13000	26000	--	16000	9100	10000
Chloride	ug/l	--	30000	34000	45000	74000	58000	--	--	--	73000	40000	--	38000	35000	72000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	--	--	--	<5	<5	--	<5	<5	<5
Conductivity (Field)	uS/cm	--	789	834	1097	1208	994	--	--	--	1088	1010	--	887	951	1223
Dissolved Organic Carbon	ug/l	--	5200	3800	4300	3100	2600	--	--	--	4400	6600	--	5900	4800	2400
Hardness, Calcium Carbonate	ug/l	--	390000	400000	530000	560000	440000	--	--	--	500000	420000	--	440000	430000	520000
Nitrate as N	ug/l	--	<100	160	460	740	860	--	--	--	<100	<100	--	<100	<100	980
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	--	--	--	<10	<10	--	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	340	250	280	500	330	--	--	--	420	510	--	350	250	280
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.87	7.96	8.12	8.47	7.76	--	--	--	7.31	7.4	--	8.05	7.95	7.77
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	11	7	8	16	9	--	--	--	15	110	--	7	9	17
Sulphate	ug/l	--	210000	240000	340000	350000	300000	--	--	--	380000	290000	--	280000	260000	370000
Temperature (Field)	deg c	-- (24)	9.1	2.0	0.7	0.7	2.7	--	--	--	18.5	13	--	5.9	5.2	0.4
Total Dissolved Solids	ug/l	--	566000	538000	800000	824000	626000	--	--	--	960000	676000	--	686000	668000	884000
Total Suspended Solids	ug/l	--	3000	2000	<1000	1000	2000	--	--	--	<1000	16000	--	<1000	<1000	5000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	44	44	47	51	42	--	--	--	53	67	--	37	37	49
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	110	110	120	190	140	--	--	--	200	110	--	84	76	140
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	140000	170000	150000	120000	--	--	--	160000	140000	--	130000	140000	150000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	--	--	--	<5.0	<5.0	--	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	--	<0.50	0.72	--	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	<1.0	1.2	--	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	--	<0.50	<0.50	--	<0.50	<0.50	0.58
Iron	ug/l	300	110	<100	<100	<100	<100	--	--	--	<100	**1700**	--	<100	<100	230
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	23000	27000	34000	38000	29000	--	--	--	38000	24000	--	24000	24000	39000
Manganese	ug/l	--	53	50	24	15	12	--	--	--	18	570	--	6.9	8.0	51
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	--	<0.10	<0.10	--	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	4600	5000	5000	6100	4800	--	--	--	8400	5100	--	4400	3800	7800
Silicon	ug/l	--	2300	2300	2800	2700	2100	--	--	--	2400	2800	--	1500	1500	2500
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	--	--	--	<0.10	<0.10	--	<0.10	<0.10	<0.10
Sodium	ug/l	--	28000	32000	44000	54000	42000	--	--	--	47000	27000	--	26000	25000	48000
Strontium	ug/l	--	3300	3500	4200	5300	3800	--	--	--	5400	3200	--	3000	2800	4900
Sulfur	ug/l	--	79000	87000	130000	140000	96000	--	--	--	130000	92000	--	83000	88000	130000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	0.068	<0.050	--	<0.050	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**	**SS-5**
			23-Feb-2016	**21-Mar-2016 (9)**	**26-Apr-2016**	**31-May-2016 (2)**	**30-Jun-2016 (2)**	**13-Jul-2016**	**04-Aug-2016 (2)**	**20-Sep-2016 (2)**	**26-Oct-2016 (9)**	**11-Nov-2016**	**14-Dec-2016**	**23-Jan-2017**	**14-Feb-2017 (3)**	**27-Mar-2017**	**21-Apr-2017**
Parameter	**Unit**	**PWQO (1)**	SS-5	SS-5	SS-5	5	5	SS-5	5	5	SS-5	SS-5	SS-5	SS-5	5	SS-6	SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	170000	110000	160000	--	--	160000	--	--	120000	180000	180000	180000	--	160000	150000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	--	--	<20	--	--	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	<50	260	<50	--	--	<50	--	--	<50	<50	150	<50	--	140	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	--	--	<2000	--	--	<2000	2000	<2000	<2000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<4000	9200	10000	--	--	21000	--	--	11000	17000	12000	17000	--	10000	13000
Chloride	ug/l	--	64000	44000	27000	--	--	86000	--	--	48000	39000	30000	28000	--	36000	37000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	--	--	<5	--	--	<5	<5	<5	<5	--	<5	<5
Conductivity (Field)	uS/cm	--	375	700	712	--	--	535	--	--	865	969	925	865	--	834	726
Dissolved Organic Carbon	ug/l	--	2800	2400	4800	--	--	3400	--	--	2900	5800	6200	5200	--	4200	4300
Hardness, Calcium Carbonate	ug/l	--	510000	290000	330000	--	--	560000	--	--	470000	540000	450000	410000	--	370000	330000
Nitrate as N	ug/l	--	760	1040	100	--	--	110	--	--	590	170	100	120	--	270	230
Nitrite as N	ug/l	--	<10	<10	<10	--	--	<10	--	--	<10	<10	<10	<10	--	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	230	470	110	--	--	300	--	--	120	390	500	250	--	360	220
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.96	7.76	7.76	--	--	7.7	--	--	7.8	7.10	7.6	7.46	--	7.66	7.17
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	6	<4	7	--	--	25	--	--	<4	13	7	12	--	13	6
Sulphate	ug/l	--	360000	190000	170000	--	--	380000	--	--	340000	330000	280000	250000	--	190000	190000
Temperature (Field)	deg c	-- (24)	0	1.3	6.4	--	--	21	--	--	16	7.0	3	1.3	--	0.6	7.9
Total Dissolved Solids	ug/l	--	828000	504000	464000	--	--	990000	--	--	812000	786000	656000	608000	--	554000	462000
Total Suspended Solids	ug/l	--	1000	1000	1000	--	--	53000	--	--	<2000	3000	5000	11000	--	3000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	43	31	33	--	--	83	--	--	45	48	40	38	--	34	37
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	130	75	74	--	--	**250**	--	--	130	94	73	69	--	76	87
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	150000	94000	110000	--	--	170000	--	--	130000	140000	150000	140000	--	120000	100000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	--	--	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	--	--	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	--	--	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	**1.2**	<0.50	--	--	<0.50	--	--	0.58	<0.50	<0.50	<0.50	--	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	--	--	**740**	--	--	<100	<100	**380**	140	--	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	34000	19000	17000	--	--	38000	--	--	32000	26000	23000	21000	--	21000	19000
Manganese	ug/l	--	10	3.6	2.2	--	--	170	--	--	<2.0	3.9	87	23	--	9.2	2.3
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	--	--	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6000	6000	3800	--	--	8600	--	--	8900	5900	3800	3500	--	4600	5900
Silicon	ug/l	--	2400	1300	690	--	--	3200	--	--	2000	1800	1900	2200	--	1800	690
Silver	ug/l	0.1	<0.10	<0.10	<0.10	--	--	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10
Sodium	ug/l	--	43000	33000	19000	--	--	53000	--	--	42000	28000	21000	18000	--	28000	24000
Strontium	ug/l	--	4100	2500	2600	--	--	5200	--	--	3900	3400	2600	2700	--	2700	2600
Sulfur	ug/l	--	120000	68000	58000	--	--	150000	--	--	130000	120000	97000	86000	--	71000	65000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	--	--	0.074	--	--	<0.050	<0.050	<0.050	<0.050	--	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			23-May-2017	26-Jun-2017	21-Jul-2017 (48)	11-Aug-2017 (2)	08-Sep-2017	17-Oct-2017	17-Nov-2017	07-Dec-2017 (14)	22-Jan-2018	16-Feb-2018 (3)	13-Mar-2018	24-Apr-2018	18-May-2018	22-Jun-2018 (2)	18-Jul-2018 (2)
Parameter	**Unit**	**PWQO (1)**	SS-5	SS-5	5	5	SS-5	SS-5	SS-5	SS-5	SS-5	5	SS-5	SS-5	SS-5	5	5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	180000	190000	--	--	190000	180000	160000	150000	198000	--	189000	162000	176000	--	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	--	--	<20	<20	<20	<20	<20	--	<20	<20	<20	--	--
Ammonia Nitrogen	ug/l	--	170	670	--	--	<50	<50	<50	<50	80	--	560	240	580	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	--	--	<2000	<2000	<2000	<2000	<1000	--	<1000	<1000	<1000	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	14000	17000	--	--	11000	11000	9700	<4000	12000	--	12000	6000	11000	--	--
Chloride	ug/l	--	39000	63000	--	--	49000	76000	41000	81000	38000	--	21000	41000	45000	--	--
Chromium (III)	ug/l	8.9 (22)	<5	<5	--	--	<5	<5	<5	<5	**<10**	--	**<10**	**<10**	**<10**	--	--
Conductivity (Field)	uS/cm	--	833	923	--	--	928	1051	844	1206	572	--	714	661	808	--	--
Dissolved Organic Carbon	ug/l	--	4800	5300	--	--	4700	4500	3900	2700	4400	--	4700	4400	4400	--	--
Hardness, Calcium Carbonate	ug/l	--	380000	440000	--	--	420000	490000	400000	520000	420000	--	370000	291000	386000	--	--
Nitrate as N	ug/l	--	<100	<100	--	--	<100	<100	460	750	210	--	260	<100	120	--	--
Nitrite as N	ug/l	--	<10	<10	--	--	<10	<10	<10	<10	<100	--	<100	<100	<100	--	--
Nitrogen, Total Kjeldahl	ug/l	--	480	1200	--	--	230	240	190	140	400	--	900	300	700	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.86	7.50	--	--	7.53	6.67	7.28	7.30	6.87	--	7.60	8.01	7.83	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	9	60	--	--	10	8	12	5	<2	--	53	63	27	--	--
Sulphate	ug/l	--	220000	240000	--	--	260000	330000	270000	340000	223000	--	156000	167000	180000	--	--
Temperature (Field)	deg c	-- (24)	12.7	16.2	--	--	14.9	12.1	2.8	1.6	0.1	--	0.4	6.1	9.8	--	--
Total Dissolved Solids	ug/l	--	580000	722000	--	--	686000	830000	655000	810000	541000	--	473000	446000	534000	--	--
Total Suspended Solids	ug/l	--	<1000	3000	--	--	<2000	<1000	<1000	<1000	22000	--	53000	<1000	<1000	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	43	58	--	--	54	56	38	46	40	--	40	30	40	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	89	120	--	--	120	120	88	130	80	--	70	80	80	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	150000	--	--	150000	150000	130000	150000	132000	--	120000	90000	125000	--	--
Chromium	ug/l	-- (30)	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	<1	--	<1	<1	<1	--	--
Cobalt	ug/l	0.9	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	<0.2	--	<0.2	<0.2	<0.2	--	--
Copper	ug/l	5	<1.0	3.9	--	--	<1.0	<1.0	<1.0	<1.0	<1	--	<1	<1	<1	--	--
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	0.56	**<10**	--	**<10**	**<10**	**<10**	--	--
Iron	ug/l	300	<100	**470**	--	--	<100	<100	<100	<100	50	--	140	<30	60	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	20000	25000	--	--	26000	28000	24000	35000	22000	--	17000	16000	18000	--	--
Manganese	ug/l	--	10	140	--	--	13	12	8.0	7.2	10	--	30	<10	20	--	--
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	4900	5200	--	--	6300	7500	6800	11000	5000	--	4000	5000	6000	--	--
Silicon	ug/l	--	1200	2200	--	--	2500	2700	1900	2300	1800	--	1700	900	900	--	--
Silver	ug/l	0.1	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.1	--	<0.1	<0.1	<0.1	--	--
Sodium	ug/l	--	25000	31000	--	--	32000	39000	26000	51000	23000	--	17000	21000	26000	--	--
Strontium	ug/l	--	2500	3200	--	--	3600	3700	2800	4700	2790	--	2540	2700	2290	--	--
Sulfur	ug/l	--	73000	82000	--	--	86000	110000	83000	130000	53300	--	44700	42600	67000	--	--
Thallium	ug/l	0.3 (33)	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	<0.1	--	<0.1	<0.1	<0.1	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			24-Aug-2018	18-Sep-2018 (2)	24-Oct-2018	20-Nov-2018	18-Dec-2018	25-Jan-2019 (3)	21-Feb-2019 (3)	13-Mar-2019 (3)	17-Apr-2019	24-May-2019	21-Jun-2019	18-Jul-2019 (2)	21-Aug-2019 (2)	18-Sep-2019 (2)	29-Oct-2019
Parameter	**Unit**	**PWQO (1)**	SS-5	SS-5	SS-5	SS-5	SS-5	5	5	5	SS-5	SS - 5	SS-5	SS-5	SS-5	SS-5	SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	160000	--	173000	205000	192000	--	--	--	106000	188000	173000	--	--	--	99000
Ammonia, unionized (Field)	ug/l	20	<20	--	<20	<20	<20	--	--	--	<20	<20	<20	--	--	--	<20
Ammonia Nitrogen	ug/l	--	70	--	20	220	70	--	--	--	30	31	<10	--	--	--	60
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	--	<1000	<1000	2000	--	--	--	<1000	<1000	<1000	--	--	--	3000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	11000	--	<5000	9000	11000	--	--	--	6000	12000	14000	--	--	--	36000
Chloride	ug/l	--	89000	--	72000	36000	35000	--	--	--	37000	13000	42000	--	--	--	65000
Chromium (III)	ug/l	8.9 (22)	<1	--	**<10**	**<10**	**<10**	--	--	--	1	1	<1	--	--	--	1
Conductivity (Field)	uS/cm	--	1126	--	1044	844	43	--	--	--	620	562	723	--	--	--	1031
Dissolved Organic Carbon	ug/l	--	4600	--	4600	5900	4500	--	--	--	1900	4700	4900	--	--	--	2700
Hardness, Calcium Carbonate	ug/l	--	431000	--	440000	460000	413000	--	--	--	251000	294000	344000	--	--	--	392000
Nitrate as N	ug/l	--	<100	--	180	150	330	--	--	--	910	170	<100	--	--	--	840
Nitrite as N	ug/l	--	<100	--	<100	<100	<100	--	--	--	<100	<100	<100	--	--	--	<100
Nitrogen, Total Kjeldahl	ug/l	--	500	--	300	1600	400	--	--	--	<100	310	250	--	--	--	300
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.53	--	7.55	7.20	7.40	--	--	--	7.23	8.17 (37)	6.90	--	--	--	7.65
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	12	--	<2	8	12	--	--	--	4	5	6	--	--	--	4
Sulphate	ug/l	--	363000	--	338000	259000	246000	--	--	--	141000	117000	176000	--	--	--	288000
Temperature (Field)	deg c	-- (24)	18.7	--	6.4	2.2	0	--	--	--	6.4	10.8	14.8	--	--	--	7.5
Total Dissolved Solids	ug/l	--	840000	--	805000	591000	583000	--	--	--	397000	338000	884000	--	--	--	629000
Total Suspended Solids	ug/l	--	2000	--	2000	6000	135000	--	--	--	<1000	<1000	2000	--	--	--	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	80	--	<10	40	40	--	--	--	30	30	40	--	--	--	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	150	--	<10	80	60	--	--	--	50	60	110	--	--	--	130
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	133000	--	135000	148000	129000	--	--	--	79000	98000	108000	--	--	--	114000
Chromium	ug/l	-- (30)	<1	--	<1	2	<1	--	--	--	1	1	<1	--	--	--	1
Cobalt	ug/l	0.9	<0.2	--	<0.2	<0.2	<0.2	--	--	--	<0.2	<0.2	<0.2	--	--	--	<0.2
Copper	ug/l	5	<1	--	<1	<1	<1	--	--	--	<1	<1	<1	--	--	--	<1
Hexavalent Chromium	ug/l	1 (22)	**<10**	--	**<10**	**<10**	**<10**	--	--	--	<1	<1	<1	--	--	--	<1
Iron	ug/l	300	<30	--	<30	40	80	--	--	--	<30	<30	<30	--	--	--	<30
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	24000	--	25000	22000	22000	--	--	--	13000	12000	18000	--	--	--	26000
Manganese	ug/l	--	<10	--	<10	<10	30	--	--	--	<10	<10	<10	--	--	--	<10
Mercury	ug/l	0.2 (32)	<0.1	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	10000	--	8000	5000	5000	--	--	--	7000	3000	6000	--	--	--	9000
Silicon	ug/l	--	2300	--	1800	1600	1600	--	--	--	900	700	1100	--	--	--	1900
Silver	ug/l	0.1	<0.1	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1
Sodium	ug/l	--	46000	--	40000	23000	22000	--	--	--	24000	12000	22000	--	--	--	39000
Strontium	ug/l	--	4130	--	<1	3150	2500	--	--	--	1830	1630	2350	--	--	--	3760
Sulfur	ug/l	--	141000	--	124000	89600	89000	--	--	--	55500	40600	67200	--	--	--	103000
Thallium	ug/l	0.3 (33)	<0.1	--	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	--	--	--	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-5 19-Nov-2019 SS-5	SS-5 18-Dec-2019 SS-5	SS-5 15-Jan-2020 SS-5	SS-5 19-Feb-2020 (3) SS-5	SS-5 19-Mar-2020 SS-5	SS-5 03-Apr-2020 SS-5	SS-5 08-May-2020 SS-5	SS-5 01-Jun-2020 SS-5	SS-5 21-Jul-2020 (2) SS-5	SS-5 25-Aug-2020 SS-5	SS-5 17-Sep-2020 SS-5	SS-5 23-Oct-2020 SS-5	SS-5 26-Nov-2020 SS-5	SS-5 11-Dec-2020 SS-5	SS-5 08-Jan-2021 SS-5
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	202000	201000	107000	--	175000	152000	146000	186000	--	194000	207000	128000	169000	172000	125000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	--	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	718	<10	<10	--	<10	<10	<10	582	--	230	111	<10	10	<10	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	3000	<1000	3000	--	5000	<1000	<1000	7000	--	5000	4000	6000	2000	1000	3000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	<5000	12000	<5000	--	<5000	8000	13000	15000	--	13000	19000	<5000	<5000	6000	8000
Chloride	ug/l	--	33000	35000	38000	--	28000	23000	62000	17000	--	30000	28000	72000	62000	50000	70000
Chromium (III)	ug/l	8.9 (22)	<1	<1	6	--	**<10**	<1	<1	<1	--	<1	<1	<1	<1	<1	<1
Conductivity (Field)	uS/cm	--	885	1009	697	--	680	614	929	694	--	908	903	1125	1130	1113	1128
Dissolved Organic Carbon	ug/l	--	5300	5400	1900	--	3500	4100	4000	5400	--	7400	6600	2800	3600	3500	2200
Hardness, Calcium Carbonate	ug/l	--	389000	470000	277000	--	333000	281000	384000	323000	--	442000	437000	446000	500000	491000	470000
Nitrate as N	ug/l	--	210	170	750	--	130	<100	210	<100	--	<100	130	<500	340	1000	1470
Nitrite as N	ug/l	--	<100	<100	<100	--	<100	<100	<100	<100	--	<100	<100	<500	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	100	547	263	--	220	388	385	620	--	739	941	580	594	272	147
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.82	8.01	7.83	--	7.96	7.92	7.69	7.71	--	7.61	7.04	7.65	7.27	7.69	7.62
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	11	8	3	--	5	4	43	13	--	18	10	7	7	8	4
Sulphate	ug/l	--	217000	259000	199000	--	143000	122000	230000	139000	--	265000	254000	367000	355000	339000	385000
Temperature (Field)	deg c	-- (24)	0.9	0.3	0.3	--	1.7	5.2	4.4	6.9	--	17.7	12.9	11.5	4.1	2.6	0.2
Total Dissolved Solids	ug/l	--	580000	624000	454000	--	429000	394000	594000	423000	--	601000	598000	798000	791000	735000	798000
Total Suspended Solids	ug/l	--	9000	14000	<1000	--	<1000	1000	7000	20000	--	13000	11000	1000	7000	5000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	40	40	20	--	30	30	50	30	--	60	50	50	50	40	40
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	70	70	90	--	80	60	110	80	--	130	80	180	100	110	140
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	123000	152000	83000	--	107000	91000	119000	108000	--	144000	142000	134000	159000	147000	134000
Chromium	ug/l	-- (30)	<1	<1	6	--	<1	<1	<1	<1	--	<1	<1	<1	<1	<1	1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	--	<0.2	<0.2	0.5	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1	<1	<1	--	<1	<1	<1	<1	--	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	<1	<1	--	**<10**	<1	<1	<1	--	<0.50	<0.50	0.6	<1	<0.5	0.84
Iron	ug/l	300	30	<30	**390**	--	<30	30	**480**	40	--	40	<30	<30	<30	70	<30
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	20000	22000	17000	--	16000	13000	21000	13000	--	20000	20000	27000	25000	30000	33000
Manganese	ug/l	--	<10	<10	<10	--	<10	<10	190	10	--	<10	<10	<10	<10	20	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	5000	5000	7000	--	5000	4000	9000	4000	--	6000	5000	11000	9000	9000	12000
Silicon	ug/l	--	1500	1600	1600	--	1500	1000	1100	1200	--	3300	2000	2900	2500	2600	3000
Silver	ug/l	0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	22000	23000	31000	--	22000	15000	40000	15000	--	22000	21000	50000	42000	39000	56000
Strontium	ug/l	--	2650	2960	2290	--	3170	1850	2890	1920	--	3460	2890	4750	3570	3850	4180
Sulfur	ug/l	--	74000	97200	64500	--	52300	44200	89000	57900	--	97200	93800	134000	131000	134000	133000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5	SS-5
			18-Feb-2021	22-Mar-2021	09-Apr-2021 (49)	28-May-2021 (2)	28-Jun-2021	15-Jul-2021 (2)	11-Aug-2021 (2)	28-Sep-2021	27-Oct-2021	11-Nov-2021	15-Dec-2021	25-Jan-2022 (3)	24-Feb-2022 (4)	17-Mar-2022 (19)
			SS-5	SS-5	SS-5	SS5	SS-5	SS5	5	SS5	SS5	SS5	SS5	SS5	5	SW5
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	189000	174000	176000	--	119000	--	--	161000	104000	171000	185000	--	--	119000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	--	<20	--	--	<20	<20	<20	<20	--	--	<20
Ammonia Nitrogen	ug/l	--	<10	10	<10	--	<10	--	--	<10	<10	<10	<10	--	--	69
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	5000	<1000	<1000	--	<1000	--	--	<1000	<1000	<1000	3000	--	--	1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	14000	5000	9000	--	<5000	--	--	<5000	<5000	5000	9000	--	--	8000
Chloride	ug/l	--	70000	28000	23000	--	92000	--	--	73000	47000	40000	17000	--	--	74000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	--	<1	--	--	<1	<1	<1	<1	--	--	<1
Conductivity (Field)	uS/cm	--	1256	799	698	--	1163	--	--	1080	810	1182	712	--	--	792
Dissolved Organic Carbon	ug/l	--	3200	4300	4700	--	2600	--	--	4200	2700	6200	7100	--	--	3200
Hardness, Calcium Carbonate	ug/l	--	581000	316000	347000	--	502000	--	--	509000	354000	433000	368000	--	--	354000
Nitrate as N	ug/l	--	480	<100	<500	--	440	--	--	<100	860	130	<100	--	--	750
Nitrite as N	ug/l	--	<100	<100	<500	--	<100	--	--	<100	<100	<100	<100	--	--	<100
Nitrogen, Total Kjeldahl	ug/l	--	1150	310	576	--	353	--	--	1350	319	430	326	--	--	283
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.62	7.56	7.51	--	7.67	--	--	7.56	7.90	7.77	7.70	--	--	7.84
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	30	4	5	--	8	--	--	5	2	3	3	--	--	6
Sulphate	ug/l	--	387000	202000	160000	--	401000	--	--	361000	258000	286000	180000	--	--	244000
Temperature (Field)	deg c	-- (24)	0.3	2.4	5.4	--	19.8	--	--	13.6	9.9	6.9	0.9	--	--	3.5
Total Dissolved Solids	ug/l	--	861000	501000	436000	--	840000	--	--	798000	590000	637000	463000	--	--	580000
Total Suspended Solids	ug/l	--	<1000	<1000	<1000	--	<1000	--	--	<1000	<1000	<1000	1000	--	--	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	30	30	--	50	--	--	60	40	50	20	--	--	30
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	130	40	60	--	**220**	--	--	160	100	70	40	--	--	100
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	180000	102000	116000	--	145000	--	--	156000	107000	137000	121000	--	--	102000
Chromium	ug/l	-- (30)	<1	<1	<1	--	<1	--	--	<1	<1	<1	<1	--	--	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	--	<0.2	--	--	<0.2	<0.2	<0.2	<0.2	--	--	<0.2
Copper	ug/l	5	<1	<1	<1	--	<1	--	--	<1	<1	<1	<1	--	--	<1
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	<0.5	--	<0.50	--	--	<0.50	0.9	<0.50	<0.50	--	--	0.6
Iron	ug/l	300	100	<30	<30	--	<30	--	--	<30	<30	<30	<30	--	--	<30
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	32000	15000	14000	--	34000	--	--	29000	21000	22000	16000	--	--	24000
Manganese	ug/l	--	20	<10	<10	--	<10	--	--	<10	<10	<10	<10	--	--	<10
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	--	--	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	7000	4000	3000	--	13000	--	--	11000	12000	8000	3000	--	--	8000
Silicon	ug/l	--	2000	1800	1500	--	2800	--	--	2700	2000	1800	1500	--	--	2600
Silver	ug/l	0.1	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	--	--	<0.1
Sodium	ug/l	--	48000	19000	15000	--	59000	--	--	47000	29000	28000	11000	--	--	46000
Strontium	ug/l	--	3680	2280	2390	--	4220	--	--	4090	2840	3030	1490	--	--	3200
Sulfur	ug/l	--	144000	71200	57100	--	141000	--	--	129000	109000	110000	60600	--	--	81200
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	--	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	--	--	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-5	SS-5	SS-5	SS-5
			28-Apr-2022	26-May-2022 (2)	24-Jun-2022	25-Jul-2022
Parameter	Unit	PWQO (1)	SS5	5	SS5	SS5
General Chemistry						
Alkalinity (Total as CaCO3)	ug/l	-- (21)	136000	--	178000	193000
Ammonia, unionized (Field)	ug/l	20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	<10	--	95	<20
Bicarbonate	ug/l	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	--	2000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	5000	--	5000	11000
Chloride	ug/l	--	100000	--	42000	51000
Chromium (III)	ug/l	8.9 (22)	<1	--	<1.0	<1
Conductivity (Field)	uS/cm	--	1103	--	804	946
Dissolved Organic Carbon	ug/l	--	3600	--	6300	7600
Hardness, Calcium Carbonate	ug/l	--	537000	--	425000	434000
Nitrate as N	ug/l	--	940	--	<100	<100
Nitrite as N	ug/l	--	<100	--	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	850	--	411	1250
Nitrogen, Organic	ug/l	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.86	--	7.29	7.02
Phosphate	ug/l	--	--	--	--	--
Phosphorus	ug/l	-- (23)	<2	--	7	11
Sulphate	ug/l	--	367000	--	251000	282000
Temperature (Field)	deg c	-- (24)	7.3	--	19.2	18.1
Total Dissolved Solids	ug/l	--	861000	--	572000	618000
Total Suspended Solids	ug/l	--	<1000	--	<1000	1000
Turbidity	ntu	-- (25)	--	--	--	--
Metals						
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--
Barium	ug/l	--	50	--	50	60
Beryllium	ug/l	-- (27)	--	--	--	--
Boron	ug/l	200 (28)	110	--	120	160
Cadmium	ug/l	0.2 (29)	--	--	--	--
Calcium	ug/l	--	159000	--	134000	139000
Chromium	ug/l	-- (30)	<1	--	<1	<1
Cobalt	ug/l	0.9	<0.2	--	<0.2	<0.2
Copper	ug/l	5	<1	--	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	--	<0.50	<0.5
Iron	ug/l	300	<30	--	<30	30
Lead	ug/l	-- (31)	--	--	--	--
Magnesium	ug/l	--	34000	--	22000	21000
Manganese	ug/l	--	<10	--	<10	<10
Mercury	ug/l	0.2 (32)	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--
Nickel	ug/l	25	--	--	--	--
Potassium	ug/l	--	14000	--	7000	7000
Silicon	ug/l	--	1200	--	1900	3300
Silver	ug/l	0.1	<0.1	--	<0.1	<0.1
Sodium	ug/l	--	59000	--	27000	30000
Strontium	ug/l	--	3880	--	2890	3360
Sulfur	ug/l	--	140000	--	79700	95800
Thallium	ug/l	0.3 (33)	<0.1	--	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--
Phenols						
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--

			SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
Parameter	**Unit**	**PWQO (1)**	**25-Sep-2002 (2)**	**31-Oct-2002**	**28-Nov-2002**	**15-Jan-2003 (4)**	**12-Feb-2003 (4)**	**15-Mar-2003 (4)**	**28-Apr-2003 (4)**	**24-May-2003 (4)**	**24-Jun-2003 (4)**	**16-Jul-2003 (4)**	**14-Aug-2003**	**30-Sep-2003 (4)**	**30-Oct-2003 (5)**	**19-Nov-2003**
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	189000	280000	--	--	--	--	--	--	--	252000	--	--	158000
Ammonia, unionized (Field)	ug/l	20	--	<20	<20	--	--	--	--	--	--	--	<20	--	--	<20
Ammonia Nitrogen	ug/l	--	--	<20	<20	--	--	--	--	--	--	--	60	--	--	<20
Bicarbonate	ug/l	--	--	189000	280000	--	--	--	--	--	--	--	252000	--	--	158000
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	<1000	2000	--	--	--	--	--	--	--	<1000	--	--	<1000
Carbonate (CO3)	ug/l	--	--	<2000	<5000	--	--	--	--	--	--	--	<2000	--	--	<2000
Chemical Oxygen Demand	ug/l	--	--	20000	26000	--	--	--	--	--	--	--	36000	--	--	9000
Chloride	ug/l	--	--	8000	4000	--	--	--	--	--	--	--	5000	--	--	5000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	450	500	--	--	--	--	--	--	--	440	--	--	295
Dissolved Organic Carbon	ug/l	--	--	9100	9400	--	--	--	--	--	--	--	15100	--	--	4600
Hardness, Calcium Carbonate	ug/l	--	--	260000	300000	--	--	--	--	--	--	--	260000	--	--	176000
Nitrate as N	ug/l	--	--	<100	<100	--	--	--	--	--	--	--	<100	--	--	<100
Nitrite as N	ug/l	--	--	<100	<100	--	--	--	--	--	--	--	<100	--	--	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	500	500	--	--	--	--	--	--	--	1500	--	--	200
Nitrogen, Organic	ug/l	--	--	480	480	--	--	--	--	--	--	--	1440	--	--	180
pH (Field)	-	6.5 - 8.5	--	7.6	7.4	--	--	--	--	--	--	--	7.3	--	--	7
Phosphate	ug/l	--	--	40	50	--	--	--	--	--	--	--	40	--	--	<30
Phosphorus	ug/l	-- (23)	--	30	20	--	--	--	--	--	--	--	20	--	--	20
Sulphate	ug/l	--	--	63000	21000	--	--	--	--	--	--	--	8000	--	--	17000
Temperature (Field)	deg c	-- (24)	--	3	0	--	--	--	--	--	--	--	24	--	--	2
Total Dissolved Solids	ug/l	--	--	317000	359000	--	--	--	--	--	--	--	300000	--	--	222000
Total Suspended Solids	ug/l	--	--	<2000	2000	--	--	--	--	--	--	--	7000	--	--	2000
Turbidity	ntu	-- (25)	--	0.4	1.8	--	--	--	--	--	--	--	0.8	--	--	1
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	<10	<10	--	--	--	--	--	--	--	<10	--	--	10
Barium	ug/l	--	--	20	<10	--	--	--	--	--	--	--	30	--	--	20
Beryllium	ug/l	-- (27)	--	<1	<1	--	--	--	--	--	--	--	<1	--	--	<1
Boron	ug/l	200 (28)	--	<50	<50	--	--	--	--	--	--	--	<10	--	--	<10
Cadmium	ug/l	0.2 (29)	--	<0.1	<0.1	--	--	--	--	--	--	--	0.1	--	--	<0.1
Calcium	ug/l	--	--	96000	115000	--	--	--	--	--	--	--	96000	--	--	67000
Chromium	ug/l	-- (30)	--	<1	3	--	--	--	--	--	--	--	5	--	--	1
Cobalt	ug/l	0.9	--	0.3	0.3	--	--	--	--	--	--	--	<0.2	--	--	<0.2
Copper	ug/l	5	--	1	1	--	--	--	--	--	--	--	**7**	--	--	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	10	40	--	--	--	--	--	--	--	200	--	--	20
Lead	ug/l	-- (31)	--	<1	<1	--	--	--	--	--	--	--	<1	--	--	<1
Magnesium	ug/l	--	--	5000	3000	--	--	--	--	--	--	--	5000	--	--	2000
Manganese	ug/l	--	--	9	1060	--	--	--	--	--	--	--	84	--	--	<10
Mercury	ug/l	0.2 (32)	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1	--	--	<0.1
Molybdenum	ug/l	40	--	<5	<5	--	--	--	--	--	--	--	<5	--	--	<5
Nickel	ug/l	25	--	<5	<5	--	--	--	--	--	--	--	2	--	--	<5
Potassium	ug/l	--	--	<1000	<1000	--	--	--	--	--	--	--	<1000	--	--	<1000
Silicon	ug/l	--	--	1100	2300	--	--	--	--	--	--	--	3300	--	--	1200
Silver	ug/l	0.1	--	<0.1	<0.1	--	--	--	--	--	--	--	<0.1	--	--	<0.1
Sodium	ug/l	--	--	8000	3000	--	--	--	--	--	--	--	4000	--	--	2000
Strontium	ug/l	--	--	121	148	--	--	--	--	--	--	--	181	--	--	93
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	**<1**	**<1**	--	--	--	--	--	--	--	**<1**	--	--	**<1**
Titanium	ug/l	--	--	<10	<10	--	--	--	--	--	--	--	<10	--	--	<10
Vanadium	ug/l	6	--	<1	1	--	--	--	--	--	--	--	1	--	--	<1
Zinc	ug/l	30 (29)	--	<5	<5	--	--	--	--	--	--	--	13	--	--	<10
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	<1	<1	--	--	--	--	--	--	--	<1	--	--	<1

Parameter	Unit	PWQO (1)	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
			23-Dec-2003 (4)	27-Jan-2004 (4)	20-Feb-2004 (4)	24-Mar-2004 (4)	12-Apr-2004	12-May-2004	28-Jun-2004	19-Jul-2004	17-Aug-2004	30-Sep-2004	07-Oct-2004 (4)	23-Nov-2004 (4)	09-Dec-2004 (4)	14-Jan-2005 (4)
General Chemistry																
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	167000	177000	232000	169000	152000	238000	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	<20	<20	<20	<20	<20	<20	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	<30	80	<30	60	60	<30	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	202000	211000	281000	202000	180000	283000	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	700	1000	2600	4900	1000	<500	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	<1000	<1000	<1000	<1000	1000	1000	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	11000	30000	44000	66000	48000	17000	--	--	--	--
Chloride	ug/l	--	--	--	--	--	9800	33300	14800	693000	14400	23600	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	285	500	480	425	380	495	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	3500	10900	9200	18900	14200	7500	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	199560	197500	269228	216700	289000	274000	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	<200	<200	<200	<200	<200	<200	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	<200	<200	<200	<2000	<200	<200	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	270	520	650	1440	1000	280	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	310	440	620	1380	940	250	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	7.1	7.1	7.2	7.1	7	7.8	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	<1000	<1000	<1000	<1000	<1000	<1000	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	8	8	66	28	18	3	--	--	--	--
Sulphate	ug/l	--	--	--	--	--	26200	10700	25300	12000	117000	51000	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	4	8	14	18	22	10	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	220000	290000	284000	1424000	398000	392000	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	2000	1000	9000	10000	4000	2000	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	0.3	0.6	5.4	1.8	1.4	0.5	--	--	--	--
Metals																
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	<5	<5	12	12	<5	6	--	--	--	--
Barium	ug/l	--	--	--	--	--	19	32	109	57	35	30	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	<5	6	15	11	18	<5	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--
Calcium	ug/l	--	--	--	--	--	73100	73800	101000	75300	107000	100000	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	<5	10	11	<5	<5	<5	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	<0.1	<0.1	0.2	0.1	<0.1	<0.1	--	--	--	--
Copper	ug/l	5	--	--	--	--	<0.5	2.4	**5.8**	1.9	1.6	<0.5	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	<30	110	**940**	**340**	90	<30	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	4100	3200	4080	6930	5330	5870	--	--	--	--
Manganese	ug/l	--	--	--	--	--	<5	30	71	88	52	7	--	--	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	**0.61**	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	--	--
Nickel	ug/l	25	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	--	--
Potassium	ug/l	--	--	--	--	--	500	300	1200	400	600	400	--	--	--	--
Silicon	ug/l	--	--	--	--	--	690	560	2430	1540	2260	1460	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--
Sodium	ug/l	--	--	--	--	--	4800	20100	10600	468000	8000	9600	--	--	--	--
Strontium	ug/l	--	--	--	--	--	153	160	157	1470	237	254	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--	--	--
Titanium	ug/l	--	--	--	--	--	<5	<5	19	<5	<5	<5	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	<0.5	<0.5	0.8	<5	<0.5	<0.5	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	<5	6	11	25	8	<5	--	--	--	--
Phenols																
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	<1	<1	1	<1	<1	<1	--	--	--	--

Parameter	Unit	PWQO (1)	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
			11-Feb-2005 (4)	14-Mar-2005 (4)	15-Apr-2005 (4)	29-May-2005 (4)	12-Jun-2005 (4)	12-Jul-2005 (4)	14-Aug-2005 (4)	24-Sep-2005 (4)	24-Oct-2005 (4)	16-Nov-2005 (4)	29-Dec-2005 (4)	19-Jan-2006 (4)	15-Feb-2006 (4)
General Chemistry															
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals															
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silicon	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Strontium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfur	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	--	--	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols															
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			30-Mar-2006 (4)	**11-Apr-2006 (4)**	**12-May-2006 (4)**	**20-Jun-2006 (4)**	**24-Jul-2006**	**14-Aug-2006**	**29-Sep-2006**	**25-Oct-2006**	**14-Nov-2006**	**12-Dec-2006**	**31-Jan-2007 (3)**	**27-Feb-2007 (3)**	**30-Mar-2007**	**26-Apr-2007**	**29-May-2007**
Parameter	**Unit**	**PWQO (1)**															T-3
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	154000	173000	170000	177000	174000	178000	--	--	154000	171000	224000
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	<20	<20	<20	<20	<20	<20	--	--	<20	<20	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	80	40	<20	<20	<20	<20	--	--	<20	<20	30
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	<1000	<1000	<1000	<1000	<1000	<1000	--	--	<1000	<1000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	10000	14000	12000	11000	5000	<5000	--	--	16000	<5000	7000
Chloride	ug/l	--	--	--	--	--	38000	35000	20000	19000	18000	21000	--	--	16000	21000	15000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	495	495	510	400	425	455	--	--	525	390	430
Dissolved Organic Carbon	ug/l	--	--	--	--	--	5000	6400	6500	5400	5200	4500	--	--	3600	4700	5900
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	306000	326000	298000	250000	277000	263000	--	--	203000	274000	276000
Nitrate as N	ug/l	--	--	--	--	--	<100	<100	<100	230	550	900	--	--	590	<100	<100
Nitrite as N	ug/l	--	--	--	--	--	<100	<100	<100	<100	<100	<100	--	--	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	330	360	310	130	230	210	--	--	130	260	430
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	7.3	7.4	7.5	7.3	7.4	7.4	--	--	7.4	7.4	7.2
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	30	30	20	<10	10	30	--	--	30	<10	30
Sulphate	ug/l	--	--	--	--	--	146000	149000	126000	105000	90000	84000	--	--	59000	100000	68000
Temperature (Field)	deg c	-- (24)	--	--	--	--	13	11	9	3	3	2	--	--	3	4	10
Total Dissolved Solids	ug/l	--	--	--	--	--	455000	476000	411000	387000	366000	382000	--	--	299000	378000	382000
Total Suspended Solids	ug/l	--	--	--	--	--	4000	2000	2000	<2000	<2000	3000	--	--	<2000	<2000	<2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	<10	<10	<10	<10	<10	<10	--	--	<10	<10	<10
Barium	ug/l	--	--	--	--	--	40	40	30	30	30	30	--	--	30	30	40
Beryllium	ug/l	-- (27)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	<1
Boron	ug/l	200 (28)	--	--	--	--	40	30	40	50	60	40	--	--	90	70	110
Cadmium	ug/l	0.2 (29)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1
Calcium	ug/l	--	--	--	--	--	106000	109000	101000	82000	91000	87000	--	--	65000	90000	89000
Chromium	ug/l	-- (30)	--	--	--	--	2	<1	<1	<1	<1	2	--	--	1	<1	2
Cobalt	ug/l	0.9	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	--	<0.2	<0.2	<0.2
Copper	ug/l	5	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	ug/l	300	--	--	--	--	110	230	150	40	70	30	--	--	<30	<30	60
Lead	ug/l	-- (31)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	<1
Magnesium	ug/l	--	--	--	--	--	10000	13000	11000	11000	12000	11000	--	--	10000	12000	13000
Manganese	ug/l	--	--	--	--	--	80	160	80	10	10	<10	--	--	10	<10	50
Mercury	ug/l	0.2 (32)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	<5	<5	<5	<5	<5	<5	--	--	<5	<5	<5
Nickel	ug/l	25	--	--	--	--	<5	<5	<5	<5	<5	<5	--	--	<5	<5	<5
Potassium	ug/l	--	--	--	--	--	2000	2000	1000	2000	2000	2000	--	--	2000	3000	2000
Silicon	ug/l	--	--	--	--	--	1300	1400	1400	1200	900	800	--	--	1200	400	1200
Silver	ug/l	0.1	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1
Sodium	ug/l	--	--	--	--	--	20000	18000	15000	15000	15000	12000	--	--	17000	22000	18000
Strontium	ug/l	--	--	--	--	--	638	810	596	674	690	729	--	--	731	821	736
Sulfur	ug/l	--	--	--	--	--	48666.7	49700	42000	35000	30000	28000	--	--	19700	33300	22700
Thallium	ug/l	0.3 (33)	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	0.1	**0.4**	**0.5**
Titanium	ug/l	--	--	--	--	--	<10	<10	<10	<10	<10	<10	--	--	<10	<10	<10
Vanadium	ug/l	6	--	--	--	--	<1	1	1	<1	<1	<1	--	--	2	<1	1
Zinc	ug/l	30 (29)	--	--	--	--	<10	<10	<10	<10	<10	<10	--	--	<10	<10	<10
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	<1	<1	<1	<1	<1	<1	--	--	<1	<1	<1

			SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
Parameter	**Unit**	**PWQO (1)**	**26-Jun-2007**	**23-Jul-2007 (4)**	**28-Aug-2007**	**28-Sep-2007 (4)**	**25-Oct-2007 (2)**	**29-Nov-2007**	**18-Dec-2007 (3)**	**08-Jan-2008**	**06-Feb-2008 (4)**	**31-Mar-2008**	**25-Apr-2008**	**22-May-2008**	**25-Jun-2008**	**09-Jul-2008**	**08-Aug-2008**
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	260000	--	178000	--	--	177000	--	133000	--	166000	163000	210000	197000	242000	273000
Ammonia, unionized (Field)	ug/l	20	<20	--	<20	--	--	<20	--	<20	--	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	60	--	<20	--	--	<20	--	200	--	<50	<50	<50	<50	140	130
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	3000	--	<1000	--	--	<1000	--	1000	--	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	20000	--	19000	--	--	7000	--	<5000	--	14000	12000	14000	13000	21000	17000
Chloride	ug/l	--	30000	--	21000	--	--	33000	--	33000	--	37000	14000	15000	24000	23000	18000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	480	--	605	--	--	480	--	500	--	525	450	490	520	500	485
Dissolved Organic Carbon	ug/l	--	12000	--	10800	--	--	6600	--	2200	--	3800	4100	3900	5800	7000	5500
Hardness, Calcium Carbonate	ug/l	--	320000	--	389000	--	--	310000	--	341000	--	290000	220000	280000	330000	290000	340000
Nitrate as N	ug/l	--	<100	--	<100	--	--	<100	--	1720	--	300	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<100	--	<100	--	--	<100	--	<100	--	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	1190	--	650	--	--	250	--	420	--	500	500	700	500	700	600
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.2	--	7.3	--	--	7.3	--	7.2	--	7.4	7.4	7.4	7.4	7.4	7.2
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	80	--	30	--	--	10	--	20	--	11	6	15	5	11	4
Sulphate	ug/l	--	94000	--	179000	--	--	150000	--	194000	--	143000	67000	78000	129000	99000	88000
Temperature (Field)	deg c	-- (24)	16	--	22	--	--	1	--	2	--	3	7	16	17	19	23
Total Dissolved Solids	ug/l	--	485000	--	482000	--	--	488000	--	502000	--	470000	330000	360000	440000	448000	446000
Total Suspended Solids	ug/l	--	14000	--	<2000	--	--	<2000	--	24000	--	<10000	<10000	<10000	<10000	<10000	<10000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	30	--	10	--	--	30	--	<10	--	--	--	--	--	--	--
Barium	ug/l	--	60	--	40	--	--	30	--	90	--	34	28	37	44	46	54
Beryllium	ug/l	-- (27)	<1	--	<1	--	--	<1	--	<1	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	80	--	70	--	--	30	--	150	--	80	80	80	100	90	100
Cadmium	ug/l	0.2 (29)	<0.1	--	<0.1	--	--	<0.1	--	<0.1	--	--	--	--	--	--	--
Calcium	ug/l	--	115000	--	136000	--	--	106000	--	87000	--	90000	75000	77000	100000	110000	110000
Chromium	ug/l	-- (30)	2	--	1	--	--	1	--	5	--	<5	<5	<5	<5	<5	<5
Cobalt	ug/l	0.9	0.5	--	<0.2	--	--	0.2	--	0.6	--	--	--	--	--	--	--
Copper	ug/l	5	1	--	<1	--	--	<1	--	<1	--	2	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	--	**<50**	--	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**
Iron	ug/l	300	**610**	--	<30	--	--	30	--	160	--	<100	<100	<100	<100	<100	<100
Lead	ug/l	-- (31)	<1	--	<1	--	--	<1	--	<1	--	--	--	--	--	--	--
Magnesium	ug/l	--	8000	--	12000	--	--	11000	--	30000	--	16000	10000	11000	12000	13000	13000
Manganese	ug/l	--	3360	--	<10	--	--	<10	--	20	--	6	3	<2	17	28	81
Mercury	ug/l	0.2 (32)	<0.1	--	<0.1	--	--	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	<5	--	<5	--	--	<5	--	<5	--	--	--	--	--	--	--
Nickel	ug/l	25	<5	--	<5	--	--	<5	--	<5	--	--	--	--	--	--	--
Potassium	ug/l	--	1000	--	1000	--	--	1000	--	6000	--	2500	2300	2100	1700	1900	2000
Silicon	ug/l	--	5200	--	2000	--	--	1400	--	2800	--	2000	1300	1300	1700	2100	2000
Silver	ug/l	0.1	<0.1	--	<0.1	--	--	<0.1	--	<0.1	--	--	--	--	--	--	--
Sodium	ug/l	--	26000	--	18000	--	--	28000	--	34000	--	37000	17000	15000	24000	25000	20000
Strontium	ug/l	--	287	--	956	--	--	920	--	3970	--	1100	1100	1100	1600	1300	1200
Sulfur	ug/l	--	31300	--	59700	--	--	50000	--	64700	--	46000	23000	20000	44000	34000	28000
Thallium	ug/l	0.3 (33)	<0.1	--	<0.1	--	--	<0.1	--	<0.1	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	ug/l	--	<10	--	<10	--	--	<10	--	<10	--	--	--	--	--	--	--
Vanadium	ug/l	6	1	--	2	--	--	<1	--	2	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	<10	--	<10	--	--	<10	--	<10	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	<1	--	<1	--	--	<1	--	<1	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			26-Sep-2008 (5)	**23-Oct-2008 (4)**	**20-Nov-2008 (4)**	**22-Dec-2008 (4)**	**20-Jan-2009 (4)**	**24-Feb-2009 (4)**	**31-Mar-2009**	**20-Apr-2009**	**22-May-2009**	**23-Jun-2009**	**27-Jul-2009**	**13-Aug-2009**	**24-Sep-2009 (4)**	**15-Oct-2009**	**18-Nov-2009**
Parameter	**Unit**	**PWQO (1)**					SS-6	SS-6	T-5	SS-6	SS-6	T-5	SS-6	SS-6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	--	169000	139000	243000	213000	195000	193000	--	202000	179000
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	--	<20	<20	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	--	<50	<50	<50	110	<50	70	--	<50	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	--	<2000	<2000	<2000	7000	<2000	<2000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	--	14000	8000	20000	20000	27000	13000	--	15000	14000
Chloride	ug/l	--	--	--	--	--	--	--	37000	55000	28000	230000	32000	41000	--	50000	49000
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	--	<5	<5
Conductivity (Field)	uS/cm	--	--	--	--	--	--	--	745	595	765	605	910	890	--	980	985
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	--	4700	3400	7100	12900	8400	6800	--	5000	4100
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	--	320000	290000	310000	290000	340000	360000	--	400000	420000
Nitrate as N	ug/l	--	--	--	--	--	--	--	1000	600	<100	<100	<100	<100	--	300	2100
Nitrite as N	ug/l	--	--	--	--	--	--	--	10	<10	<10	<10	<10	<10	--	<10	30
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	--	500	600	600	1500	700	600	--	300	600
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	--	7.9	8	7.8	7.9	7.6	7.7	--	7.8	7.9
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	--	11	9	22	130	14	11	--	<2	<2
Sulphate	ug/l	--	--	--	--	--	--	--	180000	170000	86000	37000	160000	240000	--	260000	300000
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	--	6	8	13	20	24.0	20	--	8	4
Total Dissolved Solids	ug/l	--	--	--	--	--	--	--	480000	470000	440000	750000	465000	586000	--	640000	665000
Total Suspended Solids	ug/l	--	--	--	--	--	--	--	<10000	<10000	<10000	10000	4000	3000	--	<1000	<1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	--	--	--	--	--	--	44	43	51	180	55	59	--	57	54
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	--	100	110	80	20	110	170	--	120	150
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	--	--	--	--	--	--	100000	93000	110000	100000	100000	110000	--	130000	130000
Chromium	ug/l	-- (30)	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5	--	<5	<5
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	--	--	--	--	--	--	<1	<1	<1	2	<1	<1	--	<1	<1
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	--	**<5**	**<5**	**9**	**<5**	**<5**	**<5**	--	**<5**	**<5**
Iron	ug/l	300	--	--	--	--	--	--	<100	<100	**400**	**600**	200	200	--	300	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	--	--	--	--	--	--	16000	17000	14000	7100	15000	20000	--	25000	26000
Manganese	ug/l	--	--	--	--	--	--	--	12	10	340	570	78	220	--	140	33
Mercury	ug/l	0.2 (32)	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	--	--	--	--	--	--	3400	3600	3500	2400	3100	5200	--	4200	4800
Silicon	ug/l	--	--	--	--	--	--	--	2100	840	1700	5700	2500	1200	--	1600	2000
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	--	--	--	--	--	--	34000	41000	28000	140000	29000	54000	--	64000	61000
Strontium	ug/l	--	--	--	--	--	--	--	1600	1900	1400	590	1800	2300	--	2400	2700
Sulfur	ug/l	--	--	--	--	--	--	--	54000	56000	31000	14000	48000	75000	--	83000	89000
Thallium	ug/l	0.3 (33)	--	--	--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	--	<0.05	<0.05
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-6 10-Dec-2009 SS-6	SS-6 20-Jan-2010 (4) SS-6	SS-6 03-Feb-2010 (4) SS-6	SS-6 31-Mar-2010 SS-6	SS-6 06-Apr-2010 (40) SS-6	SS-6 06-May-2010 (4) SS-6	SS-6 02-Jun-2010 (2) SS-6	SS-6 07-Jul-2010 SS-6	SS-6 18-Aug-2010 SS-6	SS-6 29-Sep-2010 SS-6	SS-6 28-Oct-2010 SS-6	SS-6 22-Nov-2010 SS-6	SS-6 09-Dec-2010 SS-6	SS-6 12-Jan-2011 SS-6	SS-6 23-Feb-2011 (3) SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	160000	--	--	176000	162000	--	--	264000	198000	192000	224000	185000	276000	202000	--
Ammonia, unionized (Field)	ug/l	20	<20	--	--	<20	<20	--	--	<20	<20	<20	<20	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	<50	--	--	<50	<50	--	--	<50	<50	60	<50	<50	<50	160	--
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	--	3000	<2000	--	--	<2000	<2000	3000	<2000	<2000	<2000	<2000	--
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	10000	--	--	25000	13000	--	--	19000	27000	16000	15000	13000	25000	17000	--
Chloride	ug/l	--	45000	--	--	29000	32000	--	--	81000	72000	82000	62000	49000	63000	64000	--
Chromium (III)	ug/l	8.9 (22)	<5	--	--	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5	--
Conductivity (Field)	uS/cm	--	920	--	--	1010	880	--	--	899	995	590	890	805	701	490	--
Dissolved Organic Carbon	ug/l	--	3100	--	--	7200	4700	--	--	6400	6600	7300	5800	4700	6400	3400	--
Hardness, Calcium Carbonate	ug/l	--	380000	--	--	310000	340000	--	--	540000	460000	410000	420000	400000	430000	460000	--
Nitrate as N	ug/l	--	2900	--	--	<100	300	--	--	<100	<100	<100	<100	300	<100	700	--
Nitrite as N	ug/l	--	20	--	--	<10	<10	--	--	<10	<10	<10	<10	<10	<10	<10	--
Nitrogen, Total Kjeldahl	ug/l	--	500	--	--	700	600	--	--	600	500	700	400	400	700	500	--
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.6	--	--	7.7	7.8	--	--	7.7	7.7	7.6	7.6	7.6	7.81	7.7	--
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	5	--	--	21	3	--	--	14	11	18	<2	8	32	13	--
Sulphate	ug/l	--	290000	--	--	140000	170000	--	--	280000	270000	250000	210000	210000	160000	260000	--
Temperature (Field)	deg c	-- (24)	2	--	--	6	11.5	--	--	30	25	13	6	3	0.5	1	--
Total Dissolved Solids	ug/l	--	650000	--	--	424000	476000	--	--	780000	674000	674000	638000	544000	544000	664000	--
Total Suspended Solids	ug/l	--	1000	--	--	2000	<1000	--	--	3000	3000	3000	3000	2000	49000	4000	--
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	44	--	--	41	45	--	--	110	74	66	53	49	45	63	--
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	110	--	--	70	150	--	--	**230**	190	190	110	90	40	150	--
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	110000	--	--	100000	93000	--	--	170000	140000	130000	140000	130000	150000	140000	--
Chromium	ug/l	-- (30)	<5	--	--	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.50	--
Copper	ug/l	5	<1	--	--	1	<1	--	--	1	<1	<1	<1	<1	<1	<1	--
Hexavalent Chromium	ug/l	1 (22)	**<5**	--	--	<0.5	**<5**	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**<5**	--
Iron	ug/l	300	<100	--	--	100	<100	--	--	200	**400**	**500**	200	300	200	**700**	--
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	22000	--	--	12000	17000	--	--	26000	25000	26000	23000	22000	13000	31000	--
Manganese	ug/l	--	14	--	--	12	15	--	--	170	130	350	150	260	84	410	--
Mercury	ug/l	0.2 (32)	<0.1	--	--	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	3900	--	--	2500	3500	--	--	5100	5600	5500	4300	4000	2400	5000	--
Silicon	ug/l	--	1500	--	--	480	1100	--	--	1400	2600	2100	1200	1200	2000	2700	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.10	--
Sodium	ug/l	--	50000	--	--	25000	35000	--	--	62000	56000	73000	54000	48000	53000	60000	--
Strontium	ug/l	--	2300	--	--	1200	2100	--	--	3000	3300	3400	2700	2500	1100	3800	--
Sulfur	ug/l	--	85000	--	--	44000	61000	--	--	100000	93000	83000	82000	72000	49000	88000	--
Thallium	ug/l	0.3 (33)	<0.05	--	--	<0.05	<0.05	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			30-Mar-2011	**14-Apr-2011 (50)**	**12-May-2011**	**20-Jun-2011**	**19-Jul-2011**	**26-Aug-2011 (4)**	**21-Sep-2011**	**28-Oct-2011**	**14-Nov-2011 (9)**	**08-Dec-2011**	**11-Jan-2012**	**06-Feb-2012**	**13-Mar-2012 (9)**	**10-Apr-2012**	**24-May-2012**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	SS 6	SW-4	SS-6	SS-6	S-3	SS-6	SS-6	SS - 6	SS -6	SS- 6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	170000	185000	235000	271000	210000	--	134000	245000	354000	252000	265000	224000	110000	280000	180000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	90	<50	140	<50	210	--	140	260	<50	<50	<50	<50	60	<50	150
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	18000	18000	32000	41000	24000	--	36000	24000	16000	16000	11000	22000	18000	16000	23000
Chloride	ug/l	--	20000	36000	87000	62000	64000	--	49000	77000	85000	62000	94000	97000	37000	62000	36000
Chromium (III)	ug/l	8.9 (22)	**19**	<5	<5	<5	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	840	760	615	872	900	--	1386	925	1045	970	795	680	626	760	805
Dissolved Organic Carbon	ug/l	--	3900	4900	7300	12700	6600	--	9700	6200	5600	5500	6200	4700	2500	4900	2700
Hardness, Calcium Carbonate	ug/l	--	190000	260000	350000	330000	420000	--	910000	490000	600000	440000	420000	500000	240000	450000	360000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	--	<100	<100	<100	300	<100	300	940	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	--	<10	<10	<10	<10	<10	<10	10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	600	500	700	900	900	--	1000	700	400	400	300	400	1100	540	370
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.8	7.8	7.5	7.21	7.2	--	7.65	7.3	7.6	7.7	7.5	7.8	7.52	7.5	7.6
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	19	17	32	39	28	--	34	11	18	10	15	15	83	27	15
Sulphate	ug/l	--	43000	87000	150000	97000	260000	--	770000	260000	280000	210000	140000	250000	170000	190000	180000
Temperature (Field)	deg c	-- (24)	2	10	15	20.7	24	--	17.1	13	4	3	1	1	2	9	16
Total Dissolved Solids	ug/l	--	698000	390000	596000	552000	714000	--	1190000	800000	894000	668000	844000	764000	398000	678000	494000
Total Suspended Solids	ug/l	--	3000	2000	8000	1000	4000	--	1000	2000	1000	1000	3000	6000	15000	1000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	31	38	74	70	80	--	130	64	93	58	55	77	33	73	58
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	50	100	120	80	140	--	140	110	90	77	170	54	96	59	160
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	86000	87000	120000	120000	150000	--	320000	160000	210000	160000	170000	190000	82000	160000	110000
Chromium	ug/l	-- (30)	<5	<5	<5	<5	<5	--	<5	<5	<5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	1	<1	1	1	<1	--	1	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	1.1
Hexavalent Chromium	ug/l	1 (22)	<0.5	0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Iron	ug/l	300	100	**400**	**1800**	200	**1600**	--	<100	**600**	<100	120	110	220	290	190	**1100**
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	10000	15000	19000	15000	22000	--	28000	23000	27000	23000	39000	20000	17000	18000	18000
Manganese	ug/l	--	54	190	900	2400	660	--	61	430	53	380	4.9	88	20	180	540
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1700	3000	4500	2900	4700	--	3600	3700	4400	3600	5100	2700	3600	3100	3400
Silicon	ug/l	--	1100	780	920	7100	3100	--	860	1900	2700	2200	3000	3000	1800	1700	1400
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	18000	32000	72000	60000	67000	--	57000	63000	78000	64000	64000	110000	32000	61000	39000
Strontium	ug/l	--	1200	1900	2200	1600	2900	--	2900	2600	2600	2200	4300	1500	2600	1600	2400
Sulfur	ug/l	--	24000	33000	54000	33000	89000	--	280000	85000	88000	78000	130000	76000	58000	67000	61000
Thallium	ug/l	0.3 (33)	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	0.05	<0.050	<0.050	<0.050	<0.050	0.052	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
			29-Jun-2012	**20-Jul-2012 (2)**	**29-Aug-2012 (2)**	**26-Sep-2012**	**10-Oct-2012**	**28-Nov-2012**	**17-Dec-2012 (3)**	**16-Jan-2013 (9)**	**26-Feb-2013 (3)**	**25-Mar-2013 (3)**	**01-Apr-2013 (4)**	**10-May-2013**	**21-Jun-2013**	**29-Jul-2013**	**14-Aug-2013**
Parameter	**Unit**	**PWQO (1)**	T-4	s-6	s-6	SS-6	SS-6	SS-6	s-6	SS-6	ss6	s6	ss6	SS-6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	270000	--	--	240000	340000	300000	--	140000	--	--	--	240000	250000	270000	250000
Ammonia, unionized (Field)	ug/l	20	<20	--	--	<20	<20	<20	--	<20	--	--	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	--	--	910	110	100	--	150	--	--	--	130	<50	67	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	--	<2000	<2000	<2000	--	<2000	--	--	--	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	43000	--	--	20000	26000	22000	--	10000	--	--	--	23000	16000	36000	20000
Chloride	ug/l	--	65000	--	--	48000	64000	63000	--	62000	--	--	--	35000	38000	42000	41000
Chromium (III)	ug/l	8.9 (22)	<5	--	--	<5	<5	<5	--	<5	--	--	--	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	844	--	--	1040	1095	1070	--	880	--	--	--	828	882	627	937
Dissolved Organic Carbon	ug/l	--	15000	--	--	8100	8300	4600	--	3600	--	--	--	5900	7000	11000	8100
Hardness, Calcium Carbonate	ug/l	--	370000	--	--	500000	570000	570000	--	520000	--	--	--	390000	440000	370000	410000
Nitrate as N	ug/l	--	170	--	--	<100	<100	2100	--	910	--	--	--	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	--	--	<10	<10	<10	--	<10	--	--	--	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	1100	--	--	1400	770	550	--	690	--	--	--	950	490	870	500
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.29	--	--	7.7	7.8	7.7	--	7.8	--	--	--	7.7	7.53	7.22	7.15
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	49	--	--	5	9	42	--	7	--	--	--	25	5	29	13
Sulphate	ug/l	--	140000	--	--	320000	260000	300000	--	330000	--	--	--	180000	190000	120000	180000
Temperature (Field)	deg c	-- (24)	21.6	--	--	10	9	2	--	1	--	--	--	17	18.3	17.2	18.5
Total Dissolved Solids	ug/l	--	582000	--	--	820000	864000	824000	--	770000	--	--	--	554000	618000	580000	632000
Total Suspended Solids	ug/l	--	9000	--	--	4000	<1000	4000	--	4000	--	--	--	1000	<1000	<1000	2000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	70	--	--	91	82	100	--	54	--	--	--	56	48	80	51
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	110	--	--	150	79	73	--	140	--	--	--	120	**240**	95	95
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	120000	--	--	170000	190000	200000	--	150000	--	--	--	130000	120000	150000	140000
Chromium	ug/l	-- (30)	<5.0	--	--	<5.0	<5.0	<5.0	--	<5.0	--	--	--	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	--	--	<0.50	<0.50	<0.50	--	<0.50	--	--	--	<0.50	<0.50	0.51	<0.50
Copper	ug/l	5	1.1	--	--	<1.0	1.2	<1.0	--	<1.0	--	--	--	1.9	1.7	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.5	--	--	<0.5	<0.5	<0.5	--	0.6	--	--	--	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	**490**	--	--	**2000**	300	**1100**	--	**370**	--	--	--	<100	<100	**2000**	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	19000	--	--	27000	24000	26000	--	32000	--	--	--	19000	33000	20000	20000
Manganese	ug/l	--	1900	--	--	1200	1100	980	--	100	--	--	--	120	2.6	870	27
Mercury	ug/l	0.2 (32)	<0.10	--	--	<0.10	<0.10	<0.10	--	<0.10	--	--	--	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1400	--	--	4600	3600	2900	--	5300	--	--	--	3900	7800	2100	2900
Silicon	ug/l	--	6200	--	--	2400	2500	2100	--	2300	--	--	--	2300	2100	4200	2700
Silver	ug/l	0.1	<0.10	--	--	<0.10	<0.10	<0.10	--	<0.10	--	--	--	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	61000	--	--	59000	72000	69000	--	61000	--	--	--	44000	55000	49000	43000
Strontium	ug/l	--	2000	--	--	3600	2100	1900	--	4000	--	--	--	2200	5900	2300	2300
Sulfur	ug/l	--	42000	--	--	110000	92000	110000	--	120000	--	--	--	58000	120000	46000	62000
Thallium	ug/l	0.3 (33)	<0.050	--	--	<0.050	<0.050	<0.050	--	<0.050	--	--	--	0.079	0.11	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			26-Sep-2013	**25-Oct-2013**	**22-Nov-2013**	**23-Dec-2013**	**09-Jan-2014 (4)**	**04-Feb-2014 (4)**	**26-Mar-2014**	**22-Apr-2014**	**21-May-2014**	**19-Jun-2014**	**15-Jul-2014**	**25-Aug-2014**	**23-Sep-2014**	**27-Oct-2014**	**20-Nov-2014**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	SS-6	SS-6	s6	s6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	250000	240000	230000	310000	--	--	260000	160000	230000	200000	230000	270000	270000	240000	270000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	--	--	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	150	200	<50	580	--	--	340	620	<50	<50	<50	<50	<50	64	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	--	--	12000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	21000	10000	13000	22000	--	--	99000	16000	15000	20000	26000	21000	12000	16000	15000
Chloride	ug/l	--	34000	38000	41000	42000	--	--	41000	25000	32000	37000	29000	32000	31000	32000	39000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	895	610	994	733	--	--	1055	830	815	855	674	845	960	756	933
Dissolved Organic Carbon	ug/l	--	6700	5300	5200	5700	--	--	5100	4100	5300	5800	8000	6400	5500	5700	5300
Hardness, Calcium Carbonate	ug/l	--	410000	420000	430000	500000	--	--	450000	270000	340000	380000	300000	390000	390000	350000	430000
Nitrate as N	ug/l	--	<100	110	<100	<100	--	--	<100	930	210	<100	<100	<100	970	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	--	--	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	640	550	350	1100	--	--	3600	1000	360	650	970	830	400	410	430
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	6.85	7.6	7.56	7.62	--	--	7.55	7.6	7.6	7.65	7.36	7.7	7.7	7.50	7.49
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	19	6	28	41	--	--	130	14	8	15	32	43	10	17	24
Sulphate	ug/l	--	200000	220000	230000	220000	--	--	230000	130000	140000	210000	98000	160000	170000	140000	200000
Temperature (Field)	deg c	-- (24)	11.3	6	1.4	0	--	--	1.4	8	9	17.5	16.5	22	21	9.3	0.6
Total Dissolved Solids	ug/l	--	642000	684000	672000	696000	--	--	660000	400000	490000	686000	428000	548000	608000	506000	578000
Total Suspended Solids	ug/l	--	6000	<1000	12000	13000	--	--	200000	<1000	3000	5000	5000	7000	4000	1000	16000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	50	68	50	89	--	--	110	35	54	57	48	67	72	43	57
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	100	120	76	58	--	--	83	82	130	120	100	130	99	71	60
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	150000	140000	170000	--	--	170000	85000	110000	140000	110000	130000	130000	130000	160000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	0.59	--	--	**1.1**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	<1.0	--	--	3.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	<100	260	130	**1600**	--	--	**10000**	100	210	210	270	**610**	**500**	<100	290
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	20000	25000	22000	25000	--	--	25000	15000	16000	20000	14000	19000	20000	18000	22000
Manganese	ug/l	--	42	1500	35	3100	--	--	2600	91	530	97	320	990	660	52	260
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	3600	4300	3300	2500	--	--	3600	3300	3600	2800	2100	3500	3800	3300	2400
Silicon	ug/l	--	2200	2400	2000	4400	--	--	5100	1200	1600	2600	3900	2200	2200	3000	3800
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	38000	43000	41000	47000	--	--	41000	22000	35000	40000	33000	33000	34000	32000	38000
Strontium	ug/l	--	2300	2900	2400	2500	--	--	2500	2100	2300	2300	1900	2200	2500	1900	2100
Sulfur	ug/l	--	72000	78000	82000	80000	--	--	80000	51000	50000	68000	34000	55000	59000	52000	73000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			09-Dec-2014 (11)	**16-Mar-2015**	**07-Apr-2015**	**21-May-2015**	**23-Jun-2015**	**22-Jul-2015 (2)**	**28-Aug-2015**	**25-Sep-2015**	**27-Oct-2015**	**20-Nov-2015**	**10-Dec-2015**	**26-Jan-2016**	**23-Feb-2016 (3)**	**21-Mar-2016**	**26-Apr-2016**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	SS-6	SS-6	SS-6	6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	370000	260000	220000	340000	240000	--	240000	280000	210000	210000	210000	230000	--	160000	210000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	<50	380	<50	290	--	--	<50	<50	98	<50	<50	71	--	1600	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	6000	<2000	<2000	<2000	--	<2000	<2000	<2000	<2000	<2000	<2000	--	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	26000	38000	11000	30000	28000	--	56000	18000	14000	15000	15000	82000	--	13000	11000
Chloride	ug/l	--	47000	40000	31000	60000	39000	--	60000	61000	48000	45000	46000	42000	--	33000	40000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	--	<5	<5	<5	<5	<5	<5	--	<5	<5
Conductivity (Field)	uS/cm	--	1197	1030	853	765	8.52	--	591	795	836	910	1046	987	--	660	791
Dissolved Organic Carbon	ug/l	--	6900	12000	4100	9500	8800	--	22000	6200	5000	4800	4000	3900	--	3500	5100
Hardness, Calcium Carbonate	ug/l	--	620000	510000	400000	430000	390000	--	240000	490000	390000	450000	440000	450000	--	290000	360000
Nitrate as N	ug/l	--	<100	180	<100	240	<100	--	<100	<100	<100	<100	<100	<100	--	230	<100
Nitrite as N	ug/l	--	<10	<10	<10	13	<10	--	<10	<10	<10	<10	<10	<10	--	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	690	1200	320	1300	470	--	900	340	<500 (35)	310	250	410	--	1700	190
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.42	**8.62**	7.66	7.6	6.81	--	7.72	7.6	7.35	8.10	7.51	7.93	--	7.65	7.75
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	49	43	29	82	25	--	33	8	<4	11	33	140	--	<4	9
Sulphate	ug/l	--	250000	250000	190000	130000	180000	--	<1000	270000	190000	230000	260000	270000	--	150000	150000
Temperature (Field)	deg c	-- (24)	0.4	1.0	1.6	14	21.0	--	18.4	16	3.4	6.1	5.2	0.3	--	1.4	7.8
Total Dissolved Solids	ug/l	--	846000	632000	516000	678000	628000	--	396000	776000	616000	668000	734000	682000	--	308000	516000
Total Suspended Solids	ug/l	--	61000	8000	7000	7000	2000	--	4000	3000	<1000	<1000	11000	83000	--	<1000	1000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	82	56	52	84	60	--	51	79	40	47	54	50	--	34	44
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	60	63	70	88	110	--	14	110	56	58	51	80	--	61	62
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	200000	150000	130000	150000	140000	--	99000	170000	120000	140000	150000	150000	--	100000	110000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
Iron	ug/l	300	**670**	<100	120	**5600**	300	--	130	**320**	<100	<100	**360**	180	--	<100	<100
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	28000	22000	19000	18000	19000	--	4800	25000	18000	20000	21000	23000	--	15000	15000
Manganese	ug/l	--	2600	130	210	1200	380	--	11	570	2.7	16	180	40	--	2.1	13
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	2200	3200	2600	2800	1100	--	<200	4100	2800	3700	3200	3600	--	3600	4100
Silicon	ug/l	--	5500	2500	2200	2100	2400	--	1000	2400	2000	2900	2900	2400	--	1200	140
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10
Sodium	ug/l	--	48000	36000	29000	60000	36000	--	40000	44000	34000	34000	35000	36000	--	24000	30000
Strontium	ug/l	--	2600	2100	1700	2400	2100	--	330	3200	1800	2100	2100	2500	--	1700	1800
Sulfur	ug/l	--	87000	93000	66000	42000	--	--	3300	88000	61000	73000	84000	84000	--	51000	50000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Parameter	Unit	PWQO (1)	SS-6 31-May-2016 SS-6	SS-6 30-Jun-2016 SS-6	SS-6 13-Jul-2016 SS-6	SS-6 04-Aug-2016 (2) 6	SS-6 20-Sep-2016 SS-6	SS-6 26-Oct-2016 SS-6	SS-6 11-Nov-2016 SS-6	SS-6 14-Dec-2016 SS-6	SS-6 23-Jan-2017 SS-6	SS-6 14-Feb-2017 (3) 6	SS-6 27-Mar-2017 SS-5	SS-6 21-Apr-2017 SS-6	SS-6 23-May-2017 SS-6	SS-6 26-Jun-2017 SS-6	SS-6 21-Jul-2017 SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	290000	250000	250000	--	170000	220000	250000	220000	270000	--	230000	190000	240000	220000	300000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	--	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	270	1000	<50	--	<50	<50	<50	240	56	--	79	<50	150	93	<50
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	3000	<2000	--	<2000	<2000	2000	<2000	6000	--	<2000	<2000	<2000	<2000	<2000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	48000	48000	20000	--	23000	15000	19000	4900	650000	--	83000	20000	21000	26000	37000
Chloride	ug/l	--	41000	76000	80000	--	59000	63000	58000	43000	40000	--	40000	30000	33000	60000	37000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	--	<5	<5	<5	<5	<5	--	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	779	495	480	--	1005	705	992	840	929	--	831	663	690	786	644
Dissolved Organic Carbon	ug/l	--	12000	10000	6000	--	8400	4100	5500	4600	4500	--	4800	6000	7100	8900	11000
Hardness, Calcium Carbonate	ug/l	--	390000	580000	580000	--	470000	560000	520000	460000	410000	--	340000	250000	290000	340000	280000
Nitrate as N	ug/l	--	<100	<100	<100	--	<100	<100	<100	170	<100	--	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	--	<10	<10	<10	11	<10	--	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	740	2200	450	--	430	180	340	480	430	--	440	250	450	540	550
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.42	7.7	7.7	--	7.64	7.6	7.44	7.5	7.45	--	7.83	7.15	7.84	7.51	7.20
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	150	93	34	--	16	8	20	<4	1200	--	140	30	20	27	60
Sulphate	ug/l	--	110000	320000	340000	--	290000	350000	260000	280000	210000	--	150000	78000	91000	100000	8900
Temperature (Field)	deg c	-- (24)	16.7	25	25	--	18.4	19	4.9	2	0.2	--	0.9	8.1	17.7	20.0	22.2
Total Dissolved Solids	ug/l	--	516000	908000	964000	--	748000	850000	738000	712000	630000	--	542000	354000	442000	552000	398000
Total Suspended Solids	ug/l	--	29000	16000	2000	--	1000	<1000	2000	3000	1600000	--	190000	14000	2000	2000	8000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	110	130	80	--	66	67	55	54	140	--	58	41	47	50	61
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	81	140	170	--	170	120	67	79	73	--	47	41	54	66	57
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	130000	190000	200000	--	150000	170000	150000	150000	150000	--	130000	92000	110000	120000	100000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	13	--	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	**4.6**	--	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	**30**	--	1.5	<1.0	<1.0	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	**1600**	**530**	<100	--	<100	<100	<100	140	**16000**	--	**2300**	**1200**	120	**500**	**1700**
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	16000	25000	30000	--	19000	30000	20000	23000	21000	--	16000	9700	11000	14000	11000
Manganese	ug/l	--	3200	930	86	--	65	100	57	220	570	--	530	64	40	190	2100
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	1300	3700	4000	--	2800	6400	4900	3900	4200	--	3600	5800	6600	5200	6800
Silicon	ug/l	--	3300	7700	2700	--	3700	2300	3200	2000	13000	--	3500	2000	760	2100	4600
Silver	ug/l	0.1	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10	**0.30**	--	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	36000	47000	51000	--	39000	45000	38000	40000	32000	--	33000	27000	32000	34000	28000
Strontium	ug/l	--	2000	2800	3900	--	2100	3600	2200	2700	2200	--	1500	1100	1300	1600	1400
Sulfur	ug/l	--	36000	110000	120000	--	96000	120000	88000	91000	79000	--	52000	30000	31000	36000	4800
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	--	<0.050	<0.050	<0.050	<0.050	0.18	--	<0.050	<0.050	<0.050	<0.050	<0.050
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			11-Aug-2017	**08-Sep-2017**	**17-Oct-2017**	**17-Nov-2017**	**07-Dec-2017 (14)**	**22-Jan-2018**	**16-Feb-2018 (51)**	**13-Mar-2018**	**24-Apr-2018**	**18-May-2018**	**22-Jun-2018 (52)**	**18-Jul-2018 (2)**	**24-Aug-2018**	**18-Sep-2018**	**24-Oct-2018**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	290000	230000	230000	240000	210000	237000	460000	259000	177000	197000	259000	--	229000	263000	250000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20
Ammonia Nitrogen	ug/l	--	170	<50	<50	<50	<50	80	2880	210	460	660	130	--	110	1970	<20
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	2000	<2000	<2000	3000	<2000	1000	44000	9000	1000	1000	11000	--	<1000	1000	1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	33000	19000	18000	39000	20000	16000	105000	29000	7000	17000	33000	--	20000	38000	10000
Chloride	ug/l	--	42000	40000	43000	41000	45000	76000	89000	42000	44000	50000	11000	--	62000	67000	65000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	**<10**	<1	**<10**	**<10**	**<10**	**<10**	--	<0.1	**<10**	**<10**
Conductivity (Field)	uS/cm	--	755	710	816	779	788	998	1216	783	702	740	732	--	969	1124	933
Dissolved Organic Carbon	ug/l	--	13000	7800	6500	4700	4100	4700	12800	6800	3900	6200	12800	--	8000	19200	6400
Hardness, Calcium Carbonate	ug/l	--	310000	310000	360000	360000	360000	475000	646000	373000	267000	330000	329000	--	388000	537000	408000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	670	270	330	230	120	300	12500	600	1900	900	1300	--	600	5300	400
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.20	7.22	7.08	7.11	7.24	7.32	6.74	7.51	7.84	7.60	7.69	--	7.39	7.39	7.42
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	42	8	10	110	32	12	365	36	68	29	52	--	23	98	8
Sulphate	ug/l	--	42000	82000	140000	110000	170000	240000	163000	100600	97000	111000	14000	--	234000	279000	226000
Temperature (Field)	deg c	-- (24)	19.6	13.7	7.5	0.6	1.3	0	0	0.2	10.2	14.9	14.7	--	18.8	19.6	6.1
Total Dissolved Solids	ug/l	--	560000	462000	570000	455000	450000	649000	910000	512000	432000	488000	489000	--	670000	754000	689000
Total Suspended Solids	ug/l	--	5000	1000	4000	14000	8000	9000	671000	6000	3000	1000	156000	--	12000	10000	4000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	82	50	50	55	49	60	130	60	50	50	50	--	90	90	60
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	70	57	47	44	34	70	60	50	60	60	70	--	120	130	60
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	100000	110000	120000	120000	130000	154000	216000	128000	87000	109000	107000	--	129000	182000	137000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<1	3	<1	<1	<1	<1	--	<1	<1	<1
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	**1.1**	<0.50	<0.2	**1.4**	<0.2	<0.2	<0.2	<0.2	--	<0.2	<0.2	<0.2
Copper	ug/l	5	<1.0	<1.0	<1.0	2.5	1.6	<1	3	<1	<1	<1	<1	--	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	**2.1**	**<10**	<1	**<10**	**<10**	**<10**	**<10**	--	**<10**	**<10**	**<10**
Iron	ug/l	300	**980**	210	230	**4800**	**1300**	160	**3800**	**390**	80	280	**1390**	--	**350**	**510**	**380**
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	13000	14000	14000	15000	15000	22000	26000	13000	12000	14000	15000	--	16000	20000	16000
Manganese	ug/l	--	4600	350	140	250	97	70	1180	410	50	150	680	--	410	960	100
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	6400	6000	5300	5400	5900	8000	9000	4000	6000	6000	4000	--	7000	7000	5000
Silicon	ug/l	--	5300	3000	3000	4700	2800	2600	6600	2900	1000	300	4000	--	3600	6300	3000
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1
Sodium	ug/l	--	34000	30000	27000	27000	27000	39000	48000	27000	24000	31000	32000	--	34000	39000	36000
Strontium	ug/l	--	1500	1700	1500	1400	1500	2430	2900	1510	1720	1540	1360	--	2910	2410	1790
Sulfur	ug/l	--	22000	28000	47000	39000	58000	48200	66900	31700	30900	44400	19800	--	90800	101000	79900
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			20-Nov-2018	**18-Dec-2018**	**25-Jan-2019 (3)**	**21-Feb-2019 (53)**	**13-Mar-2019 (3)**	**17-Apr-2019**	**24-May-2019**	**21-Jun-2019**	**18-Jul-2019**	**21-Aug-2019**	**18-Sep-2019**	**29-Oct-2019**	**19-Nov-2019 (54)**	**18-Dec-2019**	**15-Jan-2020**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	6	SS-6	6	SS-6	SS - 6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	249000	295000	--	537000	--	164000	212000	247000	268000	220000	227000	214000	356000	304000	243000
Ammonia, unionized (Field)	ug/l	20	<20	<20	--	<20	--	<20	<20	<20	<20	<20	<20	<20	--	<20	<20
Ammonia Nitrogen	ug/l	--	70	90	--	1800	--	30	25	<10	1010	2400	50	60	<10	<10	53
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	4000	2000	--	16000	--	2000	4000	<1000	<1000	3000	3000	2000	6000	1000	10000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	71000	7000	--	130000	--	7000	14000	80000	21000	18000	22000	14000	50000	48000	57000
Chloride	ug/l	--	63000	66000	--	72000	--	30000	43000	50000	74000	68000	98000	68000	72000	48000	61000
Chromium (III)	ug/l	8.9 (22)	**<10**	**<10**	--	4	--	<1	<1	<1	<1	<1	<1	<1	**<10**	<1	1
Conductivity (Field)	uS/cm	--	17	1121	--	1264	--	511	700	773	915	1024	1089	984	1240	656	992
Dissolved Organic Carbon	ug/l	--	4900	4800	--	11700	--	4000	5300	6200	7000	18700	6900	6100	6900	5600	7900
Hardness, Calcium Carbonate	ug/l	--	484000	502000	--	826000	--	219000	322000	338000	383000	485000	605000	425000	510000	462000	468000
Nitrate as N	ug/l	--	<100	<100	--	<100	--	180	170	<100	<100	<100	<100	<100	<100	<100	180
Nitrite as N	ug/l	--	<100	<100	--	<100	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	7100	400	--	7800	--	300	600	390	1700	2500	500	300	1700	3760	2420
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.33	6.98	--	6.91	--	7.35	7.96 (37)	6.86	7.06	6.83	7.05	7.11	--	**8.73**	7.53
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	152	16	--	562	--	8	14	48	44	57	14	4	140	67	194
Sulphate	ug/l	--	204000	224000	--	152000	--	63000	113000	112000	145000	284000	269000	189000	182000	165000	230000
Temperature (Field)	deg c	-- (24)	0	0.3	--	0	--	7	14	20.5	22.1	17.8	15.5	10.8	0.9	-0.3	0.3
Total Dissolved Solids	ug/l	--	647000	728000	--	819000	--	333000	398000	904000	585000	715000	793000	626000	774000	641000	663000
Total Suspended Solids	ug/l	--	433000	3000	--	1100000	--	<1000	3000	3000	11000	3000	18000	2000	180000	47000	143000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	110	70	--	180	--	30	50	60	70	100	90	60	100	70	70
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	50	60	--	60	--	40	60	80	80	130	90	70	<100	40	60
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	164000	168000	--	298000	--	76000	109000	114000	127000	163000	206000	142000	173000	157000	156000
Chromium	ug/l	-- (30)	2	<1	--	4	--	<1	<1	<1	<1	<1	1	<1	<10	<1	1
Cobalt	ug/l	0.9	**1.2**	<0.2	--	**1.9**	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**<2**	0.5	0.3
Copper	ug/l	5	2	<1	--	3	--	<1	<1	<1	<1	<1	<1	<1	**<10**	1	<1
Hexavalent Chromium	ug/l	1 (22)	**<10**	**<10**	--	<1	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	ug/l	300	**8060**	**690**	--	**8200**	--	40	190	**530**	**1020**	260	**580**	30	**5700**	**3880**	**2060**
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	18000	20000	--	20000	--	7000	12000	13000	16000	19000	22000	17000	19000	17000	19000
Manganese	ug/l	--	900	300	--	4100	--	20	100	410	590	1580	160	20	2300	630	390
Mercury	ug/l	0.2 (32)	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	5000	5000	--	6000	--	5000	7000	4000	5000	3000	7000	7000	4000	4000	8000
Silicon	ug/l	--	5100	3900	--	7600	--	1600	600	1500	4400	6000	3500	2900	5500	4100	3000
Silver	ug/l	0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<1**	<0.1	<0.1
Sodium	ug/l	--	34000	38000	--	40000	--	20000	28000	29000	40000	40000	52000	36000	38000	28000	39000
Strontium	ug/l	--	2230	2050	--	2900	--	933	1430	1690	2110	2370	2630	2100	2140	1850	2140
Sulfur	ug/l	--	66600	88500	--	48400	--	23000	35700	43400	66800	107000	101000	68200	60000	67400	77300
Thallium	ug/l	0.3 (33)	<0.1	<0.1	--	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**<1**	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
			19-Feb-2020 (54)	**19-Mar-2020**	**03-Apr-2020**	**08-May-2020**	**01-Jun-2020**	**21-Jul-2020 (2)**	**25-Aug-2020**	**17-Sep-2020**	**23-Oct-2020**	**26-Nov-2020**	**11-Dec-2020 (54)**	**08-Jan-2021**	**18-Feb-2021**	**22-Mar-2021**	**09-Apr-2021 (49)**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6	SS-6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	288000	142000	148000	213000	213000	--	220000	257000	211000	212000	257000	229000	363000	133000	205000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	250	140	<10	37	<10	--	180	15	<10	105	<10	<10	149	<10	<10
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	44000	9000	<1000	<1000	16000	--	6000	5000	7000	3000	4000	4000	9000	2000	<1000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	1010000	101000	6000	14000	46000	--	22000	27000	16000	9000	26000	27000	93000	<5000	8000
Chloride	ug/l	--	48000	28000	18000	40000	51000	--	67000	57000	49000	41000	46000	53000	57000	21000	48000
Chromium (III)	ug/l	8.9 (22)	**10**	**<10**	<1	<1	<1	--	<1	<1	<1	<1	5	<1	2	<1	<1
Conductivity (Field)	uS/cm	--	1054	599	466	828	778	--	855	946	914	601	946	1016	1265	555	724
Dissolved Organic Carbon	ug/l	--	5500	3100	3700	3900	10200	--	8900	8800	6400	4500	4300	5900	5800	3000	4800
Hardness, Calcium Carbonate	ug/l	--	418000	232000	206000	349000	322000	--	415000	408000	373000	335000	442000	472000	648000	189000	366000
Nitrate as N	ug/l	--	<100	<100	<100	<100	230	--	<100	<100	<500	120	<100	180	<100	<100	<500
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	--	<100	<100	<500	<100	<100	<100	<100	<100	<500
Nitrogen, Total Kjeldahl	ug/l	--	23900	4150	463	358	1410	--	1230	949	720	1180	1330	450	3740	571	674
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.30	7.30	7.61	7.65	7.83	--	6.71	7.21	7.43	7.72	7.35	7.46	7.11	7.31	7.45
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	1150	260	10	14	13	--	26	9	8	9	280	14	132	25	18
Sulphate	ug/l	--	139000	88000	52000	137000	124000	--	193000	178000	174000	122000	188000	260000	253000	73000	142000
Temperature (Field)	deg c	-- (24)	0.1	0.5	2.6	5.1	13	--	22.4	13.7	12.5	0.4	1.1	0.1	0.5	2.2	12.1
Total Dissolved Solids	ug/l	--	608000	330000	291000	508000	496000	--	629000	620000	558000	478000	593000	670000	793000	298000	499000
Total Suspended Solids	ug/l	--	3560000	722000	11000	21000	7000	--	19000	4000	1000	14000	236000	13000	254000	25000	3000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	500	100	30	60	40	--	70	60	60	40	130	70	120	30	50
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	100	50	40	70	90	--	110	80	70	40	60	60	50	<10	60
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	141000	78000	71000	115000	106000	--	140000	137000	128000	116000	149000	156000	225000	64000	125000
Chromium	ug/l	-- (30)	10	5	<1	<1	<1	--	<1	<1	<1	<1	5	<1	2	<1	<1
Cobalt	ug/l	0.9	**12**	**3.8**	<0.2	<0.2	<0.2	--	<0.2	<0.2	<0.2	<0.2	**4**	<0.2	**1.5**	<0.2	<0.2
Copper	ug/l	5	**<10**	**8**	<1	<1	<1	--	<1	<1	<1	<1	5	<1	2	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	**<10**	<1	<1	<1	--	<0.50	<0.50	<0.50	<1	<0.5	<0.50	<0.5	<0.5	<0.5
Iron	ug/l	300	**66500**	**9100**	160	120	90	--	300	**560**	90	**1110**	**11700**	260	**23800**	**930**	160
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	16000	9000	7000	15000	14000	--	16000	16000	13000	11000	17000	20000	21000	7000	13000
Manganese	ug/l	--	4200	1100	70	110	90	--	170	340	30	110	570	110	2980	60	40
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	4000	4000	2000	8000	10000	--	11000	5000	6000	2000	4000	6000	4000	2000	4000
Silicon	ug/l	--	20400	4200	2300	1500	1200	--	6400	4200	4000	4000	6800	3900	5800	2600	2000
Silver	ug/l	0.1	**<1**	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	**<0.5**	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	30000	21000	12000	31000	36000	--	37000	37000	26000	23000	30000	36000	36000	14000	30000
Strontium	ug/l	--	2870	1570	819	1970	1870	--	2590	1870	2170	1070	1780	1970	1990	756	1480
Sulfur	ug/l	--	70000	36200	18700	53900	46900	--	73700	69000	65700	49000	69000	88600	97400	28400	55100
Thallium	ug/l	0.3 (33)	**<1**	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	**<0.5**	<0.1	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-6	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**	**SS-6**
			28-May-2021	**28-Jun-2021**	**15-Jul-2021**	**11-Aug-2021**	**28-Sep-2021**	**27-Oct-2021**	**11-Nov-2021**	**15-Dec-2021**	**25-Jan-2022 (3)**	**24-Feb-2022 (4)**	**17-Mar-2022 (3)**	**28-Apr-2022**	**26-May-2022 (20)**	**24-Jun-2022**	**25-Jul-2022**
Parameter	**Unit**	**PWQO (1)**	SS-6	SS-6	SS-6	SS-6	SS6	SS6	SS6	SS6	SS6	6	6	SS6	SS6	SS6	SS6
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	263000	193000	262000	355000	246000	225000	260000	228000	--	--	--	189000	251000	239000	276000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	--	--	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<10	<10	<10	<10	25	<10	<10	<10	--	--	--	18	26	93	<20
Bicarbonate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	8000	4000	3000	3000	1000	<1000	1000	2000	--	--	--	<1000	<1000	3000	3000
Carbonate (CO3)	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemical Oxygen Demand	ug/l	--	9000	14000	<5000	22000	10000	9000	12000	76000	--	--	--	9000	38000	15000	28000
Chloride	ug/l	--	74000	74000	70000	73000	82000	46000	57000	32000	--	--	--	54000	40000	52000	42000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	<1	<1	<1	<1	--	--	--	<1	<1	<1.0	<1
Conductivity (Field)	uS/cm	--	894	1109	1001	1145	992	776	1076	721	--	--	--	732	667	765	896
Dissolved Organic Carbon	ug/l	--	10600	5800	9400	12500	7200	7000	7500	5400	--	--	--	5500	8400	7900	11800
Hardness, Calcium Carbonate	ug/l	--	459000	518000	512000	525000	538000	367000	439000	347000	--	--	--	369000	361000	396000	425000
Nitrate as N	ug/l	--	<500	<100	<500	<500	<100	<100	<100	<100	--	--	--	<100	<100	<100	<100
Nitrite as N	ug/l	--	<500	<100	<500	<500	<100	<100	<100	<100	--	--	--	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	1820	661	860	1790	1520	499	465	1370	--	--	--	549	610	673	1300
Nitrogen, Organic	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH (Field)	-	6.5 - 8.5	7.44	7.52	7.05	7.04	7.59	7.78	7.59	7.50	--	--	--	7.81	7.37	7.31	7.05
Phosphate	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	ug/l	-- (23)	30	27	18	39	7	4	4	117	--	--	--	<2	8	13	25
Sulphate	ug/l	--	186000	323000	228000	162000	293000	147000	190000	107000	--	--	--	173000	118000	166000	174000
Temperature (Field)	deg c	-- (24)	9.6	20.8	23.7	23.7	13.2	10.4	5.7	0.2	--	--	--	9.8	19.6	22.3	24
Total Dissolved Solids	ug/l	--	616000	784000	676000	767000	760000	557000	656000	470000	--	--	--	541000	489000	565000	586000
Total Suspended Solids	ug/l	--	18000	14000	4000	13000	<1000	<1000	12000	102000	--	--	--	<1000	1000	4000	11000
Turbidity	ntu	-- (25)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																	
Aluminum, dissolved	ug/l	-- (26)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/l	--	70	70	80	100	80	50	50	70	--	--	--	50	50	80	140
Beryllium	ug/l	-- (27)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	ug/l	200 (28)	70	200	120	110	110	60	50	40	--	--	--	70	80	80	140
Cadmium	ug/l	0.2 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/l	--	154000	171000	172000	174000	179000	124000	146000	116000	--	--	--	123000	123000	134000	147000
Chromium	ug/l	-- (30)	<1	<1	<1	<1	<1	<1	<1	3	--	--	--	<1	<1	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**1.8**	--	--	--	<0.2	<0.2	<0.2	0.3
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	2	--	--	--	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	--	<0.50	<0.5	<0.50	<0.5
Iron	ug/l	300	**550**	100	**490**	**470**	140	30	200	**3590**	--	--	--	<30	200	**410**	**1390**
Lead	ug/l	-- (31)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	ug/l	--	18000	22000	20000	22000	22000	14000	18000	14000	--	--	--	15000	13000	15000	14000
Manganese	ug/l	--	390	230	400	2150	220	10	100	360	--	--	--	<10	180	510	9560
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/l	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	ug/l	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	ug/l	--	5000	7000	6000	7000	9000	8000	7000	3000	--	--	--	9000	4000	6000	4000
Silicon	ug/l	--	2400	3600	5400	8700	4000	3900	3500	5300	--	--	--	1500	1900	3400	7000
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	43000	50000	44000	48000	45000	28000	36000	21000	--	--	--	37000	32000	35000	30000
Strontium	ug/l	--	1840	2640	2280	3350	2940	1670	1940	1150	--	--	--	1860	1540	2070	2190
Sulfur	ug/l	--	59400	114000	83000	64000	99700	58200	64800	37000	--	--	--	64400	31300	51400	67000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1	<0.1	<0.1
Titanium	ug/l	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/l	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	ug/l	30 (29)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenols																	
Phenolics, Total Recoverable	ug/l	1 (34)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

