Appendix E

Tote Road Quarry – Water Balance Analysis

Technical Memorandum

February 4, 2022

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Subject	Tote Road Quarry – Water Balance Analysis		

1. Background

The following technical memorandum summarizes the water balance assessment completed for the proposed Scotian Materials Tote Road Quarry Expansion (the Project) located near Head of St. Margarets Bay, Halifax County, Nova Scotia. The proposed Project Site comprises approximately 20 hectares (ha) of forested land in addition to the existing less than 4 ha quarry. There are no streams or wetlands within the Project Site, however the Site does contribute surface water runoff to an unnamed watercourse to the west (herein referred to as WC1), four wetlands to the west and north (WL1 through WL4), Island Lake to the northwest, and Little Indian Lake to the southeast.

The water balance presented here is a preliminary assessment of the predicted effects on surrounding surface waterbodies caused by expansion of the quarry area. Three site conditions were analyzed; existing (baseline) conditions; end-of-quarry (EOQ) conditions; and reclamation conditions. EOQ conditions consider the quarry at full development of 24 ha and are expected to occur at approximately 30 years. Runoff in EOQ conditions will be discharged in the southwest portion of the Site. Reclamation conditions are representative of the Site upon removal of all construction equipment and buildings and after re-contouring and introducing plant material to the seeding and planting of the property. As such these represent “worst case” as some degree of progressive reclamation will happen as site development occurs.

1.1 Data Collection

1.1.1 Topographic Data

A 1 meter (m) digital elevation model (DEM) collected from the Nova Scotia Data Locator - Elevation Explorer was used to delineate the watershed areas for the Project Site (Nova Scotia 2019). Watershed delineations were produced by manually assessing 1 m contours generated from the DEM, and via PCSWMM, a hydrologic modelling software.

1.1.2 Climate Data

Precipitation totals were obtained from the Environment Canada 1981 to 2010 Climate Normals for the St. Margarets Bay Climate Station (Climate ID 8204800). This station was selected based on its proximity to the Project Site (approximately 2 km southeast of the Site) and relatively long record.

Monthly potential evapotranspiration normals were calculated using the Thornthwaite equation (1948). The Thornthwaite equation requires monthly average hours of daylight and monthly average temperature as inputs. Monthly average hours of daylight were calculated for the Site using the Sunrise and Sunset Calculator (https://www.timeanddate.com/sun/, last accessed 11 September 2021). Monthly average temperature values were obtained from the Environment Canada St. Margarets Bay Station.

Table 1 presents the temperature, total precipitation, and potential evapotranspiration rates used in the analysis.

Table 1 Climate Data

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
Temperature[1] (°C)	-5.7	-5.1	-1.2	4.3	9.4	14.3	17.8	18	14.2	8.5	3.8	-1.8
Precipitation[1] (mm)	130.1	106.5	134.4	111.7	119.1	96.5	95.7	83.9	101.8	122.1	147.3	132.6
PET[2] (mm/d)	0	0	0	0.8	1.9	3.2	3.7	3.4	2.5	1.3	0.5	0

Notes:

[1] Values obtained from the Environment Canada 1981 to 2010 Climate Normals for the St. Margarets Bay Climate Station

[2] Potential Evapotranspiration was calculated using the Thornthwaite equation (1948)

2. Methodology

A preliminary water balance assessment was developed to assess the potential environmental impacts of the proposed Project at the EOQ and reclamation conditions. The assessment was developed to determine the monthly changes to flow composition during an average year for the baseline, EOQ, and reclamation scenarios.

2.1 Watershed Delineation

Contributing drainage areas were delineated for watercourse WC1, wetlands WL1 through WL4, Island Lake, and Little Indian Lake. Pre-development drainage areas are as follows:

– WC1 – 77.81 ha
– WL1 – 6.41 ha
– WL2 – 1.99 ha
– WL3 – 6.00 ha
– WL4 – 41.11 ha
– Island Lake – 1,044.56 ha
– Little Indian Lake – 18,192.89 ha

Drainage areas for WC1, WL1 – WL4, and Island Lake are all subwatersheds within the Little Indian Lake watershed. The Little Indian Lake watershed experiences no net loss in area due to the Project.

The contributing drainage areas were delineated using PCSWMM software and the 1 m DEM and were verified by manual methods within a GIS environment. Watershed delineations are presented based on three life-cycle phases of the proposed quarry: Baseline Watershed Delineations are shown in Figures 1, 2, and 3, and EOQ and Reclamation Watersheds are shown in Figure 4. It should be noted the drainage from EOQ conditions to Reclamation conditions is expected to remain constant. As such watershed areas from EOQ conditions to Reclamation conditions do not change. During EOQ and reclamation conditions, water which falls on the quarry will be discharged to the drainage areas supplying WC1, WL4, and Island Lake.

2.2 Evaporation & Evapotranspiration Potential

Evaporation describes the process of the return of moisture to the atmosphere from open water and land surfaces. Evaporation from plant surfaces is called evapotranspiration. The magnitude of evaporation or evapotranspiration over time is a function of the climate, soil and the vegetation in the area. Evaporation rates tend to peak in the summer months when temperatures are highest, daylight hours are longest, sun intensity is greatest and the growing season is at its peak.

Evapotranspiration rates were calculated using the Thornthwaite equation (1948) as described in Section 1.1.2 based on average monthly temperature and daylight hours. Potential evapotranspiration rates for the five months of December to March were set to zero due to low temperatures resulting in minimal potential for evapotranspiration. The total potential evapotranspiration rate used for this water balance is 531 mm per year. July represents the month with the highest potential evaporation rate on average, at 3.7 mm/day or 114.6 mm per month. Table 1 provides a summary of the potential evaporation rates used as a water loss parameter in the water balance assessment.

2.3 Infiltration Factor

The water storage/infiltration has been estimated using the infiltration factors taken from Table 3.1 from the Ontario Ministry of Environment, Conservation and Parks (OMECP) SWM Planning and Design Manual (2003). Calculations using OMECP (2003) Table 3.1 accounts for slope, soil types, and vegetation cover when estimating water holding capacity for an area. Each watershed was individually analyzed to determine the slope, land use and soil type drainage factors. If multiple slope or land use segments existed within a watershed an area-ratio method was used to determine the appropriate infiltration factor. During existing conditions the watersheds in the project site were determined to be rolling (0.2 infiltration factor) or hilly land (0.1) with a combination of cultivated land (0.1) and woodland (0.2). Soil in the area is described in the Nova Scotia Soil Survey as having good to excessive drainage (Nova Scotia 1981).

Based on site observations and known quarry operating procedures, significant infiltration into the quarry floor can be expected due to the practice of blasting the quarry floor to create a flat surface for hauling aggregate. This blasting can go up to 3 m below the floor level of the quarry and creates significant void space between the blasted rock. While this additional volume was not accounted for in the model with regards to storage space, the quarry floor subcatchments were assumed to have a low runoff coefficient due to the significant infiltration which will occur. An infiltration factor of 0.9 was applied to quarry areas. An area-ratio method was applied to determine the appropriate infiltration factor for watersheds containing both forested and quarry areas.

Reclamation conditions were expected to be similar to existing conditions with the exception of Flat Land (0.3) and Cultivated Land (0.1) in the area where the quarry was located.

Runoff volumes for this water balance were assumed to equal the total precipitation less the potential evapotranspiration, and infiltration. Groundwater recharge was not included in this water balance. From the Nova Scotia Department of Natural Resources (NSDNR) Estimation of Regional Groundwater Budgets (2010), groundwater recharge in the area of the Site is between 220 and 260 mm per year.

3. Results

Table 2, Table 3, and Table 4, present the water balance analysis during existing, EOQ, and reclamation conditions respectively. Table 5, and Table 6 display the percentage change in area and runoff from existing conditions to EOQ and reclamation conditions respectively. A negative value in Table 5 and Table 6 represents a decrease in the value compared to existing conditions, and a positive value represents an increase in the value compared to existing conditions.

Table 2 Water Balance - Existing conditions

Watershed	Area (ha)	Runoff (m^3)	PET (m^3)	Infiltration (m^3)
WC1	77.81	300,711	371,341	355,384
WL1	6.41	31,912	27,188	26,020
WL2	1.99	5,780	10,408	9,961
WL3	6	20,875	29,737	28,459
WL4	41.11	152,825	199,079	190,524
Island Lake	1045.25	5,086,503	4,484,765	4,292,048

Table 3 Water Balance - EOQ conditions

Watershed	Area (ha)	Runoff (m^3)	PET (m^3)	Infiltration (m^3)
WC1	86.5	295,291	410,981	436,168
WL1	5.66	29,860	23,205	22,208
WL2	0.39	1,401	1,912	1,830
WL3	3.09	12,912	14,284	13,671
WL4	50.57	167,044	242,808	257,688
Island Lake	1052.04	5,105,056	4,520,768	4,326,503

Table 4 Water Balance – Reclamation Conditions

Watershed	Area (ha)	Runoff (m^3)	PET (m^3)	Infiltration (m^3)
WC1	86.5	324,491	417,486	399,546
WL1	5.66	29,860	23,205	22,208
WL2	0.39	1,401	1,912	1,830
WL3	3.09	12,912	14,284	13,671
WL4	50.57	178,711	249,313	238,600
Island Lake	1052.04	5,106,976	4,524,494	4,330,070

Table 5 EOQ Conditions comparison to Existing Conditions

Watershed	%Area Change	%Runoff Change
WC1	11.17%	-1.80%
WL1	-11.70%	-6.43%
WL2	-80.40%	-75.75%
WL3	-48.50%	-38.15%
WL4	23.01%	9.30%
Island Lake	0.65%	0.36%

Table 6 Reclamation Conditions comparison to Existing Conditions

Watershed	%Area Change	%Runoff Change
WC1	11.17%	7.91%
WL1	-11.70%	-6.43%
WL2	-80.40%	-75.75%
WL3	-48.50%	-38.15%
WL4	23.01%	16.94%
Island Lake	0.65%	0.40%

4. Conclusions

The results from the water balance analysis can be used to assess the potential impact of the proposed quarry development on the receiving environment in terms of the change in runoff volume discharged to WC1, WL1 – WL4, and Island Lake.

Under EOQ and Reclamation conditions WC1 and WL4 experience increases in drainage area of 11.17% and 23.01% respectively due to quarry extents discharging to those catchments. In the EOQ scenario, runoff decreases 1.80% in the WC1 watershed and increases 9.30% in the WL4 watershed. In the Reclamation scenario, runoff in the WC1 and WL4 watersheds increases 7.91% and 16.94%. These changes are not significant in terms of possible impacts to the function of WC1 and WL4.

The catchment supplying WL1 experiences a decrease in area of 11.70% and a decrease in runoff of 6.43% under EOQ and Reclamation conditions. These changes are not significant in terms of possible impacts to the function of WL1.

The catchments supplying WL2 and WL3 experience decreases in area of 80.40% and 48.50% respectively under EOQ and Reclamation conditions. Runoff in these catchments decreases 75.75% and 38.15% respectively under EOQ and Reclamation conditions. These changes are considered significant in terms of possible impacts to the function of WL2 and WL3.

The catchment supplying Island Lake increases 0.65% under EOQ and Reclamation conditions. Runoff in this catchment increases 0.36% under EOQ and Reclamation. These changes are not significant in terms of possible impacts to the lake's function.

When discussing the results of this water balance it should be noted that this quarry will be developed over the course of approximately 30 years. The lengthy duration of development will allow the surrounding environment to slowly adjust to changes in the hydrologic regime. In addition, reclamation will occur throughout the course of the mine's life span. As such, the EOQ conditions represent the worst-case scenario in terms of overall development.

5. Closure

This technical memo was prepared by Glen Merkley and reviewed by Andrew Betts.

All of which is respectfully submitted

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6. References

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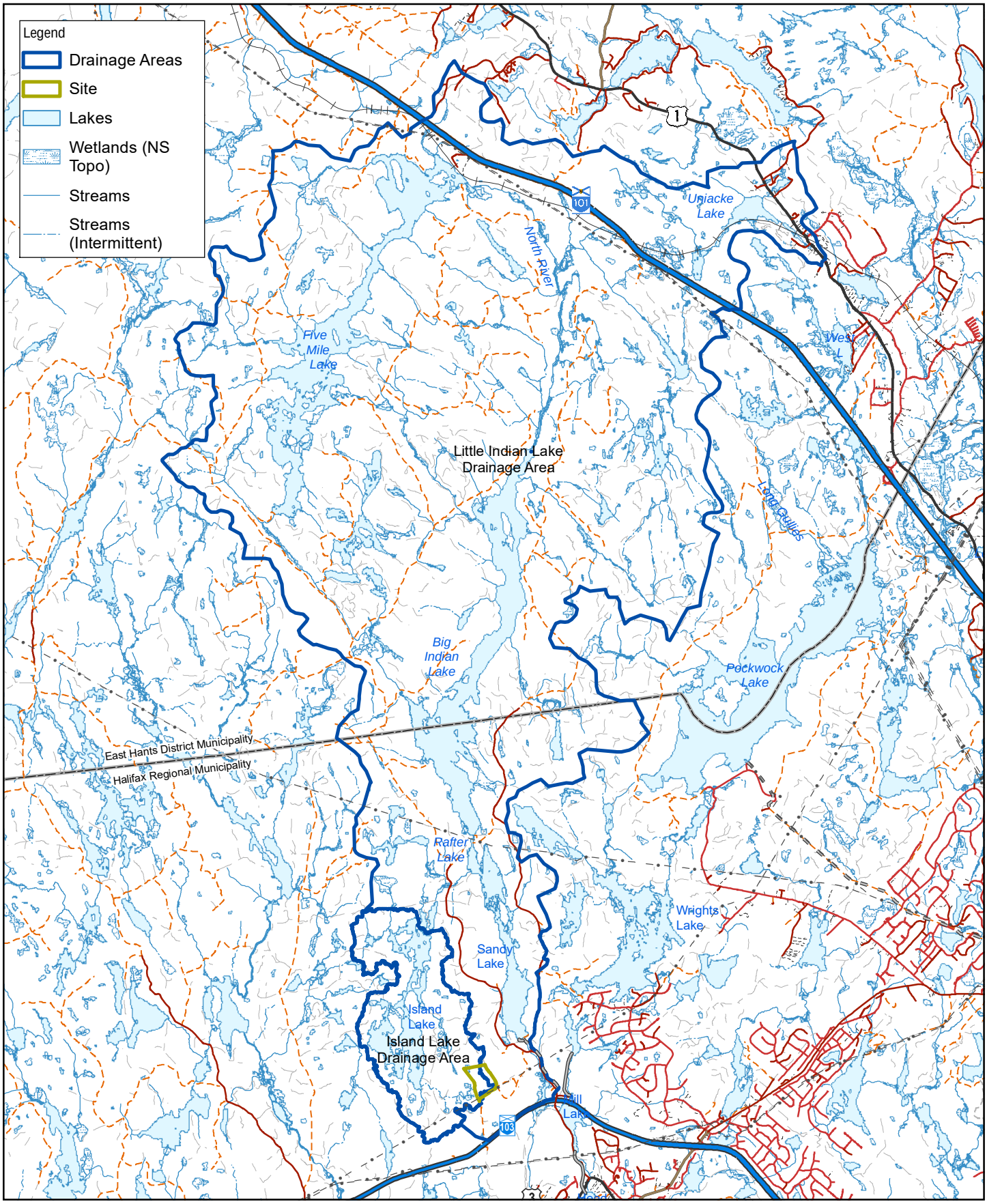

