



REPORT

Post-Construction Monitoring, 2019 Annual Report

MTO Agreement 4017-E-0048 (Assignment #2)

TDA Embankment, Boundary Road, Cornwall, Ontario

Submitted to:

Ministry of Transportation Ontario

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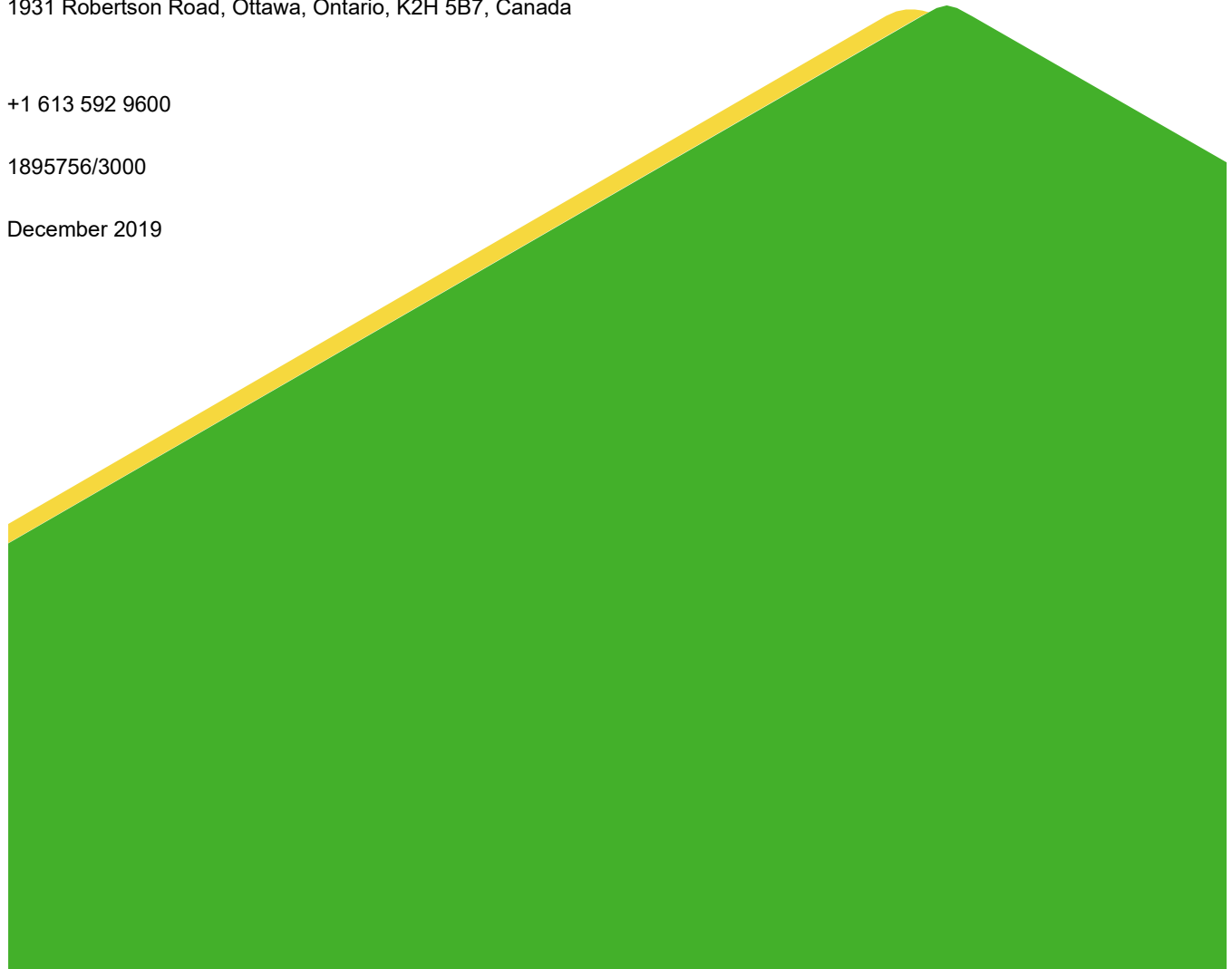
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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Ontario Ministry of Transportation (MTO) to conduct hydrogeological monitoring in relation to the pilot-scale application of Tire Derived Aggregate (TDA) as engineered fill for a bridge replacement project. The location of the bridge re-construction (referred to as the 'Site') is situated at the interchange of Boundary Road and Highway 401 in Eastern Ontario, on the municipal boundary between the City of Cornwall (west side) and the Township of South Glengarry (east side) (see Site Plan, **Figure 1**).

The Site is classified as a non-hazardous waste disposal site and operates under the Environmental Compliance Approval No. 5558-83WSFB (ECA). The core of the approach embankments for the replacement bridge were constructed from TDA fill wrapped in geotextile and covered with low permeability soil. Pursuant to Condition 21 of the ECA, TDA fill was placed greater than 2 metres above the groundwater table; a minimum of 20 metres from any surface water feature and greater than 100 metres away from any potable groundwater well. Details pertaining to the design and specifications of the TDA are presented in the Tire Derived Aggregate Design Brief application to the Ministry of the Environment (MTO, 2009) and the Final Report (MTO, 2013) prepared in accordance with Condition 41 of the ECA. The licensed TDA fill area is 0.5 hectares within a total site area of 7.5 hectares. A Site Plan showing the location of the constructed TDA embankments is provided on **Figure 1**.

Emplacement of TDA occurred in mid-May 2012. Construction monitoring commenced on June 14, 2012, approximately one month following the first date of placement of TDA, as per condition 6.4.9.2 of the Addendum #1 of MTO Contract 2010-4003, dated June 22, 2010 (MTO Contract). The new bridge structure was open to public traffic in November 2012. It is Golder's understanding that construction of final slope grading of the north and south embankments was completed in July 2014. Golder undertook the environmental monitoring program, which included groundwater, surface water and TDA leachate quality monitoring during pre-construction, construction and post-construction of the TDA embankments from November 2010 to August 2015.

Following the final post-construction monitoring, in October 2015, Golder investigated the general soil and groundwater conditions across the site by means of test pits and geochemical testing of soil samples. A site drainage assessment was also completed, in April 2016, to assess a possible hydrological connection between the TDA embankment and the nearby surface water features. The results of this investigation were presented in a report submitted to MTO dated August 2016.

The 2019 monitoring program was conducted in accordance with MTO Agreement #4017-E-0048, Assignment #2.

This report discusses the results of the 2019 monitoring program and provides recommendations for future groundwater and pan lysimeter leachate quality monitoring programs.

2.0 COMMENTS FROM THE MECP

The Ministry of the Environment Conservation and Parks (MECP) provided technical comments in response to the review of the reports entitled "*Post-Construction Monitoring Report, Annual Report #3 (PR#51), MTO Contract 2010-4003, TDA Embankment, WP-385-01-01, Boundary Road, Cornwall, Ontario*" and "*Investigation of Groundwater Impacts, Highway 401 and Boundary Road, TDA Embankments, Cornwall, Ontario*" in a letter dated January 2018 as summarized below and provided in Appendix A.

Technical comments from MECP Hydrogeologist Kyle Stephenson:

- “GAL recommends that the groundwater monitoring program be continued with all six wells to be monitored twice a year. GAL recommends that only iron, manganese and sulphate be monitored as part of the program. I am in agreement that the groundwater monitoring program should be continued at six wells on a twice per year basis (spring and fall) however, additional parameters should be monitored. The following parameters should also be included to support ongoing monitoring of the pilot TDA project: benzene, xylene, toluene, ethylbenzene, petroleum hydrocarbon fractions F1 to F4, 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene zinc, alkalinity, ammonia, conductivity, boron, hardness, strontium, sulphate, chloride and sodium. Once every three (3) years, groundwater monitoring should be conducted for the list of parameters contained in Table 2 of the December 2015 report (Post-Construction Monitoring Program). Groundwater levels should be measured during each event.”
- “GAL has indicated that all four pan lysimeters should be decommissioned; however, I recommend that pan lysimeters PL2 and PL3 remain in place. These pan lysimeters should be monitored at the same frequency and for the same parameters as groundwater monitoring wells.”
- “Some studies have identified aniline as a contaminant of concern and this parameter should be monitored on at least two occasions at pan lysimeters to support the pilot project.”
- “An annual report should be completed to present results.”
- “I recommend that TDA remain regulated and that conditions associated with use of TDA be included as part of a waste approval.”
- “Tire waste is more toxic following combustion. It is beyond the scope of my review to consider issues related to fire however this issue may be considered by others as part of TDA waste exemption discussion.”
- “GAL has conducted post construction monitoring from 2012 to 2016. I am not certain if groundwater monitoring was conducted in 2017. This should be determined and available data from 2016 and 2017 should be forwarded to the ministry for review.”

Groundwater monitoring was not undertaken in 2016 through 2018.

As per the MECP comments, all six wells were monitored in 2019 for the parameters requested by the reviewer. Pan lysimeters PL2 and PL3 were sampled on two occasions in 2019, with the samples analysed for the same list of parameters as the monitoring wells, plus aniline. In 2020 or 2021, groundwater monitoring could be conducted for the list of parameters contained in Table 2 of the *Post-Construction Monitoring Report, Annual Report #3*.

3.0 GEOLOGICAL CONDITIONS

The following section provides a brief summary of the geological setting of the TDA embankment Site based on the pre-construction data available from the augerholes/boreholes that were drilled during the installation of groundwater monitors by Genivar Consultants Limited Partnership (Genivar) and from previous geotechnical investigations conducted at the Site by Coffey Geotechnics Inc. (Coffey). Borehole logs corresponding to the six groundwater monitors installed around the areas of the proposed TDA embankments were prepared by Genivar and are provided in **Appendix B**.

The site is located in the Glengarry Till Plain physiographic region of south-eastern Ontario (Chapman and Putman, 1973). The surficial geology of the site consists of fill materials (clayey topsoil or gravel structural fill) that extend to as much as 2.6 metres below ground surface, underlain by native soils, comprised of sandy silt till

gravel (Fort Covington Till), to between 0.6 and 3.2 metres depth. A sand and gravel inter-glacial zone, with a thickness of up to 0.6 metres, and a silty sand till with gravel layer (Malone Till) was encountered between 3.1 and 6.1 metres depth. Bedrock is comprised of dark grey argillaceous limestone. The bedrock is exposed at ground surface north of the property and was encountered between 6.8 and 13.6 metres below ground surface at the site (Coffey, 2009).

4.0 SITE CONCEPTUAL MODEL

Based on the results of a 2016 investigation, Golder has developed the following site conceptual model for the Cornwall TDA embankments:

- TDA fill materials used in the construction of the embankments are located above the water table.
- A minor amount of construction debris including drywall fines (CaSO_4) was included with the TDA fill.
- A low permeability glacial till deposit underlies the TDA embankments.
- Generally low permeability fill materials used to cover the TDA fill and the side slopes of the embankments limit the amount of infiltration.
- Water that infiltrates the TDA abutments dissolves leachate indicator parameters from the soil cover and the TDA and sulphate from the drywall fines. The resultant leachate impacts the water table below the abutments.
- Groundwater is flowing slowly beneath the TDA embankments and contains elevated concentrations of iron, and manganese that originate in the native till deposits and from the historical bridge embankment (constructed of till-derived fill from a nearby source).
- Sulphate leached from drywall fines caused an increased groundwater concentration below the TDA embankment. The peak concentrations occurred soon after the TDA placement and quickly reduces to levels that are close to the applicable drinking water standard.
- TDA leachate does not discharge to any of the nearby surface water features.
- Benzene is the only TDA leachate parameter that originates from the TDA only (not from soil fill).

5.0 2019 MONITORING PROGRAM

The scope of the 2019 monitoring program was in accordance with MTO Agreement #4017-E-0048, Assignment #2. The locations of the groundwater monitors, surface water sampling stations and pan lysimeters in the vicinity of the TDA placement are shown on **Figure 1**.

Site inspections were carried out during each sampling event, with a focus on the pan lysimeter clean-outs and any surface water features within or near the site. In 2019, PL-2 and PL-3 appeared to have had small amounts of overflow, and some staining was noted at the clean-out of PL-3. No erosion was noted at either location. Most surface water stations were dry, with the exceptions of SW-1, SW-2, SW-6 and SW-7. No flow was noted at the stations that had water present.

5.1 Pan Lysimeter

The locations of the pan lysimeters were selected in order to monitor the quality of the leachate produced from the TDA. The approximate locations of the four pan lysimeters are shown on **Figure 1**. Pan lysimeter monitoring was conducted at locations PL2 and PL3, situated within the north and south TDA fill areas, respectively. With the exception of the June 2012 monitoring event at PL4, background pan lysimeters locations PL1 and PL4 were consistently dry during the entire duration of the construction and post-construction monitoring period. Monitoring at PL1 and PL4 was discontinued in 2019, as supported by the MECP comments (refer to Section 2.0).

Pan lysimeter leachate samples were collected using a Whale pump and dedicated tubing on September 18, 2019 (summer) and November 11, 2019 (fall). The pan lysimeters were purged approximately three days prior to the samples being collected. Pan lysimeter water quality samples were submitted for laboratory testing of the following parameters as per **Table 1**: alkalinity, aniline, ammonia, boron, BTEX (benzene, xylene, toluene, ethylbenzene), chloride, conductivity, hardness, iron, manganese, sodium, strontium, sulphate, petroleum hydrocarbons (PHC) (F1-F4), 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene, zinc.

The temperature, pH, conductivity and turbidity of the pan lysimeter samples were measured in the field at the time of sample collection. The meters used for measuring the pH and conductivity in the field were calibrated prior to use. All samples collected were entered on a Chain of Custody form and placed in coolers and maintained at or below 10°C for transport to Eurofins Environment Testing in Ottawa, Ontario.

5.1.1 Pan Lysimeter Compliance

For all regulated metals and organics, the toxicity characteristics leaching procedure (TCPL) testing for TDA are well below the TCPL regulatory limits (Zelibor, 1991; Ealding, 1992; Humphrey et al., 1997); therefore, TDA are not classified as hazardous waste. The purpose of a pan lysimeter is to monitor the quality of the leachate generated from the TDA. TDA Leachate Indicator parameters benzene, iron, manganese, toluene, xylenes, zinc, 1,1,1-trichloroethane, 1,1-dichloroethane and trichloroethene are used to assess potential impacts to downgradient groundwater or surface water monitoring locations. Alkalinity, hardness and sulphate are also considered TDA leachate indicator parameters at the request of the MECP. The MECP recently identified aniline as a contaminant of concern. For the purpose of this Site evaluation, pan lysimeter leachate quality is compared to the relevant groundwater Ontario Drinking Water Quality Standards (ODWQS); although potential impacts to drinking water are evaluated at the site boundaries.

5.2 Groundwater

Groundwater levels were measured, and samples were collected by Golder personnel twice in 2019 at monitoring locations MW 01, MW 02, MW 03, MW 04, MW 05 and MW 06, on September 18, 2019 (summer) and November 11, 2019 (fall). Groundwater monitors MW 05 and MW 06 were dry during the September 2019 and November 2019 monitoring sessions.

About three days prior to collecting groundwater samples, the monitoring wells were purged and developed through the removal of at least three standing volumes of water using dedicated inertial samplers. Groundwater samples were submitted for laboratory testing of the following parameters as per **Table 1**: alkalinity, ammonia, boron, BTEX, chloride, conductivity, hardness, iron, manganese, sodium, strontium, sulphate, PHC (F1-F4), 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene, zinc.

The temperature, pH and conductivity and turbidity of the groundwater samples were measured in the field at the time of sample collection. The meters used for measuring the pH and conductivity measurements in the field were calibrated prior to use. All samples collected were entered on a Chain of Custody form, placed in coolers and maintained at or below 10°C for transport to the analytical laboratory (Eurofins Environment Testing) in Ottawa, Ontario.

5.2.1 Groundwater Compliance

The use of TDA materials as light fill for the construction of the bridge embankments required that the Site be designated as a non-hazardous waste disposal site. A provisional ECA was issued on May 14, 2010 (see **Appendix A**). The volume of TDA fill is less than 40,000 cubic metres; therefore, the general waste management Regulation 347 is applicable to the Site.

Groundwater compliance assessment parameters (TDA Leachate Indicator Parameters) have been identified by previous studies which investigated potential impacts to groundwater (Humphrey and Swett, 2006; ASTM, 2008). According to the literature, the placement of TDA above the groundwater table has the potential to increase concentrations of select metals with drinking water aesthetic objectives (iron, manganese and zinc). Volatile organic compounds including benzene, xylene, toluene, 1,1,1-trichloroethane, 1,1 dichloroethane, and trichloroethene can also be released from the TDA into the groundwater system in trace amounts. As previously discussed, the MECP has suggested that alkalinity, hardness and sulphate are also TDA leachate indicators.

Under MECP Guideline B-7 (MOEE, 1994a), a change in the quality of groundwater on adjacent properties will only be acceptable if the water quality is not degraded in excess of fifty percent of the difference between background concentrations and established water quality criteria for aesthetic related parameters, and twenty-five percent of the difference between background conditions and established water quality criteria for health related parameters. It is Golder's understanding that the 7.5 ha TDA site boundary area is located well within MTO property limits.

For the purpose of this Site evaluation under MECP Guideline B-7, the Pre-Construction groundwater quality monitoring completed at all monitoring wells between November 2010 and May 2012 is assumed to be representative of background groundwater quality within the sand and gravel interglacial layer (MW 02, MW 05, MW 06), at the contact between the Fort Covington Till and Malone Till (MW 03 and MW 04) or within the top of the transition from sand and gravel unit to the Malone Till (MW 01), underlying the TDA. The sand and gravel interglacial zone and/or contact zone between the Fort Covington Till and Malone Till are interpreted to be the layers most likely to be impacted on adjacent properties by leachate from the TDA. The Ontario Drinking Water Quality Standards and Objectives (MOE, 2006) are used to represent the established water quality criteria.

Groundwater compliance of the TDA fill area is assessed by comparing groundwater concentrations of each TDA Leachate Indicator Parameter at the compliance monitoring locations, to Reasonable Use Limits (RUL) determined by the following expression:

$$RUL = C_b + x(ODWQS - C_b) \quad (1)$$

Where:

C_b = Median background concentration;

ODWQS = Ontario Drinking Water Quality Standard; and,

x = 0.25 for health-related parameters, 0.5 for non-health related parameters

6.0 SITE PHYSICAL HYDROGEOLOGICAL CONDITIONS

6.1 Groundwater Levels

Groundwater levels measured during the post-construction monitoring program are shown in **Table 2**. The depth to the water table in 2019 ranged from 0.7 metres below ground surface (mbgs), east of the north TDA embankment, to 1.5 mbgs, north of the north TDA embankment, and from 2.5 mbgs, east of the south TDA embankment, to 3.0 mbgs, southeast of the south TDA embankment. The groundwater levels within the granular layer for during the 2019 monitoring period are shown on **Figure 1** and are similar to the post-construction groundwater elevations measured in 2014 and 2015. Monitoring wells MW 05 and MW 06 were dry in August 2015 and during both 2019 monitoring events.

6.2 Hydraulic Gradients and Flow Direction

Based on the 2019 groundwater elevation data, the groundwater flow direction within the granular layer is interpreted to be generally towards the north and northwest across the Site as shown on **Figure 1**. The groundwater flow direction is indicated to be generally consistent over time based on groundwater monitoring between November 2010 and November 2019 and appears to be controlled by local topography, including the TDA embankments.

The horizontal hydraulic gradient for the granular layer groundwater flow system at the Site was estimated from the post-construction monitoring sessions completed between October 2014 and November 2019. In general, the horizontal hydraulic gradient across the Site remained consistent throughout the duration of the monitoring program: between 0.002 to 0.005 metres per metre (m/m) in the vicinity of the north TDA embankment (estimated using water level data from MW 01, MW 02 and MW 05) and usually ranging from 0.004 to 0.013 m/m in the vicinity of the south TDA embankment (estimated using water level data from MW 03, MW 04 and MW 06).

Multi-level monitors were not installed, thus vertical gradients and vertical flow directions are not assessed.

6.3 Horizontal Hydraulic Conductivity

Monitoring wells are primarily screened within the Fort Covington Till and/or Malone Till and include the target sand and gravel interglacial zone between the two units where applicable (see **Appendix B**). Published horizontal hydraulic conductivities range from 7.8×10^{-5} to 4.0×10^{-9} metres per second (m/s) with a geometric mean of 5.1×10^{-7} m/s and 2.6×10^{-6} to 4×10^{-9} m/s for the Fort Covington Till with a geometric mean of 6.5×10^{-8} m/s for the Malone Till (Molloy et al., 1994).

These values are considered generally representative of what would be expected for the granular layer present in the subsurface at the Site and are in agreement with the range of published horizontal hydraulic conductivity values reported for similar materials (Freeze and Cherry, 1979).

6.4 Groundwater Flux and Average Linear Velocity

The groundwater flux or specific discharge, q , is the volumetric flow rate of groundwater per unit area per unit time and is calculated from the Darcy's equation, as follows:

$$q = -Ki \quad (2)$$

Where:

q = groundwater flux (m/s);

K = horizontal hydraulic conductivity (m/s);

i = horizontal hydraulic gradient (m/m).

Using conservative estimates of the horizontal hydraulic gradient of 0.005 m/m for the north TDA embankment area and 0.012 m/m for the south embankment area, and published geometric mean of horizontal hydraulic conductivity testing in the Fort Covington Till (5.1×10^{-7} m/s), the maximum groundwater flux across the Site is estimated to be 2.7×10^{-9} m/s and 6.1×10^{-9} m/s in the vicinity of the north and south TDA embankments, respectively. For an assumed porosity of 0.3, these fluxes translate to a range in average linear groundwater velocity of 0.3 metres per year (m/yr) in the vicinity of the north TDA area and 0.6 m/yr in the vicinity of the south TDA area. Therefore, the approximate horizontal travel time of TDA leachate from the south TDA embankment to downgradient monitoring well MW 03 would be approximately 25-40 years, and greater than 200 years from the north TDA embankment to MW 01.

7.0 PAN LYSIMETER LEACHATE QUALITY

The results of the field and laboratory analyses of the pan lysimeter leachate samples collected during the construction and post-construction monitoring periods water quality data are presented in **Appendix C** along with the relevant ODWQS (MOE, 2006). The laboratory reports of analysis for the post-construction monitoring period are provided in **Appendix D**.

7.1 Background Pan Lysimeter Leachate Monitoring

Pan lysimeters PL1 and PL4 serve as background leachate quality monitoring for pan lysimeters PL2 and PL3, situated outside of the TDA fill areas. With the exception of the first quarterly construction monitoring event at pan lysimeter PL4, both background monitors have consistently been dry throughout the duration of the construction and post-construction monitoring programs.

The results of the field and analytical laboratory analyses on the leachate quality samples were compared to the relevant Ontario Drinking Water Quality Standards (ODWQS) included in **Appendix A**. Background pan lysimeter leachate quality is characterized by a single monitoring event at PL4 in June 2012 following the initial placement of TDA fill materials and the results are summarized in the following table.

TDA Leachate Indicator Parameters	Groundwater Quality Criteria ¹		(Background) Concentration at PL-4 (mg/L)
	ODWQS ² (mg/L)	STATUS	
Alkalinity	—	—	99
Iron	0.3	AO	<0.03
Hardness			41
Manganese	0.05	AO	<0.01
Sulphate			177
Zinc	5	AO	<0.01
Benzene	0.005	MAC	<0.0005
Toluene	0.024	AO	<0.0005
Xylenes, Total	0.3	AO	<0.0010
1,1,1-Trichloroethane	—	—	<0.0004
1,1, Dichloroethane	—	—	<0.0004
Trichloroethene	0.005	MAC	<0.0003

Notes: ¹ Considers Aesthetic Objectives (AO) and Maximum Acceptable Concentrations (MAC)

² ODWQS - Ontario Drinking Water Quality Standards and Objectives (MOE, 2006)

7.2 Pan Lysimeter Leachate Quality Assessment

The parameters with reported levels exceeding their respective ODWQS; trends in leachate quality; and, an interpretation of the pan lysimeter leachate quality results are summarized in **Table 3** at the end of the report.

Pan lysimeter locations PL1 and PL4, situated outside of the TDA fill areas were consistently dry throughout the entire duration of the post-construction monitoring period; therefore, no background leachate quality samples could be collected and compared to TDA leachate monitors PL2 and PL3 during this phase of monitoring. Based on the data obtained throughout the duration of the post-construction monitoring program at PL2 and PL3, TDA Leachate Indicator Parameters with concentrations exceeding the applicable ODWQS (AO) included iron, manganese and sulphate.

Concentrations of benzene measured at PL3 during the post-construction monitoring period were consistently below the MAC value of 0.005 mg/L, while concentrations of benzene at PL2 remained below the laboratory method detection limit (<0.0005 mg/L). Concentrations of benzene at pan lysimeters PL2 and PL3 have declined following the placement of TDA fill over time and have generally stabilized at PL2 (non-detect) and PL3 (below ODWQS) (refer to **Figure 2**).

Iron concentrations increased in pan lysimeters PL2 and PL3 following the placement of TDA fill, decreased between July 2013 and August 2015, and increased in 2019 (refer to **Figure 3**). The concentrations of iron at PL3 have been variable at times. Concentrations of manganese at pan lysimeters PL2 and PL3 initially increased following the TDA placement in May 2012 and remain variable (refer to **Figure 4**).

At the request of the MECP, alkalinity, hardness and sulphate were added to the list of TDA leachate parameters following a sharp increase in concentrations during the first year of construction. Concentrations of sulphate have declined but remain somewhat variable at PL2 and PL3 (refer to **Figure 5**), while concentrations of alkalinity and hardness are also variable (refer to **Figures 6 and 7**).

Concentrations of the remaining Leachate Indicator Parameters including o-xylene, toluene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene and zinc were consistently measured at trace levels or below the method detection limit at all pan lysimeter locations throughout the duration of the post-construction monitoring program.

Aniline does not have an ODWQS value, but an interim surface water Provincial Water Quality Objective (PWQO) of 0.002 mg/L has been set by the MECP (MOEE, 1994b). Concentrations of aniline in 2019 at PL2 were below the method detection limit (0.002 mg/L). At PL3, the 2019 concentrations of aniline were 0.0036 and 0.0040 mg/L in the summer and fall monitoring sessions, respectively, above the interim PWQO. However, since there was only periodic overflow at PL3 and no erosion noted, it is likely that the overflow amounts are very small and do not make their way to surface water in the area, as supported by the site drainage assessment (Golder, 2016).

Elevated concentrations of ammonia, chloride, conductivity, strontium and sodium have also been observed in the leachate samples collected; however, these parameters were not previously identified as parameters of concern related to the TDA. The elevated concentrations of chloride and sodium in the leachate are interpreted to be related to the application of road de-icing agents along Boundary Road. Note, sodium, along with chloride, acetate, potassium, calcium and magnesium (hardness) are primary components of de-icing agents, while phosphorus, nitrogen, sulphate and zinc represent possible secondary components of de-icing agents which may impact leachate quality. Increasing conductivity in the leachate samples is likely attributed to an increase in sodium and chloride or metals ions such as iron and manganese that have leached from the TDA due to application of de-icing agents. Elevated sulphate levels may also be attributed to the presence of a minor amount of construction debris in the fill used at the site (see Section 4.0).

8.0 GROUNDWATER QUALITY

Historical results of the field and laboratory analyses of the groundwater samples collected during the post-construction and construction periods as well as pre-construction groundwater quality data are presented in **Appendix C** along with the relevant Ontario Drinking Water Quality Standards (MOE, 2006). The laboratory reports of analysis for the four post-construction monitoring sessions are provided electronically in **Appendix D**.

Discussions regarding compliance with the Ontario Drinking Water Quality Standards (ODWQS) relate specifically to non-health related objectives (i.e., aesthetic parameters) and health-related parameters for which a Maximum Acceptable Concentration (MAC) or Interim Maximum Acceptable Concentration (IMAC) have been established.

8.1 Background Groundwater Quality

Background Site groundwater quality was characterized as part of the Pre-Construction Baseline Study conducted by Golder (June 2012). Site specific reasonable use limits (RULs) were established using the historical Pre-Construction baseline results as discussed in Section 5.2.1. The range in concentrations of the TDA Leachate Indicator Parameters at all groundwater monitors MW 01, MW 02, MW 03, MW 04, MW 05 and MW 06, for which MAC or AO objectives have been established are provided below, along with the calculated RULs. Note the list of TDA leachate indicator parameters was revised to include alkalinity, hardness and sulphate at the request of the MECP.

TDA Leachate Indicator Parameters	Groundwater Quality Criteria ¹		Pre-Concentration Range at all Monitors ³ (mg/L)	Reasonable Use Limit (mg/L)
	ODWQS ² (mg/L)	STATUS		
Alkalinity	—	—	242 – 434	—
Iron	0.3	AO	<0.03 – 21.5	0.17
Hardness	—	—	240 – 1680	—
Manganese	0.05	AO	<0.01 – 6.8	0.30
Sulphate	500	AO	9 – 98	276
Zinc	5	AO	<0.1	2.5
Benzene	0.005	MAC	<0.001	0.002
Toluene	0.024	AO	<0.001	0.012
Xylenes, Total	0.3	AO	<0.003	0.15
1,1,1-Trichloroethane	—	—	<0.0008	—
1,1-Dichloroethane	—	—	<0.0008	—
Trichloroethene	0.005	MAC	<0.0006	0.001

Notes: ¹ Considers Aesthetic Objectives (AO) and Maximum Acceptable Concentrations (MAC)

² ODWQS - Ontario Drinking Water Quality Standards and Objectives (MOE, 2006)

³ Pre-Construction (background) groundwater quality data sampled between November 2010 and May 2012

The RULs are calculated as the median value of all pre-construction groundwater quality data (MW 01, MW 02, MW 03, MW 04, MW 05 and MW 06). Where concentrations of parameters analyzed were below the method detection limit, a concentration equivalent to the method detection limit value was used in the calculation of the RUL. For the purpose of this compliance assessment, it is recognized that the background groundwater quality in the vicinity of the Site does not naturally meet the ODWQS aesthetic objective for iron and manganese at all monitoring locations, and the maximum background concentrations of iron and manganese are substantially higher than the median concentrations. Therefore, exceedance of the calculated RUL following emplacement of the TDA as part of the construction monitoring program would not necessarily be indicative of leachate impact.

8.2 Groundwater Compliance Assessment

Trends in groundwater quality; a comparison of post-construction groundwater quality to pre-construction conditions; and, an interpretation of groundwater quality at each groundwater monitor are summarized in detail in **Table 4**.

Based on the data obtained during the post-construction groundwater monitoring program, a summary of the TDA Leachate Indicator parameters with concentrations exceeding the RUL at each monitoring well location is provided in the following table.

Monitoring Well	TDA Leachate Indicator Parameters Exceeding Reasonable Use Limit in 2019	Concentration (mg/L)
MW 01	Iron Manganese	0.21, 0.29 0.95, 1.13
MW 02	Manganese (summer only)	0.31, --
MW 03	Iron (summer only) Manganese Sulphate (summer only)	0.99, -- 1.71, 0.58 314, --
MW 04	Sulphate (summer only)	286, --
MW 05	dry	--
MW 06	dry	--

The post-construction groundwater quality in monitoring wells MW 01 and MW 03 exhibited manganese and iron (summer only at MW 03) exceedances of the respective TDA Leachate Indicator Parameter RUL. The concentration of manganese also exceeded the RUL at monitoring well MW 02 on one occasion in 2019. All RUL exceedances of iron and manganese at MW 01, MW 02 and MW 03 were below the maximum observed pre-construction concentrations. Concentrations of sulphate at MW 03 and MW 04 which exceeded the RUL in summer 2019 were above the maximum observed pre-construction concentration of sulphate.

Concentrations of the remaining Leachate Indicator Parameters including benzene, total xylenes, toluene, 1,1,-trichloroethane, 1,1-dichloroethane, trichloroethene and zinc were consistently below the method detection limit at all groundwater monitoring locations throughout the duration of the construction and post-construction monitoring programs.

Concentrations of sulphate and alkalinity at monitoring wells MW 03 and MW 04 are elevated compared to background conditions (refer to **Figures 5, 6 and 7**) and generally show an increasing trend. Elevated concentrations of manganese and iron in groundwater at MW 03 prior to the placement of TDA suggest a pre-existing source of groundwater impact; while concentrations of manganese at MW 01, MW 02 and MW 04 have been variable (refer to **Figures 3 and 4**).

The groundwater quality at monitoring wells MW 02 and MW 03 consistently exceeded the ODWQS-AO for sodium (200 mg/L) throughout the duration of the pre-construction, construction and post-construction monitoring programs. The elevated concentrations of sodium at these monitoring locations are interpreted to be the result of groundwater quality impacts related to the application of road de-icing agents along Highway 401 and/or Boundary Road. Chloride was monitored starting in 2019 and exceeded the ODWQS-AO (250 mg/L) at wells MW 01, MW 02 and MW 03. Note, sodium, along with chloride, acetate, potassium, calcium and magnesium (hardness) are primary components of de-icing agents, while phosphorus, nitrogen, sulphate and zinc represent secondary components which may also impact groundwater quality.

The RUL exceedances of iron and manganese at MW 01 are not interpreted to be related to the TDA based on the estimated horizontal travel time of TDA leachate to the monitor as discussed in Section 5.4. The RUL exceedance of manganese at MW 02 is not interpreted to be related to the TDA since this monitor is situated hydrogeologically upgradient of the north TDA area and therefore is not likely impacted by the TDA.

The available groundwater monitoring data up to 2015 indicated that the groundwater quality at monitor MW 03, situated downgradient of the southern TDA fill area, appeared to be possibly impacted by leachate generated from the southern TDA embankment due to elevated and/or increasing trend in concentrations of TDA leachate indicator parameters manganese, sulphate and hardness (refer to **Figures 4, 5 and 6**). However, the concentrations of manganese, hardness and iron at MW 03 decreased in 2019 to pre-construction levels. Due to the estimated horizontal time of travel of TDA leachate to MW 03, as discussed in Section 5.4, MW 03 is not interpreted to be impacted by the TDA leachate. Note: increased concentrations of manganese, sulphate and hardness have also been observed at groundwater monitor MW 04, however this monitor is situated hydrogeologically upgradient of the south TDA area and therefore is not likely impacted by the TDA. Elevated concentrations of manganese may also be related to the fill materials used for the embankments at MW 03 or the application of the additional 0.4 metres of fill materials applied during the final grading nearby MW 03 (0.4 metres) and MW 04 (1.4 metres). In general, groundwater quality results during the post-construction monitoring program are consistent with the historical Pre-Construction results and the site is in compliance with MECP Guideline B-7.

9.0 CONCLUSIONS

Based on monitoring of groundwater and surface water quality at the existing network of monitoring locations, the Site is in compliance with the applicable MECP guideline B-7 (groundwater).

The TDA leachate quality data indicates that iron, manganese and benzene are leaching from the TDA. TDA leachate may also be characterized by elevated concentrations of alkalinity, hardness and sulphate, which are parameters which have not previously been identified in leachates generated from TDA and/or TCPL testing.

Concentrations of benzene in the leachate have declined following the placement of TDA fill over time and have generally stabilized at pan lysimeter PL2 (non-detect) and PL3 (below ODWQS). Sulphate concentrations (which may be related to a minor component of drywall fines included with the TDA) increased in the leachate pan lysimeters following the placement of TDA fill but have since decreased. Iron concentrations in the leachate pan lysimeters are variable. Measured concentrations of iron at MW 03 have been variable over time. Concentrations of manganese at groundwater monitor MW 03 were elevated following the TDA placement but have steadily declined to within pre-construction concentrations as of March 2015. Concentrations of manganese in the leachate monitors initially increased following the TDA placement in May 2012, but in 2019 were similar to the concentrations observed at the downgradient monitor MW 03. Concentrations of hardness and sulphate increased at groundwater monitors MW 03 and MW 04 since the placement of TDA fill but have generally stabilized since March 2015.

The available groundwater monitoring data indicates that the probability of groundwater impact from TDA at the monitoring locations is very low. The source of the elevated concentrations at MW 03 and MW 04 could also be related to the soil used to backfill the abutments, cover the TDA and for final grading in the vicinity of MW 03 and MW 04. Elevated concentrations of manganese and iron at MW 03 prior to the placement of the TDA fill also suggest a pre-existing source of groundwater impact.

10.0 PROPOSED 2020 MONITORING PROGRAM

The available TDA leachate quality data indicates that iron, manganese and benzene are leaching from the TDA. Based on the site conceptual model and the results of monitoring from 2012 to 2019, Golder recommends that TDA leachate and groundwater quality monitoring can be discontinued. Based on the understanding of the hydrology at the site and the historical surface water quality data, impacts to nearby surface water features as a result of the TDA leachate are not apparent and are not anticipated, therefore surface water quality monitoring is also not recommended.

Subject to approval from the MECP, it is also recommended that the six groundwater monitoring wells and four on-site pan lysimeters be decommissioned as per Ontario Regulation 903. Background pan lysimeters PL1 and PL4 have consistently been dry, while PL2 and PL3 situated within the TDA fill areas have been used to characterize TDA leachate. The clean-outs of the pan lysimeters (specifically PL2 and PL3) can allow leachate to “short circuit” to the ground surface. Decommissioning of the pan lysimeters would eliminate the potential for any future release of leachate to enter surface water, wetland or otherwise cause an adverse effect.

Until the MECP approves the recommended end to the monitoring program, ongoing monitoring will be required. Therefore, at this time the proposed 2020 post-construction monitoring program for the groundwater (six) and pan lysimeters (two) monitors is provided in **Table 4**. The 2020 monitoring is proposed to be completed in the spring and the fall. As recommended by the MECP reviewer, in 2020 or 2021, groundwater monitoring would be conducted for the list of parameters contained in Table 2 of the *Post-Construction Monitoring Report, Annual Report #3*. The results of the additional groundwater and leachate quality monitoring would be evaluated and repeated to the MECP by December 31, 2020 in order to confirm groundwater impacts from the application of the TDA fill materials.

11.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of the Ministry of Transportation Ontario. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by Golder Associates Ltd. and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by Golder Associates Ltd. provided by others as described in this report.

Golder Associates Ltd. 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 at this Site has been made using the results of physical measurements and chemical analyses of liquids from a number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at surface water stations, borehole, groundwater and pan lysimeter monitoring locations. Subsurface 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 practising 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. Golder Associates Ltd. 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 findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

Signature Page

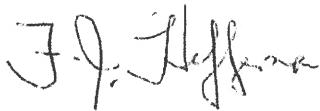
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Table 1: 2019 Pan Lysimeter and Groundwater Monitoring Program

Sampling Frequency	Sampling Locations	Analytical Parameters
Summer and Fall	PL2, PL3	alkalinity, ammonia, aniline, boron, BTEX (benzene, xylene, toluene, ethylbenzene), chloride, conductivity, hardness, iron, manganese, sodium, strontium, sulphate, PHC (F1F4), 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene, zinc
	MW 01, MW 02, MW 03, MW 04, MW 05, MW 06	alkalinity, ammonia, boron, BTEX (benzene, xylene, toluene, ethylbenzene), chloride, conductivity, hardness, iron, manganese, sodium, strontium, sulphate, PHC (F1F4), 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene, zinc

Table 2: Groundwater Elevation Data

Groundwater Monitor	Ground Surface Elevation (mASL)	Well Casing Elevation (mASL)	Groundwater Elevation (mASL)																	
			Pre-Construction				Construction								Post-Construction					
			26-Nov-10	28-Feb-11	7-Apr-11	10-May-12	14-Jun-12	17-Sep-12	18-Dec-12	11-Apr-13	5-Jul-13	21-Oct-13	3-Feb-14	25-May-14	9-Oct-14	24-Mar-15	17-Jun-15	27-Aug-15	18-Sep-19	11-Nov-19
MW 01	56.63	57.42	55.27	55.32	55.30	55.24	55.18	54.55	55.18	55.13	55.12	55.16	55.12	55.24	55.37	55.26	55.20	55.25	55.07	55.33
MW 02	56.95	57.79	56.06	56.05	56.10	56.11	56.03	55.40	55.93	56.37	55.53	55.55	55.51	55.59	55.80	55.62	55.54	55.60	55.82	55.98
MW 03	59.73	60.18	57.41	57.13	57.34	57.40	57.35	56.47	57.26	57.20	57.22	57.09	57.07	57.18	56.67	57.31	57.16	56.64	56.82	57.27
MW 04	60.64	60.68	57.00	57.60	58.12	57.96	¹	56.93	57.86	57.74	57.73	57.50	57.47	57.59	56.80 ⁴	57.60 ⁴	57.57 ⁴	56.62 ⁵	57.63	57.84
MW 05	55.47	56.30	55.49	³	55.41	55.35	55.32	²	55.28	55.26	55.11	55.38	³	55.12	55.01	³	55.09	²	²	²
MW 06	59.46	60.32	58.67	58.31	58.41	58.37	58.33	²	58.31	58.24	58.16	58.03	58.00	58.11	²	58.06	58.10	²	²	²

- Notes:** Elevations are referred to geodetic datum established at the site by McIntosh Perry on May 19, 2011 (Pre-Construction), with the exception of MW 03 and MW 04 which were re-surveyed by McIntosh Perry on
- mASL – metres above sea level
- ¹ Monitoring well MW 04 was buried/inaccessible on June 14, 2012
- ² Monitoring well location was dry
- ³ Monitoring well location was frozen
- ⁴ MW 04 was damaged following completion of the final grading of the south embankment in July 2014
- ⁵ MW 04 well casing elevation revised following June 19, 2015 well repairs

Table 3: Interpretation of 2019 Pan Lysimeter Leachate Quality Data

Pan Lysimeter Monitor	Parameters Exceeding ODWQS in 2019	Trend(s)	Interpretation and Comments
PL2	Chloride Turbidity Iron Manganese Sodium	<ul style="list-style-type: none"> Pan lysimeter leachate quality generally variable over time Concentrations of ammonia, boron, benzene, hardness, manganese, sulphate, sodium, strontium are relatively stable and have decreased since the construction period Variable alkalinity and conductivity Iron increased in 2019 as compared to 2014-2015 post-construction period 	<ul style="list-style-type: none"> PL2 is situated within the north TDA fill area and is representative of TDA leachate TDA leachate indicator parameters iron and manganese are present in the TDA leachate Consistently elevated concentrations of alkalinity, ammonia, boron, hardness, strontium, sulphate, sodium and conductivity compared to groundwater quality
PL3	Chloride Turbidity Iron Manganese Sodium Benzene	<ul style="list-style-type: none"> Pan lysimeter leachate quality generally variable over time Decreasing trend in concentrations of ammonia, benzene, boron, sulphate since the construction period 	<ul style="list-style-type: none"> PL3 is situated within the south TDA fill area is representative of TDA leachate TDA leachate indicator parameters iron, manganese and benzene are present in the TDA leachate Consistently elevated concentrations of alkalinity, ammonia, boron, hardness, strontium, sulphate, sodium and conductivity compared to groundwater quality

Table 4: Interpretation of Groundwater Quality Data

Groundwater Monitor	Geological Unit	Parameters Exceeding ODWQS during 2019 Monitoring	Trend(s)	TDA Leachate Indicator Parameters Elevated Compared to Pre-Construction Conditions ¹	Interpretation and Comments
MW 01	Transition from sand and gravel to Malone Till	Chloride Manganese Turbidity	<ul style="list-style-type: none"> Groundwater quality generally consistent over time, with the exception of variable concentrations of iron and sulphate Decreasing trend in concentrations of hardness 	Sulphate (summer only)	<ul style="list-style-type: none"> MW 01 is located approximately 60 metres east and possibly downgradient from the north TDA fill area Concentrations of Leachate Indicator parameters zinc, benzene, xylene, toluene, 1,1,1-trichloroethane, 1,1 dichloroethane, and trichloroethene were present in trace amounts or below the laboratory method detection limit Based on elevated Pre-Construction concentrations of TDA Leachate Indicator Parameter manganese and the estimated groundwater flow velocity, groundwater quality at MW 01 is interpreted not to be impacted by TDA leachate MW 01 is located downgradient of the westbound lane of Highway 401, where elevated concentrations of chloride and sodium are interpreted to be the result of groundwater quality impacts related to the application of road de-icing agents
MW 02	Sand and gravel interglacial zone	Chloride Manganese (summer only) Sodium Turbidity	<ul style="list-style-type: none"> Groundwater quality generally consistent over time for most parameters Variable concentrations of hardness, manganese, sodium, strontium and sulphate 	None	<ul style="list-style-type: none"> MW 02 is located upgradient of the north TDA fill area and possibly downgradient of the south TDA area Concentrations of Leachate Indicator parameters iron, zinc, benzene, xylene, toluene, 1,1,1-trichloroethane, 1,1 dichloroethane, and trichloroethene were present in trace amounts or below the laboratory method detection limit Based on elevated background concentrations of TDA Leachate Indicator Parameter manganese, groundwater quality at MW 02 is interpreted not to be impacted by TDA leachate MW 02 is located in the vicinity of the westbound lane of Highway 401, where elevated concentrations of chloride and sodium are interpreted to be the result of groundwater quality impacts related to the application of road de-icing agents

Groundwater Monitor	Geological Unit	Parameters Exceeding ODWQS during 2019 Monitoring	Trend(s)	TDA Leachate Indicator Parameters Elevated Compared to Pre-Construction Conditions ¹	Interpretation and Comments
MW 03	Contact between Fort Covington Till and Malone Till	Chloride Iron (summer only) Manganese Sodium Turbidity	<ul style="list-style-type: none"> Variable concentrations of ammonia and iron General increasing trend in concentrations of conductivity, hardness, sodium and sulphate until 2015, then decreasing through 2019 Steady decrease in concentration of manganese since October 2013 	Alkalinity Sulphate	<ul style="list-style-type: none"> MW 03 is located approximately 20 metres downgradient of the south TDA fill area Concentrations of Leachate Indicator parameters zinc, benzene, xylene, toluene, 1,1,1-trichloroethane, 1,1 dichloroethane, and trichloroethene were below the laboratory method detection limit Based on the estimated groundwater flow velocity, groundwater quality at MW 03 is not interpreted to be impacted by landfill leachate MW 03 is located in the vicinity of the eastbound lane of Highway 401, where elevated concentrations of chloride and sodium are interpreted to be the result of groundwater quality impacts related to the application of road de-icing agents
MW 04	Contact between Fort Covington Till and Malone Till	Turbidity	<ul style="list-style-type: none"> General increasing trend in concentrations of alkalinity, hardness, conductivity, sulphate, sodium and strontium Maximum concentrations of iron and manganese in June 2015, then decreased to pre-construction levels 	Alkalinity Sulphate	<ul style="list-style-type: none"> MW 04 is located hydrogeologically upgradient of the south and north TDA fill areas Concentrations of all Leachate Indicator parameters were present in trace amounts Groundwater quality at MW 04 is not interpreted to be impacted by TDA leachate despite the increasing trend of TDA leachate indicator parameters alkalinity, hardness and sulphate since the monitor is situated upgradient of the TDA area

Groundwater Monitor	Geological Unit	Parameters Exceeding ODWQS during 2019 Monitoring	Trend(s)	TDA Leachate Indicator Parameters Elevated Compared to Pre-Construction Conditions ¹	Interpretation and Comments
MW 05	Sand and gravel interglacial zone	Not sampled in 2019	<ul style="list-style-type: none"> Groundwater quality generally consistent over time Variable concentrations of hardness, manganese and strontium 	Not sampled in 2019	<ul style="list-style-type: none"> MW 05 is located approximately 55 metres west and cross-gradient from the north TDA fill area MW 05 is located in the vicinity of the westbound off ramp Highway 401, where elevated concentrations of sodium were historically interpreted to be the result of groundwater quality impacts related to the application of road de-icing agents Groundwater quality at MW 05 was historically interpreted not to be impacted by TDA leachate Monitoring well MW 05 was dry during both 2019 monitoring sessions
MW 06	Sand and gravel interglacial zone	Not sampled in 2019	<ul style="list-style-type: none"> Groundwater quality generally consistent over time for most parameters Variable concentrations of alkalinity, iron, manganese and TOC General decreasing trend in concentrations of conductivity, hardness, strontium and sodium 	Not sampled in 2019	<ul style="list-style-type: none"> MW 06 is located approximately 40 metres west and upgradient of the south TDA fill area MW 06 is located in the vicinity of the southbound lane of Boundary Road, where elevated concentrations of sodium were historically interpreted to be the result of groundwater quality impacts related to the application of road de-icing agents Groundwater quality at MW 06 was historically interpreted not to be impacted by TDA leachate Monitoring well MW 06 was dry during both 2019 monitoring sessions

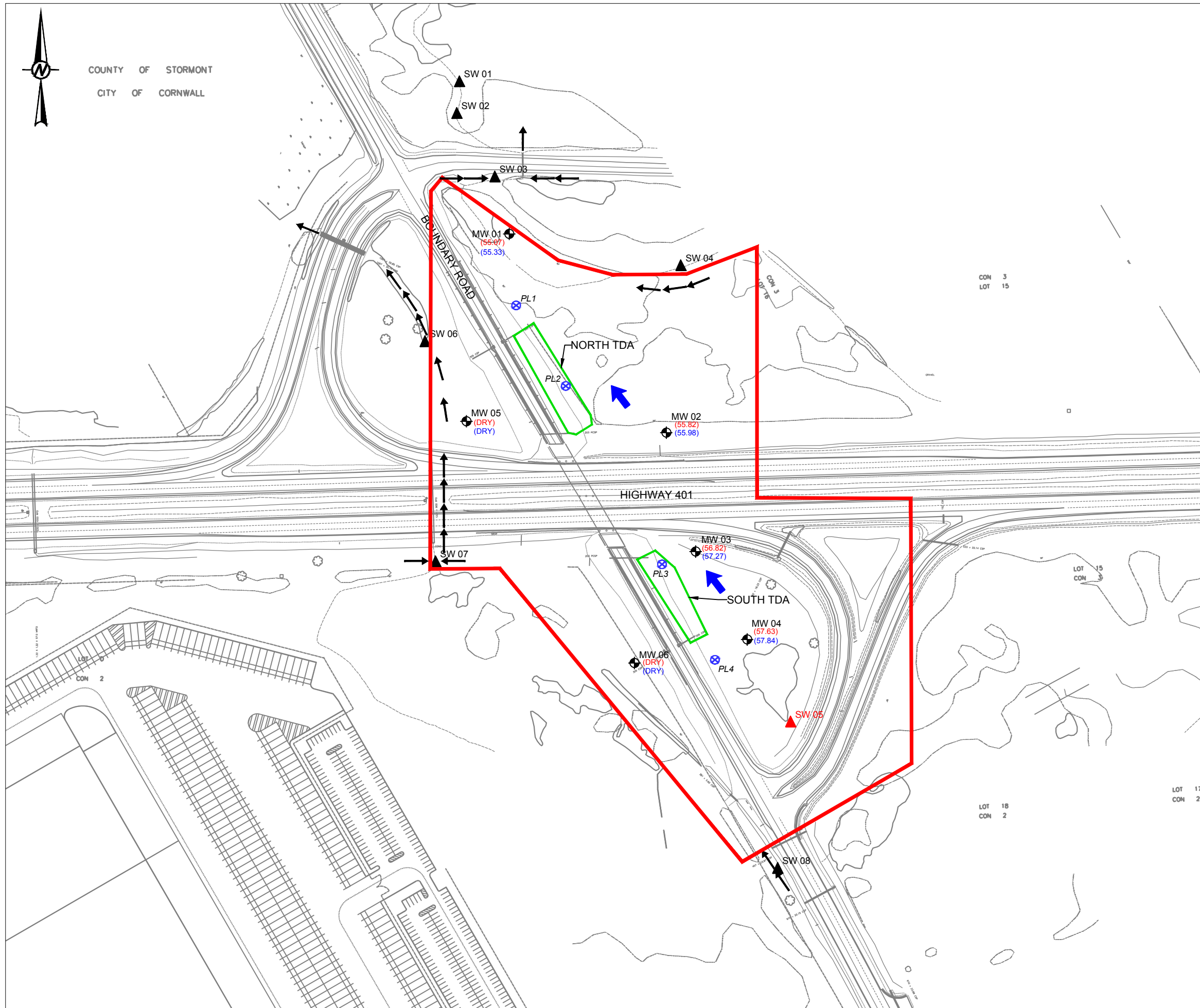
Notes: 1) Pre-Construction conditions established from groundwater quality sampling at all six monitoring well locations between November 2010 and May 2012 prior to TDA fill placement.

Table 5: Recommended 2020 Groundwater and Pan Lysimeter Monitoring Program

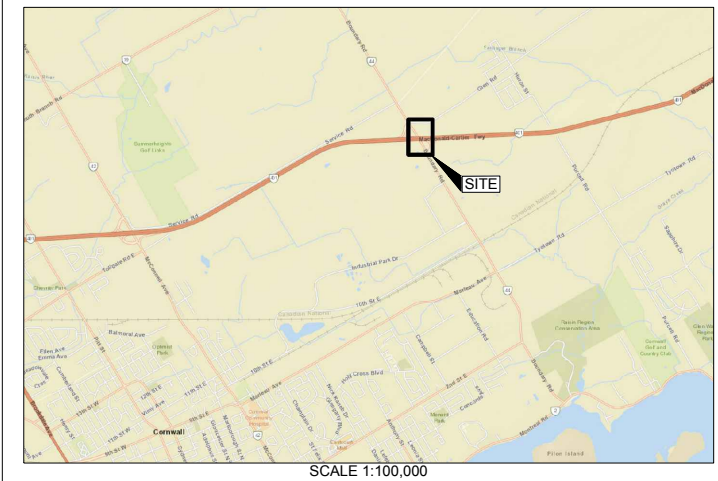
Sampling Frequency	Sampling Locations	Analytical Parameters
Annually (Spring and Fall)	PL2, PL3	alkalinity, ammonia, aniline, boron, BTEX (benzene, xylene, toluene, ethylbenzene), chloride, conductivity, hardness, iron, manganese, sodium, strontium, sulphate, PHC (F1F4), 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene, zinc
	MW 01, MW 02, MW 03, MW 04, MW 05, MW 06	alkalinity, ammonia, boron, BTEX (benzene, xylene, toluene, ethylbenzene), chloride, conductivity, hardness, iron, manganese, sodium, strontium, sulphate, PHC (F1F4), 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene, zinc
Once Every Third Year ¹	MW 01, MW 02, MW 03, MW 04, MW 05, MW 06	ammonia, ammonium, hardness, carbonate, bicarbonate, sulphate, chloride
		temperature, conductivity, pH, turbidity
		benzene, toluene, ethylbenzene, o-xylene, m,p-xylenes
		Total dissolved solids (TDS), total suspended solids (TSS), biological oxygen demand (BOD), total organic carbon (TOC)
		aluminum, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, hardness, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, silver, sodium, strontium, thallium, titanium, vanadium and zinc
		1,1,1,2-tetrachloroethane, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, 1,2-dibromoethane, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3,5-trimethylbenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, bromodichloromethane, bromoform, bromomethane, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, chloromethane, cis-1,2-dichloroethene, cis-1,2-dichloropropene, dibromochloromethane, methylene chloride, styrene, tetrachloroethylene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichloroethene, trichlorofluoromethane, vinyl chloride (EPA 624)
		benzene, toluene, ethylbenzene, o-xylene, m,p-xylenes (BTEX), F1, F2, F3, F4

Notes: 1) Proposed starting in 2020.

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KEY MAP



LEGEND

- SURFACE WATER MONITORING LOCATION
- GROUNDWATER MONITORING LOCATION
- SURFACE WATER MONITORING LOCATION (NOT ESTABLISHED)
- PAN LYSIMETER MONITORING LOCATION

TDA AREA

TDA SITE BOUNDARY (APPROXIMATE)

(55.27) GROUNDWATER ELEVATION (masl), CONSTRUCTION V (SEPTEMBER 2018)

(55.27) GROUNDWATER ELEVATION (masl), CONSTRUCTION V (NOVEMBER 2019)

INTERPRETED DIRECTION OF SHALLOW GROUNDWATER FLOW

GENERAL SURFACE WATER FLOW DIRECTION (WHEN FLOW IS PRESENT)

REFERENCE(S)

1. BASE PLAN PROVIDED IN ELECTRONIC FORMAT BY AECON



CLIENT

MINISTRY OF TRANSPORTATION

PROJECT

TIRE DERIVED AGGREGATE EMBANKMENT,
CORNWALL, ONTARIO

TITLE

**SITE PLAN WITH GROUNDWATER ELEVATION AND
FLOW DIRECTION**

CONSULTANT

YYYY-MM-DD	2019-11-15
DESIGNED	CAMC
PREPARED	ABD
REVIEWED	CAMC
APPROVED	BTB

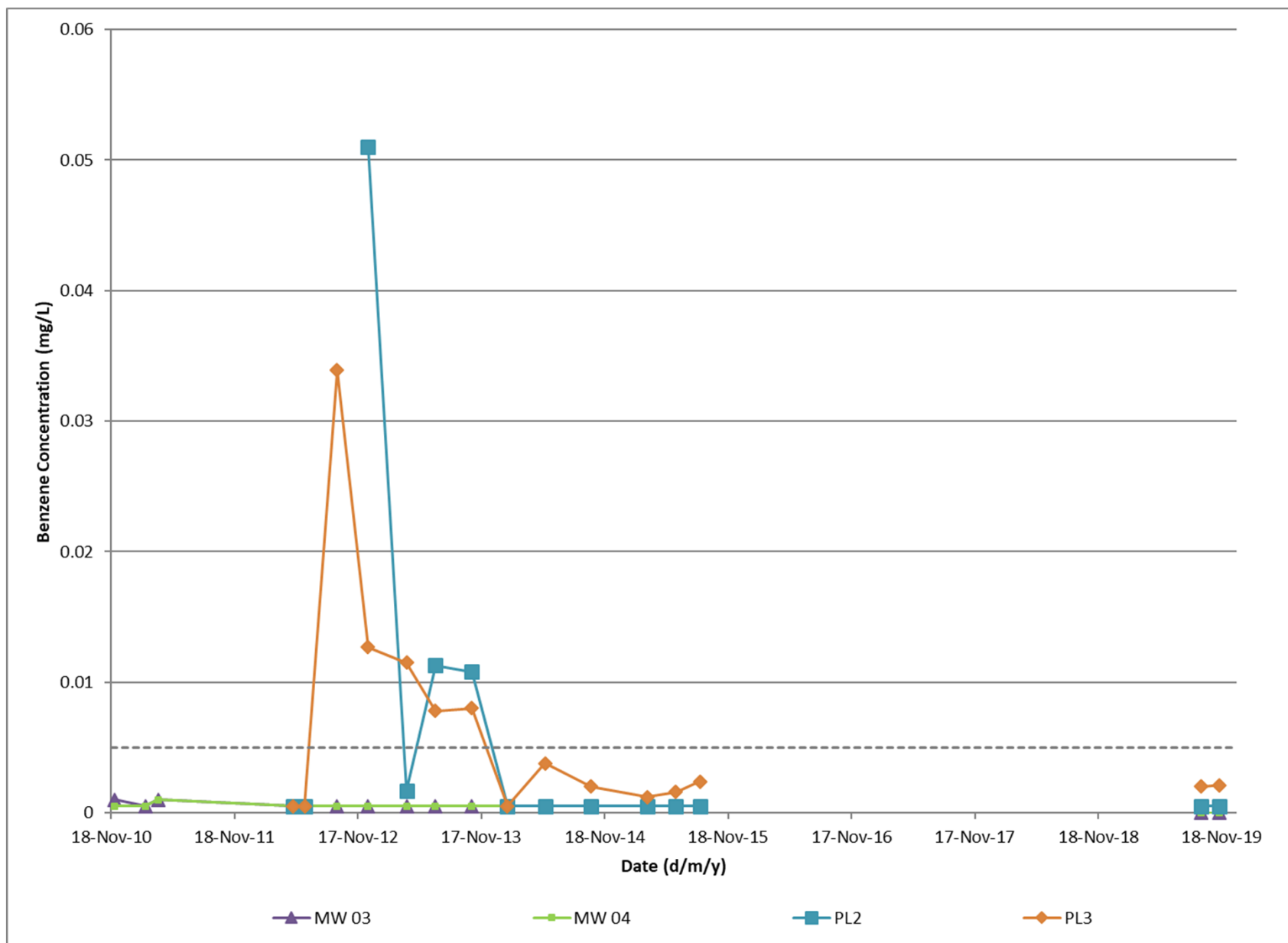
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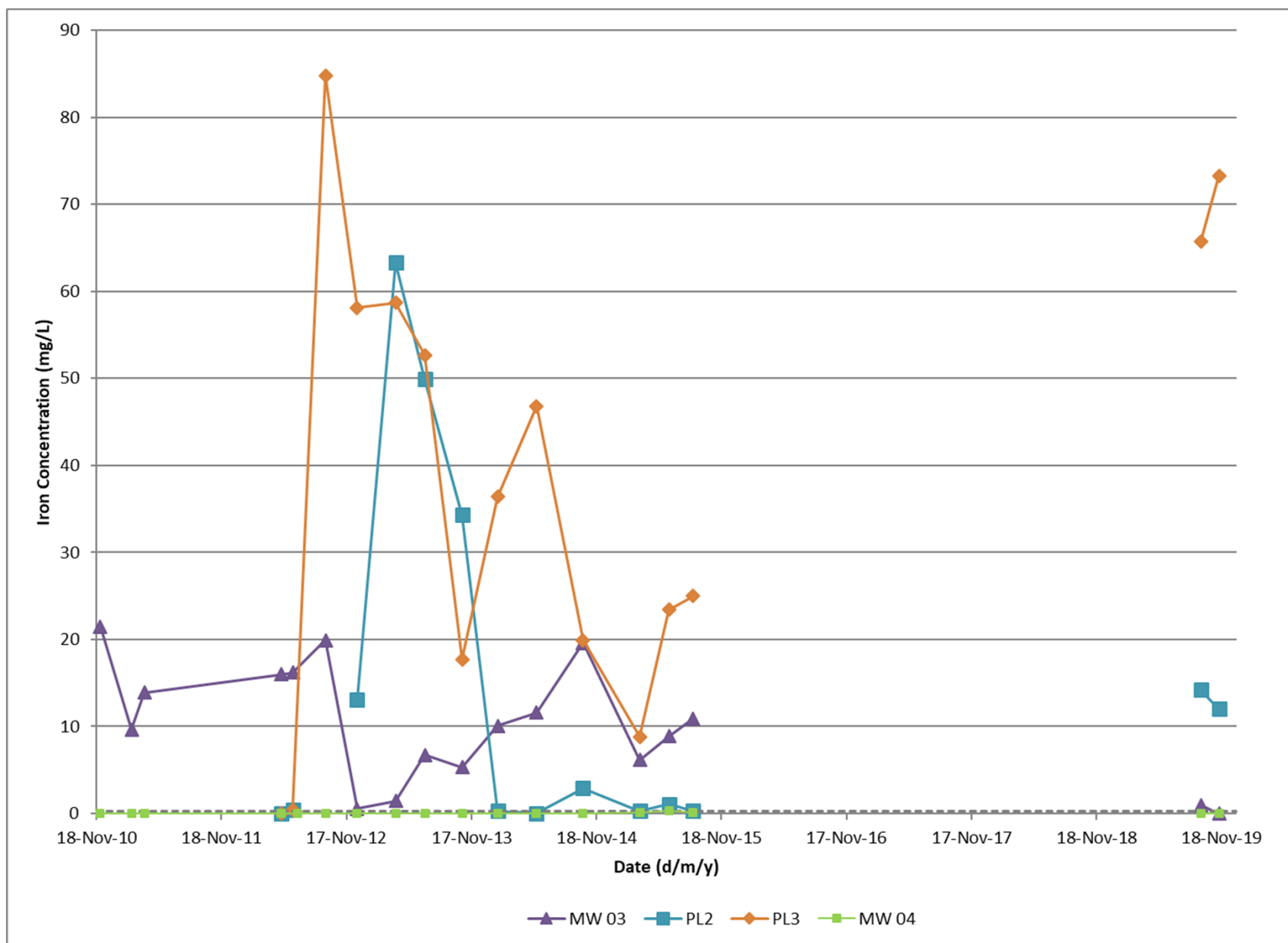
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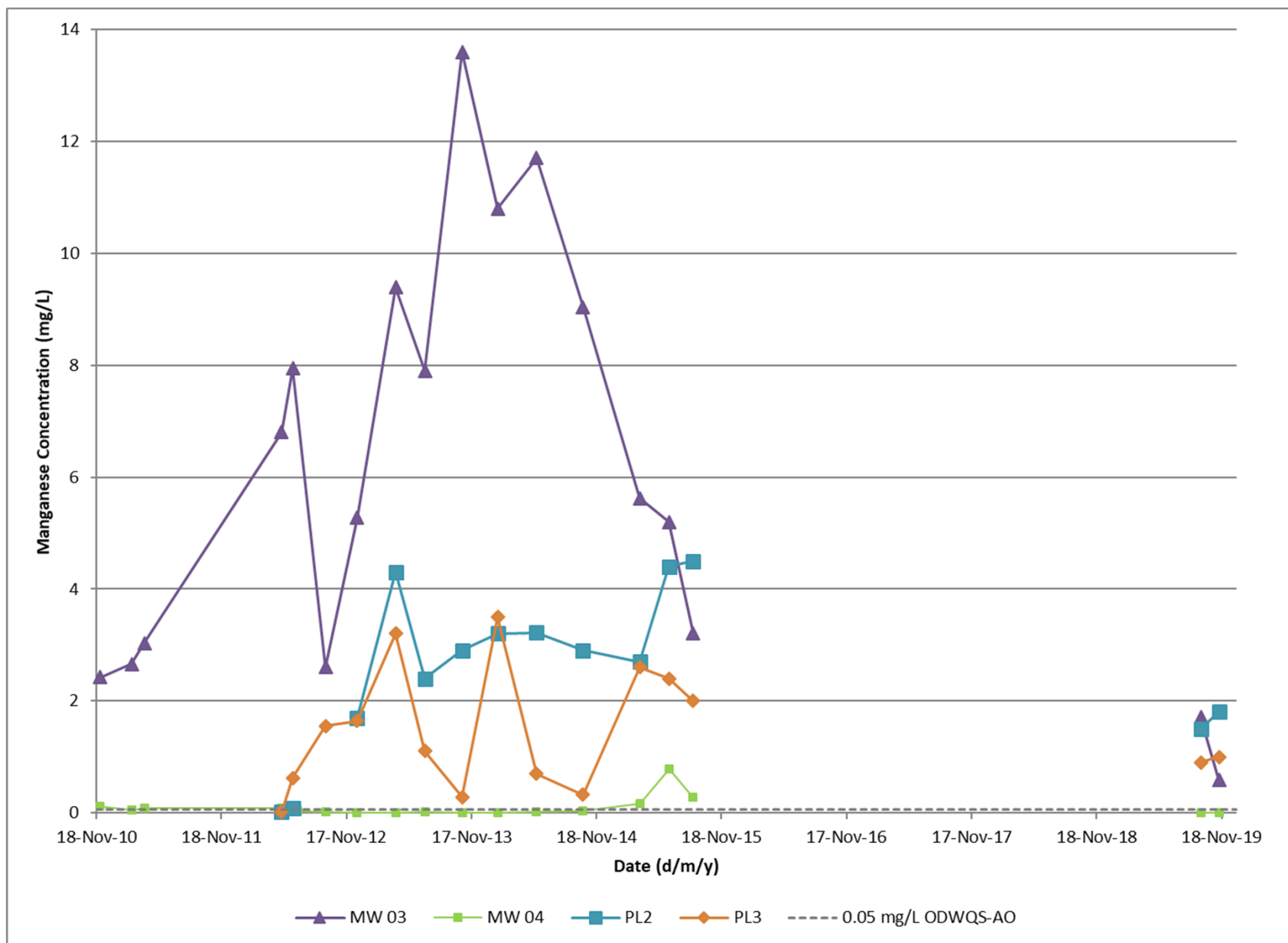
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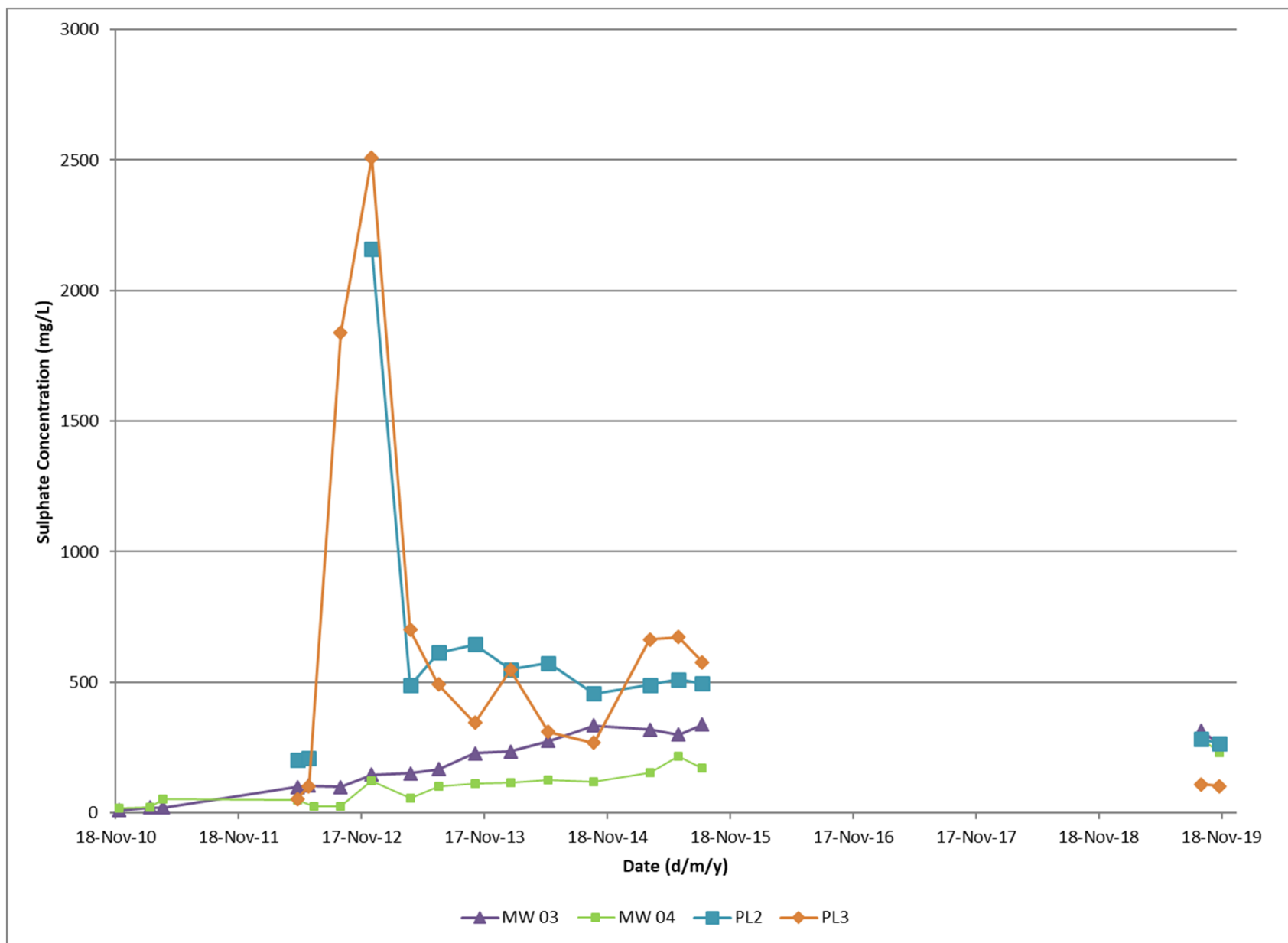
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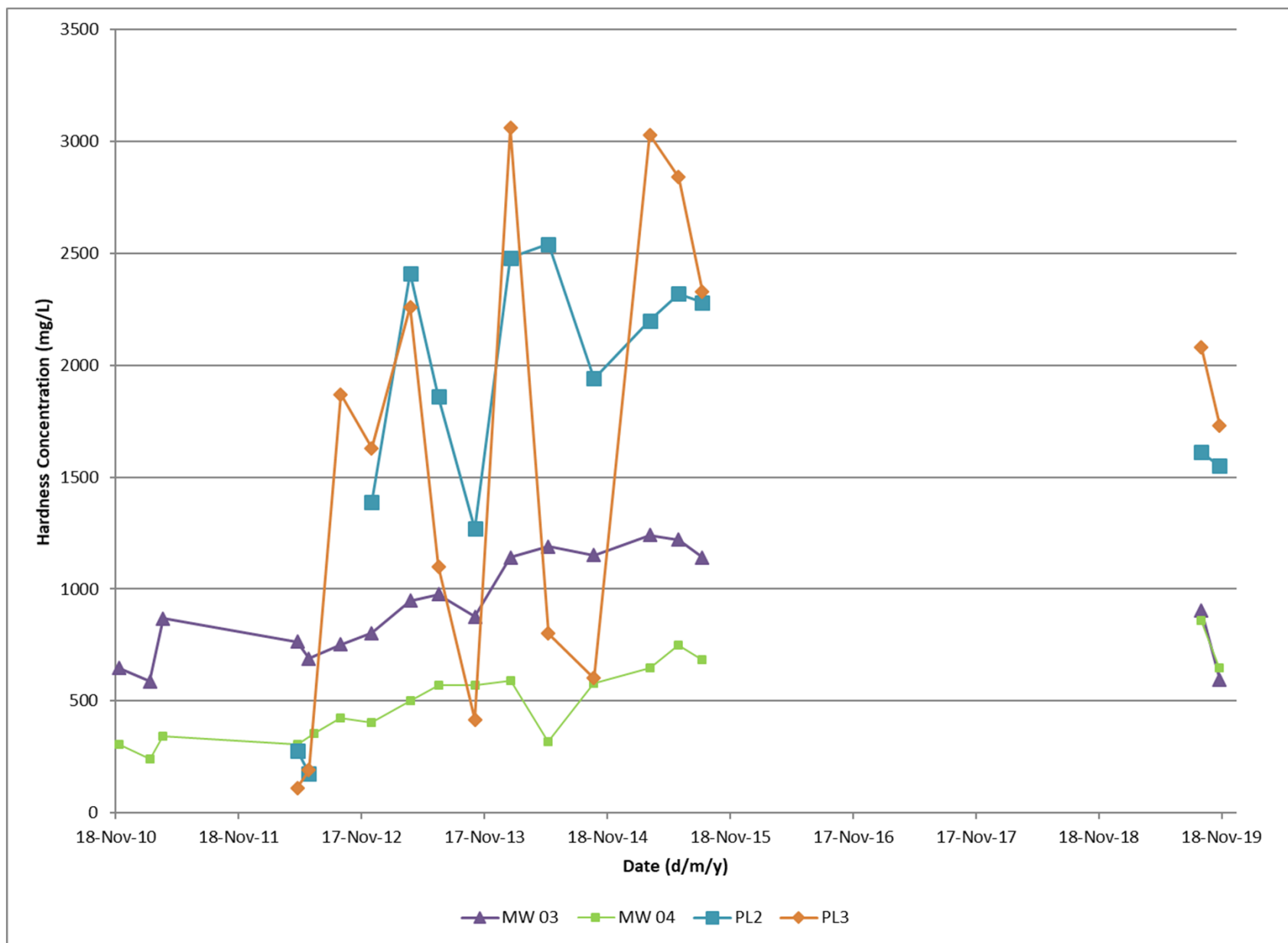


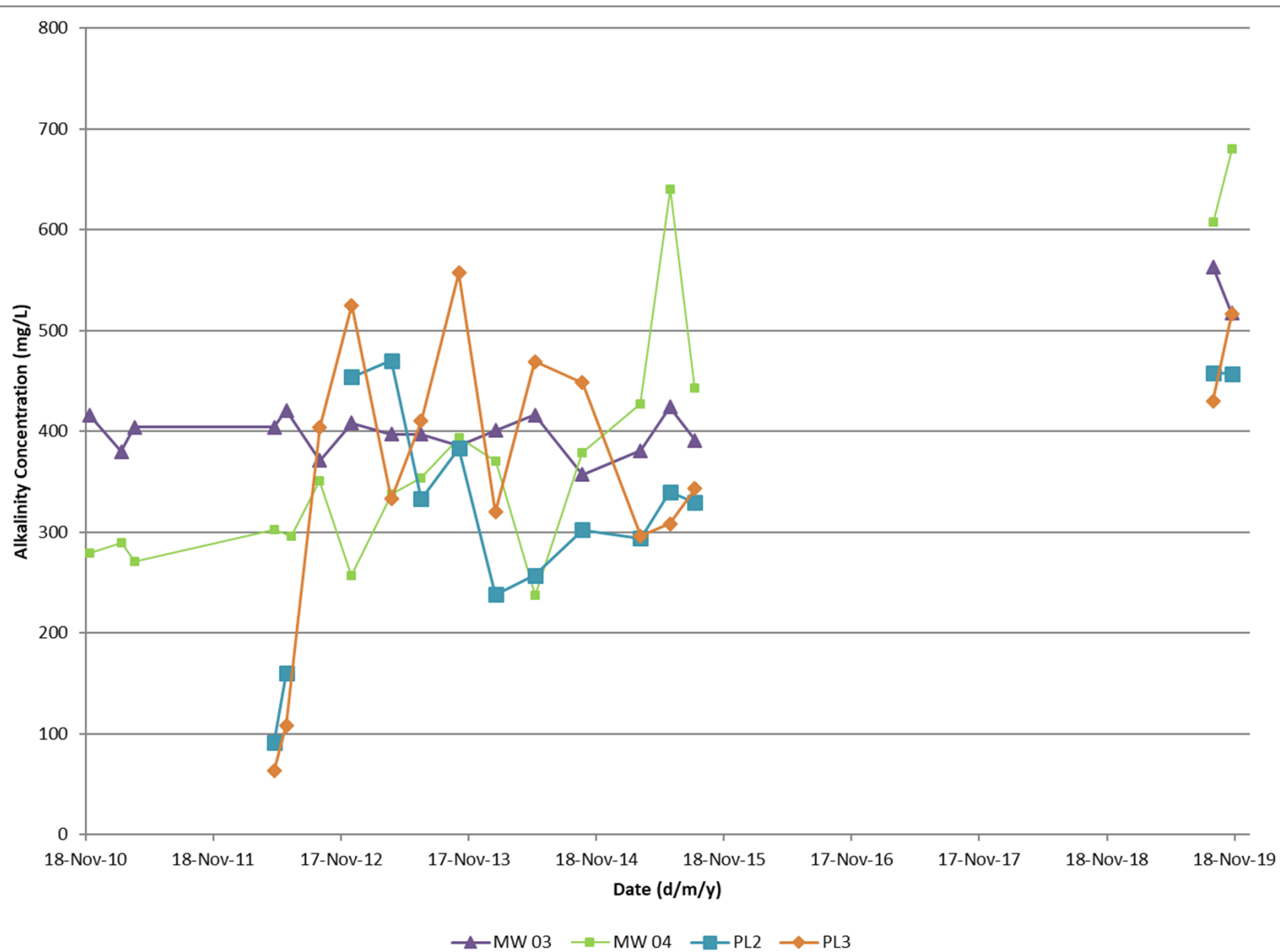












APPENDIX A

**Environmental Compliance Approval No. 5558-83WSFB
and Comments from the MECP**



Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER 5558-83WSFB
Issue Date: May 14, 2010

Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation
1355 John Counter Blvd Postal Bag 4000
Kingston, Ontario
K7L 5A3

Site Location: Boundary Road & Highway 401 Interchange
Cornwall, United Counties of Stormont, Dundas and Glengarry
K6H 6M1

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:
the use and operation of a 0.50 hectare tire derived aggregate footprint for construction of embankments
within a total site area of 7.5 hectares

Note: Use of the site for any other type of waste is not approved under this Certificate, and requires obtaining a separate approval amending this Certificate.

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

"Crown " means Her Majesty the Queen in the Right of Ontario;

"Certificate " means this entire provisional Certificate of Approval document, issued in accordance with section 39 of the EPA , and includes any schedules to it, the application and the supporting documentation listed in schedule "A";

"Director " means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part V of the EPA;

"District Manager " means the District Manager of the local district office of the Ministry in which the Site is geographically located;

"*EPA* " means *Environmental Protection Act* , R.S.O. 1990, c. E. 19, as amended;

"*Ministry* " means the Ontario Ministry of the Environment;

"*Operator*" has the same meaning as ``operator`` as defined in Section 25 of the *EPA* and means the contractor retained by the Ministry of Transportation for construction of Tire Derived Aggregate embankments;

"*Owner* " means Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation and its successors and assigns;

"*Provincial Officer* " means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the *OWRA* or section 5 of the *EPA* or section 17 of *PA* .

"*Regional Director* " means the Regional Director of the local Regional Office of the Ministry in which the Site is located.

"*Regulation 347* " or "*Reg. 347* " means Regulation 347, R.R.O. 1990, made under the *EPA* , as amended from time to time;

"*Site* " means the entire TDA site , including the buffer lands located at Boundary Road and Highway 401 and legally described as Part of Lot D, Concession 2, City of Cornwall and Part of Lot 16, Concession 3, Township of South Glengarry, approved by this *Certificate* .

"*Tire Derived Aggregate* " or "*TDA* " means pieces of scrap tires (tire chips and tire shreds) that have a basic geometrical shape and are generally between 12 mm and 305 mm in size and are intended for use in civil engineering operations.

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

TERMS AND CONDITIONS

GENERAL

Compliance

1. The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Site* is notified of the *Certificate* and the conditions herein and shall take all reasonable measures to ensure the person complies with the same.
2. Any person authorized to carry out work on or operate any aspect of the *Site* shall comply with the conditions of this *Certificate* .

In Accordance

3. Except as otherwise provided for in this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the application for this *Certificate*, dated December 21, 2009, and the supporting documentation listed in Schedule "A".

Other Legal Obligations

4. The issuance of, and compliance with, this *Certificate* does not:
- relieve any person of any obligation to comply with any provision of the *EPA* or any other applicable statute, regulation or other legal requirement; or
 - limit in any way the authority of the *Ministry* to require certain steps be taken or to request that any further information related to compliance with this *Certificate* be provided to the *Ministry*;

unless a provision of this *Certificate* specifically refers to the other requirement or authority and clearly states that the other requirement or authority is to be replaced or limited by the this *Certificate*.

Adverse Effect

5. The *Owner* and *Operator* shall take all reasonable steps to minimize and ameliorate any adverse effect or impairment of water quality resulting from the operation of the *Site*, including such accelerated or additional monitoring as may be necessary to determine the nature of the effect or impairment.
6. The *Owner Operator* shall remain responsible for any contravention of any other condition of this *Certificate* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect or impairment of water quality.

Furnish Information

7. Any information requested by the *Director* or a *Provincial Officer* concerning the *Site* and its operation under this *Certificate*, including but not limited to any records required to be kept by this *Certificate* shall be provided in a timely manner.
8. The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Certificate* or under any statute, regulation or subordinate legal instrument, in relation to the information, shall not be construed as:
- an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any condition of this *Certificate* or any statute, regulation or other subordinate legal requirement; or
 - acceptance by the *Ministry* of the information's completeness or accuracy.

Freedom of Information Act

9. Any information related to this Certificate and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

Interpretation

10. Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate*, and the conditions of this *Certificate*, the conditions in this *Certificate* shall take precedence.
11. Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the *Ministry* approved the amendment.
12. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.
13. The conditions of this *Certificate* are severable. If any condition of this *Certificate*, or the application of any condition of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

Inspections

14. No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA*, or the *EPA*, of any place to which this *Certificate* relates, and without limiting the foregoing:
- to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Certificate* are kept;
 - to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate*;
 - to inspect the *Site*, related equipment and appurtenances;
 - to inspect the practices, procedures, or operations required by the conditions of this *Certificate*; and
 - to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *EPA*, the *OWRA* or the *PA*.

Waste Type

15. Only the following types of waste shall be accepted at the *Site*:
- Tire Derived Aggregate

16. Any waste type not listed in the previous condition shall not be accepted at the *Site*.

Capacity

17. The *Owner* shall only accept and deposit TDA at the site as long as there is available capacity as defined by the TDA limits for the *Site* approved by this *Certificate* as shown in Figure 18 of Item 2 in Schedule "A".
18. The amount of TDA deposited at the site shall not exceed the site capacity of 20,000 cubic metres.

Service Area

19. Only TDA that is generated **within the Province of Ontario** shall be accepted at the *Site*.

Operation

Proper Operation

20. The TDA embankments at the Site shall be properly constructed and maintained at all times. All TDA shall be managed in accordance with the requirements of this Certificate, the EPA and Regulation 347. At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Placement of TDA

21. TDA shall be placed in accordance with the following requirements:
- A minimum of 2 metres above the groundwater table;
 - A minimum of 30 metres from any surface waterbody, watercourse, swamp or wetland; and
 - A minimum of 100 metres from any potable groundwater well.
22. TDA shall be placed in accordance with the procedures detailed in Item 2 of Schedule "A".

TDA Limits

23. TDA shall not be placed, compacted and covered outside the limits shown in Item 4 in Schedule "A" attached to this *Certificate*.

Hours of Operation

24. TDA may be accepted at the Site 24 hours per day, seven days per week.

Site Security

25. During non-operating hours, the TDA Site shall be secured against access by unauthorized

persons

TDA Inspection

26. The *Operator* shall develop and implement a program to inspect TDA to ensure that the TDA is of a type approved for acceptance under this *Certificate*.

MONITORING, RECORDING NOTIFICATION

Monthly Inspections and Log Book

27. An inspection of the TDA Site shall be conducted each month during construction to ensure compliance with this *Certificate*. Any deficiencies discovered as a result of the inspection shall be remedied immediately.
28. A record of the inspections shall be kept in a monthly log book *or a dedicated electronic file* that includes:
- the name and signature of person that conducted the inspection;
 - the date and time of the inspection;
 - the list of any deficiencies discovered;
 - the recommendations for remedial action; and
 - the date, time and description of actions taken.
29. A record shall be kept in the monthly log book of all refusal of TDA shipments, the reason(s) for refusal, and the origin of the TDA, if known.

Monitoring Program

30. Within sixty (60) days of issuance of this *Certificate*, the Owner shall submit a ground-water monitoring program to the Director for approval. The groundwater monitoring program shall include a parameter list, sampling frequency, the location of proposed on-site wells and the location of off-site domestic wells.
31. Placement and compaction of TDA may not occur until the monitoring program is approved by the Director.

Record Retention

32. Except as authorized in writing by the Director, all records required by this *Certificate* shall be retained at the Site for a minimum of two (2) years from their date of creation.
33. The Owner shall retain all documentation listed in Schedule "A" for as long as this *Certificate* is valid.

34. All monthly summary reports are to be kept at the site until they are included in the Final Report.
35. The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

Emergency Situations

36. In the event of a fire or discharge of a contaminant to the environment, TDA site staff shall contact the MOE Spills Action Centre (1-800-268-6060) and the District Office of the MOE.
37. The Operator shall submit to the District Manager a written report within 3 days of the spill or incident, outlining the nature of the incident, remedial measures taken and measures taken to prevent future occurrences at the TDA Site.
38. The Operator shall prepare an Emergency Response Manual for the TDA site prior to receipt of TDA at this Site in consultation with local emergency response agencies. The Emergency Response Manual should indicate the responsibility of each of the stakeholders with respect to handling possible emergency situations.
39. The Emergency Response Manual shall be updated on a regular basis and be provided to the District Manager within one month of the revision date.
40. The Operator shall ensure that adequate fire fighting and contingency spill clean up equipment is available and that emergency response personnel are familiar with its use and location.

Final Report

41. A written report on the completion of TDA embankment construction and monitoring of the TDA Site, shall be completed (the "Final Report") and shall be submitted to the *District Manager* by March 31, 2013.
42. The Final Report shall include the following:
 - a. the results and an interpretive analysis of the results of all groundwater monitoring;
 - b. site plans showing the final TDA embankment construction;
 - c. a discussion of any operational problems encountered at the Site and corrective action taken;
 - d. a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903;
 - e. any other information with respect to the site which the District Manager or Regional Director may require from time to time;
 - f. a statement of compliance with all conditions of this Certificate of Approval and other relevant Ministry groundwater and surface water requirements;
 - g. Summary of inspections undertaken at the site; and,
 - h. interpretations, conclusions and recommendations for future use of TDA as a recycled engineered material in Ontario.

SCHEDULE "A":

1. Application for a Provisional Certificate of Approval for a Waste Disposal Site for the Boundary Road/Highway 401 Interchange, signed and dated on December 21, 2009.
2. Document entitled "*Design Brief Tire Derived Aggregate Ministry of Transportation Application to Ministry of the Environment*" and Appendices A to D inclusive prepared by the Ministry of Transportation, dated December 2009.
3. Letter dated March 2, 2010 to Mr. David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.
4. Letter dated March 12, 2010 and attached figures entitled "TDA Site Boundary" and "MTO Property Limits" from Mr. David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.
5. Letter and attached draft Certificate of Approval dated April 8, 2010 from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE to David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation.
6. E-mail dated April 21, 2010 from Mr. David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.
7. Document entitled "MTO TDA Site - Boundary Road/Hwy 401 - Cornwall Comments on Draft C of A dated April 8/10 - REF #5447-7ZGRK2" created by Mr. David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation, dated April 21, 2010.
8. Letter and attached draft Certificate of Approval dated May 4, 2010 from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE to David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation.
9. E-mail dated May 5, 2010 from Mr. David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.
10. E-mail dated May 7, 2010 from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE to David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation.
11. E-mail dated May 7, 2010 from Mr. David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation from Greg Washuta, Senior Waste Engineer, Waste

Unit, EAAB, MOE.

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

- 1. The reason for the definitions is to define the specific meaning of terms and simplify the wording of conditions in this Certificate of Approval.*
- 2. The reason for Condition 1 and 2 is to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.*
- 3. The reason for Conditions 3 to 6 inclusive, 10-13 inclusive and 31-35 inclusive is to clarify the legal rights and responsibilities of the Owner under this Certificate of Approval.*
- 4. Conditions 7 and 8 are included to ensure that the appropriate Ministry staff have ready access to information and the operations of the Site, which are approved under this Certificate.*
- 5. Condition 9 is needed in order to clarify the Owner's responsibilities under the Freedom of Information Act.*
- 6. The reason for Condition 14 is to ensure that appropriate Ministry staff have ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Certificate of Approval. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the EPA and OWRA.*
- 7. The reason for Conditions 15, 16 and 19 is to specify the approved areas from which TDA may be accepted at the Site and the types and amounts of TDA that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.*
- 8. The reason for Conditions 17 and 18 is to specify restrictions on the extent of landfilling at this Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site. Approval to landfill beyond these limits would require an application with supporting documentation submitted to the Director.*
- 9. The reasons for Condition 24 are to specify the normal hours of operation for the TDA Site and a mechanism for amendment of the hours of operation.*
- 10. The reasons for Condition 25 are to specify site access to/from the Site and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.*
- 11. The reason for Conditions 23 is to ensure that placement of TDA is conducted in an environmentally acceptable manner.*

12. *The reasons for Conditions 20 to 22 inclusive, 26 and 27 are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.*
13. *The reason for Condition 29 is to ensure that accurate TDA records are maintained to ensure compliance with the conditions in this Certificate of Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.*
14. *The reason for Condition 30 is to demonstrate that the TDA site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.*
15. *The reasons for Condition 28 are to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this Certificate of Approval, the EPA and its regulations.*
16. *The reasons for Conditions 41 and 42 are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. A final report is an important tool used in reviewing site activities and for determining the effectiveness of site design.*
17. *The reasons for Condition 36 are to ensure that the Ministry is informed of any spills or fires at the Site and to provide public health and safety and environmental protection.*
18. *Conditions 37-40 are contained in the Certificate to guarantee that appropriate measures are taken by the Owner to prevent future occurrences of spills or fires at the site and to protect public health and safety and the environment.*

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

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

The Notice should also include:

3. *The name of the appellant;*
4. *The address of the appellant;*
5. *The Certificate of Approval number;*

6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

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

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 14th day of May, 2010



Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

GW/

c: District Manager, MOE Cornwall
David Staseff, Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation
Lisa Chalmers, MOE, Cornwall

MEMORANDUM

TO: L. Chalmers
Sr. Environmental Officer
Cornwall Area Office
Eastern Region

FROM: K. Stephenson
Hydrogeologist
Technical Support Section
Eastern Region

RE: Tire Derived Aggregate
Ontario Ministry of Transportation
Highway 401 at Boundary Road
City of Cornwall
ECA 5558-83WSFB

At your request, I have reviewed the following reports:

- “Post-Construction Monitoring Report, Annual Report #3 (PR#51), MTO Contract 2010-4003, TDA Embankment, WP-385-01-01, Boundary Road, Cornwall, Ontario” completed by Golder Associates Limited (GAL) and dated December 2015; and,
- “Investigation of Groundwater Impacts, Highway 401 and Boundary Road, TDA Embankments, Cornwall, Ontario” also completed by GAL and dated August 2016.

You specifically requested comments on:

- the results of the groundwater monitoring program required by the Environmental Compliance Approval (ECA) for the site and proposed changes to the program; and,
- comments on the proposal to exempt Tire Derived Aggregate (TDA) as a waste based on observations at the Cornwall TDA site.

I have provided comments on these two aspects below for your consideration.

Background

The ministry issued an ECA (May, 2010), 5558-83WSFB, to Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation for the use and operation of a 0.5 hectare TDA footprint for construction of embankments within a total site area of 7.5 hectares. The site is located at Boundary Road and Highway 41 interchange, Cornwall, Ontario.

TDA is derived from scrap tires. The scrap tires are mechanically processed shredded. The tires are shredded to various sizes and based on their sizes are referred to as tire shreds (50-305 mms) or tire chips (12-60 mms). During the shredding process, some wire is removed from the tires, especially the tire chipping process. TDA consists of tire shreds and tire chips. TDA is used as an alternate to conventional fill materials (soils).

As part of the approval, a pre-construction monitoring program was required. GAL conducted the pre-construction monitoring program at six groundwater monitoring wells and four pan lysimeters. These results were summarized in their report "Pre-Construction Baseline Study, TDA Embankment Boundary Road, Cornwall" dated June, 2012. The results in this report provide baseline conditions.

The TDA Embankments were installed in May, 2012. It is reported that approximately 400,000 used tires were used in the construction of the two embankments. The interchange was open to traffic in November, 2012.

GAL has conducted post construction monitoring from 2012 to 2016. I am not certain if groundwater monitoring was conducted in 2017. This should be determined and available data from 2016 and 2017 should be forwarded to the ministry for review.

The ministry has previously provided comments indicating that TDA produces a leachate.

Based on the results from the pan lysimeters, the key leachate indicator parameters are: iron; manganese; benzene; alkalinity; hardness and sulphates.

Geology

Groundwater monitoring wells were installed in November, 2010, prior to construction activities.

In total, six boreholes/monitoring wells were installed: three monitoring wells north of Highway 401 (MW01, MW02 and MW05) and three monitoring wells south of Highway 401 (MW03, MW04 and MW06). The borehole logs generally show the geology to be: fill (structural fill); brown silty sand (Fort Covington); sand and gravel seam and grey sandy silt (Malone). The monitoring wells target the interface zone of the Fort Covington/sand and gravel seam/Malone units.

Hydrogeology

GAL determined the physical hydrogeological characteristics to be:

- The groundwater flow is to the north and northwest with a hydraulic gradient of 0.002 to 0.003 across the site with a more easterly component near the south TDA embankment (horizontal hydraulic gradient of 0.01). The depth to water near the north TDA embankment ranged between 0.6 to 1.4 metres below ground surface. The depth to water near the south embankment ranged between 1.4 to 4.0 metres below ground surface.

- GAL has estimated hydraulic conductivity for the Fort Covington till to be 5.1×10^{-7} m/s and for the Malone till to be 6.5×10^{-8} m/s (geometric mean values). GAL has estimated average linear groundwater velocity to be 0.2 metres per year (north TDA area) and 0.5 metres per year (south TDA area). This means that groundwater flow from the south TDA area to monitoring well MW03 would be approximately 16 years and greater than 50 years from the north TDA area to monitoring well MW 01.

Regulatory Compliance

Guideline B-7 applies to the site and GAL has presented a B-7 assessment on page 14 of their 2015 report. Golder has indicated that MW03 is potentially impacted by the TDA and has exceedances of Guideline B-7 limits for iron, manganese and sulphate. There has been an elevated and / or increasing trend in concentrations of manganese, sulphate and hardness at monitoring wells MW03 and MW04. GAL has indicated that although MW04 is situated hydraulically upgradient of the south TDA area, transverse dispersion and diffusion may result in impacts at MW04 (increasing alkalinity and manganese).

GAL concludes that although there are Guideline B-7 exceedances at MW03, the well is located within the site boundary and therefore the site is in compliance with Guideline B-7.

In their interpretation chart GAL indicated that there were trace detections of zinc, benzene, xylene, toluene, 1,1,1-trichloroethane, 1,1-dichloroethane and trichloroethylene in trace amounts at monitoring wells MW01, MW02 and MW03.

GAL has also identified elevated concentrations of alkalinity, ammonia, conductivity, boron, hardness, strontium, sulphate, sodium at pan lysimeters PL 2 and 3 and some of these parameters are showing an increasing trend (hardness, sodium, strontium and sulphate) at monitoring wells MW03 and MW04.

Groundwater Monitoring Program

GAL presented a proposed monitoring program in their 2015 report and updated the proposed plan in the 2016 report. GAL recommends that the groundwater monitoring program be continued with all six wells to be monitored twice a year. GAL recommends that only iron, manganese and sulphate be monitored as part of the program.

I am in agreement that the groundwater monitoring program should be continued at six wells on a twice per year basis (spring and fall) however, additional parameters should be monitored. The following parameters should also be included to support ongoing monitoring of the pilot TDA project: benzene, xylene, toluene, ethylbenzene, petroleum hydrocarbon fractions F1 to F4, 1,1,1-trichloroethane, 1,1-dichloroethane, trichloroethylene zinc, alkalinity, ammonia, conductivity, boron, hardness, strontium, sulphate, chloride and sodium. Once every three (3) years, groundwater monitoring should be conducted for the list of parameters contained in Table 2 of the December 2015 report (Post-Construction Monitoring Program). Groundwater levels should be measured during each event. GAL has indicated that all four pan lysimeters should be

decommissioned; however, I recommend that pan lysimeters PL2 and PL3 remain in place. These pan lysimeters should be monitored at the same frequency and for the same parameters as groundwater monitoring wells. I am aware that there have been issues with leachate release from the pan lysimeters; however, ongoing monitoring of leachate from the source is required to support the pilot project. MTO or their consultant may have an alternate approach for source / leachate monitoring and this can be considered.

Some studies have identified aniline as a contaminant of concern and this parameter should be monitored on at least two occasions at pan lysimeters to support the pilot project (Canadian Geotechnical Journal, 2014).

An annual report should be completed to present results.

TDA Waste Exemption

TDA is not inert and produces a leachate characterized by iron, manganese, benzene, alkalinity, hardness and sulphate.

I am only aware of the TDA pilot site in Cornwall discussed in this memorandum. Groundwater monitoring to date has indicated that the site is in compliance with ministry Guideline B-7. Considering the use of TDA across the region / province, this site does not present worst case conditions in terms of hydrogeological setting. The hydrogeology of the Cornwall site is such that average groundwater flow velocity is low and contaminant migration is relatively predictable and “monitored” (geology is till overburden with groundwater flow velocity between 0.2 m/year and 0.5 m/year) limiting immediate off-site impacts. There are other areas in Eastern Region where groundwater velocity can be much greater and contaminant migration pathways can be much less predictable (e.g. the shallow fractured bedrock setting present in the Kingston area).

Benzene present in the TDA leachate is notable because this is a health-based drinking water parameter and the standard was recently reduced through regulation (standard dropped from 5 micrograms per litre “µg/L” to 1 µg/L). This lower standard also reduces the calculated Guideline B-7 limit for benzene at the site (0.25 µg/L). Monitoring at the pan lysimeters (PL2 and PL3) showed initial levels of benzene in leachate ranging between 34 and 51 µg/L with benzene levels at pan lysimeter PL3 remaining at 2.4 µg/L during the most recent monitoring event (August 2015). Although benzene has not resulted in unacceptable groundwater impacts at the Cornwall site, this parameter may be a concern at a more sensitive site (e.g. domestic wells near the roadway in an area of shallow fractured bedrock). The low standard for benzene and its health related status mean that even trace levels at an off-site domestic well may be problematic. As such, appropriate characterization of any site proposed for application of TDA should be required (i.e. hydrogeological / hydrological assessment, assessment of TDA and identification of sensitive receptors).

GAL has indicated that a waste exemption for TDA would be beneficial for Ontario and recommends a number of conditions related to the use of TDA (refer to page 18 of the August 2016 report). I recommend that TDA remain regulated and that conditions associated with use of TDA be included as part of a waste approval. This material should only be used at sites where leachate generation does not adversely impact human health and the environment.

Tire waste is more toxic following combustion. It is beyond the scope of my review to consider issues related to fire; however, this issue may be considered by others as part of TDA waste exemption discussion.

Conclusions and Recommendations

Ongoing groundwater monitoring should be conducted at the site as described in the "Groundwater Monitoring Program" section above.

I recommend that TDA remain regulated and that conditions associated with use of TDA be included as part of a waste approval.

Tire waste is more toxic following combustion. It is beyond the scope of my review to consider issues related to fire however this issue may be considered by others as part of TDA waste exemption discussion.

GAL has conducted post construction monitoring from 2012 to 2016. I am not certain if groundwater monitoring was conducted in 2017. This should be determined and available data from 2016 and 2017 should be forwarded to the ministry for review.



K. Stephenson, M.Sc., P.Eng
KMS/FC/dv

ec: V. Castro
M. Seguin
G. Faaren
P. Taylor

c: File GW ST CC 01 02 BO (TDA Boundary Road / Hwy 401)
KMS / IDS#4584-AAAKE7

References

Hennebert, P.; Lambert, S.; Fouillen, F. and B. Charrasse; "Assessing the environmental impact of shredded tires as embankment fill material"; Canadian Geotechnical Journal 51: 469-478 (2014)

APPENDIX B

**Coffey Borehole Logs
(Coffey, 2009)**



GENIVAR

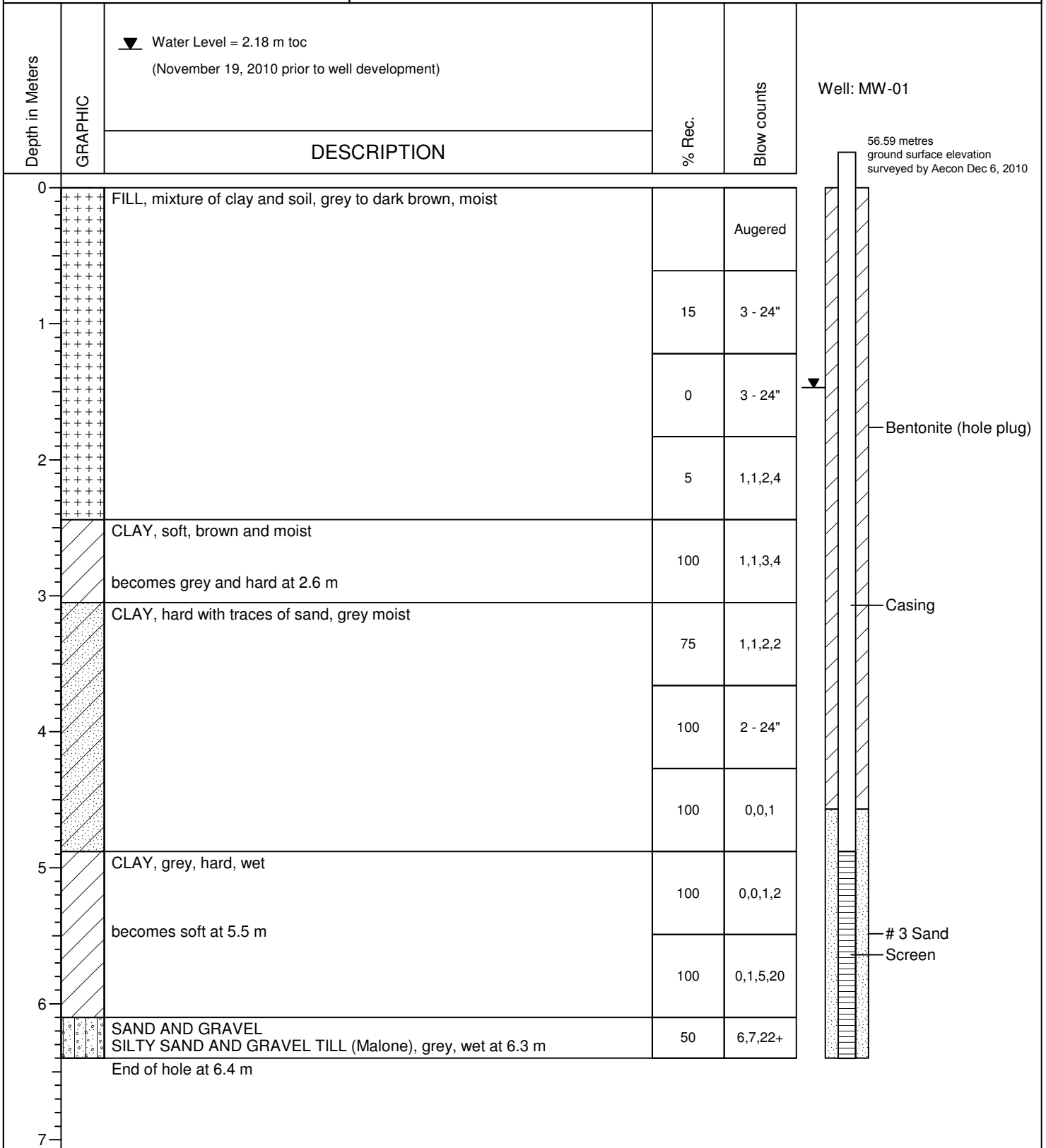
MW-01

Aecon Construction and Material
Installation of Monitoring Wells
MTO Boundary Road

Project # 10106125

Date Completed : November 19, 2010
Site Location : Boundary Rd and Hwy 401
Drilling Method : Auger
Sampling Method : SS
Hole Diameter : 0.15

Company Rep. : GR
Borehole Location : North East of Site
Logged By : GR
Easting : 524264 m
Northing : 4990225 m





GENIVAR

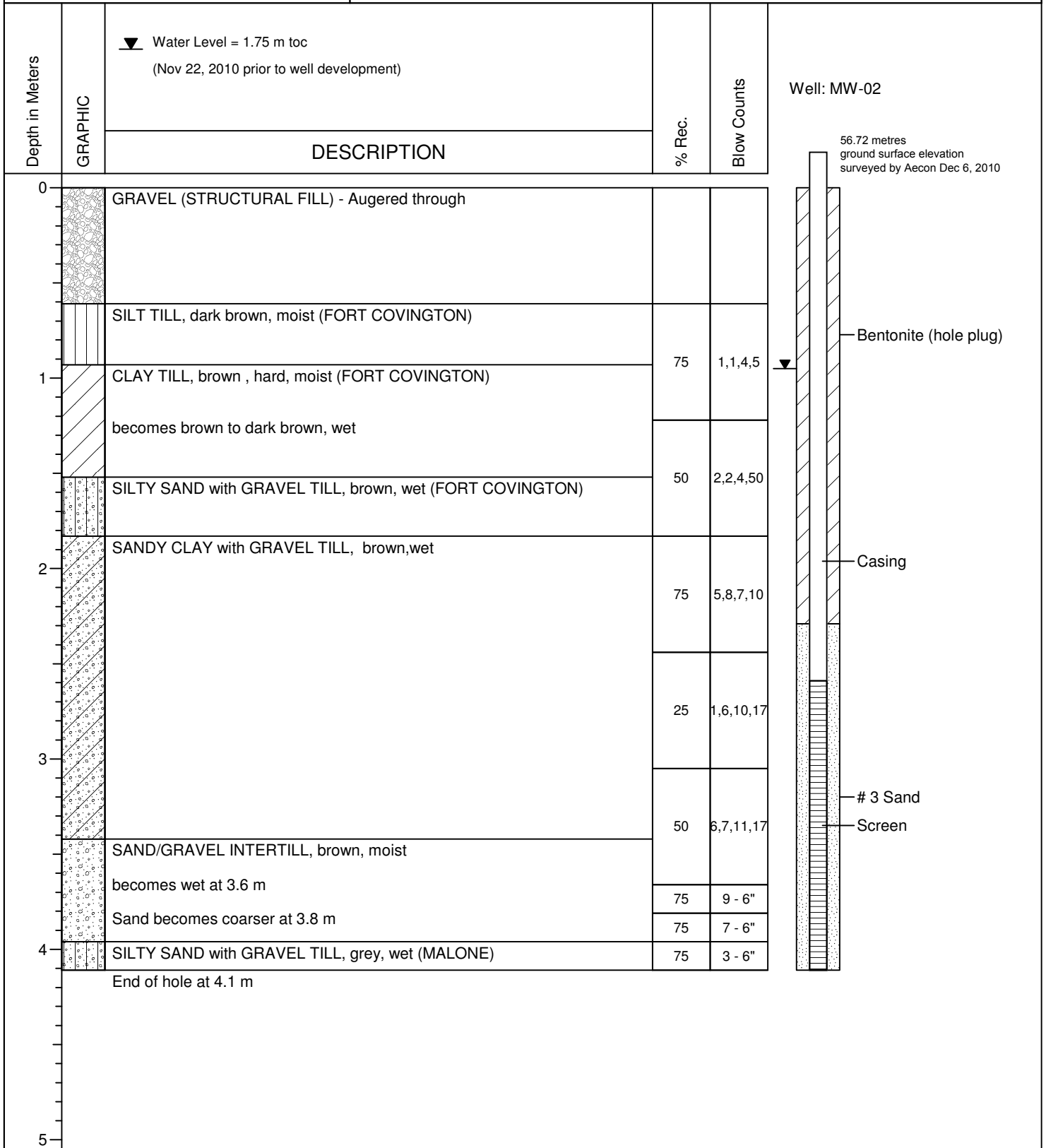
MW-02

Aecon Construction and Material
Installation of Monitoring Wells
MTO Boundary Road

Project # 10106125

Date Completed : November 22, 2010
Location : Boundary Rd and HWY 401
Drilling Method : Auger
Sampling Method : SS
Hole Diameter : 0.15 m

Company Rep. : GR
Borehole Location : North East of Site
Logged By : GR
Easting : 524351 m
Northing : 4990111 m





GENIVAR

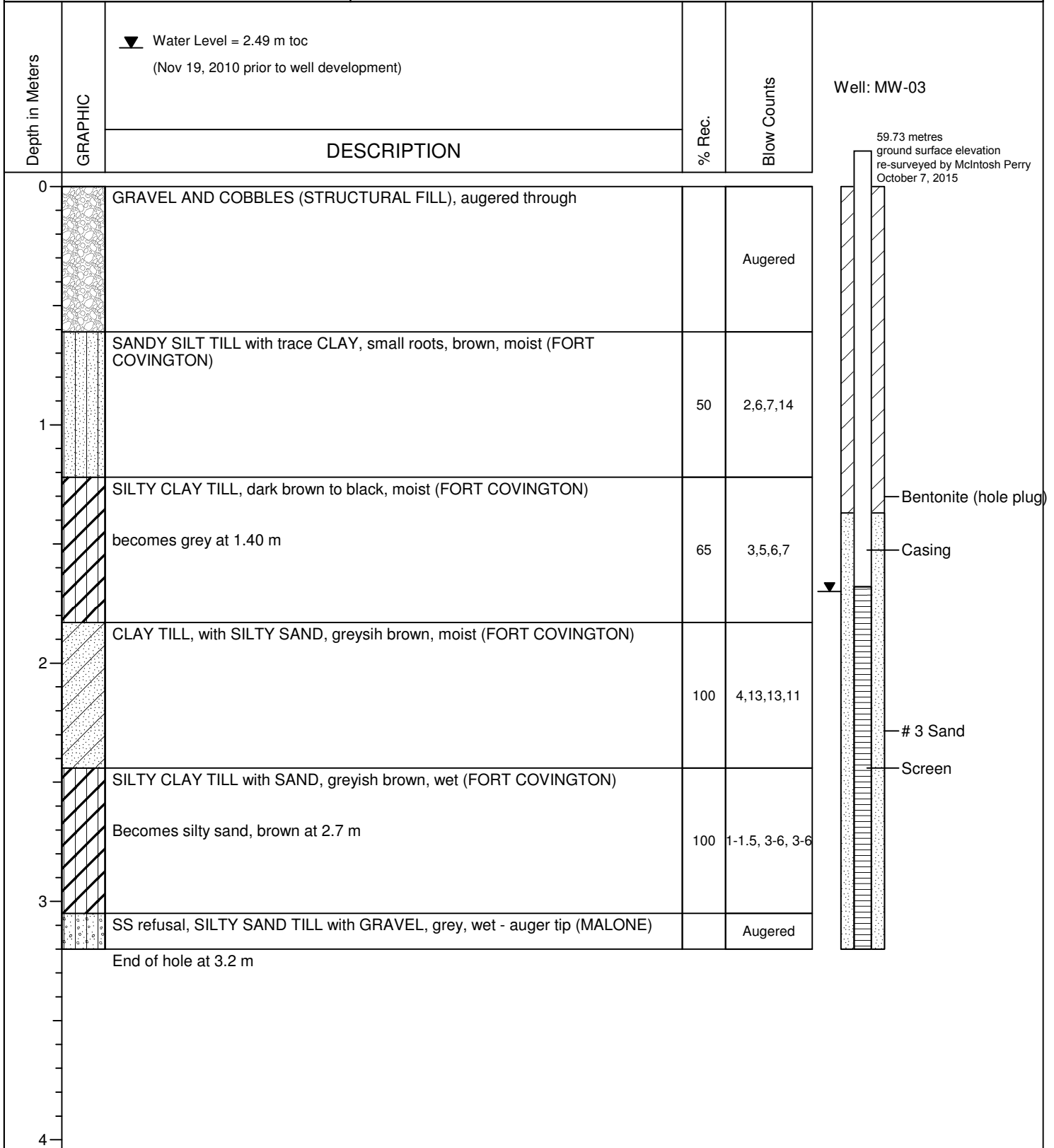
MW-03

Aecon Construction and Material
Installation of Monitoring Wells
MTO Boundary Road

Project # 10106125

Date Completed : November 19, 2010
Site Location : Boundary Rd and HWY 401
Drilling Method : Auger
Sampling Method : SS
Hole Diameter : 0.15 m

Company Rep. : GR
Borehole Location : South East of Site
Logged By : GR
Easting : 524381 m
Northing : 4990027 m





GENIVAR

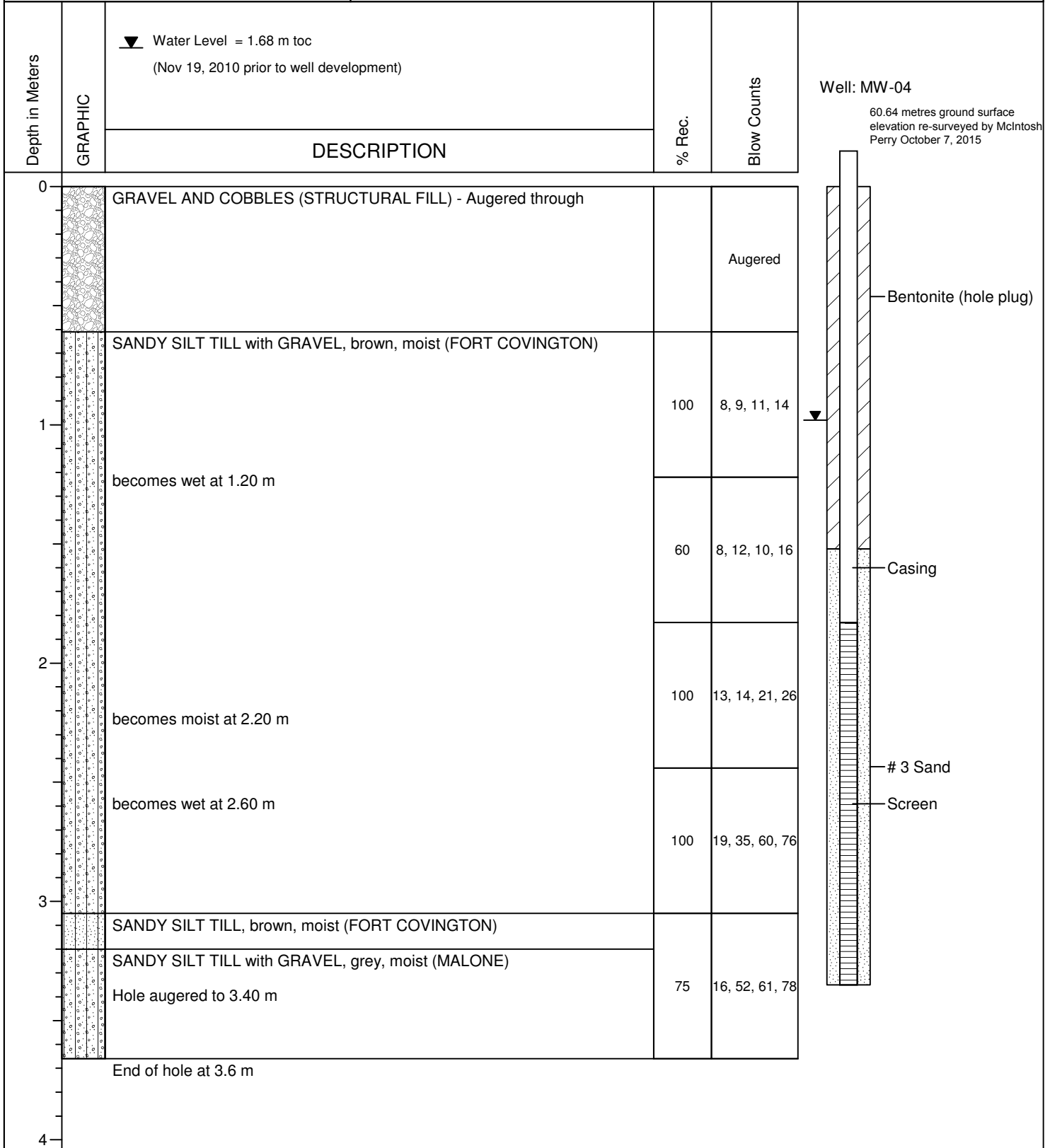
MW-04

Aecon Construction and Material
Installation of Monitoring Wells
MTO Boundary Road

Project # 10106125

Date Completed : November 19, 2010
Site Location : Boundary Rd and Hwy 401
Drilling Method : Auger
Sampling Method : SS
Hole Diameter : 0.15 m

Company Rep. : GR
Borehole Location : South East of Site
Logged By : GR
Easting : 524422 m
Northing : 4989974 m





GENIVAR

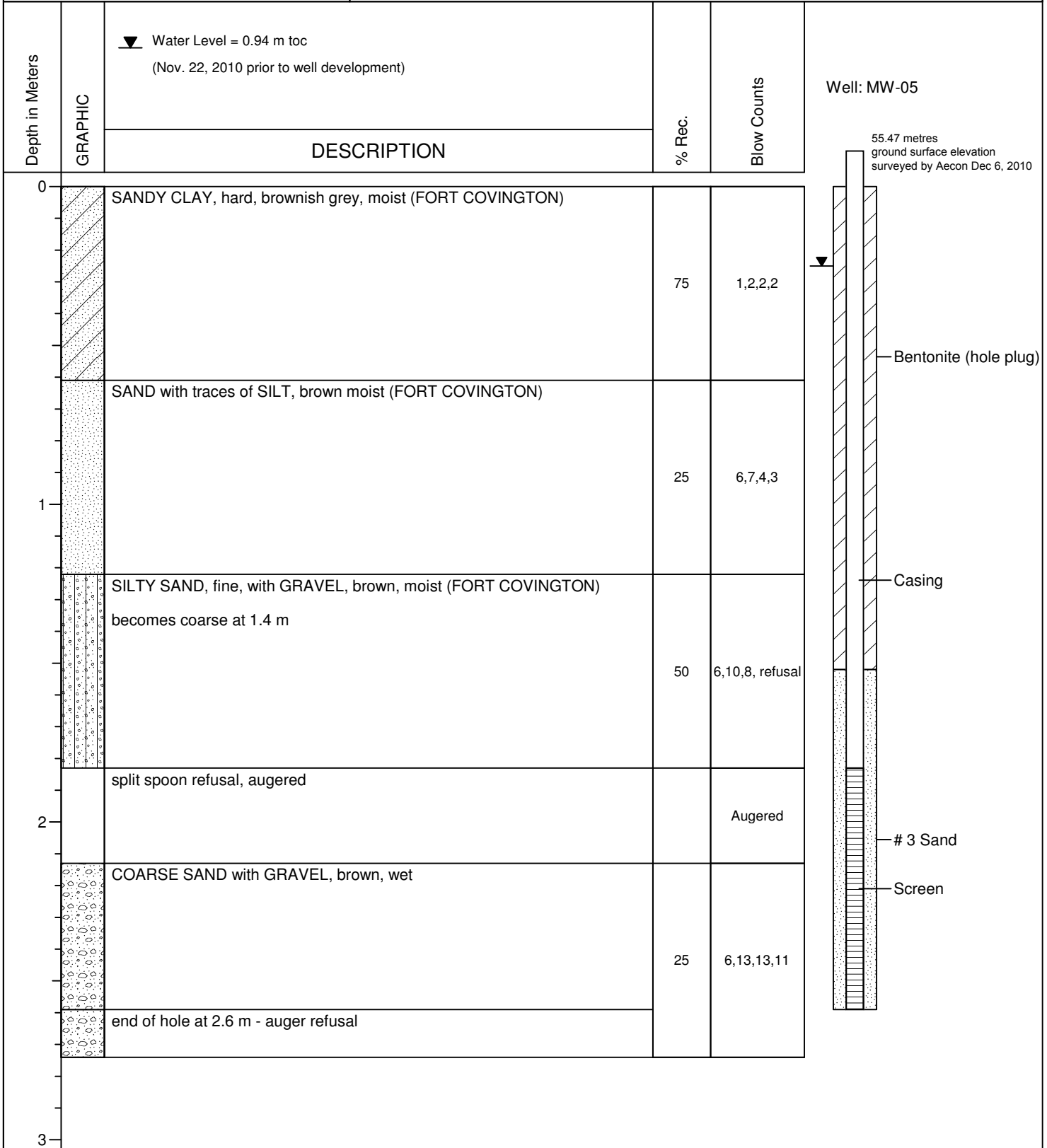
MW-05

Aecon Construction and Material
Installation of Monitoring Wells
MTO Boundary Road

Project # 10106125

Date Completed : November 22, 2010
Site Location : Boundary Rd and Hwy 401
Drilling Method : Auger
Sampling Method : SS
Hole Diameter : 0.15 m

Company Rep. : GR
Borehole Location : North West of Site
Logged By : GR
Easting : 524239 m
Logged By : 4990111 m





GENIVAR

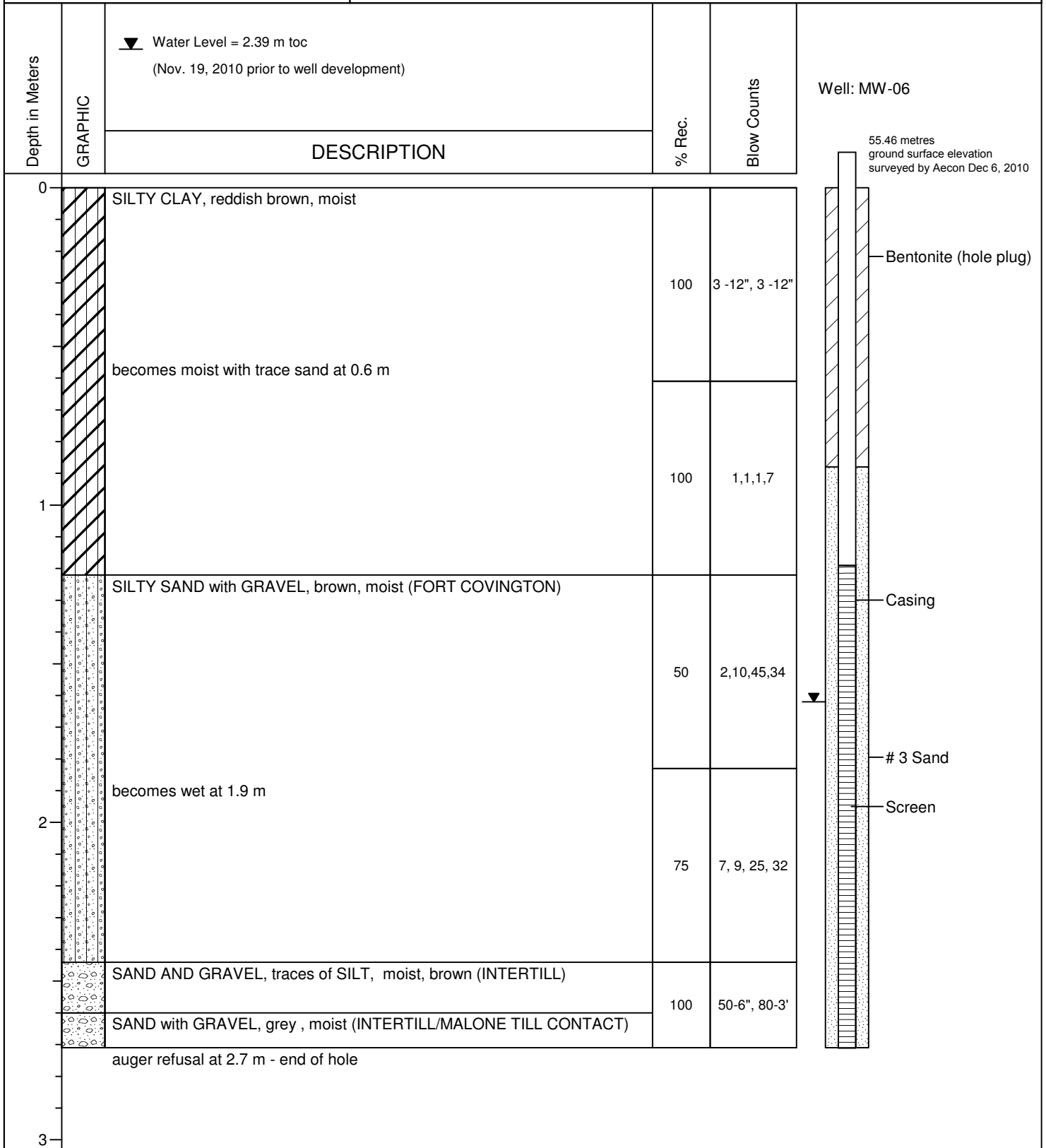
MW-06

Aecon Construction and Material
Installation of Monitoring Wells
MTO Boundary Road

Project # 10106125

Date Completed : November 19, 2010
Site Location : Boundary Rd and Hwy 401
Drilling Method : Auger
Sampling Method : SS
Hole Diameter : 0.15

Company Rep. : GR
Borehole Location : South West of Site
Logged By : GR
Easting : 524355 m
Northing : 4989961 m



APPENDIX C

**Historical Pan Lysimeter and Groundwater Data,
November 2010 to November 2019**

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL2	PL2	PL2	PL2	PL2	PL2	PL2	PL2	PL2
				11-May-2012 ⁽³⁾ P - 4	14-Jun-2012 ⁽⁴⁾ P-1	17-Sep-2012 ⁽⁵⁾ pL2	18-Dec-2012 ⁽⁶⁾ P-3	11-Apr-2013 ⁽⁷⁾ PL-1	05-Jul-2013 ⁽⁸⁾ P-2	21-Oct-2013 ⁽⁸⁾ P - 3	03-Feb-2014 ⁽⁹⁾ P-1	26-May-2014 PL - 2
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	91	160	--	454	470	333	383	238	257
Ammonia, unionized	mg/l	--	--	0.09	0.05	--	0.06	<0.02	0.02	0.03	<0.02	<0.02
Ammonia Nitrogen	mg/l	--	--	2.42	1.28	--	5.31	1.83	1.87	2.40	1.21	1.09
Ammonium	mg/l	--	--	2.33	1.23	--	5.25	1.83	1.85	2.37	1.21	1.09
Bicarbonate	mg/l	--	--	91	160	mg/l	454	470	333	383	238	257
Bromide	mg/l	--	--	9.55	10.2	--	12.0	<1.25	2.09	1.60	<2.50	3.56
Carbonate (CO3)	mg/l	--	--	<1 ⁽¹²⁾	<1 ⁽¹²⁾	--	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	2	72	--	33	11	10	17	8	8
Conductivity	uS/cm	--	--	4190	1480	--	8230	26800	15500	12600	13700	13600
Conductivity (Field)	uS/cm	--	--	>5000	1505	--	>5000	>4000	>3999	>4000	--	>5000
Fluoride	mg/l	1.5	--	0.94	0.69	--	0.25	0.10	0.20	0.22	0.22	0.20
Hardness, Calcium Carbonate	mg/l	--	--	277	176	--	1390	2410	1860	1270	2480	2540
Nitrate as N	mg/l	10.0	--	7.33	0.90	--	<0.10	<0.10	<0.10	<0.10	<0.10	0.22
Nitrite as N	mg/l	1.0	--	0.15	<0.10	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	-	--	--	8.08	7.78	--	7.71	7.07	7.65	7.54	7.29	7.74
pH (Field)	-	--	--	7.4	7.8	--	7.2	7.4	7.6	7.5	--	7.5
Phosphorus	mg/l	--	--	0.05	0.11	--	0.04	0.19	0.02	0.14	0.03	0.03
Sulphate	mg/l	--	500 ⁽¹³⁾	201	209	--	2160	488	613	644	548	574
Temperature (Field)	deg c	--	15	12	15	--	6	3	17	14	--	11
Total Organic Carbon	mg/l	--	--	1.9	75	--	29.1	6.0	9.5	16.3	7.7	6.3
Total Suspended Solids	mg/l	--	--	43	26	--	63	464	147	237	209	17
Turbidity	ntu	--	5 ⁽¹⁴⁾	<0.1	10.6	--	≥100	85.6	≥100	≥100	89.6	10.0
Turbidity (Field)	ntu	--	5 ⁽¹⁴⁾	16	19.9	--	152	527	≥100	≥100	--	≥100
Metals												
Aluminum, dissolved	mg/l	--	--	0.03	0.02	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Barium, dissolved	mg/l	1	--	0.17	0.07	--	0.06	0.5	0.2	0.2	0.3	0.16
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	--	<0.0005	<0.005	<0.005	<0.005	<0.005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.46	0.39	--	0.70	0.3	0.4	0.3	0.4	0.45
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	--	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	374	--	--
Calcium, dissolved	mg/l	--	--	63	49	--	403	754	556	--	729	747
Chromium, dissolved	mg/l	0.05	--	0.002	0.001	--	0.008	<0.05	<0.01	<0.01	<0.01	<0.001
Cobalt, dissolved	mg/l	--	--	0.0004	0.0034	--	0.0051	0.005	0.002	0.006	0.004	0.0044
Copper, dissolved	mg/l	--	1	0.001	0.015	--	0.004	<0.01	<0.01	<0.01	<0.01	0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	0.44	--	13.1	63.3	49.9	34.3	<0.3	0.04
Lead, dissolved	mg/l	0.01	--	<0.001	0.001	--	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	81	--	--
Magnesium, dissolved	mg/l	--	--	29	13	--	94	128	114	--	159	165
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	0.02	0.09	--	1.70	4.3	2.4	2.9	3.2	3.22
Molybdenum, dissolved	mg/l	--	--	0.015	0.019	--	0.007	<0.05	<0.05	<0.05	<0.05	<0.005
Nickel, dissolved	mg/l	--	--	<0.005	0.022	--	0.016	<0.05	<0.05	<0.05	<0.05	0.014
Potassium	mg/l	--	--	--	--	--	--	--	--	27	--	--
Potassium, dissolved	mg/l	--	--	39	20	--	26	38	41	--	43	40
Selenium, dissolved	mg/l	0.05	--	<0.1	<0.01	--	<0.1	<0.01	<0.01	<0.1	<0.01	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	--	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001
Sodium	mg/l	--	200 ⁽¹⁵⁾	--	--	--	--	--	--	1910	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹⁵⁾	715	191	--	1410	6560	2900	--	2020	2080
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	21.2	6.66	--	9.08	34.4	25.5	19.0	38.0	43.7
Thallium, dissolved	mg/l	--	--	0.0001	<0.0001	--	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.01
Vanadium, dissolved	mg/l	--	--	<0.001	<0.001	--	0.002	<0.01	<0.01	<0.01	<0.01	<0.001
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	0.12	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	<0.0005	--	0.0510	0.0017	0.0113	0.0108	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL2	PL2	PL2	PL2	PL2	PL2	PL2	PL2	PL2
				11-May-2012 ⁽³⁾	14-Jun-2012 ⁽⁴⁾	17-Sep-2012 ⁽⁵⁾	18-Dec-2012 ⁽⁶⁾	11-Apr-2013 ⁽⁷⁾	05-Jul-2013 ⁽⁸⁾	21-Oct-2013 ⁽⁸⁾	03-Feb-2014 ⁽⁹⁾	26-May-2014
				P - 4	P-1	pl2	P-3	PL-1	P-2	P - 3	P-1	PL - 2
o-Xylene	mg/l	--	--	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	<0.1	--	--	<0.1	--	--	--	<0.1
Petroleum Hydrocarbons - F1 (C6-C10)-BTX	mg/l	--	--	<0.1	<0.1	--	--	--	--	--	--	<0.1
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.2	--	--	--	0.3	--	--	--	<0.2
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	--	--	--	<0.2	--	--	--	<0.2
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	--	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	<0.0010	<0.0010	--	--	<0.0010	--	--	--	<0.0010
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Acenaphthene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Acenaphthylene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Aniline	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	<0.00001	--	--	--	<0.0001	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	<0.00001	--	--	--	<0.0001	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	--	--	--	0.00001	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	--	--	--	<0.00005	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	--	--	--	<0.00005	--	--	--	--
Chrysene	mg/l	--	--	<0.00002	--	--	--	<0.00005	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Fluoranthene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Fluorene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Naphthalene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Phenanthrene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Pyrene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Styrene	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
1,1,2-Trichloroethane	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
1,2-Dibromoethane	mg/l	--	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
1,2-Dichloroethane	mg/l	0.005	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
1,2-Dichloropropane	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0003	<0.0003	--	--	<0.0003	--	--	--	<0.0003
1,3-Dichlorobenzene	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
Bromodichloromethane	mg/l	--	--	<0.0003	<0.0003	--	--	<0.0003	--	--	--	<0.0003
Bromoform	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
Bromomethane	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
Carbon Tetrachloride	mg/l	0.002	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
Chlorobenzene	mg/l	0.08	0.03	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
Chloroethane	mg/l	--	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
Chloroform	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
Chloromethane	mg/l	--	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
cis-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
cis-1,2-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
Dibromochloromethane	mg/l	--	--	<0.0003	<0.0003	--	--	<0.0003	--	--	--	<0.0003
Dichlorodifluoromethane	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
Methylene Chloride	mg/l	0.05	--	<0.0040	<0.0040	--	--	<0.0040	--	--	--	<0.0040
Tetrachloroethylene	mg/l	0.01	--	<0.0003	<0.0003	--	--	0.0005	--	--	--	<0.0003
trans-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	--	--	<0.0004	--	--	--	<0.0004
trans-1,3-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003	--	--	<0.0003	--	--	--	<0.0003
Trichlorofluoromethane	mg/l	--	--	<0.0005	<0.0005	--	--	<0.0005	--	--	--	<0.0005
Vinyl Chloride	mg/l	0.001	--	<0.0002	<0.0002	--	--	<0.0002	--	--	--	<0.0002

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL2	PL2	PL2	PL2	PL2	PL2	PL2
				09-Oct-2014 ⁽¹⁰⁾ PL - 2	09-Oct-2014 PL - 2	24-Mar-2015 PL-3	17-Jun-2015 ⁽¹¹⁾ P-3	27-Aug-2015 ⁽¹¹⁾ PL-3	18-Sep-2019 PL-2	11-Nov-2019 L-2
General Chemistry										
Alkalinity (Total as CaCO3)	mg/l	--	--	302	--	294	340	329	458	457
Ammonia, unionized	mg/l	--	--	0.05	--	<0.02	<0.05	<0.02	--	--
Ammonia Nitrogen	mg/l	--	--	1.27	--	1.41	0.79	0.862	1.51	1.80
Ammonium	mg/l	--	--	1.22	--	1.41	0.79	0.86	--	--
Bicarbonate	mg/l	--	--	302	--	294	340	329	--	--
Bromide	mg/l	--	--	<1.25	--	3.44	<1.25	<2.5	--	--
Carbonate (CO3)	mg/l	--	--	<1 ⁽¹²⁾	--	<1 ⁽¹⁶⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	--	--
Chloride	mg/l	--	250	--	--	--	--	--	3920	4110
Color	color unit	--	5	8	--	6	10	7	--	--
Conductivity	uS/cm	--	--	11300	--	12700	14400	14100	12200	13300
Conductivity (Field)	uS/cm	--	--	--	>5000	--	>5000	>5000	>10000	>10000
Fluoride	mg/l	1.5	--	0.21	--	0.20	0.19	0.16	--	--
Hardness, Calcium Carbonate	mg/l	--	--	1940	--	2200	2320	2280	1610	1550
Nitrate as N	mg/l	10.0	--	0.11	--	0.40	0.54	0.55	--	--
Nitrite as N	mg/l	1.0	--	<0.10	--	<0.10	<0.10	<0.10	--	--
pH	-	--	--	7.83	--	7.40	7.47	7.95	--	--
pH (Field)	-	--	--	--	7.4	--	7.7	7.5	7.2	7.2
Phosphorus	mg/l	--	--	0.06	--	0.04	<0.05	<0.05	--	--
Sulphate	mg/l	--	500 ⁽¹³⁾	456	--	490	510	494	284	265
Temperature (Field)	deg c	--	15	--	9	--	13	15	14	10
Total Organic Carbon	mg/l	--	--	5.5	--	5.9	10.1	8.9	--	--
Total Suspended Solids	mg/l	--	--	97	--	75	21	40	--	--
Turbidity	ntu	--	5 ⁽¹⁴⁾	99.0	--	66.0	8.0	23.4	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁴⁾	--	>100	--	>100	>100	94	111
Metals										
Aluminum, dissolved	mg/l	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--
Arsenic, dissolved	mg/l	0.01	--	<0.01	--	<0.01	<0.01	<0.01	--	--
Barium, dissolved	mg/l	1	--	0.1	--	0.2	0.2	0.2	--	--
Beryllium, dissolved	mg/l	--	--	<0.005	--	<0.005	<0.005	<0.005	--	--
Boron	mg/l	5	--	--	--	--	--	--	0.2	0.2
Boron, dissolved	mg/l	5	--	0.5	--	0.5	0.4	0.3	--	--
Cadmium, dissolved	mg/l	0.005	--	<0.001	--	<0.001	<0.001	<0.001	--	--
Calcium	mg/l	--	--	--	--	--	--	--	498	472
Calcium, dissolved	mg/l	--	--	585	--	649	696	679	--	--
Chromium, dissolved	mg/l	0.05	--	<0.01	--	<0.01	<0.01	<0.01	--	--
Cobalt, dissolved	mg/l	--	--	0.004	--	0.003	0.015	0.013	--	--
Copper, dissolved	mg/l	--	1	<0.01	--	<0.01	<0.01	<0.01	--	--
Iron	mg/l	--	0.3	--	--	--	--	--	14.2	12.0
Iron, dissolved	mg/l	--	0.3	2.9	--	<0.3	1.1	<0.3	--	--
Lead, dissolved	mg/l	0.01	--	<0.01	--	<0.01	<0.01	<0.01	--	--
Magnesium	mg/l	--	--	--	--	--	--	--	88	89
Magnesium, dissolved	mg/l	--	--	116	--	140	141	143	--	--
Manganese	mg/l	--	0.05	--	--	--	--	--	1.5	1.8
Manganese, dissolved	mg/l	--	0.05	2.9	--	2.7	4.4	4.5	--	--
Molybdenum, dissolved	mg/l	--	--	<0.05	--	<0.05	<0.05	<0.05	--	--
Nickel, dissolved	mg/l	--	--	<0.05	--	<0.05	<0.05	<0.05	--	--
Potassium	mg/l	--	--	--	--	--	--	--	--	--
Potassium, dissolved	mg/l	--	--	28	--	35	40	36	--	--
Selenium, dissolved	mg/l	0.05	--	<0.01	--	<0.01	<0.01	<0.01	--	--
Silver, dissolved	mg/l	--	--	<0.001	--	<0.001	<0.001	<0.001	--	--
Sodium	mg/l	--	200 ⁽¹⁵⁾	--	--	--	--	--	1830	1920
Sodium, dissolved	mg/l	--	200 ⁽¹⁵⁾	1620	--	2060	2250	2180	--	--
Strontium	mg/l	--	--	--	--	--	--	--	10.2	12.7
Strontium, dissolved	mg/l	--	--	28.4	--	31.4	26.7	25.7	--	--
Thallium, dissolved	mg/l	--	--	<0.001	--	<0.001	<0.001	<0.001	--	--
Titanium, dissolved	mg/l	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--
Vanadium, dissolved	mg/l	--	--	<0.01	--	<0.01	<0.01	<0.01	--	--
Zinc	mg/l	--	5	--	--	--	--	--	<0.1	<0.1
Zinc, dissolved	mg/l	--	5	<0.1	--	<0.1	<0.1	<0.1	--	--
Petroleum Hydrocarbons										
Benzene	mg/l	0.001	--	<0.0005	--	--	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	--	--	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	--	--	<0.0004	<0.0004	<0.0004	<0.0004

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL2	PL2	PL2	PL2	PL2	PL2	PL2
				09-Oct-2014 ⁽¹⁰⁾	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹¹⁾	27-Aug-2015 ⁽¹¹⁾	18-Sep-2019	11-Nov-2019
				PL - 2	PL - 2	PL-3	P-3	PL-3	PL-2	L-2
o-Xylene	mg/l	--	--	<0.0005	--	--	<0.0004	<0.0004	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	--	<0.02	--	<0.02	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTX	mg/l	--	--	--	--	--	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	--	0.03	--	<0.02	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	--	<0.05	--	<0.05	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	--	<0.05	--	<0.05	<0.05
Toluene	mg/l	0.06	0.024	<0.0005	--	--	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.0010	<0.0005	--	<0.0005	<0.0005
Semi-VOCs										
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--
Aniline	mg/l	--	--	--	--	--	--	--	<0.0020	<0.0020
Anthracene	mg/l	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	--	<0.0005	--	--	--
VOCs										
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	<0.0004	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--
1,1-Dichloroethane	mg/l	--	--	--	--	--	<0.0004	--	<0.0004	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--	<0.0005	--	--	--
1,2-Dibromoethane	mg/l	--	--	--	--	--	<0.0002	--	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--	<0.0004	--	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--	<0.0002	--	--	--
1,2-Dichloropropane	mg/l	--	--	--	--	--	<0.0005	--	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	--	<0.0003	--	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	--	<0.0004	--	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--	<0.0004	--	--	--
Bromodichloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--
Bromoform	mg/l	--	--	--	--	--	<0.0004	--	--	--
Bromomethane	mg/l	--	--	--	--	--	<0.0005	--	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	--	<0.0002	--	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--	<0.0002	--	--	--
Chloroethane	mg/l	--	--	--	--	--	<0.0002	--	--	--
Chloroform	mg/l	--	--	--	--	--	<0.0005	--	--	--
Chloromethane	mg/l	--	--	--	--	--	<0.0002	--	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--
Dibromochloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--
Methylene Chloride	mg/l	0.05	--	--	--	--	<0.0040	--	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--	--	0.0004	--	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--
Trichloroethene	mg/l	0.005	--	--	--	--	<0.0003	--	0.0008	0.0010
Trichlorofluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--
Vinyl Chloride	mg/l	0.001	--	--	--	--	<0.0002	--	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL3	PL3	PL3	PL3	PL3	PL3	PL3	PL3	PL3
				10-May-2012 ⁽⁴⁾ P-1	14-Jun-2012 ⁽¹⁷⁾ P-2	17-Sep-2012 ⁽¹⁸⁾ P-1	18-Dec-2012 ⁽⁶⁾ P-1	11-Apr-2013 ⁽⁷⁾ PL-3	05-Jul-2013 ⁽⁸⁾ P-1	21-Oct-2013 ⁽¹⁸⁾ P - 1	03-Feb-2014 ⁽¹⁹⁾ P-3	26-May-2014 PL - 1
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	63	108	404	525	333	410	557	320	469
Ammonia, unionized	mg/l	--	--	0.02	0.03	0.04	0.08	<0.02	<0.02	0.08	<0.02	<0.02
Ammonia Nitrogen	mg/l	--	--	0.65	0.84	9.55	6.95	2.48	0.94	1.99	1.21	0.62
Ammonium	mg/l	--	--	0.63	0.81	9.51	6.87	2.48	0.94	1.91	1.21	0.62
Bicarbonate	mg/l	--	--	63	108	404	525	333	410	557	320	469
Bromide	mg/l	--	--	2.38	4.15	16.6	13.0	<1.25	0.70	1.46	<2.50	1.30
Carbonate (CO3)	mg/l	--	--	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	2	42	30	29	15	10	13	13	13
Conductivity	uS/cm	--	--	1450	1660	11200	9910	16500	10600	3040	20300	5680
Conductivity (Field)	uS/cm	--	--	>5000	1595	1805	>5000	>4000	>3999	>4000	--	>5000
Fluoride	mg/l	1.5	--	0.47	0.24	0.17	0.20	0.20	0.19	0.23	0.11	0.37
Hardness, Calcium Carbonate	mg/l	--	--	112	190	1870	1630	2260	1100	416	3060	801
Nitrate as N	mg/l	10.0	--	1.86	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	-	--	--	8.08	7.90	7.04	7.32	7.08	7.70	7.82	7.03	7.61
pH (Field)	-	--	--	7.4	7.9	8.0	7.3	7.5	7.6	7.5	--	7.4
Phosphorus	mg/l	--	--	0.03	2.66	0.52	0.47	0.03	0.24	0.35	0.27	0.10
Sulphate	mg/l	--	500 ⁽¹³⁾	53	103	1840	2510	700	491	345	547	309
Temperature (Field)	deg c	--	15	13	15	16	5	3	15	12	--	11
Total Organic Carbon	mg/l	--	--	2.1	42.6	54.3	32.1	9.7	10.4	77.4	20.0	10.6
Total Suspended Solids	mg/l	--	--	14	1760	982	663	196	332	8600	1590	408
Turbidity	ntu	--	5 ⁽¹⁴⁾	13.6	30.5	>100	>100	>100	>100	>100	>100	>100
Turbidity (Field)	ntu	--	5 ⁽¹⁴⁾	24	45	62	128	450	>100	>100	--	>100
Metals												
Aluminum, dissolved	mg/l	--	--	0.05	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01	<0.1	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Barium, dissolved	mg/l	1	--	0.05	0.07	0.14	0.07	0.3	0.1	0.09	0.4	0.10
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.14	0.12	0.88	0.81	0.5	0.4	0.45	0.2	0.18
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0001	<0.001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	30	58	518	452	660	309	117	966	240
Chromium, dissolved	mg/l	0.05	--	0.002	<0.001	<0.005	<0.005	<0.05	<0.01	<0.005	<0.01	<0.001
Cobalt, dissolved	mg/l	--	--	<0.0002	0.0027	0.0048	0.0026	0.003	<0.002	0.0003	0.003	0.0004
Copper, dissolved	mg/l	--	1	<0.001	0.003	0.005	0.004	<0.01	<0.01	0.001	<0.01	<0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	0.45	84.8	58.1	58.7	52.7	17.7	36.4	46.8
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.001	<0.01	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	9	11	139	121	148	79	30	158	49
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	0.01	0.62	1.55	1.64	3.2	1.1	0.28	3.5	0.70
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.05	<0.05	<0.005	<0.05	<0.005
Nickel, dissolved	mg/l	--	--	<0.005	0.010	0.019	0.009	<0.05	<0.05	<0.005	<0.05	<0.005
Potassium, dissolved	mg/l	--	--	14	10	26	30	48	19	10	36	8
Selenium, dissolved	mg/l	0.05	--	<0.01	<0.01	<0.001	<0.1	<0.1	<0.01	<0.001	<0.01	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0001	<0.001	<0.0001
Sodium	mg/l	--	200 ⁽¹⁵⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹⁵⁾	247	224	2060	1710	3470	2000	419	3420	978
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	3.61	3.02	8.20	8.71	32.1	13.7	5.19	37.6	5.93
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0001	<0.001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01	<0.1	<0.01
Vanadium, dissolved	mg/l	--	--	<0.001	<0.001	0.003	0.004	<0.01	<0.01	0.005	<0.01	<0.001
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	0.03	<0.01	<0.01	<0.1	<0.1	<0.01	<0.1	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	<0.0005	0.0339	0.0127	0.0115	0.0078	0.0080	<0.0005	0.0038
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL3	PL3	PL3	PL3	PL3	PL3	PL3	PL3	PL3
				10-May-2012 ⁽⁴⁾	14-Jun-2012 ⁽¹⁷⁾	17-Sep-2012 ⁽¹⁸⁾	18-Dec-2012 ⁽⁶⁾	11-Apr-2013 ⁽⁷⁾	05-Jul-2013 ⁽⁸⁾	21-Oct-2013 ⁽¹⁸⁾	03-Feb-2014 ⁽¹⁹⁾	26-May-2014
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	<0.1	--	--	<0.1	--	--	<0.1	<0.1
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	<0.1	<0.1	--	--	--	--	--	<0.1	<0.1
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.2	--	--	--	<0.2	--	--	--	<0.2
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	--	--	--	<0.2	--	--	--	<0.2
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	<0.0010	<0.0010	<0.0010	--	<0.0010	--	--	--	<0.0010
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Acenaphthene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Acenaphthylene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Aniline	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	<0.00001	--	--	--	<0.0001	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	<0.00001	--	--	--	<0.0001	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	--	--	--	<0.00001	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	--	--	--	<0.00005	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	--	--	--	<0.00005	--	--	--	--
Chrysene	mg/l	--	--	<0.00002	--	--	--	<0.00005	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Fluoranthene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Fluorene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Naphthalene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Phenanthrene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Pyrene	mg/l	--	--	<0.00002	--	--	--	<0.0001	--	--	--	--
Styrene	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
1,1,2-Trichloroethane	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
1,2-Dibromoethane	mg/l	--	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
1,2-Dichloroethane	mg/l	0.005	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
1,2-Dichloropropane	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0003	<0.0003	<0.0003	--	<0.0003	--	--	--	<0.0003
1,3-Dichlorobenzene	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
Bromodichloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0003	--	<0.0003	--	--	--	<0.0003
Bromoform	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
Bromomethane	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
Carbon Tetrachloride	mg/l	0.002	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
Chlorobenzene	mg/l	0.08	0.03	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
Chloroethane	mg/l	--	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
Chloroform	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
Chloromethane	mg/l	--	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
cis-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
cis-1,2-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
Dibromochloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0003	--	<0.0003	--	--	--	<0.0003
Dichlorodifluoromethane	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
Methylene Chloride	mg/l	0.05	--	<0.0040	<0.0040	<0.0040	--	<0.0040	--	--	--	<0.0040
Tetrachloroethylene	mg/l	0.01	--	<0.0003	<0.0003	0.0006	--	0.0005	--	--	--	0.0006
trans-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0004	--	<0.0004	--	--	--	<0.0004
trans-1,3-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003	<0.0003	--	<0.0003	--	--	--	0.0005
Trichlorofluoromethane	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--	--	--	<0.0005
Vinyl Chloride	mg/l	0.001	--	<0.0002	<0.0002	<0.0002	--	<0.0002	--	--	--	<0.0002

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL3	PL3	PL3	PL3	PL3	PL3	PL3	PL3
				09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹¹⁾	17-Jun-2015 ⁽¹¹⁾	27-Aug-2015 ⁽¹¹⁾	18-Sep-2019	11-Nov-2019
				PL-3	PL-3	PL-2	P-1	P-2	PL-1	PL-3	L-3
General Chemistry											
Alkalinity (Total as CaCO ₃)	mg/l	--	--	448	--	296	308	309	343	430	516
Ammonia, unionized	mg/l	--	--	0.04	--	<0.02	<0.05	<0.05	<0.02	--	--
Ammonia Nitrogen	mg/l	--	--	0.97	--	1.82	1.79	1.72	1.53	3.9	3.76
Ammonium	mg/l	--	--	0.93	--	1.82	1.79	1.72	1.53	--	--
Bicarbonate	mg/l	--	--	448	--	296	308	309	343	--	--
Bromide	mg/l	--	--	<0.25	--	<1.25	<5	<5	<5	--	--
Carbonate (CO ₃)	mg/l	--	--	<1 ⁽¹²⁾	--	<1 ⁽¹⁶⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	<1 ⁽¹²⁾	--	--
Chloride	mg/l	--	250	--	--	--	--	--	--	9360	8300
Color	color unit	--	5	10	--	6	7	7	8	--	--
Conductivity	uS/cm	--	--	4640	--	30800	30100	29900	21700	24600	23600
Conductivity (Field)	uS/cm	--	--	--	>5000	>5000	>5000	>5000	>5000	>10000	>10000
Fluoride	mg/l	1.5	--	0.31	--	<0.10	0.10	0.10	0.12	--	--
Hardness, Calcium Carbonate	mg/l	--	--	601	--	3030	2840	2820	2330	2080	1730
Nitrate as N	mg/l	10.0	--	<0.10	--	<0.10	<0.10	<0.10	<0.10	--	--
Nitrite as N	mg/l	1.0	--	<0.10	--	<0.10	<0.10	<0.10	<0.10	--	--
pH	-	--	--	7.85	--	6.82	7.15	7.13	7.67	--	--
pH (Field)	-	--	--	--	7.3	7.3	7.6	7.6	7.4	7.2	7.1
Phosphorus	mg/l	--	--	0.13	--	0.04	0.96	0.98	0.30	--	--
Sulphate	mg/l	--	500 ⁽¹³⁾	268	--	664	672	694	577	110	103
Temperature (Field)	deg c	--	15	--	8	8	13	13	16	15	10
Total Organic Carbon	mg/l	--	--	12.1	--	4.0	7.4	6.9	7.7	--	--
Total Suspended Solids	mg/l	--	--	670	--	890	1350	1200	1100	--	--
Turbidity	ntu	--	5 ⁽¹⁴⁾	>100	--	>100	>100	>100	100	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁴⁾	--	>100	>100	>100	>100	>100	>1000	>1000
Metals											
Aluminum, dissolved	mg/l	--	--	<0.01	--	<0.1	<0.1	<0.1	<0.1	--	--
Arsenic, dissolved	mg/l	0.01	--	<0.001	--	<0.01	<0.01	<0.01	<0.01	--	--
Barium, dissolved	mg/l	1	--	0.10	--	0.5	0.2	0.2	0.2	--	--
Beryllium, dissolved	mg/l	--	--	<0.0005	--	<0.005	<0.005	<0.005	<0.005	--	--
Boron	mg/l	5	--	--	--	--	--	--	--	<0.1	0.1
Boron, dissolved	mg/l	5	--	0.30	--	0.3	0.2	0.2	0.2	--	--
Cadmium, dissolved	mg/l	0.005	--	<0.0001	--	<0.001	<0.001	<0.001	<0.001	--	--
Calcium	mg/l	--	--	--	--	--	--	--	--	668	549
Calcium, dissolved	mg/l	--	--	183	--	946	915	907	722	--	--
Chromium, dissolved	mg/l	0.05	--	<0.001	--	<0.01	<0.01	<0.01	<0.01	--	--
Cobalt, dissolved	mg/l	--	--	0.0002	--	<0.002	<0.002	<0.002	<0.002	--	--
Copper, dissolved	mg/l	--	1	<0.001	--	<0.01	<0.01	<0.01	<0.01	--	--
Iron	mg/l	--	0.3	--	--	--	--	--	--	65.7	73.3
Iron, dissolved	mg/l	--	0.3	19.9	--	8.8	23.4	22.0	25.0	--	--
Lead, dissolved	mg/l	0.01	--	<0.001	--	<0.01	<0.01	<0.01	<0.01	--	--
Magnesium	mg/l	--	--	--	--	--	--	--	--	99	87
Magnesium, dissolved	mg/l	--	--	35	--	163	135	136	129	--	--
Manganese	mg/l	--	0.05	--	--	--	--	--	--	0.9	1.0
Manganese, dissolved	mg/l	--	0.05	0.32	--	2.6	2.4	2.5	2.0	--	--
Molybdenum, dissolved	mg/l	--	--	<0.005	--	<0.05	<0.05	<0.05	<0.05	--	--
Nickel, dissolved	mg/l	--	--	<0.005	--	<0.05	<0.05	<0.05	<0.05	--	--
Potassium, dissolved	mg/l	--	--	9	--	38	41	41	32	--	--
Selenium, dissolved	mg/l	0.05	--	<0.001	--	<0.01	<0.01	<0.01	<0.01	--	--
Silver, dissolved	mg/l	--	--	<0.0001	--	<0.001	<0.001	<0.001	<0.001	--	--
Sodium	mg/l	--	200 ⁽¹⁵⁾	--	--	--	--	--	--	4680	4420
Sodium, dissolved	mg/l	--	200 ⁽¹⁵⁾	767	--	6540	5560	5660	4550	--	--
Strontium	mg/l	--	--	--	--	--	--	--	--	14.0	15.0
Strontium, dissolved	mg/l	--	--	4.94	--	33.3	31.3	33.4	21.2	--	--
Thallium, dissolved	mg/l	--	--	<0.0001	--	<0.001	<0.001	<0.001	<0.001	--	--
Titanium, dissolved	mg/l	--	--	<0.01	--	<0.1	<0.1	<0.1	<0.1	--	--
Vanadium, dissolved	mg/l	--	--	<0.001	--	<0.01	<0.01	<0.01	<0.01	--	--
Zinc	mg/l	--	5	--	--	--	--	--	--	<0.1	<0.1
Zinc, dissolved	mg/l	--	5	<0.01	--	<0.1	<0.1	<0.1	<0.1	--	--
Petroleum Hydrocarbons											
Benzene	mg/l	0.001	--	0.0020	--	--	0.0016	0.0013	0.0024	0.0020	0.0021
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	--	--	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0005	--	--	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	PL3	PL3	PL3	PL3	PL3	PL3	PL3	PL3
				09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹¹⁾	17-Jun-2015 ⁽¹¹⁾	27-Aug-2015 ⁽¹¹⁾	18-Sep-2019	11-Nov-2019
				PL - 3	PL - 3	PL-2	P-1	P-2	PL-1	PL-3	L-3
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	--	<0.02	<0.02	--	<0.02	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	--	--	--	--	0.02	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	--	0.04	0.06	--	<0.02	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	--	0.05	0.32	--	0.16	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	--	<0.05	0.05	--	<0.05	<0.05
Toluene	mg/l	0.06	0.024	<0.0005	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.0010	<0.0005	<0.0005	--	<0.0005	<0.0005
Semi-VOCs											
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--
Aniline	mg/l	--	--	--	--	--	--	--	--	0.0036	0.0040
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
VOCs											
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	<0.0004	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	--	--
1,1-Dichloroethane	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	<0.0004	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--	<0.0005	<0.0005	--	--	--
1,2-Dibromoethane	mg/l	--	--	--	--	--	<0.0002	<0.0002	--	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--	<0.0004	<0.0004	--	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--	<0.0002	<0.0002	--	--	--
1,2-Dichloropropane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	--	<0.0003	<0.0003	--	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--	<0.0004	<0.0004	--	--	--
Bromodichloromethane	mg/l	--	--	--	--	--	<0.0003	<0.0003	--	--	--
Bromoform	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	--	--
Bromomethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	--	<0.0002	<0.0002	--	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--	<0.0002	<0.0002	--	--	--
Chloroethane	mg/l	--	--	--	--	--	<0.0002	<0.0002	--	--	--
Chloroform	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
Chloromethane	mg/l	--	--	--	--	--	<0.0002	<0.0002	--	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	<0.0002	--	--	--
Dibromochloromethane	mg/l	--	--	--	--	--	<0.0003	<0.0003	--	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
Methylene Chloride	mg/l	0.05	--	--	--	--	<0.0040	<0.0040	--	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--	--	<0.0003	<0.0003	--	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	<0.0004	--	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	<0.0002	--	--	--
Trichloroethene	mg/l	0.005	--	--	--	--	0.0007	0.0005	--	0.0015	0.0016
Trichlorofluoromethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	--
Vinyl Chloride	mg/l	0.001	--	--	--	--	<0.0002	<0.0002	--	--	--

Footnotes:

- < 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 ODWQS(169/03)-Health

Value Parameter is greater than ODWQS-AO

- (1) Ontario Drinking Water Quality Standards - Health Based Standards (June 2003, revised January 2018).
- (2) Ontario Drinking Water Quality Standards - Aesthetic Objectives. Aesthetic Objectives are established for parameters that may impair the taste, odour or colour of water or which may interfere with good water quality control practices. For certain parameters, both aesthetic objectives and health-related MACs have been derived (June 2003, revised June 2006).
- (3) Selenium MRL elevated due to matrix interference.
- (4) Arsenic and Selenium MRL elevated due to matrix interference.
- (5) Monitoring location was dry during this sampling event. No sample was collected.
- (6) Arsenic and Selenium MRL elevated due to matrix interference (dilution was done).
- (7) Metals and Br MRL elevated due to matrix interference (dilution was done).
- (8) Metals MRL elevated due to high conductivity (dilution was done).
- (9) Metals MRL elevated due to high conductivity (dilution was done).Br MRL elevated due to matrix interference (dilution was done).
- (10) Br MRL elevated due to matrix interference (dilution was done). Metals MRL elevated due to high conductivity (dilution was done).
- (11) Metals MRLs elevated due to matrix interference (10x dilution was done). Bromide MRL elevated due to matrix interference (dilution was done).
- (12) Not available - pH < 8.3
- (13) There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L.
- (14) Applicable for all waters at the point of consumption.
- (15) The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
- (16) No result value available.
- (17) TOC was not shaken prior to analysis due to sediment content. Arsenic and Selenium MRL elevated due to matrix interference.
- (18) Arsenic MRL elevated due to matrix interference (dilution was done).
- (19) Metals MRL elevated due to high conductivity (dilution was done).Br MRL elevated due to matrix interference (dilution was done).

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01
				26-Nov-2010	28-Feb-2011 ⁽³⁾	07-Apr-2011 ⁽⁴⁾	11-May-2012	14-Jun-2012 ⁽⁵⁾	14-Jun-2012 ⁽⁵⁾	17-Sep-2012	18-Dec-2012	11-Apr-2013
				S-1	S - 2	S-2	S - 2	S-2	S-3	S-4	S-4	S-6
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	424	434	426	398	378	379	372	363	399
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ammonia, unionized (Field)	mg/l	--	--	<0.02	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.24	0.05	0.08	0.18	0.13	0.16	0.06	0.07	0.06
Ammonium	mg/l	--	--	--	--	--	0.18	0.13	0.16	0.06	0.07	0.06
Bicarbonate	mg/l	--	--	424	434	426	398	378	379	372	363	399
Bromide	mg/l	--	--	<0.25	<0.25	<0.25	0.48	<0.25	0.39	0.34	<0.25	<0.25
Carbonate (CO3)	mg/l	--	--	<2 ⁽⁸⁾	<2 ⁽⁸⁾	<2 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	8	<2	7	4	11	12	12	10	6
Conductivity	uS/cm	--	--	2890	2850	--	2670	1990	1990	1970	2030	2550
Conductivity (Field)	uS/cm	--	--	2280	2410	2640	2760	1980	1980	2005	2080	2505
Fluoride	mg/l	1.5	--	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Hardness, Calcium Carbonate	mg/l	--	--	647	695	682	665	446	484	570	555	678
Nitrate as N	mg/l	10.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	-	--	--	--	7.53	--	7.69	7.83	7.81	7.55	7.72	7.72
pH (Field)	-	--	--	6.66	7.25	7.26	7.25	7.7	7.7	7.6	7.8	7.4
Phosphorus	mg/l	--	--	5.51	1.83	3.97	1.06	1.77	2.12	0.88	3.80	2.30
Sulphate	mg/l	--	500 ⁽⁹⁾	90	72	62	74	56	57	99	77	75
Temperature (Field)	deg c	--	15	8.2	6.2	7.0	9	13	13	13	6	4
Total Organic Carbon	mg/l	--	--	9.4	4.2	4.4	3.1	4.5	4.7	5.8	4.7	3.4
Total Suspended Solids	mg/l	--	--	5510	5430	5380	2500	969	1400	988	1110	1290
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	--	<0.1	>100	>100	>100	>100	17.1
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	--	--	--	239	140	140	162	204	-- ⁽¹²⁾
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium, dissolved	mg/l	1	--	0.33	0.33	0.31	0.28	0.23	0.24	0.26	0.27	0.27
Beryllium, dissolved	mg/l	--	--	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.03	0.02	0.02	0.03	0.03	0.03	0.06	0.03	0.03
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	185	204	207	189	129	141	169	163	194
Chromium, dissolved	mg/l	0.05	--	0.007	<0.005	<0.005	<0.005	0.003	0.002	<0.005	0.008	0.010
Cobalt, dissolved	mg/l	--	--	0.0030	0.0019	0.0020	0.0020	0.0021	0.0021	0.0032	0.0029	0.0011
Copper, dissolved	mg/l	--	1	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	0.05	0.04	0.10	0.11	0.10	0.25	0.35	<0.03
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	45	45	40	47	30	32	36	36	47
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	1.75	1.18	1.12	1.05	0.95	0.93	1.38	1.27	0.56
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	0.008	0.007	0.008	0.009	0.008	0.008	0.011	0.006	0.009
Potassium, dissolved	mg/l	--	--	3	3	2	3	2	2	3	3	3
Selenium, dissolved	mg/l	0.05	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	291	297	328	281	178	181	178	196	329
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	1.18	1.01	1.01	0.986	0.936	0.941	1.08	1.03	1.07
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	0.004	0.004	0.003	0.004	0.001	<0.001	0.005	0.005	0.003
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	ma/l	0.001	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01
				26-Nov-2010	28-Feb-2011 ⁽³⁾	07-Apr-2011 ⁽⁴⁾	11-May-2012	14-Jun-2012 ⁽⁵⁾	14-Jun-2012 ⁽⁵⁾	17-Sep-2012	18-Dec-2012	11-Apr-2013
				S-1	S-2	S-2	S-2	S-2	S-3	S-4	S-4	S-6
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0010	<0.0010	<0.0020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	--	--	--	--	<0.1
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	--	<0.2
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	--	<0.2
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	<0.0015	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	--	<0.0010
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
2-Methylnaphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Acenaphthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Acenaphthylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	--	<0.0001
Benzo[a]anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	--	<0.0001
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	--	<0.00001
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.00005
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.00005
Chrysene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.00005
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Fluorene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Naphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Phenanthrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Pyrene	mg/l	--	--	<0.00002	<0.00004	0.00010	<0.00002	--	--	--	--	<0.0001
Styrene	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0008	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
1,1,2-Trichloroethane	mg/l	--	--	<0.0004	<0.0008	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
1,2-Dibromoethane	mg/l	--	--	<0.0010	<0.0010	<0.0020	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
1,2-Dichloroethane	mg/l	0.005	--	<0.0005	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
1,2-Dichloropropane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	<0.0003	--	<0.0003
1,3-Dichlorobenzene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
Bromodichloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	<0.0003	--	<0.0003
Bromoform	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
Bromomethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
Carbon Tetrachloride	mg/l	0.002	--	<0.0005	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
Chlorobenzene	mg/l	0.08	0.03	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
Chloroethane	mg/l	--	--	<0.0010	<0.0020	<0.0020	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
Chloroform	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
Chloromethane	mg/l	--	--	<0.0010	<0.0020	<0.0020	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
cis-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
cis-1,2-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
Dibromochloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	<0.0003	--	<0.0003
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
Methylene Chloride	mg/l	0.05	--	<0.0040	<0.0040	<0.0080	<0.0040	<0.0040	<0.0040	<0.0040	--	<0.0040
Tetrachloroethylene	mg/l	0.01	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	<0.0003	--	<0.0003
trans-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	<0.0004	--	<0.0004
trans-1,3-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	<0.0003	--	<0.0003
Trichlorofluoromethane	mg/l	--	--	<0.0005	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005
Vinyl Chloride	mg/l	0.001	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	--	<0.0002

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01
				05-Jul-2013	21-Oct-2013	03-Feb-2014 ⁽⁶⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015	27-Aug-2015
				S-5	S - 6	S-1	MW - 1	MW1	MW1	S-5	S-7	S-3
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	383	404	419	408	405	--	389	399	401
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	--	<0.02	<0.05	<0.02
Ammonia, unionized (Field)	mg/l	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.06	0.06	0.08	0.06	0.12	--	0.02	0.07	0.073
Ammonium	mg/l	--	--	0.06	0.06	0.08	0.06	0.12	--	0.02	0.07	0.07
Bicarbonate	mg/l	--	--	383	404	419	408	405	--	389	399	401
Bromide	mg/l	--	--	<0.25	<0.25	<0.50	0.32	<0.25	--	0.55	<0.25	<0.25
Carbonate (CO3)	mg/l	--	--	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾	--	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	8	7	4	12	7	--	17	7	17
Conductivity	uS/cm	--	--	2110	2420	2820	2180	2410	--	2540	2280	2230
Conductivity (Field)	uS/cm	--	--	2180	2005	2205	1970	--	1880	1835	2310	2205
Fluoride	mg/l	1.5	--	0.11	0.14	0.11	0.27	0.20	--	0.15	0.24	0.24
Hardness, Calcium Carbonate	mg/l	--	--	578	545	669	556	665	--	655	599	623
Nitrate as N	mg/l	10.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
pH	-	--	--	7.82	7.75	7.59	7.86	7.99	--	7.66	7.73	7.97
pH (Field)	-	--	--	7.8	7.6	7.8	7.5	--	7.6	7.5	7.6	7.6
Phosphorus	mg/l	--	--	1.08	1.97	6.71	1.54	1.51	--	0.91	0.82	0.68
Sulphate	mg/l	--	500 ⁽⁹⁾	57	75	73	58	96	--	88	110	106
Temperature (Field)	deg c	--	15	12	8	5	8	--	8	5	9	12
Total Organic Carbon	mg/l	--	--	5.2	7.0	4.7	4.2	4.2	--	3.3	2.5	2.8
Total Suspended Solids	mg/l	--	--	587	1580	1050	691	1800	--	839	330	890
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	>100	--	>100	>100	100
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	--	>100	78	>81	>100
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001
Barium, dissolved	mg/l	1	--	0.22	0.25	0.30	0.23	0.24	--	0.29	0.25	0.21
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.04	0.04	0.03	0.05	0.08	--	0.04	0.07	0.07
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	167	154	192	160	197	--	188	174	182
Chromium, dissolved	mg/l	0.05	--	0.007	0.007	0.009	<0.001	<0.001	--	<0.001	<0.001	<0.001
Cobalt, dissolved	mg/l	--	--	0.0019	0.0027	0.0013	0.0016	0.0032	--	0.0011	0.0014	0.0029
Copper, dissolved	mg/l	--	1	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	0.12	0.23	0.06	0.10	0.34	--	0.16	0.16	0.44
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	39	39	46	38	42	--	45	40	41
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	0.87	0.97	0.59	0.80	1.19	--	0.58	0.91	1.04
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	--	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	0.006	0.007	0.005	<0.005	<0.005	--	<0.005	<0.005	<0.005
Potassium, dissolved	mg/l	--	--	3	3	5	3	5	--	3	3	4
Selenium, dissolved	mg/l	0.05	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	238	238	248	242	249	--	249	225	224
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	0.858	0.959	1.04	0.944	1.06	--	1.10	1.13	0.954
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	0.003	0.002	0.004	<0.001	<0.001	--	<0.001	<0.001	<0.001
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	ma/l	0.001	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01	MW 01
				05-Jul-2013	21-Oct-2013	03-Feb-2014 ⁽⁶⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015	27-Aug-2015
				S-5	S - 6	S-1	MW - 1	MW1	MW1	S-5	S-7	S-3
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	--	<0.1	--	--	--	<0.02	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	--	<0.1	--	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	--	<0.1	--	--	--	<0.02	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	--	<0.2	--	--	--	<0.05	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	--	<0.2	--	--	--	<0.05	--
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	--	<0.0010	--	--	<0.0010	<0.0005	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1-Dichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,2-Dibromoethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--	<0.0004	--	--	--	<0.0004	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--	<0.0002	--	--	--	<0.0002	--
1,2-Dichloropropane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--	<0.0004	--	--	--	<0.0004	--
Bromodichloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Bromoform	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
Bromomethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--	<0.0002	--	--	--	<0.0002	--
Chloroethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Chloroform	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Chloromethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Dibromochloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Methylene Chloride	mg/l	0.05	--	--	--	--	<0.0040	--	--	--	<0.0040	--
Tetrachloroethylene	mg/l	0.01	--	--	--	--	<0.0003	--	--	--	<0.0003	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Trichloroethene	mg/l	0.005	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Trichlorofluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Vinyl Chloride	mg/l	0.001	--	--	--	--	<0.0002	--	--	--	<0.0002	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 01	MW 01	MW 01
				27-Aug-2015 ⁽⁷⁾	18-Sep-2019	11-Nov-2019
				S-4	MW 1	MW-1
General Chemistry						
Alkalinity (Total as CaCO3)	mg/l	--	--	405	382	378
Ammonia, unionized	mg/l	--	--	<0.02	--	--
Ammonia, unionized (Field)	mg/l	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.066	0.13	0.02
Ammonium	mg/l	--	--	0.07	--	--
Bicarbonate	mg/l	--	--	405	--	--
Bromide	mg/l	--	--	<1.25	--	--
Carbonate (CO3)	mg/l	--	--	<1 ⁽⁸⁾	--	--
Chloride	mg/l	--	250	--	305	325
Color	color unit	--	5	8	--	--
Conductivity	uS/cm	--	--	2210	1800	1900
Conductivity (Field)	uS/cm	--	--	2205	1720	1680
Fluoride	mg/l	1.5	--	0.25	--	--
Hardness, Calcium Carbonate	mg/l	--	--	621	554	504
Nitrate as N	mg/l	10.0	--	<0.10	--	--
Nitrite as N	mg/l	1.0	--	<0.10	--	--
pH	-	--	--	7.95	--	--
pH (Field)	-	--	--	7.6	7.4	7.4
Phosphorus	mg/l	--	--	0.81	--	--
Sulphate	mg/l	--	500 ⁽⁹⁾	102	101	97
Temperature (Field)	deg c	--	15	12	10	7
Total Organic Carbon	mg/l	--	--	2.7	--	--
Total Suspended Solids	mg/l	--	--	710	--	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	100	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	≥100	39	40
Metals						
Aluminum, dissolved	mg/l	--	--	<0.01	--	--
Arsenic, dissolved	mg/l	0.01	--	<0.001	--	--
Barium, dissolved	mg/l	1	--	0.21	--	--
Beryllium, dissolved	mg/l	--	--	<0.0005	--	--
Boron	mg/l	5	--	--	0.07	0.06
Boron, dissolved	mg/l	5	--	0.08	--	--
Cadmium, dissolved	mg/l	0.005	--	<0.0001	--	--
Calcium	mg/l	--	--	--	164	144
Calcium, dissolved	mg/l	--	--	181	--	--
Chromium, dissolved	mg/l	0.05	--	<0.001	--	--
Cobalt, dissolved	mg/l	--	--	0.0028	--	--
Copper, dissolved	mg/l	--	1	<0.001	--	--
Iron	mg/l	--	0.3	--	0.21	0.29
Iron, dissolved	mg/l	--	0.3	0.42	--	--
Lead, dissolved	mg/l	0.01	--	<0.001	--	--
Magnesium	mg/l	--	--	--	35	35
Magnesium, dissolved	mg/l	--	--	41	--	--
Manganese	mg/l	--	0.05	--	0.95	1.13
Manganese, dissolved	mg/l	--	0.05	1.02	--	--
Molybdenum, dissolved	mg/l	--	--	<0.005	--	--
Nickel, dissolved	mg/l	--	--	<0.005	--	--
Potassium, dissolved	mg/l	--	--	3	--	--
Selenium, dissolved	mg/l	0.05	--	<0.001	--	--
Silver, dissolved	mg/l	--	--	<0.0001	--	--
Sodium	mg/l	--	200 ⁽¹¹⁾	--	157	160
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	229	--	--
Strontium	mg/l	--	--	--	1.05	1.10
Strontium, dissolved	mg/l	--	--	0.952	--	--
Thallium, dissolved	mg/l	--	--	<0.0001	--	--
Titanium, dissolved	mg/l	--	--	<0.01	--	--
Vanadium, dissolved	mg/l	--	--	<0.001	--	--
Zinc	mg/l	--	5	--	<0.01	<0.01
Zinc, dissolved	mg/l	--	5	<0.01	--	--
Petroleum Hydrocarbons						
Benzene	mg/l	0.001	--	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 01	MW 01	MW 01
				27-Aug-2015 ⁽⁷⁾	18-Sep-2019	11-Nov-2019
				S-4	MW 1	MW-1
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0004	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0004	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	<0.05	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	<0.05	<0.05
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	<0.0005	<0.0005
Semi-VOCs						
1-Methylnaphthalene	mg/l	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--
Styrene	mg/l	--	--	--	--	--
VOCs						
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	--
1,1,1-Trichloroethane	mg/l	--	--	--	<0.0004	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	--
1,1-Dichloroethane	mg/l	--	--	--	<0.0004	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--
1,2-Dibromoethane	mg/l	--	--	--	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--
1,2-Dichloropropane	mg/l	--	--	--	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--
Bromodichloromethane	mg/l	--	--	--	--	--
Bromoform	mg/l	--	--	--	--	--
Bromomethane	mg/l	--	--	--	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--
Chloroethane	mg/l	--	--	--	--	--
Chloroform	mg/l	--	--	--	--	--
Chloromethane	mg/l	--	--	--	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	--
Dibromochloromethane	mg/l	--	--	--	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--
Methylene Chloride	mg/l	0.05	--	--	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	--
Trichloroethene	mg/l	0.005	--	--	<0.0003	<0.0003
Trichlorofluoromethane	mg/l	--	--	--	--	--
Vinyl Chloride	mg/l	0.001	--	--	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02
				26-Nov-2010	26-Nov-2010	28-Feb-2011 ⁽¹³⁾	07-Apr-2011 ⁽⁴⁾	11-May-2012	14-Jun-2012 ⁽⁵⁾	17-Sep-2012	18-Dec-2012 ⁽¹⁴⁾	11-Apr-2013
				S-2	S-2	S - 1	S-4	S - 1	S-1	S-3	S-6	S-5
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	--	378	414	402	396	409	431	409	381
Ammonia, unionized	mg/l	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ammonia Nitrogen	mg/l	--	--	--	0.11	0.05	0.02	0.03	0.06	0.04	0.05	0.05
Ammonium	mg/l	--	--	--	--	--	--	0.03	0.06	0.04	0.05	0.05
Bicarbonate	mg/l	--	--	--	378	414	402	396	409	431	409	381
Bromide	mg/l	--	--	--	<0.25	<0.25	<0.25	0.51	0.58	<0.25	<0.25	<0.25
Carbonate (CO3)	mg/l	--	--	--	<2 ⁽⁸⁾	<2 ⁽⁸⁾	<2 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	--	8	<2	4	2	3	<2	5	9
Conductivity	uS/cm	--	--	--	3460	2930	--	2740	2720	5170	4730	3110
Conductivity (Field)	uS/cm	--	--	2819	--	2500	2760	2360	2730	2905	2130	3060
Fluoride	mg/l	1.5	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Hardness, Calcium Carbonate	mg/l	--	--	--	668	530	529	511	398	862	879	606
Nitrate as N	mg/l	10.0	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	-	--	--	--	--	7.64	--	7.78	7.93	7.48	7.71	7.80
pH (Field)	-	--	--	6.79	--	7.36	7.7	7.2	7.7	7.6	7.3	7.2
Phosphorus	mg/l	--	--	--	0.06	0.02	0.03	3.60	0.52	6.13	5.95	5.62
Sulphate	mg/l	--	500 ⁽⁹⁾	--	49	44	40	52	55	92	88	56
Temperature (Field)	deg c	--	15	8.3	--	5.6	5	13	12	13	7	5
Total Organic Carbon	mg/l	--	--	--	5.8	2.9	2.9	2.5	2.6	3.9	2.9	2.6
Total Suspended Solids	mg/l	--	--	--	132000	62500	57900	28000	15400	9030	7740	9370
Turbidity	ntu	--	5 ⁽¹⁰⁾	--	≥100	≥100	--	<0.1	≥100	≥100	≥100	42.6
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	--	--	--	--	208	195	145	220	-- ⁽¹²⁾
Metals												
Aluminum, dissolved	mg/l	--	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001
Barium, dissolved	mg/l	1	--	--	0.28	0.24	0.19	0.12	0.17	0.33	0.28	0.17
Beryllium, dissolved	mg/l	--	--	--	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	--	0.02	<0.01	<0.01	0.01	0.02	0.03	0.01	<0.01
Cadmium, dissolved	mg/l	0.005	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	--	190	153	154	142	115	256	258	175
Chromium, dissolved	mg/l	0.05	--	--	<0.005	<0.005	<0.005	<0.005	0.001	<0.005	<0.005	0.007
Cobalt, dissolved	mg/l	--	--	--	0.0032	0.0021	0.0018	0.0006	0.0011	0.0018	0.0011	0.0004
Copper, dissolved	mg/l	--	1	--	0.001	0.001	0.001	<0.001	0.004	0.001	0.001	0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	--	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	<0.03
Lead, dissolved	mg/l	0.01	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	--	47	36	35	38	27	54	57	41
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	--	0.43	0.33	0.25	0.07	0.12	0.14	0.13	0.03
Molybdenum, dissolved	mg/l	--	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	--	0.008	0.005	0.006	<0.005	<0.005	0.008	0.006	<0.005
Potassium, dissolved	mg/l	--	--	--	3	2	2	2	1	3	3	2
Selenium, dissolved	mg/l	0.05	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver, dissolved	mg/l	--	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	--	446	355	358	351	297	711	608	473
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	--	0.744	0.586	0.513	0.429	0.482	0.994	0.820	0.565
Thallium, dissolved	mg/l	--	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	--	0.004	0.004	0.003	0.004	<0.001	0.004	0.003	0.002
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	--	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02
				26-Nov-2010	26-Nov-2010	28-Feb-2011 ⁽¹³⁾	07-Apr-2011 ⁽⁴⁾	11-May-2012	14-Jun-2012 ⁽⁵⁾	17-Sep-2012	18-Dec-2012 ⁽¹⁴⁾	11-Apr-2013
				S-2	S-2	S-1	S-4	S-1	S-1	S-3	S-6	S-5
m,p-Xylenes	mg/l	--	--	--	<0.0010	<0.0010	<0.0020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	<0.1	--	<0.1	<0.1	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	0.2	<0.2	<0.2	<0.2	--	--	--	<0.2
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	<0.2
Toluene	mg/l	0.06	0.024	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.0015	<0.003	<0.0010	<0.0010	<0.0010	--	<0.0010
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
2-Methylnaphthalene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Acenaphthene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Acenaphthylene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Anthracene	mg/l	--	--	--	0.00032	<0.00002	<0.00001	<0.00001	--	--	--	<0.0001
Benzo[a]anthracene	mg/l	--	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.0001
Benzo[a]pyrene	mg/l	0.00001	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.00001
Benzo[b]fluoranthene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005
Benzo[g,h,i]perylene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Benzo[k]fluoranthene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005
Chrysene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005
Dibenzo[a,h]anthracene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Fluoranthene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Fluorene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Naphthalene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Phenanthrene	mg/l	--	--	--	0.00046	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Pyrene	mg/l	--	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001
Styrene	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
1,1,1-Trichloroethane	mg/l	--	--	--	<0.0004	<0.0008	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
1,1,2-Trichloroethane	mg/l	--	--	--	<0.0004	<0.0008	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
1,1-Dichloroethane	mg/l	--	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
1,2-Dibromoethane	mg/l	--	--	--	<0.0010	<0.0010	<0.0020	<0.0002	<0.0002	<0.0002	--	<0.0002
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
1,2-Dichloroethane	mg/l	0.005	--	--	<0.0005	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	--	<0.0002
1,2-Dichloropropane	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
1,3,5-Trimethylbenzene	mg/l	--	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003
1,3-Dichlorobenzene	mg/l	--	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
Bromodichloromethane	mg/l	--	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003
Bromoform	mg/l	--	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
Bromomethane	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
Carbon Tetrachloride	mg/l	0.002	--	--	<0.0005	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	--	<0.0002
Chlorobenzene	mg/l	0.08	0.03	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002
Chloroethane	mg/l	--	--	--	<0.0010	<0.0020	<0.0020	<0.0002	<0.0002	<0.0002	--	<0.0002
Chloroform	mg/l	--	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
Chloromethane	mg/l	--	--	--	<0.0010	<0.0020	<0.0020	<0.0002	<0.0002	<0.0002	--	<0.0002
cis-1,2-Dichloroethene	mg/l	--	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
cis-1,2-Dichloropropene	mg/l	--	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002
Dibromochloromethane	mg/l	--	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003
Dichlorodifluoromethane	mg/l	--	--	--	--	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005
Methylene Chloride	mg/l	0.05	--	--	<0.0040	<0.0040	<0.0080	<0.0040	<0.0040	<0.0040	--	<0.0040
Tetrachloroethylene	mg/l	0.01	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003
trans-1,2-Dichloroethene	mg/l	--	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004
trans-1,3-Dichloropropene	mg/l	--	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002
Trichloroethene	mg/l	0.005	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003
Trichlorofluoromethane	mg/l	--	--	--	<0.0005	<0.001	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005
Vinyl Chloride	mg/l	0.001	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02
				05-Jul-2013	21-Oct-2013	03-Feb-2014 ⁽⁶⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹⁵⁾	27-Aug-2015 ⁽⁷⁾
				S-4	S-5	S-3	MW-2	MW-2	MW2	S-4	S-5	S-5
General Chemistry												
Alkalinity (Total as CaCO ₃)	mg/l	--	--	383	392	399	392	385	--	405	354	394
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	--	<0.02	<0.05	<0.02
Ammonia Nitrogen	mg/l	--	--	0.04	0.02	0.07	0.05	0.08	--	<0.02	<0.05	<0.025
Ammonium	mg/l	--	--	<0.02	0.02	0.07	0.05	0.08	--	<0.02	<0.05	<0.02
Bicarbonate	mg/l	--	--	383	392	399	392	385	--	405	354	394
Bromide	mg/l	--	--	<0.25	<0.25	<0.50	0.53	<0.25	--	0.95	<0.50	<1.25
Carbonate (CO ₃)	mg/l	--	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	3	2	4	12	2	--	4	2	4
Conductivity	uS/cm	--	--	2990	3790	3640	2860	3970	--	3980	3370	5060
Conductivity (Field)	uS/cm	--	--	3050	2940	3910	3010	--	2895	3150	3410	1985
Fluoride	mg/l	1.5	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
Hardness, Calcium Carbonate	mg/l	--	--	575	652	642	506	720	--	756	476	968
Nitrate as N	mg/l	10.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
pH	-	--	--	7.76	7.76	7.65	7.73	7.89	--	7.63	7.82	7.98
pH (Field)	-	--	--	7.7	7.6	7.6	7.3	--	7.4	7.4	7.7	7.6
Phosphorus	mg/l	--	--	5.54	2.94	1.72	1.56	2.26	--	2.46	14.6	2.42
Sulphate	mg/l	--	500 ⁽⁹⁾	55	68	53	48	83	--	68	60	98
Temperature (Field)	deg c	--	15	12	8	6	8	--	7	6	9	13
Total Organic Carbon	mg/l	--	--	3.1	4.1	2.3	2.4	2.5	--	2.6	1.3	1.5
Total Suspended Solids	mg/l	--	--	6060	6460	1050	2180	713	--	2640	8220	1840
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	>100	--	>100	>100	100
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	--	>100	>100	>100	>100
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.1	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.01	<0.001
Barium, dissolved	mg/l	1	--	0.20	0.24	0.21	0.14	0.28	--	0.27	0.3	0.30
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	<0.01	0.01	<0.01	<0.01	0.02	--	0.01	<0.1	0.01
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	166	187	188	145	219	--	222	138	292
Chromium, dissolved	mg/l	0.05	--	0.005	0.008	0.007	<0.001	<0.001	--	<0.001	<0.01	<0.001
Cobalt, dissolved	mg/l	--	--	0.0023	0.0014	0.0002	0.0005	0.0007	--	0.0005	<0.002	0.0027
Copper, dissolved	mg/l	--	1	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.01	<0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	0.09	<0.03	<0.03	0.09	--	<0.03	<0.3	0.24
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.01	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	39	45	42	35	42	--	49	32	58
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	0.24	0.17	0.02	0.05	0.06	--	0.06	<0.1	0.19
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	--	<0.005	<0.05	<0.005
Nickel, dissolved	mg/l	--	--	<0.005	0.005	<0.005	<0.005	<0.005	--	<0.005	<0.05	<0.005
Potassium, dissolved	mg/l	--	--	2	2	3	<1	3	--	2	2	3
Selenium, dissolved	mg/l	0.05	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.01	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	438	425	462	430	548	--	596	522	697
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	0.525	0.704	0.618	0.454	0.870	--	0.794	1.13	0.961
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.1	<0.01
Vanadium, dissolved	mg/l	--	--	0.001	0.002	0.002	<0.001	<0.001	--	<0.001	<0.01	<0.001
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.1	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02	MW 02
				05-Jul-2013	21-Oct-2013	03-Feb-2014 ⁽⁶⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹⁵⁾	27-Aug-2015 ⁽⁷⁾
				S-4	S - 5	S-3	MW - 2	MW 2	MW2	S-4	S-5	S-5
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	--	<0.1	--	--	--	<0.02	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	--	<0.1	--	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	--	<0.1	--	--	--	<0.02	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	--	<0.2	--	--	--	<0.05	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	--	<0.2	--	--	--	<0.05	--
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	--	<0.0010	--	--	<0.0010	<0.0005	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1-Dichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,2-Dibromoethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--	<0.0004	--	--	--	<0.0004	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--	<0.0002	--	--	--	<0.0002	--
1,2-Dichloropropane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--	<0.0004	--	--	--	<0.0004	--
Bromodichloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Bromoform	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
Bromomethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--	<0.0002	--	--	--	<0.0002	--
Chloroethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Chloroform	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Chloromethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Dibromochloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Methylene Chloride	mg/l	0.05	--	--	--	--	<0.0040	--	--	--	<0.0040	--
Tetrachloroethylene	mg/l	0.01	--	--	--	--	<0.0003	--	--	--	<0.0003	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Trichloroethene	mg/l	0.005	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Trichlorofluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Vinyl Chloride	mg/l	0.001	--	--	--	--	<0.0002	--	--	--	<0.0002	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 02	MW 02
				18-Sep-2019	11-Nov-2019
				MW 2	MW-2
General Chemistry					
Alkalinity (Total as CaCO3)	mg/l	--	--	371	378
Ammonia, unionized	mg/l	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.07	<0.01
Ammonium	mg/l	--	--	--	--
Bicarbonate	mg/l	--	--	--	--
Bromide	mg/l	--	--	--	--
Carbonate (CO3)	mg/l	--	--	--	--
Chloride	mg/l	--	250	1340	1100
Color	color unit	--	5	--	--
Conductivity	uS/cm	--	--	5130	4370
Conductivity (Field)	uS/cm	--	--	5190	5105
Fluoride	mg/l	1.5	--	--	--
Hardness, Calcium Carbonate	mg/l	--	--	991	681
Nitrate as N	mg/l	10.0	--	--	--
Nitrite as N	mg/l	1.0	--	--	--
pH	-	--	--	--	--
pH (Field)	-	--	--	7.3	7.3
Phosphorus	mg/l	--	--	--	--
Sulphate	mg/l	--	500 ⁽⁹⁾	91	70
Temperature (Field)	deg c	--	15	11	7
Total Organic Carbon	mg/l	--	--	--	--
Total Suspended Solids	mg/l	--	--	--	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	69	52
Metals					
Aluminum, dissolved	mg/l	--	--	--	--
Arsenic, dissolved	mg/l	0.01	--	--	--
Barium, dissolved	mg/l	1	--	--	--
Beryllium, dissolved	mg/l	--	--	--	--
Boron	mg/l	5	--	<0.01	0.01
Boron, dissolved	mg/l	5	--	--	--
Cadmium, dissolved	mg/l	0.005	--	--	--
Calcium	mg/l	--	--	303	197
Calcium, dissolved	mg/l	--	--	--	--
Chromium, dissolved	mg/l	0.05	--	--	--
Cobalt, dissolved	mg/l	--	--	--	--
Copper, dissolved	mg/l	--	1	--	--
Iron	mg/l	--	0.3	<0.03	<0.03
Iron, dissolved	mg/l	--	0.3	--	--
Lead, dissolved	mg/l	0.01	--	--	--
Magnesium	mg/l	--	--	57	46
Magnesium, dissolved	mg/l	--	--	--	--
Manganese	mg/l	--	0.05	0.31	0.03
Manganese, dissolved	mg/l	--	0.05	--	--
Molybdenum, dissolved	mg/l	--	--	--	--
Nickel, dissolved	mg/l	--	--	--	--
Potassium, dissolved	mg/l	--	--	--	--
Selenium, dissolved	mg/l	0.05	--	--	--
Silver, dissolved	mg/l	--	--	--	--
Sodium	mg/l	--	200 ⁽¹¹⁾	670	568
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	--	--
Strontium	mg/l	--	--	0.797	0.931
Strontium, dissolved	mg/l	--	--	--	--
Thallium, dissolved	mg/l	--	--	--	--
Titanium, dissolved	mg/l	--	--	--	--
Vanadium, dissolved	mg/l	--	--	--	--
Zinc	mg/l	--	5	<0.01	<0.01
Zinc, dissolved	mg/l	--	5	--	--
Petroleum Hydrocarbons					
Benzene	mg/l	0.001	--	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 02	MW 02
				18-Sep-2019	11-Nov-2019
				MW 2	MW-2
m,p-Xylenes	mg/l	--	--	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.05	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.05	<0.05
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	<0.0005	<0.0005
Semi-VOCs					
1-Methylnaphthalene	mg/l	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--
Acenaphthene	mg/l	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--
Anthracene	mg/l	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--
Chrysene	mg/l	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--
Fluoranthene	mg/l	--	--	--	--
Fluorene	mg/l	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--
Naphthalene	mg/l	--	--	--	--
Phenanthrene	mg/l	--	--	--	--
Pyrene	mg/l	--	--	--	--
Styrene	mg/l	--	--	--	--
VOCs					
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	--
1,2-Dibromoethane	mg/l	--	--	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--
1,2-Dichloropropane	mg/l	--	--	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--
Bromodichloromethane	mg/l	--	--	--	--
Bromoform	mg/l	--	--	--	--
Bromomethane	mg/l	--	--	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--
Chloroethane	mg/l	--	--	--	--
Chloroform	mg/l	--	--	--	--
Chloromethane	mg/l	--	--	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--
Dibromochloromethane	mg/l	--	--	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--
Methylene Chloride	mg/l	0.05	--	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003
Trichlorofluoromethane	mg/l	--	--	--	--
Vinyl Chloride	mg/l	0.001	--	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03
				29-Nov-2010 ⁽¹⁶⁾	28-Feb-2011 ⁽¹⁷⁾	07-Apr-2011 ⁽¹⁸⁾	11-May-2012 ⁽¹⁹⁾	14-Jun-2012 ⁽²⁰⁾	17-Sep-2012 ⁽²¹⁾	18-Dec-2012 ⁽²²⁾	11-Apr-2013 ⁽²²⁾	05-Jul-2013 ⁽²²⁾
				S-1	S-4	S-5	S-5	S-4	S-1	S-1	S-3	S-2
General Chemistry												
Alkalinity (Total as CaCO ₃)	mg/l	--	--	416	380	404	404	421	371	408	397	397
Ammonia, unionized	mg/l	--	--	0.05	0.03	0.05	0.03	0.04	0.04	<0.02	<0.02	<0.02
Ammonia, unionized (Field)	mg/l	--	--	<0.02	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	4.32	2.36	4.46	2.42	3.28	2.97	0.48	0.82	0.68
Ammonium	mg/l	--	--	--	--	--	2.39	3.24	2.93	0.48	0.82	0.68
Bicarbonate	mg/l	--	--	416	380	404	404	421	371	408	397	397
Bromide	mg/l	--	--	<0.25	1.01	1.00	1.35	1.77	0.86	1.41	3.98	1.99
Carbonate (CO ₃)	mg/l	--	--	<2 ⁽⁸⁾	<2 ⁽⁸⁾	<2 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	10	11	23	12	10	6	3	3	3
Conductivity	uS/cm	--	--	2280	2330	--	2650	2610	2640	2760	2850	3080
Conductivity (Field)	uS/cm	--	--	1960	2500	2740	2814	2590	2605	2650	2860	3100
Fluoride	mg/l	1.5	--	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	<0.10
Hardness, Calcium Carbonate	mg/l	--	--	646	587	868	764	689	752	803	948	975
Nitrate as N	mg/l	10.0	--	<0.10	<0.10	<0.10	0.52	0.54	0.15	0.12	0.72	0.40
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	-	--	--	7.49	7.35	--	7.40	7.56	7.43	7.34	7.39	7.35
pH (Field)	-	--	--	6.98	7.1	7.35	6.92	7.8	7.7	7.4	6.9	7.4
Phosphorus	mg/l	--	--	12.1	3.27	2.86	2.55	1.74	19.4	1.25	2.73	2.34
Sulphate	mg/l	--	500 ⁽⁹⁾	9	21	21	98	104	98	146	151	166
Temperature (Field)	deg c	--	15	8.2	6.7	6.6	8.8	12	14	7	6	11
Total Organic Carbon	mg/l	--	--	24.5	10.0	10.0	8.5	7.3	15.3	7.6	6.6	8.6
Total Suspended Solids	mg/l	--	--	8720	4380	7930	4920	3240	8660	1120	3330	1630
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	--	<0.1	>100	>100	<100	47.5	>100
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	--	--	--	250	145	--	213	410	>100
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium, dissolved	mg/l	1	--	0.32	0.30	0.35	0.28	0.34	0.34	0.30	0.28	0.32
Beryllium, dissolved	mg/l	--	--	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.03	0.02	0.02	0.02	0.02	0.16	0.06	0.02	0.03
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	183	174	270	222	200	194	236	279	280
Chromium, dissolved	mg/l	0.05	--	0.007	0.009	<0.005	<0.005	0.005	0.009	0.008	0.009	0.009
Cobalt, dissolved	mg/l	--	--	0.0033	0.0043	0.0039	0.0068	0.0079	0.0043	0.0059	0.0073	0.0075
Copper, dissolved	mg/l	--	1	<0.001	0.001	0.001	<0.001	0.001	0.001	0.002	0.002	0.002
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	21.5	9.66	13.9	16.0	16.2	19.9	0.55	1.43	6.74
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	46	37	47	51	46	65	52	61	67
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	2.42	2.66	3.03	6.80	7.94	2.60	5.27	9.39	7.90
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	<0.005	0.006	0.008	0.010	0.012	0.006	0.008	0.015	0.010
Potassium, dissolved	mg/l	--	--	5	2	3	2	2	9	3	3	5
Selenium, dissolved	mg/l	0.05	--	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	173	196	239	238	215	239	214	301	294
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	0.739	0.671	0.799	0.794	0.908	0.863	0.878	0.995	0.938
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	0.006	0.005	0.004	0.006	0.002	0.006	0.006	0.005	0.004
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03
				29-Nov-2010 ⁽¹⁶⁾	28-Feb-2011 ⁽¹⁷⁾	07-Apr-2011 ⁽¹⁸⁾	11-May-2012 ⁽¹⁹⁾	14-Jun-2012 ⁽²⁰⁾	17-Sep-2012 ⁽²¹⁾	18-Dec-2012 ⁽²²⁾	11-Apr-2013 ⁽²²⁾	05-Jul-2013 ⁽²²⁾
				S-1	S-4	S-5	S-5	S-4	S-1	S-1	S-3	S-2
Ethylbenzene	mg/l	0.14	0.0016	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0020	<0.0010	<0.0020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	<0.1	--	<0.1	<0.1	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	<0.2	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	<0.2	--
Toluene	mg/l	0.06	0.024	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	<0.0015	<0.003	<0.0010	<0.0010	<0.0010	--	<0.0010	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
2-Methylnaphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Acenaphthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Acenaphthylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.0001	--
Benzo[a]anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.0001	--
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.00001	--
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005	--
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005	--
Chrysene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005	--
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Fluorene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Naphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Phenanthrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Pyrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Styrene	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
1,1,1-Trichloroethane	mg/l	--	--	<0.0008	<0.0008	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
1,1,2-Trichloroethane	mg/l	--	--	<0.0008	<0.0008	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
1,1-Dichloroethane	mg/l	--	--	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
1,1-Dichloroethylene	mg/l	0.014	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
1,2-Dibromoethane	mg/l	--	--	<0.0020	<0.0010	<0.0020	<0.0002	<0.0002	<0.0002	--	<0.0002	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
1,2-Dichloroethane	mg/l	0.005	--	<0.001	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	--	<0.0002	--
1,2-Dichloropropane	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0006	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003	--
1,3-Dichlorobenzene	mg/l	--	--	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
Bromodichloromethane	mg/l	--	--	<0.0006	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003	--
Bromoform	mg/l	--	--	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
Bromomethane	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
Carbon Tetrachloride	mg/l	0.002	--	<0.001	<0.0005	<0.001	<0.0002	<0.0002	<0.0002	--	<0.0002	--
Chlorobenzene	mg/l	0.08	0.03	<0.0004	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002	--
Chloroethane	mg/l	--	--	<0.0020	<0.0020	<0.0020	<0.0002	<0.0002	<0.0002	--	<0.0002	--
Chloroform	mg/l	--	--	<0.001	<0.0005	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
Chloromethane	mg/l	--	--	<0.0020	<0.0020	<0.0020	<0.0002	<0.0002	<0.0002	--	<0.0002	--
cis-1,2-Dichloroethene	mg/l	--	--	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
cis-1,2-Dichloropropene	mg/l	--	--	<0.0004	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002	--
Dibromochloromethane	mg/l	--	--	<0.0006	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	--
Methylene Chloride	mg/l	0.05	--	<0.0080	<0.0040	<0.0080	<0.0040	<0.0040	<0.0040	--	<0.0040	--
Tetrachloroethylene	mg/l	0.01	--	<0.0006	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003	--
trans-1,2-Dichloroethene	mg/l	--	--	<0.0008	<0.0004	<0.0008	<0.0004	<0.0004	<0.0004	--	<0.0004	--
trans-1,3-Dichloropropene	mg/l	--	--	<0.0004	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002	--
Trichloroethene	mg/l	0.005	--	<0.0006	<0.0003	<0.0006	<0.0003	<0.0003	<0.0003	--	<0.0003	--
Trichlorofluoromethane	mg/l	--	--	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	--
Vinyl Chloride	mg/l	0.001	--	<0.0004	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	--	<0.0002	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03
				21-Oct-2013 ⁽²²⁾	03-Feb-2014 ⁽¹⁴⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹⁵⁾	27-Aug-2015 ⁽¹⁵⁾	18-Sep-2019
				S - 3	S-4	MW - 3	MW 3	MW3	S-1	S-2	S-1	MW 3
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	386	401	416	357	--	381	424	391	563
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	--	<0.02	<0.05	0.06	--
Ammonia, unionized (Field)	mg/l	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.81	1.02	1.48	1.39	--	0.88	1.05	1.48	0.50
Ammonium	mg/l	--	--	0.81	1.02	1.48	1.39	--	0.88	1.04	1.42	--
Bicarbonate	mg/l	--	--	386	401	416	357	--	381	424	391	--
Bromide	mg/l	--	--	0.80	0.84	1.44	<0.25	--	1.33	<0.50	<1.25	--
Carbonate (CO3)	mg/l	--	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	765
Color	color unit	--	5	5	4	16	17	--	6	4	2	--
Conductivity	uS/cm	--	--	3520	3810	4150	4690	--	4560	4700	4940	3570
Conductivity (Field)	uS/cm	--	--	3210	3180	3100	--	3210	3205	4250	--	3480
Fluoride	mg/l	1.5	--	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	--
Hardness, Calcium Carbonate	mg/l	--	--	877	1140	1190	1150	--	1240	1220	1140	903
Nitrate as N	mg/l	10.0	--	<0.10	0.75	0.48	<0.10	--	<0.10	0.51	<0.10	--
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	--
pH	-	--	--	7.32	7.26	7.52	7.59	--	7.17	7.32	7.89	--
pH (Field)	-	--	--	7.5	7.4	7.3	--	7.4	7.3	7.3	--	7.3
Phosphorus	mg/l	--	--	3.18	6.89	2.01	3.91	--	1.26	1.85	0.97	--
Sulphate	mg/l	--	500 ⁽⁹⁾	228	235	274	335	--	318	299	337	314
Temperature (Field)	deg c	--	15	8	6	7	--	7	4	10	--	10
Total Organic Carbon	mg/l	--	--	9.1	16.0	7.5	9.8	--	6.4	4.5	7.2	--
Total Suspended Solids	mg/l	--	--	3460	4000	1330	7050	--	1240	694	6770	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	--	>100	>100	100	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	--	>100	>100	>100	--	>1000
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	0.02	--	<0.01	<0.1	<0.1	--
Arsenic, dissolved	mg/l	0.01	--	<0.01	<0.01	<0.001	0.002	--	<0.001	<0.01	<0.01	--
Barium, dissolved	mg/l	1	--	0.32	0.40	0.41	0.37	--	0.36	0.3	0.3	--
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.005	<0.005	--
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	0.07
Boron, dissolved	mg/l	5	--	0.03	0.02	0.02	0.05	--	0.02	<0.1	<0.1	--
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.001	<0.001	--
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	279
Calcium, dissolved	mg/l	--	--	249	333	339	347	--	361	364	336	--
Chromium, dissolved	mg/l	0.05	--	<0.005	0.008	<0.001	<0.001	--	<0.001	<0.01	<0.01	--
Cobalt, dissolved	mg/l	--	--	0.0130	0.0106	0.0085	0.0068	--	0.0042	0.004	0.003	--
Copper, dissolved	mg/l	--	1	0.001	0.001	<0.001	<0.001	--	<0.001	<0.01	<0.01	--
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	0.99
Iron, dissolved	mg/l	--	0.3	5.32	10.1	11.6	19.6	--	6.13	8.9	10.9	--
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.01	<0.01	--
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	50
Magnesium, dissolved	mg/l	--	--	62	74	83	69	--	83	76	72	--
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	1.71
Manganese, dissolved	mg/l	--	0.05	13.6	10.8	11.7	9.04	--	5.62	5.2	3.2	--
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	<0.05	<0.05	--
Nickel, dissolved	mg/l	--	--	0.015	0.016	0.011	<0.005	--	0.008	<0.05	<0.05	--
Potassium, dissolved	mg/l	--	--	3	6	2	6	--	3	4	7	--
Selenium, dissolved	mg/l	0.05	--	<0.01	<0.001	<0.001	<0.001	--	<0.001	<0.01	<0.01	--
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.001	<0.001	--
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	434
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	249	346	428	529	--	555	600	693	--
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	0.983
Strontium, dissolved	mg/l	--	--	1.00	1.11	1.25	1.34	--	1.32	1.25	1.00	--
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.001	<0.001	--
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.1	<0.1	--
Vanadium, dissolved	mg/l	--	--	0.005	0.004	<0.001	<0.001	--	<0.001	<0.01	<0.01	--
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	<0.01
Zinc, dissolved	mg/l	--	5	0.01	<0.01	<0.01	<0.01	--	<0.01	<0.1	<0.1	--
Petroleum Hydrocarbons												
Benzene	ma/l	0.001	--	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03	MW 03
				21-Oct-2013 ⁽²²⁾	03-Feb-2014 ⁽¹⁴⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015 ⁽¹⁵⁾	27-Aug-2015 ⁽¹⁵⁾	18-Sep-2019
				S-3	S-4	MW-3	MW3	MW3	S-1	S-2	S-1	MW3
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	<0.1	--	--	--	<0.02	--	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	<0.1	--	--	--	--	--	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	<0.1	--	--	--	<0.02	--	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	<0.2	--	--	--	<0.05	--	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	<0.2	--	--	--	<0.05	--	<0.05
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.0010	--	--	<0.0010	<0.0005	--	<0.0005
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
1,1-Dichloroethane	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,2-Dibromoethane	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	<0.0004	--	--	--	<0.0004	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	<0.0002	--	--	--	<0.0002	--	--
1,2-Dichloropropane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	<0.0003	--	--	--	<0.0003	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	<0.0004	--	--	--	<0.0004	--	--
Bromodichloromethane	mg/l	--	--	--	--	<0.0003	--	--	--	<0.0003	--	--
Bromoform	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
Bromomethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	<0.0002	--	--	--	<0.0002	--	--
Chloroethane	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Chloroform	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Chloromethane	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Dibromochloromethane	mg/l	--	--	--	--	<0.0003	--	--	--	<0.0003	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Methylene Chloride	mg/l	0.05	--	--	--	<0.0040	--	--	--	<0.0040	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--	<0.0003	--	--	--	<0.0003	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Trichloroethene	mg/l	0.005	--	--	--	<0.0003	--	--	--	<0.0003	--	<0.0003
Trichlorofluoromethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Vinyl Chloride	mg/l	0.001	--	--	--	<0.0002	--	--	--	<0.0002	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 03
				11-Nov-2019
				MW-3
General Chemistry				
Alkalinity (Total as CaCO3)	mg/l	--	--	517
Ammonia, unionized	mg/l	--	--	--
Ammonia, unionized (Field)	mg/l	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.22
Ammonium	mg/l	--	--	--
Bicarbonate	mg/l	--	--	--
Bromide	mg/l	--	--	--
Carbonate (CO3)	mg/l	--	--	--
Chloride	mg/l	--	250	354
Color	color unit	--	5	--
Conductivity	uS/cm	--	--	2480
Conductivity (Field)	uS/cm	--	--	3375
Fluoride	mg/l	1.5	--	--
Hardness, Calcium Carbonate	mg/l	--	--	595
Nitrate as N	mg/l	10.0	--	--
Nitrite as N	mg/l	1.0	--	--
pH	-	--	--	--
pH (Field)	-	--	--	7.4
Phosphorus	mg/l	--	--	--
Sulphate	mg/l	--	500 ⁽⁹⁾	265
Temperature (Field)	deg c	--	15	6
Total Organic Carbon	mg/l	--	--	--
Total Suspended Solids	mg/l	--	--	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	>1000
Metals				
Aluminum, dissolved	mg/l	--	--	--
Arsenic, dissolved	mg/l	0.01	--	--
Barium, dissolved	mg/l	1	--	--
Beryllium, dissolved	mg/l	--	--	--
Boron	mg/l	5	--	0.09
Boron, dissolved	mg/l	5	--	--
Cadmium, dissolved	mg/l	0.005	--	--
Calcium	mg/l	--	--	184
Calcium, dissolved	mg/l	--	--	--
Chromium, dissolved	mg/l	0.05	--	--
Cobalt, dissolved	mg/l	--	--	--
Copper, dissolved	mg/l	--	1	--
Iron	mg/l	--	0.3	<0.03
Iron, dissolved	mg/l	--	0.3	--
Lead, dissolved	mg/l	0.01	--	--
Magnesium	mg/l	--	--	33
Magnesium, dissolved	mg/l	--	--	--
Manganese	mg/l	--	0.05	0.58
Manganese, dissolved	mg/l	--	0.05	--
Molybdenum, dissolved	mg/l	--	--	--
Nickel, dissolved	mg/l	--	--	--
Potassium, dissolved	mg/l	--	--	--
Selenium, dissolved	mg/l	0.05	--	--
Silver, dissolved	mg/l	--	--	--
Sodium	mg/l	--	200 ⁽¹¹⁾	250
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	--
Strontium	mg/l	--	--	1.21
Strontium, dissolved	mg/l	--	--	--
Thallium, dissolved	mg/l	--	--	--
Titanium, dissolved	mg/l	--	--	--
Vanadium, dissolved	mg/l	--	--	--
Zinc	mg/l	--	5	<0.01
Zinc, dissolved	mg/l	--	5	--
Petroleum Hydrocarbons				
Benzene	mg/l	0.001	--	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 03
				11-Nov-2019
				MW-3
Ethylbenzene	mg/l	0.14	0.0016	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0004
o-Xylene	mg/l	--	--	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.05
Toluene	mg/l	0.06	0.024	<0.0005
Xylenes, Total	mg/l	0.09	0.02	<0.0005
Semi-VOCs				
1-Methylnaphthalene	mg/l	--	--	--
2-Methylnaphthalene	mg/l	--	--	--
Acenaphthene	mg/l	--	--	--
Acenaphthylene	mg/l	--	--	--
Anthracene	mg/l	--	--	--
Benzo[a]anthracene	mg/l	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--
Benzo[b]fluoranthene	mg/l	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--
Chrysene	mg/l	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--
Fluoranthene	mg/l	--	--	--
Fluorene	mg/l	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--
Naphthalene	mg/l	--	--	--
Phenanthrene	mg/l	--	--	--
Pyrene	mg/l	--	--	--
Styrene	mg/l	--	--	--
VOCs				
1,1,1,2-Tetrachloroethane	mg/l	--	--	--
1,1,1-Trichloroethane	mg/l	--	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--
1,1,2-Trichloroethane	mg/l	--	--	--
1,1-Dichloroethane	mg/l	--	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--
1,2-Dibromoethane	mg/l	--	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--
1,2-Dichloroethane	mg/l	0.005	--	--
1,2-Dichloropropane	mg/l	--	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--
1,3-Dichlorobenzene	mg/l	--	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--
Bromodichloromethane	mg/l	--	--	--
Bromoform	mg/l	--	--	--
Bromomethane	mg/l	--	--	--
Carbon Tetrachloride	mg/l	0.002	--	--
Chlorobenzene	mg/l	0.08	0.03	--
Chloroethane	mg/l	--	--	--
Chloroform	mg/l	--	--	--
Chloromethane	mg/l	--	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--
Dibromochloromethane	mg/l	--	--	--
Dichlorodifluoromethane	mg/l	--	--	--
Methylene Chloride	mg/l	0.05	--	--
Tetrachloroethylene	mg/l	0.01	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--
Trichloroethene	mg/l	0.005	--	<0.0003
Trichlorofluoromethane	mg/l	--	--	--
Vinyl Chloride	mg/l	0.001	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04
				26-Nov-2010	28-Feb-2011 ⁽³⁾	07-Apr-2011 ⁽²³⁾	11-May-2012	14-Jun-2012 ⁽²⁴⁾	28-Jun-2012 ⁽²⁵⁾	17-Sep-2012 ⁽²⁶⁾	18-Dec-2012 ⁽²⁶⁾	11-Apr-2013 ⁽²⁶⁾
				S-4	S - 5	S-6	S - 4	s4	S-1	S-2	S-2	S-4
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	279	289	271	302	--	296	351	257	338
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	--	<0.02	<0.02	<0.02	<0.02
Ammonia, unionized (Field)	mg/l	--	--	<0.02	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.07	0.04	0.03	0.03	--	0.11	0.03	0.03	0.03
Ammonium	mg/l	--	--	--	--	--	0.03	--	0.11	0.03	0.03	0.03
Bicarbonate	mg/l	--	--	279	289	271	302	--	296	351	257	338
Bromide	mg/l	--	--	<0.25	<0.25	0.75	0.31	--	0.40	1.42	0.61	0.82
Carbonate (CO3)	mg/l	--	--	<2 ⁽⁶⁾	<2 ⁽⁶⁾	<2 ⁽⁶⁾	<1 ⁽⁶⁾	--	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	12	<2	3	<2	--	3	2	7	10
Conductivity	uS/cm	--	--	610	601	--	735	--	719	807	1120	908
Conductivity (Field)	uS/cm	--	--	532	1050	1390	764	--	740	1420	1080	1090
Fluoride	mg/l	1.5	--	0.13	0.12	<0.10	0.10	--	0.11	0.10	0.15	0.10
Hardness, Calcium Carbonate	mg/l	--	--	304	240	342	305	--	353	422	403	500
Nitrate as N	mg/l	10.0	--	0.14	0.13	0.50	0.34	--	0.22	0.15	2.45	0.37
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10	<0.10
pH	-	--	--	--	7.96	--	7.96	--	7.81	7.71	7.83	7.81
pH (Field)	-	--	--	7.29	7.9	7.8	7.6	--	7.9	7.36	7.7	7.0
Phosphorus	mg/l	--	--	4.96	6.50	2.69	3.81	--	3.03	3.57	2.65	2.31
Sulphate	mg/l	--	500 ⁽⁹⁾	18	21	51	49	--	26	25	122	57
Temperature (Field)	deg c	--	15	7.6	6.8	5.8	9	--	13.9	14	6	3
Total Organic Carbon	mg/l	--	--	5.4	2.6	2.7	2.5	--	2.0	2.5	3.1	3.3
Total Suspended Solids	mg/l	--	--	15300	29800	14700	12100	--	4700	6080	4010	11400
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	--	<0.1	--	>100	>100	>100	77.9
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	--	--	--	180	--	142	98	145	-- ⁽¹²⁾
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001	<0.001
Barium, dissolved	mg/l	1	--	0.05	0.04	0.06	0.05	--	0.05	0.06	0.06	0.05
Beryllium, dissolved	mg/l	--	--	<0.001	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.02	<0.01	0.04	0.03	--	<0.01	0.02	0.01	<0.01
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	87	63	99	89	--	105	126	122	149
Chromium, dissolved	mg/l	0.05	--	0.003	0.004	0.005	0.004	--	0.002	0.003	0.003	0.006
Cobalt, dissolved	mg/l	--	--	0.0005	0.0003	0.0006	0.0005	--	0.0002	0.0002	<0.0002	<0.0002
Copper, dissolved	mg/l	--	1	<0.001	<0.001	<0.001	<0.001	--	<0.001	0.009	<0.001	<0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	<0.03	<0.03	<0.03	--	<0.03	<0.03	<0.03	<0.03
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	21	20	23	20	--	22	26	24	31
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	0.11	0.05	0.09	0.09	--	0.03	0.02	<0.01	<0.01
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	--	<0.005	<0.005	<0.005	<0.005
Potassium, dissolved	mg/l	--	--	2	2	2	<1	--	1	1	2	1
Selenium, dissolved	mg/l	0.05	--	<0.001	<0.001	<0.01	<0.001	--	<0.01	<0.01	<0.01	<0.01
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	15	11	31	16	--	22	17	82	27
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	0.279	0.207	0.452	0.708	--	0.611	0.506	0.655	0.631
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	0.002	0.002	0.002	0.003	--	0.001	0.003	0.003	0.002
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	<0.01	<0.01	<0.01	--	<0.01	0.03	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	<0.0005	<0.001	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04
				26-Nov-2010	28-Feb-2011 ⁽³⁾	07-Apr-2011 ⁽²³⁾	11-May-2012	14-Jun-2012 ⁽²⁴⁾	28-Jun-2012 ⁽²⁵⁾	17-Sep-2012 ⁽²⁶⁾	18-Dec-2012 ⁽²⁶⁾	11-Apr-2013 ⁽²⁶⁾
				S-4	S-5	S-6	S-4	S-4	S-1	S-2	S-2	S-4
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.001	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0010	<0.0010	<0.0020	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	--	--	--	--	<0.1
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	<0.1	<0.1	--	<0.1	--	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	--	--	--	--	<0.1
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	--	<0.2
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	--	<0.2
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.001	<0.0005	--	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	<0.0015	<0.003	<0.0010	--	--	<0.0010	--	<0.0010
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	0.00004	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
2-Methylnaphthalene	mg/l	--	--	0.00004	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Acenaphthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Acenaphthylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Anthracene	mg/l	--	--	0.00044	<0.00002	<0.00001	<0.00001	--	--	--	--	<0.0001
Benzo[a]anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	--	<0.0001
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	--	<0.00001
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.00005
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.00005
Chrysene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.00005
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Fluorene	mg/l	--	--	0.00023	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Naphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Phenanthrene	mg/l	--	--	0.00032	<0.00004	<0.00002	<0.00002	--	--	--	--	<0.0001
Pyrene	mg/l	--	--	0.00004	<0.00004	0.00009	<0.00002	--	--	--	--	<0.0001
Styrene	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0008	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
1,1,2-Trichloroethane	mg/l	--	--	<0.0004	<0.0008	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
1,2-Dibromoethane	mg/l	--	--	<0.0010	<0.0010	<0.0020	<0.0002	--	--	<0.0002	--	<0.0002
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
1,2-Dichloroethane	mg/l	0.005	--	<0.0005	<0.0005	<0.001	<0.0002	--	--	<0.0002	--	<0.0002
1,2-Dichloropropane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	--	--	<0.0003	--	<0.0003
1,3-Dichlorobenzene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
Bromodichloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	--	--	<0.0003	--	<0.0003
Bromoform	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
Bromomethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
Carbon Tetrachloride	mg/l	0.002	--	<0.0005	<0.0005	<0.001	<0.0002	--	--	<0.0002	--	<0.0002
Chlorobenzene	mg/l	0.08	0.03	<0.0002	<0.0002	<0.0004	<0.0002	--	--	<0.0002	--	<0.0002
Chloroethane	mg/l	--	--	<0.0010	<0.0020	<0.0020	<0.0002	--	--	<0.0002	--	<0.0002
Chloroform	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
Chloromethane	mg/l	--	--	<0.0010	<0.0020	<0.0020	<0.0002	--	--	<0.0002	--	<0.0002
cis-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
cis-1,2-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0004	<0.0002	--	--	<0.0002	--	<0.0002
Dibromochloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	--	--	<0.0003	--	<0.0003
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	<0.0005	--	<0.0005
Methylene Chloride	mg/l	0.05	--	<0.0040	<0.0040	<0.0080	<0.0040	--	--	<0.0040	--	<0.0040
Tetrachloroethylene	mg/l	0.01	--	<0.0003	<0.0003	<0.0006	<0.0003	--	--	<0.0003	--	<0.0003
trans-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	--	--	<0.0004	--	<0.0004
trans-1,3-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0004	<0.0002	--	--	<0.0002	--	<0.0002
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003	<0.0006	<0.0003	--	--	<0.0003	--	<0.0003
Trichlorofluoromethane	mg/l	--	--	<0.0005	<0.001	<0.001	<0.0005	--	--	<0.0005	--	<0.0005
Vinyl Chloride	mg/l	0.001	--	<0.0002	<0.0002	<0.0004	<0.0002	--	--	<0.0002	--	<0.0002

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04
				05-Jul-2013 ⁽²⁶⁾	21-Oct-2013 ⁽²⁷⁾	03-Feb-2014 ⁽²⁶⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015	27-Aug-2015
				S-1	S - 1	S-5	MW - 4	MW 4	MW4	S-2	S-1	S-2
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	354	394	370	237	379	--	427	640	443
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	--	<0.02	<0.05	<0.02
Ammonia, unionized (Field)	mg/l	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.04	0.03	<0.02	0.09	0.10	--	0.11	0.10	0.045
Ammonium	mg/l	--	--	0.04	0.03	<0.02	0.09	0.10	--	0.11	0.10	0.04
Bicarbonate	mg/l	--	--	354	394	370	237	379	--	427	640	443
Bromide	mg/l	--	--	0.69	0.99	1.18	<0.25	0.36	--	0.56	<0.25	0.53
Carbonate (CO3)	mg/l	--	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾
Chloride	mg/l	--	250	--	--	--	--	--	--	--	--	--
Color	color unit	--	5	3	2	15	12	2	--	4	10	23
Conductivity	uS/cm	--	--	1100	1270	1190	804	1100	--	1400	1860	1360
Conductivity (Field)	uS/cm	--	--	1114	1070	1290	1085	--	1105	1140	1280	1320
Fluoride	mg/l	1.5	--	0.11	<0.10	<0.10	0.20	0.10	--	<0.10	<0.10	<0.10
Hardness, Calcium Carbonate	mg/l	--	--	568	569	590	319	577	--	648	751	683
Nitrate as N	mg/l	10.0	--	0.35	0.11	0.22	1.00	<0.10	--	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
pH	-	--	--	7.59	7.77	7.73	7.89	7.88	--	7.54	7.40	7.95
pH (Field)	-	--	--	7.5	7.4	7.7	7.5	--	7.6	7.4	7.8	7.6
Phosphorus	mg/l	--	--	4.30	4.48	0.01	4.05	2.20	--	0.44	0.81	2.42
Sulphate	mg/l	--	500 ⁽⁹⁾	103	113	114	124	120	--	154	217	171
Temperature (Field)	deg c	--	15	12	8	5	7	--	6	5	9	13
Total Organic Carbon	mg/l	--	--	4.2	5.4	4.7	3.9	3.8	--	5.3	6.8	2.9
Total Suspended Solids	mg/l	--	--	6660	6790	9200	3420	5040	--	1010	324	5560
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	>100	--	>100	>100	100
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	>100	--	>100	>100	>100	>100
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	0.02	--	<0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001
Barium, dissolved	mg/l	1	--	0.08	0.08	0.07	0.06	0.09	--	0.08	0.16	0.09
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Boron	mg/l	5	--	--	--	--	--	--	--	--	--	--
Boron, dissolved	mg/l	5	--	0.02	0.01	<0.01	0.10	0.02	--	0.03	0.16	0.01
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Calcium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Calcium, dissolved	mg/l	--	--	173	170	177	98	175	--	195	228	206
Chromium, dissolved	mg/l	0.05	--	0.002	0.002	0.007	<0.001	<0.001	--	<0.001	<0.001	<0.001
Cobalt, dissolved	mg/l	--	--	0.0002	0.0002	<0.0002	<0.0002	0.0002	--	0.0018	0.0027	0.0026
Copper, dissolved	mg/l	--	1	<0.001	0.001	0.002	0.001	0.001	--	0.002	<0.001	<0.001
Iron	mg/l	--	0.3	--	--	--	--	--	--	--	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	<0.03	<0.03	<0.03	<0.03	--	0.13	0.34	0.10
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.001	<0.001	<0.001
Magnesium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Magnesium, dissolved	mg/l	--	--	33	35	36	18	34	--	39	44	41
Manganese	mg/l	--	0.05	--	--	--	--	--	--	--	--	--
Manganese, dissolved	mg/l	--	0.05	0.01	<0.01	<0.01	0.01	0.03	--	0.17	0.78	0.27
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	--	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	--	<0.005	0.007	<0.005
Potassium, dissolved	mg/l	--	--	2	1	2	2	2	--	2	3	2
Selenium, dissolved	mg/l	0.05	--	<0.01	<0.01	<0.01	<0.001	<0.001	--	<0.001	<0.001	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Sodium	mg/l	--	200 ⁽¹¹⁾	--	--	--	--	--	--	--	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	41	26	26	56	32	--	80	138	50
Strontium	mg/l	--	--	--	--	--	--	--	--	--	--	--
Strontium, dissolved	mg/l	--	--	0.607	0.556	0.421	1.33	0.542	--	1.30	5.61	0.676
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	<0.001	0.003	0.002	<0.001	<0.001	--	<0.001	<0.001	<0.001
Zinc	mg/l	--	5	--	--	--	--	--	--	--	--	--
Zinc, dissolved	mg/l	--	5	<0.01	0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	ma/l	0.001	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04	MW 04
				05-Jul-2013 ⁽²⁶⁾	21-Oct-2013 ⁽²⁷⁾	03-Feb-2014 ⁽²⁸⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015	17-Jun-2015	27-Aug-2015
				S-1	S - 1	S-5	MW - 4	MW 4	MW4	S-2	S-1	S-2
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	--	<0.1	--	--	--	<0.02	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	--	<0.1	--	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	--	<0.1	--	--	--	<0.02	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	--	<0.2	--	--	--	<0.05	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	--	<0.2	--	--	--	<0.05	--
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	--	--	--	<0.0010	--	--	<0.0010	<0.0005	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1-Dichloroethane	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,2-Dibromoethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--	<0.0004	--	--	--	<0.0004	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--	<0.0002	--	--	--	<0.0002	--
1,2-Dichloropropane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--	<0.0004	--	--	--	<0.0004	--
Bromodichloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Bromoform	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
Bromomethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--	<0.0002	--	--	--	<0.0002	--
Chloroethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Chloroform	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Chloromethane	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Dibromochloromethane	mg/l	--	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Methylene Chloride	mg/l	0.05	--	--	--	--	<0.0040	--	--	--	<0.0040	--
Tetrachloroethylene	mg/l	0.01	--	--	--	--	<0.0003	--	--	--	<0.0003	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	--	<0.0004	--	--	--	<0.0004	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	--	<0.0002	--	--	--	<0.0002	--
Trichloroethene	mg/l	0.005	--	--	--	--	<0.0003	--	--	--	<0.0003	--
Trichlorofluoromethane	mg/l	--	--	--	--	--	<0.0005	--	--	--	<0.0005	--
Vinyl Chloride	mg/l	0.001	--	--	--	--	<0.0002	--	--	--	<0.0002	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 04	MW 04
				18-Sep-2019	11-Nov-2019
				MW 4	MW-4
General Chemistry					
Alkalinity (Total as CaCO3)	mg/l	--	--	608	680
Ammonia, unionized	mg/l	--	--	--	--
Ammonia, unionized (Field)	mg/l	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.06	<0.01
Ammonium	mg/l	--	--	--	--
Bicarbonate	mg/l	--	--	--	--
Bromide	mg/l	--	--	--	--
Carbonate (CO3)	mg/l	--	--	--	--
Chloride	mg/l	--	250	164	16
Color	color unit	--	5	--	--
Conductivity	uS/cm	--	--	2010	1650
Conductivity (Field)	uS/cm	--	--	2015	1985
Fluoride	mg/l	1.5	--	--	--
Hardness, Calcium Carbonate	mg/l	--	--	860	649
Nitrate as N	mg/l	10.0	--	--	--
Nitrite as N	mg/l	1.0	--	--	--
pH	-	--	--	--	--
pH (Field)	-	--	--	7.3	7.3
Phosphorus	mg/l	--	--	--	--
Sulphate	mg/l	--	500 ⁽⁹⁾	286	231
Temperature (Field)	deg c	--	15	12	8
Total Organic Carbon	mg/l	--	--	--	--
Total Suspended Solids	mg/l	--	--	--	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	120	109
Metals					
Aluminum, dissolved	mg/l	--	--	--	--
Arsenic, dissolved	mg/l	0.01	--	--	--
Barium, dissolved	mg/l	1	--	--	--
Beryllium, dissolved	mg/l	--	--	--	--
Boron	mg/l	5	--	0.11	0.19
Boron, dissolved	mg/l	5	--	--	--
Cadmium, dissolved	mg/l	0.005	--	--	--
Calcium	mg/l	--	--	267	202
Calcium, dissolved	mg/l	--	--	--	--
Chromium, dissolved	mg/l	0.05	--	--	--
Cobalt, dissolved	mg/l	--	--	--	--
Copper, dissolved	mg/l	--	1	--	--
Iron	mg/l	--	0.3	<0.03	<0.03
Iron, dissolved	mg/l	--	0.3	--	--
Lead, dissolved	mg/l	0.01	--	--	--
Magnesium	mg/l	--	--	47	35
Magnesium, dissolved	mg/l	--	--	--	--
Manganese	mg/l	--	0.05	<0.01	<0.01
Manganese, dissolved	mg/l	--	0.05	--	--
Molybdenum, dissolved	mg/l	--	--	--	--
Nickel, dissolved	mg/l	--	--	--	--
Potassium, dissolved	mg/l	--	--	--	--
Selenium, dissolved	mg/l	0.05	--	--	--
Silver, dissolved	mg/l	--	--	--	--
Sodium	mg/l	--	200 ⁽¹¹⁾	138	108
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	--	--
Strontium	mg/l	--	--	7.05	9.97
Strontium, dissolved	mg/l	--	--	--	--
Thallium, dissolved	mg/l	--	--	--	--
Titanium, dissolved	mg/l	--	--	--	--
Vanadium, dissolved	mg/l	--	--	--	--
Zinc	mg/l	--	5	<0.01	<0.01
Zinc, dissolved	mg/l	--	5	--	--
Petroleum Hydrocarbons					
Benzene	mg/l	0.001	--	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 04	MW 04
				18-Sep-2019	11-Nov-2019
				MW 4	MW-4
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0004	<0.0004
o-Xylene	mg/l	--	--	<0.0004	<0.0004
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.02	<0.02
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.05	<0.05
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.05	<0.05
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005
Xylenes, Total	mg/l	0.09	0.02	<0.0005	<0.0005
Semi-VOCs					
1-Methylnaphthalene	mg/l	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--
Acenaphthene	mg/l	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--
Anthracene	mg/l	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--
Chrysene	mg/l	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--
Fluoranthene	mg/l	--	--	--	--
Fluorene	mg/l	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--
Naphthalene	mg/l	--	--	--	--
Phenanthrene	mg/l	--	--	--	--
Pyrene	mg/l	--	--	--	--
Styrene	mg/l	--	--	--	--
VOCs					
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0004
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004
1,1-Dichloroethylene	mg/l	0.014	--	--	--
1,2-Dibromoethane	mg/l	--	--	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--
1,2-Dichloropropane	mg/l	--	--	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--
Bromodichloromethane	mg/l	--	--	--	--
Bromoform	mg/l	--	--	--	--
Bromomethane	mg/l	--	--	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--
Chloroethane	mg/l	--	--	--	--
Chloroform	mg/l	--	--	--	--
Chloromethane	mg/l	--	--	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--
Dibromochloromethane	mg/l	--	--	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--
Methylene Chloride	mg/l	0.05	--	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003
Trichlorofluoromethane	mg/l	--	--	--	--
Vinyl Chloride	mg/l	0.001	--	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05
				29-Nov-2010	28-Feb-2011 ⁽²⁶⁾	07-Apr-2011 ⁽²⁹⁾	11-May-2012	14-Jun-2012 ⁽⁵⁾	17-Sep-2012 ⁽³⁰⁾	18-Dec-2012	11-Apr-2013 ⁽³¹⁾	05-Jul-2013
				S-2	MW 05	S-1	S - 7	S-6	sw5	S-7	S-1	S-7
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	387	--	304	299	384	--	329	335	354
Ammonia, unionized	mg/l	--	--	<0.02	--	<0.02	<0.02	<0.02	--	<0.02	<0.02	<0.02
Ammonia, unionized (Field)	mg/l	--	--	<0.02	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.02	--	0.03	0.03	0.24	--	0.02	0.06	<0.02
Ammonium	mg/l	--	--	--	--	--	0.03	0.24	--	0.02	0.06	<0.02
Bicarbonate	mg/l	--	--	387	--	304	299	384	--	329	335	354
Bromide	mg/l	--	--	1.07	--	<0.25	0.66	1.10	--	<0.25	<0.50	0.41
Carbonate (CO3)	mg/l	--	--	<2 ⁽⁸⁾	--	<2 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾
Color	color unit	--	5	3	--	9	4	2	--	<2	5	2
Conductivity	uS/cm	--	--	3790	--	--	3150	3980	--	3920	3600	4390
Conductivity (Field)	uS/cm	--	--	3250	--	2390	2405	4010	--	2880	3600	4400
Fluoride	mg/l	1.5	--	<0.10	--	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
Hardness, Calcium Carbonate	mg/l	--	--	508	--	1360	378	491	--	460	572	612
Nitrate as N	mg/l	10.0	--	<0.10	--	0.24	<0.10	<0.10	--	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	--	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
pH	-	--	--	7.84	--	--	8.10	7.91	--	7.94	7.88	7.95
pH (Field)	-	--	--	7.5	--	7.7	7.5	7.9	--	7.8	7.66	8.0
Phosphorus	mg/l	--	--	2.86	--	1.73	2.24	0.74	--	1.94	5.43	1.66
Sulphate	mg/l	--	500 ⁽⁹⁾	60	--	78	50	61	--	61	52	61
Temperature (Field)	deg c	--	15	7.9	--	5.8	12	13	--	7	5	13
Total Organic Carbon	mg/l	--	--	4.4	--	2.8	2.5	2.1	--	2.7	3.0	2.7
Total Suspended Solids	mg/l	--	--	3040	--	11200	2480	577	--	1810	22800	1980
Turbidity	ntu	--	5 ⁽¹⁰⁾	≥100	--	--	<0.1	≥100	--	≥100	41.7	≥100
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	--	--	--	180	185	--	149	-- ⁽¹²⁾	≥100
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	--	<0.1	<0.01	<0.01	--	<0.01	<0.01	<0.01
Arsenic, dissolved	mg/l	0.01	--	<0.001	--	<0.01	<0.001	<0.001	--	<0.001	<0.001	<0.001
Barium, dissolved	mg/l	1	--	0.20	--	0.2	0.14	0.22	--	0.19	0.18	0.27
Beryllium, dissolved	mg/l	--	--	<0.001	--	<0.005	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Boron, dissolved	mg/l	5	--	0.06	--	<0.1	0.04	0.04	--	0.05	0.03	0.03
Cadmium, dissolved	mg/l	0.005	--	<0.0001	--	<0.001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Calcium, dissolved	mg/l	--	--	136	--	477	92	124	--	110	145	156
Chromium, dissolved	mg/l	0.05	--	<0.005	--	<0.01	0.005	0.002	--	0.005	0.006	0.007
Cobalt, dissolved	mg/l	--	--	0.0019	--	<0.002	<0.0002	0.0003	--	<0.0002	<0.0002	0.0004
Copper, dissolved	mg/l	--	1	0.002	--	<0.01	0.002	0.001	--	<0.001	0.001	<0.001
Iron, dissolved	mg/l	--	0.3	<0.03	--	<0.3	<0.03	<0.03	--	<0.03	<0.03	<0.03
Lead, dissolved	mg/l	0.01	--	<0.001	--	<0.01	<0.001	<0.001	--	<0.001	<0.001	<0.001
Magnesium, dissolved	mg/l	--	--	41	--	41	36	44	--	45	51	54
Manganese, dissolved	mg/l	--	0.05	0.33	--	0.2	<0.01	0.05	--	<0.01	0.02	0.22
Molybdenum, dissolved	mg/l	--	--	<0.005	--	<0.05	<0.005	<0.005	--	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	0.006	--	<0.05	<0.005	0.005	--	<0.005	<0.005	0.007
Potassium, dissolved	mg/l	--	--	4	--	3	3	3	--	3	3	4
Selenium, dissolved	mg/l	0.05	--	<0.001	--	<0.01	<0.001	<0.001	--	<0.001	<0.001	<0.001
Silver, dissolved	mg/l	--	--	<0.0001	--	<0.001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	592	--	2420	531	523	--	607	604	706
Strontium, dissolved	mg/l	--	--	0.780	--	0.68	0.625	0.912	--	0.782	0.794	1.10
Thallium, dissolved	mg/l	--	--	<0.0001	--	<0.001	<0.0001	<0.0001	--	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.01	--	<0.1	<0.01	<0.01	--	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	0.004	--	<0.01	0.001	<0.001	--	0.001	0.002	0.002
Zinc, dissolved	mg/l	--	5	<0.01	--	<0.1	<0.01	<0.01	--	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	--	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0010	--	<0.0020	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	--	<0.1	<0.1	<0.1	--	--	<0.1	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	--	<0.1	<0.1	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	--	0.2	<0.1	--	--	--	<0.1	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	0.6	--	<0.2	<0.2	--	--	--	<0.2	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	--	<0.2	<0.2	--	--	--	<0.2	--
Toluene	mg/l	0.06	0.024	<0.0005	--	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05
				29-Nov-2010	28-Feb-2011 ⁽²⁶⁾	07-Apr-2011 ⁽²⁹⁾	11-May-2012	14-Jun-2012 ⁽⁹⁾	17-Sep-2012 ⁽³⁰⁾	18-Dec-2012	11-Apr-2013 ⁽³¹⁾	05-Jul-2013
				S-2	MW 05	S-1	S-7	S-6	sw5	S-7	S-1	S-7
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.003	<0.0010	<0.0010	--	--	<0.0010	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
2-Methylnaphthalene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Acenaphthene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Acenaphthylene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Anthracene	mg/l	--	--	<0.00001	--	<0.00001	<0.00001	--	--	--	<0.0001	--
Benzo[a]anthracene	mg/l	--	--	<0.00001	--	<0.00001	<0.00001	--	--	--	<0.0001	--
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	--	<0.00001	<0.00001	--	--	--	<0.00001	--
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.00005	--
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.00005	--
Chrysene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.00005	--
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Fluoranthene	mg/l	--	--	<0.00002	--	0.00005	<0.00002	--	--	--	<0.0001	--
Fluorene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Naphthalene	mg/l	--	--	<0.00002	--	<0.00002	<0.00002	--	--	--	<0.0001	--
Phenanthrene	mg/l	--	--	<0.00002	--	<0.00002	0.00005	--	--	--	<0.0001	--
Pyrene	mg/l	--	--	<0.00002	--	0.00007	0.00002	--	--	--	<0.0001	--
Styrene	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,1,2-Trichloroethane	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,1-Dichloroethane	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,1-Dichloroethylene	mg/l	0.014	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,2-Dibromoethane	mg/l	--	--	<0.0010	--	<0.0020	<0.0002	<0.0002	--	--	<0.0002	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,2-Dichloroethane	mg/l	0.005	--	<0.0005	--	<0.001	<0.0002	<0.0002	--	--	<0.0002	--
1,2-Dichloropropane	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0003	--	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
1,3-Dichlorobenzene	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
Bromodichloromethane	mg/l	--	--	<0.0003	--	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
Bromoform	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
Bromomethane	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
Carbon Tetrachloride	mg/l	0.002	--	<0.0005	--	<0.001	<0.0002	<0.0002	--	--	<0.0002	--
Chlorobenzene	mg/l	0.08	0.03	<0.0002	--	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--
Chloroethane	mg/l	--	--	<0.0010	--	<0.0020	<0.0002	<0.0002	--	--	<0.0002	--
Chloroform	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
Chloromethane	mg/l	--	--	<0.0010	--	<0.0020	<0.0002	<0.0002	--	--	<0.0002	--
cis-1,2-Dichloroethene	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
cis-1,2-Dichloropropene	mg/l	--	--	<0.0002	--	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--
Dibromochloromethane	mg/l	--	--	<0.0003	--	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	<0.0005	--
Methylene Chloride	mg/l	0.05	--	<0.0040	--	<0.0080	<0.0040	<0.0040	--	--	<0.0040	--
Tetrachloroethylene	mg/l	0.01	--	<0.0003	--	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
trans-1,2-Dichloroethene	mg/l	--	--	<0.0004	--	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
trans-1,3-Dichloropropene	mg/l	--	--	<0.0002	--	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--
Trichloroethene	mg/l	0.005	--	<0.0003	--	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
Trichlorofluoromethane	mg/l	--	--	<0.0005	--	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
Vinyl Chloride	mg/l	0.001	--	<0.0002	--	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05
				21-Oct-2013	03-Feb-2014 ⁽²⁸⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015 ⁽²⁸⁾	17-Jun-2015 ⁽¹⁵⁾	27-Aug-2015 ⁽³⁰⁾	18-Sep-2019 ⁽³⁰⁾
				S - 7	m5	MW - 5	MW 5	MW5	5	S-6	55	MW 05
General Chemistry												
Alkalinity (Total as CaCO3)	mg/l	--	--	360	--	409	368	--	--	419	--	--
Ammonia, unionized	mg/l	--	--	<0.02	--	<0.02	<0.02	--	--	<0.05	--	--
Ammonia, unionized (Field)	mg/l	--	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.02	--	0.07	0.05	--	--	<0.05	--	--
Ammonium	mg/l	--	--	0.02	--	0.07	0.05	--	--	<0.05	--	--
Bicarbonate	mg/l	--	--	360	--	409	368	--	--	419	--	--
Bromide	mg/l	--	--	0.35	--	0.94	<0.25	--	--	<0.50	--	--
Carbonate (CO3)	mg/l	--	--	<1 ⁽⁸⁾	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	--	<1 ⁽⁸⁾	--	--
Color	color unit	--	5	<2	--	13	2	--	--	4	--	--
Conductivity	uS/cm	--	--	4090	--	4420	3760	--	--	3450	--	--
Conductivity (Field)	uS/cm	--	--	>4000	--	4150	--	4210	--	3720	--	--
Fluoride	mg/l	1.5	--	<0.10	--	<0.10	<0.10	--	--	<0.10	--	--
Hardness, Calcium Carbonate	mg/l	--	--	400	--	580	495	--	--	610	--	--
Nitrate as N	mg/l	10.0	--	<0.10	--	<0.10	<0.10	--	--	<0.10	--	--
Nitrite as N	mg/l	1.0	--	<0.10	--	<0.10	<0.10	--	--	<0.10	--	--
pH	-	--	--	7.94	--	7.78	7.90	--	--	7.74	--	--
pH (Field)	-	--	--	7.8	--	7.6	--	7.4	--	7.7	--	--
Phosphorus	mg/l	--	--	1.32	--	4.01	2.39	--	--	1.61	--	--
Sulphate	mg/l	--	500 ⁽⁹⁾	68	--	77	64	--	--	60	--	--
Temperature (Field)	deg c	--	15	9	--	8	--	7	--	10	--	--
Total Organic Carbon	mg/l	--	--	3.2	--	3.2	3.7	--	--	1.3	--	--
Total Suspended Solids	mg/l	--	--	3680	--	3630	1730	--	--	1840	--	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	--	>100	>100	--	--	>100	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	>100	--	>100	--	>100	--	>100	--	--
Metals												
Aluminum, dissolved	mg/l	--	--	<0.01	--	<0.01	<0.01	--	--	<0.1	--	--
Arsenic, dissolved	mg/l	0.01	--	<0.001	--	<0.001	<0.001	--	--	<0.01	--	--
Barium, dissolved	mg/l	1	--	0.22	--	0.26	0.19	--	--	0.2	--	--
Beryllium, dissolved	mg/l	--	--	<0.0005	--	<0.0005	<0.0005	--	--	<0.005	--	--
Boron, dissolved	mg/l	5	--	0.04	--	0.04	0.03	--	--	<0.1	--	--
Cadmium, dissolved	mg/l	0.005	--	<0.0001	--	<0.0001	<0.0001	--	--	<0.001	--	--
Calcium, dissolved	mg/l	--	--	99	--	150	142	--	--	180	--	--
Chromium, dissolved	mg/l	0.05	--	0.007	--	<0.001	<0.001	--	--	<0.01	--	--
Cobalt, dissolved	mg/l	--	--	0.0003	--	<0.0002	<0.0002	--	--	<0.002	--	--
Copper, dissolved	mg/l	--	1	<0.001	--	<0.001	<0.001	--	--	<0.01	--	--
Iron, dissolved	mg/l	--	0.3	<0.03	--	<0.03	<0.03	--	--	<0.3	--	--
Lead, dissolved	mg/l	0.01	--	<0.001	--	<0.001	<0.001	--	--	<0.01	--	--
Magnesium, dissolved	mg/l	--	--	37	--	50	34	--	--	39	--	--
Manganese, dissolved	mg/l	--	0.05	0.05	--	<0.01	0.05	--	--	0.2	--	--
Molybdenum, dissolved	mg/l	--	--	<0.005	--	<0.005	<0.005	--	--	<0.05	--	--
Nickel, dissolved	mg/l	--	--	<0.005	--	<0.005	<0.005	--	--	<0.05	--	--
Potassium, dissolved	mg/l	--	--	3	--	2	4	--	--	2	--	--
Selenium, dissolved	mg/l	0.05	--	<0.001	--	<0.001	<0.001	--	--	<0.01	--	--
Silver, dissolved	mg/l	--	--	<0.0001	--	<0.0001	<0.0001	--	--	<0.001	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	582	--	715	603	--	--	499	--	--
Strontium, dissolved	mg/l	--	--	0.779	--	1.08	0.818	--	--	0.56	--	--
Thallium, dissolved	mg/l	--	--	<0.0001	--	<0.0001	<0.0001	--	--	<0.001	--	--
Titanium, dissolved	mg/l	--	--	<0.01	--	<0.01	<0.01	--	--	<0.1	--	--
Vanadium, dissolved	mg/l	--	--	0.002	--	<0.001	<0.001	--	--	<0.01	--	--
Zinc, dissolved	mg/l	--	5	<0.01	--	<0.01	<0.01	--	--	<0.1	--	--
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	--	<0.0005	<0.0005	--	--	<0.0005	--	--
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	--	<0.0005	<0.0005	--	--	<0.0005	--	--
m,p-Xylenes	mg/l	--	--	<0.0005	--	<0.0005	<0.0005	--	--	<0.0004	--	--
o-Xylene	mg/l	--	--	<0.0005	--	<0.0005	<0.0005	--	--	<0.0004	--	--
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	<0.1	--	--	--	<0.02	--	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	<0.1	--	--	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	<0.1	--	--	--	<0.02	--	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	<0.2	--	--	--	<0.05	--	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	<0.2	--	--	--	<0.05	--	--
Toluene	mg/l	0.06	0.024	<0.0005	--	<0.0005	<0.0005	--	--	<0.0005	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05	MW 05
				21-Oct-2013	03-Feb-2014 ⁽²⁸⁾	26-May-2014	09-Oct-2014	09-Oct-2014	24-Mar-2015 ⁽²⁸⁾	17-Jun-2015 ⁽¹⁵⁾	27-Aug-2015 ⁽³⁰⁾	18-Sep-2019 ⁽³⁰⁾
				S - 7	m5	MW - 5	MW 5	MW5	5	S-6	55	MW 05
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.0010	--	--	--	<0.0005	--	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
1,1-Dichloroethane	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
1,1-Dichloroethylene	mg/l	0.014	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,2-Dibromoethane	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	<0.0004	--	--	--	<0.0004	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	<0.0002	--	--	--	<0.0002	--	--
1,2-Dichloropropane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	<0.0003	--	--	--	<0.0003	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	<0.0004	--	--	--	<0.0004	--	--
Bromodichloromethane	mg/l	--	--	--	--	<0.0003	--	--	--	<0.0003	--	--
Bromoform	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
Bromomethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	<0.0002	--	--	--	<0.0002	--	--
Chloroethane	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Chloroform	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Chloromethane	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Dibromochloromethane	mg/l	--	--	--	--	<0.0003	--	--	--	<0.0003	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Methylene Chloride	mg/l	0.05	--	--	--	<0.0040	--	--	--	<0.0040	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--	<0.0003	--	--	--	<0.0003	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	<0.0004	--	--	--	<0.0004	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	<0.0002	--	--	--	<0.0002	--	--
Trichloroethene	mg/l	0.005	--	--	--	<0.0003	--	--	--	<0.0003	--	--
Trichlorofluoromethane	mg/l	--	--	--	--	<0.0005	--	--	--	<0.0005	--	--
Vinyl Chloride	mg/l	0.001	--	--	--	<0.0002	--	--	--	<0.0002	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06
				26-Nov-2010 ⁽³²⁾	28-Feb-2011 ⁽³³⁾	07-Apr-2011 ⁽³⁴⁾	11-May-2012 ⁽³⁵⁾	14-Jun-2012 ⁽³⁶⁾	17-Sep-2012 ⁽³⁰⁾	18-Dec-2012	11-Apr-2013	05-Jul-2013
				S-6	S - 6	S-7	S - 6	S-5	sw6	S-3	S-2	S-3
General Chemistry												
Alkalinity (Total as CaCO ₃)	mg/l	--	--	256	242	288	410	549	--	384	568	646
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	--	<0.02	<0.02	<0.02
Ammonia, unionized (Field)	mg/l	--	--	<0.02	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.07	0.07	0.09	0.13	0.18	--	0.05	0.07	0.12
Ammonium	mg/l	--	--	--	--	--	0.13	0.18	--	0.05	0.07	0.12
Bicarbonate	mg/l	--	--	256	242	288	410	549	--	384	568	646
Bromide	mg/l	--	--	<0.25	<0.25	<0.25	<0.50	<0.50	--	<0.25	<0.25	<0.25
Carbonate (CO ₃)	mg/l	--	--	<2 ⁽⁶⁾	<2 ⁽⁶⁾	<2 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾	--	<1 ⁽⁶⁾	<1 ⁽⁶⁾	<1 ⁽⁶⁾
Color	color unit	--	5	9	4	14	34	119	--	73	72	81
Conductivity	uS/cm	--	--	7400	17800	--	11700	5790	--	1910	2960	2450
Conductivity (Field)	uS/cm	--	--	>3995	>5000	2270	>5000	>4000	--	2000	3100	2400
Fluoride	mg/l	1.5	--	0.11	<0.10	<0.10	0.10	0.16	--	0.20	0.17	0.21
Hardness, Calcium Carbonate	mg/l	--	--	811	1680	1230	911	815	--	117	185	171
Nitrate as N	mg/l	10.0	--	0.15	0.37	0.27	<0.10	<0.10	--	0.37	0.19	<0.10
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10	<0.10	<0.10
pH	-	--	--	--	7.37	--	7.51	7.86	--	7.88	7.75	7.76
pH (Field)	-	--	--	6.62	7.1	7.48	6.98	7.8	--	7.8	7.1	7.8
Phosphorus	mg/l	--	--	0.15	2.35	4.86	6.53	2.71	--	2.90	2.26	4.84
Sulphate	mg/l	--	500 ⁽⁹⁾	24	92	81	93	65	--	78	160	231
Temperature (Field)	deg c	--	15	5.6	6.7	6.5	9	12	--	6	4	12
Total Organic Carbon	mg/l	--	--	6.5	4.7	6.0	9.2	15.8	--	10.8	12.5	19.6
Total Suspended Solids	mg/l	--	--	25000	18300	17300	11400	8420	--	4720	4250	6750
Turbidity	ntu	--	5 ⁽¹⁰⁾	≥100	≥100	--	<0.1	≥100	--	≥100	≥100	≥100
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	--	--	--	169	165	--	182	438	≥100
Metals												
Aluminum, dissolved	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	0.02	0.02	0.03
Arsenic, dissolved	mg/l	0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.001	<0.001	<0.01
Barium, dissolved	mg/l	1	--	0.4	0.7	0.4	0.3	0.4	--	0.02	0.04	0.04
Beryllium, dissolved	mg/l	--	--	<0.01	<0.005	<0.005	<0.005	<0.005	--	<0.0005	<0.0005	<0.0005
Boron, dissolved	mg/l	5	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	0.01	0.01	0.04
Cadmium, dissolved	mg/l	0.005	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.0001	<0.0001	<0.0001
Calcium, dissolved	mg/l	--	--	292	592	440	327	290	--	42	66	62
Chromium, dissolved	mg/l	0.05	--	<0.005	<0.005	<0.005	<0.05	<0.01	--	0.010	<0.005	0.006
Cobalt, dissolved	mg/l	--	--	<0.002	<0.002	<0.002	<0.002	<0.002	--	<0.0002	<0.0002	0.0017
Copper, dissolved	mg/l	--	1	<0.01	<0.01	<0.01	<0.01	<0.01	--	0.004	0.005	0.004
Iron, dissolved	mg/l	--	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	--	0.06	0.04	0.44
Lead, dissolved	mg/l	0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.001	<0.001	<0.001
Magnesium, dissolved	mg/l	--	--	20	49	32	23	22	--	3	5	4
Manganese, dissolved	mg/l	--	0.05	0.2	0.3	<0.1	0.2	<0.1	--	0.01	<0.01	0.29
Molybdenum, dissolved	mg/l	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.005	<0.005	<0.005
Nickel, dissolved	mg/l	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.005	<0.005	<0.005
Potassium, dissolved	mg/l	--	--	4	3	3	<1	2	--	1	2	1
Selenium, dissolved	mg/l	0.05	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.001	<0.001	<0.001
Silver, dissolved	mg/l	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.0001	<0.0001	<0.0001
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	1230	2910	2080	2390	2070	--	371	693	545
Strontium, dissolved	mg/l	--	--	2.39	4.91	3.20	2.44	2.59	--	0.232	0.421	0.391
Thallium, dissolved	mg/l	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	--	<0.0001	<0.0001	<0.0001
Titanium, dissolved	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.01	<0.01	<0.01
Vanadium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	0.004	0.005	0.006
Zinc, dissolved	mg/l	--	5	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.01	<0.01	<0.01
Petroleum Hydrocarbons												
Benzene	mg/l	0.001	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
m,p-Xylenes	mg/l	--	--	<0.0010	<0.0010	<0.0020	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	<0.1	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	<0.1	--	<0.1	<0.1	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	<0.1	<0.1	<0.1	<0.1	--	--	--	<0.1	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	<0.2	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	<0.2	--
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	<0.0005	<0.0005	<0.0005

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06
				26-Nov-2010 ⁽³²⁾	28-Feb-2011 ⁽³³⁾	07-Apr-2011 ⁽³⁴⁾	11-May-2012 ⁽³⁵⁾	14-Jun-2012 ⁽³⁶⁾	17-Sep-2012 ⁽³⁰⁾	18-Dec-2012	11-Apr-2013	05-Jul-2013
				S-6	S - 6	S-7	S - 6	S-5	sw6	S-3	S-2	S-3
Xylenes, Total	mg/l	0.09	0.02	--	<0.0015	<0.003	<0.0010	<0.0010	--	--	<0.0010	--
Semi-VOCs												
1-Methylnaphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
2-Methylnaphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Acenaphthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Acenaphthylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.0001	--
Benzo[a]anthracene	mg/l	--	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.0001	--
Benzo[a]pyrene	mg/l	0.00001	--	<0.00001	<0.00002	<0.00001	<0.00001	--	--	--	<0.00001	--
Benzo[b]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005	--
Benzo[g,h,i]perylene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Benzo[k]fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005	--
Chrysene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.00005	--
Dibenzo[a,h]anthracene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Fluoranthene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Fluorene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Naphthalene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Phenanthrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Pyrene	mg/l	--	--	<0.00002	<0.00004	<0.00002	<0.00002	--	--	--	<0.0001	--
Styrene	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
VOCs												
1,1,1,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,1,1-Trichloroethane	mg/l	--	--	<0.0004	<0.0008	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,1,2-Trichloroethane	mg/l	--	--	<0.0004	<0.0008	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,1-Dichloroethane	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,1-Dichloroethylene	mg/l	0.014	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,2-Dibromoethane	mg/l	--	--	<0.0010	<0.0010	<0.0020	<0.0002	<0.0002	--	--	<0.0002	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,2-Dichloroethane	mg/l	0.005	--	<0.0005	<0.0005	<0.001	<0.0002	<0.0002	--	--	<0.0002	--
1,2-Dichloropropane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
1,3,5-Trimethylbenzene	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
1,3-Dichlorobenzene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
Bromodichloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
Bromoform	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
Bromomethane	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
Carbon Tetrachloride	mg/l	0.002	--	<0.0005	<0.0005	<0.001	<0.0002	<0.0002	--	--	<0.0002	--
Chlorobenzene	mg/l	0.08	0.03	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--
Chloroethane	mg/l	--	--	<0.0010	<0.0020	<0.0020	<0.0002	<0.0002	--	--	<0.0002	--
Chloroform	mg/l	--	--	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
Chloromethane	mg/l	--	--	<0.0010	<0.0020	<0.0020	<0.0002	<0.0002	--	--	<0.0002	--
cis-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
cis-1,2-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--
Dibromochloromethane	mg/l	--	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
Dichlorodifluoromethane	mg/l	--	--	--	--	--	<0.0005	<0.0005	--	--	<0.0005	--
Methylene Chloride	mg/l	0.05	--	<0.0040	<0.0040	<0.0080	<0.0040	<0.0040	--	--	<0.0040	--
Tetrachloroethylene	mg/l	0.01	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
trans-1,2-Dichloroethene	mg/l	--	--	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	--	--	<0.0004	--
trans-1,3-Dichloropropene	mg/l	--	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--
Trichloroethene	mg/l	0.005	--	<0.0003	<0.0003	<0.0006	<0.0003	<0.0003	--	--	<0.0003	--
Trichlorofluoromethane	mg/l	--	--	<0.0005	<0.001	<0.001	<0.0005	<0.0005	--	--	<0.0005	--
Vinyl Chloride	mg/l	0.001	--	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	--	--	<0.0002	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06
				21-Oct-2013	03-Feb-2014	26-May-2014	09-Oct-2014 ⁽³⁰⁾	24-Mar-2015	17-Jun-2015	27-Aug-2015 ⁽³⁰⁾	18-Sep-2019 ⁽³⁰⁾
				S - 4	S-6	MW - 6	6	S-3	S-4	66	MW 06
General Chemistry											
Alkalinity (Total as CaCO ₃)	mg/l	--	--	638	465	480	--	262	388	--	--
Ammonia, unionized	mg/l	--	--	<0.02	<0.02	<0.02	--	<0.02	<0.05	--	--
Ammonia, unionized (Field)	mg/l	--	--	--	--	--	--	--	--	--	--
Ammonia Nitrogen	mg/l	--	--	0.05	0.08	0.08	--	0.02	0.08	--	--
Ammonium	mg/l	--	--	0.05	0.08	0.08	--	0.02	0.08	--	--
Bicarbonate	mg/l	--	--	638	465	480	--	262	388	--	--
Bromide	mg/l	--	--	<0.25	<0.25	<0.25	--	<0.25	<0.25	--	--
Carbonate (CO ₃)	mg/l	--	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	<1 ⁽⁸⁾	<1 ⁽⁸⁾	--	--
Color	color unit	--	5	79	31	35	--	134	33	--	--
Conductivity	uS/cm	--	--	3150	1930	1560	--	937	1440	--	--
Conductivity (Field)	uS/cm	--	--	2365	3090	2205	--	2180	1010	3920	--
Fluoride	mg/l	1.5	--	0.20	0.20	0.23	--	0.16	0.18	--	--
Hardness, Calcium Carbonate	mg/l	--	--	164	193	179	--	162	234	--	--
Nitrate as N	mg/l	10.0	--	0.18	0.24	<0.10	--	0.80	0.10	--	--
Nitrite as N	mg/l	1.0	--	<0.10	<0.10	<0.10	--	<0.10	<0.10	--	--
pH	-	--	--	7.75	7.86	8.00	--	7.62	7.65	--	--
pH (Field)	-	--	--	7.6	7.6	7.4	--	7.5	7.8	7.4	--
Phosphorus	mg/l	--	--	2.75	4.77	2.08	--	2.48	7.93	--	--
Sulphate	mg/l	--	500 ⁽⁹⁾	437	160	136	--	56	226	--	--
Temperature (Field)	deg c	--	15	7	6	8	--	6	9	13	--
Total Organic Carbon	mg/l	--	--	30.6	14.3	8.9	--	6.5	11.5	--	--
Total Suspended Solids	mg/l	--	--	4570	13800	1920	--	3250	550	--	--
Turbidity	ntu	--	5 ⁽¹⁰⁾	>100	>100	>100	--	>100	>100	--	--
Turbidity (Field)	ntu	--	5 ⁽¹⁰⁾	80.2	>100	70	--	53.0	>100	>100	--
Metals											
Aluminum, dissolved	mg/l	--	--	0.04	0.01	0.02	--	0.02	<0.01	--	--
Arsenic, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	--	<0.001	<0.001	--	--
Barium, dissolved	mg/l	1	--	0.05	0.03	0.03	--	0.02	0.03	--	--
Beryllium, dissolved	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	--	--
Boron, dissolved	mg/l	5	--	0.03	0.01	0.06	--	0.03	0.12	--	--
Cadmium, dissolved	mg/l	0.005	--	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	--	--
Calcium, dissolved	mg/l	--	--	59	64	57	--	55	82	--	--
Chromium, dissolved	mg/l	0.05	--	0.010	0.010	<0.001	--	<0.001	<0.001	--	--
Cobalt, dissolved	mg/l	--	--	0.0004	<0.0002	0.0004	--	<0.0002	<0.0002	--	--
Copper, dissolved	mg/l	--	1	0.007	0.003	0.004	--	0.003	0.006	--	--
Iron, dissolved	mg/l	--	0.3	0.10	<0.03	0.03	--	<0.03	<0.03	--	--
Lead, dissolved	mg/l	0.01	--	<0.001	<0.001	<0.001	--	<0.001	<0.001	--	--
Magnesium, dissolved	mg/l	--	--	4	8	9	--	6	7	--	--
Manganese, dissolved	mg/l	--	0.05	0.03	0.03	0.08	--	<0.01	<0.01	--	--
Molybdenum, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	--	<0.005	<0.005	--	--
Nickel, dissolved	mg/l	--	--	<0.005	<0.005	<0.005	--	<0.005	<0.005	--	--
Potassium, dissolved	mg/l	--	--	<1	8	8	--	4	1	--	--
Selenium, dissolved	mg/l	0.05	--	<0.001	<0.001	<0.001	--	<0.001	<0.001	--	--
Silver, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	--	--
Sodium, dissolved	mg/l	--	200 ⁽¹¹⁾	590	372	327	--	161	230	--	--
Strontium, dissolved	mg/l	--	--	0.389	0.435	0.431	--	0.280	0.574	--	--
Thallium, dissolved	mg/l	--	--	<0.0001	<0.0001	<0.0001	--	<0.0001	<0.0001	--	--
Titanium, dissolved	mg/l	--	--	<0.01	<0.01	<0.01	--	<0.01	<0.01	--	--
Vanadium, dissolved	mg/l	--	--	0.006	0.003	<0.001	--	<0.001	<0.001	--	--
Zinc, dissolved	mg/l	--	5	<0.01	<0.01	<0.01	--	<0.01	<0.01	--	--
Petroleum Hydrocarbons											
Benzene	mg/l	0.001	--	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	--	--
Ethylbenzene	mg/l	0.14	0.0016	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	--	--
m,p-Xylenes	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	--	--
o-Xylene	mg/l	--	--	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0004	--	--
Petroleum Hydrocarbons - F1 (C6-C10)	mg/l	--	--	--	--	<0.1	--	--	<0.02	--	--
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	mg/l	--	--	--	--	<0.1	--	--	--	--	--
Petroleum Hydrocarbons - F2 (C10-C16)	mg/l	--	--	--	--	<0.1	--	--	<0.02	--	--
Petroleum Hydrocarbons - F3 (C16-C34)	mg/l	--	--	--	--	<0.2	--	--	<0.05	--	--
Petroleum Hydrocarbons - F4 (C34-C50)	mg/l	--	--	--	--	<0.2	--	--	<0.05	--	--
Toluene	mg/l	0.06	0.024	<0.0005	<0.0005	<0.0005	--	<0.0005	<0.0005	--	--

Parameter	Unit	ODWQS (169/03)- Health ⁽¹⁾	ODWQS- AO ⁽²⁾	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06	MW 06
				21-Oct-2013	03-Feb-2014	26-May-2014	09-Oct-2014 ⁽³⁰⁾	24-Mar-2015	17-Jun-2015	27-Aug-2015 ⁽³⁰⁾	18-Sep-2019 ⁽³⁰⁾
				S - 4	S-6	MW - 6	6	S-3	S-4	66	MW 06
Xylenes, Total	mg/l	0.09	0.02	--	--	<0.0010	--	<0.0010	<0.0005	--	--
Semi-VOCs											
1-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/l	--	--	--	--	--	--	--	--	--	--
Acenaphthene	mg/l	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	mg/l	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	mg/l	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/l	--	--	--	--	--	--	--	--	--	--
Dibenzo[a,h]anthracene	mg/l	--	--	--	--	--	--	--	--	--	--
Fluoranthene	mg/l	--	--	--	--	--	--	--	--	--	--
Fluorene	mg/l	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	mg/l	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/l	--	--	--	--	--	--	--	--	--	--
Phenanthrene	mg/l	--	--	--	--	--	--	--	--	--	--
Pyrene	mg/l	--	--	--	--	--	--	--	--	--	--
Styrene	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
VOCs											
1,1,1,2-Tetrachloroethane	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
1,1,1-Trichloroethane	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
1,1,2,2-Tetrachloroethane	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
1,1,2-Trichloroethane	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
1,1-Dichloroethane	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
1,1-Dichloroethylene	mg/l	0.014	--	--	--	<0.0005	--	--	<0.0005	--	--
1,2-Dibromoethane	mg/l	--	--	--	--	<0.0002	--	--	<0.0002	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	<0.0004	--	--	<0.0004	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	<0.0002	--	--	<0.0002	--	--
1,2-Dichloropropane	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
1,3,5-Trimethylbenzene	mg/l	--	--	--	--	<0.0003	--	--	<0.0003	--	--
1,3-Dichlorobenzene	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	<0.0004	--	--	<0.0004	--	--
Bromodichloromethane	mg/l	--	--	--	--	<0.0003	--	--	<0.0003	--	--
Bromoform	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
Bromomethane	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
Carbon Tetrachloride	mg/l	0.002	--	--	--	<0.0002	--	--	<0.0002	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	<0.0002	--	--	<0.0002	--	--
Chloroethane	mg/l	--	--	--	--	<0.0002	--	--	<0.0002	--	--
Chloroform	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
Chloromethane	mg/l	--	--	--	--	<0.0002	--	--	<0.0002	--	--
cis-1,2-Dichloroethene	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
cis-1,2-Dichloropropene	mg/l	--	--	--	--	<0.0002	--	--	<0.0002	--	--
Dibromochloromethane	mg/l	--	--	--	--	<0.0003	--	--	<0.0003	--	--
Dichlorodifluoromethane	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
Methylene Chloride	mg/l	0.05	--	--	--	<0.0040	--	--	<0.0040	--	--
Tetrachloroethylene	mg/l	0.01	--	--	--	<0.0003	--	--	<0.0003	--	--
trans-1,2-Dichloroethene	mg/l	--	--	--	--	<0.0004	--	--	<0.0004	--	--
trans-1,3-Dichloropropene	mg/l	--	--	--	--	<0.0002	--	--	<0.0002	--	--
Trichloroethene	mg/l	0.005	--	--	--	<0.0003	--	--	<0.0003	--	--
Trichlorofluoromethane	mg/l	--	--	--	--	<0.0005	--	--	<0.0005	--	--
Vinyl Chloride	mg/l	0.001	--	--	--	<0.0002	--	--	<0.0002	--	--

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 ODWQS(169/03)-Health

Value Parameter is greater than ODWQS-AO

- (1) Ontario Drinking Water Quality Standards - Health Based Standards (June 2003, revised January 2018).
- (2) Ontario Drinking Water Quality Standards - Aesthetic Objectives. Aesthetic Objectives are established for parameters that may impair the taste, odour or colour of water or which may interfere with good water quality control practices. For certain parameters, both aesthetic objectives and health-related MACs have been derived (June 2003, revised June 2006).
- (3) PAH MRLs elevated due to insufficient sample volume.
- (4) Due to matrix interference 2x dilution factor required for VOCs.
- (5) TOC was not shaken prior to analysis due to sediment content.
- (6) Br MRL elevated due to matrix interference (dilution was done).
- (7) Bromide MRL elevated due to matrix interference (dilution was done).
- (8) Not available - pH < 8.3
- (9) There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L.
- (10) Applicable for all waters at the point of consumption.
- (11) The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
- (12) No result value available.
- (13) PAH MRL elevated due to insufficient sample volume.
- (14) Arsenic MRL elevated due to matrix interference (dilution was done).
- (15) Metals MRLs elevated due to matrix interference (10x dilution was done). Bromide MRL elevated due to matrix interference (dilution was done).
- (16) Arsenic MRL elevated due to matrix interference. Due to matrix interference 2 X dilution factor required for VOCs.
- (17) Arsenic and Selenium MRL elevated due to matrix interference. PAH MRLs elevated due to insufficient sample volume.
- (18) Due to matrix interference 2x dilution factor required for VOCs. Arsenic and Selenium MRL elevated due to matrix interference.
- (19) Arsenic and Selenium MRL elevated due to matrix interference.
- (20) TOC was not shaken prior to analysis due to sediment content. Arsenic and Selenium MRL elevated due to matrix interference.
- (21) Holding time for Turbidity analysis was exceeded for the entire report. Arsenic and Selenium MRL elevated due to matrix interference (dilution was done).
- (22) Arsenic and Selenium MRL elevated due to matrix interference (dilution was done).
- (23) Due to matrix interference 2x dilution factor required for VOCs. Selenium MRL elevated due to matrix interference.
- (24) Monitoring location was not accessible.
- (25) Selenium MRL elevated due to matrix interference.
- (26) Selenium MRL elevated due to matrix interference (dilution was done).
- (27) Selenium MRL elevated due to matrix interference (dilution was done). All samples were subcontracted for TOC analysis.
- (28) Monitoring location was frozen during this sampling event. No sample was collected.
- (29) Due to matrix interference 2x dilution factor required for VOCs. Metals MRL elevated due to matrix interference.
- (30) Monitoring location was dry during this sampling event. No sample was collected.
- (31) Br MRL elevated due to matrix interference (dilution was done).
- (32) Metals MRL elevated due to matrix interference.
- (33) Metals MRL elevated due to matrix interference. PAH MRLs elevated due to insufficient sample volume.
- (34) Metals MRL elevated due to matrix interference. Due to matrix interference 2x dilution factor required for VOCs.
- (35) Metals and Br MRL elevated due to matrix interference.
- (36) Metals and Bromide MRL elevated due to matrix interference. TOC was not shaken prior to analysis due to sediment content.

APPENDIX D

Laboratory Certificates of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)


Report Number: 1917174
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

Page 1 of 7

Dear Caitlin Cooke:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:


Sarah Horner
2019.09.27
15:58:25
-04'00'

APPROVAL:

Sarah Horner, Inorganics Technician

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

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Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917174
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1454738 GW 2019-09-18 MW 1	1454739 GW 2019-09-18 MW 2	1454740 GW 2019-09-18 MW 3	1454741 GW 2019-09-18 MW 4
Group	Analyte	MRL	Units	Guideline					
Anions	Cl	1	mg/L			305	1340	765	164
	SO4	1	mg/L			101	91	314	286
General Chemistry	Alkalinity as CaCO3	5	mg/L			382	371	563	608
	Conductivity	5	uS/cm			1800	5130	3570	2010
Hardness	Hardness as CaCO3	1	mg/L			554	991	903	860
Hydrocarbons	F1 (C6-C10)	20	ug/L			<20	<20	<20	<20
	F1-BTEX (C6-C10)	20	ug/L			<20	<20	<20	<20
	F2 (C10-C16)	20	ug/L			<20	<20	<20	<20
	F3 (C16-C34)	50	ug/L			<50	<50	<50	<50
	F4 (C34-C50)	50	ug/L			<50	<50	<50	<50
Metals	B	0.01	mg/L			0.07	<0.01	0.07	0.11
	Ca	1	mg/L			164	303	279	267
	Fe	0.03	mg/L			0.21	<0.03	0.99	<0.03
	Mg	1	mg/L			35	57	50	47
	Mn	0.01	mg/L			0.95	0.31	1.71	<0.01
	Na	2	mg/L			157	670	434	138
	Sr	0.001	mg/L			1.05	0.797	0.983	7.05
	Zn	0.01	mg/L			<0.01	<0.01	<0.01	<0.01
PHC Surrogate	Alpha-androstrane	0	%			106	106	102	103
Subcontract-Inorg	N-NH3	0.01	mg/L			0.13	0.07	0.50	0.06
VOCs Surrogates	Toluene-d8	0	%			98	96	99	98
Volatiles	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	Benzene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	Ethylbenzene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
 1931 Robertson Road
 Ottawa, ON
 K2H 5B7
 Attention: Ms. Caitlin Cooke
 PO#:
 Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917174
 Date Submitted: 2019-09-19
 Date Reported: 2019-09-27
 Project: 19115319
 COC #: 207115

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1454738 GW 2019-09-18 MW 1	1454739 GW 2019-09-18 MW 2	1454740 GW 2019-09-18 MW 3	1454741 GW 2019-09-18 MW 4
Group	Analyte	MRL	Units	Guideline					
Volatiles	m/p-xylene	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	o-xylene	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	Toluene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	Trichloroethylene	0.3	ug/L			<0.3	<0.3	<0.3	<0.3
	Xylene; total	0.5	ug/L			<0.5	<0.5	<0.5	<0.5

Guideline = *** = Guideline Exceedence**

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 1931 Robertson Road
 Ottawa, ON
 K2H 5B7
 Attention: Ms. Caitlin Cooke
 PO#:
 Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917174
 Date Submitted: 2019-09-19
 Date Reported: 2019-09-27
 Project: 19115319
 COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 372827 Analysis/Extraction Date 2019-09-23 Analyst SKH Method M SM3120B-3500C			
Calcium	<1 mg/L	98	90-110
Magnesium	<1 mg/L	94	76-124
Sodium	<2 mg/L	98	82-118
Run No 372829 Analysis/Extraction Date 2019-09-23 Analyst H D Method EPA 200.8			
Boron (total)	<0.01 mg/L	100	84.9-115
Iron	<0.03 mg/L	101	91-109
Manganese	<0.01 mg/L	104	92.9-107
Strontium	<0.001 mg/L	99	92.8-107.1
Zinc	<0.01 mg/L	103	91.5-108.4
Run No 372868 Analysis/Extraction Date 2019-09-24 Analyst SKH Method M SM3120B-3500C			
Sodium	<2 mg/L	101	82-118
Run No 372940 Analysis/Extraction Date 2019-09-25 Analyst TJB Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F1	<20 ug/L	102	60-140

Guideline = * = **Guideline Exceedence**

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917174
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 372946 Analysis/Extraction Date 2019-09-24 Analyst SKH Method SM 4110			
SO4	<1 mg/L	100	90-110
Run No 372955 Analysis/Extraction Date 2019-09-23 Analyst TJB Method EPA 8260			
Trichloroethane, 1,1,1-	<0.4 ug/L	94	60-130
Dichloroethane, 1,1-	<0.4 ug/L	89	60-130
Benzene	<0.5 ug/L	99	60-130
Ethylbenzene	<0.5 ug/L	94	60-130
m/p-xylene	<0.4 ug/L	101	60-130
o-xylene	<0.4 ug/L	97	60-130
Toluene	<0.5 ug/L	100	60-130
Trichloroethylene	<0.3 ug/L	96	60-130
Run No 372956 Analysis/Extraction Date 2019-09-25 Analyst TJB Method EPA 8260			
Xylene Mixture			
Run No 372957 Analysis/Extraction Date 2019-09-25 Analyst TJB Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F1-BTEX			

Guideline = * = **Guideline Exceedence**

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Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917174
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 372964 Analysis/Extraction Date 2019-09-25 Analyst C M Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F2	<20 ug/L	80	60-140
Petroleum Hydrocarbons F3	<50 ug/L	80	60-140
Petroleum Hydrocarbons F4	<50 ug/L	80	60-140
Run No 372965 Analysis/Extraction Date 2019-09-25 Analyst K J Method SM2320,2510,4500H/F			
Alkalinity (CaCO ₃)	<5 mg/L	98	90-110
Conductivity	<5 uS/cm	98	90-110
Run No 372990 Analysis/Extraction Date 2019-09-24 Analyst JM Method SUBCONTRACT P-INORG			
N-NH ₃	<0.01 mg/L	104	
Run No 373024 Analysis/Extraction Date 2019-09-25 Analyst SKH Method SM 4110			
Chloride	<1 mg/L	100	90-110
SO ₄	<1 mg/L	100	90-110
Run No 373089 Analysis/Extraction Date 2019-09-27 Analyst AET Method C SM2340B			
Hardness as CaCO ₃			

Guideline =
*** = Guideline Exceedence**

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
 1931 Robertson Road
 Ottawa, ON
 K2H 5B7
 Attention: Ms. Caitlin Cooke
 PO#:
 Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917174
 Date Submitted: 2019-09-19
 Date Reported: 2019-09-27
 Project: 19115319
 COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 373141 Analysis/Extraction Date 2019-09-27 Analyst SKH Method M SM3120B-3500C			
Calcium	<1 mg/L	99	90-110
Run No 373142 Analysis/Extraction Date 2019-09-27 Analyst SKH Method C SM2340B			
Hardness as CaCO ₃			

Guideline = *** = Guideline Exceedence**

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)


Report Number: 1917175
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

Page 1 of 7

Dear Caitlin Cooke:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:



Rebecca Koshy
2019.10.03
15:55:09 -04'00'

APPROVAL:

Rebecca Koshy, Project Manager

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Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917175
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1454742 Leach 2019-09-18 PL-2	1454743 Leach 2019-09-18 PL-3
Group	Analyte	MRL	Units	Guideline			
Anions	Cl	1	mg/L			3920	9360
	SO4	1	mg/L			284	110
General Chemistry	Alkalinity as CaCO3	5	mg/L			458	430
	Conductivity	5	uS/cm			12200	24600
Hardness	Hardness as CaCO3	1	mg/L			1610	2080
Hydrocarbons	F1 (C6-C10)	20	ug/L			<20	<20
	F1-BTEX (C6-C10)	20	ug/L			<20	<20
	F2 (C10-C16)	20	ug/L			<20	<20
	F3 (C16-C34)	50	ug/L			<50	160
	F4 (C34-C50)	50	ug/L			<50	<50
Metals	B	0.1	mg/L			0.2	<0.1
	Ca	1	mg/L			498	668
	Fe	0.3	mg/L			14.2	65.7
	Mg	1	mg/L			88	99
	Mn	0.1	mg/L			1.5	0.9
	Na	2	mg/L			1830	4680
	Sr	0.01	mg/L			10.2	14.0
	Zn	0.1	mg/L			<0.1	<0.1
PHC Surrogate	Alpha-androstrane	0	%			113	107
Subcontract	Aniline	2.0	ug/L			<2.0	3.6
Subcontract-Inorg	N-NH3	0.04	mg/L			1.51	
		0.1	mg/L				3.9
VOCs Surrogates	Toluene-d8	0	%			96	97
Volatiles	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4

Guideline = *** = Guideline Exceedence**

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Certificate of Analysis

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Report Number: 1917175
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1454742 Leach 2019-09-18 PL-2	1454743 Leach 2019-09-18 PL-3
Group	Analyte	MRL	Units	Guideline			
Volatiles	Benzene	0.5	ug/L			<0.5	2.0
	Ethylbenzene	0.5	ug/L			<0.5	<0.5
	m/p-xylene	0.4	ug/L			<0.4	<0.4
	o-xylene	0.4	ug/L			<0.4	<0.4
	Toluene	0.5	ug/L			<0.5	<0.5
	Trichloroethylene	0.3	ug/L			0.8	1.5
	Xylene; total	0.5	ug/L			<0.5	<0.5

Guideline = * = Guideline Exceedence

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1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917175
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 372827 Analysis/Extraction Date 2019-09-23 Analyst SKH Method M SM3120B-3500C			
Calcium	<1 mg/L	98	90-110
Magnesium	<1 mg/L	94	76-124
Sodium	<2 mg/L	98	82-118
Run No 372829 Analysis/Extraction Date 2019-09-23 Analyst H D Method EPA 200.8			
Boron (total)	<0.1 mg/L	100	84.9-115
Iron	<0.3 mg/L	101	91-109
Manganese	<0.1 mg/L	104	92.9-107
Strontium	<0.01 mg/L	99	92.8-107.1
Zinc	<0.1 mg/L	103	91.5-108.4
Run No 372868 Analysis/Extraction Date 2019-09-24 Analyst SKH Method M SM3120B-3500C			
Sodium	<2 mg/L	101	82-118
Run No 372940 Analysis/Extraction Date 2019-09-25 Analyst TJB Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F1	<20 ug/L	102	60-140

Guideline = * = **Guideline Exceedence**

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
Ottawa, ON
K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917175
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 372955 Analysis/Extraction Date 2019-09-24 Analyst TJB Method EPA 8260			
Trichloroethane, 1,1,1-	<0.4 ug/L	94	60-130
Dichloroethane, 1,1-	<0.4 ug/L	89	60-130
Benzene	<0.5 ug/L	99	60-130
Ethylbenzene	<0.5 ug/L	94	60-130
m/p-xylene	<0.4 ug/L	101	60-130
o-xylene	<0.4 ug/L	97	60-130
Toluene	<0.5 ug/L	100	60-130
Trichloroethylene	<0.3 ug/L	96	60-130
Run No 372956 Analysis/Extraction Date 2019-09-25 Analyst TJB Method EPA 8260			
Xylene Mixture			
Run No 372957 Analysis/Extraction Date 2019-09-25 Analyst TJB Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F1-BTEX			
Run No 372964 Analysis/Extraction Date 2019-09-25 Analyst C M Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F2	<20 ug/L	80	60-140

Guideline = * = **Guideline Exceedence**

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Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1917175
Date Submitted: 2019-09-19
Date Reported: 2019-09-27
Project: 19115319
COC #: 207115

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Petroleum Hydrocarbons F3	<50 ug/L	80	60-140
Petroleum Hydrocarbons F4	<50 ug/L	80	60-140
Run No 372965 Analysis/Extraction Date 2019-09-25 Analyst K J Method SM2320,2510,4500H/F			
Alkalinity (CaCO ₃)	<5 mg/L	98	90-110
Conductivity	<5 uS/cm	98	90-110
Run No 373024 Analysis/Extraction Date 2019-09-25 Analyst SKH Method SM 4110			
Chloride	<10 mg/L		90-110
SO ₄	<1 mg/L	100	90-110
Run No 373089 Analysis/Extraction Date 2019-09-27 Analyst AET Method C SM2340B			
Hardness as CaCO ₃			
Run No 373098 Analysis/Extraction Date 2019-09-25 Analyst AET Method SM4500-NH ₃ -G			
N-NH ₃	<0.01 mg/L	104	
Run No 373104 Analysis/Extraction Date 2019-09-26 Analyst REE Method SUBCONTRACT-A			
Aniline	<2.0 ug/L	53	

Guideline =

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
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K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920733
Date Submitted: 2019-11-11
Date Reported: 2019-11-18
Project: 1895756
COC #: 205628

Page 1 of 6

Dear Caitlin Cooke:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:



Addrine Thomas
2019.11.18
14:13:19 -05'00'

APPROVAL:

Addrine Thomas, Inorganics Supervisor

Charlie
Long Qu
2019.11.1
8 13:54:26
-05'00'

APPROVAL:

Long Qu, Organics Supervisor

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
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K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920733
Date Submitted: 2019-11-11
Date Reported: 2019-11-18
Project: 1895756
COC #: 205628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1465762 GW 2019-11-11 MW-1	1465763 GW 2019-11-11 MW-2	1465764 GW 2019-11-11 MW-3	1465765 GW 2019-11-11 MW-4
Group	Analyte	MRL	Units	Guideline					
Anions	Cl	1	mg/L			325	1100	354	16
	SO4	1	mg/L			97	70	265	231
General Chemistry	Alkalinity as CaCO3	5	mg/L			378	378	517	680
	Conductivity	5	uS/cm			1900	4370	2480	1650
Hardness	Hardness as CaCO3	1	mg/L			504	681	595	649
Hydrocarbons	F1 (C6-C10)	20	ug/L			<20	<20	<20	<20
	F1-BTEX (C6-C10)	20	ug/L			<20	<20	<20	<20
	F2 (C10-C16)	20	ug/L			<20	<20	<20	<20
	F3 (C16-C34)	50	ug/L			<50	<50	<50	<50
	F4 (C34-C50)	50	ug/L			<50	<50	<50	<50
Metals	B	0.01	mg/L			0.06	0.01	0.09	0.19
	Ca	1	mg/L			144	197	184	202
	Fe	0.03	mg/L			0.29	<0.03	<0.03	<0.03
	Mg	1	mg/L			35	46	33	35
	Mn	0.01	mg/L			1.13	0.03	0.58	<0.01
	Na	2	mg/L			160	568	250	108
	Sr	0.001	mg/L			1.10	0.931	1.21	9.97
	Zn	0.01	mg/L			<0.01	<0.01	<0.01	<0.01
Nutrients	N-NH3	0.01	mg/L			0.02	<0.01	0.22	<0.01
PHC Surrogate	Alpha-androstrane	0	%			76	95	84	90
VOCs Surrogates	Toluene-d8	0	%			106	104	105	102
Volatiles	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	Benzene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	Ethylbenzene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
 1931 Robertson Road
 Ottawa, ON
 K2H 5B7
 Attention: Ms. Caitlin Cooke
 PO#:
 Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920733
 Date Submitted: 2019-11-11
 Date Reported: 2019-11-18
 Project: 1895756
 COC #: 205628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1465762 GW 2019-11-11 MW-1	1465763 GW 2019-11-11 MW-2	1465764 GW 2019-11-11 MW-3	1465765 GW 2019-11-11 MW-4
Group	Analyte	MRL	Units	Guideline					
Volatiles	m/p-xylene	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	o-xylene	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	Toluene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	Trichloroethylene	0.3	ug/L			<0.3	<0.3	<0.3	<0.3
	Xylene; total	0.5	ug/L			<0.5	<0.5	<0.5	<0.5

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Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920733
Date Submitted: 2019-11-11
Date Reported: 2019-11-18
Project: 1895756
COC #: 205628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 375809 Analysis/Extraction Date 2019-11-12 Analyst H D Method EPA 200.8			
Boron (total)	<0.01 mg/L	108	84.9-115
Iron	<0.03 mg/L	98	91-109
Manganese	<0.01 mg/L	103	92.9-107
Strontium	<0.001 mg/L	106	92.8-107.1
Zinc	<0.01 mg/L	99	91.5-108.4
Run No 375848 Analysis/Extraction Date 2019-11-13 Analyst C M Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F2	<20 ug/L	104	60-140
Petroleum Hydrocarbons F3	<50 ug/L	104	60-140
Petroleum Hydrocarbons F4	<50 ug/L	104	60-140
Run No 375910 Analysis/Extraction Date 2019-11-13 Analyst SKH Method M SM3120B-3500C			
Calcium	<1 mg/L	92	90-110
Magnesium	<1 mg/L	92	76-124
Sodium	<2 mg/L	111	82-118
Run No 375929 Analysis/Extraction Date 2019-11-13 Analyst AET Method SM2320,2510,4500H/F			

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Client: Golder Associates Ltd. (Ottawa)
1931 Robertson Road
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K2H 5B7
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920733
Date Submitted: 2019-11-11
Date Reported: 2019-11-18
Project: 1895756
COC #: 205628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Alkalinity (CaCO ₃)	<5 mg/L	94	90-110
Conductivity	<5 uS/cm	100	90-110
Run No 375991 Analysis/Extraction Date 2019-11-12 Analyst TJB Method EPA 8260			
Trichloroethane, 1,1,1-		107	60-130
Dichloroethane, 1,1-		104	60-130
Benzene		100	60-130
Ethylbenzene		100	60-130
Petroleum Hydrocarbons F1	<20 ug/L	100	60-140
Petroleum Hydrocarbons F1-BTEX			
m/p-xylene		100	60-130
o-xylene		98	60-130
Toluene		108	60-130
Trichloroethylene		107	60-130
Run No 375992 Analysis/Extraction Date 2019-11-15 Analyst TJB Method EPA 8260			
Xylene Mixture			
Run No 375993 Analysis/Extraction Date 2019-11-15 Analyst AET Method C SM2340B			

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 K2H 5B7
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Report Number: 1920733
 Date Submitted: 2019-11-11
 Date Reported: 2019-11-18
 Project: 1895756
 COC #: 205628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Hardness as CaCO ₃			
Run No 376038 Analysis/Extraction Date 2019-11-15 Analyst SG Method C SM4500-NH3D			
N-NH ₃	<0.01 mg/L	106	
Run No 376082 Analysis/Extraction Date 2019-11-15 Analyst AET Method SM 4110			
Chloride	<1 mg/L	100	90-110
SO ₄	<1 mg/L	105	90-110

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1931 Robertson Road
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K2H 5B7
Attention: Ms. Caitlin Cooke
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Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920734
Date Submitted: 2019-11-11
Date Reported: 2019-11-22
Project: 1895756
COC #: 205628

Page 1 of 6

Dear Caitlin Cooke:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:



Rebecca Koshy
2019.11.22
17:50:26 -05'00'

APPROVAL:

Rebecca Koshy, Project Manager

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Date Submitted: 2019-11-11
Date Reported: 2019-11-22
Project: 1895756
COC #: 205628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1465766 Leach 2019-11-11 L-2	1465767 Leach 2019-11-11 L-3
Group	Analyte	MRL	Units	Guideline			
Anions	Cl	1	mg/L			4110	8300
	SO4	1	mg/L			265	103
General Chemistry	Alkalinity as CaCO3	5	mg/L			457	516
	Conductivity	5	uS/cm			13300	23600
Hardness	Hardness as CaCO3	1	mg/L			1550	1730
Hydrocarbons	F1 (C6-C10)	20	ug/L			<20	<20
	F1-BTEX (C6-C10)	20	ug/L			<20	<20
	F2 (C10-C16)	20	ug/L			<20	<20
	F3 (C16-C34)	50	ug/L			<50	<50
	F4 (C34-C50)	50	ug/L			<50	<50
Metals	B	0.1	mg/L			0.2	0.1
	Ca	1	mg/L			472	549
	Fe	0.03	mg/L			12.0	73.3
	Mg	1	mg/L			89	87
	Mn	0.1	mg/L			1.8	1.0
	Na	2	mg/L			1920	4420
	Sr	0.001	mg/L			12.7	15.0
	Zn	0.1	mg/L			<0.1	<0.1
Nutrients	N-NH3	0.01	mg/L			1.80	3.76
PHC Surrogate	Alpha-androstrane	0	%			78	90
Subcontract	Aniline	2.0	ug/L			<2.0	4.0
VOCs Surrogates	Toluene-d8	0	%			108	110
Volatiles	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4
	Benzene	0.5	ug/L			<0.5	2.1

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Date Submitted: 2019-11-11
Date Reported: 2019-11-22
Project: 1895756
COC #: 205628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1465766 Leach 2019-11-11 L-2	1465767 Leach 2019-11-11 L-3
Group	Analyte	MRL	Units	Guideline			
Volatiles	Ethylbenzene	0.5	ug/L			<0.5	<0.5
	m/p-xylene	0.4	ug/L			<0.4	<0.4
	o-xylene	0.4	ug/L			<0.4	<0.4
	Toluene	0.5	ug/L			<0.5	<0.5
	Trichloroethylene	0.3	ug/L			1.0	1.6
	Xylene; total	0.5	ug/L			<0.5	<0.5

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Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920734
Date Submitted: 2019-11-11
Date Reported: 2019-11-22
Project: 1895756
COC #: 205628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 375809 Analysis/Extraction Date 2019-11-12 Analyst H D Method EPA 200.8			
Boron (total)	<0.1 mg/L	108	84.9-115
Iron	<0.03 mg/L	98	91-109
Manganese	<0.1 mg/L	103	92.9-107
Strontium	<0.001 mg/L	106	92.8-107.1
Zinc	<0.1 mg/L	99	91.5-108.4
Run No 375848 Analysis/Extraction Date 2019-11-13 Analyst C M Method CCME O.Reg 153/04			
Petroleum Hydrocarbons F2	<20 ug/L	104	60-140
Petroleum Hydrocarbons F3	<50 ug/L	104	60-140
Petroleum Hydrocarbons F4	<50 ug/L	104	60-140
Run No 375910 Analysis/Extraction Date 2019-11-13 Analyst SKH Method M SM3120B-3500C			
Calcium	<1 mg/L	92	90-110
Magnesium	<1 mg/L	92	76-124
Sodium	<2 mg/L	96	82-118
Run No 375929 Analysis/Extraction Date 2019-11-13 Analyst AET Method SM2320,2510,4500H/F			

Guideline = * = **Guideline Exceedence**

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 Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1920734
 Date Submitted: 2019-11-11
 Date Reported: 2019-11-22
 Project: 1895756
 COC #: 205628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Alkalinity (CaCO ₃)	<5 mg/L	94	90-110
Conductivity	<5 uS/cm	100	90-110
Run No 375991 Analysis/Extraction Date 2019-11-12 Analyst TJB Method EPA 8260			
Trichloroethane, 1,1,1-		107	60-130
Dichloroethane, 1,1-		104	60-130
Benzene		100	60-130
Ethylbenzene		100	60-130
Petroleum Hydrocarbons F1	<20 ug/L	100	60-140
Petroleum Hydrocarbons F1-BTEX			
m/p-xylene		100	60-130
o-xylene		98	60-130
Toluene		108	60-130
Trichloroethylene		107	60-130
Run No 375992 Analysis/Extraction Date 2019-11-15 Analyst TJB Method EPA 8260			
Xylene Mixture			
Run No 375993 Analysis/Extraction Date 2019-11-15 Analyst AET Method C SM2340B			

Guideline = * = **Guideline Exceedence**

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 COC #: 205628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Hardness as CaCO ₃			
Run No 376038 Analysis/Extraction Date 2019-11-15 Analyst SG Method C SM4500-NH3D			
N-NH ₃	<0.01 mg/L	106	
Run No 376082 Analysis/Extraction Date 2019-11-15 Analyst AET Method SM 4110			
Chloride	<1 mg/L	100	90-110
SO ₄	<1 mg/L	105	90-110
Run No 376459 Analysis/Extraction Date 2019-11-22 Analyst JM Method SUBCONTRACT-A			
Aniline	<2.0 ug/L	41	

Guideline = *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range



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