			SS-7	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**
			31-Mar-2009	**20-Apr-2009**	**22-May-2009**	**23-Jun-2009**	**27-Jul-2009**	**13-Aug-2009**	**24-Sep-2009 (4)**	**15-Oct-2009**	**18-Nov-2009**	**10-Dec-2009**	**20-Jan-2010 (4)**	**03-Feb-2010 (4)**	**31-Mar-2010**	**06-Apr-2010 (40)**	**06-May-2010 (4)**
Parameter	**Unit**	**PWQO (1)**	T-4	SS-7	SS-7	T-6	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	160000	175000	225000	241000	222000	258000	--	277000	237000	215000	--	--	174000	176000	--
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	--	--	<20	<20	--
Ammonia Nitrogen	ug/l	--	<50	<50	<50	<50	<50	<50	--	<50	<50	<50	--	--	<50	<50	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	2000	<2000	<2000	--	<2000	<2000	<2000	--	--	<2000	4000	--
Chemical Oxygen Demand	ug/l	--	17000	16000	17000	44000	38000	28000	--	43000	16000	6000	--	--	19000	34000	--
Chloride	ug/l	--	130000	100000	280000	110000	58000	120000	--	60000	49000	51000	--	--	120000	150000	--
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	--	--	<5	<5	--
Conductivity (Field)	uS/cm	--	800	770	805	695	695	745	--	835	1005	910	--	--	965	965	--
Dissolved Organic Carbon	ug/l	--	5700	5400	5600	14700	11700	10100	--	14900	6400	6600	--	--	5400	10700	--
Hardness, Calcium Carbonate	ug/l	--	220000	260000	300000	260000	230000	240000	--	310000	310000	230000	--	--	230000	340000	--
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	--	<100	<100	200	--	--	<100	200	--
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	--	<10	<10	<10	--	--	<10	<10	--
Nitrogen, Total Kjeldahl	ug/l	--	500	700	500	1200	700	600	--	900	600	400	--	--	800	700	--
pH (Field)	-	6.5 - 8.5	8.1	8.3	7.9	8.1	7.6	7.5	--	7.9	7.9	7.8	--	--	7.6	7.8	--
Phosphorus	ug/l	-- (23)	8	21	12	44	11	8	--	45	<2	<2	--	--	<2	28	--
Sulphate	ug/l	--	37000	79000	45000	19000	34000	53000	--	58000	95000	46000	--	--	40000	36000	--
Temperature (Field)	deg c	-- (24)	6	9	14	20	24.0	22	--	9	4	1	--	--	7	11.2	--
Total Dissolved Solids	ug/l	--	505000	520000	920000	510000	416000	605000	--	515000	485000	430000	--	--	460000	564000	--
Total Suspended Solids	ug/l	--	<10000	<10000	<10000	<10000	2000	<1000	--	3000	<1000	1000	--	--	<1000	4000	--
Metals																	
Barium	ug/l	--	55	51	200	72	62	96	--	66	63	68	--	--	64	70	--
Boron	ug/l	200 (28)	10	20	10	30	20	50	--	<10	20	<10	--	--	10	20	--
Calcium	ug/l	--	85000	99000	120000	89000	78000	93000	--	120000	120000	84000	--	--	86000	84000	--
Chromium	ug/l	-- (30)	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	--	--	<5	<5	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	ug/l	5	2	<1	<1	<1	1	1	--	3	1	1	--	--	<1	2	--
Hexavalent Chromium	ug/l	1 (22)	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	--	**<5**	**<5**	**<5**	--	--	<0.5	**<5**	--
Iron	ug/l	300	<100	<100	<100	200	<100	<100	--	100	<100	<100	--	--	200	300	--
Magnesium	ug/l	--	4900	6100	7100	7200	4600	6600	--	7500	7400	6000	--	--	5300	5600	--
Manganese	ug/l	--	10	32	41	290	8	13	--	55	12	<2	--	--	18	47	--
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	--
Potassium	ug/l	--	700	700	800	1500	500	1600	--	2000	900	900	--	--	800	1700	--
Silicon	ug/l	--	1200	500	1200	3100	1800	2100	--	7000	1900	1600	--	--	950	1900	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	ug/l	--	78000	61000	170000	66000	53000	110000	--	56000	43000	48000	--	--	73000	97000	--
Strontium	ug/l	--	440	480	670	580	400	680	--	480	450	530	--	--	440	550	--
Sulfur	ug/l	--	13000	25000	15000	6000	9700	17000	--	19000	28000	15000	--	--	1200000	12000	--
Thallium	ug/l	0.3 (33)	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	--	<0.05	<0.05	<0.05	--	--	<0.05	<0.05	--