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GHD

SCOTIAN MATERIALS LIMITED
HEAD OF ST MARGARETS, NOVA SCOTIA
TOTE ROAD QUARRY EXPANSION

BASELINE WATERSHED DELINEATION LITTLE INDIAN LAKE DRAINAGE AREA

Project No. 11216599
Revision No. -
Date 21/10/2021

FIGURE 1

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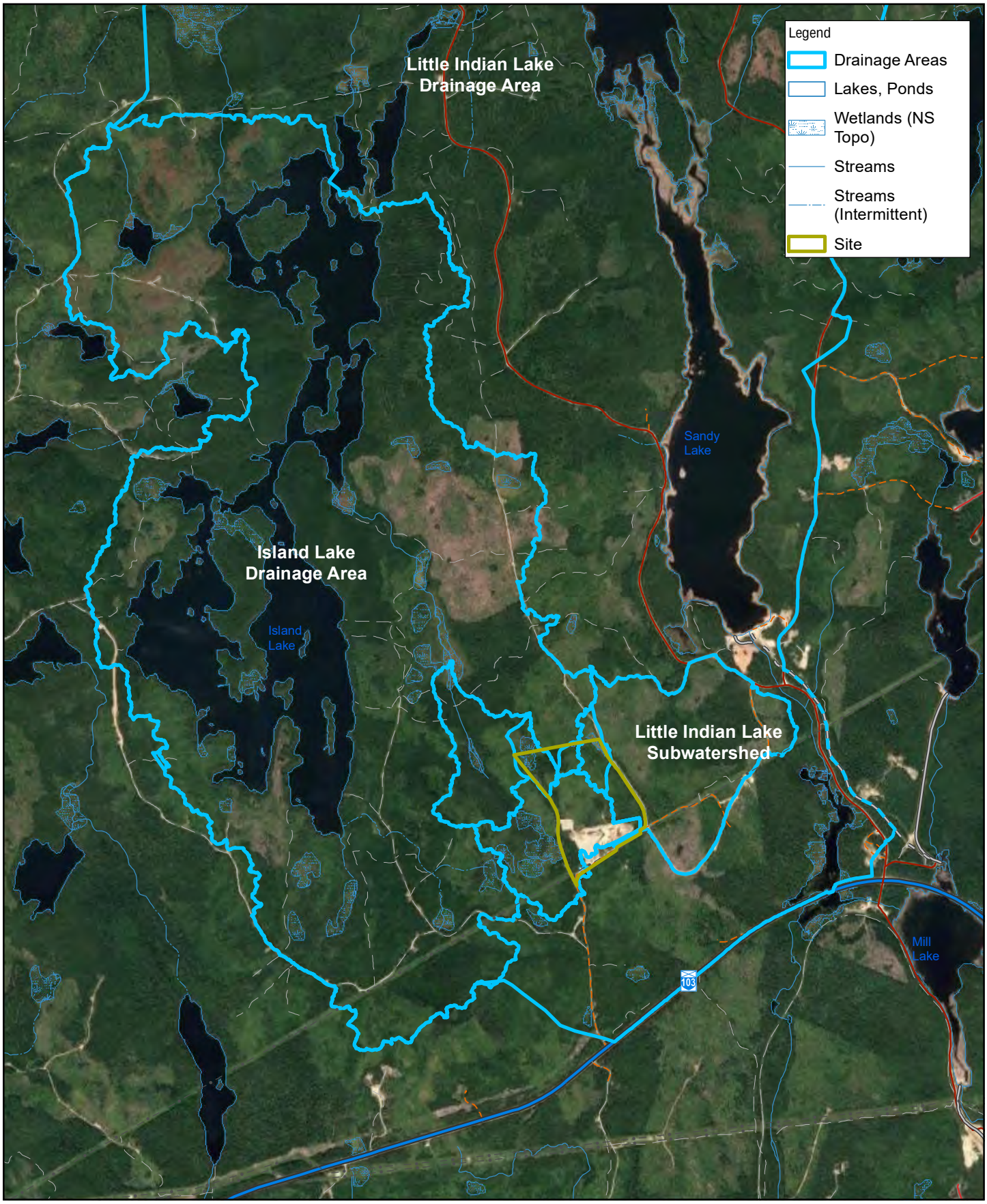

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SCOTIAN MATERIALS LIMITED
HEAD OF ST MARGARETS BAY, NOVA SCOTIA
TOTE ROAD QUARRY EXPANSION PROJECT

BASELINE WATERSHED DELINEATION
ISLAND LAKE

Project No. 11216599
Revision No. -
Date 21/10/2021

FIGURE 2

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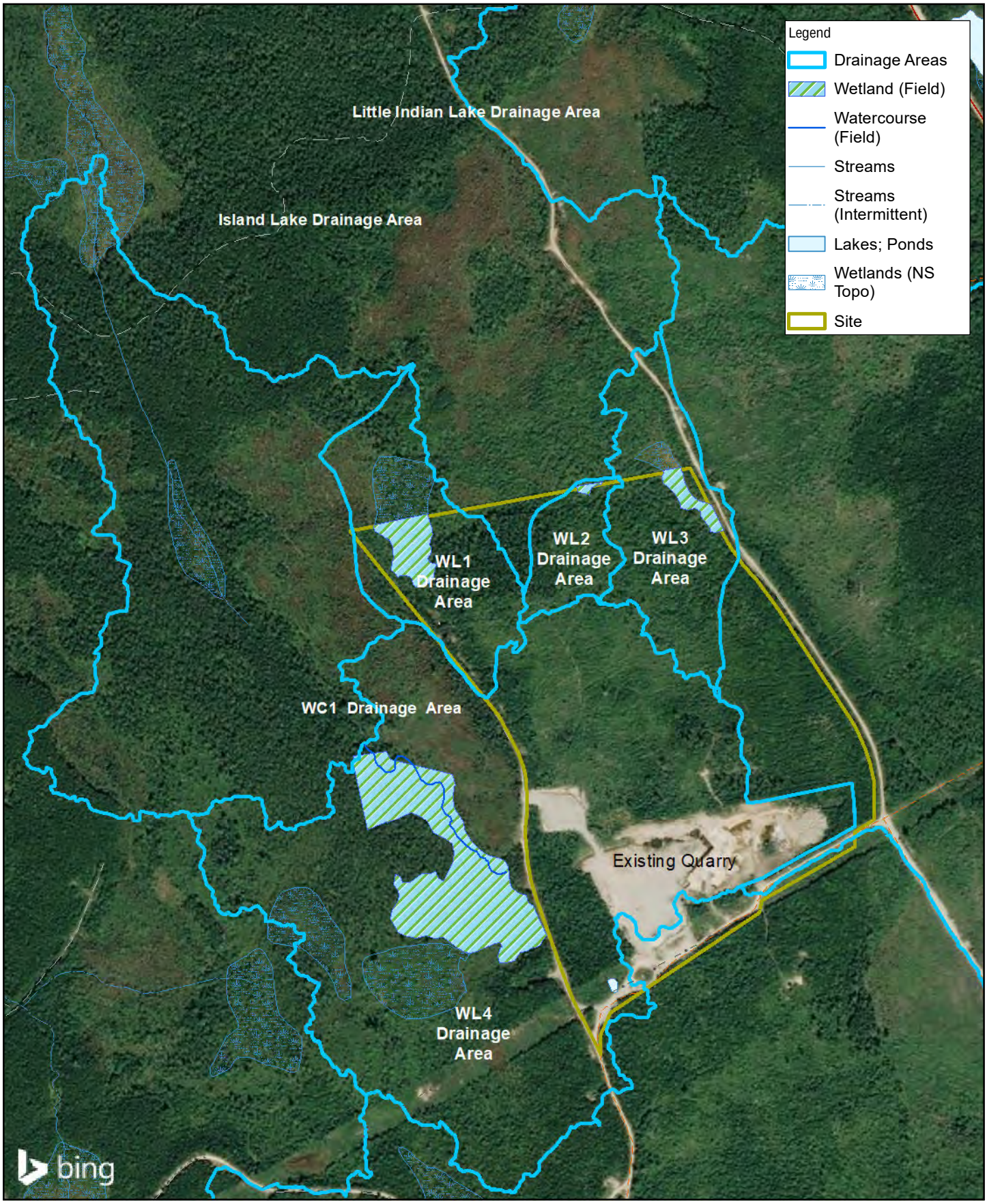

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GHD

SCOTIAN MATERIALS LIMITED
HEAD OF ST MARGARETS BAY, NOVA SCOTIA
TOTE ROAD QUARRY EXPANSION PROJECT

BASELINE WATERSHED DELINEATION

Project No. 11216599
Revision No. -
Date 21/10/2021

FIGURE 3

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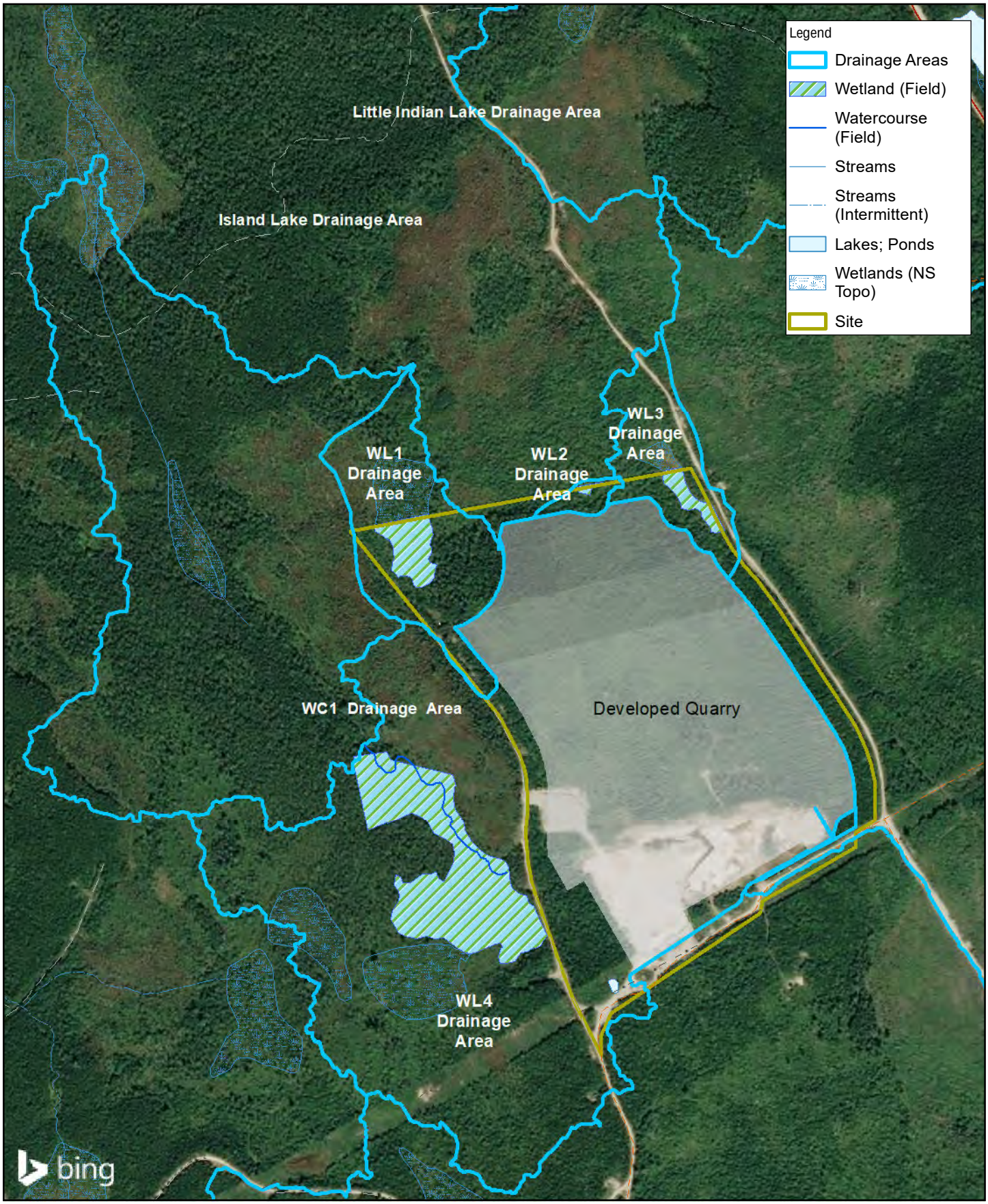

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Metres

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GHD

SCOTIAN MATERIALS LIMITED
HEAD OF ST MARGARETS BAY, NOVA SCOTIA
TOTE ROAD QUARRY EXPANSION PROJECT

END OF QUARRY (EOQ) AND RECLAMATION WATERSHED DELINEATION

Project No. 11216599
Revision No. -
Date 21/10/2021

FIGURE 4

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Appendix F

Monitoring Well Installation and Baseline Groundwater Quality Program – Tote Road Quarry

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Our ref: 11216599

November 01, 2021

Mr. Robert MacPherson, P. Eng.
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Monitoring Well Installation and Baseline Groundwater Quality Program, Tote Road Quarry, Head of St. Margaret's Bay, Nova Scotia

Dear Mr. MacPherson:

1. Introduction

GHD is pleased to provide Scotian Materials Limited (Scotian) with the results of the Monitoring Well Installation and Baseline Groundwater Monitoring Program completed at the Tote Road Quarry (PID 41457821) located on Tote Road, Head of St. Margaret's Bay, Halifax County, Nova Scotia (NS).

The scope of work was based on the proposed work plan outlined in GHD's proposal dated September 23, 2020 in support of the development and submission of an Environmental Assessment Registration Document (EARD) for the expansion of the Tote Road Quarry, which included the following tasks related to the hydrogeologic investigation:

– Site reconnaissance to identify monitoring well locations
– Installation of four monitoring wells
– Groundwater sampling
– Installation of transducers (Divers and Baro-Diver) to monitor changes in groundwater levels

The purpose of the Monitoring Well Installation and Baseline Groundwater Monitoring Program is to establish baseline groundwater levels and quality prior to the expansion of the Tote Road Quarry.

This letter includes the following:

– Attachment 1: Borehole Logs
– Attachment 2: Laboratory Certificates of Analysis

2. Site Location and Description

The Tote Road Quarry is located on Tote Road, Head of St. Margarets Bay, Halifax County, NS (the Site), approximately 2.3 kilometres (km) west of the community of Westwood Hills, Upper Tantallon, NS, and 2.5 km northwest of the community Head of St. Margarets Bay, NS. Access to Tote Road Quarry is from

Highway 103 Exit 5A at Ingramport, NS via a new property access road to Tote Road or from Highway 3 at Head of St. Margarets Bay Road via Bowater Mersey Road, Hiking Trail Road, and then by an unnamed road to the Site. The Site Location is shown on Figure 1.

An Industrial Approval (IA) (2014-090423-01) to construct, operate, and reclaim a quarry less than 4 hectares (ha) was granted by the Nova Scotia Environment (NSE) [now the Department of Environment and Climate Change (ECC)] in 2014. Operations at the Tote Road Quarry to date have included grubbing and removal of overburden soils, blasting, crushing, and stockpiling aggregate. The existing quarry has been developed to the approved footprint, however there are aggregate reserves remaining within this area.

3. Method of Investigation

The following section provides an overview of the fieldwork and sampling methodology used as part of the Monitoring Well Installation and Baseline Groundwater Monitoring Program. It is noted that prior to proceeding with any subsurface investigation, various utility representatives were contacted to identify underground utility locations. Prior to drilling activities GHD completed a site reconnaissance visit with Scotian on March 12, 2021, to identify monitoring well locations. Monitoring wells were installed outside of the proposed expansion footprint as part of the Tote Road Quarry Expansion Project, where possible.

The primary potential environmental receptors are the wetlands adjacent to the Tote Road Quarry. There are no nearby domestic water supply wells within 2.5 km of the Project Site. The rationale for the monitoring locations is provided below.

Monitoring Well	Rationale
MW-01	Adjacent to the wetland west of the property
MW-02	Adjacent to the wetland in northwest corner of the property
MW-03	Adjacent to the wetland in northeast corner of the property
MW-04	Provide groundwater data from the central portion of the property

3.1 Monitoring Well Installation

Logan Drilling and Geotechnical (Logan) was retained by GHD to advance four boreholes completed as monitoring wells using a CME-75 track mounted drill rig. The field investigation was carried out between April 6 and 8, 2021 under the full-time supervision of GHD field staff.