Parameter	Unit	PWQO (1)	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
			02-Jun-2010	**07-Jul-2010 (2)**	**18-Aug-2010**	**29-Sep-2010**	**28-Oct-2010 (55)**	**22-Nov-2010**	**09-Dec-2010**	**12-Jan-2011 (3)**	**23-Feb-2011 (3)**	**30-Mar-2011**	**14-Apr-2011**	**12-May-2011**	**20-Jun-2011**	**19-Jul-2011**	**26-Aug-2011 (4)**
			SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS 7	S-3	SS-7	SS-7
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	169000	--	321000	209000	243000	202000	207000	--	--	177000	171000	243000	227000	291000	--
Ammonia, unionized (Field)	ug/l	20	<20	--	<20	<20	<20	<20	<20	--	--	<20	<20	<20	<20	<20	--
Ammonia Nitrogen	ug/l	--	<50	--	<50	<50	<50	<50	<50	--	--	<50	<50	<50	<50	<50	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	<2000	<2000	<2000	<2000	<2000	--	--	<2000	<2000	<2000	<2000	<2000	--
Chemical Oxygen Demand	ug/l	--	44000	--	36000	22000	20000	23000	20000	--	--	21000	19000	25000	37000	42000	--
Chloride	ug/l	--	98000	--	220000	67000	95000	48000	88000	--	--	310000	140000	130000	130000	74000	--
Chromium (III)	ug/l	8.9 (22)	<5	--	<5	<5	7	<5	<5	--	--	**10**	<5	<5	<5	<5	--
Conductivity (Field)	uS/cm	--	880	--	925	485	870	890	804	--	--	830	760	605	958	635	--
Dissolved Organic Carbon	ug/l	--	15900	--	9100	9200	8000	8200	7200	--	--	6100	6500	6700	9100	14100	--
Hardness, Calcium Carbonate	ug/l	--	200000	--	340000	220000	420000	220000	250000	--	--	200000	230000	320000	300000	340000	--
Nitrate as N	ug/l	--	<100	--	<100	<100	<100	<100	200	--	--	200	<100	<100	<100	<100	--
Nitrite as N	ug/l	--	<10	--	<10	<10	<10	<10	<10	--	--	<10	<10	<10	<10	<10	--
Nitrogen, Total Kjeldahl	ug/l	--	1100	--	400	600	500	400	500	--	--	500	600	500	600	1000	--
pH (Field)	-	6.5 - 8.5	7.6	--	7.6	7.4	7.7	7.6	7.63	--	--	7.6	7.9	7.6	8.16	7.5	--
Phosphorus	ug/l	-- (23)	24	--	4	17	<2	7	19	--	--	16	120	29	26	32	--
Sulphate	ug/l	--	17000	--	74000	66000	65000	40000	44000	--	--	37000	37000	65000	75000	55000	--
Temperature (Field)	deg c	-- (24)	19	--	27	13	5	2	0.5	--	--	2	9	14	25.3	27	--
Total Dissolved Solids	ug/l	--	420000	--	918000	458000	560000	408000	464000	--	--	904000	506000	598000	570000	548000	--
Total Suspended Solids	ug/l	--	3000	--	<1000	<1000	2000	<1000	3000	--	--	3000	2000	2000	2000	1000	--
Metals																	
Barium	ug/l	--	64	--	190	88	110	62	67	--	--	110	57	79	91	79	--
Boron	ug/l	200 (28)	30	--	30	30	20	10	<10	--	--	<10	10	20	20	20	--
Calcium	ug/l	--	76000	--	120000	83000	110000	82000	100000	--	--	120000	93000	130000	130000	140000	--
Chromium	ug/l	-- (30)	<5	--	<5	<5	<5	<5	<5	--	--	<5	<5	<5	<5	<5	--
Cobalt	ug/l	0.9	--	--	--	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	--
Copper	ug/l	5	<1	--	<1	1	<1	<1	<1	--	--	**6**	<1	1	<1	<1	--
Hexavalent Chromium	ug/l	1 (22)	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	--
Iron	ug/l	300	200	--	<100	<100	<100	<100	<100	--	--	<100	<100	300	100	300	--
Magnesium	ug/l	--	6400	--	8000	6400	7100	5500	6600	--	--	8500	5800	7600	8900	7800	--
Manganese	ug/l	--	110	--	16	23	19	21	<2	--	--	13	58	270	24	82	--
Mercury	ug/l	0.2 (32)	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--
Potassium	ug/l	--	900	--	1100	1300	1200	900	900	--	--	1200	1300	1000	700	900	--
Silicon	ug/l	--	3700	--	2700	1800	1900	1400	1600	--	--	1200	1100	1400	3100	3900	--
Silver	ug/l	0.1	--	--	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--
Sodium	ug/l	--	63000	--	180000	84000	100000	49000	66000	--	--	180000	86000	77000	99000	56000	--
Strontium	ug/l	--	460	--	860	620	720	470	550	--	--	840	440	530	530	420	--
Sulfur	ug/l	--	5900	--	26000	24000	27000	14000	15000	--	--	13000	14000	23000	27000	21000	--
Thallium	ug/l	0.3 (33)	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	--

Parameter	Unit	PWQO (1)	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
			21-Sep-2011	**28-Oct-2011**	**14-Nov-2011 (9)**	**08-Dec-2011**	**11-Jan-2012 (3)**	**06-Feb-2012 (3)**	**13-Mar-2012**	**10-Apr-2012**	**24-May-2012**	**29-Jun-2012**	**20-Jul-2012 (2)**	**29-Aug-2012 (2)**	**26-Sep-2012**	**10-Oct-2012**	**28-Nov-2012**
			S-6	SS-7	SS-7	SS - 7	SS-7	SS-7	SS-7	SS-7	SS-7	T-5	s-7	s-7	SS-7	SS-7	SS-7
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	199000	211000	222000	191000	--	--	130000	180000	220000	210000	--	--	190000	220000	240000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	--	--	<20	<20	<20	<20	--	--	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	<50	<50	--	--	<50	<50	<50	<50	--	--	150	97	70
Biochemical Oxygen Demand, 5 Day	ug/l	--	3000	<2000	<2000	<2000	--	--	<2000	<2000	<2000	<2000	--	--	<2000	2000	<2000
Chemical Oxygen Demand	ug/l	--	47000	19000	18000	25000	--	--	23000	31000	23000	29000	--	--	27000	37000	29000
Chloride	ug/l	--	110000	130000	140000	83000	--	--	230000	340000	400000	160000	--	--	100000	110000	130000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	--	--	<5	<5	<5	<5	--	--	<5	<5	<5
Conductivity (Field)	uS/cm	--	925	620	620	640	--	--	660	880	775	1062	--	--	965	960	835
Dissolved Organic Carbon	ug/l	--	15700	5300	5800	7600	--	--	6200	8600	9800	9300	--	--	12000	12000	8300
Hardness, Calcium Carbonate	ug/l	--	430000	350000	370000	320000	--	--	200000	320000	360000	360000	--	--	460000	450000	390000
Nitrate as N	ug/l	--	<100	1900	700	300	--	--	370	<100	360	<100	--	--	<100	<100	180
Nitrite as N	ug/l	--	<10	<10	<10	<10	--	--	<10	<10	<10	<10	--	--	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	1400	500	400	800	--	--	580	930	500	1200	--	--	1600	1200	830
pH (Field)	-	6.5 - 8.5	7.45	7.4	7.4	7.3	--	--	7.4	7.6	7.9	7.81	--	--	7.8	7.7	7.6
Phosphorus	ug/l	-- (23)	46	9	15	28	--	--	26	3	12	24	--	--	36	23	16
Sulphate	ug/l	--	260000	210000	220000	150000	--	--	41000	63000	98000	140000	--	--	310000	250000	170000
Temperature (Field)	deg c	-- (24)	23.8	15	5	2	--	--	2	10	16	24.7	--	--	11	8	2
Total Dissolved Solids	ug/l	--	782000	806000	790000	582000	--	--	658000	978000	1090000	726000	--	--	876000	784000	700000
Total Suspended Solids	ug/l	--	3000	<1000	9000	4000	--	--	6000	3000	<1000	2000	--	--	2000	2000	1000
Metals																	
Barium	ug/l	--	160	120	130	66	--	--	68	130	150	91	--	--	75	70	67
Boron	ug/l	200 (28)	20	60	70	18	--	--	10	20	26	32	--	--	79	58	27
Calcium	ug/l	--	160000	130000	130000	120000	--	--	87000	120000	130000	120000	--	--	170000	160000	150000
Chromium	ug/l	-- (30)	<5	<5	<5	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.5	<0.5	<0.5	<0.50	--	--	<0.50	<0.50	<0.50	<0.50	--	--	<0.50	<0.50	<0.50
Copper	ug/l	5	<1	1	2	2.4	--	--	1.1	1.5	2.2	**6.7**	--	--	<1.0	<1.0	1.4
Hexavalent Chromium	ug/l	1 (22)	<0.5	<0.5	0.5	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--	--	<0.5	<0.5	<0.5
Iron	ug/l	300	300	<100	<100	**320**	--	--	120	<100	<100	<100	--	--	<100	<100	**320**
Magnesium	ug/l	--	12000	12000	14000	9000	--	--	5900	9900	11000	10000	--	--	16000	15000	14000
Manganese	ug/l	--	150	10	15	62	--	--	17	12	21	33	--	--	62	39	200
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	--	--	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10
Potassium	ug/l	--	5100	2200	2300	1300	--	--	1300	1600	2000	990	--	--	2300	2600	2100
Silicon	ug/l	--	2500	2000	2500	2200	--	--	1300	820	950	2300	--	--	2600	2700	2400
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.10	--	--	<0.10	<0.10	<0.10	<0.10	--	--	<0.10	<0.10	<0.10
Sodium	ug/l	--	69000	130000	150000	73000	--	--	140000	200000	300000	110000	--	--	87000	96000	100000
Strontium	ug/l	--	680	1200	1400	610	--	--	650	1100	1200	620	--	--	1500	1300	1100
Sulfur	ug/l	--	85000	76000	71000	54000	--	--	14000	22000	34000	54000	--	--	110000	85000	66000
Thallium	ug/l	0.3 (33)	<0.05	<0.05	<0.05	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050

			SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
			17-Dec-2012 (3)	**16-Jan-2013 (3)**	**26-Feb-2013 (3)**	**18-Mar-2013 (3)**	**01-Apr-2013 (4)**	**10-May-2013**	**21-Jun-2013**	**29-Jul-2013**	**14-Aug-2013**	**26-Sep-2013**	**25-Oct-2013**	**22-Nov-2013**	**23-Dec-2013**	**09-Jan-2014 (4)**	**04-Feb-2014 (4)**
Parameter	**Unit**	**PWQO (1)**	s-7	s7	ss7	s7	ss7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	s7	s7
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--	--	--	--	240000	250000	300000	270000	250000	210000	250000	280000	--	--
Ammonia, unionized (Field)	ug/l	20	--	--	--	--	--	<20	<20	<20	<20	<20	<20	<20	<20	--	--
Ammonia Nitrogen	ug/l	--	--	--	--	--	--	140	140	<50	64	52	260	<50	140	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--	--	--	--	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	--	--
Chemical Oxygen Demand	ug/l	--	--	--	--	--	--	30000	24000	23000	25000	29000	26000	24000	11000	--	--
Chloride	ug/l	--	--	--	--	--	--	110000	99000	120000	130000	49000	38000	59000	80000	--	--
Chromium (III)	ug/l	8.9 (22)	--	--	--	--	--	<5	<5	<5	<5	<5	<5	<5	<5	--	--
Conductivity (Field)	uS/cm	--	--	--	--	--	--	905	883	770	1072	733	835	851	-- (42)	--	--
Dissolved Organic Carbon	ug/l	--	--	--	--	--	--	8100	10000	9800	11000	9900	11000	7200	6100	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--	--	--	--	360000	300000	340000	270000	270000	200000	310000	380000	--	--
Nitrate as N	ug/l	--	--	--	--	--	--	<100	<100	<100	<100	<100	<100	<100	<100	--	--
Nitrite as N	ug/l	--	--	--	--	--	--	<10	<10	<10	<10	<10	<10	<10	<10	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--	--	--	--	820	560	760	620	560	770	280	630	--	--
pH (Field)	-	6.5 - 8.5	--	--	--	--	--	7.6	6.91	7.86	7.23	6.95	7.8	7.69	**8.58**	--	--
Phosphorus	ug/l	-- (23)	--	--	--	--	--	13	2	2	6	10	12	21	19	--	--
Sulphate	ug/l	--	--	--	--	--	--	130000	76000	88000	77000	72000	37000	97000	120000	--	--
Temperature (Field)	deg c	-- (24)	--	--	--	--	--	19	19.7	18.3	17.3	14.1	5	2.6	0	--	--
Total Dissolved Solids	ug/l	--	--	--	--	--	--	598000	532000	684000	616000	476000	360000	522000	584000	--	--
Total Suspended Solids	ug/l	--	--	--	--	--	--	2000	<1000	<1000	<1000	1000	2000	7000	<1000	--	--
Metals																	
Barium	ug/l	--	--	--	--	--	--	84	78	93	82	59	53	62	74	--	--
Boron	ug/l	200 (28)	--	--	--	--	--	37	30	35	28	31	13	22	17	--	--
Calcium	ug/l	--	--	--	--	--	--	130000	110000	140000	100000	96000	76000	110000	130000	--	--
Chromium	ug/l	-- (30)	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	--
Cobalt	ug/l	0.9	--	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--
Copper	ug/l	5	--	--	--	--	--	1.5	1.3	<1.0	1.1	<1.0	2.0	<1.0	<1.0	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--
Iron	ug/l	300	--	--	--	--	--	<100	<100	<100	<100	<100	<100	<100	<100	--	--
Magnesium	ug/l	--	--	--	--	--	--	10000	8100	10000	7800	7600	5400	8300	11000	--	--
Manganese	ug/l	--	--	--	--	--	--	110	40	3.0	7.5	9.7	6.0	7.4	12	--	--
Mercury	ug/l	0.2 (32)	--	--	--	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--
Potassium	ug/l	--	--	--	--	--	--	1400	910	1000	1100	1300	920	1500	1400	--	--
Silicon	ug/l	--	--	--	--	--	--	1700	1500	2900	2300	1900	1400	1500	2500	--	--
Silver	ug/l	0.1	--	--	--	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	--
Sodium	ug/l	--	--	--	--	--	--	85000	91000	110000	130000	63000	50000	62000	70000	--	--
Strontium	ug/l	--	--	--	--	--	--	760	670	810	740	630	460	690	750	--	--
Sulfur	ug/l	--	--	--	--	--	--	45000	26000	33000	24000	26000	14000	35000	42000	--	--
Thallium	ug/l	0.3 (33)	--	--	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--

			SS-7	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**
			26-Mar-2014	**22-Apr-2014**	**21-May-2014**	**19-Jun-2014**	**15-Jul-2014**	**25-Aug-2014**	**23-Sep-2014**	**27-Oct-2014**	**20-Nov-2014**	**09-Dec-2014 (11)**	**16-Mar-2015**	**07-Apr-2015**	**21-May-2015**	**23-Jun-2015**	**22-Jul-2015**	**28-Aug-2015**
Parameter	**Unit**	**PWQO (1)**	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-3	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	260000	160000	200000	250000	280000	200000	240000	260000	270000	340000	260000	190000	210000	260000	240000	290000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	20	<20
Ammonia Nitrogen	ug/l	--	180	180	<50	<50	<50	<50	<50	80	<50	<50	290	<50	<50	--	73	<50
Biochemical Oxygen Demand, 5 Day	ug/l	--	2000	<2000	<2000	2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Chemical Oxygen Demand	ug/l	--	22000	24000	25000	26000	28000	31000	25000	21000	13000	18000	120000	19000	25000	34000	22000	21000
Chloride	ug/l	--	230000	150000	130000	140000	94000	54000	79000	61000	61000	68000	470000	230000	480000	170000	180000	280000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	1509	680	720	1007	860	595	710	795	903	1063	2074	1188	780	1196	1254	765
Dissolved Organic Carbon	ug/l	--	4900	8400	10000	9600	9900	11000	9800	8600	7100	7100	6300	4900	9000	10000	9300	8800
Hardness, Calcium Carbonate	ug/l	--	430000	200000	230000	260000	310000	190000	200000	290000	360000	470000	510000	300000	380000	370000	360000	260000
Nitrate as N	ug/l	--	<100	140	<100	<100	<100	<100	<100	<100	440	<100	<100	180	<100	<100	<100	<100
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	1400	740	480	460	460	820	840	410	360	380	4800	350	530	490	520	480
pH (Field)	-	6.5 - 8.5	7.97	7.5	7.6	7.58	7.48	7.8	7.8	7.97	7.85	7.94	7.99	7.83	7.6	8.11	7.63	7.5
Phosphorus	ug/l	-- (23)	65	<2	3	<10 (35)	7	32	12	15	23	29	28000	10	6	44	29	9
Sulphate	ug/l	--	130000	30000	33000	61000	49000	38000	42000	79000	120000	160000	93000	60000	58000	120000	110000	100000
Temperature (Field)	deg c	-- (24)	1.1	6	10	18.9	17.2	24	16	10.6	0.4	0.1	1.2	7.5	15	24.9	23.1	23
Total Dissolved Solids	ug/l	--	892000	472000	518000	596000	504000	340000	456000	504000	478000	708000	1170000	686000	1340000	820000	774000	940000
Total Suspended Solids	ug/l	--	32000	1000	<1000	2000	<1000	1000	3000	<1000	4000	1000	290000	<2000	3000	3000	1000	<1000
Metals																		
Barium	ug/l	--	120	60	75	77	70	61	62	63	64	84	240	84	170	100	130	120
Boron	ug/l	200 (28)	30	<10	12	32	36	15	22	30	25	42	22	17	21	51	44	33
Calcium	ug/l	--	180000	72000	80000	110000	110000	71000	74000	110000	140000	180000	190000	110000	150000	130000	130000	98000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**1.5**	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	1.1	<1.0	2.1	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	**6.5**	<1.0	<1.0	<1.0	1.6	1.3
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	**520**	<100	120	<100	<100	<100	100	<100	120	<100	**7300**	<100	<100	100	<100	<100
Magnesium	ug/l	--	15000	5400	6500	8600	8400	5000	5500	8800	11000	16000	15000	8900	12000	12000	12000	8600
Manganese	ug/l	--	520	7.6	15	5.7	8.4	12	37	3.7	80	130	2000	37	35	140	140	6.6
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	ug/l	--	2400	1000	1300	1100	1500	1000	980	2900	2600	4100	2800	2200	2000	2600	2000	1600
Silicon	ug/l	--	2700	680	790	1700	3200	2000	2100	2200	2600	2800	5900	1600	1400	2300	5200	2500
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	140000	87000	100000	130000	82000	62000	86000	66000	56000	64000	240000	130000	280000	120000	120000	270000
Strontium	ug/l	--	1200	420	540	730	680	430	450	700	770	1200	1300	840	1100	1100	1000	840
Sulfur	ug/l	--	45000	9900	12000	23000	17000	13000	16000	31000	43000	59000	36000	22000	20000	--	39000	35000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.062	<0.050	<0.050	<0.050	<0.050	<0.050

			SS-7	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**
			25-Sep-2015	**27-Oct-2015**	**20-Nov-2015**	**10-Dec-2015**	**26-Jan-2016**	**23-Feb-2016**	**21-Mar-2016**	**26-Apr-2016**	**31-May-2016**	**30-Jun-2016**	**13-Jul-2016**	**04-Aug-2016 (2)**	**20-Sep-2016**	**26-Oct-2016**	**11-Nov-2016**	**14-Dec-2016**
Parameter	**Unit**	**PWQO (1)**	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	7	SS-7	SS-7	SS-7	SS-7
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	270000	250000	230000	240000	260000	250000	170000	210000	270000	260000	270000	--	270000	250000	250000	200000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	<50	<50	<50	100	<50	110	<50	190	270	<50	--	<50	<50	<50	1300
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	<2000	<2000	<2000	4000	<2000	<2000	<2000	3000	<2000	<2000	--	<2000	<2000	<2000	<2000
Chemical Oxygen Demand	ug/l	--	21000	18000	22000	14000	180000	11000	16000	15000	62000	29000	27000	--	32000	22000	21000	16000
Chloride	ug/l	--	170000	130000	91000	91000	85000	150000	120000	130000	110000	390000	360000	--	150000	120000	100000	140000
Chromium (III)	ug/l	8.9 (22)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--	<5	<5	<5	<5
Conductivity (Field)	uS/cm	--	705	1165	870	1027	992	475	755	918	899	505	480	--	1260	540	958	640
Dissolved Organic Carbon	ug/l	--	9500	6500	8000	5700	6100	5800	5800	6500	12000	7600	7100	--	9600	7300	7700	8900
Hardness, Calcium Carbonate	ug/l	--	240000	390000	310000	360000	360000	360000	220000	290000	310000	440000	300000	--	400000	220000	360000	260000
Nitrate as N	ug/l	--	<100	<100	<100	<100	640	<100	<100	<100	<100	<100	<100	--	140	240	<100	110
Nitrite as N	ug/l	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	--	<10	<10	<10	<10
Nitrogen, Total Kjeldahl	ug/l	--	610	310	280	330	660	250	380	180	830	820	350	--	620	180	380	1900
pH (Field)	-	6.5 - 8.5	7.6	7.03	8.36	8.09	7.98	7.68	7.67	8.02	7.28	6.8	7.6	--	7.85	7.6	7.74	7.5
Phosphorus	ug/l	-- (23)	7	6	12	8	490	22	7	13	140	19	13	--	27	6	6	5
Sulphate	ug/l	--	89000	170000	110000	150000	130000	110000	42000	54000	62000	73000	100000	--	160000	110000	140000	59000
Temperature (Field)	deg c	-- (24)	16	5.5	7.1	5.6	0.4	0	3.3	7.9	27.0	25	26	--	22.2	18	5.7	1
Total Dissolved Solids	ug/l	--	660000	736000	568000	640000	614000	748000	430000	516000	576000	1120000	1040000	--	804000	620000	652000	550000
Total Suspended Solids	ug/l	--	2000	2000	<1000	<1000	290000	<1000	3000	<1000	9000	7000	2000	--	<1000	2000	1000	1000
Metals																		
Barium	ug/l	--	98	89	62	74	130	75	47	59	150	130	130	--	120	77	67	69
Boron	ug/l	200 (28)	30	27	19	23	35	24	14	20	42	29	30	--	52	26	25	18
Calcium	ug/l	--	89000	150000	100000	130000	160000	130000	82000	96000	110000	120000	110000	--	140000	80000	110000	89000
Chromium	ug/l	-- (30)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0
Cobalt	ug/l	0.9	<0.50	<0.50	<0.50	<0.50	**1.2**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50
Copper	ug/l	5	1.2	1.6	<1.0	<1.0	**7.0**	<1.0	<1.0	<1.0	<1.0	1.0	1.0	--	<1.0	2.1	<1.0	<1.0
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50
Iron	ug/l	300	<100	<100	<100	<100	**3900**	<100	<100	<100	**340**	120	<100	--	<100	<100	<100	<100
Magnesium	ug/l	--	7000	13000	8800	11000	12000	11000	6200	7500	11000	11000	9200	--	11000	6700	9100	7100
Manganese	ug/l	--	22	13	5.7	13	870	16	8.4	20	3800	36	24	--	93	15	12	13
Mercury	ug/l	0.2 (32)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1
Potassium	ug/l	--	1300	3400	2200	3400	3900	2800	1600	2000	2600	1800	1600	--	2700	1200	2200	1000
Silicon	ug/l	--	2400	2200	1500	1100	4000	2100	960	250	9700	2400	2400	--	3400	1900	2100	1700
Silver	ug/l	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10
Sodium	ug/l	--	160000	87000	77000	71000	65000	110000	71000	81000	88000	250000	270000	--	130000	140000	80000	92000
Strontium	ug/l	--	670	1100	700	1000	1100	920	530	670	940	1000	870	--	1000	570	790	560
Sulfur	ug/l	--	30000	54000	34000	51000	45000	38000	16000	20000	29000	27000	36000	--	55000	38000	48000	22000
Thallium	ug/l	0.3 (33)	<0.050	<0.050	<0.050	<0.050	0.070	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	<0.050	<0.050	<0.050	<0.050

Parameter	Unit	PWQO (1)	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
			23-Jan-2017	**14-Feb-2017 (3)**	**27-Mar-2017**	**21-Apr-2017**	**23-May-2017**	**26-Jun-2017 (56)**	**24-Jul-2017 (57)**	**11-Aug-2017**	**08-Sep-2017**	**17-Oct-2017**	**17-Nov-2017**	**07-Dec-2017**	**22-Jan-2018**	**16-Feb-2018**	**13-Mar-2018**
			SS-7	7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	210000	--	210000	180000	250000	250000	270000	310000	260000	280000	210000	230000	231000	280000	209000
Ammonia, unionized (Field)	ug/l	20	<20	--	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	<50	--	150	<50	52	810 (36)	130	150	150	61	<50	<50	120	110	80
Biochemical Oxygen Demand, 5 Day	ug/l	--	<2000	--	<2000	<2000	<2000	<2000	2000	<2000	<2000	<2000	<2000	<2000	<1000	2000	<1000
Chemical Oxygen Demand	ug/l	--	13000	--	14000	21000	31000	24000	37000	38000	25000	35000	24000	16000	15000	23000	18000
Chloride	ug/l	--	420000	--	280000	130000	110000	180000	63000	64000	81000	93000	37000	65000	256000	155000	237000
Chromium (III)	ug/l	8.9 (22)	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**<10**	<1	**<10**
Conductivity (Field)	uS/cm	--	1919	--	1427	769	831	1122	651	773	723	869	597	715	1110	1120	1268
Dissolved Organic Carbon	ug/l	--	6300	--	6300	7900	12000	9100	14000	14000	11000	11000	7300	7000	6100	9400	5400
Hardness, Calcium Carbonate	ug/l	--	380000	--	320000	200000	260000	250000	240000	270000	230000	280000	210000	250000	328000	374000	359000
Nitrate as N	ug/l	--	110	--	160	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	110
Nitrite as N	ug/l	--	<10	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	250	--	440	310	580	750 (36)	790	680	900	520	320	170	400	800	500
pH (Field)	-	6.5 - 8.5	7.50	--	7.75	8.20	7.82	7.91	7.28	7.45	7.60	7.56	7.75	7.39	7.40	7.77	7.78
Phosphorus	ug/l	-- (23)	14	--	36	11	57	25	42	57	17	50	10	19	9	96	32
Sulphate	ug/l	--	83000	--	64000	38000	35000	39000	<1000	<1000	30000	55000	39000	51000	74000	53000	70000
Temperature (Field)	deg c	-- (24)	0.3	--	0.7	9.1	21.2	19.6	17.7	22.5	15.2	9.5	1.4	0.5	0	0	0.3
Total Dissolved Solids	ug/l	--	1120000	--	828000	424000	494000	648000	392000	534000	424000	545000	365000	370000	722000	728000	858000
Total Suspended Solids	ug/l	--	2000	--	3000	<1000	10000	2000	3000	6000	2000	9000	1000	2000	5000	61000	12000
Metals																	
Barium	ug/l	--	100	--	79	51	78	90	83	83	66	71	43	46	70	90	80
Boron	ug/l	200 (28)	19	--	15	13	20	19	18	24	19	24	14	14	10	10	10
Calcium	ug/l	--	140000	--	110000	69000	99000	88000	88000	94000	84000	99000	79000	89000	118000	135000	129000
Chromium	ug/l	-- (30)	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1	<1	<1
Cobalt	ug/l	0.9	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.2	0.3	<0.2
Copper	ug/l	5	1.1	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**<10**	<1	**<10**
Iron	ug/l	300	<100	--	<100	<100	170	<100	270	**360**	180	**390**	<100	190	260	**1160**	140
Magnesium	ug/l	--	11000	--	8900	5200	7200	6800	6200	6800	6000	7600	6000	6600	8000	9000	9000
Manganese	ug/l	--	12	--	28	7.6	220	79	500	300	48	140	21	41	140	520	60
Mercury	ug/l	0.2 (32)	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Potassium	ug/l	--	2500	--	2400	1300	1800	980	950	1200	1500	3500	1600	2000	3000	2000	3000
Silicon	ug/l	--	2200	--	1600	620	1200	2200	3300	4200	2500	3400	1800	1800	2100	2700	1700
Silver	ug/l	0.1	<0.10	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1
Sodium	ug/l	--	230000	--	160000	81000	90000	150000	58000	60000	73000	69000	38000	45000	107000	89000	129000
Strontium	ug/l	--	1000	--	770	410	560	620	510	560	530	580	410	510	724	715	900
Sulfur	ug/l	--	30000	--	23000	12000	10000	14000	2600	2000	8600	20000	15000	18000	9500	21000	21000
Thallium	ug/l	0.3 (33)	<0.050	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.1	<0.1	<0.1

			SS-7	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**
			24-Apr-2018	**18-May-2018**	**22-Jun-2018**	**18-Jul-2018**	**24-Aug-2018**	**18-Sep-2018**	**24-Oct-2018**	**20-Nov-2018**	**18-Dec-2018**	**25-Jan-2019**	**21-Feb-2019**	**13-Mar-2019**	**17-Apr-2019**	**24-May-2019**	**21-Jun-2019**	**18-Jul-2019**
Parameter	**Unit**	**PWQO (1)**	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS - 7	SS-7	SS-7
General Chemistry																		
Alkalinity (Total as CaCO3)	ug/l	-- (21)	180000	236000	275000	311000	255000	295000	266000	246000	241000	255000	263000	260000	137000	221000	246000	330000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	310	820	330	50	80	1710	20	470	<20	150	170	2170	20	33	<10	180
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	<1000	1000	5000	<1000	1000	<1000	<1000	2000	2000	2000	1000	<1000	<1000	<1000	8000
Chemical Oxygen Demand	ug/l	--	13000	23000	20000	52000	30000	31000	13000	<5000	11000	17000	15000	8000	8000	25000	170000	33000
Chloride	ug/l	--	170000	162000	37000	240000	128000	168000	137000	103000	155000	149000	279000	318000	93000	124000	137000	140000
Chromium (III)	ug/l	8.9 (22)	**<10**	**<10**	**<10**	**<10**	<0.1	**<10**	**<10**	**<10**	**<10**	<1	<1	<1	<1	1	<1	<1
Conductivity (Field)	uS/cm	--	888	1037	1114	1317	1012	1115	1062	640	459	32	1358	1592	572	819	879	975
Dissolved Organic Carbon	ug/l	--	5800	7500	11100	28800	11400	18900	8300	7300	5600	5800	5100	5600	4300	8600	10400	11400
Hardness, Calcium Carbonate	ug/l	--	222000	315000	560000	300000	271000	347000	292000	308000	326000	366000	359000	361000	155000	242000	227000	261000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	130	110	100	<100	190	<100	<100	<100	<100
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	3700	900	600	1750	700	2800	600	1500	300	1000	1400	300	200	410	620	1300
pH (Field)	-	6.5 - 8.5	7.99	7.27	7.72	7.70	7.82	6.95	7.64	7.84	6.73	7.05	7.38	6.90	7.18	8.12 (37)	7.46	7.18
Phosphorus	ug/l	-- (23)	72	22	20	83	23	42	12	12	4	14	8	12	7	14	27	50
Sulphate	ug/l	--	44000	50000	8000	10000	86000	73000	119000	95000	92000	113000	110000	97000	17000	34000	28000	15000
Temperature (Field)	deg c	-- (24)	12.0	11.8	21.0	20.3	21.1	24.0	6.1	0	0	0	0	0.7	9.0	17.4	22.8	26.2
Total Dissolved Solids	ug/l	--	586000	682000	741000	838000	682000	774000	748000	590000	728000	754000	897000	1050000	375000	480000	593000	617000
Total Suspended Solids	ug/l	--	15000	2000	4000	7000	2000	6000	4000	5000	1000	4000	<1000	4000	<1000	3000	2000	15000
Metals																		
Barium	ug/l	--	70	90	100	80	100	110	80	70	80	90	90	100	40	60	70	110
Boron	ug/l	200 (28)	20	30	30	30	30	40	30	20	20	20	20	20	<10	20	20	30
Calcium	ug/l	--	79000	113000	155000	107000	97000	124000	102000	110000	114000	130000	129000	128000	57000	87000	81000	93000
Chromium	ug/l	-- (30)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	<1	<1	<1	<1	<1	<1	<1
Iron	ug/l	300	120	220	90	270	140	150	110	120	70	150	100	100	<30	80	190	**620**
Magnesium	ug/l	--	6000	8000	42000	8000	7000	9000	9000	8000	10000	10000	9000	10000	3000	6000	6000	7000
Manganese	ug/l	--	60	360	90	1590	90	210	70	50	60	250	180	80	<10	80	170	810
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Potassium	ug/l	--	2000	3000	19000	2000	3000	3000	4000	4000	4000	4000	3000	4000	1000	2000	1000	2000
Silicon	ug/l	--	500	700	1500	6300	2600	3300	1900	1900	2000	2300	2400	2100	800	300	1100	4300
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	86000	99000	69000	142000	90000	117000	106000	76000	87000	91000	135000	163000	59000	89000	101000	101000
Strontium	ug/l	--	673	817	819	816	991	881	941	896	921	985	928	1160	312	531	570	774
Sulfur	ug/l	--	12300	22500	11700	5500	33700	26000	45800	31100	36000	42500	33900	34600	6100	11800	11300	6400
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

			SS-7	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**	**SS-7**
			21-Aug-2019 (54)	**18-Sep-2019**	**29-Oct-2019**	**19-Nov-2019**	**18-Dec-2019**	**15-Jan-2020**	**19-Feb-2020**	**19-Mar-2020**	**03-Apr-2020**	**08-May-2020**	**01-Jun-2020**	**21-Jul-2020**	**25-Aug-2020**	**17-Sep-2020**	**23-Oct-2020**
Parameter	**Unit**	**PWQO (1)**	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7	SS-7
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	340000	314000	218000	251000	262000	201000	282000	194000	141000	200000	277000	324000	232000	284000	237000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	520	240	150	<10	<10	<10	16	<10	<10	55	<10	<10	50	68	<10
Biochemical Oxygen Demand, 5 Day	ug/l	--	4000	<1000	2000	3000	5000	1000	7000	3000	<1000	<1000	12000	6000	8000	8000	8000
Chemical Oxygen Demand	ug/l	--	39000	27000	20000	18000	22000	13000	28000	9000	26000	22000	41000	67000	37000	28000	29000
Chloride	ug/l	--	182000	158000	84000	63000	137000	125000	193000	142000	106000	135000	188000	182000	132000	86000	99000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	<1	<1	**<10**	**<10**	<1	<1	<1	<1	<1	<1	<1
Conductivity (Field)	uS/cm	--	1163	1116	829	779	712	862	1262	876	648	878	844	697	681	880	846
Dissolved Organic Carbon	ug/l	--	31900	11500	7100	8500	8600	6300	8700	4800	4900	7400	13300	24200	12000	10600	9200
Hardness, Calcium Carbonate	ug/l	--	323000	418000	209000	246000	339000	254000	376000	257000	174000	215000	274000	338000	247000	266000	234000
Nitrate as N	ug/l	--	<100	<100	<100	<100	<100	100	<100	<100	<100	120	<100	<100	<100	<100	<100
Nitrite as N	ug/l	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	1800	1200	600	300	198	448	766	301	465	1270	4660	2400	1260	1330	951
pH (Field)	-	6.5 - 8.5	7.10	7.25	7.38	7.51	8.10	7.42	7.43	7.64	7.78	7.73	7.35	7.97	7.90	7.52	7.41
Phosphorus	ug/l	-- (23)	30	52	13	18	67	7	23	7	7	8	48	96	59	28	23
Sulphate	ug/l	--	33000	80000	67000	55000	81000	44000	75000	30000	18000	24000	5000	4000	58000	55000	52000
Temperature (Field)	deg c	-- (24)	21.5	16.7	12.8	0.7	-0.2	0.9	0.1	1.6	4.7	8.8	11.9	26.9	25.2	16.6	9.5
Total Dissolved Solids	ug/l	--	812000	806000	526000	506000	715000	554000	858000	571000	423000	559000	722000	754000	626000	569000	551000
Total Suspended Solids	ug/l	--	16000	12000	2000	9000	11000	8000	5000	3000	<1000	4000	14000	9000	10000	13000	9000
Metals																	
Barium	ug/l	--	100	120	50	60	80	50	100	70	40	60	120	130	90	80	70
Boron	ug/l	200 (28)	<100	20	20	20	20	20	20	10	<10	10	20	40	40	30	30
Calcium	ug/l	--	116000	151000	74000	87000	121000	92000	134000	93000	63000	78000	100000	122000	89000	95000	84000
Chromium	ug/l	-- (30)	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cobalt	ug/l	0.9	**<2**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	**<10**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium	ug/l	1 (22)	<1	<1	<1	<1	<1	<1	<1	**<10**	<1	<1	<1	<0.5	<0.50	<0.50	<0.50
Iron	ug/l	300	**700**	**830**	90	260	300	90	**780**	60	50	30	**700**	**810**	300	260	190
Magnesium	ug/l	--	8000	10000	6000	7000	9000	6000	10000	6000	4000	5000	6000	8000	6000	7000	6000
Manganese	ug/l	--	1100	430	40	270	240	40	750	30	10	30	2250	1460	230	210	120
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Potassium	ug/l	--	1000	5000	2000	2000	4000	2000	5000	1000	<1000	<1000	1000	2000	3000	4000	2000
Silicon	ug/l	--	5300	3500	2000	2200	2100	1600	2600	1500	1000	200	1600	10000	4800	3300	3300
Silver	ug/l	0.1	**<1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	127000	117000	86000	57000	94000	75000	115000	88000	61000	94000	126000	122000	106000	79000	79000
Strontium	ug/l	--	800	965	515	594	945	556	1170	592	331	468	637	874	736	802	662
Sulfur	ug/l	--	13200	28400	23400	18600	30200	14400	30600	11000	6520	9600	6590	2600	24100	19700	21700
Thallium	ug/l	0.3 (33)	**<1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Unit	PWQO (1)	SS-7 26-Nov-2020 (58) 7	SS-7 11-Dec-2020 (58) 7
General Chemistry				
Alkalinity (Total as CaCO3)	ug/l	-- (21)	--	--
Ammonia, unionized (Field)	ug/l	20	--	--
Ammonia Nitrogen	ug/l	--	--	--
Biochemical Oxygen Demand, 5 Day	ug/l	--	--	--
Chemical Oxygen Demand	ug/l	--	--	--
Chloride	ug/l	--	--	--
Chromium (III)	ug/l	8.9 (22)	--	--
Conductivity (Field)	uS/cm	--	--	--
Dissolved Organic Carbon	ug/l	--	--	--
Hardness, Calcium Carbonate	ug/l	--	--	--
Nitrate as N	ug/l	--	--	--
Nitrite as N	ug/l	--	--	--
Nitrogen, Total Kjeldahl	ug/l	--	--	--
pH (Field)	-	6.5 - 8.5	--	--
Phosphorus	ug/l	-- (23)	--	--
Sulphate	ug/l	--	--	--
Temperature (Field)	deg c	-- (24)	--	--
Total Dissolved Solids	ug/l	--	--	--
Total Suspended Solids	ug/l	--	--	--
Metals				
Barium	ug/l	--	--	--
Boron	ug/l	200 (28)	--	--
Calcium	ug/l	--	--	--
Chromium	ug/l	-- (30)	--	--
Cobalt	ug/l	0.9	--	--
Copper	ug/l	5	--	--
Hexavalent Chromium	ug/l	1 (22)	--	--
Iron	ug/l	300	--	--
Magnesium	ug/l	--	--	--
Manganese	ug/l	--	--	--
Mercury	ug/l	0.2 (32)	--	--
Potassium	ug/l	--	--	--
Silicon	ug/l	--	--	--
Silver	ug/l	0.1	--	--
Sodium	ug/l	--	--	--
Strontium	ug/l	--	--	--
Sulfur	ug/l	--	--	--
Thallium	ug/l	0.3 (33)	--	--