Logan advanced four boreholes to depths ranging from 6.55 (MW-03) to 9.75 (MW-01) metres below ground surface (mbgs) completed as monitoring wells. Hollow stem and standard augers were used to advance through the overburden. Overburden was characterized using split-spoon samplers and wet rotary drilling methods were used to advance the boreholes through bedrock. HQ 2.5” core was retrieved during bedrock drilling and was logged by GHD staff.

A monitor well, consisting of a 50 mm diameter polyvinyl chloride (PVC) 20-slot screen and riser, was installed in each borehole. The annular space between the PVC screen and the borehole wall was backfilled with #2 silica sand to a height of 0.6 m above the top of the well screen, followed by hydrated bentonite pellets ranging from 2.6 to 3.0 m thick to seal the well between bedrock and the overburden, topped with silica sand to ground surface. Each monitoring well was secured with a locking j-plug and protected with an above-ground protective cover. Each monitoring well was developed and purged a minimum of 9 well volumes, or until dry, following installation.

All monitoring wells had transducers (Divers) installed at a depth of 0.5 – 1.0 m from the bottom of the monitoring well, to automatically record water levels every 15 minutes. GHD also installed a Baro-Diver near MW-03, to compensate the pressure data for the effects of atmospheric pressure.

A summary of the monitoring well details is presented below. The stratigraphic sequence encountered in the newly installed boreholes was predominantly silty sand with trace clay and trace gravel underlain by light to medium grey medium grained Sandy Lake Biotite Monzogranite. The locations of the monitoring well locations are shown on Figure 2. Stratigraphic descriptions are presented on the monitoring well logs in Attachment 1.

	MW-01	MW-02	MW-03	MW-04
Borehole Depth (mbgs)	9.75	6.63	6.55	9.50
Depth to Bedrock (mbgs)	2.90	0.94	0.69	0.89
Depth to Groundwater (mbtr) April / August 2021	5.241 / 5.387	0.453 / 0.584	0.844 / 1.032	1.541 / 1.957
Screened Interval (mbgs)	6.71-9.75	3.58-6.63	3.51-6.55	6.45-9.50
Notes: mbgs – metres below ground surface mbtr – metres below top of riser				

3.2 Groundwater Monitoring and Sampling

The newly constructed monitoring wells (MW-01, MW-02, MW-03, and MW-04) were sampled on April 8, 2021. A subsequent round of groundwater monitoring was completed on August 17 and 18, 2021. Prior to collecting the groundwater samples, the static water levels were measured in each monitoring well, and the well was purged. GHD purged a minimum of three well volumes from the wells. GHD monitored stabilization parameters (temperature, pH, and conductivity) until they stabilized.

The water level in each of the monitoring well was allowed to recover to its approximate static water level prior to collecting the groundwater samples. Monitor wells were developed with polyethylene tubing, fitted with a foot valve, and groundwater samples were collected using a dedicated disposable bailer to minimize sediment accumulative in the sample bottles. Samples collected for dissolved metals analysis were filtered first using a syringe and 0.45 µm filter or dedicated Waterra tubing and in-line filter. The preservative for the dissolved metals sample collected from MW-04 in April 2021 was rinsed out in the field, and sample was submitted for lab filtration and preservation due to turbid water quality following the recent installation of the monitoring well. All dissolved metals samples collected in August 2021 were field filtered.

The groundwater samples were placed directly in new laboratory supplied sample bottles and then transferred to coolers with ice immediately after they were collected. The samples were maintained in cool storage until they were delivered to AGAT Laboratory in Dartmouth, NS.

3.3 Laboratory Analyses

The groundwater samples collected from the monitoring wells were submitted for standard water and dissolved metals analysis. A total of five (5) groundwater samples, including one (1) field duplicate sample (MWDUP) were collected during the April 2021 and August 2021 groundwater monitoring, and submitted for analysis. Field duplicate sample (MWDUP) was collected at MW-03 in April 2021 and at MW-02 in August 2021.

All samples were submitted to the laboratory in coolers filled with ice to keep samples at <10°C. Standard chain of custody forms accompanied these samples to the laboratory.

The samples were submitted to the AGAT Laboratories Ltd. (AGAT) in Dartmouth, Nova Scotia. AGAT is accredited by the Standards Council of Canada and Canadian Association for Laboratory Accreditation Inc.

Analytical methods used by the laboratory are referenced in the certificates of analysis presented in Attachment 2.

4. Applicable Standards and Results for Groundwater Analysis

4.1 Field Observations

On April 8, 2021, the depth to groundwater ranged from 0.453 to 5.241 mbgs. On August 17, 2021, the depth to groundwater ranged from 0.584 to 5.387 mbgs. In October of 2021 DesignPoint Engineering & Surveying Ltd. surveyed the monitoring wells. Groundwater elevations are presented in Table 1.

The groundwater elevation data presented on Figure 2 indicate groundwater elevations are higher beneath the topographic high in the center of the property than the areas adjacent the wetlands on and near the property. Bedrock groundwater flows in a radial pattern from the topographic high near MW-04 to the property boundary and adjacent wetlands.

The interpretation of the groundwater levels and flow direction is based on measurements collected from two monitoring events (April and August 2021) and will be confirmed with future groundwater elevation monitoring.

4.2 Applicable Comparison Standards

The groundwater analytical results at the Site are compared to Health Canada Guidelines for Canadian Drinking Water Quality Guidelines (CDWQG) [Maximum Allowable Concentration (MAC) and Aesthetic Objective (AO)], Canadian Council of Ministers of the Environment guidelines for the protection of Freshwater Aquatic Life (CCME FWAL), and Nova Scotia Environment (NSE) Pathway Specific Standards (PSS) for groundwater; groundwater discharge to surface water (0-10 m from a freshwater body).

4.3 Interpretation and Evaluation of Results

The following section provides an overview of the groundwater monitoring program analytical results and exceedances. The groundwater analytical results for standard water analysis and dissolved metals are compared to the applicable guidelines in Tables 2 and 3. Laboratory analytical certificates are provided in Attachment 2. Groundwater exceedances indicated in the analytical results are summarized in Table 1 (Standard water analysis) and Table 2 (Dissolved Metals) below.

Table 1 Groundwater Exceedances – Standard Water Analysis

Monitoring Well ID	Date	Canadian Drinking Water Quality Guidelines; MAC	Canadian Drinking Water Quality Guidelines; AO	CCME for the protection of Freshwater Aquatic Life	NSE PSS for GW; GW Discharge to SW (0-10 m from a freshwater body)
MW-01	8-Apr-21	--	pH, Turbidity	pH	--
	18-Aug-21	--	pH, Turbidity	pH	--
MW-02	8-Apr-21	--	pH, Turbidity	pH	--
	18-Aug-21	--	pH, Turbidity	pH	--

Monitoring Well ID	Date	Canadian Drinking Water Quality Guidelines; MAC	Canadian Drinking Water Quality Guidelines; AO	CCME for the protection of Freshwater Aquatic Life	NSE PSS for GW; GW Discharge to SW (0-10 m from a freshwater body)
MWDUP (Field Dup of MW-02)		--	pH, Turbidity	pH	--
MW-03	8-Apr-21	--	pH, Turbidity	pH	--
MWDUP (Field Dup of MW-03)		--	pH, Turbidity	pH	--
MW-03	18-Aug-21	--	pH, Turbidity	pH	--
MW-04	8-Apr-21	--	pH, Turbidity	Fluoride, Ammonia	--
	18-Aug-21	--	pH, Turbidity	pH	--
Note: -- denotes no exceedance					

Table 2 Groundwater Exceedances – Dissolved Metals

Monitoring Well ID	Date	Canadian Drinking Water Quality Guidelines; MAC	Canadian Drinking Water Quality Guidelines; AO	CCME for the protection of Freshwater Aquatic Life	NSE PSS for GW; GW Discharge to SW (0-10 m from a freshwater body)
MW-01	8-Apr-21	Manganese	Iron, Manganese	Aluminium, Cadmium, Copper, Iron, Manganese, Zinc	Aluminium, Cadmium, Chromium, Copper, Iron, Zinc
	18-Aug-21	Manganese	Iron, Manganese	Aluminium, Cadmium, Iron, Manganese, Zinc	Aluminium, Cadmium, Chromium Iron, Zinc
MW-02	8-Apr-21	--	Manganese	Aluminium, Cadmium, Copper, Zinc	Aluminium, Cadmium, Copper, Zinc
	18-Aug-21	--	Aluminium	Aluminium, Cadmium, Copper	Aluminium, Cadmium, Copper
MWDUP (Field Dup of MW-02)		--	Aluminium	Aluminium, Cadmium, Copper	Aluminium, Cadmium, Copper
MW-03	8-Apr-21	Lead, Manganese	Manganese	Aluminium, Copper, Lead, Manganese	Aluminium, Cadmium, Copper, Lead
MWDUP (Field Dup of MW-03)		Manganese	Manganese	Aluminium, Copper, Manganese	Aluminium, Cadmium, Copper

Monitoring Well ID	Date	Canadian Drinking Water Quality Guidelines; MAC	Canadian Drinking Water Quality Guidelines; AO	CCME for the protection of Freshwater Aquatic Life	NSE PSS for GW; GW Discharge to SW (0-10 m from a freshwater body)
MW-03	18-Aug-21	Manganese	Manganese	Aluminium	Aluminium, Cadmium
MW-04	8-Apr-21	Manganese	Manganese	Aluminium, Cadmium, Copper, Manganese, Zinc	Aluminium, Cadmium, Copper, Zinc
	18-Aug-21	Manganese	Manganese	Aluminium, Cadmium, Copper, Manganese, Zinc	Aluminium, Cadmium, Copper, Manganese, Zinc
Note: -- denotes no exceedance					

The Nova Scotia Department of Natural Resources has published a series of groundwater chemistry maps for selected naturally occurring parameters including aluminum[1], iron[2], and manganese[3]. Cadmium and zinc occur naturally in groundwater because they are mineral constituents, and they were detected in baseline groundwater samples that were collected prior to any site relates activities in the immediate vicinity of the newly installed monitoring wells. Therefore, aluminum, cadmium, iron, lead, manganese, and zinc are all naturally occurring in groundwater.

4.4 Quality Assurance and Quality Control Results

A QA/QC program was implemented to reduce and quantify potential issues introduced during sample collection, handling, shipping, and analysis. The program included, but was not limited to using dedicated sampling equipment, sample specific identification and chain of custody records.

The results of the laboratory QA/QC analyses are presented in the laboratory certificates of analysis in Attachment 2. The analyses include method blanks, matrix spikes, and laboratory control samples. No laboratory QA/QC issues were identified that call into question the reliability of the laboratory data reported.

The field QA/QC samples included one groundwater field duplicate sample (MWDUP, field duplicate of MW-03 in April 2021 and field duplicate of MW-02 in August 2021). The relative percent differences (RPDs) associated with the duplicate samples must be less than 50 percent. All field duplicate results were within acceptable agreement, demonstrating acceptable sampling and analytical precision.

The results of the duplicate sample comparisons are considered acceptable and assist in confirming laboratory precision and/or absence of significant cross-contamination attributed to sample collection and handling activities.

[1] Kennedy, G. W. 2021. Aluminum in groundwater from bedrock aquifers in Nova Scotia; Nova Scotia Department of Energy and Mines, Geoscience and Mines Branch,
Open File Map ME 2021-001, scale 1:500 000

[2] Kennedy, G. W. and Finlayson-Bourque, D. 2011: Iron in groundwater from bedrock aquifers in Nova Scotia; Nova Scotia Department of Natural Resources, Mineral Resources
Branch, Open File Map ME 2011-022, scale 1:500 000

[3] Kennedy, G. W. 2019: Manganese in groundwater from bedrock aquifers in Nova Scotia; Nova Scotia Department of Energy and Mines, Geoscience and Mines Branch, Open File
Map ME 2019-002, scale 1:500 000

5. Conclusions

GHD was retained by Scotian Materials Limited to complete an initial hydrogeologic investigation, including monitoring well Installation and baseline groundwater monitoring program at the Tote Road Quarry Expansion Project property located in Head of St. Margaret's Bay, NS. The program included drilling four boreholes, completed as monitoring wells and two rounds of baseline groundwater monitoring (April 2021 and August 2021) The purpose of the Monitoring Well Installation and Baseline Groundwater Monitoring Program is to establish baseline groundwater levels and quality prior to the expansion of the Tote Road Quarry.

A total of five (5) groundwater samples [including one (1) field duplicate] were submitted to AGAT Laboratories for standard water analysis and dissolved metals for each round of groundwater monitoring.

Standard water analysis parameters were within the applicable CDWQ, CCME FWAL and NSE PSS guidelines with the exception of CDWQ AO guidelines for pH and turbidity in all monitoring wells during the April and August 2021 groundwater monitoring, CCME FWAL guidelines for pH in samples collected from MW-01, MW-02, MW-03 during the April and August 2021 monitoring and MW-04 during the August 2021 monitoring, and exceedances of applicable CCME FWAL guidelines for fluoride and ammonia in the sample collected from MW-04 during the April 2021 monitoring event.

During the April 2021 groundwater monitoring event, dissolved metals were within the applicable CDWQ, CCME FWAL, and NSE PSS guidelines with the exception of the CCME FWAL and NSE PSS guidelines for aluminum in all samples submitted, CCME FWAL cadmium exceedance in MW-01, MW-02, MW-04 and NSE PSS exceedances of cadmium in all samples, NSE PSS exceedance of chromium in MW-01, exceedance of copper NSE PSS and CCME FWAL guidelines in all samples submitted, exceedance of CDWQ AO, CCME FWAL and NSE PSS guidelines of iron in MW-01, lead exceedances of CDWQ MAC, CCME FWAL, and NSE PSS guidelines in MW-03, manganese exceedances of CDWQ MAC and CCME FWAL guidelines in samples submitted from MW-01, MW-03, MWDUP (Field Dup of MW-03) ad MW-04, and manganese exceedances of CDWQ guidelines in all samples submitted, samples submitted from MW-01, MW-02 and MW-04 also exceeded CCME FWAL and NSE PSS guidelines for zinc.

Analytical results from the August 2021 groundwater monitoring event indicate dissolved metals were within the applicable CDWQ, CCME FWAL, and NSE PSS guidelines with the exception of the CCME FWAL and NSE PSS guidelines for aluminum in all samples submitted. Samples submitted from MW-02 and MWDUP (Field Dup of MW-02) also exceeded applicable CDWQ AO guidelines for aluminum. Applicable CCME FWAL guidelines for cadmium were exceeded in samples submitted from MW-01, MW-02, MW-04 and NSE PSS exceedances of cadmium in all samples, NSE PSS exceedance of chromium in MW-01, exceedance of copper CCME FWAL and NSE PSS guidelines in samples submitted from MW-02 and MW-04, exceedance of CDWQ AO, CCME FWAL and NSE PSS guidelines of iron in MW-01, manganese exceedances of CDWQ MAC and CDWQ AO in samples submitted from MW-01, MW-03 and MW-04, manganese exceedances of CCME FWAL guidelines in MW-01 and MW-04 and NSE PSS in samples submitted from MW-04. Samples submitted from MW-01 and MW-04 also exceeded CCME FWAL and NSE PSS guidelines for zinc.

Aluminum, cadmium, iron, lead, manganese, and zinc are all naturally occurring in groundwater.

6. Limitation of Liability, Scope of Report and Third Party Reliance

This report has been prepared and the work referred to in this report has been undertaken by GHD for Scotian Materials Limited. It is intended for the sole and exclusive use of Scotian, its affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively, "Scotian"). Any use, reliance on or

decision made by any person other than Scotian based on this report is the sole responsibility of such other person. Scotian and GHD make no representation of warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any other liability of responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by GHD with respect to this report and any conclusions or recommendations made in this report reflect GHD's judgement based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information examined at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis where were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than by Scotian, copying or distribution of this report or use of, or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of GHD. Nothing in this report is intended to constitute or provide a legal opinion.

7. Closure

We trust this submission meets with your requirements, however if you have any questions please contact the undersigned at your convenience.

Regards,

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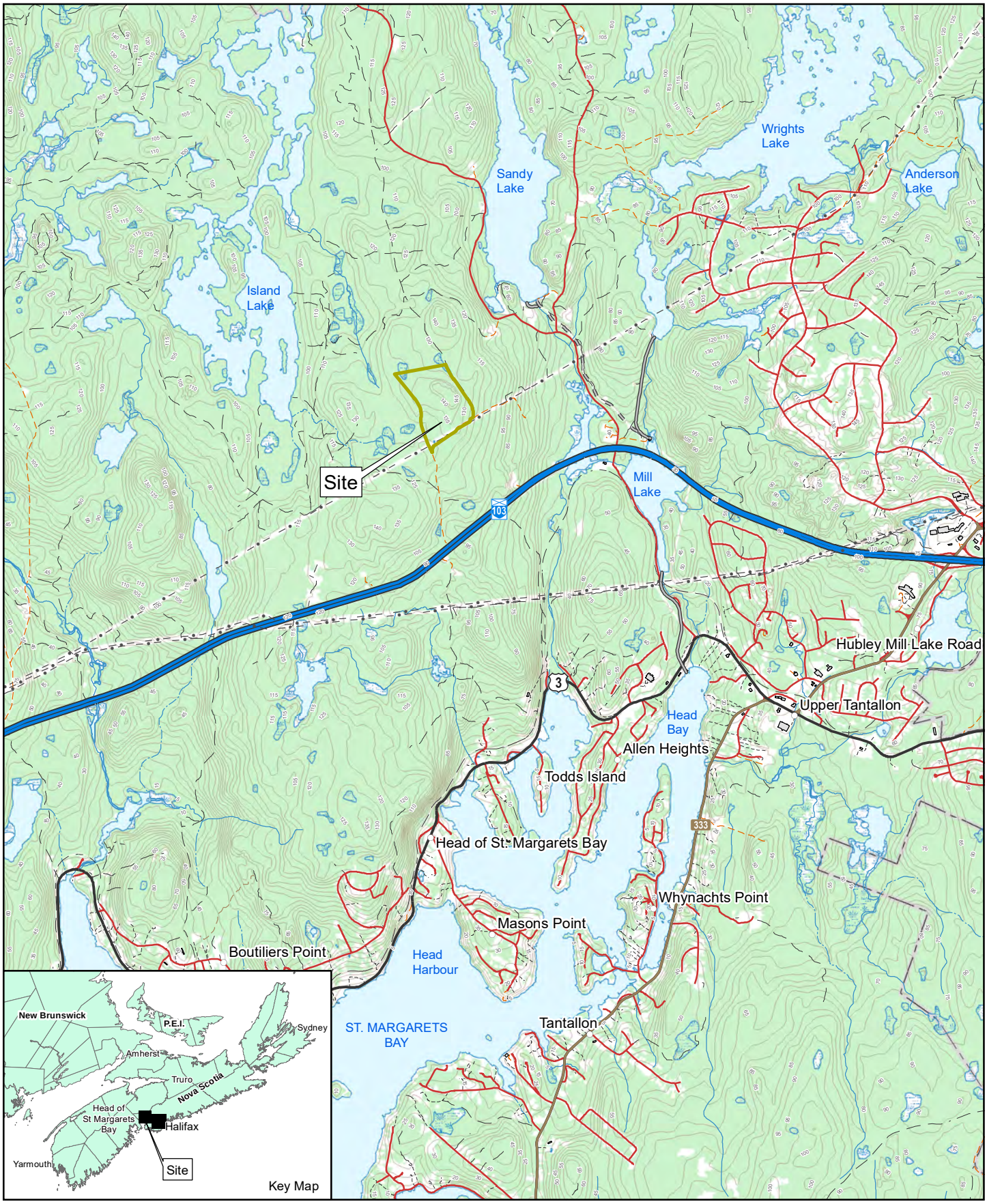
JR/tj/3

Encl.



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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983 CSRS
Grid: NAD 1983 CSRS UTM Zone 20N

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GHD

SCOTIAN MATERIALS LIMITED
HEAD OF ST. MARGARETS BAY, NOVA SCOTIA
TOTE ROAD QUARRY EXPANSION PROJECT

SITE LOCATION

Project No. 11216599
Revision No. -
Date 12/05/2021

FIGURE 1

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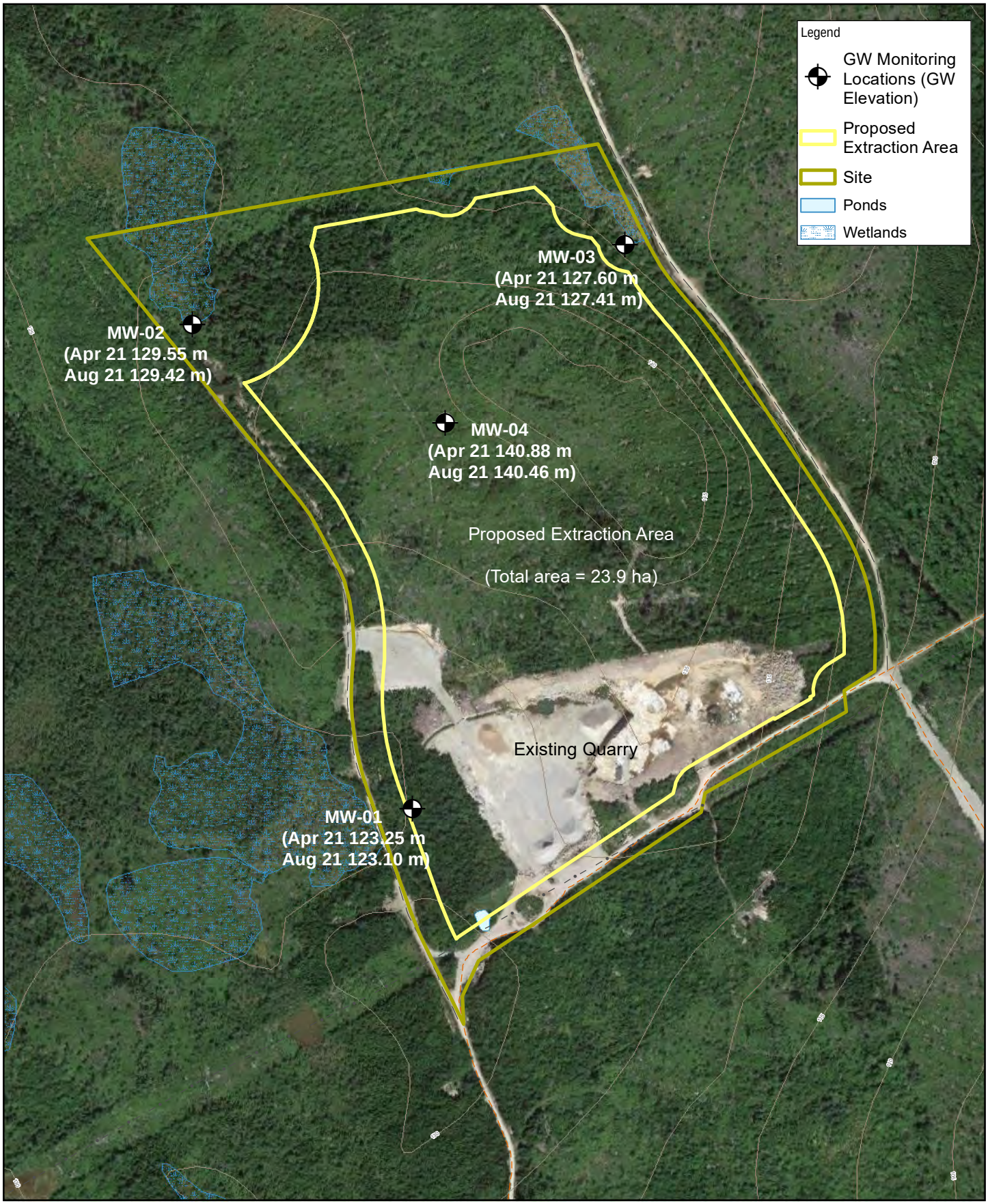

Paper Size ANSI A

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983 CSRS
Grid: NAD 1983 CSRS UTM Zone 20N

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GHD

SCOTIAN MATERIALS LIMITED
HEAD OF ST MARGARETS, NOVA SCOTIA
TOTE ROAD QUARRY EXPANSION

MONITORING WELL
SITE PLAN

Project No. 11216599
Revision No. -
Date 4/11/2021

FIGURE 2

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Data source: GeoNova, Scotian Materials, GHD . Created by: jjparks

Table 1
Tote Road Quarry Expansion Project - Groundwater Monitoring Well Summary
Tote Road Quarry Monitoring Well Installation and Baseline Groundwater Quality Program

Monitor Well ID	Ground Surface (masl)	Screen Interval (mbgs)	Date	GPS Coordinates	Total Drill Depth (mbgs)	Static Water Level (mbtr)	Total Well Depth (mbtr)	Riser (m)	Reference Elevation[1] (masl)	Groundwater Elevation[2] (masl)
MW-01	127.61	6.71-9.75	8-Apr-21	44.712163, -63.923405	9.75	5.24	10.58	0.88	128.49	123.25
			17-Aug-21			5.39	10.52			123.10
MW-02	129.35	3.58-6.63	8-Apr-21	44.716363, -63.926156	6.63	0.45	7.11	0.65	130.00	129.55
			17-Aug-21			0.58	7.03			129.42
MW-03	127.88	3.51-6.55	8-Apr-21	44.717108, -63.920885	6.55	0.84	7.07	0.56	128.44	127.60
			17-Aug-21			1.03	7.00			127.41
MW-04	141.61	6.45-6.50	8-Apr-21	44.715537, -63.923049	9.50	1.54	10.23	0.81	142.42	140.88
			17-Aug-21			1.96	10.15			140.46

[1] Reference Elevation = Ground Surface + Riser
[2] Groundwater Elevation = Reference Elevation - Static Water Level
masl - metres above sea level
mbgs - metres below ground surface
mbtr - metres below top of riser

Table 2
Tote Road Quarry Expansion Project - Standard Water Analysis
Tote Road Quarry Monitoring Well Installation and Baseline Groundwater Quality Program

Monitoring Well ID	Unit	CDWQG;MAC	CDWQG;AO	CCME FWAL	NSE PSS GW discharge to SW; 0-10 m from SW	MW-01		MW-02			MW-03			MW-04	
										MWDUP (Field Dup of MW-02)		MWDUP (Field Dup of MW-03)			
AGAT Sample ID						2322517	2867350	2322568	2867375	2867378	2322569	2322571	2867376	2322570	2867377
Sampling Date						8-Apr-21	18-Aug-21	8-Apr-21	18-Aug-21	18-Aug-21	8-Apr-21	8-Apr-21	18-Aug-21	8-Apr-21	18-Aug-21
pH		-	7.0-10.5	6.5-9.0	-	6.02	6.01	5.59	5.91	6.09	6.36	6.41	5.97	6.9	6.0
Reactive Silica as SiO2	mg/L	-	-	-	-	14	15.9	7.8	6.8	7.2	9.6	9.6	9.3	11.5	10.4
Chloride	mg/L	-	120	120	1500	8	8	6	6	7	4	4	5	7.0	9.0
Fluoride	mg/L	-	120	0.12	-	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	0.31	<0.12
Sulphate	mg/L	-	-	-	-	10	5	3	4	5	<2	<2	3	24	5
Alkalinity	mg/L	-	-	-	-	35	39	<5	7	9	19	21	9	25	10
True Color	TCU	-	15	-	-	<5.00	31.5	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Turbidity	NTU	-	0.3	-	-	1130	74.5	23.1	1.4	1.2	7.9	5.6	7.2	364	5
Electrical Conductivity	umho/cm	-	-	-	-	152	141	44	50	57	59	59	44	168	69
Nitrate + Nitrite as N	mg/L	-	-	-	-	2.86	1.6	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	3.03	0.09
Nitrate as N	mg/L	10	-	13	-	2.86	1.6	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	3.0	0.1
Nitrite as N	mg/L	1	-	0.06	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L	-	-	Dependent on temp / pH[a]	-	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03
Total Organic Carbon	mg/L	-	-	-	-	<0.5	<0.5	3.2	<0.5	0.9	1.6	<0.5	0.5	5.40	<0.5
Ortho-Phosphate as P	mg/L	-	-	-	-	0.02	0.01	0.02	<0.01	<0.01	0.02	0.02	0.01	0.02	<0.01
Bicarb. Alkalinity (as CaCO3)	mg/L	-	-	-	-	35	39	<5	7	9	19	21	9	25	10
Carb. Alkalinity (as CaCO3)	mg/L	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hydroxide	mg/L	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calculated TDS	mg/L	-	500	-	-	86	76	16	20	23	29	30	21	91	32
Hardness	mg/L	-	-	-	-	7.3	8.9	3.9	3.1	2.9	14.4	14.4	9	34.6	9.2
Langelier Index (@20C)	NA	-	-	-	-	-3.81	-3.65	-5.27	-4.98	-4.78	-3.26	-3.17	-4.18	-2.3	-4.3
Langelier Index (@ 4C)	NA	-	-	-	-	-4.13	-3.97	-5.59	-5.3	-5.1	-3.58	-3.49	-4.5	-2.7	-4.6
Saturation pH (@ 20C)	NA	-	-	-	-	9.83	9.66	10.9	10.9	10.9	9.62	9.58	10.2	9.2	10.2
Saturation pH (@ 4C)	NA	-	-	-	-	10.2	9.98	11.2	11.2	11.2	9.94	9.9	10.5	9.53	10.5
Anion Sum	me/L	-	-	-	-	1.34	1.22	0.24	0.39	0.48	0.49	0.53	0.38	1.4	0.6
Cation sum	me/L	-	-	-	-	1.47	1.43	0.33	0.3	0.29	0.6	0.59	0.36	1.5	0.6
% Difference/ Ion Balance	%	-	-	-	-	4.6	7.7	16.3	13.6	25.1	10.2	5.1	2.5	1.7	1.6

Notes:
- No Value
MW-01, MW-02, MW-03 field filtered, MW-04 lab filtered

[a] CCME FWAL Ammonia (Total) long term concentation was calculated for each sample, based on temperature and pH; MW-01 - 0.102 mg/L, MW-02 - 0.153 mg/L, MW-03 - 0.0483 mg/L, MW-04 - 0.0103 mg/L

Screening:

Bold	Indicates exceedance of applicable CDWQ; MAC guideline
Double Underline	Indicates exceedance of applicable CDWQ; AO guideline
Shaded	Indicates exceedance of applicable CCME FWAL guideline
Italics	Indicates exceedance of applicable NSE PSS guideline

References:
Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Freshwater Aquatic Life, current to 2021
Nova Scotia Environment (NSE) Pathway Specific Standards (PSS); GW discharge to SW, 0-10 m from surface water body, current to 2021
Canadian Drinking Water Quality (CDWQ) MAC, AO Guidelines - Summary of Guidelines for Canadian Drinking Water Quality, Health Canada, September 2020
MAC - Maximum Acceptable Concentration (MAC), established for subtances that are known or suspect to cause adverse effects on health
AO - Aesthetic Objective (AO), apply to characteristics of drinking water that can affects its acceptance by consumers or interfere with practices for supplying good quality water

Table 3
Tote Road Quarry Expansion Project - Dissolved Metals
Tote Road Quarry Monitoring Well Installation and Baseline Groundwater Quality Program