			SS-8	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**	**SS-8**
			08-Jan-2021	**18-Feb-2021**	**22-Mar-2021 (59)**	**09-Apr-2021 (47)**	**28-May-2021**	**28-Jun-2021**	**15-Jul-2021**	**11-Aug-2021**	**28-Sep-2021**	**27-Oct-2021**	**11-Nov-2021**	**15-Dec-2021**	**25-Jan-2022 (18)**	**24-Feb-2022 (4)**	**17-Mar-2022 (60)**
Parameter	**Unit**	**PWQO (1)**	SS-8	SS-7	SS-8	SS-8	SS-8	SS-8	SS-8	SS-8	SS8	SS8	SS8	SS8	SS8	8	SW8
General Chemistry																	
Alkalinity (Total as CaCO3)	ug/l	-- (21)	221000	270000	157000	172000	229000	218000	262000	280000	273000	195000	225000	205000	256000	--	159000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	--	<20
Ammonia Nitrogen	ug/l	--	<10	<10	<10	<10	<10	<10	<10	11	<10	<10	<10	<10	<10	--	39
Biochemical Oxygen Demand, 5 Day	ug/l	--	3000	5000	2000	<1000	2000	2000	2000	5000	2000	<1000	<1000	2000	<1000	--	2000
Chemical Oxygen Demand	ug/l	--	25000	23000	9000	11000	<5000	24000	<5000	<5000	<5000	18000	16000	18000	21000	--	18000
Chloride	ug/l	--	233000	334000	177000	230000	357000	480000	382000	336000	185000	37000	72000	142000	351000	--	980000
Chromium (III)	ug/l	8.9 (22)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1
Conductivity (Field)	uS/cm	--	1227	1552	884	1033	1343	1926	1680	1737	1052	464	700	886	113	--	2803
Dissolved Organic Carbon	ug/l	--	6800	6700	5300	6300	11900	6800	7700	7300	8200	8900	9900	9100	9000	--	5000
Hardness, Calcium Carbonate	ug/l	--	281000	333000	179000	249000	300000	319000	309000	327000	232000	176000	213000	239000	325000	--	383000
Nitrate as N	ug/l	--	270	190	<1000	<500	<100	<100	<100	220	<100	<100	<100	<100	<500	--	370
Nitrite as N	ug/l	--	<100	<100	<1000	<500	<100	<100	<100	<100	<100	<100	<100	<100	<500	--	<100
Nitrogen, Total Kjeldahl	ug/l	--	544	464	207	285	988	731	1040	838	2470	457	672	479	507	--	390
pH (Field)	-	6.5 - 8.5	7.91	7.32	7.62	7.83	7.56	7.88	7.44	7.10	7.99	8.01	8.01	7.89	8.42	--	7.84
Phosphorus	ug/l	-- (23)	33	16	5	7	17	14	12	20	8	8	6	6	20	--	19
Sulphate	ug/l	--	48000	48000	18000	27000	32000	67000	69000	87000	96000	24000	38000	21000	52000	--	40000
Temperature (Field)	deg c	-- (24)	0.5	0.4	6.8	13.6	15.1	25.7	22.9	23.0	15.9	12.4	6.5	0.9	0	--	4.7
Total Dissolved Solids	ug/l	--	806000	1030000	564000	682000	890000	339000	1180000	1190000	819000	349000	467000	564000	936000	--	2070000
Total Suspended Solids	ug/l	--	8000	6000	2000	2000	1000	4000	6000	6000	2000	2000	1000	2000	<1000	--	19000
Metals																	
Barium	ug/l	--	90	100	50	80	100	130	120	150	90	40	60	50	110	--	190
Boron	ug/l	200 (28)	10	20	<10	10	20	30	30	50	20	10	10	<10	10	--	<10
Calcium	ug/l	--	101000	117000	65000	90000	107000	113000	109000	113000	83000	64000	77000	86000	120000	--	137000
Chromium	ug/l	-- (30)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	--	0.2
Copper	ug/l	5	1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	--	<1
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50
Iron	ug/l	300	**400**	270	40	60	180	170	150	210	80	100	120	80	270	--	270
Magnesium	ug/l	--	7000	10000	4000	6000	8000	9000	9000	11000	6000	4000	5000	6000	11000	--	10000
Manganese	ug/l	--	50	50	10	20	140	50	130	540	20	<10	60	10	80	--	50
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1
Potassium	ug/l	--	1000	1000	<1000	1000	1000	2000	2000	2000	1000	1000	<1000	<1000	1000	--	2000
Silicon	ug/l	--	2300	1700	1500	1100	1900	2700	2800	4000	2400	2100	2300	1900	2800	--	2000
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1
Sodium	ug/l	--	137000	187000	84000	119000	184000	318000	285000	236000	182000	42000	67000	86000	177000	--	495000
Strontium	ug/l	--	609	760	364	579	613	765	763	1050	566	298	375	350	781	--	1320
Sulfur	ug/l	--	16200	19700	6700	10400	12100	25700	26600	31900	32900	9400	12600	7800	18800	--	13000
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1

Parameter	Unit	PWQO (1)	SS-8 28-Apr-2022 SS8	SS-8 26-May-2022 (20) SS8	SS-8 24-Jun-2022 SS8	SS-8 25-Jul-2022 SS8
General Chemistry						
Alkalinity (Total as CaCO3)	ug/l	-- (21)	185000	231000	238000	274000
Ammonia, unionized (Field)	ug/l	20	<20	<20	<20	<20
Ammonia Nitrogen	ug/l	--	1170	36	75	<20
Biochemical Oxygen Demand, 5 Day	ug/l	--	<1000	<1000	2000	<1000
Chemical Oxygen Demand	ug/l	--	19000	33000	16000	19000
Chloride	ug/l	--	297000	458000	224000	284000
Chromium (III)	ug/l	8.9 (22)	<1	1	<1.0	<1
Conductivity (Field)	uS/cm	--	1203	1570	1011	1368
Dissolved Organic Carbon	ug/l	--	7900	8100	10500	10400
Hardness, Calcium Carbonate	ug/l	--	262000	308000	237000	203000
Nitrate as N	ug/l	--	110	<100	<100	120
Nitrite as N	ug/l	--	<100	<100	<100	<100
Nitrogen, Total Kjeldahl	ug/l	--	1600	521	755	1770
pH (Field)	-	6.5 - 8.5	7.99	7.81	7.76	7.85
Phosphorus	ug/l	-- (23)	11	4	9	13
Sulphate	ug/l	--	31000	45000	32000	52000
Temperature (Field)	deg c	-- (24)	13.0	17.6	23.5	22.1
Total Dissolved Solids	ug/l	--	890000	1130000	760000	890000
Total Suspended Solids	ug/l	--	<1000	<1000	<1000	2000
Metals						
Barium	ug/l	--	90	120	100	100
Boron	ug/l	200 (28)	<10	20	20	30
Calcium	ug/l	--	95000	110000	85000	73000
Chromium	ug/l	-- (30)	<1	1	<1	<1
Cobalt	ug/l	0.9	<0.2	<0.2	<0.2	<0.2
Copper	ug/l	5	<1	1	<1	2
Hexavalent Chromium	ug/l	1 (22)	<0.50	<0.5	<0.50	<0.5
Iron	ug/l	300	30	60	90	150
Magnesium	ug/l	--	6000	8000	6000	5000
Manganese	ug/l	--	<10	20	30	40
Mercury	ug/l	0.2 (32)	<0.1	<0.1	<0.1	<0.1
Potassium	ug/l	--	<1000	1000	1000	1000
Silicon	ug/l	--	1100	1300	2100	3200
Silver	ug/l	0.1	<0.1	<0.1	<0.1	<0.1
Sodium	ug/l	--	175000	291000	154000	207000
Strontium	ug/l	--	663	803	517	616
Sulfur	ug/l	--	12300	16000	11300	20200
Thallium	ug/l	0.3 (33)	<0.1	<0.1	<0.1	<0.1

Footnotes:

Tables should be read in conjunction with the accompanying document.

< Indicates parameter not detected above laboratory method detection limit.

> Indicates parameter detected above equipment analytical range.

-- Chemical not analyzed or criteria not defined.

Value Parameter is greater than PWQO

(1) Provincial Water Quality Objectives (July 1994, reprinted February 1999)

(2) Monitoring location was dry during this sampling event. No sample was collected.

(3) Monitoring location was frozen during this sampling event. No sample was collected.

(4) Pumps were not discharging water. No sample could be collected.

(5) No sample was collected.

(6) Revised Report: Dissolved metals were originally reported in error and have now been removed from the report.

(7) Metal Analysis: Sample was diluted for Calcium and RDL was adjusted accordingly.

(8) Results for dissolved magnesium are greater than total magnessium. The results have been confirmed by re-analysis.

(9) Total/Dissolved Chromium < Hexavalent Chromium: Both values fall within acceptable RPD limits for duplicates and are likely equivalent.

(10) Metal Analysis:RDL of Calcium was adjusted due to high concentration of Strontium.

(11) Metals: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

(12) Metal Analysis:RDL for Calcium was adjusted due to high concentration of Strontium.

(13) Metal analysis:RDL of Nickel was adjusted due to high concentration of Calcium.

(14) Hexavalent Chromium > Total/Dissolved Chromium: Both values fall within the method uncertainty for duplicates and are likely equivalent.

(15) Hexavalent Chromium > Total/Dissolved Chromium: Both values fall within the method uncertainty for duplicates and are likely equivalent. TKN < Ammonia: Both values fall within the method uncertainty for duplicates and are likely equivalent.

(16) No Cr(VI) bottle submitted; analysis performed from the unpreserved sample. Cr(VI) analysis performed past holding time.

(17) N-NO2 MRL elevated due to matrix interference (dilution was done).

(18) Cl & SO4 MRL elevated due to matrix interference (dilution was done).

(19) SO4 MRL elevated due to matrix interference (dilution was done).

(20) Cl & SO4 MRL elevated due to matrix interference (dilution was done).

(21) Alkalinity should not be decreased by more than 25% of the natural concentration.

(22) Adopted Canadian Water Quality Guidelines.

(23) Current scientific evidence is insufficient to develop a firm Objective at this time. Accordingly, the following phosphorus concentrations should be considered as general guidelines which should be supplemented by site-specific studies: To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 20 ug/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 ug/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 30 ug/L.

(24) (1) General: The natural thermal regime of any body of water shall not be altered so as to impair the quality of the natural environment. In particular, the diversity, distribution and abundance of plant and animal life shall not be significantly changed. (2) Waste Heat Discharge: (a) Ambient Temperature Changes: The temperature at the edge of a mixing zone shall not exceed the natural ambient water temperature at a representative control location by more than 10°C (18°F). However, in special circumstances, local conditions may require a significantly lower temperature difference than 10°C (18°F). Potential dischargers are to apply to the MOEE for guidance as to the allowable temperature rise for each thermal discharge. This ministry will also specify the nature of the mixing zone and the procedure for the establishment of a representative control location for temperature recording on a case-by-case basis. (b) Discharge Temperature Permitted: The maximum temperature of the receiving body of water, at any point in the thermal plume outside a mixing zone, shall not exceed 30°C (86°F) or the temperature of a representative control location plus 10°C (18°F) or the allowed temperature difference, which ever is the lesser temperature. These maximum temperatures are to be measured on a mean daily basis from continuous records. (c) Taking and Discharging of Cooling Water: Users of cooling water shall meet both the Objectives for temperature outlined above and the "Procedures for the Taking and Discharge of Cooling Water" as outlined in the MOEE publication Deriving Receiving-Water Based, Point-Source Effluent Requirements for Ontario Waters(1994).

(25) Suspended matter should not be added to surface water in concentrations that will change the natural Secchi disc reading by more than 10 percent.

(26) At pH 4.5 to 5.5 the Interim PWQO is 15 µg/L based on inorganic monomeric aluminum measure in clay-free samples; At pH > 5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters representative of that geological area of the Province that are unaffected by man-made inputs. At pH > 6.5 to 9.0, the Interim PWQO is 75 µg/L based on total aluminum measured in clay-free samples. If natural background aluminum concentrations in water bodies unaffected by man-made inputs are greater than the numerical Interim PWQO (above), no condition is permitted that would increase the aluminum concentration in clay-free samples by more than 10% of the natural background level. Note: pH values of < 6.5 and > 8.5 are outside the range considered acceptable by the PWQO for pH. See the Scientific Criteria Document for Development of Provincial Water Quality Objectives and Guidelines - Aluminum for a discussion of analytical procedures.

(27) If hardness as CaCO3 < 75 mg/L, PWQO = 11 µg/L; if hardness as CaCO3 > 75 mg/L, PWQO = 1100 µg/L.

(28) See Section 1.2.3. of PWQO. This Interim PWQO was set for emergency purposes based on the best information readily available. Employ due caution when applying this value.

(29) An Interim PWQO also exists for this parameter. See Section 1.10 of the PWQO - Where both a PWQO and an Interim PWQO exist.

(30) PWQO values exist for Cr(III) and Cr(VI)

(31) If alkalinity as CaCO3 < 20 mg/L, PWQO = 5 µg/L; if alkalinity as CaCO3 from 20 to 40 mg/L, PWQO = 10 µg/L; if alkalinity as CaCO3 from 40 to 80 mg/L, PWQO = 20 µg/L; if alkalinity as CaCO3 > 80 mg/L, PWQO = 25 ug/L. An Interim PWQO also exists for this parameter. See Section 1.10 of the PWQO - Where both a PWQO and an Interim PWQO exist.

(32) In a filtered water sample.

(33) See Section 1.2.2. of PWQO. This Interim PWQO is currently under development. The value is subject to change upon publication by MOEE.

(34) Determined by the total reactive phenols test - the 4-AAP (4-amino-antipyrine) test. This objective should be used primarily as a screening tool. The isomer specific PWQOs for various phenolics should be employed where possible.

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

(36) TKN < NH4: Both values fall within acceptable RPD limits for duplicates and are likely equivalent.

(37) Lab measured value. pH pen not working in field.

(38) Insufficient water for sample collection or analysis at this monitoring location during sampling event.

(39) Construction

(40) Dissolved Magnesium > total Magnesium. Reported results were confirmed by re-analysis of origiginal containers submitted.

(41) Due to turbidity, sample was filtered prior to Cr(VI) analysis; Cr(VI) souble reported.

(42) Field Parameters were not measured

(43) The ratio of sulphate to sulfur exceeded 3:1 ratio. This was confirmed by re-analysis.

(44) Except for sample 1383014, Cr(VI) samples for this report were filtered prior to analysis due to turbidity - soluble Cr(IV) reported.

(45) Alkalinity, Minerals+ Anions, N-NO2, N-NO3, BOD, and conductivity were analysed after being stored for an extended period of time outside of the optimal temperatures due to a power outage for the entire report.

(46) Cr(VI) analyzed past the holding time for unpreserved samples for this report.

(47) N-NO2 AND N-NO3 MRL elevated due to matrix interference (dilution was done).

(48) Monitoring location was stagnant during sampling event. No sample was collected.

(49) N-NO2 and N-NO3 MRL elevated due to matrix interference (dilution was done).

(50) Total Chromium < Hexavalent Chromium: Both values fall within acceptable RPD limits for duplicates and are likely equivalent.

(51) Metals analysis performed on a nitric acid digest of the sample material.

(52) Sample was filtered prior to Cr(VI) analysis - soluble Cr(VI) has been reported.

(53) Due to turbidity, sample was filtered prior to Cr(VI) analysis; soluble Cr(VI) reported.

(54) Metals MRL elevated due to matrix interference (dilution was done).

(55) The results for dissolved magnesium are greater than total magnesium. The results have been confirmed by re-analysis.

(56) TKN < Ammonia: Both values fall within the method uncertainty for duplicates and are likely equivalent.

(57) BOD Analaysis: Analysis was performed past sample holding time. This may increase the variability associated with these results.

(58) Monitoring location was not accessible.

(59) NO2 and NO3 MRL elevated due to matrix interference (dilution was done).

(60) Cl MRL elevated due to matrix interference (dilution was done).

APPENDIX F

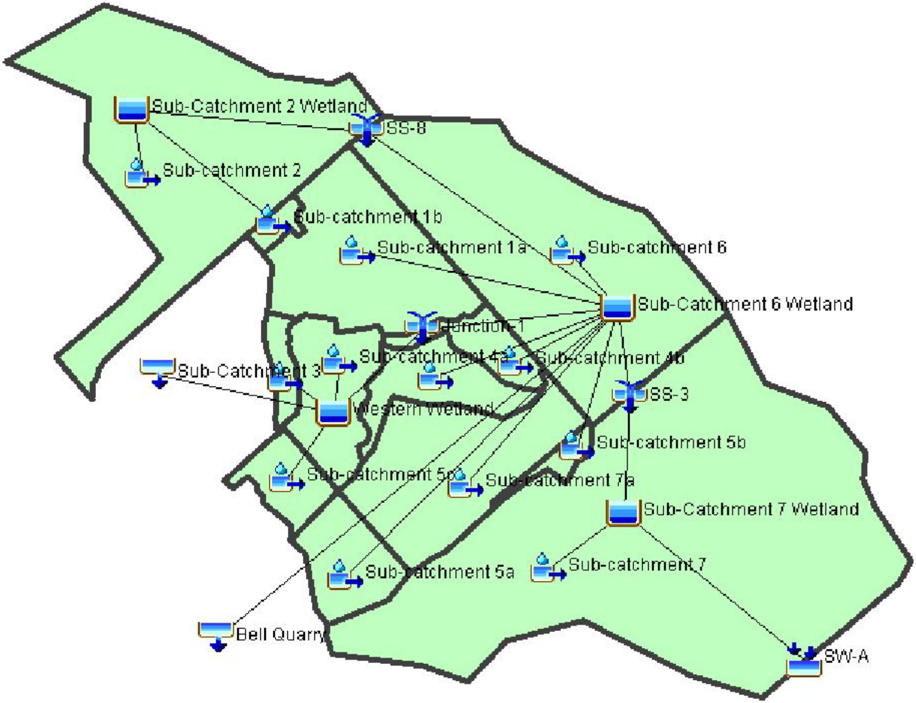
Inputs to Hydrological Model

October 2023

Figure F-1

19130670

Existing Conditions (Scenario 2) Model Schematic



Entered by: MR

Page 1 of 1

WSP

Checked by: KMM

Table F-1

Potential Evaporation Data

Month	Ottawa International Airport PE (1950 - 2013)		Ottawa International Airport PE (2018 - 2019) - Calibration	
	Rate (mm/month)	Coefficient	Rate (mm/month)	Coefficient
January	0.5	1	0.4	1
February	0.6	1	1.2	1
March	5.7	1	2.3	1
April	32.0	1	22.6	1
May	80.5	1	80.0	1
June	116.4	1	111.9	1
July	135.7	1	148.6	1
August	116.8	1	123.7	1
September	74.5	1	79.8	1
October	36.3	1	33.4	1
November	9.9	1	3.9	1
December	1.2	1	0.6	1

Note:

[1] Potential evaporation data was sourced from water budget data provided by Environment Canada for the Ottawa International Airport Meteorological Station (ID: 6106001, 1939 - 2021).

Entered by: MR
Checked by: KMM

Table F-2
Canopy Interception and Surface Depression Storage Inputs

Existing Conditions (Scenarios 2 & 4)				
Subbasin	Canopy Interception		Surface Depression Storage	
	Initial Storage (%)	Max Storage (mm)	Initial Storage (%)	Max Storage (mm)
Sub-catchment 1A	0	0.17	0	8
Sub-catchment 1B	0	0.00	0	4
Sub-catchment 1C	0	0.97	0	9
Sub-catchment 2	0	0.56	0	5
Sub-catchment 4A	0	0.43	0	10
Sub-catchment 4B	0	0.73	0	10
Sub-catchment 5A	0	1.00	0	10
Sub-catchment 5B	0	1.00	0	10
Sub-catchment 5C	0	0.84	0	10
Sub-catchment 6	0	1.00	0	5
Sub-catchment 7	0	0.95	0	10
Sub-catchment 7A	0	0.18	0	10
Sub-catchment 7B	0	0.48	0	10

Operational Conditions (Scenario 5)				
Subbasin	Canopy Interception		Surface Depression Storage	
	Initial Storage (%)	Max Storage (mm)	Initial Storage (%)	Max Storage (mm)
Sub-catchment 2	0	0.56	0	5
Sub-catchment 3A	0	0.00	0	2
Sub-catchment 4B	0	0.98	0	10
Sub-catchment 5A	0	0.00	0	2
Sub-catchment 5B	0	1.00	0	10
Sub-catchment 5C	0	0.00	0	2
Sub-catchment 6	0	1.00	0	5
Sub-catchment 7	0	0.95	0	10

Rehabilitated Conditions (Scenario 8)				
Subbasin	Canopy Interception		Surface Depression Storage	
	Initial Storage (%)	Max Storage (mm)	Initial Storage (%)	Max Storage (mm)
Sub-catchment 2	0	0.56	0	5
Sub-catchment 3A	0	0.00	0	10
Sub-catchment 4B	0	0.98	0	10
Sub-catchment 5B	0	1.00	0	10
Sub-catchment 6	0	1.00	0	5
Sub-catchment 7	0	0.95	0	10

Note:

[1] Sub-catchment 3 (i.e., Existing Stittsville Quarry) and Bell Quarry were not included in the tables above as their surplus estimates were calculated using discharge pumping records and a water balance assessment, respectively.

Entered by: MR
Checked by: KMM

Table F-3

Inputs to Soil Moisture Accounting Method

Existing Conditions (Scenarios 2 and 4)

Subbasin	Soil (%)	GW 1 (%)	GW 2 (%)	Max Infiltration (mm/hr)	Impervious (%)	Soil Storage (mm)	Tension Storage (mm)	Soil Percolation (mm/hr)	GW 1 Storage (mm)	GW 1 Percolation (mm/hr)	GW 1 Coefficeint (hr)	GW 2 Storage (mm)	GW 2 Percolation (mm/hr)	GW 2 Coefficient (hr)
Sub-catchment 1A	0	0	0	50	32%	155	0	150	200	30	40	0	0	0
Sub-catchment 1B	0	0	0	50	80%	45	0	150	200	30	40	0	0	0
Sub-catchment 1C	0	0	0	50	15%	321	0	150	200	30	40	0	0	0
Sub-catchment 2	0	0	0	50	40%	193	0	150	200	30	40	0	0	0
Sub-catchment 4A	0	0	0	50	0%	204	0	150	200	30	40	0	0	0
Sub-catchment 4B	0	0	0	50	55%	216	0	150	200	30	40	0	0	0
Sub-catchment 5A	0	0	0	50	0%	339	0	150	200	30	40	0	0	0
Sub-catchment 5B	0	0	0	50	55%	208	0	150	200	30	40	0	0	0
Sub-catchment 5C	0	0	0	50	0%	300	0	150	200	30	40	0	0	0
Sub-catchment 6	0	0	0	50	64%	223	0	150	200	30	40	0	0	0
Sub-catchment 7	0	0	0	50	54%	192	0	150	200	30	40	0	0	0
Sub-catchment 7A	0	0	0	50	14%	184	0	150	200	30	40	0	0	0
Sub-catchment 7B	0	0	0	50	5%	248	0	150	200	30	40	0	0	0

Operational Conditions (Scenario 5)

Subbasin	Soil (%)	GW 1 (%)	GW 2 (%)	Max Infiltration (mm/hr)	Impervious (%)	Soil Storage (mm)	Tension Storage (mm)	Soil Percolation (mm/hr)	GW 1 Storage (mm)	GW 1 Percolation (mm/hr)	GW 1 Coefficeint (hr)	GW 2 Storage (mm)	GW 2 Percolation (mm/hr)	GW 2 Coefficient (hr)
Sub-catchment 2	0	0	0	50	40%	193	0	150	200	30	40	0	0	0
Sub-catchment 3A	0	0	0	50	100%	8	0	150	200	30	40	0	0	0
Sub-catchment 4B	0	0	0	50	67%	211	0	150	200	30	40	0	0	0
Sub-catchment 5A	0	0	0	50	100%	8	0	150	200	30	40	0	0	0
Sub-catchment 5B	0	0	0	50	55%	208	0	150	200	30	40	0	0	0
Sub-catchment 5C	0	0	0	50	100%	8	0	150	200	30	40	0	0	0
Sub-catchment 6	0	0	0	50	64%	223	0	150	200	30	40	0	0	0
Sub-catchment 7	0	0	0	50	54%	192	0	150	200	30	40	0	0	0

Rehabilitated Conditions (Scenario 8)

Subbasin	Soil (%)	GW 1 (%)	GW 2 (%)	Max Infiltration (mm/hr)	Impervious (%)	Soil Storage (mm)	Tension Storage (mm)	Soil Percolation (mm/hr)	GW 1 Storage (mm)	GW 1 Percolation (mm/hr)	GW 1 Coefficeint (hr)	GW 2 Storage (mm)	GW 2 Percolation (mm/hr)	GW 2 Coefficient (hr)
Sub-catchment 2	0	0	0	50	40%	193	0	150	200	30	40	0	0	0
Sub-catchment 3A	0	0	0	50	0%	90	0	150	200	30	40	0	0	0
Sub-catchment 4B	0	0	0	50	67%	211	0	150	200	30	40	0	0	0
Sub-catchment 5B	0	0	0	50	55%	208	0	150	200	30	40	0	0	0
Sub-catchment 6	0	0	0	50	64%	223	0	150	200	30	40	0	0	0
Sub-catchment 7	0	0	0	50	54%	192	0	150	200	30	40	0	0	0

Note:

[1] Sub-catchment 3 (i.e., Existing Stittsville Quarry) and Bell Quarry were not included in the tables above as their surplus estimates were calculated using discharge pumping records and a water balance assessment, respectively.

Table F-4
Baseflow Inputs

Subbasin	Simulated Groundwater Discharge (m^3/d)				
	Pre-development Conditions (Scenario 1)	Existing Conditions (Scenario 2)	Existing Conditions (Scenario 4)	Operational Conditions (Scenario 5)	Rehabilitated Conditions (Scenario 8)
Sub-catchment 1A	31.3	74	57	0.0	7.8
Sub-catchment 1B	51.3	2.6	1.9	0.0	0.0
Sub-catchment 1C	0	5.8	0	-	-
Sub-catchment 2	352.1	294	250	207	284
Sub-catchment 3	88.4	508	-	-	-
Sub-catchment 4A	196.65	96	26	-	-
Sub-catchment 4B	117.94	97	93	0	101
Sub-catchment 5A	0	0	-	-	-
Sub-catchment 5B	0	0	0	0	0
Sub-catchment 5C	0	3.5	-	-	-
Sub-catchment 6	460.95	448	436	227	471
Sub-catchment 7	778	764	671	521	712
Sub-catchment 7A	110.75	103	71	-	-
Sub-catchment 7B	0	0	0	-	-
Stittsville Quarry	-	(See catchment 3)	650	392	13
Stittsville 2 Quarry	-	-	-	1185	258
Bell Quarry	-	80	235	122	3

Note:

- =within quarry excavation

Bell Quarry excavation includes 5A, 5C during operations

Stittsville Quarry Excavation includes catchment 3

Stittsville 2 Quarry Excavation includes 1C, 4A, 7A, 7B

Entered by: MR
Checked by: KMM

Table F-5
Lag Time Inputs

Existing Conditions (Scenarios 2 and 4)

Subbasin	Runoff Coefficient, C	Area (ha)	Watershed Slope, Sw (%)	Watershed Length, L (m)	Time of Concentration, tc (min)	Lag Time, tlag (min)
Sub-catchment 1A	0.491	39.39	0.9%	690.00	247.62	**148.57**
Sub-catchment 1B	0.700	2.60	1.4%	138.33	62.91	**37.74**
Sub-catchment 1C	0.409	4.17	0.6%	95.00	115.80	**69.48**
Sub-catchment 2	0.328	91.11	0.1%	1076.05	143.47	**86.08**
Sub-catchment 4A	0.178	18.68	0.6%	323.21	38.45	**23.07**
Sub-catchment 4B	0.195	8.54	0.9%	306.33	36.22	**21.73**
Sub-catchment 5A	0.350	14.20	2.0%	339.33	32.50	**19.50**
Sub-catchment 5B	0.184	2.89	0.8%	338.33	45.40	**27.24**
Sub-catchment 5C	0.366	9.00	1.7%	241.85	25.14	**15.08**
Sub-catchment 6	0.159	88.78	0.2%	1283.00	168.15	**100.89**
Sub-catchment 7	0.151	180.64	0.7%	1564.70	143.65	**86.19**
Sub-catchment 7A	0.360	38.89	1.1%	930.00	91.12	**54.67**
Sub-catchment 7B	0.394	14.37	1.0%	428.33	47.32	**28.39**

Operational Conditions (Scenario 5)

Subbasin	Runoff Coefficient, C	Area (ha)	Watershed Slope, Sw (%)	Watershed Length, L (m)	Time of Concentration, tc (min)	Lag Time, tlag (min)
Sub-catchment 2	0.491	39.39	0.9%	690.00	247.62	**148.57**
Sub-catchment 3A	0.700	118.10	0.5%	883.00	229.46	**137.67**
Sub-catchment 4B	0.142	6.97	0.8%	243.67	29.72	**17.83**
Sub-catchment 5A	0.350	14.20	2.0%	339.33	32.50	**19.50**
Sub-catchment 5B	0.184	2.89	0.8%	338.33	45.40	**27.24**
Sub-catchment 5C	0.366	9.00	1.7%	241.85	25.14	**15.08**
Sub-catchment 6	0.159	88.78	0.2%	1283.00	168.15	**100.89**
Sub-catchment 7	0.151	180.64	0.7%	1564.70	143.65	**86.19**

Rehabilitated Conditions (Scenario 8)

Subbasin	Runoff Coefficient, C	Area (ha)	Watershed Slope, Sw (%)	Watershed Length, L (m)	Time of Concentration, tc (min)	Lag Time, tlag (min)
Sub-catchment 2	0.491	39.39	0.9%	690.00	247.62	**148.57**
Sub-catchment 3A	0.100	118.10	0.8%	883.00	470.69	**282.41**
Sub-catchment 4B	0.142	6.97	0.8%	243.67	29.72	**17.83**
Sub-catchment 5B	0.184	2.89	0.8%	338.33	45.40	**27.24**
Sub-catchment 6	0.159	88.78	0.2%	1283.00	168.15	**100.89**
Sub-catchment 7	0.151	180.64	0.7%	1564.70	143.65	**86.19**

Note: 0.53183

[1] Where the C value is highlighted green, C > 0.4, therefore the Bransby Williams Formula method was considered, otherwise, the Airport Formula method was used.

[2] Sub-catchment 3 (i.e., Existing Stittsville Quarry) and Bell Quarry were not included in the tables above as their surplus estimates were calculated using discharge pumping records and a water balance assessment, respectively.

Entered by: MR
Checked by: KMM

Table F-6
Snowmelt / Accumulation Inputs

Existing, Operational, and Rehabilitation Conditions (Scenarios 2, 4, 5, & 8)										
Subbasin	Lapse Rate (°C/1000 m)	PX Temperature (°C)	Base Temperature (°C)	ATI Coefficient	Welt Meltrate (mm/°C-day	Rain Rate Limit (mm/day)	Cold Limit (mm/day)	Coldrate Coefficient	Water Capacity (%)	Groundmelt (mm/day)
Sub-catchment 1A	0	0.00	-0.4	1.0	3.3	0	0	0	5	0
Sub-catchment 1B	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 1C	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 2	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 3A	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 4A	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 4B	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 5A	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 5B	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 5C	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 6	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 7	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 7A	0	0.00	-0.4	1	3.3	0	0	0	5	0
Sub-catchment 7B	0	0.00	-0.4	1	3.3	0	0	0	5	0

Note:

[1] ATI-Meltrate Function for HEC-HMS was defined by the degree-day equation for Eastern Canada Forested Basins (Pysklywec, 1968).

Entered by: MR
Checked by: KMM

APPENDIX G

Water Balance Results

Table G-1
Existing Land Uses, Soil Types, and Catchment Areas

Existing Condition

Type	WHC	Type of Land Use	Soil Type	Infiltration Factor (%)				Catchment Areas (m^2)
				Topo	Soils	Cover	Total	
Sub-Catchment 1A								
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45	43,259
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55	1,931
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0.0	0	90,721
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35	181,825
Meadow / Grass (on Organic Deposits)	250 mm	Pastures and Shrubs	Silt Loam / Organic Deposits	0.15	0.2	0.1	0.45	42,594
Existing Quarry Extraction Area	10 mm	Aggregate Extraction	Bedrock	0	0	0.0	0	27,929
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0.0	0	2,951
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0.0	0	2,652
							Total	**393,861**
Sub-Catchment 1B								
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35	5,282
Existing Quarry Extraction Area	10 mm	Aggregate Extraction	Bedrock	0	0	0	0	20,689
							Total	**25,971**
Sub-Catchment 1C								
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45	5,685
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55	28,971
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0	0	5,998
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35	933
Existing Quarry Extraction Area	10 mm	Aggregate Extraction	Bedrock	0	0	0	0	67
							Total	**41,655**
Sub-Catchment 2								
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45	270,308
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55	36,692
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0	0	105,035
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35	145,606
Exposed Sand / Gravel Deposits (on Bedrock)	75 mm	Bare Deposit Area	Bedrock	0.15	0.1	0	0.25	92,761
Exposed Sand / Gravel Deposits	100 mm	Bare Deposit Area	Fine Sand	0.15	0.4	0	0.55	1,403
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0	113,208
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0	146,066
							Total	**911,080**
Sub-Catchment 3								
Existing Quarry Extraction Area	10 mm	Aggregate Extraction	Bedrock	0	0	0	0	516,896
							Total	**516,896**
Sub-Catchment 4A								
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45	62,320
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55	17,308
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0	96,797
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0	10,406
							Total	**186,831**
Sub-Catchment 4B								

Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		13,139
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55		14,672
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0	0		630
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35		7,927
Meadow / Grass (on Organic Deposits)	250 mm	Pastures and Shrubs	Silt Loam / Organic Deposits	0.15	0.2	0.1	0.45		2,383
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0		4,897
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0		41,769
								Total	**85,416**
Sub-Catchment 5A									
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		141,984
								Total	**141,984**
Sub-Catchment 5B									
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		11,455
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55		1,449
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0		12,943
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0		3,063
								Total	**28,910**
Sub-Catchment 5C									
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		71,675
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55		3,486
Exposed Sand / Gravel Deposits (on Bedrock)	75 mm	Bare Deposit Area	Bedrock	0.15	0.1	0	0.25		14,813
								Total	**89,974**
Sub-Catchment 6									
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		178,223
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55		144,975
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0		26,797
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0		537,846
								Total	**887,841**
Sub-Catchment 7									
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		480,159
Forest (on Fine Sand)	250 mm	Mature Forests	Fine Sand	0.15	0.4	0.2	0.75		149,344
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55		77,882
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0	0		17,755
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35		1,871
Meadow / Grass (on Fine Sand)	100 mm	Pastures and Shrubs	Fine Sand	0.15	0.4	0.1	0.65		32,718
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0		618,002
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0		428,683
								Total	**1,806,415**
Sub-Catchment 7A									
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45		46,739
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55		14,997
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0	0		3,744

Table G-1

Existing Land Uses, Soil Types, and Catchment Areas

Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35	205,658
Meadow / Grass (on Organic Deposits)	250 mm	Pastures and Shrubs	Silt Loam / Organic Deposits	0.15	0.2	0.1	0.45	1,246
Exposed Sand / Gravel Deposits (on Bedrock)	75 mm	Bare Deposit Area	Bedrock	0.15	0.1	0	0.25	67,104
Wetland (on Bedrock)	100 mm	Wetland Habitat	Bedrock	0	0	0	0	45,939
Wetland	150 mm	Wetland Habitat	Silt Loam / Organic Deposits	0	0	0	0	3,518
							Total	**388,945**
Sub-Catchment 7B								
Forest (on Bedrock)	100 mm	Mature Forests	Bedrock	0.15	0.1	0.2	0.45	64,715
Forest (on Organic Deposits)	400 mm	Mature Forests	Silt Loam / Organic Deposits	0.15	0.2	0.2	0.55	476
Impervious Built-Up Areas	3 mm	Buildings / Concrete	n/a	0	0	0	0	6,901
Meadow / Grass (on Bedrock)	100 mm	Pastures and Shrubs	Bedrock	0.15	0.1	0.1	0.35	71,609
Meadow / Grass (on Organic Deposits)	250 mm	Pastures and Shrubs	Silt Loam / Organic Deposits	0.15	0.2	0.1	0.45	7
							Total	**143,709**
Bell Quarry								
Existing Quarry Extraction Area	10 mm	Aggregate Extraction	Bedrock	0	0	0	0	187,651
							Total	**187,651**
							Total Catchment Area	**5,837,139**

Note:

WHC - Water Holding Capacity

The infiltration factor is estimated by summing a factor for topography, soils and cover (MOE Stormwater Management Planning and Design Manual, 2003-Table 3.1)

Entered by: MR
Checked by: KMM

Table G-2
Summary of Results - Sub-Catchment Water Balance

Existing Condition - Estimated Annual Average Water Balance									
Land Use	Area	Precipitation		Surplus		Baseflow		Surplus + Baseflow	
	(m^2)	(mm/a)	(m^3/a)	(mm/a)	(m^3/a)	(mm/a)	(m^3/a)	(mm/a)	(m^3/a)
Sub-Catchment 1A	393,861	750.2	295470	419.0	165,026	68.6	27010	487.6	192,036
Sub-Catchment 1B	25,971	750.2	19,480	466.2	12,108	36.5	949	502.8	13,057
Sub-Catchment 1C	41,655	750.2	31,250	380.5	15,849	0.0	0	380.5	15,849
Sub-Catchment 2	911,080	750.2	683,490	402.2	366,414	117.8	107,310	520.0	473,724
Sub-Catchment 3	516,896	750.2	387,780	554.1	286,397	0.0	0	554.1	286,397
Sub-Catchment 4A	186,831	750.2	140160	388.9	72,658	0.0	0	388.9	72,658
Sub-Catchment 4B	85,416	750.2	64,080	374.9	32,021	414.5	35,405	789.4	67,426
Sub-Catchment 5A	141,984	750.2	106,520	394.0	55,942	0.0	0	394.0	55,942
Sub-Catchment 5B	28,910	750.2	21,690	389.4	11,258	0.0	0	389.4	11,258
Sub-Catchment 5C	89,974	750.2	67500	395.7	35,600	0.0	0	395.7	35,600
Sub-Catchment 6	887,841	750.2	666,060	372.8	330,988	184.2	163,520	557.0	494,508
Sub-Catchment 7	1,806,415	750.2	1,355,170	383.5	692,696	154.4	278,860	537.8	971,556
Sub-Catchment 7A	388,945	750.2	291,790	396.5	154,201	96.7	37,595	493.1	191,796
Sub-Catchment 7B	143,709	750.2	107,810	398.7	57,300	0.0	0	398.7	57,300
Bell Quarry	187,651	750.2	140,780	484.7	90,945	155.6	29,200	640.3	120,145
TOTAL	**5,837,139**	**750.2**	**4,379,030**	**407.6**	**2,379,404**	**116.5**	**679,849**	**524.1**	**3,059,253**

Note:

[1] - Average annual surplus from Sub-catchment 3 is taken from effluent discharge records provided by Tomlinson between 2018 -2022. Therefore, the baseflow contribution is already considered.

APPENDIX H

Water Supply Well Impact Assessment

Well ID	Year Well Drilled	Easting	Northing	Static Water Level (metres below ground surface)	Well Depth (metres below ground surface)	Lowest Water Found Depth (metres below ground surface)	Available Drawdown (metres)	Simulated Drawdown in TZ Under Full Development Compared to Existing Conditions (metres)	Percentage Decrease in Available Drawdown Predicted due to Quarry Dewatering at Full Quarry Development (%)
1502597	1950	424311	5008452	4.6	21.3	21.3	16.7	3.8	22.5%
1502824	1960	423651	5010512	3.0	9.1	9.1	6.1	8.5	140.4%
1502938	1961	422671	5009922	0.6	45.7	44.2	43.5	8.6	19.8%
1502939	1964	424251	5011202	3.0	14.6	9.1	6.1	2.3	37.1%
1502940	1964	424351	5011322	2.4	16.2	12.2	9.7	1.8	18.8%
1509891	1968	423616	5010682	1.5	50.3	49.3	47.8	6.6	13.8%
1509895	1968	422471	5009732	6.1	41.8	36.5	30.5	5.0	16.5%
1509995	1969	422566	5009822	4.6	99.1	97.4	92.9	6.8	7.3%
1511033	1971	423161	5010352	4.6	36.6	35.6	31.1	11.6	37.4%
1516027	1977	422430	5011221	7.6	53.3	52.7	45.1	1.7	3.9%
1516641	1978	422630	5010921	5.5	76.2	76.1	70.6	3.1	4.3%
1516650	1978	422530	5011121	9.1	61.0	59.4	50.2	2.2	4.3%
1516838	1978	423930	5011121	5.5	200.9	176.6	171.1	3.0	1.8%
1517038	1979	423330	5011921	3.0	38.1	36.2	33.2	1.1	3.4%
1517621	1981	424430	5011321	9.1	61.0	56.3	47.2	1.7	3.7%
1518255	1983	422330	5011321	3.7	96.0	57.9	54.2	1.4	2.6%
1519077	1984	422630	5010921	2.4	30.5	28.9	26.5	3.1	11.5%
1531945	2001	424306	5011260	1.8	152.4	140.7	138.9	2.0	1.5%
7109804	2008	423896	5011938	2.5	36.6	33.8	31.4	1.1	3.4%
7112987	2008	422435	5008851	6.2	38.1	36.0	29.8	1.2	4.0%
7132600	2009	423344	5009981	6.3	109.7	101.1	94.8	21.6	22.8%
7132601	2009	423295	5009832	8.2	115.8	113.3	105.1	21.0	20.0%
7132631	2009	423238	5009914	7.9	189.0	147.7	139.8	21.2	15.2%
7160144	2011	423652	5012001	-	91.4	-	-	1.0	-
7163243	2011	423343	5009788	8.0	176.8	173.0	165.0	21.1	12.8%
7167929	2011	424109	5010909	1.4	35.1	30.8	29.4	3.6	12.2%
7187467	2012	422398	5008745	23.5	38.1	34.4	11.0	1.2	11.1%
7252404	2015	424402	5011324	2.3	96.6	94.7	92.4	1.8	1.9%

Well ID	Year Well Drilled	Easting	Northing	Static Water Level (metres below ground surface)	Well Depth (metres below ground surface)	Lowest Water Found Depth (metres below ground surface)	Available Drawdown (metres)	Simulated Drawdown in TZ Under Full Development Compared to Existing Conditions (metres)	Percentage Decrease in Available Drawdown Predicted due to Quarry Dewatering at Full Quarry Development (%)
7310052	2018	421979	5010630	1.8	61.0	58.2	56.3	1.6	2.8%
7310053	2018	421789	5010751	4.4	91.4	85.0	80.6	1.0	1.3%
7314134	2018	423677	5010490	2.0	42.7	38.7	36.7	8.7	23.7%
7329128	2018	421897	5010606	4.5	61.0	58.8	54.3	1.4	2.5%
7329129	2018	421954	5010648	2.4	61.0	59.1	56.7	1.5	2.6%
7334852	2019	421883	5010719	2.2	36.6	33.5	31.3	1.3	4.0%
7334853	2019	422029	5010745	5.2	128.0	64.2	59.1	1.6	2.7%
7334854	2019	422089	5010730	4.6	128.0	66.1	61.4	1.8	2.9%
7347907	2019	421846	5010758	6.1	22.6	20.7	14.6	1.2	7.9%
7347981	2019	422834	5008270	3.3	52.1	45.5	42.2	1.5	3.5%
7351167	2019	422091	5010758	5.2	59.4	57.6	52.3	1.8	3.4%
7357248	2019	422064	5010777	5.9	86.9	85.0	79.0	1.7	2.1%
7357251	2020	422113	5010834	6.5	91.4	89.2	82.7	1.7	2.1%
7357252	2020	422149	5010798	6.5	91.4	89.5	83.0	1.9	2.3%

wsp.com