Monitoring Well ID	Unit	CDWQG; MAC	CDWQG;AO	CCME FWAL	NSE PSS; GW discharge to SW, 0-10 m from SW	MW-01		MW-02			MW-03			MW-04	
										MWDUP (Field Dup of MW-02)		MWDUP (Field Dup of MW-03)			
AGAT Sample ID						2322517	2867350	2322568	2867375	2867378	2322569	2322571	2867376	2322570	2867377
Sampling Date						8-Apr-21	18-Aug-21	8-Apr-21	18-Aug-21	18-Aug-21	8-Apr-21	8-Apr-21	18-Aug-21	8-Apr-21	18-Aug-21
Dissolved Aluminum	ug/L	-	100	5;100 (see note)[a]	5	*42*	*74*	*76*	*265*	*267*	*25*	*24*	*38*	*44*	*83*
Dissolved Antimony	ug/L	6	-	-	20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dissolved Arsenic	ug/L	10	-	5	5	<2	7	<2	<2	<2	<2	<2	<2	<2	<2
Dissolved Barium	ug/L	2000	-	-	1000	7	6	7	7	7	<5	<5	5	12	19
Dissolved Beryllium	ug/L	-	-	-	5.3	<2	<2	<2	<2	<2	<2	<2	<2	<2	2
Dissolved Bismuth	ug/L	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dissolved Boron	ug/L	5000	-	1500	1200	33	22	<5	<5	<5	<5	<5	<5	15	<5
Dissolved Cadmium	ug/L	7	-	[e]0.04 (0.07 MW-04 - April)	0.01	*0.133*	*0.071*	*0.125*	*0.121*	*0.122*	*0.018*	*0.021*	*0.022*	*0.141*	*1.36*
Dissolved Calcium	mg/L	-	-	-	-	1.6	2.1	0.9	0.6	0.5	4.3	4.3	2.6	9	2
Dissolved Chromium	ug/L	50	-	-	1	*3*	*2*	<1	<1	<1	<1	<1	<1	<1	2
Dissolved Cobalt	ug/L	-	-	-	10	2	2	<1	<1	<1	<1	<1	<1	2	2
Dissolved Copper	ug/L	2000	1000	[d]2	2	*9*	*<2*	*6*	*<2*	*<2*	*5*	*5*	*<2*	*6*	*47*
Dissolved Iron	ug/L	-	300	300	300	938	*2230*	<50	<50	<50	<50	<50	<50	<50	<50
Dissolved Lead	ug/L	5	-	[f]1	1	<0.5	<0.5	1	<0.5	<0.5	***6.4***	<0.5	<0.5	<0.5	<0.5
Dissolved Magnesium	mg/L	-	-	-	-	0.8	0.9	0.4	0.4	0.4	0.9	0.9	0.6	3	1
Dissolved Manganese	ug/L	120	20	[b]Calculation	820	**5450**	**396**	42	19	19	**3790**	**3460**	**126**	**759**	***1890***
Dissolved Molybdenum	ug/L	-	-	73	73	<2	<2	<2	<2	<2	<2	<2	<2	3	<2
Dissolved Nickel	ug/L	-	-	[g]25	25	12	6	<2	<2	<2	2	2	4	4	5
Dissolved Phosphorus	mg/L	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dissolved Potassium	mg/L	-	-	-	-	2.1	1.6	0.7	0.3	0.3	0.7	0.8	0.4	3	1
Dissolved Selenium	ug/L	50	-	1.0	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dissolved Silver	ug/L	-	-	0.25	0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Sodium	mg/L	-	200000	-	-	23.6	25.4	5	4.5	4.4	3.6	3.5	3.8	15	6
Dissolved Strontium	ug/L	7000	-	-	21000	30	36	9	6	5	12	13	15	97	16
Dissolved Thallium	ug/L	-	-	0.8	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Tin	ug/L	-	-	-	-	<2	<2	<2	<2	<2	5	<2	<2	<2	<2
Dissolved Titanium	ug/L	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dissolved Uranium	ug/L	20	-	15	300	1.6	2.2	1.1	1.3	1.3	0.4	0.4	0.4	1.2	5.8
Dissolved Vanadium	ug/L	-	-	-	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Dissolved Zinc	ug/L	-	5000	[c]7.0	30	*29*	*36*	*33*	*25*	*21*	<5	6	7	*42*	*105*

Notes:

a Al concentration for protection of FWAL, long term is 5 µg/L if pH <6.5 and 100 µg/L if pH≥6.5

b Mn concentration for protection of FWAL, long term is found using the CWQG calculator

c Zn concentration for protection of FWAL, long term is for surface water of 50 mg CaCO3·L−1 hardness, pH of 7.5 and 0.5 mg·L−1 DOC

d Cu guideline = When water hardness is 0 to <82 mg/L, the guideline is 2 µg/L; when hardness is > 82 to < 180 mg/L equation: e 0.845[ln(hardness)] -1.465 X 0.2 µg/L is used to determine the copper guideline. At hardness >180 mg/L the guideline is 4 µg/L. Water hardness at all locations are <82 mg/L and as such, the guideline is 2 µg/L.

e Cd guideline for FWAL is 0.04 ug/L at hardness <17 mg/L, otherwise calculated as 10^(0.83[log(hardness)]-2.46)

f Pb guideline = When water hardness is 0 to <60 mg/L, the guideline is 1ug/L; when hardness is >60 to < 180 mg/L equation: e 1.273[ln(hardness)] -4.705 ug/L is used to determine the lead guideline. At hardness >180 mg/L the guideline is 7 ug/L.

g Ni guideline = When water hardness is 0 to <60 mg/L, the guideline is 25 ug/L; when hardness is > 60 to < 180 mg/L equation: e 0.76[ln(hardness)] + 1.06 ug/L is used to determine the nickel guideline. At hardness >180 mg/L the guideline is 150 ug/L.

- No Value

MW-01, MW-02, MW-03 field filtered, MW-04 lab filtered

Screening:

Bold	Indicates exceedance of applicable CDWQ; MAC guideline
Double Underline	Indicates exceedance of applicable CDWQ; AO guideline
Shaded	Indicates exceedance of applicable CCME FWAL guideline
Italics	Indicates exceedance of applicable NSE PSS guideline

References:

Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Freshwater Aquatic Life, current to 2021
Nova Scotia Environment (NSE) Pathway Specific Standards (PSS); GW discharge to SW, 0-10 m from surface water body, current to 2021
Canadian Drinking Water Quality (CDWQ) MAC, AO Guidelines - Summary of Guidelines for Canadian Drinking Water Quality, Health Canada, September 2020
MAC - Maximum Acceptable Concentration (MAC), established for substances that are known or suspect to cause adverse effects on health
AO - Aesthetic Objective (AO), apply to characteristics of drinking water that can affects its acceptance by consumers or interfere with practices for supplying good quality water

Attachment 1

Borehole Logs

REFERENCE No.: 11216599-03

ENCLOSURE No.:

BOREHOLE No.: MW-01

ELEVATION: 127.61 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: SCOTIAN MATERIALS LIMITED

PROJECT: TOTE ROAD QUARRY

LOCATION: HEAD OF ST. MARGARET'S BAY, NOVA SCOTIA

DESCRIBED BY: J. ROMO CHECKED BY: J. ROMO

DATE (START): 7 April 2021 DATE (FINISH): 7 April 2021

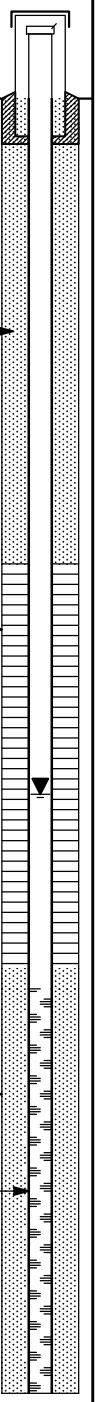
LEGEND

- SSE - SPLIT SPOON
- STE - SHELBY TUBE
- RCE - ROCK CORE
- ▼ - WATER LEVEL
- O.V.C. - ORGANIC VAPOR CONC.
- CHEM - CHEMICAL ANALYSIS

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery %	Other Tests	Organic Vapor ppm	Blows per 6 in. / 15 cm	Penetraion Index N
		127.61		GROUND SURFACE							
				Silty sand, native, trace gravel, dense, brown, moist to dry			10			16-28-16-22	44
	0.61	127.00		Granite boulders, infill							
	1.0										
						1					
	2.0										
	2.90	124.71									
	3.0			Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, orange stained 45° fractures		2	95				
	3.33	124.28		Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, weathered, few 45° fractures		3	95				
	4.0										
	4.27	123.34		Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, weathered 45° fractures with orange staining		4	60				
	5.0					5	45				
	6.0										
	6.25	121.36		Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, orange staining, 45° fractures, few vertical fractures, orange staining on fractures		6	100				
	7.0					7	90				
	8.0					8	100				
	9.0					9	100				
	9.75	117.86		End of hole at 9.75m							
	10.0										

REMARKS

S.U. 0.88 m
T.O.C. 128.49 m
50mm PVC Well Casing
3.51 m
Bentonite Plug
WL 5.241 m 4/8/2021
6.55 m
6.71 m
Silica Sand
50mm PVC Well Screen
9.75 m



File: N:\CA\HALIFAX\PROJECTS\66\11216599\DIGITAL_DESIGN\GINT\11216599 WELL LOGS_NOV 02 2021.GPJ Library File: GHD_GEOTECH_V13.GLB Report: WELL LOG Date: 3/11/21

REFERENCE No.: 11216599-03

ENCLOSURE No.:

BOREHOLE No.: MW-02

ELEVATION: 129.35 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: SCOTIAN MATERIALS LIMITED

PROJECT: TOTE ROAD QUARRY

LOCATION: HEAD OF ST. MARGARET'S BAY, NOVA SCOTIA

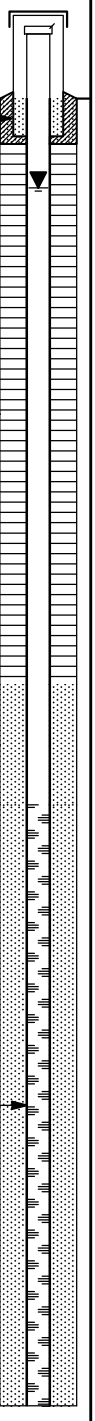
DESCRIBED BY: J. ROMO CHECKED BY: J. ROMO

DATE (START): 6 April 2021 DATE (FINISH): 7 April 2021

LEGEND

- SSE - SPLIT SPOON
- STE - SHELBY TUBE
- RCE - ROCK CORE
- ▼ - WATER LEVEL
- O.V.C. - ORGANIC VAPOR CONC.
- CHEM - CHEMICAL ANALYSIS

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	Other Tests	Organic Vapor	Blows per 6 in. / 15 cm	Penetraion Index	REMARKS
		129.35		GROUND SURFACE			%		ppm		N	S.U. 0.65 m T.O.C. 130.00 m
				Sandy silt, native, trace organics (i.e. root material, moss), very loose, brown, moist to wet			10			WOH-6-1-6	7	50mm PVC Well Casing 0.23 m
							10			18-35-50/1"		WL 0.453 m 4/8/2021
3	0.94	128.41										
	1.0			Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, minor orange staining, few horizontal and 45° fractures with orange staining		1	90					Bentonite Plug
	2.0											
						2	95					2.97 m Silica Sand 3.58 m
	3.0											
	4.0					3	100					
	5.0											50mm PVC Well Screen
	6.0					4	100					
22	6.63	122.72		End of hole at 6.63m								6.63 m



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REFERENCE No.: 11216599-03

ENCLOSURE No.:

BOREHOLE No.: MW-03

ELEVATION: 127.88 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: SCOTIAN MATERIALS LIMITED

PROJECT: TOTE ROAD QUARRY

LOCATION: HEAD OF ST. MARGARET'S BAY, NOVA SCOTIA

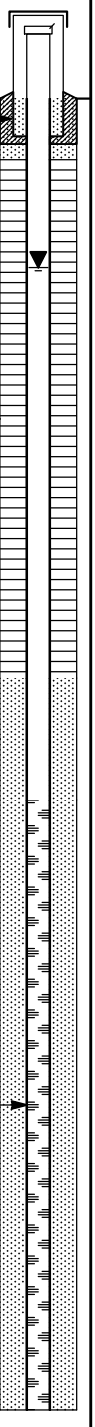
DESCRIBED BY: J. ROMO CHECKED BY: J. ROMO

DATE (START): 6 April 2021 DATE (FINISH): 6 April 2021

LEGEND

- SSE - SPLIT SPOON
- STE - SHELBY TUBE
- RCE - ROCK CORE
- ▼ - WATER LEVEL
- O.V.C. - ORGANIC VAPOR CONC.
- CHEM - CHEMICAL ANALYSIS

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery %	Other Tests	Organic Vapor ppm	Blows per 6 in. / 15 cm	Penetraion Index N	REMARKS
		127.88		GROUND SURFACE								S.U. 0.56 m T.O.C. 128.44 m
1	0.30	127.58		Silty sand, native, trace clay, trace gravel, trace organics (i.e. root material, moss), very dense, brown, moist to wet			50			WOH- 3-23-27	26	50mm PVC Well Casing 0.30 m
2	0.69	127.19		Weathered rock/clay						50/3"		
3	1.0			Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, few vertical fractures, wet								WL 0.844 m 4/8/2021
4						1	90					
5												Bentonite Plug
6	2.0											
7												
8												
9						2	100					
10	3.0											2.90 m
11												Silica Sand
12												3.51 m
13	4.0											
14						3	100					
15												
16												
17	5.0											50mm PVC Well Screen
18												
19						4	100					
20	6.0											
21												
22	6.55	121.33		End of hole at 6.55m								6.55 m



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REFERENCE No.: 11216599-03

ENCLOSURE No.:

BOREHOLE No.: MW-04

ELEVATION: 141.61 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: SCOTIAN MATERIALS LIMITED

PROJECT: TOTE ROAD QUARRY

LOCATION: HEAD OF ST. MARGARET'S BAY, NOVA SCOTIA

DESCRIBED BY: J. ROMO CHECKED BY: J. ROMO

DATE (START): 7 April 2021 DATE (FINISH): 8 April 2021

LEGEND

- SSE - SPLIT SPOON
- STE - SHELBY TUBE
- RCE - ROCK CORE
- ▼ - WATER LEVEL
- O.V.C. - ORGANIC VAPOR CONC.
- CHEM - CHEMICAL ANALYSIS

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery %	Other Tests	Organic Vapor ppm	Blows per 6 in. / 15 cm	Penetraion Index N	REMARKS
		141.61		GROUND SURFACE								S.U. 0.81 m T.O.C. 142.42 m
1				Silty sand, native, trace clay, trace gravel, loose, brown, moist			50			WOH-2-3-23	5	50mm PVC Well Casing 0.36 m
2							60			26-50/5"		
3	0.89	140.72										
	1.0			Sandy Lake Biotite Monzogranite, light to medium grey, medium grained, weathered, orange staining, few orange stained 45° and horizontal fractures		1	77					
4												
5												WL 1.541 m 4/8/2021
6												
7	2.0											
8						2	100					Bentonite Plug
9												
10	3.0											
11												3.40 m
12												
13	4.0					3	86					
14												
15						4	84					
16												Silica Sand
17	5.0					5	70					
18												
19						6	84					
20	6.0					7	100					
21												6.45 m
22												
23	7.0					8	95					
24												
25												
26	8.0											50mm PVC Well Screen
27												
28												
29						9	92					
30	9.0											
31	9.50	132.11		End of hole at 9.50m								9.50 m

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Attachment 2

Laboratory Certificate of Analysis

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: GHD LIMITED
120 WESTERN PARKWAY, SUITE 110
BEDFORD, NS B4B2V0
(902) 468-1248
ATTENTION TO: Callie Andrews
PROJECT: 11216599- Tote Road
AGAT WORK ORDER: 21X731543
WATER ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician
DATE REPORTED: Apr 27, 2021
PAGES (INCLUDING COVER): 15
VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*Notes

VERSION 2:This report supersedes all previous reports and has been updated to include requested guidelines.

AGAT Laboratories
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Certificate of Analysis

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

(Water) TOC

DATE RECEIVED: 2021-04-09

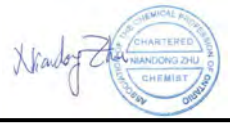
DATE REPORTED: 2021-04-27

				SAMPLE DESCRIPTION:	21MW1	21MW2	21MW3	21MW4	21MW-Dup
				SAMPLE TYPE:	Water	Water	Water	Water	Water
				DATE SAMPLED:	2021-04-08 14:00	2021-04-08 13:30	2021-04-08 10:00	2021-04-08 15:00	2021-04-09
Parameter	Unit	G / S	RDL		2322517	2322568	2322569	2322570	2322571
Total Organic Carbon	mg/L		0.5		<0.5	3.2	1.6	5.4	<0.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

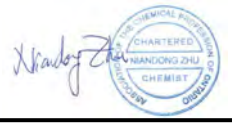
Standard Water Analysis + Dissolved Metals

DATE RECEIVED: 2021-04-09

DATE REPORTED: 2021-04-27

					SAMPLE DESCRIPTION:	21MW1	21MW2	21MW3	21MW-Dup
					SAMPLE TYPE:	Water	Water	Water	Water
					DATE SAMPLED:	2021-04-08 14:00	2021-04-08 13:30	2021-04-08 10:00	2021-04-09
Parameter	Unit	G / S: A	G / S: B	RDL		2322517	2322568	2322569	2322571
pH		6.5-9.0	7.0-10.5 OG			6.02	5.59	6.36	6.41
Reactive Silica as SiO2	mg/L			0.5		14.0	7.8	9.6	9.6
Chloride	mg/L	640, 120	250 AO	1		8	6	4	4
Fluoride	mg/L	0.12	1.5	0.12		<0.12[<A]	<0.12[<A]	<0.12[<A]	<0.12[<A]
Sulphate	mg/L		500 AO	2		10	3	<2	<2
Alkalinity	mg/L			5		35	<5	19	21
True Color	TCU	Narrative	15 AO	5.00		<5.00	<5.00	<5.00	<5.00
Turbidity	NTU	Narrative	1.0	0.5		1130[>B]	23.1[>B]	7.9[>B]	5.6[>B]
Electrical Conductivity	umho/cm			1		152	44	59	59
Nitrate + Nitrite as N	mg/L			0.05		2.86	0.05	<0.05	<0.05
Nitrate as N	mg/L	550, 13	10	0.05		2.86[<B]	0.05[<B]	<0.05[<B]	<0.05[<B]
Nitrite as N	mg/L	0.06	1.0	0.05		<0.05[<A]	<0.05[<A]	<0.05[<A]	<0.05[<A]
Ammonia as N	mg/L	Fact Sheet		0.03		0.04	<0.03	<0.03	<0.03
Ortho-Phosphate as P	mg/L			0.01		0.02	0.02	0.02	0.02
Dissolved Sodium	mg/L		200 AO	0.1		23.6	5.0	3.6	3.5
Dissolved Potassium	mg/L			0.1		2.1	0.7	0.7	0.8
Dissolved Calcium	mg/L			0.1		1.6	0.9	4.3	4.3
Dissolved Magnesium	mg/L			0.1		0.8	0.4	0.9	0.9
Bicarb. Alkalinity (as CaCO3)	mg/L			5		35	<5	19	21
Carb. Alkalinity (as CaCO3)	mg/L			10		<10	<10	<10	<10
Hydroxide	mg/L			5		<5	<5	<5	<5
Calculated TDS	mg/L		500 AO	1		86	16	29	30
Hardness	mg/L					7.3	3.9	14.4	14.4
Langelier Index (@20C)	NA					-3.81	-5.27	-3.26	-3.17
Langelier Index (@ 4C)	NA					-4.13	-5.59	-3.58	-3.49
Saturation pH (@ 20C)	NA					9.83	10.9	9.62	9.58
Saturation pH (@ 4C)	NA					10.2	11.2	9.94	9.90
Anion Sum	me/L					1.34	0.24	0.49	0.53
Cation sum	me/L					1.47	0.33	0.60	0.59

Certified By:



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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Dissolved Metals

DATE RECEIVED: 2021-04-09

DATE REPORTED: 2021-04-27

Parameter	Unit	G / S: A	G / S: B	RDL	SAMPLE DESCRIPTION: 21MW1	21MW2	21MW3	21MW-Dup
					SAMPLE TYPE: Water	Water	Water	Water
					DATE SAMPLED: 2021-04-08 14:00	2021-04-08 13:30	2021-04-08 10:00	2021-04-09
					2322517	2322568	2322569	2322571
% Difference/ Ion Balance	%				4.6	16.3	10.2	5.1
Dissolved Aluminum	ug/L	Variable	2900; 100 OG AO	5	42	76	25	24
Dissolved Antimony	ug/L		6	2	<2[<B]	<2[<B]	<2[<B]	<2[<B]
Dissolved Arsenic	ug/L	5	10	2	<2[<A]	<2[<A]	<2[<A]	<2[<A]
Dissolved Barium	ug/L		2000	5	7[<B]	7[<B]	<5[<B]	<5[<B]
Dissolved Beryllium	ug/L			2	<2	<2	<2	<2
Dissolved Bismuth	ug/L			2	<2	<2	<2	<2
Dissolved Boron	ug/L	29000, 1500	5000	5	33[<B]	<5[<B]	<5[<B]	<5[<B]
Dissolved Cadmium	ug/L	1.0, 0.09	7	0.017	0.133[<B]	0.125[<B]	0.018[<B]	0.021[<B]
Dissolved Chromium	ug/L		50	1	3[<B]	<1[<B]	<1[<B]	<1[<B]
Dissolved Cobalt	ug/L			1	2	<1	<1	<1
Dissolved Copper	ug/L	Equation	1000 AO	2	9	6	5	5
Dissolved Iron	ug/L	300	300 AO	50	938[>A]	<50[<A]	<50[<A]	<50[<A]
Dissolved Lead	ug/L	Equation	5	0.5	<0.5[<B]	1.0[<B]	6.4[>B]	<0.5[<B]
Dissolved Manganese	ug/L		20 AO	2	5450	42	3790	3460
Dissolved Molybdenum	ug/L	73		2	<2[<A]	<2[<A]	<2[<A]	<2[<A]
Dissolved Nickel	ug/L	Equation		2	12	<2	2	2
Dissolved Phosphorus	mg/L			0.02	<0.02	<0.02	<0.02	<0.02
Dissolved Selenium	ug/L	1.0	50	1	<1[<A]	<1[<A]	<1[<A]	<1[<A]
Dissolved Silver	ug/L	0.25		0.1	<0.1[<A]	<0.1[<A]	<0.1[<A]	<0.1[<A]
Dissolved Strontium	ug/L		7000	5	30[<B]	9[<B]	12[<B]	13[<B]
Dissolved Thallium	ug/L	0.8		0.1	<0.1[<A]	<0.1[<A]	<0.1[<A]	<0.1[<A]
Dissolved Tin	ug/L			2	<2	<2	5	<2
Dissolved Titanium	ug/L			2	<2	<2	<2	<2
Dissolved Uranium	ug/L	33, 15	20	0.1	1.6[<B]	1.1[<B]	0.4[<B]	0.4[<B]
Dissolved Vanadium	ug/L			2	<2	<2	<2	<2
Dissolved Zinc	ug/L	30	5000 AO	5	29[<A]	33[>A]	<5[<A]	6[<A]

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Dissolved Metals

DATE RECEIVED: 2021-04-09

DATE REPORTED: 2021-04-27

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to CCME FWAL - update 2015, B Refers to Canadian Drinking Water Quality - updated 2021-03
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

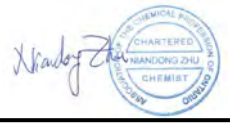
2322517 Metals analysis completed on a filtered sample.
% Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

2322568-2322571 Metals analysis completed on a filtered sample.
% Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

When the cation and anion sums are at, or below 1 me/L, the acceptable criteria is less than 0.3me/L

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:



AGAT Laboratories

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Dartmouth, Nova Scotia
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TEL (902)468-8718
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

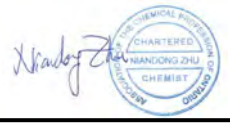
Standard Water Analysis + Dissolved Metals (Lab Filtered)

DATE RECEIVED: 2021-04-09

DATE REPORTED: 2021-04-27

					SAMPLE DESCRIPTION:	21MW4
					SAMPLE TYPE:	Water
					DATE SAMPLED:	2021-04-08 15:00
Parameter	Unit	G / S: A	G / S: B	RDL		2322570
pH		6.5-9.0	7.0-10.5 OG			6.88
Reactive Silica as SiO2	mg/L			0.5		11.5
Chloride	mg/L	640, 120	250 AO	1		7
Fluoride	mg/L	0.12	1.5	0.12		0.31[A-B]
Sulphate	mg/L		500 AO	2		24
Alkalinity	mg/L			5		25
True Color	TCU	Narrative	15 AO	5.00		<5.00
Turbidity	NTU	Narrative	1.0	0.5		364[>B]
Electrical Conductivity	umho/cm			1		168
Nitrate + Nitrite as N	mg/L			0.05		3.03
Nitrate as N	mg/L	550, 13	10	0.05		3.03[<B]
Nitrite as N	mg/L	0.06	1.0	0.05		<0.05[<A]
Ammonia as N	mg/L	Fact Sheet		0.03		0.03
Ortho-Phosphate as P	mg/L			0.01		0.02
Dissolved Sodium	mg/L		200 AO	0.1		15.2
Dissolved Potassium	mg/L			0.1		2.9
Dissolved Calcium	mg/L			0.1		9.4
Dissolved Magnesium	mg/L			0.1		2.7
Bicarb. Alkalinity (as CaCO3)	mg/L			5		25
Carb. Alkalinity (as CaCO3)	mg/L			10		<10
Hydroxide	mg/L			5		<5
Calculated TDS	mg/L		500 AO	1		91
Hardness	mg/L					34.6
Langelier Index (@20C)	NA					-2.33
Langelier Index (@ 4C)	NA					-2.65
Saturation pH (@ 20C)	NA					9.21
Saturation pH (@ 4C)	NA					9.53
Anion Sum	me/L					1.41
Cation sum	me/L					1.46

Certified By:



AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Dissolved Metals (Lab Filtered)

DATE RECEIVED: 2021-04-09

DATE REPORTED: 2021-04-27

			SAMPLE DESCRIPTION:		21MW4
			SAMPLE TYPE:		Water
			DATE SAMPLED:		2021-04-08 15:00
Parameter	Unit	G / S: A	G / S: B	RDL	2322570
% Difference/ Ion Balance	%				1.7
Dissolved Aluminum	ug/L	Variable	2900; 100 OG AO	5	44
Dissolved Antimony	ug/L		6	2	<2[<B]
Dissolved Arsenic	ug/L	5	10	2	<2[<A]
Dissolved Barium	ug/L		2000	5	12[<B]
Dissolved Beryllium	ug/L			2	<2
Dissolved Bismuth	ug/L			2	<2
Dissolved Boron	ug/L	29000, 1500	5000	5	15[<B]
Dissolved Cadmium	ug/L	1.0, 0.09	7	0.017	0.141[<B]
Dissolved Chromium	ug/L		50	1	<1[<B]
Dissolved Cobalt	ug/L			1	2
Dissolved Copper	ug/L	Equation	1000 AO	2	6
Dissolved Iron	ug/L	300	300 AO	50	<50[<A]
Dissolved Lead	ug/L	Equation	5	0.5	<0.5[<B]
Dissolved Manganese	ug/L		20 AO	2	759
Dissolved Molybdenum	ug/L	73		2	3[<A]
Dissolved Nickel	ug/L	Equation		2	4
Dissolved Phosphorus	mg/L			0.02	<0.02
Dissolved Selenium	ug/L	1.0	50	1	<1[<A]
Dissolved Silver	ug/L	0.25		0.1	<0.1[<A]
Dissolved Strontium	ug/L		7000	5	97[<B]
Dissolved Thallium	ug/L	0.8		0.1	<0.1[<A]
Dissolved Tin	ug/L			2	<2
Dissolved Titanium	ug/L			2	<2
Dissolved Uranium	ug/L	33, 15	20	0.1	1.2[<B]
Dissolved Vanadium	ug/L			2	<2
Dissolved Zinc	ug/L	30	5000 AO	5	42[>A]

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Standard Water Analysis + Dissolved Metals (Lab Filtered)

DATE RECEIVED: 2021-04-09

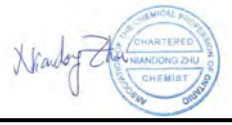
DATE REPORTED: 2021-04-27

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: A Refers to CCME FWAL - update 2015, B Refers to Canadian Drinking Water Quality - updated 2021-03
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2322570 Metals analysis completed on a lab filtered sample.
% Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:



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Exceedance Summary

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
2322517	21MW1	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals	Dissolved Iron	ug/L	300	938
2322517	21MW1	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals	pH		6.5-9.0	6.02
2322517	21MW1	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Dissolved Iron	ug/L	300 AO	938
2322517	21MW1	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Dissolved Manganese	ug/L	20 AO	5450
2322517	21MW1	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Turbidity	NTU	1.0	1130
2322517	21MW1	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	pH		7.0-10.5 OG	6.02
2322568	21MW2	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals	Dissolved Zinc	ug/L	30	33
2322568	21MW2	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals	pH		6.5-9.0	5.59
2322568	21MW2	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Dissolved Manganese	ug/L	20 AO	42
2322568	21MW2	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Turbidity	NTU	1.0	23.1
2322568	21MW2	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	pH		7.0-10.5 OG	5.59
2322569	21MW3	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals	pH		6.5-9.0	6.36
2322569	21MW3	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Dissolved Lead	ug/L	5	6.4
2322569	21MW3	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Dissolved Manganese	ug/L	20 AO	3790
2322569	21MW3	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Turbidity	NTU	1.0	7.9
2322569	21MW3	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	pH		7.0-10.5 OG	6.36
2322570	21MW4	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals (Lab Filtered)	Dissolved Zinc	ug/L	30	42
2322570	21MW4	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals (Lab Filtered)	Fluoride	mg/L	0.12	0.31
2322570	21MW4	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals (Lab Filtered)	Dissolved Manganese	ug/L	20 AO	759
2322570	21MW4	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals (Lab Filtered)	Turbidity	NTU	1.0	364
2322570	21MW4	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals (Lab Filtered)	pH		7.0-10.5 OG	6.88
2322571	21MW-Dup	NS-CCME FWAL	Standard Water Analysis + Dissolved Metals	pH		6.5-9.0	6.41
2322571	21MW-Dup	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Dissolved Manganese	ug/L	20 AO	3460
2322571	21MW-Dup	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	Turbidity	NTU	1.0	5.6
2322571	21MW-Dup	NS-CDWQ incl [AO]	Standard Water Analysis + Dissolved Metals	pH		7.0-10.5 OG	6.41

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Quality Assurance

CLIENT NAME: GHD LIMITED

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Apr 27, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Standard Water Analysis + Dissolved Metals															
pH	2324934		6.71	6.88	2.5%	<	99%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	2318181		4.6	5.2	12.1%	< 0.5	99%	80%	120%	106%	80%	120%	90%	80%	120%
Chloride	2322003		6	6	1.6%	< 1	90%	80%	120%	NA	80%	120%	96%	70%	130%
Fluoride	2322003		0.51	0.52	NA	< 0.12	107%	80%	120%	NA	80%	120%	93%	70%	130%
Sulphate	2318156	2318156	<2	<2	NA	< 2	103%	80%	120%	NA	80%	120%	95%	70%	130%
Alkalinity	2324934		43	43	0.1%	< 5	96%	80%	120%	NA			NA		
True Color	2318181		<5.00	<5.00	NA	< 5	100%	80%	120%	107%	80%	120%	NA		
Turbidity	2318319		1.3	1.2	NA	< 0.5	97%	80%	120%	NA			NA		
Electrical Conductivity	2324934		172	172	0.1%	< 1	100%	90%	110%	NA			NA		
Nitrate as N	2322003		0.37	0.38	2.1%	< 0.05	97%	80%	120%	NA	80%	120%	100%	70%	130%
Nitrite as N	2322003		<0.05	<0.05	NA	< 0.05	101%	80%	120%	NA	80%	120%	81%	70%	130%
Ammonia as N	2322936		2.46	2.20	11.1%	< 0.03	97%	80%	120%	97%	80%	120%	NA	70%	130%
Ortho-Phosphate as P	2318181		0.02	0.02	NA	0.01	89%	80%	120%	99%	80%	120%	99%	80%	120%
Dissolved Sodium	2322571	2322571	3.5	3.5	0.3%	< 0.1	109%	80%	120%	115%	80%	120%	NA	70%	130%
Dissolved Potassium	2322571	2322571	0.8	0.7	3.5%	< 0.1	99%	80%	120%	113%	80%	120%	107%	70%	130%
Dissolved Calcium	2322571	2322571	4.3	4.1	6.1%	< 0.1	98%	80%	120%	97%	80%	120%	NA	70%	130%
Dissolved Magnesium	2322571	2322571	0.9	0.8	3.3%	< 0.1	100%	80%	120%	104%	80%	120%	99%	70%	130%
Bicarb. Alkalinity (as CaCO3)	2324934		43	43	0.1%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	2324934		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	2324934		<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Dissolved Aluminum	2322571	2322571	24	23	NA	< 5	82%	80%	120%	99%	80%	120%	104%	70%	130%
Dissolved Antimony	2322571	2322571	<2	<2	NA	< 2	91%	80%	120%	111%	80%	120%	103%	70%	130%
Dissolved Arsenic	2322571	2322571	<2	<2	NA	< 2	96%	80%	120%	106%	80%	120%	106%	70%	130%
Dissolved Barium	2322571	2322571	<5	<5	NA	< 5	90%	80%	120%	97%	80%	120%	92%	70%	130%
Dissolved Beryllium	2322571	2322571	<2	<2	NA	< 2	100%	80%	120%	111%	80%	120%	105%	70%	130%
Dissolved Bismuth	2322571	2322571	<2	<2	NA	< 2	100%	80%	120%	109%	80%	120%	90%	70%	130%
Dissolved Boron	2322571	2322571	<5	<5	NA	< 5	100%	80%	120%	115%	80%	120%	100%	70%	130%
Dissolved Cadmium	2322571	2322571	0.021	0.030	NA	< 0.017	95%	80%	120%	103%	80%	120%	105%	70%	130%
Dissolved Chromium	2322571	2322571	<1	<1	NA	< 1	91%	80%	120%	104%	80%	120%	92%	70%	130%
Dissolved Cobalt	2322571	2322571	<1	<1	NA	< 1	95%	80%	120%	104%	80%	120%	97%	70%	130%
Dissolved Copper	2322571	2322571	5	5	NA	< 2	97%	80%	120%	107%	80%	120%	101%	70%	130%
Dissolved Iron	2322571	2322571	<50	<50	NA	< 50	92%	80%	120%	106%	80%	120%	92%	70%	130%
Dissolved Lead	2322571	2322571	<0.5	<0.5	NA	< 0.5	95%	80%	120%	104%	80%	120%	99%	70%	130%
Dissolved Manganese	2322571	2322571	394	421	6.6%	< 2	95%	80%	120%	103%	80%	120%	NA	70%	130%
Dissolved Molybdenum	2322571	2322571	<2	<2	NA	< 2	91%	80%	120%	101%	80%	120%	97%	70%	130%
Dissolved Nickel	2322571	2322571	2	2	NA	< 2	95%	80%	120%	108%	80%	120%	102%	70%	130%
Dissolved Phosphorus	2322571	2322571	<0.02	<0.02	NA	< 0.02	99%	80%	120%	112%	80%	120%	98%	70%	130%
Dissolved Selenium	2322571	2322571	<1	<1	NA	< 1	101%	80%	120%	100%	80%	120%	120%	70%	130%
Dissolved Silver	2322571	2322571	<0.1	<0.1	NA	< 0.1	96%	80%	120%	103%	80%	120%	97%	70%	130%

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Quality Assurance

CLIENT NAME: GHD LIMITED
PROJECT: 11216599- Tote Road
SAMPLING SITE:

AGAT WORK ORDER: 21X731543
ATTENTION TO: Callie Andrews
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Apr 27, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Strontium	2322571	2322571	13	12	NA	< 5	91%	80%	120%	102%	80%	120%	91%	70%	130%
Dissolved Thallium	2322571	2322571	<0.1	<0.1	NA	< 0.1	92%	80%	120%	100%	80%	120%	95%	70%	130%
Dissolved Tin	2322571	2322571	<2	<2	NA	< 2	92%	80%	120%	108%	80%	120%	101%	70%	130%
Dissolved Titanium	2322571	2322571	<2	<2	NA	< 2	100%	80%	120%	110%	80%	120%	98%	70%	130%
Dissolved Uranium	2322571	2322571	0.4	0.4	NA	< 0.1	98%	80%	120%	108%	80%	120%	100%	70%	130%
Dissolved Vanadium	2322571	2322571	<2	<2	NA	< 2	95%	80%	120%	102%	80%	120%	95%	70%	130%
Dissolved Zinc	2322571	2322571	6	5	NA	< 5	95%	80%	120%	102%	80%	120%	111%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.
Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

Standard Water Analysis + Dissolved Metals (Lab Filtered)															
pH	2324934		6.71	6.88	2.5%	<	99%	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	2318181		4.6	5.2	12.1%	< 0.5	99%	80%	120%	106%	80%	120%	90%	80%	120%
Chloride	2322003		6	6	1.6%	< 1	90%	80%	120%	NA	80%	120%	96%	70%	130%
Fluoride	2322003		0.51	0.52	NA	< 0.12	107%	80%	120%	NA	80%	120%	NA	70%	130%
Sulphate	2322003		39	40	1.6%	< 2	103%	80%	120%	NA	80%	120%	NA	70%	130%
Alkalinity	2324934		43	43	0.1%	< 5	96%	80%	120%	NA			NA		
True Color	2318181		<5.00	<5.00	NA	< 5	100%	80%	120%	107%	80%	120%	NA		
Turbidity	2309098		<0.5	<0.5	NA	< 0.5	97%	80%	120%	NA			NA		
Electrical Conductivity	2324934		172	172	0.1%	< 1	100%	90%	110%	NA			NA		
Nitrate as N	2322003		0.37	0.38	2.1%	< 0.05	97%	80%	120%	NA	80%	120%	100%	70%	130%
Nitrite as N	2322003		<0.05	<0.05	NA	< 0.05	101%	80%	120%	NA	80%	120%	81%	70%	130%
Ammonia as N	2322936		2.46	2.20	11.1%	< 0.03	97%	80%	120%	97%	80%	120%	NA	70%	130%
Ortho-Phosphate as P	2318181		0.02	0.02	NA	0.01	89%	80%	120%	99%	80%	120%	99%	80%	120%
Dissolved Potassium	2322571	2322571	0.8	0.7	3.5%	< 0.1	99%	80%	120%	113%	80%	120%	107%	70%	130%
Dissolved Calcium	2322571	2322571	4.3	4.1	6.1%	< 0.1	98%	80%	120%	97%	80%	120%	NA	70%	130%
Dissolved Magnesium	2322571	2322571	0.9	0.8	3.3%	< 0.1	100%	80%	120%	104%	80%	120%	99%	70%	130%
Bicarb. Alkalinity (as CaCO3)	2324934		43	43	0.1%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	2324934		<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	2324934		<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Dissolved Aluminum	2322571	2322571	24	23	NA	< 5	82%	80%	120%	99%	80%	120%	104%	70%	130%
Dissolved Antimony	2322571	2322571	<2	<2	NA	< 2	91%	80%	120%	111%	80%	120%	103%	70%	130%
Dissolved Arsenic	2322571	2322571	<2	<2	NA	< 2	96%	80%	120%	106%	80%	120%	106%	70%	130%
Dissolved Barium	2322571	2322571	<5	<5	NA	< 5	90%	80%	120%	97%	80%	120%	92%	70%	130%
Dissolved Beryllium	2322571	2322571	<2	<2	NA	< 2	100%	80%	120%	111%	80%	120%	105%	70%	130%
Dissolved Bismuth	2322571	2322571	<2	<2	NA	< 2	100%	80%	120%	109%	80%	120%	90%	70%	130%
Dissolved Boron	2322571	2322571	<5	<5	NA	< 5	100%	80%	120%	115%	80%	120%	100%	70%	130%
Dissolved Cadmium	2322571	2322571	0.021	0.030	NA	< 0.017	95%	80%	120%	103%	80%	120%	105%	70%	130%
Dissolved Chromium	2322571	2322571	<1	<1	NA	< 1	91%	80%	120%	104%	80%	120%	92%	70%	130%
Dissolved Cobalt	2322571	2322571	<1	<1	NA	< 1	95%	80%	120%	104%	80%	120%	97%	70%	130%

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Quality Assurance

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SAMPLING SITE:

AGAT WORK ORDER: 21X731543
ATTENTION TO: Callie Andrews
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Apr 27, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Copper	2322571	2322571	5	5	NA	< 2	97%	80%	120%	107%	80%	120%	101%	70%	130%
Dissolved Iron	2322571	2322571	<50	<50	NA	< 50	92%	80%	120%	106%	80%	120%	92%	70%	130%
Dissolved Lead	2322571	2322571	<0.5	<0.5	NA	< 0.5	95%	80%	120%	104%	80%	120%	99%	70%	130%
Dissolved Molybdenum	2322571	2322571	<2	<2	NA	< 2	91%	80%	120%	101%	80%	120%	97%	70%	130%
Dissolved Nickel	2322571	2322571	2	2	NA	< 2	95%	80%	120%	108%	80%	120%	102%	70%	130%
Dissolved Phosphorus	2322571	2322571	<0.02	<0.02	NA	< 0.02	99%	80%	120%	112%	80%	120%	98%	70%	130%
Dissolved Selenium	2322571	2322571	<1	<1	NA	< 1	101%	80%	120%	100%	80%	120%	120%	70%	130%
Dissolved Silver	2322571	2322571	<0.1	<0.1	NA	< 0.1	96%	80%	120%	103%	80%	120%	97%	70%	130%
Dissolved Strontium	2322571	2322571	13	12	NA	< 5	91%	80%	120%	102%	80%	120%	91%	70%	130%
Dissolved Thallium	2322571	2322571	<0.1	<0.1	NA	< 0.1	92%	80%	120%	100%	80%	120%	95%	70%	130%
Dissolved Tin	2322571	2322571	<2	<2	NA	< 2	92%	80%	120%	108%	80%	120%	101%	70%	130%
Dissolved Titanium	2322571	2322571	<2	<2	NA	< 2	100%	80%	120%	110%	80%	120%	98%	70%	130%
Dissolved Uranium	2322571	2322571	0.4	0.4	NA	< 0.1	98%	80%	120%	108%	80%	120%	100%	70%	130%
Dissolved Vanadium	2322571	2322571	<2	<2	NA	< 2	95%	80%	120%	102%	80%	120%	95%	70%	130%
Dissolved Zinc	2322571	2322571	6	5	NA	< 5	95%	80%	120%	102%	80%	120%	111%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

(Water) TOC															
Total Organic Carbon	2318319		<0.5	<0.5	NA	< 0.5	100%	90%	110%	99%	90%	110%	104%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

(Water) TOC															
Total Organic Carbon	2322571	2322571	<0.5	<0.5	NA	< 0.5	99%	90%	110%	102%	90%	110%	112%	80%	120%

Certified By:

AGAT Laboratories

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FAX (902)468-8924
http://www.agatlabs.com

Method Summary

CLIENT NAME: GHD LIMITED

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Reactive Silica as SiO2	INOR-121-6027	SM 4500-SiO2 F	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Alkalinity	INOR-121-6001	SM 2320 B	
True Color	INOR-121-6008	SM 2120 B	LACHAT FIA
Turbidity	INOR-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-121-6047	SM 4500-NH3 H	COLORIMETER
Ortho-Phosphate as P	INOR-121-6012	SM 4500-P G	COLORIMETER
Dissolved Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Potassium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance	CALCULATION	SM 1030E	CALCULATION
Dissolved Aluminum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Antimony	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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Method Summary

CLIENT NAME: GHD LIMITED

AGAT WORK ORDER: 21X731543

PROJECT: 11216599- Tote Road

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Phosphorus	MET-121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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Chain of Custody Record

Laboratory Use Only
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: 0.3, 0.4, 0.4
Hold Time:
AGAT Job Number: 21X730 1543
Notes: 21MW4 lab filtration + Preservative required. Bottle rinsed in field

Report Information
Company: GHD Ltd.
Contact: Callie Andrews
Address: 120 Western Parkway, Bedford, NS
Phone: 902-468-1248 Fax: 902-468-2207
Client Project #: 11216599-Tote Road
AGAT Quotation:
Please Note: If quotation number is not provided client will be billed full price for analysis.

Report Information (Please print):
1. Name: Callie Andrews
Email: Callie.Andrews@ghd.com
2. Name: Jessica Romo
Email: Jessica.Romo@ghd.com

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Excel Format Included
☐ Export

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days
Date Required:

Invoice To Same Yes ☐ / No ☐
Company: Invoicing-Canada@ghd.com
Contact:
Address:
Phone: Fax:
PO/Credit Card#: 73523232

Regulatory Requirements (Check):
☑ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☑ CCME ☑ CDWQ
☐ Industrial ☐ NSEQS-Cont Sites
☐ Commercial ☐ HRM 101
☐ Res/Park ☐ Storm Water
☐ Agricultural ☐ Waste Water
☑ FWAL
☐ Sediment ☐ Other

Drinking Water Sample: ☐ Yes ☐ No **Salt Water Sample** ☐ Yes ☐ No
Reg. No.:

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments – Site/Sample Info, Sample Containment	Standard water plus dissolved metals
21MW1	Apr 8/21 2:00 pm	GW	3	sample field filtered	☑
21MW2	Apr 8/21 1:30 pm	GW	3	sample field filtered	☑
21MW3	Apr 8/21 10:00 AM	GW	3	sample field filtered	☑
21MW4	Apr 8/21 3:00 pm	GW	3	~~sample field filtered~~ JF	☑
21MW-DUP	Apr 8/21 —	GW	3	sample field filtered	☑

Preservative rinsed in field. Lab filtration + preservative required

Samples Relinquished By (Print Name):	Date/Time	Samples Received By (Print Name):	Date/Time
Jessica Romo	Apr 9/21 9:26 Am		
Samples Relinquished By (Sign):	**Date/Time**	**Samples Received By (Sign):**	**Date/Time**
Jessica Romo	Apr 9/21 9:26 Am		

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page ☐ of ☐
N°:

Document ID: DIV-130-0500-002

Date revised: May 19, 2016

AGAT Laboratories

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CLIENT NAME: GHD LIMITED
120 WESTERN PARKWAY, SUITE 110
BEDFORD, NS B4B2V0
(902) 468-1248
ATTENTION TO: Callie Andrews
PROJECT: 11216599
AGAT WORK ORDER: 21X789740
WATER ANALYSIS REVIEWED BY: Ashley Dussault, Report Writer
DATE REPORTED: Aug 30, 2021
PAGES (INCLUDING COVER): 9
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

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Certificate of Analysis

AGAT WORK ORDER: 21X789740

PROJECT: 11216599

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Dissolved Metals

DATE RECEIVED: 2021-08-18

DATE REPORTED: 2021-08-30

SAMPLE DESCRIPTION:				21MW1	21MW2	21MW3	21MW4	21MW-DUP
SAMPLE TYPE:				Water	Water	Water	Water	Water
DATE SAMPLED:				2021-08-18 12:40	2021-08-18 12:25	2021-08-18 13:15	2021-08-18 12:55	2021-08-18
Parameter	Unit	G / S	RDL	2867350	2867375	2867376	2867377	2867378
pH				6.01	5.91	5.97	5.95	6.09
Reactive Silica as SiO2	mg/L		0.5	15.9	6.8	9.3	10.4	7.2
Chloride	mg/L		1	8	6	5	9	7
Fluoride	mg/L		0.12	<0.12	<0.12	<0.12	<0.12	<0.12
Sulphate	mg/L		2	5	4	3	5	5
Alkalinity	mg/L		5	39	7	9	10	9
True Color	TCU		5.00	31.5	<5.00	<5.00	<5.00	<5.00
Turbidity	NTU		0.5	74.5	1.4	7.2	4.9	1.2
Electrical Conductivity	umho/cm		1	141	50	44	69	57
Nitrate + Nitrite as N	mg/L		0.05	1.60	<0.05	<0.05	0.09	<0.05
Nitrate as N	mg/L		0.05	1.60	<0.05	<0.05	0.09	<0.05
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	<0.5	<0.5	0.5	<0.5	0.9
Ortho-Phosphate as P	mg/L		0.01	0.01	<0.01	0.01	<0.01	<0.01
Dissolved Sodium	mg/L		0.1	25.4	4.5	3.8	6.0	4.4
Dissolved Potassium	mg/L		0.1	1.6	0.3	0.4	0.7	0.3
Dissolved Calcium	mg/L		0.1	2.1	0.6	2.6	2.2	0.5
Dissolved Magnesium	mg/L		0.1	0.9	0.4	0.6	0.9	0.4
Bicarb. Alkalinity (as CaCO3)	mg/L		5	39	7	9	10	9
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10	<10	<10	<10
Hydroxide	mg/L		5	<5	<5	<5	<5	<5
Calculated TDS	mg/L		1	76	20	21	32	23
Hardness	mg/L			8.9	3.1	9.0	9.2	2.9
Langelier Index (@20C)	NA			-3.65	-4.98	-4.18	-4.25	-4.78
Langelier Index (@ 4C)	NA			-3.97	-5.30	-4.50	-4.57	-5.10
Saturation pH (@ 20C)	NA			9.66	10.9	10.2	10.2	10.9
Saturation pH (@ 4C)	NA			9.98	11.2	10.5	10.5	11.2
Anion Sum	me/L			1.22	0.39	0.38	0.56	0.48

Certified By: Ashley Dussault

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Certificate of Analysis

AGAT WORK ORDER: 21X789740

PROJECT: 11216599

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Dissolved Metals

DATE RECEIVED: 2021-08-18

DATE REPORTED: 2021-08-30

SAMPLE DESCRIPTION:				21MW1	21MW2	21MW3	21MW4	21MW-DUP
SAMPLE TYPE:				Water	Water	Water	Water	Water
DATE SAMPLED:				2021-08-18 12:40	2021-08-18 12:25	2021-08-18 13:15	2021-08-18 12:55	2021-08-18
Parameter	Unit	G / S	RDL	2867350	2867375	2867376	2867377	2867378
Cation sum	me/L			1.43	0.30	0.36	0.55	0.29
% Difference/ Ion Balance	%			7.7	13.6	2.5	1.6	25.1
Dissolved Aluminum	ug/L		5	74	265	38	83	267
Dissolved Antimony	ug/L		2	<2	<2	<2	<2	<2
Dissolved Arsenic	ug/L		2	7	<2	<2	<2	<2
Dissolved Barium	ug/L		5	6	7	5	19	7
Dissolved Beryllium	ug/L		2	<2	<2	<2	2	<2
Dissolved Bismuth	ug/L		2	<2	<2	<2	<2	<2
Dissolved Boron	ug/L		5	22	<5	<5	<5	<5
Dissolved Cadmium	ug/L		0.017	0.071	0.121	0.022	1.36	0.122
Dissolved Chromium	ug/L		1	2	<1	<1	2	<1
Dissolved Cobalt	ug/L		1	2	<1	<1	2	<1
Dissolved Copper	ug/L		2	<2	<2	<2	47	<2
Dissolved Iron	ug/L		50	2230	<50	<50	<50	<50
Dissolved Lead	ug/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Manganese	ug/L		2	396	19	126	1890	19
Dissolved Molybdenum	ug/L		2	<2	<2	<2	<2	<2
Dissolved Nickel	ug/L		2	6	<2	4	5	<2
Dissolved Phosphorus	mg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dissolved Selenium	ug/L		1	<1	<1	<1	<1	<1
Dissolved Silver	ug/L		0.1	<0.1	0.2	<0.1	<0.1	0.2
Dissolved Strontium	ug/L		5	36	6	15	16	5
Dissolved Thallium	ug/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Tin	ug/L		2	<2	<2	<2	<2	<2
Dissolved Titanium	ug/L		2	<2	<2	<2	<2	<2
Dissolved Uranium	ug/L		0.1	2.2	1.3	0.4	5.8	1.3
Dissolved Vanadium	ug/L		2	<2	<2	<2	<2	<2
Dissolved Zinc	ug/L		5	36	25	7	105	21

Certified By: Ashley Dussault

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21X789740

PROJECT: 11216599

CLIENT NAME: GHD LIMITED

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Dissolved Metals

DATE RECEIVED: 2021-08-18

DATE REPORTED: 2021-08-30

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

2867350 Metals analysis completed on a filtered sample.
% Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

2867375-2867378 Metals analysis completed on a filtered sample.
% Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.
When the cation and anion sums are at, or below 1 me/L, the acceptable criteria is less than 0.3me/L

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Ashley Dussault

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Quality Assurance

CLIENT NAME: GHD LIMITED
PROJECT: 11216599
SAMPLING SITE:

AGAT WORK ORDER: 21X789740
ATTENTION TO: Callie Andrews
SAMPLED BY:

Water Analysis

RPT Date: Aug 30, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Standard Water Analysis + Dissolved Metals															
pH	2867350	2867350	6.01	6.11	1.7%	<	NA	80%	120%	NA	80%	120%	NA	80%	120%
Reactive Silica as SiO2	2867375	2867375	6.8	6.6	2.3%	< 0.5	102%	80%	120%	93%	80%	120%	100%	80%	120%
Chloride	2867375	2867375	6	6	5.8%	< 1	103%	80%	120%	NA	80%	120%	104%	70%	130%
Fluoride	2867375	2867375	<0.12	<0.12	NA	< 0.12	107%	80%	120%	NA	80%	120%	100%	70%	130%
Sulphate	2867375	2867375	4	4	NA	< 2	116%	80%	120%	NA	80%	120%	109%	70%	130%
Alkalinity	2894805	2894805	110	111	0.3%	< 5	86%	80%	120%	NA			NA		
True Color	2867375	2867375	<5.00	<5.00	NA	< 5	109%	80%	120%	96%	80%	120%	NA		
Turbidity	2892391		0.6	0.6	NA	< 0.5	91%	80%	120%	NA			NA		
Electrical Conductivity	2867350	2867350	141	137	2.6%	<1	109%	90%	110%	NA			NA		
Nitrate as N	2867375	2867375	<0.05	<0.05	NA	< 0.05	101%	80%	120%	NA	80%	120%	98%	70%	130%
Nitrite as N	2867375	2867375	<0.05	<0.05	NA	< 0.05	102%	80%	120%	NA	80%	120%	101%	70%	130%
Ammonia as N	2869956		<0.03	<0.03	NA	< 0.03	97%	80%	120%	90%	80%	120%	126%	70%	130%
Total Organic Carbon	2869866		<0.5	<0.5	NA	< 0.5	98%	80%	120%	NA	80%	120%	83%	80%	120%
Ortho-Phosphate as P	2867375	2867375	<0.01	<0.01	NA	< 0.01	105%	80%	120%	103%	80%	120%	112%	80%	120%
Dissolved Sodium	2867378	2867378	4.4	4.4	1.1%	< 0.1	110%	80%	120%	116%	80%	120%	NA	70%	130%
Dissolved Potassium	2867378	2867378	0.3	0.3	NA	< 0.1	105%	80%	120%	110%	80%	120%	97%	70%	130%
Dissolved Calcium	2867378	2867378	0.5	0.6	10.8%	< 0.1	107%	80%	120%	110%	80%	120%	96%	70%	130%
Dissolved Magnesium	2867378	2867378	0.4	0.4	NA	< 0.1	108%	80%	120%	111%	80%	120%	97%	70%	130%
Bicarb. Alkalinity (as CaCO3)	2867350	2867350	39	38	2.8%	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Carb. Alkalinity (as CaCO3)	2867350	2867350	<10	<10	NA	< 10	NA	80%	120%	NA	80%	120%	NA	80%	120%
Hydroxide	2867350	2867350	<5	<5	NA	< 5	NA	80%	120%	NA	80%	120%	NA	80%	120%
Dissolved Aluminum	2867378	2867378	267	273	2.2%	< 5	108%	80%	120%	115%	80%	120%	NA	70%	130%
Dissolved Antimony	2867378	2867378	<2	<2	NA	< 2	90%	80%	120%	104%	80%	120%	95%	70%	130%
Dissolved Arsenic	2867378	2867378	<2	<2	NA	< 2	98%	80%	120%	102%	80%	120%	102%	70%	130%
Dissolved Barium	2867378	2867378	7	7	NA	< 5	90%	80%	120%	96%	80%	120%	75%	70%	130%
Dissolved Beryllium	2867378	2867378	<2	<2	NA	< 2	109%	80%	120%	114%	80%	120%	104%	70%	130%
Dissolved Bismuth	2867378	2867378	<2	<2	NA	< 2	99%	80%	120%	106%	80%	120%	NA	70%	130%
Dissolved Boron	2867378	2867378	<5	<5	NA	< 5	111%	80%	120%	120%	80%	120%	100%	70%	130%
Dissolved Cadmium	2867378	2867378	0.122	0.120	1.7%	< 0.017	102%	80%	120%	105%	80%	120%	103%	70%	130%
Dissolved Chromium	2867378	2867378	<1	<1	NA	< 1	100%	80%	120%	100%	80%	120%	88%	70%	130%
Dissolved Cobalt	2867378	2867378	<1	<1	NA	< 1	100%	80%	120%	104%	80%	120%	92%	70%	130%
Dissolved Copper	2867378	2867378	<2	<2	NA	< 2	102%	80%	120%	106%	80%	120%	97%	70%	130%
Dissolved Iron	2867378	2867378	<50	<50	NA	< 50	97%	80%	120%	100%	80%	120%	74%	70%	130%
Dissolved Lead	2867378	2867378	<0.5	<0.5	NA	< 0.5	99%	80%	120%	105%	80%	120%	92%	70%	130%
Dissolved Manganese	2867378	2867378	19	19	1.1%	< 2	100%	80%	120%	104%	80%	120%	NA	70%	130%
Dissolved Molybdenum	2867378	2867378	<2	<2	NA	< 2	94%	80%	120%	99%	80%	120%	89%	70%	130%
Dissolved Nickel	2867378	2867378	<2	3	NA	< 2	100%	80%	120%	103%	80%	120%	98%	70%	130%
Dissolved Phosphorus	2867378	2867378	<0.02	<0.02	NA	< 0.02	116%	80%	120%	109%	80%	120%	87%	70%	130%
Dissolved Selenium	2867378	2867378	<1	<1	NA	< 1	95%	80%	120%	103%	80%	120%	114%	70%	130%

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Quality Assurance

CLIENT NAME: GHD LIMITED

AGAT WORK ORDER: 21X789740

PROJECT: 11216599

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Aug 30, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Silver	2867378	2867378	0.2	0.3	NA	< 0.1	97%	80%	120%	103%	80%	120%	94%	70%	130%
Dissolved Strontium	2867378	2867378	5	6	NA	< 5	99%	80%	120%	101%	80%	120%	92%	70%	130%
Dissolved Thallium	2867378	2867378	<0.1	<0.1	NA	< 0.1	97%	80%	120%	101%	80%	120%	89%	70%	130%
Dissolved Tin	2867378	2867378	<2	<2	NA	< 2	95%	80%	120%	106%	80%	120%	92%	70%	130%
Dissolved Titanium	2867378	2867378	<2	<2	NA	< 2	108%	80%	120%	115%	80%	120%	90%	70%	130%
Dissolved Uranium	2867378	2867378	1.3	1.3	1.4%	< 0.1	94%	80%	120%	101%	80%	120%	77%	70%	130%
Dissolved Vanadium	2867378	2867378	<2	<2	NA	< 2	96%	80%	120%	99%	80%	120%	88%	70%	130%
Dissolved Zinc	2867378	2867378	21	20	NA	< 5	101%	80%	120%	103%	80%	120%	115%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:

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Method Summary

CLIENT NAME: GHD LIMITED

AGAT WORK ORDER: 21X789740

PROJECT: 11216599

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Reactive Silica as SiO2	INOR-121-6027	SM 4500-SiO2 F	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Alkalinity	INOR-121-6001	SM 2320 B	
True Color	INOR-121-6008	SM 2120 B	LACHAT FIA
Turbidity	INOR-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-121-6047	SM 4500-NH3 H	COLORIMETER
Total Organic Carbon	INOR-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INOR-121-6012	SM 4500-P G	COLORIMETER
Dissolved Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Potassium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance	CALCULATION	SM 1030E	CALCULATION
Dissolved Aluminum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Antimony	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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Method Summary

CLIENT NAME: GHD LIMITED

AGAT WORK ORDER: 21X789740

PROJECT: 11216599

ATTENTION TO: Callie Andrews

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Phosphorus	MET-121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Dissolved Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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Chain of Custody Record

Laboratory Use Only
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: 6.1 12.9, 4.5
Hold Time:
AGAT Job Number: 21X789740
Notes:
'21 AUG 18 4:34PM

Report Information
Company: GHD Ltd.
Contact: Callie Andrews
Address: 120 Western Parkway, Bedford, NS
Phone: 902-468-1248 Fax: 902-468-2207
Client Project #: 11216599
AGAT Quotation: GHD 2021 Standard Rates
Please Note: If quotation number is not provided client will be billed full price for analysis.

Report Information (Please print):
1. Name: Callie Andrews
Email: Callie.Andrews@ghd.com
2. Name: Jessica Romo
Email: Jessica.Romo@ghd.com

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Excel Format Included
☐ Export

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days
Date Required:

Invoice To Same Yes ☐ / No ☐
Company: same
Contact:
Address:
Phone: Fax:
PO/Credit Card#: 73523232

Regulatory Requirements (Check):
☑ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☑ CCME ☑ CDWQ
☐ Industrial ☐ NSEQS-Cont Sites
☐ Commercial ☐ HRM 101
☐ Res/Park ☐ Storm Water
☐ Agricultural ☐ Waste Water
☑ FWAL
☐ Sediment ☑ Other NSE PSS

Drinking Water Sample: ☐ Yes ☐ No **Salt Water Sample** ☐ Yes ☐ No
Reg. No.:

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments – Site/Sample Info. Sample Containment	Field Filtered/Preserved	Standard Water Analysis	Metals: ☐ Total ☑ Diss ☐ Available	Mercury	☐ BOD ☐ CBOD	pH	☐ TSS ☐ TDS ☐ VSS	TKN	Total Phosphorus	Phenols	Tier 1: TPH/BTEX (PIRI) ☐ low level	Tier 2: TPH/BTEX Fractionation	CCME-CWS TPH/BTEX	VOC	THM	HAA	PAH	PCB	TC + EC ☐ P/A ☐ MPN ☐ MF	☐ HPC ☐ Pseudomonas	Fecal Coliform ☐ MPN ☐ MF	Other:	Other:	Hazardous (Y/N)
21MW1	Aug 18/21 12:40 pm	gw	3		y	☑	☑																				N
21MW2	Aug 18/21 12:25pm	gw	3		y	☑	☑																				N
21MW3	Aug 18/21 1:15pm	gw	3		y	☑	☑																				N
21MW4	Aug 18/21 12:55pm	gw	3		y	☑	☑																				N
21MW-DUP	Aug 18/21 —	gw	3		y	☑	☑																				N

Samples Relinquished By (Print Name): Jessica Romo
Samples Relinquished By (Sign): Jessica Romo
Date/Time: Aug 18/21 4:32 pm
Samples Received By (Print Name):
Samples Received By (Sign):
Date/Time:
Date/Time: Aug 18/21 4:32 pm
Date/Time:

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 1
N°: