



CanNorth

Canada North Environmental Services Limited Partnership

A First Nation Environmental Services Company

**NUCLEAR WASTE MANAGEMENT ORGANIZATION
ADAPTIVE PHASED MANAGEMENT PROJECT – WABIGOON LAKE
OJIBWAY NATION-IGNACE AREA
ENVIRONMENTAL MEDIA BASELINE PROGRAM – YEAR 1 BASELINE
REPORT**

Final Report

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LIST OF ACRONYMS

<u>Term</u>	<u>Description</u>
AOI	Area of Interest
APM	Adaptive Phased Management
BCMOE	British Columbia Ministry of Environment
BOD	Biochemical Oxygen Demand
CALA	Canadian Association for Laboratory Accreditation
COPC	Contaminants of Potential Concern
CWQG	Canadian Water Quality Guideline
DEM	Digital Elevation Model
DGR	Deep Geological Repository
DMP	Data Management Plan
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
ECHA	European Chemicals Agency
EMBP	Environmental Media Baseline Program
FEQG	Federal Environmental Quality Guideline
GPS	Global Positioning System
IA	Impact Assessment
IK	Indigenous Knowledge
LSA/LSA _x	Local Study Area/Local Study Area for 'X' environmental component
MECP	Ontario Ministry of the Environment, Conservation and Parks (formerly Ontario Ministry of the Environment [MOE], formerly Ontario Ministry of the Environment and Energy [MOEE])
MNO	Métis Nation of Ontario
NTU	Nephelometric Turbidity Units
NWMO	Nuclear Waste Management Organization
ORP	Oxidation-reduction Potential
PAH	Polycyclic Aromatic Hydrocarbon

PHC	Petroleum Hydrocarbon
PNEC	Probable No Effects Concentration
PQP	Project Quality Plan
PWQO	Provincial Water Quality Objective
QA/QC	Quality Assurance/Quality Control
RDL	Reportable Detection Limit
RSA/RSA _x	Regional Study Area/Regional Study Area for 'X' environmental component
SSA	Site Study Area
SVOC	Semi-volatile Organic Compound
TDS	Total Dissolved Solids
TIC	Total Inorganic Carbon
TOC	Total Organic Carbon
TSS	Total Suspended Solids
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WQG	Water Quality Guidelines
WLON	Wabigoon Lake Ojibway Nation
WQG	Water Quality Guideline

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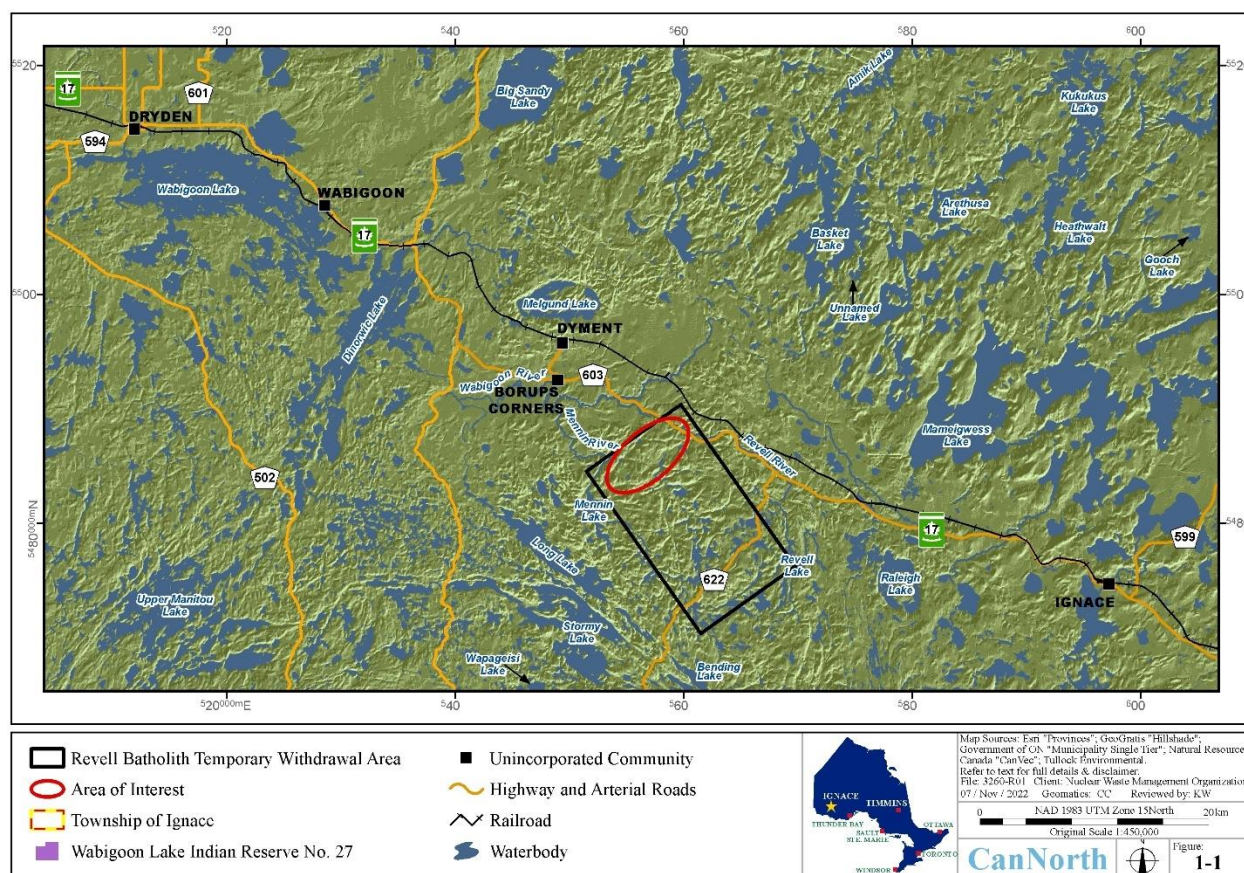
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EXECUTIVE SUMMARY

The Nuclear Waste Management Organization (NWMO) has undertaken a voluntary siting process for the safe, long-term management of used nuclear fuel. Canada's plan, which follows an approach known as Adaptive Phased Management (APM), would safely contain and isolate used nuclear fuel inside a deep geological repository (DGR) in a manner that protects people and the environment for generations to come. Throughout this document, the term Project is used to refer to the DGR and associated infrastructure.

There are two remaining sites being considered as informed and willing hosts for the Project: the Wabigoon Lake Ojibway Nation (WLON)-Ignace area and the Saugeen Ojibway Nation (SON)-South Bruce area, both in Ontario. The WLON-Ignace area site, which is approximately 40 km west of Ignace in Northwestern Ontario, is the focus of this report. The nearest First Nation community to the potential site is WLON, but the area is also used by other Indigenous communities, including members of the Métis Nation of Ontario (MNO).

As part of the siting process, an Environmental Media Baseline Program (EMBP) was initiated to collect baseline environmental data to get an understanding of the current conditions. The collection of data from the WLON-Ignace area under the EMBP commenced in summer 2021. During Year 1 of the program, data were collected on surface water quality, surface water flow (hydrology), and soil quality. The baseline data were collected by KGS Group Consulting Engineers, North/South Consultants and ECOSTEM Ltd. The objective of this report is to summarize the available data and the current understanding.



Surface water quality

The northern portion of the Project area contains several small, connected waterbodies that collectively drain into Mennin Lake. Mennin Lake flows north into the Mennin River, and then northwest into the Wabigoon River. On the other side of the Project area the Revell River flows into the Wabigoon River. This river drains northwest to Wabigoon Lake, which in turn, drains towards the Winnipeg River and the Nelson River, which outlets at Hudson Bay.

Water quality samples were collected from:

- Several ponds located in Project area and region, some that may be impacted and others that are expected to remain unaffected
- Mennin Lake and Mennin River
- Revell Lake and Revell River
- Wabigoon River

Information was collected in the spring, summer, fall, and winter during the Year 1 program to characterize the water quality, which included taking measurements in the field and collecting water samples which were sent to a laboratory for analysis. The laboratory measured general water quality characteristics, nutrient levels, metal and trace element levels, organic compound levels, and radionuclides. They also counted the types of plankton (very small plants and animals that float in the water and are important food sources for fish and animals).



Mennin Lake

The visibility in the water was higher in the lakes compared to the ponds and rivers. Measured pH was acidic to neutral, with average levels ranging from 5.4 to 6.7. Temperature and oxygen levels were found to change from the surface of the water to the bottom (i.e., through the water column) in some of the lakes and ponds sampled in the summer and/or fall. These results and variations are common and expected.

The nutrient levels in the samples taken were below water quality guidelines, except total phosphorus. Total phosphorus levels tended to be elevated in all areas, though levels tended to be somewhat lower in Revell Lake. Overall, the nutrient levels are not considered a concern as based on the average phosphorus levels, the productivity of the lakes in the study area (or the lakes trophic status) would still be considered low or oligotrophic. Bacterial counts were elevated in some of the ponds, reflecting natural conditions.

Total and dissolved metals and trace elements were generally low and similar between waterbodies. There were some elevated concentrations of aluminum and copper that were above water quality guidelines in many of the study areas. These results illustrate that some parameters are found at higher levels in the study area before development of the Project, which is important to establish during the baseline period. All other parameters were low, including radionuclides. Glyphosate was also analyzed but was not found in any of the samples collected.



Wabigoon River

Phytoplankton and zooplankton samples collected in the spring, summer, and fall from Mennin and Revell lakes showed that the communities differed between seasons. The plankton communities in both lakes had a moderate number of types of plankton and diversity. The communities will continue to be characterized during future years of the EMBP to provide site characterization information.

Hydrology

To understand the existing hydrologic condition of the study area, it is important to collect data to assess seasonal changes in storage volume, water level, flow rates and footprint of the waterbodies located within the study area. These waterbodies include Mennin Lake, Revell Lake, Mennin River, Revell River and several small lakes and streams. In Year 1 of this monitoring program, hydrologic (flow and water level), bathymetric, meteorological, aerial survey data were collected to characterize the hydrologic condition of the study area.

The information showed that the small lakes that are tributaries to Mennin Lake are shallow, with depths ranging from 3 m to 5 m. The larger Mennin Lake and Revell Lake, have depths ranging from 15 m to 25 m. Water level monitoring in local lakes was completed and found to vary between 1 m to 3 m seasonally. Stream flow measurements were taken, but only a limited amount of data are available at this time due to difficulties in accessing locations. Meteorological data including total precipitation, ambient temperature, and aerial survey data (terrain elevations and land cover information) were also collected and will be used to supplement the hydrologic analysis for the study area.

The hydrologic monitoring program will continue for at least another 2 years, during which the data gaps and any data quality issues will be addressed to collect all necessary data to complete the existing-condition site hydrology assessment as part of the site feasibility study.

Soil quality

Most of the area is comprised of undeveloped upland habitat that is almost exclusively dominated by mixes of black spruce and jack pine. Wetlands comprise 11% of the study area and are primarily black spruce dominated swamps.

In Year 1 of the program, 24 samples were collected from the area of the site with jack pine habitat, 8 from areas with black spruce habitat and 8 from the wetlands. The laboratory measured general soil characteristics, nutrient levels, metal and trace element levels, organic compound levels, and radionuclides.



Jack Pine site

The chemistry information for the jack pine and black spruce habitats were quite similar, with the wetland samples having a different chemistry. This is likely a result of higher total organic carbon in the wetland samples. The pH of all samples was low, indicating that the soil is acidic.

The soil was found to have elevated concentrations of some parameters including aluminum, chromium, iron, lithium, manganese, sulphur, and titanium. These are components of the soil and reflect the local geology. Only molybdenum in the wetland area was found to exceed the Ontario soil quality guideline and background concentrations from other areas, indicating that this environment has higher levels than typically found. It is good to understand this during the baseline period before there may be any influence from the Project.



Wetland site

Hydrocarbons were detected in the wetland samples, but this is believed to be due to the high organic content of the soil.

Some radionuclides were detected, these can be present from fallout from historical global nuclear weapons, nuclear weapons testing, and nuclear accidents.

Next Steps

The information presented in this report represents only one year of data, and because conditions change from year-to-year, particularly for water quality and flow, data collections will continue to provide an understanding of the range of conditions in the WLON-Ignace area. This report is the first summary of the information. There will be additional years of data and additional components sampled as part of the EMBP (such as air quality) and these will be discussed in future reports.

LAND ACKNOWLEDGEMENT

It is acknowledged that the lands and communities discussed in this report are primarily situated on the Traditional Territory of the Anishinaabe people of Treaty 3 and the Métis Nation.

1.0 INTRODUCTION

1.1 Overview

The Nuclear Waste Management Organization (NWMO) was established in 2002 with the objective of developing and implementing a plan for the long-term management of Canada's used nuclear fuel. The process has included the adoption of Adaptive Phased Management (APM), undertaking a siting process for the Deep Geological Repository (DGR) and associated infrastructure (hereinafter referred to as the Project), and conducting preliminary studies. From an initial list of 22 potential sites, two remain in the voluntary siting process for informed and willing hosts for the Project, the Wabigoon Lake Ojibway Nation (WLON)-Ignace area in Northwestern Ontario and the Saugeen Ojibway Nation (SON)-South Bruce area in Southern Ontario. The WLON-Ignace area site, which is approximately 40 km west of Ignace, as shown on Figure 1-1, is the focus of this report. The nearest First Nation to the Northwestern Ontario area is WLON. There are also several neighbouring Indigenous communities in the area including the Métis Nation of Ontario (MNO).

The NWMO is actively engaging with local Indigenous Nations, governments, and communities throughout the site selection process to better understand the thoughts and concerns of people who wish to be engaged. From the results of the most recent (2021) Ignace community survey, Ignace residents indicated very high interest in the environment, including water, soil, wildlife, and air (CCI Research Inc. 2021).

As part of the siting process, an Environmental Media Baseline Program (EMBP; CanNorth et al. 2020) was designed to collect baseline environmental data to be used to inform an Impact Assessment (IA) should the community remain in the process and become the single preferred site for the Project.

The collection of data from the WLON-Ignace area under the EMBP commenced in summer 2021. During Year 1 of the program (summer 2021 to spring 2022), data were collected to inform the surface water, hydrology, and soil components. The baseline data collection program is being managed by KGS Group Consulting Engineers. They were

responsible for program management and the hydrology component of the program. KGS was supported by North/South Consultants for the surface water quality component and ECOSTEM Ltd for the soil component.

The objective of this report is to summarize the collections that occurred and to provide a high-level summary of the Year 1 baseline data collected for the EMBP.

The NWMO plans to share this information with local communities to provide an update and gain input on the EMBP. It needs to be emphasized that at this time, the assessment has been conducted primarily through a Western Science approach. Additional discussion and input are required by rights-holders to reflect Indigenous Knowledge (IK) and a holistic view of the environment, within a harmonized approach.

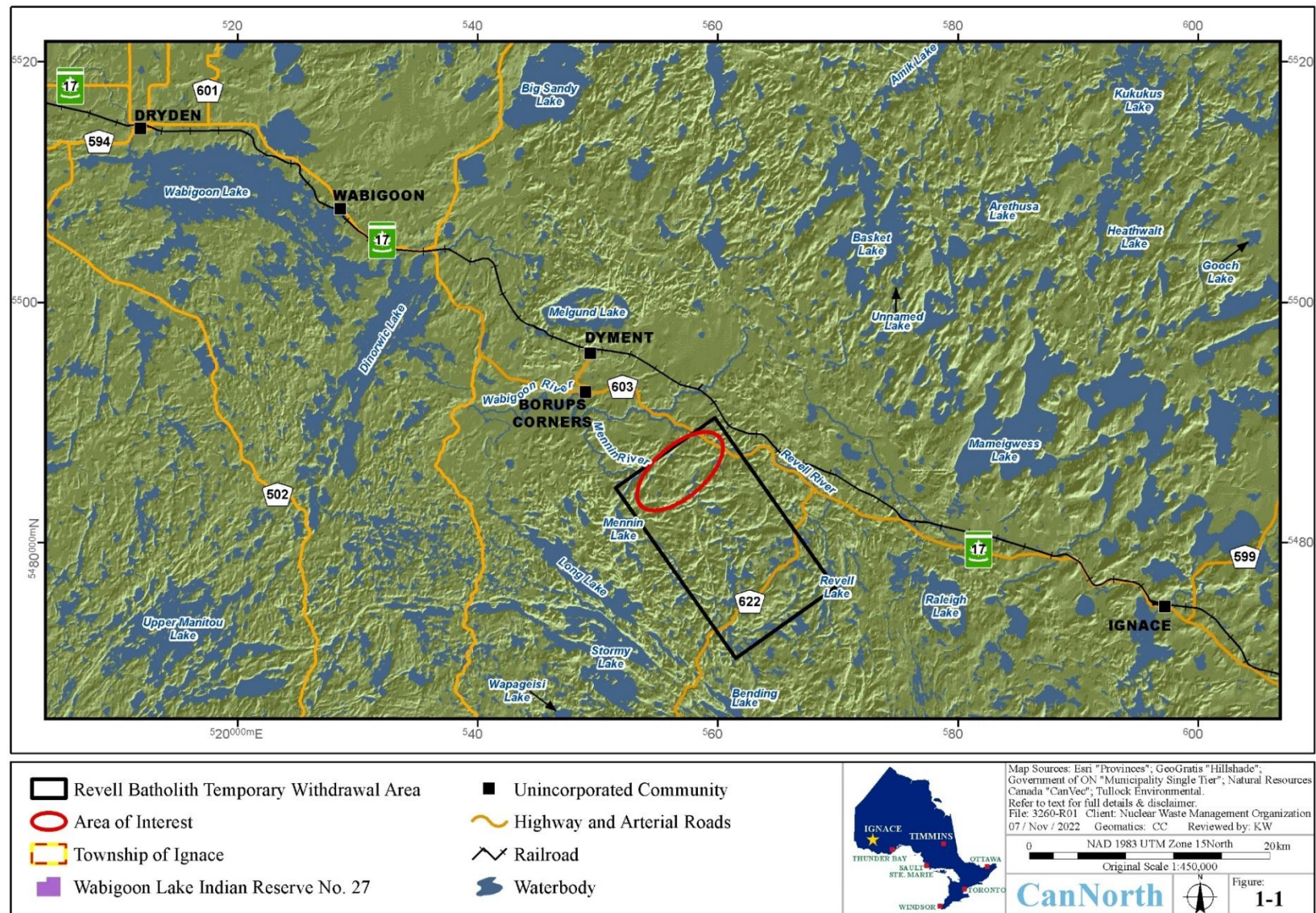
1.2 Scope

The current document provides simple summary statistics for the Year 1 data collected for surface water, hydrology, and soil, and general site characterization information based on observations while in the field. Sediment, air, noise, light, and tissues are also components of the EMBP but data collection was not scheduled for Year 1; these components will be included and reviewed in a future year.

This report is shared with the public and rights-holders in order to present the findings thus far and to obtain feedback such as any concerns around measured concentrations, areas that should be sampled in future years, etc.

Once feedback is obtained, a Program Review report will be produced later in 2023 which will:

- Outline changes or updates to applicable regulations, standards, guidelines, and current and emerging best practice identified in a high-level review;
- Recommend changes to the EMBP design for future years along with explanations as to why the changes are recommended;
- Provide a rationale table illustrating changes that were considered and rationale as to why they were or were not implemented; and
- Summarize input received and provide responses.

Figure 1-1 Proposed location for DGR in Wabigoon Lake Ojibway Nation-Ignace area

2.0 ENVIRONMENTAL MEDIA BASELINE PROGRAM

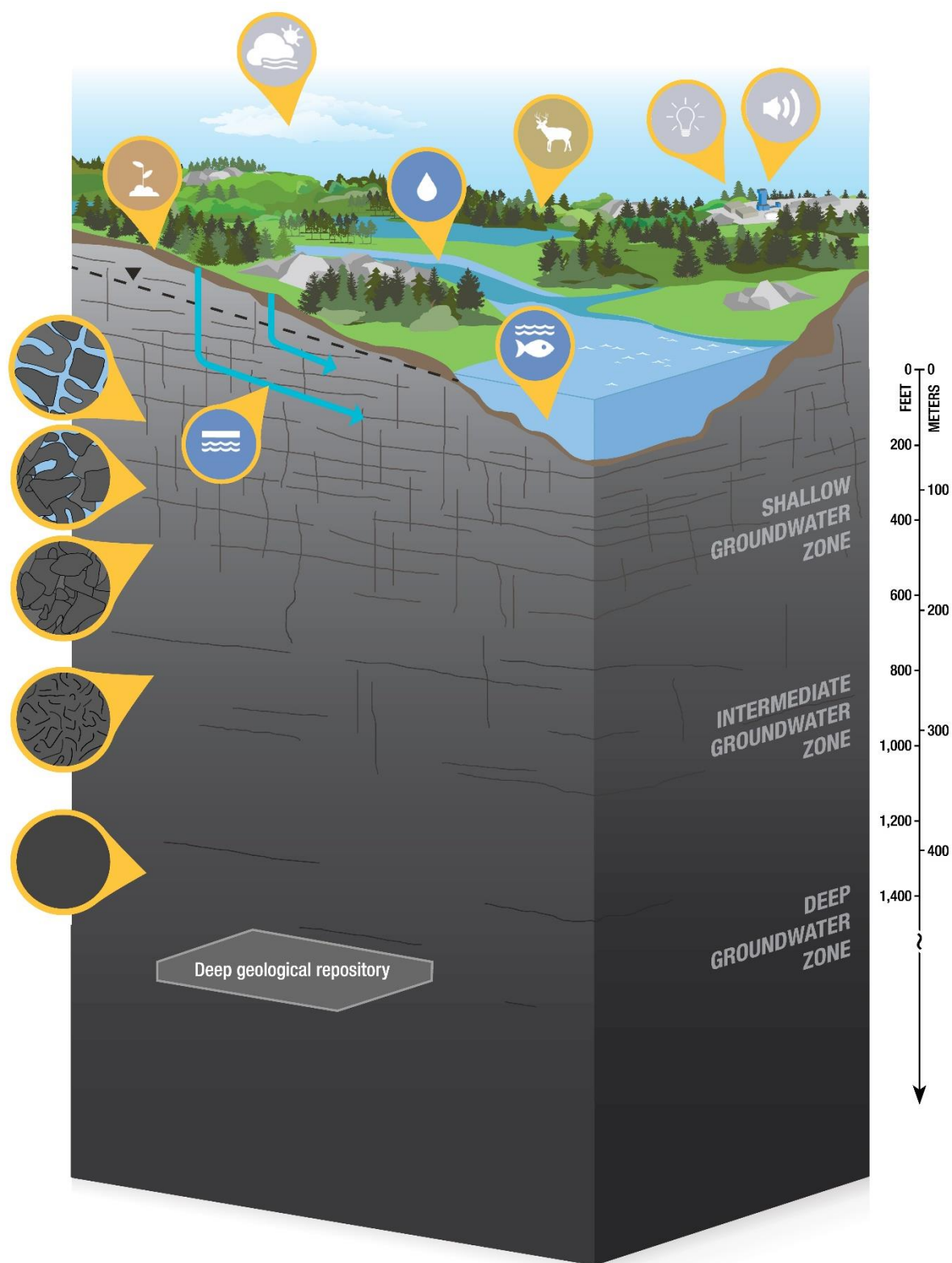
A Preliminary Sample Design Feasibility Assessment report (CanNorth et al. 2019) was prepared in advance of the EMBP to develop and evaluate various design options for the program. In selecting the design options, consideration was given to input received from people who participated in 10 different community engagement workshops led by the NWMO between November 2018 and April 2019. A second set of community engagement workshops was then held in September and October 2019 to obtain community feedback on the design options (i.e., sampling locations, frequency, etc.) and seek further input and clarification on how some of the issues and concerns raised during the first round of workshops could be addressed in the EMBP.

Ultimately, all of this information was used in the final design of the EMBP, as detailed under separate cover (CanNorth et al. 2020). Annual reviews and a thorough three-year program update will be completed to modify the EMBP as needed, based on analysis of data collected each year, continued feedback from stakeholders, rights-holders, and technical experts, and data needs of other studies being completed in support of the Project.

The full EMBP is focused on select environmental components that have potential to interact with the Project and includes 1) tissues, 2) hydrology, 3) surface water parameters, 4) air quality, noise, and light, and 5) soil (soil quality and gamma radiation). Shallow groundwater (from 0 to 100 metres below ground surface [m bgs]) and subsurface soil and bedrock (between 0.3 m bgs to 100 m bgs) are also essential components when conducting site characterization of a DGR facility (CNSC 2021). Although these two components were originally part of the EMBP (CanNorth et al. 2019) and discussed with stakeholders and rights-holders at community engagement workshops in 2019, they are being implemented separately by the Geosciences group within the NWMO as part of the deep drilling program and will be reported distinctly from this report. The NWMO will remain accountable for addressing concerns raised at engagement workshops related to groundwater. Shallow groundwater will also be included in the safety case, which will include identifying three groundwater systems (shallow, intermediate, and deep).

Figure 2-1 provides a pictorial representation of the Project and how the various Project components may interact with one another and the environment. Further details on these potential interactions, as well as potential mitigation measures, is provided under separate cover (CanNorth et al. 2023).

Figure 2-1 Conceptual Site Model for the biophysical environment



Note: 1000 m reflects the extent of deep drilling being completed by the NWMO.

2.1 Schedule

Data collections and reporting for the EMBP are planned to take place for one to three years for each component. Surface water quality, hydrology and soil were monitored in 2021 and 2022; additional components (air, tissues, sediment, benthic invertebrates, groundwater, as well as additional components of the surface water program) will be sampled in future years. Although Year 1 was intended to be the first year for all monitoring activities so that all EMBP monitoring would be completed after three years, this was not possible for various reasons such as delays in equipment, complications with COVID-19, etc.

2.2 Study Area

The EMBP includes monitoring the conceptual boundary of the potential facility (called the Site Study Area [SSA]) that would be located somewhere within the AOI, in environments surrounding the facility (called the Local Study Area [LSA]), and in some cases, in a larger area (called the Regional Study Area [RSA]). The proposed LSA_x and RSA_x, where 'x' is specific for each of the environmental components, differ for the components and are discussed within respective sections of this report.

In addition to examining areas in the SSA and LSA that could be subject to future Project impacts, study areas that can act as reference areas in the future were established. Sampling reference areas will aid in determining whether changes over time can be attributed to the Project or are due to other factors such as climate change, natural variability, or other sources of non-natural origin.

2.3 Contaminants of Potential Concern

A comprehensive list of Contaminants of Potential Concern (COPC) is required for a baseline sampling program to provide a complete picture of the natural constituents in the environment; however, it is also important that the COPC list meets EMBP project objectives, is relevant to potential interactions with the environment, and is not cost prohibitive. The COPC list for Year 1 of the EMBP was developed in collaboration with the NWMO, with consideration of stakeholder and rights-holder concerns, and with consultation of external sources of information. The Preliminary Sample Design Feasibility Assessment report (CanNorth et al. 2019) provides the rationale for the selection of COPC.

In general, only those contaminants with the highest potential for having interactions with the Project have been identified as COPC. There are some exceptions where a contaminant was included due to a high level of community concern, and the potential for cumulative effects. For example, the herbicide glyphosate is not expected to have any Project-environment interactions, but it may be present in environmental media being sampled as part of the EMBP due to its use by the forestry industry or in invasive vegetation management. Community engagement workshops revealed that there is a high level of concern around the use of glyphosate and its environmental fate and, thus, it has been included as a COPC for those media identified as being of highest concern by community members (e.g., surface water, berries, etc.).

Table 2-1 summarizes the planned COPC list for the environmental components monitored in 2021 and 2022, as per the EMBP design (CanNorth et al. 2020). It should be noted that not all parameters are intended to be measured in every sample. The list contains a wide suite of parameters, including metals, radionuclides, Polycyclic Aromatic Hydrocarbons (PAHs), Petroleum Hydrocarbons (PHCs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), pesticides, nutrients, and generic parameters routinely used to characterize components of the environment. The list will be re-evaluated as part of the Program Review report to ensure it remains relevant and that information is available for all COPC.

Table 2-1 Contaminants of Potential Concern by Environmental Component

Group	Parameters ¹
Surface Water (LSA_{SW} and Reference Area)	
Radionuclides	<u>Tier 1</u> : H-3, C-14, Sr-90, I-129, Cs-137 [and associated Co-60, Se-79, Ru-106], gross- α , gross- β <u>Tier 2</u> : Cl-36, Co-60, Se-79, Ru-106, Np-237, Pu-238, Pu-239, Pu-240, Pu-241 Am-241, Cm-244 (<i>artificial</i>) Ra-226, U-238, U-234, U-235, U-238, K-40, Th-228, Th-230, Th-232 (<i>natural</i>)
Metals (Total and Dissolved)	Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Cesium, Chromium (total, trivalent, hexavalent), Cobalt, Copper, Iron, Lead, Lithium, Mercury, Manganese, Molybdenum, Nickel, Rhodium, Ruthenium, Samarium, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc, Zirconium
Organics	Semi-volatile Organic Compounds (SVOCs)
<i>In situ</i> limnology	Dissolved Oxygen (DO), Temperature, pH, Conductivity, Redox Potential
Nutrients and General Chemistry	Alkalinity, Bicarbonate, Bromide, Calcium, Carbonate, Chloride, Cyanide, Fluoride, Hydroxide, Magnesium, pH, Potassium, Sodium, Specific Conductivity, Sulphate, Sum of Ions, Total Dissolved Solids (TDS), Total Hardness, Total Suspended Solids (TSS), Turbidity, Ammonia as Nitrogen, Nitrate + Nitrite, Nitrate (NO ₃), Total Organic Carbon (TOC), Total Inorganic Carbon (TIC), Dissolved Organic Carbon (DOC), Phosphorus, Total Kjeldahl Nitrogen, Iodine* 5-day Biological Oxygen Demand (BOD ₅), E. coli, Total Coliforms
Other	Glyphosate
Soils	
Radionuclides	<u>Tier 1</u> : H-3, C-14, Sr-90, I-129, Cs-137 [and associated Co-60, Se-79, Ru-106], gross- α , gross- β <u>Tier 2</u> : Cl-36, Co-60, Se-79, Ru-106, Np-237, Pu-238, Pu-239, Pu-240, Pu-241 Am-241, Cm-244 (<i>artificial</i>) Ra-226, U-238, U-234, U-235, U-238, K-40, Th-228, Th-230, Th-232 (<i>natural</i>)
Metals	Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Bromine, Cadmium, Calcium, Cesium, Chromium (total, hexavalent), Cobalt, Copper, Iron, Lead, Lithium, Mercury, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Rhodium, Ruthenium, Samarium, Selenium, Sodium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc, Zirconium Acid generation and leaching potential
Organics	PAHs, VOCs, SVOCs, PHCs
General Chemistry and Characterization	Inorganic nitrogen compounds (nitrogen, nitrate, nitrite), pH, Moisture, Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC), Electrical Conductivity, Sodium Absorption Ratio, Iodine* Grain size distribution
Other	Glyphosate

Note: As tissues, sediment, air quality, and RSA water quality were not monitored in 2021 and 2022, parameters associated with these environmental components, as well as gamma radiation to be included in a future year of the soil program, are not included.

* Iodine may be measured in media.

¹ Not all parameters were measured in 2021 and 2022 as planned. This is not unexpected in a large program and will be noted in the Program Review and corrected in subsequent sampling campaigns.

² Tier 1 radionuclides are those that may be associated with releases from the Project. Tier 2 radionuclides are being measured to establish baseline.

3.0 SURFACE WATER QUALITY

3.1 Sampling Overview

The primary objectives of the Year 1 surface water quality program were to 1) characterize ponds, lakes, and rivers in the LSA_{SW}, 2) locate suitable sampling station locations and reference areas and obtain site characterization information to inform benthic invertebrate station locations for Year 2, and 3) establish variability in COPC concentrations and other endpoints to re-evaluate the sample design in the Program Review report.

The surface water sampling locations were selected in consideration of potential direct Project interactions with the environment, the potential for cumulative effects, input received from stakeholders and rights-holders, and potential reference areas. During community engagement workshops conducted in Ignace, Dymont, and WLON, taking care of water and monitoring surface water were common themes expressed by stakeholders and rights-holders (CanNorth et al. 2020). Thus, beyond ensuring pertinent data are collected for scientific purposes, an additional data objective of the surface water quality program is to provide community assurance, address perceptions, and build relationships. This included incorporating a water quality monitoring program in the RSA_{SW} that will sample locations identified as important areas to monitor by stakeholders and rights-holders. Sampling within the RSA_{SW} will be implemented in a later year of the program once the final site has been selected.

The study components included in the surface water parameters component of the EMBP include:

- Surface water quality and characterization;
- Sediment quality and characterization;
- Phytoplankton and zooplankton community composition and biomass; and
- Benthic invertebrate community composition and biomass.

The Year 1 program included sampling surface water quality and plankton. Collections of these components have continued in Year 2, and the sediment and benthic invertebrate sample collections were initiated.

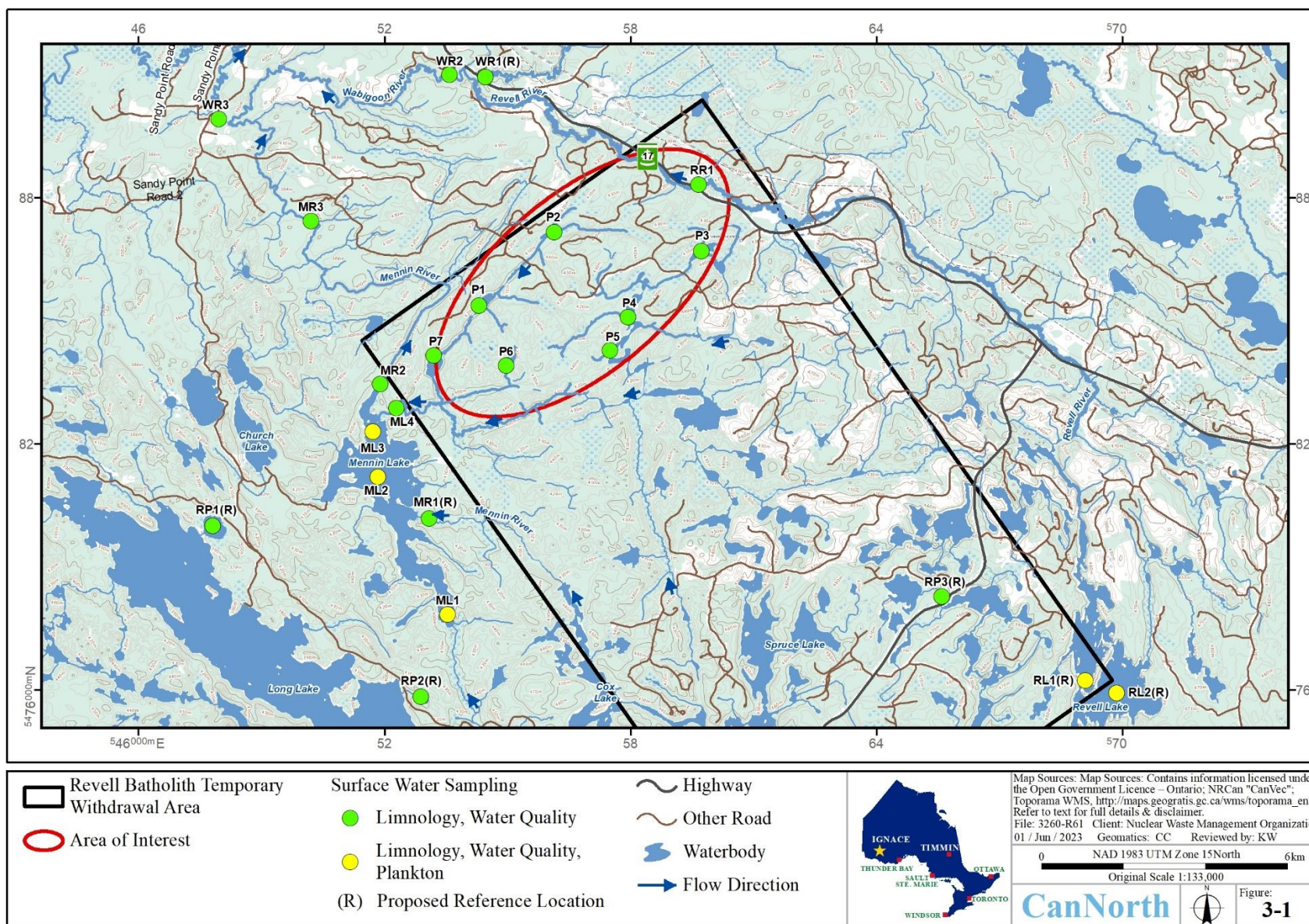
3.1.1 Study Areas

The LSA_{SW} includes waterbodies with the potential of being impacted by the Project, as well as potential reference areas. Locations for water withdrawal and treated effluent

release from the Project have not yet been determined; thus, assumptions were made in order to initiate data collections for the EMBP (CanNorth et al. 2020). Figure 3-1 presents the surface water quality stations sampled during the Year 1 program. This included the following waterbodies:

- Seven ponds located in the AOI (sites P1 to P7). Since it is not yet known where within the AOI the Project site may be located, it is also not known which waterbodies within that area would be most likely to be subject to potential impacts; thus, all ponds in the AOI were included in the Year 1 program.
- Three ponds outside of the AOI that could act as reference areas (sites RP1 to RP3) for the ponds sampled in the AOI.
- The watercourse extending from the AOI and entering Mennin Lake at the north end (site ML4).
- Three areas of Mennin Lake (sites ML1 to ML3). Potential Project interactions with Mennin Lake are currently unclear and could include water withdrawal, treated effluent release, and/or COPC contributions from the AOI in the north end of the lake where the inflow is located.
- Two areas of Revell Lake (sites RL1 and RL2), which is the proposed reference lake for Mennin Lake.
- Two areas of the Mennin River downstream of Mennin Lake (sites MR2 and MR3) and one site in the Revell River (site RR1) as these waterbodies are potential exposure locations for treated effluent release.
- One area of the Mennin River upstream of Mennin Lake (site MR1) to provide a potential future reference area for the Mennin River downstream of Mennin Lake and/or the Revell River.
- Three areas of the Wabigoon River (sites WR1, WR2, and WR3) as far-field potential future exposure (sites WR2 and WR3) and reference (site WR1) locations.

Figure 3-1 Year 1 surface water sampling locations



3.1.2 Contaminants of Potential Concern

A large suite of COPC were included in the Year 1 program (see Table 2-1) and the COPC measured somewhat differed between sampling locations depending on the data needs. The majority of locations and COPC are being tested for the first time, with the exception of data collected during preliminary studies completed in the AOI during Phase 1 and Phase 2 studies (CanNorth et al. 2020). During development of the COPC list for the EMBP, PHCs, and VOCs were identified as having potential Project interactions; however, the NWMO initiated an annual sampling program in the AOI in 2017 that includes measuring suites of these parameters in surface water, sediment, and soil. Since baseline data were already being collected for these parameters at various locations throughout the AOI and near vicinity, they were not included in the EMBP for surface water quality. In the AOI and associated reference areas, PAHs and SVOCs are included since these have not been previously measured by the NWMO and there is the potential for Project-interactions. These were only sampled within the AOI Ponds and associated reference ponds as potential interactions would be near-field, such as a fuel spill, or entirely unrelated to the potential Project impacts.

3.2 Methods

Site visits occurred in summer 2021 (July, August), fall 2021 (September, October), winter 2022 (February), and spring 2022 (May, June). At each station, *in situ* limnology profiles and water quality samples were collected. In addition, plankton samples were collected during the open water seasons at stations sampled in Mennin and Revell lakes. In the lakes and rivers, three samples were collected per station and season. In the AOI and reference ponds, one sample was collected per season due to their smaller size except for the fall program where three samples were collected to provide data to examine variability during the Program Review report. Table 3-1 details the data collections that occurred at each station during each season.

Information on the Quality Assurance and Quality Control (QA/QC) program is provided in Appendix A.

Table 3-1 Summary of surface water and plankton samples collected during the Year 1 EMBP.

Waterbody/ Watercourse	Location Details	Station ID	Site ID	Sample Type ¹	UTM (Zone 15U)		Date Sampled	Sample Collection Type	Limnology Profile	Base Water Quality ²	PAHs and SVOCs	Herbicides & Pesticides	Radioactive Isotopes ³	Additional Radioactive Isotopes ⁴	Chlorophyll <i>a</i>	Phytoplankton & Zooplankton
					Easting	Northing										
Mennin Lake	LSA	MenninLake_01	ML1	Rep (A, B, C)	553539	5477830	2021-07-31	M/D	x	x					x	x
				Rep (A, B, C)			2021-09-25	C	x	x			x ⁵		x	x ¹²
				Rep (A, B, C)			2022-06-01	M/D	x	x			x		x	x
		MenninLake_02	ML2	Rep (A, B, C)	551843	5481188	2021-08-02	T/B	x	x					x	x
				Rep (A, B, C)			2021-09-23	T/B	x	x			x	x	x	x
				Rep (A, B, C)			2022-05-27	T/B	x	x			x	x	x	x
		MenninLake_03	ML3	Rep (A, B, C)	551723	5482293	2021-07-30	C	x	x					x	x
				Rep (A, B, C)			2021-09-24	C	x	x			x ⁶		x	x
				Rep (A, B, C)			2022-05-26	C	x	x			x		x	x
		MenninRiver_01	MR1	Rep (A, B, C)	553097	5480169	2021-07-31	M/D	x	x					x	
				Rep (A, B, C)			2021-09-24	M/D	x	x			x ⁶		x	
				Rep (A, B, C)			2022-05-25	M/D	x	x			x		x	
		MenninRiver_02	MR2	Rep (A, B, C)	551899	5483447	2021-08-01	M/D	x	x					x	
				Rep (A, B, C)			2021-09-24	M/D	x	x			x ⁶	x	x	
				Rep (A, B, C)			2022-05-28	M/D	x	x			x	x	x	
		MenninRiver_03	MR3	Rep (A, B, C)	550207	5487427	2021-08-05	M/D	x	x					x	
				Rep (A, B, C)			2021-09-27	M/D	x	x			x		x	
				Rep (A, B, C)			2022-05-23	M/D	x	x			x		x	
Revell Lake	LSA	RevellLake_01	RL1	Rep (A, B, C)	569112	5476222	2021-08-07	T/B	x	x					x	x
				Rep (A, B, C)			2021-09-21	T/B	x	x			x		x	x
				Rep (A, B, C)			2022-05-19	C	x	x			x ^{5,7}		x	x
		RevellLake_02	RL2	Rep (A, B, C)	569870	5475911	2021-08-06	T/B	x	x					x	x
				Rep (A, B, C)			2021-09-22	C	x	x			x		x	x
				Rep (A, B, C)			2022-05-20	T/B	x	x			x		x	x
Revell River	LSA	RevellRiver_01	RR1	Rep (A, B, C)	559675	5488313	2021-08-04	M/D	x	x					x	
				Rep (A, B, C)			2021-09-21	M/D	x	x			x	x	x	
				Rep (A, B, C)			2022-05-24	M/D	x	x			x	x	x	
Unknown Waterbody 1	AOI Pond	UWB_01	P1	Rep (A, B, C)	554315	5485367	2021-10-01	M/D	x	x	x	x	x		x	
				Rep (A)			2022-05-31	M/D	x	x	x	x	x		x	
Unknown Waterbody 2	AOI Pond	UWB_02	P2	Rep (A, B, C)	556141	5487157	2021-10-01	M/D	x	x	x	x	x		x	
				Rep (A)			2022-02-16	M/D	x	x	x	x	x		x	
				Rep (A)			2022-05-23	M/D	x	x	x	x	x		x	

Table 3-1 Summary of surface water and plankton samples collected during the Year 1 EMBP. (continued)

Waterbody/ Watercourse	Location Details	Station ID	Site ID	Sample Type ¹	UTM (Zone 15U)		Date Sampled	Sample Collection Type	Linnology Profile	Base Water Quality ²	PAHs and SVOCs		Herbicides & Pesticides	Radioactive Isotopes ³	Additional Radioactive Isotopes ⁴	Chlorophyll <i>a</i>	Phytoplankton & Zooplankton
Unknown Waterbody 3	AOI Pond	UWB_03	P3	Rep (A)	559738	5486690	2021-08-03	T/B	x	x	x		x				
				Rep (A, B, C)			2021-09-27	C	x	x	x		x ⁸	x	x	x	
				Rep (A)			2022-02-15	M/D	x	x	x		x	x	x	x	
				Rep (A)			2022-05-21	C	x	x	x		x	x	x	x	
Unknown Waterbody 4	AOI Pond	UWB_04	P4	No water samples	557952	5485088	2021-07-14	-	x								
				Rep (A, B, C)			2021-09-29	C	x	x	x		x	x		x	
				No water samples			2022-02-18	-	x								
				Rep (A)			2022-05-22	T/B	x	x	x		x	x		x	
Unknown Waterbody 5	AOI Pond	UWB_05	P5	Rep (A, B, C)	557513	5484267	2021-09-29	C	x	x	x		x	x		x	
				Rep (A)			2022-05-22	C	x	x	x		x	x		x	
Unknown Waterbody 6	AOI Pond	UWB_06	P6	Rep (A, B, C)	554977	5483904	2021-09-27	M/D	x	x	x		x ⁸	x		x	
				Rep (A)			2022-06-02	M/D	x	x	x		x	x		x	
Unknown Waterbody 7	AOI Pond	UWB_07	P7	Rep (A, B, C)	553212	5484148	2021-09-26	M/D	x	x	x		x ⁸	x		x	
				Rep (A)			2022-05-28	T/B	x	x	x		x	x		x	
Unknown Waterbody 8	Reference Pond	UWB_08	RP1	Rep (A)	547817	5479994	2021-08-08	T/B		x	x		x	x		x	
				Rep (A, B, C)			2021-09-26	C	x	x	x		x	x ⁵		x	
				Rep (A)			2022-05-25	T/B	x	x	x		x	x		x	
Unknown Waterbody 9	Reference Pond	UWB_09	RP2	Rep (A)	552887	5475830	2021-08-07	T/B	x	x	x		x	x ^{5,7,9}		x	
				Rep (A, B, C)			2021-09-26	C	x	x	x		x	x ^{5,10}		x	
				Rep (A)			2022-05-24	T/B	x	x	x		x	x ^{5,7}		x	
Unknown Waterbody 10	Reference Pond	UWB_10	RP3	Rep (A, B, C)	565602	5478268	2021-09-30	M/D	x	x	x		x	x		x	
				Rep (A)			2022-05-29	M/D	x	x	x		x	x		x	
Unknown Watercourse 1	LSA	UWC_01	ML4	Rep (A, B, C)	552298	5482868	2021-08-01	M/D	x	x						x	
				Rep (A, B, C)			2021-09-23	M/D	x	x				x		x	
				Rep (A, B, C)			2022-06-01	M/D	x	x				x		x	

Table 3-1 Summary of surface water and plankton samples collected during the Year 1 EMBP. (continued)

Waterbody/ Watercourse	Location Details	Station ID	Site ID	Sample Type ¹	UTM (Zone 15U)		Date Sampled	Sample Collection Type	Linnology Profile	Base Water Quality ²	PAHs and SVOCs		Herbicides & Pesticides	Radioactive Isotopes ³	Additional Radioactive Isotopes ⁴	Chlorophyll <i>a</i>	Phytoplankton & Zooplankton
Wabigoon River	LSA	WabigoonRiver_01	WR1	Rep (A, B, C)	554467	5490939	2021-08-03	M/D	x	x						x	
				Rep (A, B, C)			2021-09-22	M/D	x	x				x		x	
				Rep (A, B, C)			2022-05-22	C	x	x				x		x	
		WabigoonRiver_02	WR2	Rep (A, B, C)	553589	5490991	2021-08-04	M/D	x	x						x	
				Rep (A, B, C)			2021-09-27	M/D	x	x				x		x	
				Rep (A, B, C)			2022-05-22	C	x	x				x ⁵		x	
Wabigoon River	LSA	WabigoonRiver_03	WR3	Rep (A, B, C)	547959	5489918	2021-07-29	M/D	x	x				x ^{10,11}		x	
				Rep (A, B, C)			2021-09-25	M/D	x	x				x ⁵		x	
				Rep (A, B, C)			2022-05-29	C	x	x				x		x	

¹ Rep (A, B, C) means three samples were collected; Rep (A) means one sample was collected.

² Analyses includes: physical properties, anions and nutrients, cyanides, organic and inorganic carbon, aggregate organics (BOD), bacteriological tests (*Escherichia coli* and total coliform count), and metals (total, dissolved, and speciated [chromium III, VI, hexavalent]).

³ Includes gross alpha and gross beta analysis.

⁴ Analysis includes: Plutonium-238, Plutonium-239, Chlorine-36, and Neptunium-237.

⁵ No Iodine-129 analysis.

⁶ No Americium-241 analysis.

⁷ No Hydrogen-3 analysis.

⁸ No herbicide analysis.

⁹ No gross alpha analysis; no gross beta analysis.

¹⁰ No Carbon-14 analysis.

¹¹ No Radium-226 analysis.

¹² Zooplankton sample is missing.

PAH = polycyclic aromatic hydrocarbons; SVOC = semi-volatile organic compounds; LSA_{SW} = local study area for surface water; M/D = mid/discrete (sample was collected at *mid* depth or at a *discrete* depth); C = composite (a sample was collected at three depths but composited into one sample); T/B = top/bottom (one sample was collected from a discrete depth near the surface/top and one sample was collected at a discrete depth near the bottom); AOI = area of interest; BOD = biochemical oxygen demand.

3.2.1 Field Methods

3.2.1.1 Site Characterization

General site characterization data were collected at each station to aid in planning for future field programs and to assess if historic or current impacts in the area may deem the study area not representative of baseline or reference conditions. The assessment included recording historic and current land use, describing the surrounding environment, and noting the disturbance level (i.e., road proximity, nearby industry, etc.) and community use (i.e., cabins, fishing, drinking water). Photographs were taken at each station.

3.2.1.2 Surface Water Quality

Limnology

During each site visit, limnological measurements were collected from each station and included temperature (°C), dissolved oxygen (%), pH, specific conductivity (µS/cm), oxidation-reduction potential (ORP; mV), and turbidity (Nephelometric Turbidity Units [NTU]). Measurements were collected throughout the water column according to the depth displayed on the EXO multi-meter. The number of measurements taken depended on the station depth and consisted of the following:

- In water less than 1 m deep: a minimum of a single near surface measurement (e.g., 0.3 m) was taken.
- In water less than 2 m deep: measurements were taken at 0.5 m intervals (e.g., near surface [0.3 m], 1.0 m, 1.5 m).
- In water greater than 2 m deep: measurements were taken at 1 m intervals (e.g., near surface [0.3 m], 1.0 m, 2.0 m).

To provide an additional measure of water transparency, a 20-cm diameter black and white Secchi disk was used. The Secchi depth represents the water depth where the observer can no longer view the disk from the boat. The total water depth of each station was measured using a depth sounder.

Chemistry

Water samples were collected using a Kemmerer water sampler for submission to a laboratory for chemical analyses. In water depths of less than 2 m, a sample was collected from mid-depth or at least 15 cm below the surface. In water depths of more than 2 m, with a thermocline (i.e., at least a 1°C change in temperature in 1 m of water), two discrete

sample sets were collected. The first set of samples was collected closer to the surface (above the thermocline) and the second set of samples was collected closer to the bottom (below the thermocline). Composite samples were taken at stations with no thermocline and where the water depths were greater than 2 m (water was collected near surface, at mid-depth, and near bottom in the water column and mixed). Locations with less than 1.5 m water in ice-covered conditions were collected using a peristaltic pump and water was discharged from the tubing directing into the sample bottles.

Water samples for dissolved metals and dissolved organic carbon were field filtered for parameters using a 0.45 µM cellulose acetate filter and syringe provided by the lab. Based on discussions with the analytical lab and the NWMO, samples for chlorophyll a were not field filtered.

Water samples were stored in coolers provided by the laboratory in the dark at 4°C (not frozen) until delivered to the lab. Samples were delivered to the laboratory daily, to meet hold times for analyses.

Invasive Species Protection

Aquatic sampling gear, personal gear, and any other gear that contacts water are potential vectors for transfer of aquatic invasive species and/or pathogens between waterbodies. To reduce the risk of field programs contributing to these transfers, all equipment was new or decontaminated prior to arriving on site. In addition, during the field program, all equipment that contacted the water was cleaned and disinfected each evening.

3.2.1.3 Plankton

Three replicate plankton samples were collected from three locations in Mennin Lake and two locations in Revell Lake in the summer and fall of 2021 and winter and spring of 2022. Plankton samples were taken in the euphotic zone (the upper layer of water that receives sunlight), which was measured as twice the Secchi depth. If the water depth was less than the Secchi depth, then the samples were collected above 1 m of the bottom so that the sediment was not disturbed.

The phytoplankton samples were collected by slowly lowering weighted Nalgene or Tygon tubing vertically through the euphotic zone. The tube was then pulled up and the water contained in the tube was discharged into the sample container. Each sample was a composite of between 3 and 10 hauls, depending on the station depth. Phytoplankton

samples were preserved using 1% Lugol's solution and were stored in the dark at room temperature.

The zooplankton samples were collected using a 64 µm mesh Wisconsin net. The net was lowered to the euphotic zone depth and raised vertically at a continuous rate of 0.5 m/s through the water column. At the surface, the outer sides of the net were rinsed and the bucket containing the sample was detached from the net and drained into the sample container. Each sample was a composite of between 3 and 5 hauls depending on the station depth. Zooplankton samples were preserved with 70% ethanol and stored in the dark at room temperature.

3.2.2 Laboratory Analyses

3.2.2.1 Water Chemistry

Water chemistry samples were analyzed by ALS laboratories, a CALA accredited lab. Information on laboratory QA/QC is provided in Appendix A.

3.2.2.2 Plankton

Plankton laboratory analyses was also completed by ALS laboratories following APHA 10200 C, F, and I reference methods for phytoplankton and C, G, and I for zooplankton. Samples were prepared by sedimentation/settling and examined using a compound phase contrast inverted microscope or stereoscopic microscope (to aid in identification of larger crustaceans). Plankton was identified to species, where possible, and enumerated. The average biovolume and total biovolume for every genus/species was also reported.

3.2.3 Data Analyses

3.2.3.1 Water Quality

Statistical Analyses

In order to provide a high-level characterization of the waterbodies sampled in the study areas for Year 1 of the surface water quality program, data were grouped into categories and summary statistics were completed using the data from all seasons and stations within each category. To complete these analyses, the following categories were used:

- Mennin Lake (3 stations, 36 samples)
- Mennin River (3 stations, 27 samples)
- Revell Lake (2 stations, 30 samples)
- Revell River (1 station, 9 samples)

- AOI Ponds (7 stations, 34 samples)
- Reference Ponds (3 stations, 18 samples)
- Unnamed Watercourse (1 station, 9 samples)
- Wabigoon River (3 stations, 27 samples)

Note, sample sizes of some parameters varied from the target sample size presented above, particularly for radionuclides. To calculate summary statistics, values below Reportable Detection Limits (RDLs) were set equal to the RDL. The summary statistics calculated included the sample size, mean, standard deviation, median, 5th percentile, and 95th percentile. In addition, for each parameter the units, number of samples (n), RDL, and number of samples below the RDL (n<RDL) are reported.

Guideline Comparisons

The measured data are compared to Water Quality Guidelines (WQGs). The EMBP Design report (CanNorth et al. 2020) identified the following primary references for obtaining these values:

- Canadian Council of Ministers of the Environment (CCME 2023): Canadian Water Quality Guidelines (CWQGs) for the Protection of Freshwater Aquatic Life, and for the Protection of Agriculture (Irrigation and Livestock).
- Government of Canada (GC 2021)¹: Federal Environmental Quality Guidelines (FEQGs) for surface water quality.
- Ontario Ministry of Environment, Conservation and Parks (MECP): Provincial Water Quality Objectives (PWQOs; MOEE 1994).
- Health Canada (2022a): Guidelines for Canadian Drinking Water Quality and Recreational Water Quality.

Guidelines are also available from other jurisdictions, such as the British Columbia Ministry of Environment (BCMOE) approved water quality guidelines (BCMOE 2023), which can be considered on an as-needed basis. In addition, the NWMO developed interim acceptance criteria for the protection of persons and the environment from non-radiological impacts for surface water, groundwater, soil, sediment, and air (NWMO 2015, 2019). The interim acceptance criteria are primarily based on the applicable guidelines, supplemented as needed by internationally developed guidelines and literature. These acceptance criteria

¹ <https://www.canada.ca/en/health-canada/services/chemical-substances/fact-sheets/federal-environmental-quality-guidelines.html>

are being used in the NWMO postclosure safety assessment and are, therefore, also relevant as an evaluation tool.

The approach outlined below was followed to select the WQGs for the measured parameters. When guidelines were available from multiple agencies for a parameter, the following approach was taken in selecting an appropriate WQG.

1. As specified in the EMBP, the first consideration was for all federal (CWQGs and FEQGs) and provincial (MECP) guidelines. However, within this there are some additional considerations:
 - a. For many of the metals and trace elements, the CWQGs and FEQGs are updated values compared to the MECP guidelines. Therefore, for these COPCs, the FEQG was the first priority, CWQG was the second priority, and MECP was the third priority.
 - If there was a value for dissolved, it was given preference over the guideline for total in the assessment of the data.
 - b. Other than the metals and trace elements, the most restrictive of the applicable federal and provincial guidelines was selected, except as follows.
 - The MECP PWQOs for PAHs are below the level of detection. As the basis of these values is unknown, they were not considered in the selection of the applicable guidelines.
2. If federal or provincial values were not available, as outlined in the EMBP, guidelines from the BCMOE were considered.
3. If no values were available from the first two steps then guidelines from other jurisdictions and sources were adopted including:
 - Environmental quality guidelines for Alberta surface waters (GA 2018).
 - United States Environmental Protection Agency (US EPA 2022) water quality criteria for aquatic life.
 - NWMO interim acceptance criteria (NWMO 2015, 2019).
 - Suter and Tsao (1996).
 - European Union – Probable No Effects Concentration (PNEC) values from the European Chemicals Agency (ECHA)².
4. The final consideration in selecting the WQG was to ensure that the value did not exceed drinking water or recreational use guidelines.

² <https://echa.europa.eu/information-on-chemicals>

- a. For drinking water guidelines, only those that are health-based were included as candidate guidelines (not operational guidelines or aesthetic objectives, with the exception of sulphate and Total Dissolved Solids (TDS) as these are based on taste).
- b. The bacterial guidelines for drinking water not considered appropriate for application to freshwater sources.

The selected WQGs are included in Appendix B, although WQGs were not available for every COPC.

3.2.3.2 Plankton

For each waterbody (i.e., Mennin Lake and Revell Lake), phytoplankton and zooplankton density (organisms/L) and percent taxonomic composition were reported seasonally (spring, summer, and fall). Additional community metrics calculated included taxon richness, Simpson's diversity index, and Simpson's evenness. The biotic indices were calculated at the family level of taxonomy following Environment and Climate Change Canada recommendations for benthic invertebrates (EC 2012). Brief descriptions of these indices are provided below.

Simpson's diversity index is a measure of diversity which considers both the number of family-level taxa (richness) and the evenness of distribution of individuals among taxa in a sample (EC 2012). For each family-level taxon, this index was calculated by determining the proportion of individuals that contribute to the community total in the sample. The value of the Simpson's diversity index ranges between zero and one where the greater the value, the greater the community diversity.

Simpson's evenness is a measure of the equitability of distribution of individuals among taxa within the community. Evenness was calculated by determining the relative diversity over the total number of taxa in each sample, where relative diversity is the sum of the proportions of each taxon in the sample (EC 2012). A community in which each taxon presence is equally abundant has high evenness, while a community numerically dominated by one or few taxa has low evenness (EC 2012). As with the Simpson's diversity index, evenness ranges between zero and one.

3.3 Results

3.3.1 Site Characterization

Site characterization collected during the Year 1 EMBP is provided in Table 3-2 and photographs are presented in Appendix C. In general, the study area is typical of a northern,

forested environment with mature, undisturbed forests and few human developments. The stations sampled were described as having predominantly silt/clay/sand bottoms with a lack of rocky erosional habitat in the river areas. A separate habitat mapping study is being completed as part of the Biodiversity Impact Study.

Table 3-2 Site characterization information for surface water stations sampled during the Year 1 EMBP.

Waterbody/ Watercourse	Site ID	Date Sampled	Station Depth (m)	General Field Observations	Land Use Comments
Mennin Lake	ML1	2021-07-31	1.4	- Soft muck and sand sediment	Mature undisturbed forest
		2021-09-25	2.2	- Shallow, vegetated area of Mennin Lake	
		2022-06-01	2	- Abundant zooplankton - Mature forest and island surrounding site	
	ML2	2021-08-02	13.25	- Soft sand sediment	Mature undisturbed forest
		2021-09-23	14.5	- Deepest section of Mennin Lake (Information obtained from a local Indigenous Guide)	
		2022-05-27	14.2	- Open, unprotected area of lake	
	ML3	2021-07-30	5.5	- Soft sand sediment	Mature forest, road 1m away
		2021-09-24	6.1	- Intermediate depth in lake	
		2022-05-26	6.4	- Protected inlet with mature forest and wetland surrounding - Rocky outcrops with a high fish population nearby (e.g., Pike and Walleye)	
Mennin River	MR1	2021-07-31	0.5	- Soft muck, detritus, and mud sediment	Mature undisturbed forest
		2021-09-24	1	- Wetlands surrounding, emergent and submergent vegetation	
		2022-05-25	1	- Meandering stream with slow flow - Inlet to Mennin Lake - Birds and amphibians noted on every visit	
	MR2	2021-08-01	1	- Soft mud and sand sediment, with some boulder	Mature undisturbed forest
		2021-09-24	1.5	- Wetlands and mature forest surrounding	
		2022-05-28	1.2	- Outlet to Mennin Lake - Large beaver dam prevents access further downstream	
	MR3	2021-08-05	0.9	- Soft mud and sand sediment	100 m from historical forestry area
		2021-09-27	0.8	- Permanent flowing water	
		2022-05-23	0.8	- Deadfall and sandbars nearby - Overgrown forestry area 100 m away from site	
Revell Lake	RL1	2021-08-07	8.7	- Soft mud and sand sediment	Boat docks present, forestry along access road
		2021-09-21	9.1	- Rocky outcrops and islands of mature forest surrounding site	
		2022-05-19	10	- Some benthic vegetation	
	RL2	2021-08-06	7.7	- Soft mud and sand sediment	Fishing hot spot, forestry along access road
		2021-09-22	8.1	- Rocky outcrops and islands of mature forest surrounding site	
		2022-05-20	8.6	- High zooplankton concentration in summer months	

Table 3-2 Site characterization information for surface water stations sampled during the Year 1 EMBP. (continued)

Waterbody/ Watercourse	Site ID	Date Sampled	Station Depth (m)	General Field Observations	Land Use Comments
Revell River	RR1	2021-08-04 2021-09-21 2022-05-24	0.8 0.9 1	- Soft mud and sand sediment, some detritus - Mature forest surrounding - Sand bars formed after high flow - 200 m upstream of highway 17	Highway bridge downstream
Unknown Waterbody 1	P1	2021-10-01 2022-05-31	0.9 0.8	- Soft muck and detritus - Surrounded by mature forest and historical logging - Wetland characteristics and rocky outcrops	Undisturbed forest
Unknown Waterbody 2	P2	2021-10-01 2022-02-16 2022-05-23	1.9 0.8 2	- Soft sand and mud sediment - Large bedrock outcrops surrounding pond - Mature forest and historical logging in area	Mature forest, Previous logging (50- 100 m away)
Unknown Waterbody 3	P3	2021-08-03 2021-09-27 2022-02-15 2022-05-21	3.5 3.8 2.2 4	- Soft mud sediment, some boulder and cobble - Historical logging in area - Active logging road 200 m SW of site - Ephemeral inlet - Outlet leads to wetland area with emergent vegetation	Mature undisturbed forest
Unknown Waterbody 4	P4	2021-07-14 2021-09-29 2022-02-18 2022-05-22	3.6 3 2.1 ² 3.6	- Soft mud sediment - Rocky outcrops and mature forest surrounding site - Historical logging in area	Undisturbed forest
Unknown Waterbody 5	P5	2021-09-29 2022-05-22	2.5 2.8	- Soft mud sediment - Rocky outcrops and mature forest surrounding site - Historical logging in area	Undisturbed forest
Unknown Waterbody 6	P6	2021-09-27 2022-06-02	0.9 1	- Shallow, soft muck and detritus sediment - Helicopter access only - Bog wetland and mature forest surrounding site - High submergent vegetation	Undisturbed forest
Unknown Waterbody 7	P7	2021-09-26 2022-05-28	0.9 2.7	- Shallow, sand with soft muck and detritus - Helicopter access only - Hummocked wetland and mature forest surrounding - Some bedrock around the southwest side of pond	Undisturbed forest
Unknown Waterbody 8	RP1	2021-08-08 2021-09-26 2022-05-25	4.8 5.1 3	- Soft mud sediment - Small minnow pond - Active logging 100 m E of site - Mature forest surrounding area - Active wildlife on nearly every visit	Recent forest clearing (100 m away), fishing spot

Table 3-2 Site characterization information for surface water stations sampled during the Year 1 EMBP. (continued)

Waterbody/ Watercourse	Site ID	Date Sampled	Station Depth (m)	General Field Observations	Land Use Comments
Unknown Waterbody 9	RP2	2021-08-07	3.4	- Soft muck and detritus sediment - Rapid oxygen decrease with increased depth in water column - Mature forest surrounding pond - Two inactive beaver dams nearby	Undisturbed forest
		2021-09-26	3.1		
		2022-05-24	3.8		
Unknown Waterbody 10	RP3	2021-09-30	0.8	- Soft mud and sand sediment - Atikokan highway 200 m E of site - Mature forest surrounding with wetland characteristics (e.g., cattails and emergent vegetation on E side of pond)	Highway nearby (50 m)
		2022-05-29	1.6		
Unknown Watercourse 1	ML4	2021-08-01	1.7	- Soft muck, detritus, and mud sediment - Wetlands surrounding, emergent and submergent vegetation - Meandering stream with slow flow - Abundant deadfall in area	Mature undisturbed forest
		2021-09-23	2		
		2022-06-01	2		
Wabigoon River	WR1	2021-08-03	0.6	- Soft mud/silt and sand sediment - 300 m upstream of highway 17 - Thick, mature forest surrounding - Permanent flowing water - Sand bars forming during periods following high flow	Highway (200 m away), cabin close by, undisturbed forest
		2021-09-22	0.9		
		2022-05-22	3.4		
	WR2	2021-08-04	0.8	- Soft mud/silt and sand sediment - 800 m downstream of highway 17 - Thick, mature forest surrounding - Permanent flowing water - Sand bars forming during periods following high flow	Undisturbed forest
		2021-09-27	0.9		
		2022-05-22	2.1		
	WR3	2021-07-29	1.9	- Soft mud/silt and sand sediment - 200 m upstream of dirt road - Thick, mature forest surrounding - Permanent flowing water - Sand bars forming during periods following high flow - Waterfall 300m downstream of site	Highway (200 m away), fishing spots, undisturbed forest
		2021-09-25	2.8		
		2022-05-29	3		

3.3.2 Surface Water Quality

The objective of the surface water quality program was to provide an understanding of existing baseline conditions in the LSA_{SW}, and to provide a baseline for which future conditions can be compared. Detailed limnology and surface water quality results are provided in Appendix B. This section provides a summary of general results, as well as stations where WQGs were exceeded.

3.3.2.1 Limnology

Field measured water quality parameters included water clarity (measured as a Secchi depth), turbidity, temperature, dissolved oxygen, specific conductance, ORP, and pH. Detailed measurements are presented in Appendix B, Table 2 and are summarized in Table 3-3. The summary table presents average measurements across seasons and depth profiles, while the detailed data display the seasonal profile measurements.

Water clarity was moderate to low in the LSA_{SW}, averaging higher in the lakes (Revell Lake = 3.6 m) as compared to the ponds (AOI Ponds = 0.7 m). Many of the river sampling locations had Secchi disc readings reaching the bottom of the water column due to the shallow nature of the sampling area. Thus, for rivers, turbidity is a better measure of water clarity. Average turbidity of the Mennin, Revell, and Wabigoon rivers ranged between 1.7 and 4.5 NTU as compared to between 1.7 and 2.3 NTU in the ponds and 0.4 and 1.8 NTU in the lakes and ponds. Overall, this indicates the rivers tended to have lower water clarity than the lakes.

Average temperatures were comparable between waterbodies, ranging between 13.5°C and 16.9°C. As shown in Appendix B, Table 2, thermal stratification of the water column was evident during the summer sampling in Mennin and Revell lakes and in Mennin Lake during the fall. In the AOI and Reference ponds, water temperature tended to decrease with depth.

Average dissolved oxygen concentrations remained above the lower guideline for the protection of freshwater aquatic life (6.5 mg/L); though areas that showed thermal stratification also displayed decreases in dissolved oxygen. Anoxic (no dissolved oxygen) or near anoxic dissolved oxygen levels were present near the bottom of some lake and pond sampling areas in the summer and/or fall sampling seasons.

Specific conductance varied across the study area. Mennin and Revell lakes, the AOI Ponds, and the Unnamed Watercourse averaged ~20 µS/cm. Average levels were slightly higher in the Mennin River (30.7 µS/cm) and Reference Ponds (41.4 µS/cm). Finally, average levels were highest in the Wabigoon River (56.2 µS/cm) and Revell River (99.3 µS/cm).

Table 3-3 Summary of limnological measurements

Parameter	Mennin Lake		Mennin River		Revell Lake		Revell River		AOI Ponds		Reference Ponds		Unnamed Watercourse		Wabigoon River	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Station Depth (m)	7.3	5.4	1.0	0.3	8.7	0.8	0.9	0.1	2.3	1.1	3.2	1.5	1.9	0.2	1.8	1.1
Secchi Depth (m)	1.7	0.4	0.8	0.2	3.6	0.8	0.5	0.4	0.7	0.3	1.1	0.2	0.8	0.3	0.6	0.3
Temp. (°C)	13.7	5.1	16.9	4.3	14.0	5.5	13.5	3.4	13.8	4.7	15.6	3.4	15.3	3.0	14.2	4.4
Dissolved Oxygen (mg/L)	8.0	3.0	8.3	1.8	8.7	1.8	8.4	1.3	7.6	1.8	11.8	17.1	7.8	1.5	9.5	1.5
Dissolved Oxygen (%)	77.1	28.0	84.9	16.7	83.9	15.7	80.0	10.6	71.3	20.9	75.9	28.5	77.7	11.8	91.7	4.2
Specific Conductance (µS/cm)	23.1	4.4	30.7	17.4	20.7	4.9	99.3	64.2	21.4	5.0	41.4	12.7	21.5	4.9	56.2	30.9
pH	6.1	0.5	6.3	0.6	6.3	0.5	6.2	0.8	5.6	0.5	6.7	0.6	5.4	0.7	6.4	0.7
ORP (mV)	329.2	76.6	265.8	75.7	303.8	75.4	260.1	33.7	324.4	62.1	272.4	67.1	347.0	41.1	219.8	72.1
Turbidity (NTU)	1.8	1.6	2.1	1.0	0.4	0.2	1.7	0.1	1.7	1.1	2.3	1.5	2.0	0.4	4.5	1.7

Data represent mean and standard deviation (SD) of all surface and profile measurements collected in all seasons. Detailed seasonal profile data are presented in Appendix B.

Field measured ORP in the LSA_{SW} averaged between 219.8 mV and 347.0 mV. Field measured pH in the LSA_{SW} was slightly acidic, with average levels ranging from 5.4 to 6.7. The lowest pH values were recorded in the AOI Ponds and Unnamed Watercourse and the highest in the Reference Ponds. The remaining waterbodies contained average pH levels between 6.1 and 6.4. It is noted that field measured pH values were considerably lower than the lab measured pH (Appendix B). Some variance is expected from the *in situ* field-based measure as compared to the lab measure; however, the difference is quite large. This may be due in part to a lower frequency of lab measured pH values and the seasonal nature of the *in situ* pH, which tended to be lowest in the spring and fall and highest in the summer. Further evaluation of field measured pH as compared to laboratory measured pH should be completed as the baseline program continues.

3.3.2.2 Anions, Nutrients, Organics, and Physical Properties

Detailed summary statistics outlining the general chemistry characteristics of the LSA_{SW} are presented in Appendix B, Tables 3 to 10. Laboratory measures of conductivity and turbidity tended to agree with the field measured parameters. The pH levels, which are discussed above, tended to be higher in the laboratory analysed samples. It is noted that no laboratory pH data are available for the fall, winter, or spring sampling campaigns.

Of the 30 anions, nutrients, organics, and physical properties analysed to characterize the general chemistry of the LSA_{SW}, 11 have available WQGs (Table 3-4). All parameters except total phosphorus fell within the available WQGs. Total phosphorus levels (a nutrient) tended to be elevated throughout the LSA_{SW}, though levels tended to be somewhat lower in Revell Lake in which only the 95th percentile exceeded the 0.01 mg/L WQG. Note that this WQG is only meant to apply to lakes naturally below this value; to avoid nuisance concentrations of algae in lakes phosphorus in the ice-free period should not exceed 0.02 mg/L (MOEE 1994). Overall, these nutrient levels are not considered a concern as based on the average phosphorus levels, the productivity of the lakes in the study area (or the lakes trophic status) would still be considered low or oligotrophic (Wetzel 2001).

Table 3-4 Summary of exceedances of available guidelines for anions, nutrients, organics, and physical properties.

Parameter	Guideline ^a	Exceedance							
		Mennin Lake	Mennin River	Revell Lake	Revell River	AOI Ponds	Reference Ponds	Unnamed Watercourse	Wabigoon River
Ammonia, Total (as N)	5.855								
Chloride (Cl)	120								
Conductivity	700								
Cyanide, Total	0.005								
Fluoride (F)	0.12								
Nitrite (as N)	0.02								
pH	6.5 to 9.0								
Phosphorus (P), Total	0.01								
Sulphate (SO ₄)	128								
Total Dissolved Solids	500								
Turbidity	50								

^a All units in mg/L except Turbidity which is in NTU and pH which is unitless.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

3.3.2.3 Bacteriological Tests

Bacteriological tests were completed for the bacteria *E. Coli* and total coliforms as an indicator of sanitary quality of the surface water. WQGs were only available for *E. Coli* (Table 3-5). The 95th percentile of samples collected from the Revell River exceeded the available WQG of 100 CRU/100 mL measuring 107 CFU/100 mL. In addition, the mean (120 CFU/100 mL), median (130 CFU/100 mL), and 95th (150 CFU/100 mL) percentile of samples collected from the Unnamed Watercourse exceeded the available *E. Coli* WQG.

Table 3-5 Summary of exceedances of available guidelines for bacteriological tests.

Parameter	Guideline	Exceedance							
		Mennin Lake	Mennin River	Revell Lake	Revell River	AOI Ponds	Reference Ponds	Unnamed Watercourse	Wabigoon River
Escherichia Coli	100								

Units in CFU/100 mL.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

3.3.2.4 Metals and Trace Elements

As detailed in Appendix B, Tables 3 to 10, baseline concentrations of total and dissolved metals and trace elements were low and similar between waterbodies in the LSA_{SW}. Of the 90 total and dissolved metals assessed in the water chemistry samples, 43 have available WQGs (Table 3-6). Few of these parameters exceeded guidelines in the LSA_{SW}.

Figure 3-2 summarizes the COPC where the WQG was exceeded (aluminum and copper). The 95th percentile of total aluminum concentrations from the Mennin River, Revell River, and Wabigoon River exceeded the guideline of 0.32 mg/L, but the mean and median levels did not, indicating levels generally remain below guidelines. In Unnamed Watercourse and the AOI Ponds, the mean, median, and 95th percentile exceeded the total aluminum WQG, indicating levels are elevated in these waterbodies relatively regularly. Copper concentrations were also elevated above available WQGs. The 95th percentile of total copper concentrations from Unnamed Watercourse exceeded the WQG. Dissolved copper exceeded WQGs throughout the LSA_{SW}, though most regularly in Unnamed Watercourse (exceedances of mean, median, and 95th percentile; Table 3-6).

Metals and trace elements are naturally occurring in the environment and elevated levels of copper and aluminum in the area may be more an indication that these are naturally elevated in the area, rather than a result of human caused disturbance.

Table 3-6 Summary of exceedances of available guidelines for metals and trace elements.

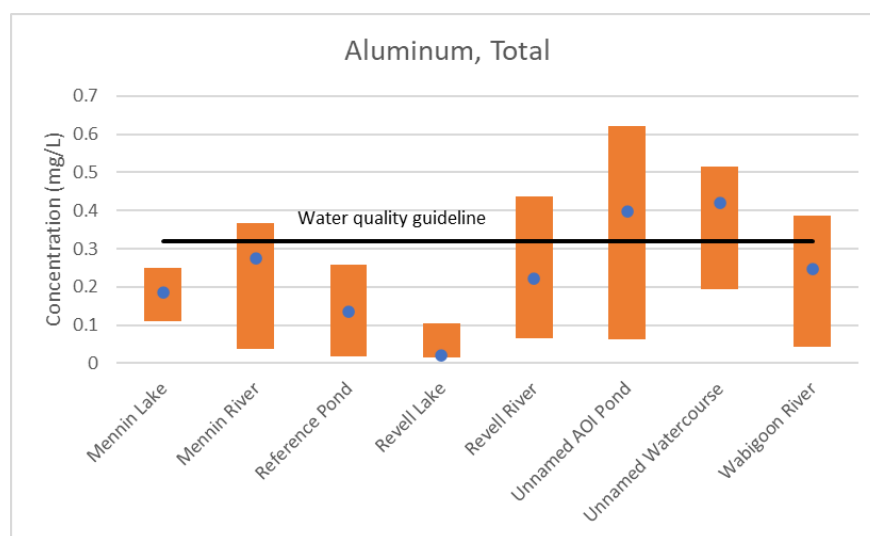
Parameter	Guideline	Exceedance							
		Mennin Lake	Mennin River	Revell Lake	Revell River	AOI Ponds	Reference Ponds	Unnamed Watercourse	Wabigoon River
Total									
Aluminum (Al)	0.32								
Antimony (Sb)	0.006								
Arsenic (As)	0.005								
Barium (Ba)	1								
Beryllium (Be)	0.011								
Bismuth (Bi)	17.5								
Boron (B)	1.5								
Cadmium (Cd)	0.00004								
Calcium (Ca)	1000								
Chromium III (Cr3+)	0.0089								
Chromium VI (Cr6+)	0.005								
Cobalt (Co)	0.00078								
Copper (Cu)	0.002							4	
Iron (Fe)	3.3								
Lead (Pb)	0.001								
Lithium (Li)	2.5								
Magnesium (Mg)	82								
Manganese (Mn)	0.12								
Mercury (Hg)	0.000026								
Molybdenum (Mo)	0.073								
Nickel (Ni)	0.025								
Potassium (K)	53								
Rhodium (Rh)	0.01								
Ruthenium (Ru)	0.01								
Samarium (Sm)	0.0082								
Selenium (Se)	0.001								
Silver (Ag)	0.00025								
Sodium (Na)	680								
Strontium (Sr)	7								
Tellurium (Te)	0.0058								
Thallium (Tl)	0.0008								
Tin (Sn)	0.073								
Titanium (Ti)	0.076								
Tungsten (W)	0.03								
Uranium (U)	0.015								
Vanadium (V)	0.12								
Zinc (Zn)	0.02								
Zirconium (Zr)	0.004								

Table 3-6 Summary of exceedances of available guidelines for metals and trace elements. (continued)

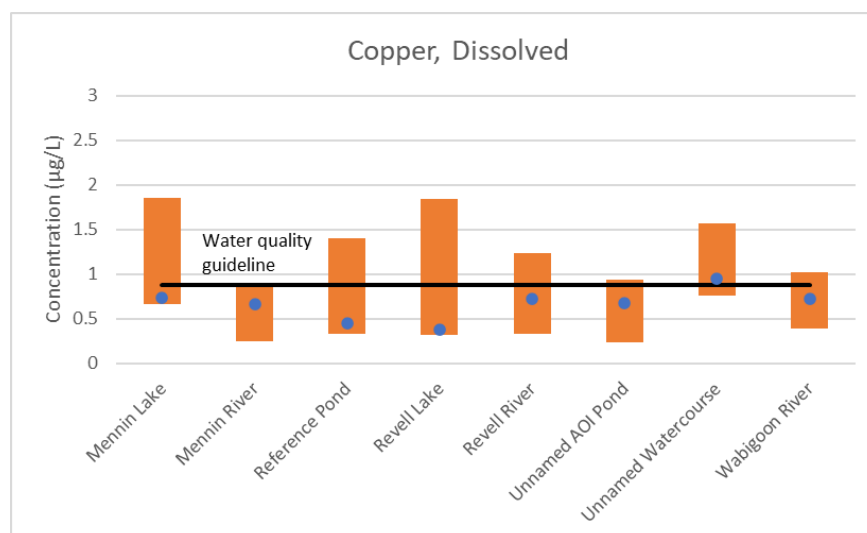
Parameter	Guideline	Exceedance							
		Mennin Lake	Mennin River	Revell Lake	Revell River	AOI Ponds	Reference Ponds	Unnamed Watercourse	Wabigoon River
Dissolved									
Copper (Cu)	0.00088								
Lead (Pb)	0.0065								
Manganese (Mn)	0.23								
Strontium (Sr)	2.5								
Zinc (Zn)	0.017								

All units in mg/L.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

Figure 3-2 Summary of aluminum and copper concentrations in surface water

**Figure 3 2 Summary of aluminum and copper concentrations in surface water
(continued)**



Note: The orange bars represent the range of data (from the 5th percentile to the 95th percentile) and the blue dots are the median of the data.

3.3.2.5 Organic Compounds

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are a class of chemicals that occur naturally in coal, crude oil, and gasoline or produced when these products (and others) are burned. A total of 19 PAHs were assessed in the AOI Ponds and Reference Ponds, of which 10 have available WQGs (Table 3-7). All values were measured at or below the RDL in both the AOI and Reference ponds. Although exceedances were noted, it was due to the RDL of the analysis being higher than or equal to the available WQG for the PAHs. To more accurately determine if levels exceed guidelines during baseline conditions, lower RDLs will need to be achieved by the laboratory for anthracene, benzo(a)anthracene, benzo(a)pyrene, and pyrene.

Table 3-7 Summary of exceedances of available guidelines for Polycyclic Aromatic Hydrocarbons (PAHs).

Parameter	Guideline	Exceedance	
		AOI Ponds	Reference Ponds
1-Methylnaphthalene	526		
Acenaphthene	5.8		
Anthracene	0.012	*	*
Benzo(a)anthracene	0.018	*	*
Benzo(a)pyrene	0.015	*	*
Fluoranthene	0.04		
Fluorene	3		
Naphthalene	1.1		
Phenanthrene	0.4		
Pyrene	0.025	*	*

*RDL similar to or higher than guideline.

All units in µg/L.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

Semi-Volatile Organic Compounds

SVOCs are a class of chemicals that can be found in pesticides, cleaning agents, personal care products, and additives to flooring, furniture, clothing, cookware, food packaging, and electronics. A total of 20 SVOCs were assessed in the AOI Ponds and Reference Ponds, of which 18 have available WQGs (Table 3-8). All but two values were measured below RDLs. Similar to the PAHs, some exceedances were noted due to the RDL of the analysis being higher than or equal to the available WQG. To more accurately determine if levels exceed guidelines during baseline conditions, lower RDLs will need to be achieved by the laboratory for 1,2,4-trichlorobenzene, 2,4-dichlorophenol, pentachlorophenol and biphenyl.

Table 3-8 Summary of exceedances of available guidelines for Semi-volatile Organic Compounds (SVOCs).

Parameter	Guideline	Exceedance	
		AOI Ponds	Reference Ponds
1,2,4-Trichlorobenzene	0.5	*	*
2,4,5-Trichlorophenol	18		
2,4,6-Trichlorophenol	5		
2,4+2,6-Dinitrotoluene	10		
2,4-Dichlorophenol	0.2	*	*
2,4-Dimethylphenol	10		
2,4-Dinitrophenol	6.2		
2,4-Dinitrotoluene	4		
2,6-Dinitrotoluene	6		
2-Chlorophenol	7		
3,3'-Dichlorobenzidine	0.6		
Biphenyl	0.2	*	*
Bis(2-chloroethyl)ether	200		
Bis(2-ethylhexyl)phthalate	3		
Diethylphthalate	210		
Dimethylphthalate	330		
Pentachlorophenol	0.5	*	*
Phenol	4		

*RDL close to or higher than guideline.

All units in µg/L.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

3.3.2.6 Herbicides and Pesticides

Two herbicides and pesticides were assessed in the AOI and Reference Ponds, AMPA and glyphosate. All levels were below the RDL and below available guidelines.

3.3.2.7 Radionuclides

A total of 22 naturally occurring and artificial radionuclides were assessed in the water chemistry samples from the LSA_{SW} of which 13 have available WQGs. No radionuclides exceeded the available guidelines. It is noted that the Tier 1 radionuclide Se-79 and Tier 2 radionuclides Pu-240, and Cm-244 were not measured.

3.3.3 Plankton

Plankton sampling was completed seasonally at three locations in Mennin Lake and two locations Revell Lake through 2022. Plankton sampling was completed to describe the baseline plankton community structure, density, richness, diversity, and biomass and to characterize the community composition in the LSA_{SW}. Phytoplankton composition and biomass (primary production) provides an assessment of water-quality conditions and an indication of the trophic status of lakes. Zooplankton composition and biomass (secondary production) provide insight to the quality of the food chain and the energy flow through the system.

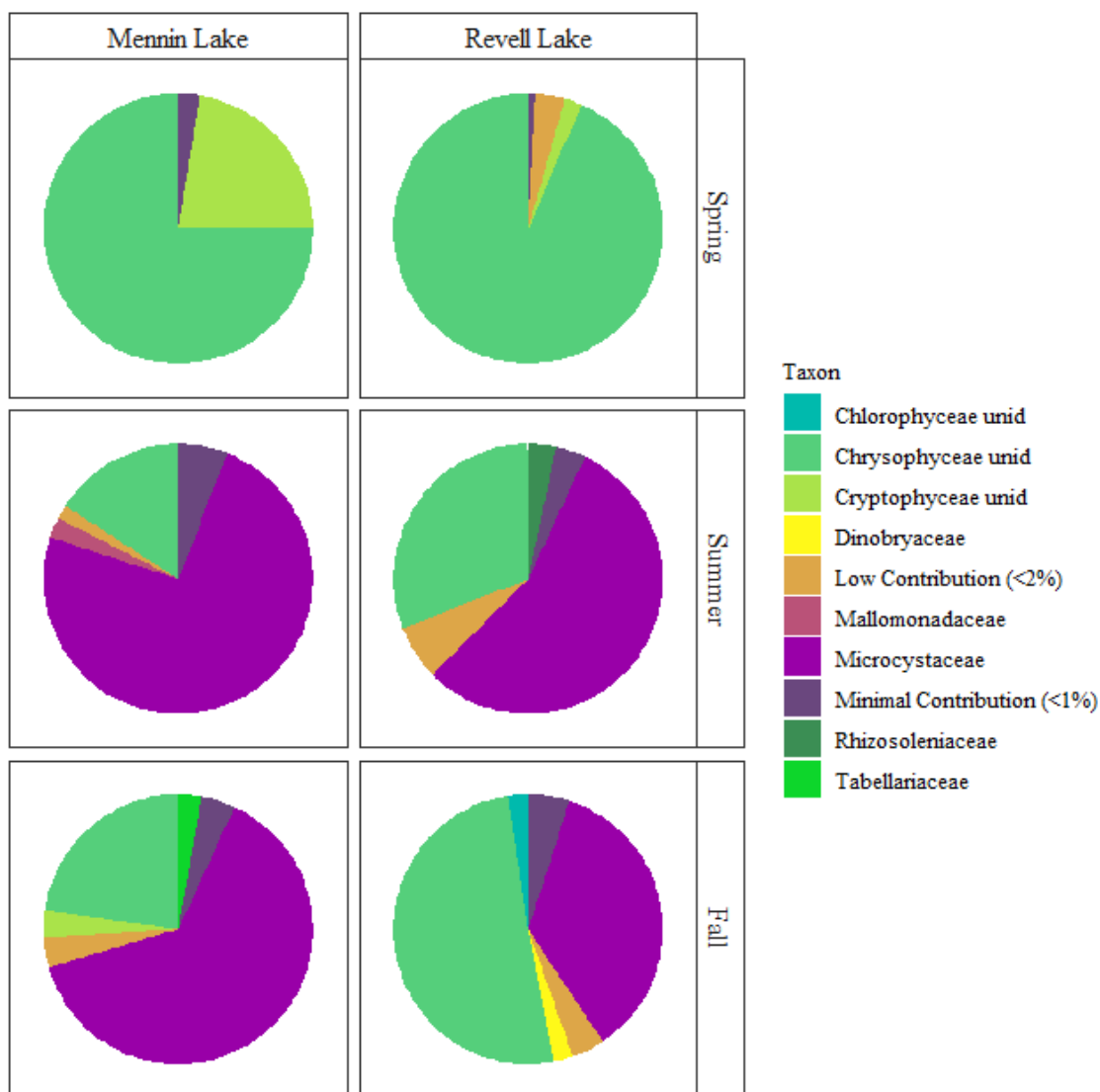
Detailed phytoplankton enumeration results are presented in Appendix D, Tables 1 to 4. Zooplankton enumeration results are detailed in Appendix D, Tables 5 to 8. Summaries of the phytoplankton and zooplankton community metrics and community composition are provided below.

3.3.3.1 Phytoplankton

Community Composition

Phytoplankton community composition is summarized in Figure 3-3 by season. Both lakes displayed seasonal variability in community composition. In the spring, both Mennin Lake and Revell Lake were largely comprised of Chrysophyceae (Class of golden algae) consisting of 75% and 96% of the communities, respectively. The subdominant taxa in the spring samples from Mennin Lake was Cryptophyceae (cryptomonads) consisting of 23% of the community. Given the large dominance of golden algae in Revell Lake, no subdominant taxa were identified.

Summer sampling revealed communities largely dominated by Microcystaceae (Family of cyanobacteria) in both Mennin (74% of community composition) and Revell (56% of community composition) lakes. Subdominant taxa were golden algae (19% and 35%, respectively). Cyanobacteria have been implicated in adverse health reactions and Health Canada has established a guideline of 50,000 cells/ml for recreational waters (Health Canada 2022b). Cyanobacteria levels exceeded this threshold in Mennin Lake during the summer sampling event measuring 98,927 cells/ml.

Figure 3-3 Phytoplankton percent composition in Mennin and Revell lakes, 2021/22.

Fall sampling revealed a community that was still dominated by Microcystaceae in Mennin Lake, though the overall of cyanobacteria had diminished (29,705 cells/ml) to levels below the Health Canada recreational use guideline. The subdominant taxa remained golden algae. In Revell Lake, golden algae dominated (54% of community composition) the fall phytoplankton community, with Microcystaceae being subdominant (36% of community composition).

Community Metrics

A summary of phytoplankton community metrics is presented in Table 3-9. Density tended to be highest in Mennin Lake as compared to Revell Lake, with the highest levels measured

in the summer and the lowest levels measured in the spring. Biovolume followed a similar pattern. Taxon richness assessed at the Family level ranged between 18 and 33 in Mennin Lake and 9 and 29 in Revell Lake. Richness was highest in the summer in Mennin Lake and highest in the fall in Revell Lake. Simpson's diversity was moderate in both waterbodies during the spring (measuring between 0.657 and 0.764) and low in the summer and fall (measuring between 0.182 and 0.367). Simpson's evenness was overall quite low due to the relative dominance of few taxa in each community.

Table 3-9 Phytoplankton community metrics for Year 1 of EMBP, 2021/22.

Season	Density (Org/L)	Total Biovolume (µL)	Taxon Richness ¹	Simpson's Diversity ¹	Simpson's Evenness ¹
Mennin Lake					
Spring	22,818,000	4,500	18	0.764	0.24
Summer	131,032,000	58,696	33	0.182	0.04
Fall	46,390,000	14,220	28	0.235	0.05
Revell Lake					
Spring	9,788,000	1,263	9	0.657	0.32
Summer	29,555,000	17,331	24	0.280	0.06
Fall	21,440,000	9,135	29	0.367	0.05

¹Computed at the family level.

3.3.3.2 Zooplankton

Community Composition

Zooplankton community composition is summarized in Figure 3-4 by season. Community composition varied by season and between lakes. During the spring, community composition in Mennin and Revell lakes was dominated by Copepoda (copepods)³, which consisted of 49% and 64% of the community composition, respectively. Subdominant taxa included the Family Epistylidae (a family of ciliates) that represented 24% and 15% of the Mennin and Revell lakes spring zooplankton communities, respectively.

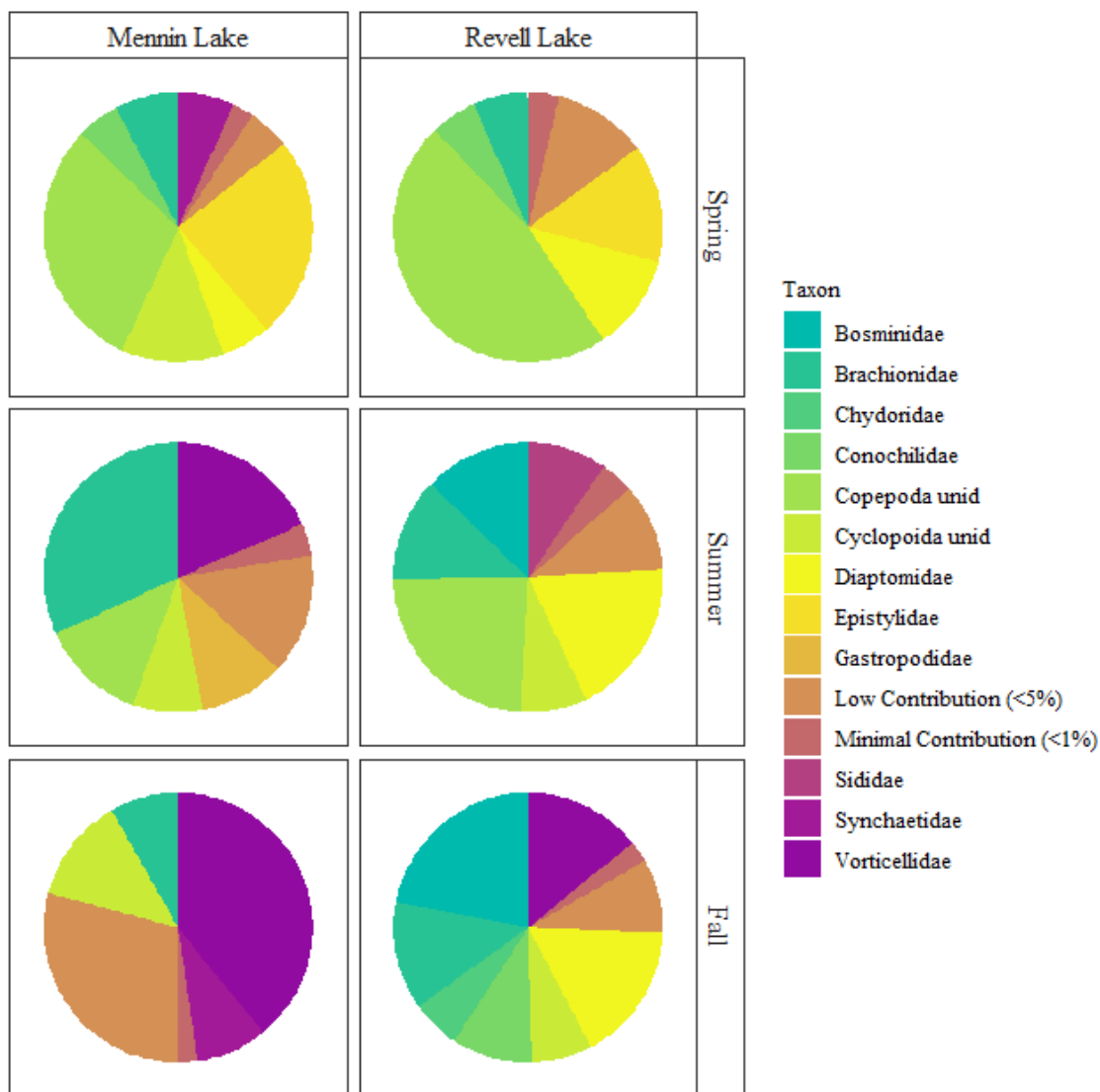
In the summer, the Mennin Lake zooplankton community was dominated by Brachionidae (a family of rotifers; 32% of the community composition) and Vorticellidae (a family of ciliates; 19% of the community composition). The zooplankton community in Revell Lake was dominated by copepods (54% of the community composition), with Bosminidae (a

³ This includes the combined groups of Copepoda unid., Cyclopoida unid., and Diaptomidae presented in Figure 3-4.

family of cladoceran) and Brachionidae as the subdominant taxa (13% and 12% of the community composition, respectively).

Fall sampling of the zooplankton community revealed a community composition dominated by Vorticellidae (39%) in Mennin Lake and copepods (27%) and Bosminidae (22%) in Revell Lake.

Figure 3-4 Zooplankton percent composition in Mennin and Revell lakes, 2021/22.



Community Metrics

A summary of zooplankton community metrics is presented in Table 3-10. Density tended to be highest in Mennin Lake as compared to Revell Lake, with the highest levels measured in the summer and the lowest levels measured in the fall. Total biovolume was also higher

in Mennin Lake as compared to Revell Lake, with seasonal patterns differing slightly between lakes. In Mennin Lake, biovolume was highest in the summer and lowest in the fall; whereas in Revell Lake, biovolume was highest in the fall and lowest in the spring. Taxon richness assessed at the Family level ranged between 16 and 19 in both waterbodies. Simpson's diversity was moderate (ranged between 0.732 and 0.843) in both waterbodies and slightly higher in Revell Lake as compared to Mennin Lake. Simpson's evenness was moderately low, ranging between 0.20 and 0.35.

Table 3-10 Zooplankton community metrics for Year 1 of EMBP, 2021/22.

Season	Density (Org/L)	Total Biovolume (µL)	Taxon Richness ¹	Simpson's Diversity ¹	Simpson's Evenness ¹
Mennin Lake					
Spring	131	0.0760	16	0.759	0.26
Summer	571	0.1287	19	0.755	0.21
Fall	104	0.0386	19	0.732	0.20
Revell Lake					
Spring	99	0.0658	19	0.816	0.29
Summer	72	0.0787	16	0.817	0.34
Fall	62	0.0927	18	0.843	0.35

¹Computed at the Family level, except for unidentified Hydracarina, unidentified Copepoda, unidentified Ciliata, and unidentified Rotifer which were identified at a higher taxonomic level.

3.4 Summary

The Year 1 surface water quality program was completed between the summer 2021 and spring 2022 to initiate the characterization of ponds, lakes, and rivers within the LSA_{sw}. The information from the Year 1 program was also utilized to help inform the benthic invertebrate station locations for future monitoring years.

The focus of the Year 1 surface water quality program was water quality and plankton community sampling. The COPC levels in most waterbodies were low, below or close to the RDLs, and below available WQGs, though phosphorus, aluminum, and copper concentrations were elevated above WQGs in the area. These results illustrate that some parameters are higher in the study area before development of the Project, which is important to establish during the baseline period. Plankton communities tended to vary seasonally and displayed a moderate taxon richness and diversity. As additional data become available from the Year 2 and Year 3 sampling campaigns, a full characterization of the study area will be completed.

4.0 HYDROLOGY

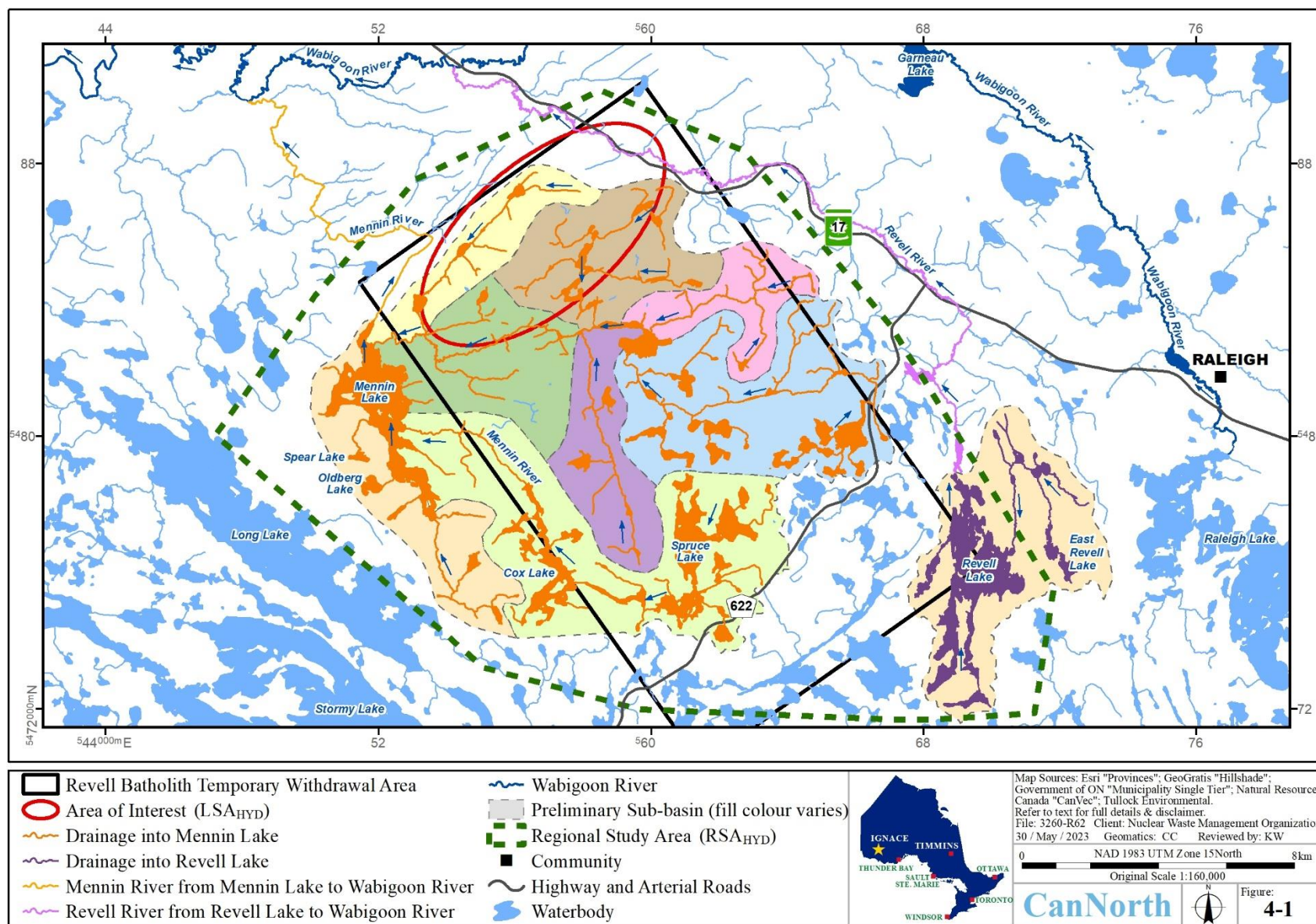
4.1 Sampling Overview

The purpose of the hydrology monitoring is to determine the existing hydrology conditions within the vicinity of the proposed Project location and to assess the potential impact posed by the development of the Project. The hydrologic conditions near the Project location will be monitored for at least three years and the data collected will be used to assess the feasibility of design, construction, and operation of the Project on the local hydrologic environment.

The AOI is bounded by Revell River to the northeast and the inlet location to Mennin Lake to the southwest. Three small streams are located within the area, running through multiple wetlands and small lakes in the southwest direction until reaching confluence before discharging into Mennin Lake. This inlet to Mennin Lake from the small streams within the study area is in close proximity to the outlet of Mennin Lake which discharges towards the northwest into Mennin River. Figure 4-1 illustrates the locations and flow directions of the waterbodies within the study area.

Given the abundance of small streams, wetlands, and lakes near the AOI and the potential need to withdraw and discharge water during operation of the Project should this site be selected for further consideration, it is important to understand whether some of these waterbodies are intermittent, the variability of water volume available in the waterbodies, when/if any seasonal flooding may occur, and other factors that have an effect on the hydrologic conditions of the study area such as ice causing changes in the river paths, logging activities, forest fires, and man-made and animal (beaver) dams being built or altered.

Figure 4-1 Surface waterbodies and flow directions in the study area.



During Year 1 of the program (summer 2021 to spring 2022), monitoring instrumentation was set up at the study area and hydrologic and meteorological data were collected as follows:

- Continuous water level at two large lakes (Revell Lake and Mennin Lake) and eight smaller waterbodies (shown in Figure 4-2).
- Discrete flow measurements at two large rivers and five small rivers/streams (shown in Figure 4-2).
- Bathymetric survey of 13 waterbodies (shown in Figure 4-2).
- Continuous meteorological data collection including ambient temperature, total precipitation, and snow cover.
- Aerial survey of imagery, bare-earth elevation and land cover of the AOI and surrounding areas.

A summary of the hydrology component of the EMBP is presented in this section.

4.1.1 Lake Water Level and Characteristics

In Year 1 of the monitoring program, level loggers were installed at 10 locations in the AOI and surrounding areas to continuously measure the water level of waterbodies. As shown in Figure 4-2, monitoring locations include Revell River (T15), Mennin River (T14), and 8 other smaller streams, wetlands, and lakes in the study area (S01, S02, S04, S05, S09, S10, S11, S12). Barometric loggers were also installed in order to complement the level logger data and accurately determine true changes in water levels⁴. Water level measurement recording commenced after the instrument installation in June-July 2021, lasted through spring 2022, and will continue throughout the 3-year study period of this program.

The continuous water level monitoring data will be used as baseline information to understand the characteristics of the waterbodies within the study area, including the potential for increased water levels that might result in flooding, decreased water levels that might limit the ability to draw and discharge water, and changes in water quality due to changes in water level which might affect aquatic habitat.

⁴ Level loggers measure total pressure (water column equivalent plus barometric pressure). Barometric loggers are installed so that barometric pressure fluctuations can be removed from the level logger data.

4.1.2 Stream and River Flow

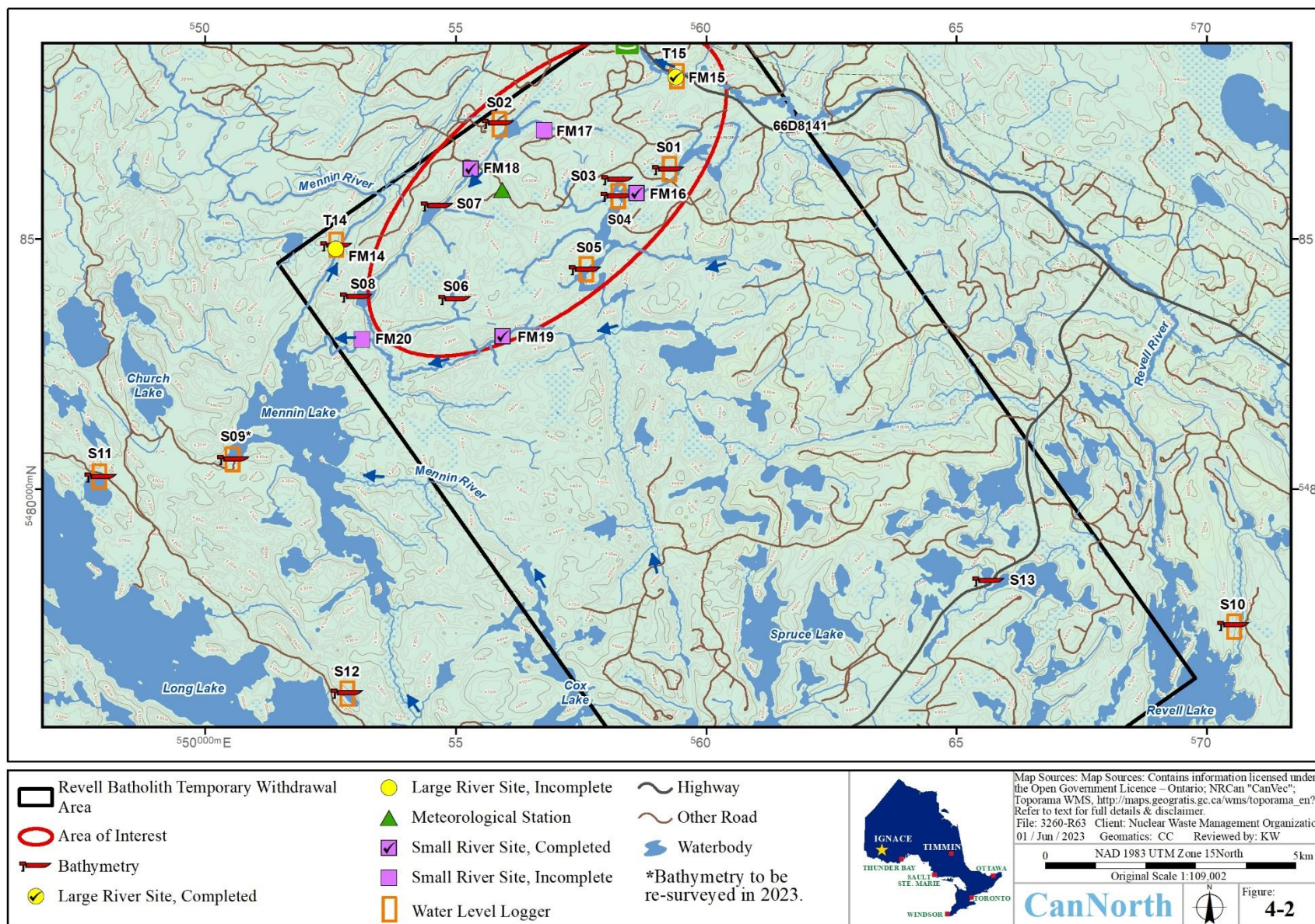
In Year 1 of the monitoring program, discrete flow measurements were taken using acoustic doppler velocity sensors at two major rivers (Revell and Mennin rivers) and five small streams within the AOI and surrounding areas. The locations of the flow measurement locations are illustrated in Figure 4-2, labeled as large (FM14, FM15) and small (FM16 to FM20) river sites. The discrete flow measurements on the major rivers will be used to establish a flow-discharge relationships for the waterways such that the continuous water level measurements can be translated to continuous flow measurements. The flow measurements at the small streams will be used to assess the range of flow present in the streams throughout the high and low flow seasons.

The flow measurements will help in assessing the feasibility of withdrawing water for supply and the assimilative capacity of these waterbodies, establishing a water balance between the major rivers and Mennin Lake, and evaluating the floodplain during snowmelt or heavy rainfall events.

4.1.3 Bathymetry

In Year 1 of the monitoring program, bathymetric surveys were completed at 13 waterbodies between July to October 2021. The locations of these surveyed waterbodies are illustrated in Figure 4-2, including Mennin Lake (S09), Revell Lake (S10), and 11 other smaller wetlands and lakes (S01 to S08, S11 to S13). The purpose of the bathymetric surveys is to estimate the stage-storage relationship of these waterbodies. With this information in conjunction with the lake water level data, the seasonal variability of water volume in these waterbodies can be estimated and the feasibility of withdrawing water for supply and the assimilative capacity of these waterbodies can be assessed when considering this study area for the development of the Project.

Figure 4-2 Hydrology monitoring locations in Year 1 of the EMBP.



4.1.4 Meteorology

In June 2021, a meteorological station was installed near the center of the AOI as shown on Figure 4-2. Continuous soil moisture content, ambient temperature, total precipitation (rainfall and estimate of snowfall), snow depth, wind speed and direction, relative humidity, atmospheric pressure, and solar radiation were recorded from summer 2021 to spring 2022 and these recording will continue throughout the 3-year study period. The collected meteorological data will support not only the hydrology component of the site feasibility studies, but also surface water, soils, and air. For the hydrology component, the most important data collected are ambient temperature and precipitation, which will be used to assess the frequency of intense rainfall, major flooding events, drought conditions, and snow cover seasonality. The data will also be used to assess how climate change will impact the longer-term hydrologic conditions of the AOI.

4.1.5 Aerial Survey

Prior to Year 1 of the EMBP, an aerial survey was conducted on October 11, 2017, during which aerial imagery and lidar data were collected simultaneously. The results of the lidar survey will be used to develop a Digital Elevation Model (DEM) for the AOI and to assess the land cover (vegetation, building, water etc.). The aerial survey results are critical for data input for a flood assessment model, determining the footprint and flow direction of waterbodies within the AOI. The aerial imagery collection is intended for assessing the amount of snow and ice cover in the study area during the winter.

4.2 Methods

4.2.1 Field Methods

4.2.1.1 Water Level

Level loggers were installed and used to collect the water level data at 6-hour intervals. The water level stations were installed by inserting the pressure transducer into a perforated plastic tubing attached to an aviation cable. The cable was then secured to a ground anchor and the pressure transducer was submerged into the waterbody at a depth that would remain underwater during normal water level fluctuations. Barometric pressure transducers were also installed. Throughout Year 1 of the monitoring period, maintenance visits were conducted to ensure that instrumentation defects, battery life, and wildlife did not affect the continuous collection of water level data.

4.2.1.2 Flow Measurements

To measure the stream flow, field staff entered the watercourses and used acoustic doppler velocimeters for smaller streams and rivers with lower flow depth (FM16 through to FM20 in Figure 4-2) and with acoustic doppler current profilers for larger streams and river with higher flow depths (FM14 and FM15 in Figure 4-2). The velocity data collected at each flow measurement location were incorporated with the water depth and the waterway cross-section information to calculate the discharge at time of measurement.

4.2.1.3 Bathymetric Survey

Bathymetric data of waterbodies in the study area were captured using a sonar attached to the side of a boat or canoe used for the survey. A survey grade Global Positioning System (GPS) tracker was used in conjunction with the sonar unit to collect the geodetic data of the lake depths at 5-meter intervals across the entire waterbody of interest.

4.2.1.4 Meteorological Station

A solar-powered Campbell Scientific datalogger with cellular communication link was deployed as the meteorological station for this monitoring program. The station collects barometric pressure, air temperature, relative humidity, rain, snow depth, wind speed, wind direction, net solar radiation, and soil water content at 15-minute intervals. The data are uploaded to cloud storage hourly.

4.2.1.5 Aerial Survey

The aerial survey completed in October 2017 was conducted by piloting a small aircraft over the study area and collecting the lidar data and aerial imagery simultaneously. The lidar data were then processed to generate a bare-earth DEM with one-meter resolution. In addition, the resulting lidar point clouds were processed to generate the land cover information for the Project area.

4.2.2 Data Quality Assurance & Quality Control

For each monitoring component, QA/QC measures were completed as part of the data collection effort and included calibration of survey equipment, protection of the instrument against factors that may obstruct or damage the equipment (wildlife, flooding, and winter conditions), and establishing proper vertical and horizontal datum for the data collection. Project Quality Plans (PQPs) and Data Management Plans (DMPs) were completed for the

monitoring components and the work was carried out consistent with these PQPs and DMPs.

Data quality controls were also conducted throughout Year 1 of the monitoring programs. Site visits to the monitoring stations were conducted to download and assess the reliability of the data, re-calibrate the survey equipment, and perform other maintenance activities periodically. After all data from Year 1 were retrieved, the data were checked for completeness and reliability (by comparison with normal range expected for the AOI).

4.3 Results

The data from the Year 1 hydrology monitoring component of the EMBP are summarized in Appendix F and a brief summary is provided herein.

4.3.1 Water Level

Continuous water level monitoring at 6-hour intervals were completed at 10 water level monitoring locations. Water level time series for all 10 stations were relatively complete between June/July 2021 when the level sensors were installed until the end of Year 1 (June 2022). No major data gaps were discovered. The seasonal variation in water level for all stations during Year 1 was between 1 m to 3 m, which is within the reasonable range when compared to the water level recorded at the Ontario Ministry of the Environment's hydrometric stations at small lakes and streams in the area. The water level monitoring will continue for another two years at a minimum.

4.3.2 Stream and River Flow

The discrete stream and river flow monitoring was partially completed in Year 1, primarily due to difficulty in accessing some of the monitoring sites. Monitoring was incomplete for FM14, FM17, and FM20 (see Figure 4-2).

For the two larger rivers where the flow measurements were used to establish stage-flow relationships (FM14 and FM15 in Figure 4-2), an adequate number of measurements and a wide range of flow conditions at time of measurement are critical. Based on these two criteria, the flow measurements on the Revell River (FM15) can be preliminarily considered complete with six measurements ranging from 0.1 m³/s to 2.6 m³/s. However, due to a beaver dam obstructing the access road to the flow measurement location on the Mennin River (FM14), only three flow measurements were collected which is insufficient to develop the stage-flow relationship.

Similar to the Mennin River, access to two of the five flow measurement locations for small streams (FM17 and FM20) was restricted and only one flow measurement was taken at each of these two streams in Year 1. Alternative monitoring locations will be selected or alternative means of transportation (by air or by water) will be used to fill the data gaps in Year 2 and Year 3 of the EMBP at these locations. Monitoring at the remaining three flow measurement locations (FM16, FM18, FM19) can also be considered preliminary complete.

4.3.3 Bathymetry

The completed bathymetric survey results from July 2021 to October 2021 have been digitized. The results showed that the surveyed waterbodies that are tributaries to Mennin Lake (i.e., S01 to S08) are shallow impoundments with depths ranging from 3 m to 5 m. The larger waterbodies, including Mennin Lake (S09) and Revell Lake (S10), range from 15 m to 25 m deep. During the quality control assessment, it was determined that the high wind/waves conditions on the day of the survey for Mennin Lake resulted in the data failing the quality control. As a result, Mennin Lake is scheduled to be re-surveyed in 2023.

4.3.4 Meteorology

A variety of meteorological parameters were monitored continuously at the meteorological station, with the most important parameters for site hydrology being the ambient temperature and total precipitation. During the quality control process, some temporal data gaps were observed from the Year 1 ambient temperature and total precipitation, but the issues have been addressed during maintenance visits and the data recording resumed afterwards. As such, only eight months worth of data are available and statistical analyses can therefore not be completed at this time. The recorded data were, however, within reasonable range when compared to typical range from other stations in Northwest Ontario. The continuous meteorology monitoring will continue throughout Year 2 and Year 3 of the monitoring period.

4.3.5 Aerial Survey

As a result of the aerial survey and lidar data processing, a bare-earth DEM and a land cover layer were completed for the AOI and surrounding area of approximately 50 km². The footprint and flow directions of the waterbodies in the study area were estimated from the data and shown in Figure 4-1. This information will also be ready for floodplain modeling as part of the site feasibility analysis after the completion of the 3-year EMBP.

Because the survey prior to Year 1 was conducted in October, additional aerial imagery survey is required to assess the amount of snow and ice cover in the area during the winter.

4.4 Summary

In summary, the hydrology portion of the EMBP was initiated during Year 1. All required monitoring instrumentation was installed and the proposed data collection for Year 1 was completed, with the exception of stream and river flow monitoring that was not completed at all locations due to access restrictions. Alternative monitoring locations will be selected or alternative means of transportation (by air or by water) will be used to fill the data gaps in Year 2 and Year 3 of the EMBP at these locations (FM14, FM15, FM20). Several data gaps were also identified as a result of data quality assurance and control including bathymetry at Mennin Lake (schedule to be re-surveyed in 2023) additional aerial imagery collection during winter to assess snow and ice cover and meteorology. Corrective actions have been identified to address these gaps and will be carried out in subsequent years of the EMBP.

5.0 SOIL

5.1 Sampling Overview

The purpose of the soil component of the EMBP is to determine the existing conditions within the SSA, LSA_{SOIL}, and RSA_{SOIL} in order to assess the potential for impacts and feasibility of the design and construction of the Project.

Understanding terrestrial soil quality and bedrock chemistry is an essential component of site characterization for a DGR. The Project may affect the surficial soil (top 30 cm) through multiple pathways (CanNorth et al. 2020), and soil is the main medium from which COPC may partition into groundwater and surface water (CCME 2016). Soil quality may be affected by excavation and construction activities, air deposition, and water (spills, runoff, leachate) and then transferred to other media such as plant tissue and subsequently up the food chain. Heterogeneous bedrock (consolidated or unconsolidated) may affect COPC distribution, especially in fractured areas (CCME 2016).

The soil component of the EMBP includes assessing soil at the ground surface (top 30 cm). Soil quality was to be sampled primarily in Year 1 using standard field methods, with confirmation sampling occurring in Year 2 at a subset of the Year 1 locations.

In Year 1 of the monitoring program, 40 soil samples and five duplicate soil samples were collected (Figure 5-1 and Table 5-1). The Station IDs shown in Figure 5-1 and Table 5-1 represent Habitat Type-Age Class-Geographic Quadrant-Replicate Number:

- Habitat Types: Jack Pine (P); Black Spruce (S), or Wetland (SW).
- Age Classes:
 - 12 or 19 years for harvested upland jack pine and/or black spruce on silty to fine loamy mineral substrates; and
 - 90 or 94 year old for unharvested upland jack pine and/or black spruce on silty to fine loamy mineral substrates.
- Geographic Quadrants: The LSA_{SOIL} was subdivided into four quadrants for geographic stratification (NE, NW, SE, and SW).
- Replicate Number: Sequential number.

For example, P15NE03 represents sequentially the 3rd sample from the northeast quadrant and in the jack pine habitat and having harvested upland jack pine and/or black spruce on silty to fine loamy mineral substrates.

Photographs of the soil grids and soil horizons are included in Appendix C.

5.2 Methods

Soil samples were collected using the methods and standard operating procedures as documented in the EMBP (CanNorth et al. 2020).

5.2.1 Field Methods

Eight discrete soil samples (subsamples) were collected from each site. Except for VOC samples, the discrete samples were physically composited at the final sample location. The VOC samples were composited by putting 1/8th of the final target soil volume from each of the eight subsamples into two vials containing methanol. Discrete samples were extracted by a Terracore sampler from the first four locations into one vial, and the samples from the second four locations went into another vial. In wetlands where an extensive fibric moss layer was encountered, samples were collected immediately below the fibric moss, or if the fibric moss extended below 30 cm, no sample was collected and the field form documented the fibric moss presence with a note that a sample was not able to be collected.

Figure 5-1 Year 1 Soil Sampling Locations

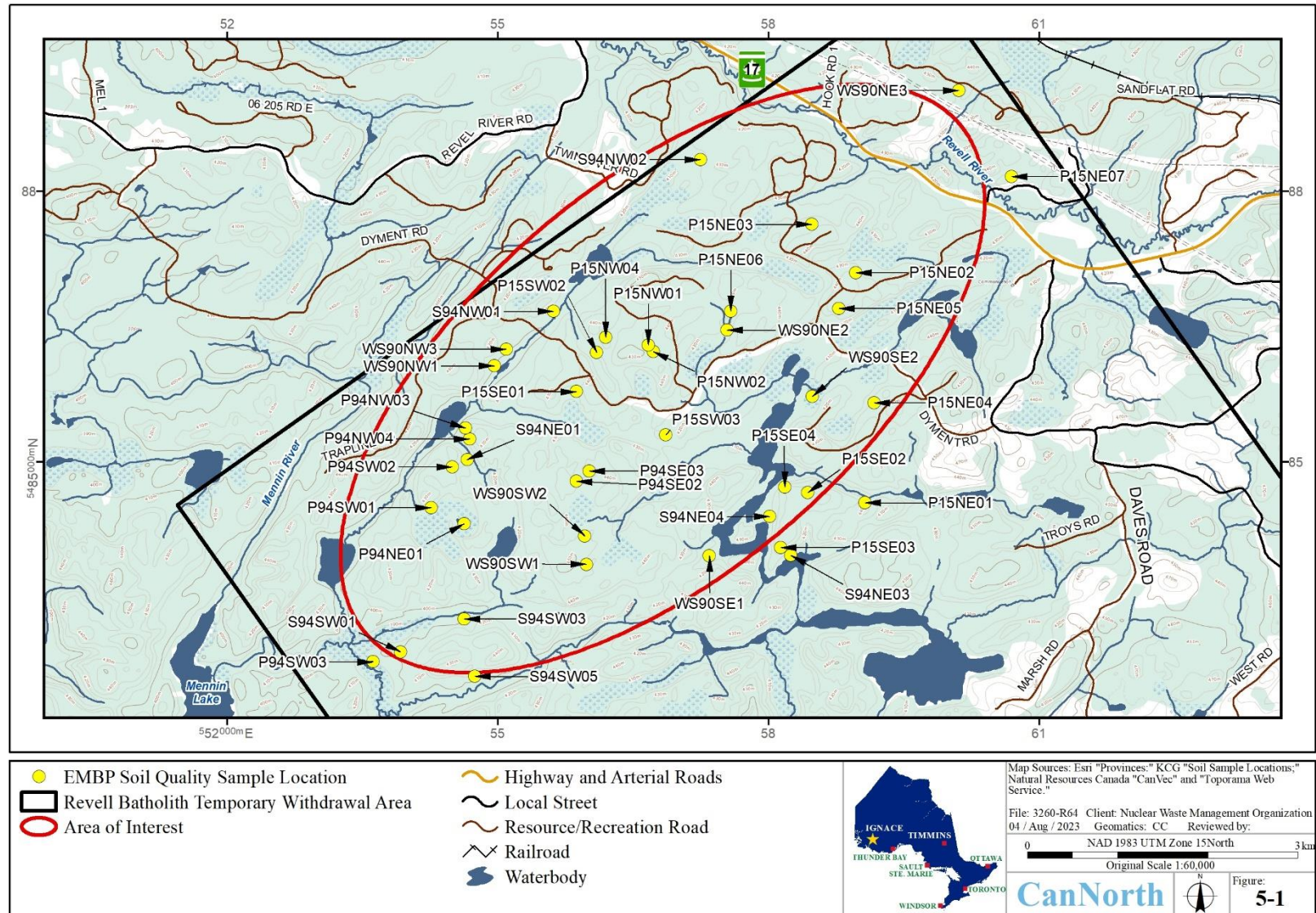


Table 5-1 Year 1 Soil Samples

Station ID	Site ID (on Chain of Custody)	Duplicate Sample Collected?	Date Sampled	Matrix Type
S94NW01	USB90NW1		27-Jul-21	Soil
P15NE03	P12-N07		9-Aug-21	Soil
P15NE01	P12S01		12-Aug-21	Soil
P15NE04	P12S02	Yes	12-Aug-21	Soil
P94SE02	P90N02		13-Aug-21	Soil
P94SE03	P90N04		14-Aug-21	Soil
S94NE01	S90N01		14-Aug-21	Soil
P15SE01	P12S04		15-Aug-21	Soil
P15NE05	P12N02		10-Aug-21	Soil
S94NE04	S90N03		11-Aug-21	Soil
S94NE03	S94NE02		7-Oct-21	Soil
P15NE02	P15NE02		8-Oct-21	Soil
S94NW02	S94NW02		9-Oct-21	Soil
P94NW03	P94NW03		12-Oct-21	Soil
P94SW02	P94SW02		13-Oct-21	Soil
P15NW04	P15NW04		20-Aug-22	Soil
P15SW02	P15SW02		20-Aug-22	Soil
P15NE07	P15NE07		19-Aug-22	Soil
P94NW04	P94NW04		21-Aug-22	Soil
P94SW01	P94SW01	Yes	21-Aug-22	Soil
P15NW02	P15NW02		23-Aug-22	Soil
P15NW01	P15NW01		23-Aug-22	Soil
P94NE01	P94NE01		22-Aug-22	Soil
WS90SW1	WS90SW1		22-Aug-22	Peat
P15SE02	P15SE02	Yes	25-Aug-22	Soil
P15SE03	P15SE03		25-Aug-22	Soil
WS90NE2	WS90NE2		28-Aug-22	Peat
WS90NW1	WS90NW1		27-Aug-22	Soil
P15NE06	P15NE06		26-Aug-22	Soil
P15SW03	P15SW03		26-Aug-22	Soil
WS90NW3	WS90NW3		27-Aug-22	Peat
WS90SW2	WS90SW2		28-Aug-22	Peat
WS90NE3	WS90NE3	Yes	29-Aug-22	Peat
P15SE04	P15SE04		30-Aug-22	Soil
WS90SE1	WS90SE1		30-Aug-22	Peat
WS90SE2	WS90SE2		31-Aug-22	Peat
S94SW01	S94SW01	Yes	13-Sep-22	Soil
P94SW03	P94SW03		13-Sep-22	Soil
S94SW05	S94SW05		14-Sep-22	Soil
S94SW03	S94SW03		14-Sep-22	Soil

The sample locations were pre-selected from a square or rectangular grid superimposed on the site, depending on the shape of the area that meets the sampling criteria. Data recorded at every discrete sample location by a soil specialist included:

- The top and bottom depths of the sample from the mineral surface (black spruce and jack pine ecosites) or organic substrate surface (wetland ecosite).
- Texture of mineral sample or organic horizon type: Soil texture refers to the mixture of grain sizes (diameter of the soil particles) in the sample; organic horizon type refers to the fibric, mesic or humic organic horizons as described in the CSSC manual.
- Grain size sorting: Grain size sorting classes included very well, well, moderately, poorly, and very poorly.

Data recorded for the central discrete sample location only included:

- Soil color of composite sample (indicate if wet or dry sample): Soil color was determined from a Munsell color book and recorded as hue, value and chroma (e.g., 7.5YR 5/3).
- CSSC Soil Great Group.

Field duplicate samples are intended to ensure that sampling and laboratory analyses produce repeatable results. Five field duplicate samples were collected (a frequency of 12.5% of the composite samples). This is a reduced frequency compared to the EMBP, which required a duplicate sample to be taken at a frequency of 20% of the composite samples; however, this frequency does exceed the 10% recommended by CCME (2016).

Rinseate blanks were collected to check contamination of the sampling device from any sources of field contamination. Fifteen (15) rinseate samples were collected (i.e., a frequency of 37.5% of the composite samples, which exceeds the frequency of 20% specified in the EMBP).

Trip blanks were used to check contamination of sample jars from sources of VOCs (e.g., gasoline-fueled vehicles) during sampling and cooler transport. In total, 28 trip blanks were submitted to the laboratory for analyses (i.e., one trip blank was submitted per batch of samples submitted to the laboratory, which satisfies the requirements of the EMBP).

5.2.2 Laboratory Analyses

All soil samples and associated rinseate and trip blanks were analyzed by ALS laboratories, a CALA accredited lab.

5.2.3 Data Analyses

Soil samples were generally analyzed for metals (total); metals (leachable); general chemistry, ions, and nutrients; organics and volatiles; radionuclides; and glyphosate. Rinseate blanks were analyzed for a similar list of analytes as the soil samples, with the exception of radionuclides; trip blanks were analyzed for VOCs.

The EMBP Design report (CanNorth et al. 2020) identified the following primary references for obtaining regulatory guidelines:

- MECP: Soil, Groundwater and Sediment Site Condition Standards (MOE 2011a).
- CCME (2023): Canadian Soil Quality Guidelines (CSQGs) for the Protection of Environment and Human Health.
- Non-Radiological Interim Acceptance Criteria for the Protection of Persons and the Environment (NWMO 2015).

If guidelines were not available from these federal or provincial agencies then other jurisdictions could be considered. In addition, the NWMO developed interim acceptance criteria for the protection of persons and the environment from non-radiological impacts for surface water, groundwater, soil, sediment, and air (NWMO 2015, 2019). The interim acceptance criteria are primarily based on the applicable guidelines, supplemented as needed by internationally developed guidelines and literature. These acceptance criteria are being used in the NWMO postclosure safety assessment and are, therefore, also relevant as an evaluation tool.

5.3 Results

Preliminary summary statistics were performed on the soils results for each reported analyte by habitat type (Appendix E). These preliminary summary statistics included average result concentration, median result concentration, standard deviation, and the 5th and 95th percentile concentrations. The results were then compared to the guidelines in the primary references included in Section 5.2.3.

Overall, statistics by analyte for the jack pine (P) and black spruce (S) habitats are comparable, with the statistics for the wetland (WS) habitat markedly different for most analytes. This is likely a result of the higher total organic carbon in the WS samples (average of 38%) compared to the P and S samples (average of approximately 1%).

5.3.1 Anions, Nutrients, Organics, and Physical Properties

Of the 13 anions, nutrients, organics, and physical properties analysed to characterize the general chemistry of the LSA_{SOIL}, only 3 have available guidelines. As shown in Table 5-2, pH is outside the expected range. The pH is acidic, which is typical for both wetland and pine forest soils, with the median values ranging from 3.38 in the wetland to 4.51 in the Jack Pine habitat.

Table 5-2 Summary of exceedances of available guidelines for anions, nutrients, organics, and physical properties.

Parameter	Guideline	Units	Exceedance	Exceedance	Exceedance
			Jack Pine	Black Spruce	Wetland
Conductivity	0.57	mS/cm			
pH	6 - 8	pH units			
SAR	2.4	-			
	All summary statistics below the guideline				
	95 th Percentile outside guideline				
	Mean and 95 th Percentile outside guideline				
	Mean, Median and 95 th Percentile outside guideline				
	5 th Percentile, Mean, Median and 95 th Percentile outside guideline				

5.3.2 Metals and Trace Elements

Of the 44 metals and trace elements assessed in the soil samples, 34 have available guidelines. As shown in Table 5-3, some of the analyzed parameters exceeded soil quality guidelines in the LSA_{SOIL}. Figure 5-2 summarizes the measured data for the COPC where the soil quality guideline was exceeded (aluminum, chromium, iron, lithium, manganese, molybdenum, and titanium); although an exceedance was also noted for hexavalent chromium and sulphur, these are complicated by the majority of the data being below detection limits. It should be noted that some of the soil guidelines are the upper estimate of background in Ontario and are not related to any potential for effects. To add context to the data, the upper range of background in Ontario was added to the Figure 5-2 where available. This value is based on the Ontario Typical Range (OTR) for rural parkland; the OTR98 is the 97.5th percentile of the distribution of a database of surface soils in Ontario

that are not contaminated by point sources and has been adopted as the upper estimate of background (MOE 2011b). Based on this figure, only molybdenum in the wetland was measured at above the guideline and above typical background levels.

Table 5-3 Summary of exceedances of available guidelines for metals and trace elements.

Parameter	Guideline	Measurement	Exceedance	Exceedance	Exceedance
			Jack Pine	Black Spruce	Wetland
Aluminum (Al)-Total	50	mg/kg			
Antimony (Sb)-Total	1	mg/kg			
Arsenic (As)-Total	11	mg/kg			
Barium (Ba)-Total	210	mg/kg			
Beryllium (Be)-Total	2.5	mg/kg			
Bismuth (Bi)-Total	20	mg/kg			
Boron (B)-Total	1.5	mg/kg	*	*	*
Cadmium (Cd)-Total	1	mg/kg			
Chromium (Cr)-Total	0.4	mg/kg			
Cobalt (Co)-Total	19	mg/kg			
Copper (Cu)-Total	62	mg/kg			
Iron (Fe)-Total	200	mg/kg			
Lead (Pb)-Total	45	mg/kg			
Lithium (Li)-Total	2	mg/kg			
Manganese (Mn)-Total	100	mg/kg			
Mercury (Hg)-Total	0.16	mg/kg			
Molybdenum (Mo)-Total	2	mg/kg			
Nickel (Ni)-Total	37	mg/kg			
Rhodium (Rh)-Total	2.2	mg/kg			
Ruthenium (Ru)-Total	1	mg/kg			
Selenium (Se)-Total	1	mg/kg			
Silver (Ag)-Total	0.5	mg/kg			
Strontium (Sr)-Total	33000	mg/kg			
Sulphur (S)-Total	500	mg/kg	*	*	*
Tellurium (Te)-Total	250	mg/kg			
Thallium (Tl)-Total	1	mg/kg			
Tin (Sn)-Total	5	mg/kg			
Titanium (Ti)-Total	1000	mg/kg			
Tungsten (W)-Total	400	mg/kg			
Uranium (U)-Total	1.9	mg/kg			
Vanadium (V)-Total	86	mg/kg			
Zinc (Zn)-Total	200	mg/kg			
Zirconium (Zr)-Total	97	mg/kg			
Chromium, Hexavalent	0.4	mg/kg			*

*RDL close to or higher than guideline.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

Figure 5-2 Summary of selected COPC in soil

Note: The orange bars represent the range of data (from the 5th percentile to the 95th percentile) and the blue dots are the median of the data.

5.3.3 Organic Compounds

Volatile Organic Compounds (VOCs)

A total of 68 VOCs were analyzed, of which 44 have available soil quality guidelines (Table 5-4). Although exceedances were noted, it was due to the RDL of the analysis being higher than or equal to the available guideline. To more accurately determine if levels exceed guidelines during baseline conditions, lower RDLs will need to be achieved by the laboratory.

Table 5-4 Summary of exceedances of available guidelines for volatile organic compounds.

Parameter	Guideline	Units	Exceedance	Exceedance	Exceedance
			Jack Pine	Black Spruce	Wetland
Acetone	0.5	mg/kg	*	*	*
Benzene	0.02	mg/kg			
Bromodichloromethane	0.05	mg/kg	*	*	*
Bromoform	0.05	mg/kg	*	*	*
Bromomethane	0.05	mg/kg	*	*	*
Carbon tetrachloride	0.05	mg/kg	*	*	*
Chlorobenzene	0.05	mg/kg	*	*	*
Dibromochloromethane	0.05	mg/kg	*	*	*
Chloroform	0.05	mg/kg	*	*	*
1,2-Dichlorobenzene	0.05	mg/kg	*	*	*
1,3-Dichlorobenzene	0.05	mg/kg	*	*	*
1,4-Dichlorobenzene	0.05	mg/kg	*	*	*
Dichlorodifluoromethane	0.05	mg/kg	*	*	*
1,1-Dichloroethane	0.05	mg/kg	*	*	*
1,2-Dichloroethane	0.05	mg/kg	*	*	*
1,1-Dichloroethylene	0.05	mg/kg	*	*	*
cis-1,2-Dichloroethylene	0.05	mg/kg	*	*	*
trans-1,2-Dichloroethylene	0.05	mg/kg	*	*	*
Methylene Chloride	0.05	mg/kg	*	*	*
1,2-Dichloropropane	0.05	mg/kg	*	*	*
1,3-Dichloropropane	0.05	mg/kg	*	*	*
cis-1,3-Dichloropropene	0.05	mg/kg	*	*	*
trans-1,3-Dichloropropene	0.05	mg/kg	*	*	*
1,3-Dichloropropene (cis & trans)	5	mg/kg			
Ethylbenzene	0.05	mg/kg			
Hexachlorobutadiene	0.01	mg/kg	*	*	*
Hexane	0.05	mg/kg	*	*	*
n-Hexane	0.05	mg/kg			
Methyl Ethyl Ketone	0.5	mg/kg	*	*	*
Methyl Isobutyl Ketone	0.5	mg/kg	*	*	*

Table 5-4 Summary of exceedances of available guidelines for volatile organic compounds. (continued)

Parameter	Guideline	Units	Exceedance	Exceedance	Exceedance
			Jack Pine	Black Spruce	Wetland
MTBE	0.05	mg/kg	*	*	*
Styrene	0.05	mg/kg	*	*	*
1,1,1,2-Tetrachloroethane	0.05	mg/kg	*	*	*
1,1,2,2-Tetrachloroethane	0.05	mg/kg	*	*	*
Tetrachloroethylene	0.05	mg/kg	*	*	*
Toluene	0.2	mg/kg			
1,2,3-Trichlorobenzene	0.05	mg/kg	*	*	*
1,2,4-Trichlorobenzene	0.05	mg/kg			
1,1,1-Trichloroethane	0.05	mg/kg	*	*	*
1,1,2-Trichloroethane	0.05	mg/kg	*	*	*
Trichloroethylene	0.05	mg/kg			
Trichlorofluoromethane	0.25	mg/kg			
Vinyl chloride	0.02	mg/kg			
Xylenes (Total)	0.05	mg/kg	*	*	*

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

*RDL close to or higher than guideline.

Petroleum Hydrocarbons (PHCs)

Guidelines are available for the F1 to F4 fractions of PHC (Table 5-5). Although exceedances were noted in the jack pine and black spruce habitats for F2, it was due to the RDL of the analysis being higher than or equal to the available guideline. Hydrocarbons were detected in wetland habitat samples: F2 (C10-C16) (25% of samples), F3 (C16-C34) (88% of samples), and F4 (C34-C50) (88% of samples). The lab noted for some of the wetland samples that the detection limit had to be adjusted as the sample had high moisture content. As the PHC were found at all places across the area (SW, NW, NE, and SE) it is expected that this reflects natural organic compounds. CCME (CCME 2008) acknowledges that soils with a high natural organic carbon content (such as peats) may give a “false positive” result when analyzed, specifically, laboratory results for F2, F3 and F4 may be falsely elevated.

Table 5-5 Summary of exceedances of available guidelines for petroleum hydrocarbons.

Parameter	Guideline	Units	Exceedance	Exceedance	Exceedance
			Jack Pine	Black Spruce	Wetland
F1 (C6-C10) -BTEX	25	mg/kg			
F2 (C10-C16)	10	mg/kg	*	*	
F3 (C16-C34)	240	mg/kg			
F4 (C34-C50)	120	mg/kg			
	All summary statistics below the guideline				
	95 th Percentile above guideline				
	Mean and 95 th Percentile above guideline				
	Mean, Median and 95 th Percentile above guideline				
	5 th Percentile, Mean, Median and 95 th Percentile above guideline				

*RDL close to or higher than guideline.

Polycyclic Aromatic Hydrocarbons (PAHs) and Semivolatile Organic Compounds (SVOCs)

Table 5-6 summarizes the exceedances of the soil quality guideline for PAHs and SVOCs. Although exceedances were noted, it was due to the RDL of the analysis being higher than or equal to the available guideline. To more accurately determine if levels exceed guidelines during baseline conditions, lower RDLs will need to be achieved by the laboratory. Phenol was detected in 13% of samples, with one detection each in the Jack Pine and the Wetland habitat samples and three detections in the Black Spruce habitat samples.

Table 5-6 Summary of exceedances of available guidelines for PAHs and SVOCs.

Parameter	Guideline	Units	Exceedance	Exceedance	Exceedance
			Jack Pine	Black Spruce	Wetland
Acenaphthene	0.072	mg/kg			*
Acenaphthylene	0.093	mg/kg			*
Anthracene	0.16	mg/kg			*
Benzo(a)anthracene	0.36	mg/kg			*
Benzo(a)pyrene	0.3	mg/kg			*
Benzo(b)fluoranthene	0.47	mg/kg			
Benzo(ghi)perylene	0.68	mg/kg			
Benzo(k)fluoranthene	0.48	mg/kg			
Biphenyl	0.05	mg/kg			*
4-Chloroaniline	0.5	mg/kg			*
Bis(2-chloroethyl)ether	0.5	mg/kg			*
Bis(2-chloroisopropyl)ether	0.5	mg/kg			*
2-Chlorophenol	0.1	mg/kg			*
Chrysene	2.8	mg/kg			
Dibenzo(a,h)anthracene	0.1	mg/kg			*
3,3'-Dichlorobenzidine	1	mg/kg			*
2,4-Dichlorophenol	0.1	mg/kg			*
Diethylphthalate	0.5	mg/kg			*
Dimethylphthalate	0.5	mg/kg			*
2,4-Dimethylphenol	0.2	mg/kg			*
2,4-Dinitrophenol	2	mg/kg			*
2,4-Dinitrotoluene	0.5	mg/kg			*
2,6-Dinitrotoluene	0.5	mg/kg			*
2,4+2,6-Dinitrotoluene	0.5	mg/kg			*
Bis(2-ethylhexyl)phthalate	5	mg/kg			
Fluoranthene	0.56	mg/kg			
Fluorene	0.12	mg/kg			*
Indeno(1,2,3-cd)pyrene	0.23	mg/kg			*
1-Methylnaphthalene	0.59	mg/kg			
2-Methylnaphthalene	0.59	mg/kg			
Naphthalene	0.09	mg/kg			*
Pentachlorophenol	0.1	mg/kg			*
Phenanthrene	0.69	mg/kg			
Phenol	0.5	mg/kg			
Pyrene	1	mg/kg			
1,2,4-Trichlorobenzene	0.05	mg/kg			*
2,4,5-Trichlorophenol	0.1	mg/kg			*
2,4,6-Trichlorophenol	0.1	mg/kg			*

*RDL close to or higher than guideline.

	All summary statistics below the guideline
	95 th Percentile above guideline
	Mean and 95 th Percentile above guideline
	Mean, Median and 95 th Percentile above guideline
	5 th Percentile, Mean, Median and 95 th Percentile above guideline

5.3.4 Herbicides and Pesticides

Two herbicides and pesticides were analyzed, AMPA and glyphosate. No guidelines are available, but all levels were below the RDL.

5.3.5 Radionuclides

A total of 14 radionuclides were analyzed in the soil samples from the LSA_{SOIL}. There are no guidelines for these parameters. It is noted that not all the Tier 1 radionuclide (Se-79) and Tier 2 radionuclides (Pu-240, Pu-241, and Cm-244) or the Tier 2 natural radionuclides were included in the analyte list.

Pu-238, Pu-239 and Sr-90 can be present from fallout from historical global nuclear weapons, nuclear weapons testing, and nuclear accidents. Pu-238 and Pu-239 were detected in 10% and 40% of jack pine habitat samples, respectively, and Pu-239 and Sr-90 were detected in 20% of black spruce habitat samples.

5.4 Summary

In summary, the soils portion of the monitoring plan was initiated. Data quality assurance and control are ongoing, and several data gaps have been identified. These data gaps will be reviewed in the context of the project data quality objectives and corrective actions will be identified to address these data gaps, as appropriate.

The chemistry information for the jack pine and black spruce habitats were quite similar, with the wetland samples having a different chemistry. This is likely a result of higher total organic carbon in the wetland samples. The pH of all samples was low, indicating that the soil is acidic.

The soil was found to have elevated concentrations of some parameters including aluminum, chromium, iron, lithium, manganese, molybdenum, sulphur, and titanium. These are components of the soil and reflect the local geology. Hexavalent chromium was also identified at exceeding guidelines but the interpretation is complicated due to the detection limit. Hydrocarbons were detected in the wetland samples, but the high organic content of the soil is likely influencing the laboratory analysis.

Some radionuclides were detected and are most likely the result from fallout from historical global nuclear weapons, nuclear weapons testing, and nuclear accidents.

6.0 MAP SOURCES AND DISCLAIMERS

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7.0 LITERATURE CITED

BCMOE (British Columbia Ministry of Environment). 2023. Approved water quality guidelines. <https://alpha.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>.

CanNorth, Geosyntec, IEC, and Z.& A. Inc. (Canada North Environmental Services, Geosyntec Consultants International Inc., Independent Environmental Consultants, Zajdlik & Associates Inc.). 2019. Nuclear Waste Management Organization Adaptive Phased Management Project - Northwestern Ontario region: Environmental Media Baseline Program - Preliminary sample design feasibility assessment. Final report, November.

CanNorth, Geosyntec, IEC, and Z.& A. Inc. (Canada North Environmental Services, Geosyntec Consultants International Inc., Independent Environmental Consultants, Zajdlik & Associates Inc.). 2020. Nuclear Waste Management Organization Adaptive Phased Management Project - Northwestern Ontario region: Environmental Media Baseline Program design. Final report, June.

CanNorth, Geosyntec, IEC, and Zajdlik & Associates Inc. (Canada North Environmental Services, Geosyntec Consultants International Inc., Independent Environmental Consultants, Zajdlik & Associates Inc.). 2023. Nuclear Waste Management Organization Adaptive Phased Management project - Wabigoon Lake Ojibway Nation-Ignace Area: Biophysical conceptual site model update and screening level change assessment. Final report, April.

CCI Research Inc. 2021. Nuclear Waste Management Organization and Township of Ignace - Community survey report. <https://www.nwmo.ca/~media/Site/Files/PDFs/2021/06/02/15/40/NWMO-Community-Results--Ignace-v300.ashx?la=en>.

CCME (Canadian Council of Ministers of the Environment). 2008. Canada-Wide standard for petroleum hydrocarbons (PHC) in soil. User guidance. PN 1398.

CCME (Canadian Council of Ministers of the Environment). 2016. Guidance manual for environmental site characterization in support of environmental and human health risk assessment. Volume 3 Suggested Operating Procedures. PN 1555.

CCME (Canadian Council of Ministers of the Environment). 2023. Canadian Environmental Quality Guidelines summary table. <https://ccme.ca/en/summary-table>.

- CNSC (Canadian Nuclear Safety Commission). 2021. Guidance on deep geological repository site characterization. Regulatory document REGDOC-1.2.1.
- EC (Environment Canada). 2012. Metal mining technical guidance for environmental effects monitoring. Ottawa, Ontario: Environment Canada, National EEM Office, Science Policy and Environmental Quality Branch. <https://ec.gc.ca/eseem/default.asp?lang=En&n=AEC7C481-1>.
- GA (Government of Alberta). 2018. Environmental Quality Guidelines for Alberta Surface Waters. <https://open.alberta.ca/publications/9781460138731>.
- GC (Government of Canada). 2021. Federal Environmental Quality Guidelines summary table. <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Health Canada. 2022a. Guidelines for Canadian drinking water quality - Summary table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
- Health Canada. 2022b. Guidelines for Canadian recreational water quality - Cyanobacteria and their toxins. February 2022.
- MOE (Ontario Ministry of the Environment). 2011a. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Ministry of the Environment and Climate Change. April 15, 2011.
- MOE (Ontario Ministry of the Environment). 2011b. Rationale for the development of soil and ground water standards for use at contaminated sites in Ontario. Prepared by the Standards Development Branch, September.
- MOEE (Ontario Ministry of the Environment and Energy). 1994. Provincial water quality objectives of the Ministry of Environment and Energy. ISBN 0-7778-8473-9 rev.
- NWMO (Nuclear Waste Management Organization). 2015. Non-radiological interim acceptance criteria for the protection of persons and the environment. NWMO TR-2015-03.
- NWMO (Nuclear Waste Management Organization). 2019. Supplementary non-radiological interim acceptance criteria for the protection of persons and the environment. NWMO-TR-2017-05.

Suter, G.W.I.I., and C.L. Tsao. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Prepared for U.S. Department of Energy: ES/ER/TM-96/R2.

US EPA (United States Environmental Protection Agency). 2022. National Recommended Water Quality Criteria - Aquatic Life Criteria Table. <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table> (accessed September 15, 2022).

Wetzel, R.G. Limnology: Lake and River Ecosystems. 3rd Edition.

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APPENDIX A

QA/QC METHODS AND RESULTS

APPENDIX A: QA/QC METHODS AND RESULTS

INTRODUCTION

All sample collection and handling in the field adhered to applicable protocols, whenever possible. Any deviations from protocols were recorded along with the rationale for the deviation.

All chemistry and taxonomy samples were analyzed by ALS in Winnipeg. ALS is certified and accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). As such, the ALS laboratories adhere to strict QA/QC standards and protocols. With each set of samples run, ALS tests reference materials, duplicates, and spiked samples.

METHODS

Water Quality

Some of the specific QA/QC methods employed during the water quality sampling program included:

- Regular calibration, inspection, and accuracy verifications of field meters and equipment;
- Use of gloves during sampling;
- Sampling equipment was rigorously cleaned prior to departure for the field to avoid sample contamination and equipment was triple rinsed with site water prior to use;
- The peristaltic pump was run for approximately 5 to 7 minutes so that the tubing was rinsed with approximately three times its volume; the water was then discarded prior to sampling;
- Sampling from downstream to upstream where replicates are collected;
- General measures to prevent sample contamination were adhered to (e.g., avoid contact with fuel while sampling);
- Avoiding contact with the insides of sample bottles, including lids;
- Limiting exposure of the inside of the sample bottles to the atmosphere;
- Sample bottles were filled to the top without any headspace unless specified otherwise. Some substances may volatilize and may be lost from a headspace when a bottle is opened;

- Samples for laboratory analysis were kept cool (4°C) and in the dark but not frozen; and
- Samples were delivered to the laboratory daily to ensure hold times were met for all applicable parameters (shortest hold time was for *E. Coli* at 30 hours).

The following blanks and field duplicates were collected for verification of the analytical results:

- One field blank per survey was collected by bringing lab supplied deionized water into the field. Field blanks were prepared by passing deionized water through the Kemmerer and all other sample handling procedures, including filtration for the field filtered parameters and preservation. A second field blank was collected if a peristaltic pump was used and was be prepared by passing deionized water through the pump and following all other sample handling procedures.
- One filtration blank per survey was collected by running deionized water supplied by the analytical laboratory through the filtration system, putting it into sample containers and preserving the samples.
- One trip blank per survey was prepared by the analytical laboratory by filling one set of sample bottles with deionized water and adding preservatives where appropriate. The trip blanks were transported to the field site with the same handling and transport protocols, but they were not opened at any point in the field and thus were not exposed to the environment.
- Field duplicate samples were collected at a frequency of five samples per season. Duplicates were collected at the same time as the main sample and filled at the same time from the same Kemmerer.

Plankton

The following are some of the specific QA/QC methods employed during the plankton sampling program:

- All phytoplankton weighted sample tubing (Nalgene or Tygon) were triple rinsed with site water prior to sampling; and
- The fine mesh Wisconsin net was soaked in the site lake water for 2 minutes prior to use then attached to zooplankton bucket.

Samples were preserved in the field as required and submitted to ALS, a certified laboratory, for taxonomic analysis.

Soil Quality

The following are some of the specific QA/QC methods employed during soil sampling program:

- Samples were discarded if the sampling quality control measures were not met.
- Sampling equipment was cleaned prior to the start of sampling.
- Chain-of-custody forms were used in the transportation of samples so the samples could be tracked from the field to the laboratory.
- Field duplicate samples were taken at a frequency of approximately 10% of the samples collected to ensure that sampling and laboratory analyses produced repeatable results.
- Rinseate blanks were collected to check contamination of the sampling device from any sources of field contamination.
- Trip blanks were used to check contamination of sample jars during sampling and cooler transport.

QA/QC Data Analyses

For the water and soil samples, the Relative Percent Difference (RPD) was calculated between the test sample and the duplicate sample¹. The Data Quality Objective (DQO) for the RPDs was set at 20% for water quality and 40% for soil quality. The intent of applying this DQO was to provide a benchmark for the initial data screening process, which determined whether the results were acceptable or required further investigation. It is estimated that at concentrations near the reported detection limit (RDL), measurement uncertainty is very high, often approaching 100% at concentrations within five times the RDL. Thus, RPDs of greater than 20% or 40% were only considered a potential issue if the test and duplicate results were both greater than five times the RDL.

Similarly, parameter concentrations in the water field and trip blank samples should be at or below the RDL as they are composed of deionized water. Thus, if parameter concentrations were greater than five times the RDL in the field and trip blank samples they were further investigated. Notably,

¹ $(RPD = ((Duplicate - Sample)/((Duplicate + Sample)/2))*100$.

the deionized water that was used to prepare the blank samples can absorb carbon dioxide (CO₂) in the air resulting in low pH in the blank samples. Therefore, discrepancies between pH values measured in the blank samples and the RDLs are not considered as errant.

The QA/QC chemistry tables present the calculated RPDs, identify whether parameter concentrations are higher than five times the RDL, and flag parameters that exceed the above mentioned criteria. Plankton taxonomy and enumeration data were reviewed for potential data entry errors prior to analysis of community composition and metrics.

RESULTS

Water Quality

Water chemistry QA/QC results from the summer and fall of 2021 and winter and spring of 2022 are presented in Appendix A, Tables 1 through 4. In very few instances, the RPDs for some parameters in some of the water samples exceed the DQO of 20% and were five times the RDL. Unfortunately, flagged results were not able to be re-analysed by ALS for confirmation of the original measurement. ALS includes comprehensive QC checks with every analysis to ensure high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results. Additionally, analytical results for the field blank and trip blank samples were low or non-detectable and considered acceptable. Thus, these exceedances are likely related to matrix heterogeneity and measurement uncertainty and not a result of sample contamination.

Soil Quality

The soil chemistry QA/QC results are presented in Appendix A, Table 5. In total, three analytes (conductivity, manganese, and potassium) exceeded the DQO while being more than 5 times the RDL. Those occurred in samples collected on the 25th and 29th of August 2022. Unfortunately, flagged results were not able to be re-analysed by ALS for confirmation of the original measurement. ALS includes comprehensive QC checks with every analysis to ensure high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results. Overall, the number of flagged results was less than 1% of the measures taken for this survey (193 analytes x 5 pairs of samples = 965 measures). Variability between the samples and their duplicates in these three measures is likely attributable to a small amount spatial

heterogeneity occurring in soil chemistry. The results were therefore overall considered consistent between the samples and their duplicates, and no contamination of the samples was apparent.

A total of 15 rinseate blanks and 28 trip blacks were collected and satisfied the requirements of the EMBP.

LITERATURE CITED

Environment Canada (EC). 2012. Metal mining technical guidance for environmental effects monitoring. Environment Canada, National Environmental Effects Monitoring Office, Science Policy and Environmental Quality Branch, Ottawa, Ontario.

Saskatchewan Environment and Public Safety (SEPS). 1989. Environmental monitoring guidelines (for operational monitoring at uranium and gold mining and milling operations in Saskatchewan), Saskatchewan Environment and Public Safety, Mines Pollution Control Branch.

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APPENDIX A, TABLE 1

Water chemistry QAQC results, summer 2021.

Analyte	Summer 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-03				UWB-09				Blanks		
			ML2-A SURF				MR2-A				RR1-A SURF				P3-A				RP1-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Bacteriological Tests																									
Escherichia Coli	CFU/100mL	1	1	<1	0	No	32	29	9.8	Yes	22	24	8.7	Yes	2	<1	66.7	No	7	1	150	No	-	<1	<1
Total Coliforms	CFU/100mL	1	>200	>200	0	Yes	>200	>200	0	Yes	>200	>200	0	Yes	6	1	142.9	No	>200	>200	0	Yes	-	<1	<1
Anions, Nutrients, and Physical Properties																									
Alkalinity, Total (as CaCO3)	mg/L	1	7.5	8.2	8.9	Yes	7	7.3	4.2	Yes	27.1	27.7	2.2	Yes	10.2	10.3	1.0	Yes	28.7	27.8	3.2	Yes	-	<1	1
Ammonia, Total (as N)	mg/L	0.01	<0.01	<0.01	0	No	0.038	0.024	45.2	No	0.041	0.017	82.8	No	<0.01	<0.01	0	No	<0.01	0.011	9.5	No	-	<0.01	<0.01
Bicarbonate (HCO3)	mg/L	1.2	9.2	10	8.3	Yes	8.5	8.9	4.6	Yes	33.1	33.8	2.1	Yes	12.4	12.6	1.6	Yes	35	33.9	3.2	Yes	-	<1.2	1.2
Biochemical Oxygen Demand	mg/L	2	<2	<2	0	No	<2	<2	0	No	<2	<2	0	No	<2	<2	0	No	<2	<2	0	No	-	<2	<2
Bromide (Br)	mg/L	0.1	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	-	<0.1	<0.1
Carbonate (CO3)	mg/L	0.6	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	-	<0.6	<0.6
Chloride (Cl)	mg/L	0.5	0.68	0.69	1.5	No	0.65	0.65	0	No	41.8	41.8	0	Yes	0.75	0.75	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
Conductivity	umhos/cm	1	24.3	24.3	0	Yes	25.2	24.7	2.0	Yes	196	196	0	Yes	30	52.9	55.2	Yes	58.9	57.7	2.1	Yes	-	<1	<1
Cyanide, Total	mg/L	0.002	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	0.0834	0.0075	167.0	No	<0.002	<0.002	0	No	-	<0.002	<0.002
Dissolved Organic Carbon	mg/L	0.5	10.9	10.9	0	Yes	12.2	12.1	0.8	Yes	8.37	8.41	0.5	Yes	16.3	16.6	1.8	Yes	16.3	16.4	0.6	Yes	0.56	<0.5	<0.5
Fluoride (F)	mg/L	0.02	0.037	0.037	0	No	0.042	0.042	0	No	0.042	0.042	0	No	0.027	0.027	0	No	0.032	0.032	0	No	-	<0.02	<0.02
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	-	<0.34	<0.34
Nitrate (as N)	mg/L	0.02	<0.02	<0.02	0	No	<0.02	<0.02	0	No	0.067	0.068	1.5	No	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Nitrate and Nitrite as N	mg/L	0.07	<0.07	<0.07	0	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	-	<0.07	<0.07
Nitrite (as N)	mg/L	0.01	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	-	<0.01	<0.01
pH	pH units	0.1	6.91	6.93	0.3	Yes	6.83	6.88	0.7	Yes	7.54	7.43	1.5	Yes	6.97	6.98	0.1	Yes	7.67	7.53	1.8	Yes	-	5.58	5.43
Sulphate (SO4)	mg/L	0.3	1.06	1.05	0.9	No	0.98	0.97	1.0	No	2.01	2.02	0.5	Yes	0.43	0.43	0	No	0.49	0.49	0	No	-	<0.3	<0.3
Total Dissolved Solids	mg/L	4 to 13.33	32.5	34.7	6.5	Yes	40.5	39.9	1.5	Yes	112	109	2.7	Yes	44.6	40	10.9	No	51.7	59.6	14.2	Yes	-	4.6	<4
Total Inorganic Carbon	mg/L	0.5	<0.5	1.01	67.5	No	<0.5	<0.5	0	No	3.88	3.83	1.3	Yes	0.88	0.72	20.0	No	3.09	6.43	70.2	Yes	-	<0.5	<0.5
Total Kjeldahl Nitrogen	mg/L	0.2	0.36	<0.2	57.1	No	0.35	0.28	22.2	No	0.26	0.27	3.8	No	0.3	0.28	6.9	No	0.63	0.64	1.6	No	-	<0.2	<0.2
Total Organic Carbon	mg/L	0.5	10.7	10.7	0	Yes	12.2	12.2	0	Yes	8.51	8.45	0.7	Yes	16.1	16.4	1.8	Yes	16.5	17	3.0	Yes	-	<0.5	<0.5
Total Suspended Solids	mg/L	3	3.9	<3	26.1	No	3.4	5.8	52.2	No	<3	<3	0	No	3.2	<3	6.5	No	4.7	3.9	18.6	No	-	<3	<3
Turbidity	NTU	0.1	1.68	1.58	6.1	Yes	3.29	3.4	3.3	Yes	2.21	2.14	3.2	Yes	2.16	2.09	3.3	Yes	1.87	1.78	4.9	Yes	-	<0.1	<0.1
Phosphorus (P)-Total (EPA)	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	-	<0.05	<0.05
Phosphorus (P)-Total (APHA)	mg/L	0.003	0.0119	0.0114	4.3	No	0.021	0.0206	1.9	Yes	0.0116	0.011	5.3	No	0.0214	0.0201	6.3	Yes	0.0186	0.0202	8.2	Yes	-	<0.003	<0.003
Other																									
Chlorophyll a	µg/L	0.1	6.78	6.75	0.4	Yes	6.77	4.5	40.3	Yes	1.52	1.43	6.1	Yes	16	5.92	92.0	Yes	10.9	10.9	0	Yes	-	<0.1	<0.1
Herbicides and Pesticides																									
AMPA	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
Glyphosate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Metals																									
Aluminum (Al)-Dissolved	mg/L	0.001	0.0859	0.0908	5.5	Yes	0.14	0.0962	37.1	Yes	0.0559	0.0514	8.4	Yes	0.187	0.232	21.5	Yes	0.0111	0.0078	34.9	Yes	0.0019	<0.001	<0.001
Aluminum (Al)-Total	mg/L	0.003	0.111	0.119	7.0	Yes	0.152	0.146	4.0	Yes	0.0667	0.0681	2.1	Yes	0.217	0.208	4.2	Yes	0.0173	0.0195	12.0	Yes	-	<0.003	<0.003
Antimony (Sb)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Antimony (Sb)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Arsenic (As)-Dissolved	mg/L	0.0001	0.00036	0.00036	0	No	0.00042	0.00043	2.4	No	0.00029	0.00029	0	No	0.00047	0.00057	19.2	No	0.00036	0.00035	2.8	No	<0.0001	<0.0001	<0.0001
Arsenic (As)-Total	mg/L	0.0001	0.00037	0.00035	5.6	No	0.00043	0.0004	7.2	No	0.00029	0.00029	0	No	0.00051	0.00049	4.0	No	0.00037	0.00036	2.7	No	-	<0.0001	<0.0001
Barium (Ba)-Dissolved	mg/L	0.0001	0.00548	0.0056	2.2	Yes	0.00525	0.00544	3.6	Yes	0.0137	0.0141	2.9	Yes	0.00508	0.0053	4.2	Yes	0.00513	0.00521	1.5	Yes	<0.0001	<0.0001	<0.0001
Barium (Ba)-Total	mg/L	0.0001	0.00543	0.00552	1.6	Yes	0.00562	0.00542	3.6	Yes	0.0146	0.0144	1.4	Yes	0.00528	0.00545	3.2	Yes	0.00604	0.00607	0.5	Yes	-	<0.0001	<0.0001
Beryllium (Be)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Beryllium (Be)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Bismuth (Bi)-Dissolved	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Bismuth (Bi)-Total	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<																	

APPENDIX A, TABLE 1

Water chemistry QAQC results, summer 2021.

Analyte	Summer 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-03				UWB-09				Blanks		
			ML2-A SURF				MR2-A				RR1-A SURF				P3-A				RP1-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals																									
Chromium (Cr)-Total	mg/L	0.0001	0.00043	0.00046	6.7	No	0.00039	0.0003	26.1	No	0.00033	0.00036	8.7	No	0.00043	0.00042	2.4	No	0.00012	<0.0001	18.2	No	-	<0.0001	<0.0001
Chromium (III)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	0.00053	<0.0005	5.8	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Chromium (III)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Chromium (VI)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Chromium, Hexavalent	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	0.00057	13.1	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Cobalt (Co)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	0.0001	0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Cobalt (Co)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	0.00013	0.00012	8	No	0.00012	0.00012	0	No	0.00011	0.00011	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Copper (Cu)-Dissolved	mg/L	0.0002	0.00068	0.0007	2.9	No	0.00082	0.00081	1.2	No	0.00033	0.00035	5.9	No	0.00053	0.00068	24.8	No	0.00027	0.00025	7.7	No	0.0007	<0.0002	<0.0002
Copper (Cu)-Total	mg/L	0.0005	0.00074	0.00073	1.4	No	0.0169	0.00076	182.8	No	<0.0005	<0.0005	0	No	0.00051	0.0031	143.5	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Iron (Fe)-Dissolved	mg/L	0.01	0.146	0.153	4.7	Yes	0.304	0.217	33.4	Yes	1.07	1.07	0	Yes	0.55	0.772	33.6	Yes	0.022	0.021	4.7	No	<0.01	<0.01	<0.01
Iron (Fe)-Total	mg/L	0.01	0.189	0.194	2.6	Yes	0.438	0.337	26.1	Yes	1.37	1.42	3.6	Yes	0.686	0.676	1.5	Yes	0.084	0.082	2.4	Yes	-	<0.01	<0.01
Lead (Pb)-Dissolved	mg/L	0.00005	0.000051	0.000057	11.1	No	0.000086	0.000078	9.8	No	0.000087	0.000085	2.3	No	0.000153	0.000176	14.0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Lead (Pb)-Total	mg/L	0.00005	0.000069	0.00008	14.8	No	0.000143	0.000141	1.4	No	0.000107	0.000118	9.8	No	0.000197	0.000206	4.5	No	<0.00005	<0.00005	0	No	-	<0.00005	<0.00005
Lithium (Li)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Lithium (Li)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Magnesium (Mg)-Dissolved	mg/L	0.005	0.736	0.738	0.3	Yes	0.797	0.807	1.2	Yes	1.53	1.55	1.3	Yes	0.777	0.777	0	Yes	1.46	1.48	1.4	Yes	0.0112	<0.005	<0.005
Magnesium (Mg)-Total	mg/L	0.005	0.761	0.735	3.5	Yes	0.8	0.802	0.2	Yes	1.59	1.6	0.6	Yes	0.794	0.811	2.1	Yes	1.52	1.5	1.3	Yes	-	<0.005	<0.005
Manganese (Mn)-Dissolved	mg/L	0.0001	0.00259	0.00284	9.2	Yes	0.00888	0.00702	23.4	Yes	0.0228	0.0227	0.4	Yes	0.00375	0.0076	67.8	Yes	0.00053	0.00046	14.1	No	0.0001	<0.0001	<0.0001
Manganese (Mn)-Total	mg/L	0.0001	0.0116	0.0113	2.6	Yes	0.0234	0.0232	0.9	Yes	0.0261	0.0264	1.1	Yes	0.0154	0.0153	0.7	Yes	0.0271	0.0271	0	Yes	-	<0.0001	<0.0001
Mercury (Hg)-Dissolved	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	<0.000005
Mercury (Hg)-Total	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	-	<0.000005	<0.000005
Molybdenum (Mo)-Dissolved	mg/L	0.00005	0.000265	0.00028	5.5	Yes	0.00031	0.000266	15.3	Yes	0.000085	0.000095	11.1	No	<0.00005	0.000054	7.7	No	0.000056	0.000058	3.5	No	<0.00005	<0.00005	<0.00005
Molybdenum (Mo)-Total	mg/L	0.00005	0.000287	0.000278	3.2	Yes	0.000272	0.000261	4.1	Yes	0.000077	0.000083	7.5	No	<0.00005	<0.00005	0	No	0.00007	0.000062	12.1	No	-	<0.00005	<0.00005
Nickel (Ni)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Nickel (Ni)-Total	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00187	<0.0005	115.6	No	<0.0005	<0.0005	0	No	<0.0005	0.0006	18.2	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Phosphorus (P)-Dissolved	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	<0.05
Potassium (K)-Dissolved	mg/L	0.05	0.407	0.406	0.2	Yes	0.318	0.315	0.9	Yes	0.757	0.754	0.4	Yes	0.664	0.675	1.6	Yes	0.56	0.578	3.2	Yes	<0.05	<0.05	<0.05
Potassium (K)-Total	mg/L	0.05	0.419	0.412	1.7	Yes	0.31	0.314	1.3	Yes	0.768	0.781	1.7	Yes	0.669	0.686	2.5	Yes	0.586	0.594	1.4	Yes	-	<0.05	<0.05
Rhodium (Rh)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Rhodium (Rh)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Rubidium (Rb)-Dissolved	mg/L	0.0002	0.00136	0.00128	6.1	Yes	0.00114	0.00104	9.2	Yes	0.00219	0.00224	2.3	Yes	0.00203	0.00205	1.0	Yes	0.00111	0.00117	5.3	Yes	<0.0002	<0.0002	<0.0002
Rubidium (Rb)-Total	mg/L	0.0002	0.00128	0.00122	4.8	Yes	0.00114	0.00116	1.7	Yes	0.00231	0.00244	5.5	Yes	0.00204	0.00208	1.9	Yes	0.00118	0.00118	0	Yes	-	<0.0002	<0.0002
Ruthenium (Ru)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Ruthenium (Ru)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<										

APPENDIX A, TABLE 1

Water chemistry QAQC results, summer 2021.

Analyte	Summer 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-03				UWB-09				Blanks		
			ML2-A SURF				MR2-A				RR1-A SURF				P3-A				RP1-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals																									
Tungsten (W)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Uranium (U)-Dissolved	mg/L	0.00001	0.000089	0.000091	2.2	Yes	0.000103	0.000096	7.0	Yes	0.000102	0.000102	0	Yes	0.000068	0.000068	0	Yes	<0.00001	<0.00001	0	No	<0.00001	<0.00001	<0.00001
Uranium (U)-Total	mg/L	0.00001	0.000091	0.000099	8.4	Yes	0.000109	0.000109	0	Yes	0.000109	0.000112	2.7	Yes	0.00007	0.000072	2.8	Yes	<0.00001	<0.00001	0	No	-	<0.00001	<0.00001
Vanadium (V)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00056	<0.0005	11.3	No	0.00066	0.00067	1.5	No	<0.0005	0.0007	33.3	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Vanadium (V)-Total	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00064	0.00063	1.6	No	0.00076	0.00077	1.3	No	0.00055	0.00052	5.6	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Zinc (Zn)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	0.0013	26.1	No	0.0017	0.0011	42.9	No	0.0015	0.0026	53.7	No	0.0016	0.0013	20.7	No	0.0044	0.0012	<0.001
Zinc (Zn)-Total	mg/L	0.003	<0.003	<0.003	0	No	<0.003	<0.003	0	No	<0.003	<0.003	0	No	<0.003	0.0037	20.9	No	<0.003	<0.003	0	No	-	<0.003	<0.003
Zirconium (Zr)-Dissolved	mg/L	0.0002	<0.0002	<0.0002	0	No	0.00027	0.0002	29.8	No	0.0002	0.00021	4.9	No	0.00026	0.00035	29.5	No	<0.0002	<0.0002	0	No	<0.0002	<0.0002	<0.0002
Zirconium (Zr)-Total	mg/L	0.0002	<0.0002	<0.0002	0	No	<0.0002	<0.0002	0	No	<0.0002	<0.0002	0	No	0.00023	0.00022	4.4	No	<0.0002	<0.0002	0	No	-	<0.0002	<0.0002
Other																									
Iodide (I)	mg/L	0.2	-	-	-	-	<0.2	<0.2	0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																									
1+2-Methylnaphthalenes	µg/L	0.0283	-	-	-	-	-	-	-	-	-	-	-	-	<0.028	<0.028	0	No	<0.028	<0.028	0	No	-	<0.028	<0.028
1-Methylnaphthalene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
2-Methylnaphthalene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Acenaphthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Acenaphthylene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(a)anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(a)pyrene	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	0	No	<0.01	<0.01	0	No	-	<0.01	<0.01
Benzo(b&j)fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(g,h,i)perylene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(k)fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Chrysene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Dibenz(a,h)anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Fluorene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Naphthalene	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0	No	<0.05	<0.05	0	No	-	<0.05	<0.05
Phenanthrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Pyrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Radionuclides																									
Am-241	Bq/L	0.8 to 3.4	<0.87	<2.9	107.7	No	-	-	-	-	<2.2	<1.6	31.6	No	<0.8	-	-	-	<3	<3.4	12.5	No	-	<2.9	<0.84
C-14	Bq/L	6.7 to 18	<18	<18	0	No	<18	<18	0	No	<6.7	<6.7	0	No	<10	<10	0	No	<6.8	<6.9	1.5	No	-	<8.2	<8.3
Chlorine 36	Bq/L	0.032 to 0.038	<0.038	-	-	-	<0.032	-	-	-	<0.036	-	-	-	<0.033	-	-	-	-	-	-	-	-	-	-
Co-60	Bq/L	0.19 to 0.55	<0.4	<0.38	5.1	No	<0.39	<0.19	69.0	No	<0.33	<0.21	44.4	No	<0.39	<0.37	5.3	No	<0.37	<0.55	39.1	No	-	<0.42	<0.44
Cs-137	Bq/L	0.19 to 0.37	<0.37	<0.33	11.4	No	<0.36	<0.19	61.8	No	<0.28	<0.2	33.3	No	<0.37	<0.35	5.6	No	<0.36	<0.26	32.3	No	-	<0.36	<0.33
Gross Alpha	Bq/L	0.059 to 0.096	<0.07	<0.086	20.5	No	<0.076	<0.072	5.4	No	<0.077	<0.096	22.0	No	<0.072	<0.061	16.5	No	<0.059	<0.061	3.3	No	-	<0.078	<0.071
Gross Beta	Bq/L	0.085 to 0.14	0.1	<0.14	33.3	No	<0.12	<0.11	8.7	No	<0.11	<0.11	0	No	<0.085	0.085	0	No	<0.087	<0.085	2.3	No	-	<0.11	<0.11
H-3	Bq/L	11 to 13	<13	<13	0	No	<13	<13	0	No	<11	<11	0	No	<12	<12	0	No	<11	<11	0	No	-	<13	<13
Iodine-129	Bq/L	0.16 to 0.21	<0.2	<0.18	10.5	No	<0.19	<0.18	5.4	No	<0.18	<0.19	5.4	No	<0.17	<0.16	6.1	No	<0.19	<0.18	5.4	No	-	<0.21	<0.2
K-40	Bq/L	4.1 to 6.6	<6	<6.4	6.5	No	<5.8	<4.2	32	No	<6.5	<4.1	45.3	No	<5.7	<5.5	3.6	No	<5.2	<5	3.9	No	-	<6.6	<6.3
Neptunium-237	Bq/L	0.0031 to 0.0035	<0.0031	-	-	-	<0.0035	-	-	-	<0.0035	-	-	-	<0.0031	-	-	-	-	-	-	-	-	-	-
Pu-238	Bq/L	0.00019 to 0.0012	0.00035	-	-	-	<0.00085	-	-	-	0.00032	-	-	-	<0.0012	-	-	-	-	-	-	-	-	-	-
Pu-239	Bq/L	0.00019 to 0.001	0.00028	-	-	-	<0.00058	-	-	-	<0.001	-	-	-	<0.00092	-	-	-	-	-	-	-	-	-	-
Ra-226	Bq/L	0.0041 to 0.012	<0.0054	<0.0063	15.4	No	<0.0063	<0.0099	44.4	No	0.0092	<0.0041	76.7	No	<0.0068	<0.0086	23.4	No	<0.012	<0.0067	56.7	No	-	<0.0059	<0.007
Ru-106	Bq/L	1.7 to 3.6																							

APPENDIX A, TABLE 1

Water chemistry QAQC results, summer 2021.

Analyte	Summer 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-03				UWB-09				Blanks		
			ML2-A SURF				MR2-A				RR1-A SURF				P3-A				RP1-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Semi-Volatile Organic Compounds																									
1,2,4-Trichlorobenzene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
2,4,5-Trichlorophenol	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
2,4,6-Trichlorophenol	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
2,4+2,6-Dinitrotoluene	µg/L	0.566	-	-	-	-	-	-	-	-	-	-	-	-	<0.57	<0.57	0	No	<0.57	<0.57	0	No	-	<0.57	<0.57
2,4-Dichlorophenol	µg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.3	0	No	<0.3	<0.3	0	No	-	<0.3	<0.3
2,4-Dimethylphenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
2,4-Dinitrophenol	µg/L	1	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	0	No	<1	<1	0	No	-	<1	<1
2,4-Dinitrotoluene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
2,6-Dinitrotoluene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
2-Chlorophenol	µg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.3	0	No	<0.3	<0.3	0	No	-	<0.3	<0.3
3,3'-Dichlorobenzidine	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
4-Chloroaniline	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Biphenyl	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Bis(2-chloroethyl)ether	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Bis(2-chloroisopropyl)ether	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Bis(2-ethylhexyl)phthalate	µg/L	2	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	0	No	<2	<2	0	No	-	<2	<2
Diethylphthalate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Dimethylphthalate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Pentachlorophenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
Phenol	µg/L	0.5 to 1	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<1	<1

RDL = reportable detection limit; dash = no data.
Relative percent difference (RPD) = | ((Duplicate - Sample)/((Duplicate + Sample)/2))*100 |.
For calculation of RPDs, values <RDL were set equal to the RDL; Grayed cells indicate exceedances of data quality control limits (RPD > 20%, with both samples >5*RDL).
¹Ranking of a "yes" used only if either value is >5*RDL.

APPENDIX A, TABLE 2

Water chemistry QAQC results, fall 2021.

Analyte	Fall 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A				MR2-A				RR1-A				RP1-A				P3-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Bacteriological Tests																									
Escherichia Coli	CFU/100mL	1	33	31	6.3	Yes	63	74	16.1	Yes	108	91	17.1	Yes	19	24	23.3	Yes	33	23	35.7	Yes	-	<1	-
Total Coliforms	CFU/100mL	1	>200	>200	0	Yes	>200	>200	0	Yes	>200	>200	0	Yes	>200	>200	0	Yes	>200	>200	0	Yes	-	26	-
Anions, Nutrients, and Physical Properties																									
Alkalinity, Total (as CaCO3)	mg/L	1	7.6	7.8	2.6	Yes	4.4	3.8	14.6	No	4.7	5.2	10.1	No	23.8	24.1	1.3	Yes	4.4	4.3	2.3	No	-	<1	<1
Ammonia, Total (as N)	mg/L	0.01	<0.01	0.018	57.1	No	0.031	0.027	13.8	No	0.016	0.138	158.4	No	0.019	0.011	53.3	No	0.023	0.018	24.4	No	-	0.02	<0.01
Bicarbonate (HCO3)	mg/L	1.2	9.3	9.5	2.1	Yes	5.4	4.6	16.0	No	5.7	6.3	10.0	No	29	29.4	1.4	Yes	5.4	5.2	3.8	No	-	<1.2	<1.2
Biochemical Oxygen Demand	mg/L	2	<2	<2	0	No	<2	<2	0	No	2	<2	0	No	<2	<2	0	No	<2	<2	0	No	-	<2	<2
Bromide (Br)	mg/L	0.1	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	-	<0.1	<0.1
Carbonate (CO3)	mg/L	0.6	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	-	<0.6	<0.6
Chloride (Cl)	mg/L	0.5	0.73	0.65	11.6	No	0.65	0.65	0	No	7.33	7.67	4.5	Yes	<0.5	<0.5	0	No	0.66	0.67	1.5	No	-	<0.5	<0.5
Conductivity	umhos/cm	1	25.2	25.5	1.2	Yes	21.8	22	0.9	Yes	56.6	57.7	1.9	Yes	53.8	54.1	0.6	Yes	22	22	0	Yes	-	1.6	<1
Cyanide, Total	mg/L	0.002	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	-	<0.002	<0.002
Dissolved Organic Carbon	mg/L	0.5	13.1	12.6	3.9	Yes	22.8	21.5	5.9	Yes	35.9	38.1	5.9	Yes	18.5	17.8	3.9	Yes	20.9	21.5	2.8	Yes	<0.5	<0.5	<0.5
Fluoride (F)	mg/L	0.02	0.039	0.039	0	No	0.038	0.038	0	No	0.021	0.021	0	No	0.03	0.031	3.3	No	0.024	0.025	4.1	No	-	<0.02	<0.02
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	-	<0.34	<0.34
Nitrate (as N)	mg/L	0.02	<0.02	<0.02	0	No	<0.02	<0.02	0	No	0.087	0.084	3.5	No	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Nitrate and Nitrite as N	mg/L	0.07	<0.07	<0.07	0	No	<0.07	<0.07	0	No	0.087	0.084	3.5	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	-	<0.07	<0.07
Nitrite (as N)	mg/L	0.01	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	-	<0.01	<0.01
pH	pH units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate (SO4)	mg/L	0.3	1.05	0.95	10.0	No	0.88	0.89	1.1	No	2.13	2	6.3	Yes	0.56	0.61	8.5	No	0.43	0.43	0	No	-	<0.3	<0.3
Total Dissolved Solids	mg/L	4 to 13.33	38.1	37.3	2.1	Yes	60.4	59.8	1.0	Yes	99	110	10.5	Yes	61.5	61.5	0	Yes	51.8	48.6	6.4	Yes	-	<4	<4
Total Inorganic Carbon	mg/L	0.5	0.65	0.85	26.7	No	<0.5	<0.5	0	No	<0.5	<0.5	0	No	3.91	3.45	12.5	Yes	0.69	<0.5	31.9	No	-	<0.5	<0.5
Total Kjeldahl Nitrogen	mg/L	0.2	0.41	0.46	11.5	No	0.41	0.76	59.8	No	1.14	1.01	12.1	Yes	1.12	1.09	2.7	Yes	0.31	0.35	12.1	No	-	<0.2	<0.2
Total Organic Carbon	mg/L	0.5	12.2	12	1.7	Yes	21.3	21.3	0	Yes	35.6	36	1.1	Yes	18	17.8	1.1	Yes	21.4	21.1	1.4	Yes	-	<0.5	0.55
Total Suspended Solids	mg/L	3	3	<3	0	No	3.5	3.1	12.1	No	3.7	3.3	11.4	No	4	3.6	10.5	No	<3	3.1	3.3	No	-	<3	<3
Turbidity	NTU	0.1	2.04	2.05	0.5	Yes	2.18	2.26	3.6	Yes	1.72	1.79	4.0	Yes	2.5	2.6	3.9	Yes	2.24	2.13	5.0	Yes	-	0.12	<0.1
Phosphorus (P)-Total (EPA)	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	-	<0.05	<0.05
Phosphorus (P)-Total (APHA)	mg/L	0.003	0.0139	0.0143	2.8	No	0.0258	0.0209	21.0	Yes	0.0269	0.0257	4.6	Yes	0.0242	0.026	7.2	Yes	0.0176	0.0183	3.9	Yes	-	<0.003	<0.003
Other																									
Chlorophyll a	µg/L	0.1	6.36	5.83	8.7	Yes	3.69	3.6	2.5	Yes	1.2	1.16	3.4	Yes	16.2	17.9	10.0	Yes	3.16	3.56	11.9	Yes	-	<0.1	-
Herbicides and Pesticides																									
AMPA	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	-	-	-	-	-	-	<0.5
Glyphosate	µg/L	0.2 to 5	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<5	<5	0	No	-	-	<0.2
Metals																									
Aluminum (Al)-Dissolved	mg/L	0.001	0.112	0.1	11.3	Yes	0.34	0.326	4.2	Yes	0.381	0.408	6.8	Yes	0.0302	0.0301	0.3	Yes	0.283	0.251	12.0	Yes	<0.001	<0.001	<0.001
Aluminum (Al)-Total	mg/L	0.003	0.185	0.187	1.1	Yes	0.355	0.333	6.4	Yes	0.421	0.436	3.5	Yes	0.0554	0.0511	8.1	Yes	0.375	0.288	26.2	Yes	-	<0.003	<0.003
Antimony (Sb)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Antimony (Sb)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Arsenic (As)-Dissolved	mg/L	0.0001	0.00036	0.00037	2.7	No	0.00047	0.00043	8.9	No	0.0005	0.0005	0	No	0.00036	0.00034	5.7	No	0.00048	0.00045	6.5	No	<0.0001	<0.0001	<0.0001
Arsenic (As)-Total	mg/L	0.0001	0.0004	0.00041	2.5	No	0.0005	0.00043	15.1	No	0.00056	0.00056	0	Yes	0.00037	0.00037	0	No	0.00058	0.00048	18.9	No	-	<0.0001	<0.0001
Barium (Ba)-Dissolved	mg/L	0.0001	0.00498	0.00511	2.6	Yes	0.00681	0.00667	2.1	Yes	0.00942	0.00988	4.8	Yes	0.00594	0.00602	1.3	Yes	0.0055	0.00498	9.9	Yes	<0.0001	<0.0001	<0.0001
Barium (Ba)-Total	mg/L	0.0001	0.00618	0.00618	0	Yes	0.00717	0.00723	0.8	Yes	0.0101	0.0104	2.9	Yes	0.0069	0.007	1.4	Yes	0.00611	0.0057	6.9	Yes	-	<0.0001	<0.0001
Beryllium (Be)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Beryllium (Be)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Bismuth (Bi)-Dissolved	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Bismuth (Bi)-Total	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005													

APPENDIX A, TABLE 2

Water chemistry QAQC results, fall 2021.

Analyte	Fall 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A				MR2-A				RR1-A				RP1-A				P3-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals																									
Chromium (Cr)-Total	mg/L	0.0001	0.00038	0.00036	5.4	No	0.00056	0.0005	11.3	No	0.00068	0.00065	4.5	Yes	0.00023	0.00016	35.9	No	0.00062	0.00046	29.6	No	-	<0.0001	<0.0001
Chromium (III)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	0.00053	0.00054	1.9	No	<0.0005	0.00091	58.2	No	0.00051	<0.0005	2.0	No	<0.0005	<0.0005	<0.0005
Chromium (III)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Chromium (VI)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Chromium, Hexavalent	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	0.00066	<0.0005	27.6	No	<0.0005	<0.0005	0	No	0.00054	0.00051	5.7	No	-	<0.0005	<0.0005
Cobalt (Co)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	0.00027	0.00027	0	No	0.00029	0.0003	3.4	No	<0.0001	<0.0001	0	No	0.0002	0.00016	22.2	No	<0.0001	<0.0001	<0.0001
Cobalt (Co)-Total	mg/L	0.0001	0.00011	0.00011	0	No	0.0003	0.00028	6.9	No	0.00032	0.00033	3.1	No	<0.0001	<0.0001	0	No	0.00026	0.00019	31.1	No	-	<0.0001	<0.0001
Copper (Cu)-Dissolved	mg/L	0.0002	0.00582	0.00099	141.9	No	0.00091	0.00088	3.4	No	0.00118	0.00121	2.5	Yes	0.00034	0.00034	0	No	0.00075	0.00053	34.4	No	0.0005	0.00045	<0.0002
Copper (Cu)-Total	mg/L	0.0005	0.00091	0.00088	3.4	No	0.00092	0.0009	2.2	No	0.00138	0.00133	3.7	No	0.00091	<0.0005	58.2	No	0.0008	0.00078	2.5	No	-	0.00063	<0.0005
Iron (Fe)-Dissolved	mg/L	0.01	0.23	0.211	8.6	Yes	0.606	0.57	6.1	Yes	0.858	0.875	2.0	Yes	0.053	0.056	5.5	Yes	0.782	0.677	14.4	Yes	<0.01	<0.01	<0.01
Iron (Fe)-Total	mg/L	0.01	0.441	0.435	1.4	Yes	0.659	0.612	7.4	Yes	0.925	0.992	7.0	Yes	0.148	0.142	4.1	Yes	1.05	0.804	26.5	Yes	-	<0.01	<0.01
Lead (Pb)-Dissolved	mg/L	0.00005	0.00021	0.000081	88.7	No	0.000202	0.000191	5.6	No	0.000262	0.000283	7.7	Yes	<0.00005	<0.00005	0	No	0.000365	0.000254	35.9	Yes	<0.00005	<0.00005	<0.00005
Lead (Pb)-Total	mg/L	0.00005	0.00014	0.000136	2.9	No	0.000227	0.000233	2.6	No	0.00034	0.00031	9.2	Yes	<0.00005	0.000052	3.9	No	0.000323	0.000293	9.7	Yes	-	<0.00005	<0.00005
Lithium (Li)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	0.0011	<0.001	9.5	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Lithium (Li)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Magnesium (Mg)-Dissolved	mg/L	0.005	0.675	0.713	5.5	Yes	0.755	0.777	2.9	Yes	0.792	0.813	2.6	Yes	1.58	1.6	1.3	Yes	0.712	0.676	5.2	Yes	<0.005	<0.005	<0.005
Magnesium (Mg)-Total	mg/L	0.005	0.788	0.787	0.1	Yes	0.822	0.775	5.9	Yes	0.815	0.859	5.3	Yes	1.62	1.62	0	Yes	0.753	0.707	6.3	Yes	-	<0.005	<0.005
Manganese (Mn)-Dissolved	mg/L	0.0001	0.00863	0.00791	8.7	Yes	0.026	0.0274	5.2	Yes	0.0271	0.027	0.4	Yes	0.00105	0.00117	10.8	Yes	0.0188	0.0167	11.8	Yes	<0.0001	<0.0001	<0.0001
Manganese (Mn)-Total	mg/L	0.0001	0.0338	0.0332	1.8	Yes	0.0322	0.03	7.1	Yes	0.0298	0.0316	5.9	Yes	0.0304	0.0309	1.6	Yes	0.023	0.0191	18.5	Yes	-	<0.0001	<0.0001
Mercury (Hg)-Dissolved	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	0.000008	0.000008	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	<0.000005
Mercury (Hg)-Total	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	0.0000096	0.0000078	20.7	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	-	<0.000005	<0.000005
Molybdenum (Mo)-Dissolved	mg/L	0.00005	0.000326	0.000298	9.0	Yes	0.000157	0.000124	23.5	No	0.000062	0.000058	6.7	No	0.00006	0.000067	11.0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Molybdenum (Mo)-Total	mg/L	0.00005	0.000371	0.000346	7.0	Yes	0.000126	0.000139	9.8	No	0.000091	0.000066	31.8	No	0.000056	0.00006	6.9	No	<0.00005	<0.00005	0	No	-	<0.00005	<0.00005
Nickel (Ni)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00056	0.00054	3.6	No	0.00062	0.00061	1.6	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Nickel (Ni)-Total	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00053	0.00063	17.2	No	0.00077	0.00076	1.3	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Phosphorus (P)-Dissolved	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	<0.05
Potassium (K)-Dissolved	mg/L	0.05	0.388	0.396	2.0	Yes	0.603	0.569	5.8	Yes	0.985	1.03	4.5	Yes	0.628	0.64	1.9	Yes	0.816	0.766	6.3	Yes	<0.05	<0.05	<0.05
Potassium (K)-Total	mg/L	0.05	0.426	0.419	1.7	Yes	0.588	0.552	6.3	Yes	0.988	1.05	6.1	Yes	0.635	0.637	0.3	Yes	0.843	0.822	2.5	Yes	-	<0.05	<0.05
Rhodium (Rh)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Rhodium (Rh)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Rubidium (Rb)-Dissolved	mg/L	0.0002	0.00127	0.00143	11.9	Yes	0.00204	0.002	2.0	Yes	0.00308	0.00339	9.6	Yes	0.00132	0.00127	3.9	Yes	0.00254	0.00233	8.6	Yes	<0.0002	<0.0002	<0.0002
Rubidium (Rb)-Total	mg/L	0.0002	0.0015	0.00147	2.0	Yes	0.00196	0.00197	0.5	Yes	0.00319	0.00357	11.2	Yes	0.00147	0.00132	10.8	Yes	0.00276	0.00263	4.8	Yes	-	<0.0002	<0.0002
Ruthenium (Ru)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Ruthenium (Ru)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0																

APPENDIX A, TABLE 2

Water chemistry QAQC results, fall 2021.

Analyte	Fall 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A				MR2-A				RR1-A				RP1-A				P3-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals																									
Tungsten (W)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Uranium (U)-Dissolved	mg/L	0.00001	0.000095	0.000097	2.1	Yes	0.000133	0.000122	8.6	Yes	0.000114	0.00011	3.6	Yes	<0.00001	<0.00001	0	No	0.00007	0.000069	1.4	Yes	<0.00001	<0.00001	<0.00001
Uranium (U)-Total	mg/L	0.00001	0.000106	0.000099	6.8	Yes	0.000133	0.000134	0.7	Yes	0.000131	0.000126	3.9	Yes	<0.00001	<0.00001	0	No	0.000073	0.000071	2.8	Yes	-	<0.00001	<0.00001
Vanadium (V)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00078	0.00074	5.3	No	0.00085	0.00091	6.8	No	<0.0005	<0.0005	0	No	0.00066	0.00054	20	No	<0.0005	<0.0005	<0.0005
Vanadium (V)-Total	mg/L	0.0005	0.00056	0.00057	1.8	No	0.00091	0.00084	8.0	No	0.00103	0.00107	3.8	No	<0.0005	<0.0005	0	No	0.00092	0.00075	20.4	No	-	<0.0005	<0.0005
Zinc (Zn)-Dissolved	mg/L	0.001	0.0044	<0.001	125.9	No	0.0027	0.0031	13.8	No	0.004	0.0039	2.5	No	<0.001	0.0011	9.5	No	0.0019	0.0023	19.0	No	<0.001	<0.001	<0.001
Zinc (Zn)-Total	mg/L	0.003	<0.003	<0.003	0	No	<0.003	<0.003	0	No	0.0043	0.0045	4.5	No	<0.003	<0.003	0	No	<0.003	<0.003	0	No	-	<0.003	<0.003
Zirconium (Zr)-Dissolved	mg/L	0.0002	0.00022	0.00022	0	No	0.00034	0.00028	19.4	No	0.00033	0.00039	16.7	No	<0.0002	<0.0002	0	No	0.0003	0.00028	6.9	No	<0.0002	<0.0002	<0.0002
Zirconium (Zr)-Total	mg/L	0.0002	0.0002	<0.0002	0	No	0.00028	0.00027	3.6	No	0.00034	0.00028	19.4	No	<0.0002	<0.0002	0	No	0.00027	0.00025	7.7	No	-	<0.0002	<0.0002
Other																									
Iodide (I)	mg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																									
1+2-Methylnaphthalenes	µg/L	0.0283	-	-	-	-	-	-	-	-	-	-	-	-	<0.028	<0.028	0	No	<0.028	<0.028	0	No	-	-	<0.028
1-Methylnaphthalene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
2-Methylnaphthalene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Acenaphthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Acenaphthylene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Benzo(a)anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Benzo(a)pyrene	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	0	No	<0.01	<0.01	0	No	-	-	<0.01
Benzo(b&j)fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Benzo(g,h,i)perylene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Benzo(k)fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Chrysene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Dibenz(a,h)anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Fluorene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Indeno(1,2,3-cd)pyrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Naphthalene	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0	No	<0.05	<0.05	0	No	-	-	<0.05
Phenanthrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Pyrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	-	<0.02
Radionuclides																									
C-14	Bq/L	6.4 to 19	<7.8	<7.4	5.3	No	<6.4	<7.3	13.1	No	<8.5	<6.8	22.2	No	<7.9	<6.7	16.4	No	<19	<19	0	No	-	<7.4	<7.4
Chlorine 36	Bq/L	0.13 to 0.23	<0.14	-	-	-	<0.15	-	-	-	<0.14	-	-	-	-	-	-	-	<0.23	-	-	-	-	<0.13	<0.13
Co-60	Bq/L	0.29 to 0.43	<0.32	<0.29	9.8	No	<0.36	<0.3	18.2	No	<0.38	<0.36	5.4	No	<0.37	<0.41	10.3	No	<0.43	<0.33	26.3	No	-	<0.41	<0.32
Cs-137	Bq/L	0.25 to 0.37	<0.25	<0.25	0	No	<0.36	<0.36	0	No	<0.32	<0.37	14.5	No	<0.32	<0.32	0	No	<0.36	<0.34	5.7	No	-	<0.36	<0.36
Gross Alpha	Bq/L	0.059 to 0.092	<0.068	<0.067	1.5	No	0.084	0.073	14.0	No	0.059	<0.092	43.7	No	<0.078	<0.086	9.8	No	<0.076	<0.072	5.4	No	-	<0.06	<0.075
Gross Beta	Bq/L	0.099 to 0.11	<0.1	<0.11	9.5	No	0.11	<0.11	0	No	<0.1	<0.11	9.5	No	<0.11	0.11	0	No	<0.11	0.14	24.0	No	-	<0.1	<0.11
H-3	Bq/L	12 to 13	<12	<12	0	No	<12	<12	0	No	<12	<12	0	No	<12	<12	0	No	<12	<13	8.0	No	-	<12	<12
Iodine-129	Bq/L	0.16 to 0.3	0.24	<0.2	18.2	No	<0.19	<0.19	0	No	<0.18	<0.17	5.7	No	<0.26	<0.27	3.8	No	<0.27	<0.3	10.5	No	-	<0.2	<0.17
K-40	Bq/L	4.7 to 7.3	<5.9	<4.7	22.6	No	<5.5	<5	9.5	No	<5.5	<5.7	3.6	No	<5.2	<5.6	7.4	No	<7.3	<5.6	26.4	No	-	<5.2	<4.9
Neptunium-237	Bq/L	0.0013 to 0.0035	<0.0025	-	-	-	0.0015	-	-	-	<0.0027	-	-	-	-	-	-	-	<0.0035	-	-	-	-	<0.0028	<0.0031
Pu-238	Bq/L	0.00034 to 0.0017	<0.0007	-	-	-	<0.00089	-	-	-	<0.0012	-	-	-	-	-	-	-	<0.00034	-	-	-	-	<0.0017	<0.0013
Pu-239	Bq/L	0.00034 to 0.0022	<0.0007	-	-	-	<0.0022	-	-	-	<0.0014	-	-	-	-	-	-	-	0.00038	-	-	-	-	0.0011	<0.00065
Ra-226	Bq/L	0.0048 to 0.0085	<0.0055	<0.0051	7.5	No	<0.005	<0.0065	26.1	No	<0.0085	<0.0076	11.2	No	<0.0085	<0.0062	31.3	No	<0.0048	<0.006	22.2	No	-	<0.0061	<0.0053
Ru-106	Bq/L	2.4 to 3.6	<2.5	<2.4	4.1	No	<3.1	<2.8	10.2	No	<3.6	<3.1	14.9	No	<3	<3.1	3.3	No	<3.5	<2.8	22.2	No	-	<3.3	<2.9
Sr-90	Bq/L	0.012 to 0.02	0.019	0.2	165.3	No	<0.016	<0.016	0	No	<0.017	<0.013	26.7												

APPENDIX A, TABLE 2

Water chemistry QAQC results, fall 2021.

Analyte	Fall 2021																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A				MR2-A				RR1-A				RP1-A				P3-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Semi-Volatile Organic Compounds																									
1,2,4-Trichlorobenzene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
2,4,5-Trichlorophenol	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	-	<0.2
2,4,6-Trichlorophenol	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	-	<0.2
2,4+2,6-Dinitrotoluene	µg/L	0.566	-	-	-	-	-	-	-	-	-	-	-	-	<0.57	<0.57	0	No	<0.57	<0.57	0	No	-	-	<0.57
2,4-Dichlorophenol	µg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.3	0	No	<0.3	<0.3	0	No	-	-	<0.3
2,4-Dimethylphenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	-	<0.5
2,4-Dinitrophenol	µg/L	1	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	0	No	<1	<1	0	No	-	-	<1
2,4-Dinitrotoluene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
2,6-Dinitrotoluene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
2-Chlorophenol	µg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.3	0	No	<0.3	<0.3	0	No	-	-	<0.3
3,3'-Dichlorobenzidine	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
4-Chloroaniline	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
Biphenyl	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
Bis(2-chloroethyl)ether	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
Bis(2-chloroisopropyl)ether	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	-	<0.4
Bis(2-ethylhexyl)phthalate	µg/L	2	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	0	No	<2	<2	0	No	-	-	<2
Diethylphthalate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	-	<0.2
Dimethylphthalate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	-	<0.2
Pentachlorophenol	µg/L	0.5 to 1.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<1.3	<0.5	88.9	No	-	-	<0.5
Phenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	-	<0.5

RDL = reportable detection limit; dash = no data.

Relative percent difference (RPD) = | ((Duplicate - Sample)/((Duplicate + Sample)/2))*100 |.

For calculation of RPDs, values <RDL were set equal to the RDL; Grayed cells indicate exceedances of data quality control limits (RPD > 20%, with both samples >5*RDL).

¹Ranking of a "yes" used only if either value is >5*RDL.

APPENDIX A, TABLE 3

Water chemistry QAQC results, winter 2022.

Analyte	Winter 2022								
	Units	RDL	UWB-03				Blanks		
			P3				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Bacteriological Tests									
Escherichia Coli	CFU/100mL	1	<1	<1	0	No	-	-	-
Total Coliforms	CFU/100mL	1	12	9	28.6	Yes	-	-	-
Anions, Nutrients, and Physical Properties									
Alkalinity, Total (as CaCO3)	mg/L	1	4.5	3.9	14.3	No	-	<1	<1
Ammonia, Total (as N)	mg/L	0.01	0.078	0.079	1.3	Yes	-	<0.01	0.011
Bicarbonate (HCO3)	mg/L	1.2	5.5	4.8	13.6	No	-	<1.2	<1.2
Biochemical Oxygen Demand	mg/L	2	<2	<2	0	No	-	<2	<2
Bromide (Br)	mg/L	0.1	<0.1	<0.1	0	No	-	<0.1	<0.1
Carbonate (CO3)	mg/L	0.6	<0.6	<0.6	0	No	-	<0.6	<0.6
Chloride (Cl)	mg/L	0.5	0.98	1.01	3.0	No	-	<0.5	<0.5
Conductivity	umhos/cm	1	25.7	25.9	0.8	Yes	-	<1	<1
Cyanide, Total	mg/L	0.002	<0.002	<0.002	0	No	-	<0.002	<0.002
Dissolved Organic Carbon	mg/L	0.5	27.5	27.4	0.4	Yes	<0.5	<0.5	<0.5
Fluoride (F)	mg/L	0.02	0.026	0.027	3.8	No	-	<0.02	<0.02
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	0	No	-	<0.34	<0.34
Nitrate (as N)	mg/L	0.02	0.108	0.22	68.3	Yes	-	<0.02	<0.02
Nitrate and Nitrite as N	mg/L	0.07	0.108	0.22	68.3	No	-	<0.07	<0.07
Nitrite (as N)	mg/L	0.01	<0.01	<0.01	0	No	-	<0.01	<0.01
pH	pH units	-	-	-	-	-	-	-	-
Sulphate (SO4)	mg/L	0.3	0.81	0.77	5.1	No	-	<0.3	<0.3
Total Dissolved Solids	mg/L	4	54.8	62.6	13.3	Yes	-	<4	<4
Total Inorganic Carbon	mg/L	0.5	0.59	<0.5	16.5	No	-	<0.5	<0.5
Total Kjeldahl Nitrogen	mg/L	0.2	0.67	0.64	4.6	No	-	<0.2	<0.2
Total Organic Carbon	mg/L	0.5	25.9	25.6	1.2	Yes	-	<0.5	<0.5
Total Suspended Solids	mg/L	3	<3	<3	0	No	-	<3	<3
Turbidity	NTU	0.1	1.16	1.12	3.5	Yes	-	<0.1	<0.1
Phosphorus (P)-Total (EPA)	mg/L	0.05	<0.05	<0.05	0	No	-	<0.05	<0.05
Phosphorus (P)-Total (APHA)	mg/L	0.003	0.0164	0.0153	6.9	Yes	-	<0.003	<0.003
Other									
Chlorophyll a	µg/L	0.1	0.31	0.31	0	No	-	-	-
Herbicides and Pesticides									
AMPA	µg/L	0.5	<0.5	<0.5	0	No	-	<0.5	<0.5
Glyphosate	µg/L	0.2	<0.2	<0.2	0	No	-	<0.2	<0.2
Metals									
Aluminum (Al)-Dissolved	mg/L	0.001	0.408	0.41	0.5	Yes	<0.001	<0.001	<0.001
Aluminum (Al)-Total	mg/L	0.003	0.419	0.424	1.2	Yes	-	<0.003	<0.003
Antimony (Sb)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Antimony (Sb)-Total	mg/L	0.0001	<0.0001	0.00011	9.5	No	-	<0.0001	<0.0001
Arsenic (As)-Dissolved	mg/L	0.0001	0.0005	0.00048	4.1	No	<0.0001	<0.0001	<0.0001
Arsenic (As)-Total	mg/L	0.0001	0.0005	0.00055	9.5	No	-	<0.0001	<0.0001
Barium (Ba)-Dissolved	mg/L	0.0001	0.00689	0.00679	1.5	Yes	<0.0001	<0.0001	<0.0001
Barium (Ba)-Total	mg/L	0.0001	0.00695	0.00702	1.0	Yes	-	0.00014	<0.0001
Beryllium (Be)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Beryllium (Be)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Bismuth (Bi)-Dissolved	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Bismuth (Bi)-Total	mg/L	0.00005	<0.00005	<0.00005	0	No	-	<0.00005	<0.00005
Boron (B)-Dissolved	mg/L	0.01	<0.01	<0.01	0	No	<0.01	<0.01	<0.01
Boron (B)-Total	mg/L	0.01	<0.01	<0.01	0	No	-	<0.01	<0.01
Cadmium (Cd)-Dissolved	mg/L	0.000005	0.0000167	0.000019	12.9	No	<0.000005	<0.000005	<0.000005
Cadmium (Cd)-Total	mg/L	0.000005	0.000021	0.0000162	25.8	No	-	<0.000005	<0.000005
Calcium (Ca)-Dissolved	mg/L	0.05	2.62	2.65	1.1	Yes	<0.05	<0.05	<0.05
Calcium (Ca)-Total	mg/L	0.05	2.59	2.62	1.2	Yes	-	0.053	<0.05
Cesium (Cs)-Dissolved	mg/L	0.00001	0.000022	0.000021	4.7	No	<0.00001	<0.00001	<0.00001
Cesium (Cs)-Total	mg/L	0.00001	0.000025	0.000024	4.1	No	-	<0.00001	<0.00001

APPENDIX A, TABLE 3

Water chemistry QAQC results, winter 2022.

Analyte	Winter 2022								
	Units	RDL	UWB-03				Blanks		
			P3				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals									
Chromium (Cr)-Dissolved	mg/L	0.0001	0.00058	0.00062	6.7	Yes	<0.0001	<0.0001	<0.0001
Chromium (Cr)-Total	mg/L	0.0001	0.00066	0.00068	3.0	Yes	-	<0.0001	<0.0001
Chromium (III)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Chromium (III)-Total	mg/L	0.001	<0.001	<0.001	0	No	-	<0.001	<0.001
Chromium (VI)-Dissolved	mg/L	0.0005	0.00058	0.00055	5.3	No	<0.0005	<0.0005	<0.0005
Chromium, Hexavalent	mg/L	0.0005	0.00053	<0.0005	5.8	No	-	<0.0005	<0.0005
Cobalt (Co)-Dissolved	mg/L	0.0001	0.00032	0.00034	6.1	No	<0.0001	<0.0001	<0.0001
Cobalt (Co)-Total	mg/L	0.0001	0.00032	0.00035	9.0	No	-	<0.0001	<0.0001
Copper (Cu)-Dissolved	mg/L	0.0002	0.00076	0.00086	12.3	No	<0.0002	<0.0002	<0.0002
Copper (Cu)-Total	mg/L	0.0005	0.00092	0.00075	20.4	No	-	<0.0005	<0.0005
Iron (Fe)-Dissolved	mg/L	0.01	0.882	0.943	6.7	Yes	<0.01	<0.01	<0.01
Iron (Fe)-Total	mg/L	0.01	0.948	0.956	0.8	Yes	-	<0.01	<0.01
Lead (Pb)-Dissolved	mg/L	0.00005	0.000331	0.000347	4.7	Yes	<0.00005	<0.00005	<0.00005
Lead (Pb)-Total	mg/L	0.00005	0.000359	0.000357	0.6	Yes	-	<0.00005	<0.00005
Lithium (Li)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Lithium (Li)-Total	mg/L	0.001	0.001	0.001	0	No	-	<0.001	<0.001
Magnesium (Mg)-Dissolved	mg/L	0.005	0.763	0.756	0.9	Yes	<0.005	<0.005	<0.005
Magnesium (Mg)-Total	mg/L	0.005	0.764	0.786	2.8	Yes	-	0.0109	<0.005
Manganese (Mn)-Dissolved	mg/L	0.0001	0.0288	0.0292	1.4	Yes	<0.0001	<0.0001	<0.0001
Manganese (Mn)-Total	mg/L	0.0001	0.0299	0.0285	4.8	Yes	-	0.00018	<0.0001
Mercury (Hg)-Dissolved	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	<0.000005
Mercury (Hg)-Total	mg/L	0.000005	<0.000005	<0.000005	0	No	-	<0.000005	<0.000005
Molybdenum (Mo)-Dissolved	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Molybdenum (Mo)-Total	mg/L	0.00005	<0.00005	<0.00005	0	No	-	<0.00005	<0.00005
Nickel (Ni)-Dissolved	mg/L	0.0005	<0.0005	0.0005	0	No	<0.0005	<0.0005	<0.0005
Nickel (Ni)-Total	mg/L	0.0005	0.00052	0.00054	3.8	No	-	<0.0005	<0.0005
Phosphorus (P)-Dissolved	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	<0.05
Potassium (K)-Dissolved	mg/L	0.05	0.78	0.827	5.8	Yes	<0.05	<0.05	<0.05
Potassium (K)-Total	mg/L	0.05	0.776	0.843	8.3	Yes	-	<0.05	<0.05
Rhodium (Rh)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Rhodium (Rh)-Total	mg/L	0.001	<0.001	<0.001	0	No	-	<0.001	<0.001
Rubidium (Rb)-Dissolved	mg/L	0.0002	0.00228	0.00231	1.3	Yes	<0.0002	<0.0002	<0.0002
Rubidium (Rb)-Total	mg/L	0.0002	0.00231	0.00234	1.3	Yes	-	<0.0002	<0.0002
Ruthenium (Ru)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Ruthenium (Ru)-Total	mg/L	0.001	<0.001	<0.001	0	No	-	<0.001	<0.001
Samarium (Sm)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Samarium (Sm)-Total	mg/L	0.001	<0.001	<0.001	0	No	-	<0.001	<0.001
Selenium (Se)-Dissolved	mg/L	0.00005	0.000071	0.000099	32.9	No	<0.00005	<0.00005	<0.00005
Silver (Ag)-Total	mg/L	0.00001	<0.00001	<0.00001	0	No	-	<0.00001	<0.00001
Sodium (Na)-Dissolved	mg/L	0.05	1.33	1.37	3.0	Yes	<0.05	<0.05	<0.05
Sodium (Na)-Total	mg/L	0.05	1.37	1.4	2.2	Yes	-	0.111	<0.05
Strontium (Sr)-Dissolved	mg/L	0.0002	0.0107	0.0106	0.9	Yes	<0.0002	<0.0002	<0.0002
Strontium (Sr)-Total	mg/L	0.0002	0.0107	0.0108	0.9	Yes	-	<0.0002	<0.0002
Sulfur (S)-Dissolved	mg/L	0.5	<0.5	<0.5	0	No	<0.5	<0.5	<0.5
Sulfur (S)-Total	mg/L	0.5	<0.5	<0.5	0	No	-	<0.5	<0.5
Tellurium (Te)-Dissolved	mg/L	0.0002	<0.0002	<0.0002	0	No	<0.0002	<0.0002	<0.0002
Tellurium (Te)-Total	mg/L	0.0002	<0.0002	<0.0002	0	No	-	<0.0002	<0.0002
Thallium (Tl)-Dissolved	mg/L	0.00001	<0.00001	<0.00001	0	No	<0.00001	<0.00001	<0.00001
Thallium (Tl)-Total	mg/L	0.00001	<0.00001	<0.00001	0	No	-	<0.00001	<0.00001
Thorium (Th)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Thorium (Th)-Total	mg/L	0.0001	0.00012	0.00012	0	No	-	<0.0001	<0.0001
Tin (Sn)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Tin (Sn)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Titanium (Ti)-Dissolved	mg/L	0.0003	0.00457	0.00472	3.2	Yes	<0.0003	<0.0003	<0.0003

APPENDIX A, TABLE 3

Water chemistry QAQC results, winter 2022.

Analyte	Winter 2022								
	Units	RDL	UWB-03				Blanks		
			P3				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals									
Titanium (Ti)-Total	mg/L	0.0003	0.0051	0.00586	13.9	Yes	-	<0.0003	<0.0003
Tungsten (W)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Tungsten (W)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Uranium (U)-Dissolved	mg/L	0.00001	0.000091	0.000092	1.1	Yes	<0.00001	<0.00001	<0.00001
Uranium (U)-Total	mg/L	0.00001	0.000097	0.000096	1.0	Yes	-	<0.00001	<0.0000
Vanadium (V)-Dissolved	mg/L	0.0005	0.00077	0.00074	4.0	No	<0.0005	<0.0005	<0.0005
Vanadium (V)-Total	mg/L	0.0005	0.00082	0.00077	6.3	No	-	<0.0005	<0.0005
Zinc (Zn)-Dissolved	mg/L	0.001	0.0029	0.0036	21.5	No	<0.001	<0.001	<0.001
Zinc (Zn)-Total	mg/L	0.003	0.0031	0.0032	3.2	No	-	<0.003	<0.003
Zirconium (Zr)-Dissolved	mg/L	0.0002	0.00031	0.0003	3.3	No	<0.0002	<0.0002	<0.0002
Zirconium (Zr)-Total	mg/L	0.0002	0.00029	0.00028	3.5	No	-	<0.0002	<0.0002
Other									
Iodide (I)	mg/L	0.2	<0.2	<0.2	0	No	-	<0.2	<0.2
Polycyclic Aromatic Hydrocarbons									
1+2-Methylnaphthalenes	µg/L	0.0283	<0.028	<0.028	0	No	-	<0.028	<0.028
1-Methylnaphthalene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
2-Methylnaphthalene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Acenaphthene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Acenaphthylene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Anthracene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(a)anthracene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(a)pyrene	µg/L	0.01	<0.01	<0.01	0	No	-	<0.01	<0.01
Benzo(b&j)fluoranthene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(g,h,i)perylene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(k)fluoranthene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Chrysene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Dibenz(a,h)anthracene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Fluoranthene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Fluorene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Naphthalene	µg/L	0.05	<0.05	<0.05	0	No	-	<0.05	<0.05
Phenanthrene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Pyrene	µg/L	0.02	<0.02	<0.02	0	No	-	<0.02	<0.02
Radionuclides									
C-14	Bq/L	4.1 to 4.2	<4.1	<4.1	0	No	-	<4.1	<4.2
Chlorine 36	Bq/L	0.22 to 0.28	<0.28	-	-	-	-	<0.23	<0.22
Co-60	Bq/L	0.31 to 0.42	<0.36	<0.42	15.4	No	-	<0.31	<0.38
Cs-137	Bq/L	0.24 to 0.35	0.25	<0.35	33.3	No	-	<0.29	<0.32
Gross Alpha	Bq/L	0.072 to 0.09	<0.072	0.19	90.1	No	-	<0.086	<0.078
Gross Beta	Bq/L	0.12 to 0.13	0.17	0.37	74.1	No	-	<0.13	<0.12
H-3	Bq/L	12	<12	<12	0	No	-	<12	<12
Iodine-129	Bq/L	0.27 to 0.3	<0.3	<0.27	10.5	No	-	<0.28	<0.27
K-40	Bq/L	4.9 to 8.7	<5.6	<6.1	8.5	No	-	<4.9	<8.7
Neptunium-237	Bq/L	0.0013 to 0.003	0.0039	-	-	-	-	<0.003	0.0027
Pu-238	Bq/L	0.0014 to 0.0026	<0.0026	-	-	-	-	<0.0014	<0.0014
Pu-239	Bq/L	0.00053 to 0.0019	<0.0019	-	-	-	-	<0.00098	<0.00053
Ra-226	Bq/L	0.0077 to 0.013	<0.013	<0.012	8.0	No	-	<0.0078	<0.0077
Ru-106	Bq/L	2.8 to 3.1	<2.8	<3.1	10.2	No	-	<2.8	<3
Sr-90	Bq/L	0.017 to 0.018	<0.018	<0.018	0	No	-	<0.018	<0.017
Th-228	Bq/L	0.0055 to 0.0078	<0.0078	<0.0065	18.2	No	-	<0.0068	<0.0055
Th-230	Bq/L	0.0043 to 0.0054	<0.0054	<0.0047	13.9	No	-	<0.0048	<0.0043
Th-232	Bq/L	0.0015 to 0.0021	<0.002	<0.0021	4.9	No	-	<0.0019	<0.0015
U-234	Bq/L	0.0017 to 0.0036	0.0046	0.0043	6.7	No	-	<0.0017	<0.0021
U-235	Bq/L	0.0013 to 0.0042	0.0014	<0.0042	100.0	No	-	<0.0015	<0.0014

APPENDIX A, TABLE 3

Water chemistry QA/QC results, winter 2022.

Analyte	Winter 2022								
	Units	RDL	UWB-03				Blanks		
			P3				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Radionuclides									
U-238	Bq/L	0.0015 to 0.0049	<0.0033	<0.0049	39.0	No	-	<0.0015	<0.0015
Semi-Volatile Organic Compounds									
1,2,4-Trichlorobenzene	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
2,4,5-Trichlorophenol	µg/L	0.2 to 0.4	<0.2	<0.4	66.7	No	-	<0.2	<0.2
2,4,6-Trichlorophenol	µg/L	0.2 to 0.4	<0.2	<0.4	66.7	No	-	<0.2	<0.2
2,4+2,6-Dinitrotoluene	µg/L	0.566 to 1.13	<0.57	<1.1	63.5	No	-	<0.57	<0.57
2,4-Dichlorophenol	µg/L	0.3 to 0.6	<0.3	<0.6	66.7	No	-	<0.3	<0.3
2,4-Dimethylphenol	µg/L	0.5 to 1	<0.5	<1	66.7	No	-	<0.5	<0.5
2,4-Dinitrophenol	µg/L	2	<2	<2	0	No	-	<2	<2
2,4-Dinitrotoluene	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
2,6-Dinitrotoluene	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
2-Chlorophenol	µg/L	0.3 to 0.6	<0.3	<0.6	66.7	No	-	<0.3	<0.3
3,3'-Dichlorobenzidine	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
4-Chloroaniline	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
Biphenyl	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
Bis(2-chloroethyl)ether	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
Bis(2-chloroisopropyl)ether	µg/L	0.4 to 0.8	<0.4	<0.8	66.7	No	-	<0.4	<0.4
Bis(2-ethylhexyl)phthalate	µg/L	2 to 4	<2	<4	66.7	No	-	<2	<2
Diethylphthalate	µg/L	0.2 to 0.4	<0.2	<0.4	66.7	No	-	<0.2	<0.2
Dimethylphthalate	µg/L	0.2 to 0.4	<0.2	<0.4	66.7	No	-	<0.2	<0.2
Pentachlorophenol	µg/L	0.5 to 1	<0.5	<1	66.7	No	-	<0.5	<0.5
Phenol	µg/L	0.5 to 1	0.94	<1	6.2	No	-	0.97	<0.5

RDL = reportable detection limit; dash = no data.

Relative percent difference (RPD) = $|((\text{Duplicate} - \text{Sample})/((\text{Duplicate} + \text{Sample})/2)) * 100|$.

For calculation of RPDs, values <RDL were set equal to the RDL; Grayed cells indicate exceedances of data quality control limits (RPD > 20%, with both sample

¹Ranking of a "yes" used only if either value is >5*RDL.

APPENDIX A, TABLE 4

Water chemistry QAQC results, spring 2022.

Analyte	Spring 2022																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A		RPD (%)	>5*RDL ¹	MR2-A		RPD (%)	>5*RDL ¹	RR1-A		RPD (%)	>5*RDL ¹	RP1-A		RPD (%)	>5*RDL ¹	P3-A		RPD (%)	>5*RDL ¹	Filter	Field	Trip
Sample	Duplicate	Sample	Duplicate	Sample			Duplicate	Sample			Duplicate	Sample			Duplicate	Sample			Duplicate	Sample			Duplicate	FB-1A	WB-1A
Bacteriological Tests																									
Escherichia Coli	CFU/100mL	1	<1	<1	0	No	53	44	18.6	Yes	9	11	20.0	Yes	1	1	0	No	2	1	66.7	No	-	-	<1
Total Coliforms	CFU/100mL	1	28	19	38.3	Yes	>200	>200	0	Yes	>200	>200	0	Yes	79	77	2.6	Yes	79	68	15.0	Yes	-	-	<1
Anions, Nutrients, and Physical Properties																									
Alkalinity, Total (as CaCO3)	mg/L	1	5.2	5	3.9	No	4.1	4	2.5	No	5.2	3.8	31.1	No	23	22.7	1.3	Yes	4.5	2.8	46.6	No	-	<1	<1
Ammonia, Total (as N)	mg/L	0.01	0.047	0.01	129.8	No	0.033	0.02	49.1	No	0.014	0.047	108.2	No	0.03	0.037	20.9	No	0.044	0.022	66.7	No	-	<0.01	0.055
Bicarbonate (HCO3)	mg/L	1.2	6.3	6.1	3.2	Yes	5	4.9	2.0	No	6.3	4.6	31.2	No	28.1	27.7	1.4	Yes	5.5	3.4	47.2	No	-	<1.2	<1.2
Biochemical Oxygen Demand	mg/L	2 to 6	<2	<2	0	No	<2	6.6	107.0	No	<2	<6	100.0	No	<2	<2	0	No	<2	<2	0	No	-	<2	<2
Bromide (Br)	mg/L	0.1	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	<0.1	<0.1	0	No	-	<0.1	<0.1
Carbonate (CO3)	mg/L	0.6	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	<0.6	<0.6	0	No	-	<0.6	<0.6
Chloride (Cl)	mg/L	0.5	0.66	0.66	0	No	0.56	0.59	5.2	No	9.35	8.33	11.5	Yes	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
Conductivity	umhos/cm	1	21.7	21.3	1.9	Yes	18.6	18.6	0	Yes	51.7	47.2	9.1	Yes	46.9	47.4	1.1	Yes	17.1	15.8	7.9	Yes	-	<1	<1
Cyanide, Total	mg/L	0.002	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	<0.002	<0.002	0	No	-	<0.002	<0.002
Dissolved Organic Carbon	mg/L	0.5	12.8	14.8	14.5	Yes	15.1	15.3	1.3	Yes	17.2	16.1	6.6	Yes	19.4	20.6	6	Yes	16.1	15.7	2.5	Yes	<0.5	11.5	<0.5
Fluoride (F)	mg/L	0.02	0.037	0.037	0	No	0.036	0.036	0	No	0.022	0.022	0	No	0.025	0.025	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	<0.34	<0.34	0	No	-	<0.34	<0.34
Nitrate (as N)	mg/L	0.02	0.078	0.077	1.3	No	0.034	0.035	2.9	No	0.028	0.033	16.4	No	<0.02	<0.02	0	No	0.036	0.035	2.8	No	-	<0.02	<0.02
Nitrate and Nitrite as N	mg/L	0.07	0.078	0.077	1.3	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	<0.07	<0.07	0	No	-	<0.07	<0.07
Nitrite (as N)	mg/L	0.01	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	<0.01	<0.01	0	No	-	<0.01	<0.01
pH	pH units	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate (SO4)	mg/L	0.3	1.02	1.01	1.0	No	0.86	0.88	2.3	No	1.1	1.13	2.7	No	0.55	0.55	0	No	0.46	0.49	6.3	No	-	<0.3	<0.3
Total Dissolved Solids	mg/L	4 to 13.33	36.7	36.3	1.1	Yes	38.8	37.9	2.3	Yes	48	45.7	4.9	No	52.8	52.4	0.8	Yes	40	38.6	3.6	Yes	-	<4	<4
Total Inorganic Carbon	mg/L	0.5 to 1	2.91	<0.5	141.3	No	<0.5	<0.5	0	No	1.06	0.54	65.0	No	4.04	3.82	5.6	Yes	3.27	<1	106.3	No	-	<0.5	<0.5
Total Kjeldahl Nitrogen	mg/L	0.2	<0.2	0.52	88.9	No	0.6	0.5	18.2	No	0.77	0.47	48.4	No	0.71	0.93	26.8	No	0.52	0.49	5.9	No	-	<0.2	<0.2
Total Organic Carbon	mg/L	0.5	13.4	13.3	0.7	Yes	16.8	16.4	2.4	Yes	17.5	16.4	6.5	Yes	17.1	17.9	4.6	Yes	15.9	16.4	3.1	Yes	-	11	<0.5
Total Suspended Solids	mg/L	3	<3	<3	0	No	<3	<3	0	No	4.1	6.7	48.1	No	<3	<3	0	No	<3	<3	0	No	-	<3	<3
Turbidity	NTU	0.1	1.64	1.56	5	Yes	1.59	1.54	3.2	Yes	0.75	0.73	2.7	Yes	2.19	2.18	0.5	Yes	1.55	1.57	1.3	Yes	-	<0.1	<0.1
Phosphorus (P)-Total (EPA)	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	-	<0.05	<0.05
Phosphorus (P)-Total (APHA)	mg/L	0.003	0.0129	0.0116	10.6	No	0.014	0.0127	9.7	No	0.0109	0.0144	27.7	No	0.0212	0.0203	4.3	Yes	0.0128	0.0138	7.5	No	-	<0.003	<0.003
Other																									
Chlorophyll a	µg/L	0.1	3.4	3.66	7.4	Yes	3.48	3.34	4.1	Yes	0.51	0.5	2.0	No	11.9	11.7	1.7	Yes	2.03	1.18	53.0	Yes	-	-	-
Herbicides and Pesticides																									
AMPA	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
Glyphosate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Metals																									
Aluminum (Al)-Dissolved	mg/L	0.001	0.174	0.18	3.4	Yes	0.245	0.233	5.0	Yes	0.19	0.193	1.6	Yes	0.0613	0.0627	2.3	Yes	0.234	0.241	2.9	Yes	<0.001	<0.001	<0.001
Aluminum (Al)-Total	mg/L	0.003	0.183	0.208	12.8	Yes	0.314	0.298	5.2	Yes	0.326	0.253	25.2	Yes	0.106	0.113	6.4	Yes	0.256	0.258	0.8	Yes	-	<0.003	<0.003
Antimony (Sb)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	0.00017	<0.0001	51.9	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Antimony (Sb)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	0.00018	57.1	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Arsenic (As)-Dissolved	mg/L	0.0001	0.00031	0.0003	3.3	No	0.00036	0.00037	2.7	No	0.00033	0.00032	3.1	No	0.00028	0.00028	0	No	0.00031	0.00031	0	No	<0.0001	<0.0001	<0.0001
Arsenic (As)-Total	mg/L	0.0001	0.00032	0.00033	3.1	No	0.00036	0.00039	8.0	No	0.00033	0.00034	3.0	No	0.00029	0.00031	6.7	No	0.00032	0.00032	0	No	-	<0.0001	<0.0001
Barium (Ba)-Dissolved	mg/L	0.0001	0.0054	0.0055	1.8	Yes	0.00508	0.00522	2.7	Yes	0.00518	0.00523	1.0	Yes	0.00542	0.00568	4.7	Yes	0.00397	0.00417	4.9	Yes	<0.0001	<0.0001	0.00011
Barium (Ba)-Total	mg/L	0.0001	0.0058	0.00597	2.9	Yes	0.00553	0.00562	1.6	Yes	0.00601	0.00581	3.4	Yes	0.00635	0.00639	0.6	Yes	0.0041	0.00414	1.0	Yes	-	<0.0001	<0.0001
Beryllium (Be)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	<0.0001
Beryllium (Be)-Total	mg/L	0.0001	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	<0.0001	<0.0001	0	No	-	<0.0001	<0.0001
Bismuth (Bi)-Dissolved	mg/L	0.00005	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	0	No</			

APPENDIX A, TABLE 4

Water chemistry QAQC results, spring 2022.

Analyte	Spring 2022																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A				MR2-A				RR1-A				RP1-A				P3-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Metals																									
Chromium (III)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Chromium (III)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Chromium (VI)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	0.00106	<0.0005	71.8	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Chromium, Hexavalent	mg/L	0.0005	0.00075	0.00059	23.9	No	<0.0005	<0.0005	0	No	0.00053	<0.0005	5.8	No	0.00074	0.00069	7.0	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Cobalt (Co)-Dissolved	mg/L	0.0001	<0.0001	<0.0001	0	No	0.00014	0.00013	7.4	No	0.00012	0.00011	8.7	No	<0.0001	<0.0001	0	No	0.00024	0.00027	11.8	No	<0.0001	<0.0001	<0.0001
Cobalt (Co)-Total	mg/L	0.0001	<0.0001	0.0001	0	No	0.00018	0.00016	11.8	No	0.00016	0.00015	6.5	No	<0.0001	<0.0001	0	No	0.00027	0.00027	0	No	-	<0.0001	<0.0001
Copper (Cu)-Dissolved	mg/L	0.0002	0.00069	0.00068	1.5	No	0.00076	0.00076	0	No	0.00071	0.00075	5.5	No	0.00042	0.00047	11.2	No	0.00046	0.0004	14.0	No	<0.0002	<0.0002	<0.0002
Copper (Cu)-Total	mg/L	0.0005	0.00083	0.00078	6.2	No	0.00081	0.00081	0	No	0.00092	0.00082	11.5	No	0.00058	0.00055	5.3	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Iron (Fe)-Dissolved	mg/L	0.01	0.272	0.276	1.5	Yes	0.327	0.313	4.4	Yes	0.345	0.343	0.6	Yes	0.206	0.214	3.8	Yes	0.462	0.512	10.3	Yes	<0.01	<0.01	<0.01
Iron (Fe)-Total	mg/L	0.01	0.344	0.384	11.0	Yes	0.439	0.432	1.6	Yes	0.494	0.425	15.0	Yes	0.352	0.34	3.5	Yes	0.689	0.712	3.3	Yes	-	<0.01	<0.01
Lead (Pb)-Dissolved	mg/L	0.00005	0.000082	0.000078	5.0	No	0.000113	0.00011	2.7	No	0.000095	0.000096	1.0	No	<0.00005	<0.00005	0	No	0.000162	0.000161	0.6	No	<0.00005	<0.00005	<0.00005
Lead (Pb)-Total	mg/L	0.00005	0.000118	0.000115	2.6	No	0.000148	0.00014	5.6	No	0.000206	0.00014	38.2	No	0.000051	<0.00005	2.0	No	0.000213	0.00021	1.4	No	-	<0.00005	<0.00005
Lithium (Li)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Lithium (Li)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Magnesium (Mg)-Dissolved	mg/L	0.005	0.642	0.628	2.2	Yes	0.584	0.578	1.0	Yes	0.523	0.522	0.2	Yes	1.31	1.34	2.3	Yes	0.477	0.497	4.1	Yes	<0.005	<0.005	<0.005
Magnesium (Mg)-Total	mg/L	0.005	0.657	0.661	0.6	Yes	0.597	0.599	0.3	Yes	0.567	0.544	4.1	Yes	1.4	1.4	0	Yes	0.475	0.486	2.3	Yes	-	<0.005	<0.005
Manganese (Mn)-Dissolved	mg/L	0.0001	0.0197	0.0197	0	Yes	0.0178	0.0155	13.8	Yes	0.0108	0.0104	3.8	Yes	0.00138	0.00136	1.5	Yes	0.0276	0.0295	6.7	Yes	<0.0001	<0.0001	<0.0001
Manganese (Mn)-Total	mg/L	0.0001	0.0239	0.0247	3.3	Yes	0.0208	0.018	14.4	Yes	0.0128	0.0118	8.1	Yes	0.0198	0.0197	0.5	Yes	0.0289	0.0302	4.4	Yes	-	<0.0001	<0.0001
Mercury (Hg)-Dissolved	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	<0.000005
Mercury (Hg)-Total	mg/L	0.000005	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	<0.000005	<0.000005	0	No	-	<0.000005	<0.000005
Molybdenum (Mo)-Dissolved	mg/L	0.00005	0.000288	0.000287	0.3	Yes	0.000182	0.000176	3.4	No	<0.00005	<0.00005	0	No	0.000052	0.000052	0	No	<0.00005	<0.00005	0	No	<0.00005	<0.00005	<0.00005
Molybdenum (Mo)-Total	mg/L	0.00005	0.000275	0.000279	1.4	Yes	0.000198	0.000195	1.5	No	<0.00005	<0.00005	0	No	0.000061	0.000062	1.6	No	<0.00005	<0.00005	0	No	-	<0.00005	<0.00005
Nickel (Ni)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Nickel (Ni)-Total	mg/L	0.0005	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	-	<0.0005	<0.0005
Phosphorus (P)-Dissolved	mg/L	0.05	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	0	No	<0.05	<0.05	<0.05
Potassium (K)-Dissolved	mg/L	0.05	0.394	0.388	1.5	Yes	0.42	0.414	1.4	Yes	0.504	0.505	0.2	Yes	0.597	0.612	2.5	Yes	0.525	0.548	4.3	Yes	<0.05	<0.05	<0.05
Potassium (K)-Total	mg/L	0.05	0.405	0.402	0.7	Yes	0.418	0.414	1.0	Yes	0.505	0.522	3.3	Yes	0.633	0.617	2.6	Yes	0.525	0.525	0	Yes	-	<0.05	<0.05
Rhodium (Rh)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Rhodium (Rh)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Rubidium (Rb)-Dissolved	mg/L	0.0002	0.00127	0.00127	0	Yes	0.00135	0.0013	3.8	Yes	0.00157	0.00152	3.2	Yes	0.00121	0.00131	7.9	Yes	0.0015	0.00162	7.7	Yes	<0.0002	<0.0002	<0.0002
Rubidium (Rb)-Total	mg/L	0.0002	0.00132	0.00132	0	Yes	0.00157	0.00146	7.3	Yes	0.00177	0.00167	5.8	Yes	0.00116	0.00118	1.7	Yes	0.00148	0.00149	0.7	Yes	-	<0.0002	<0.0002
Ruthenium (Ru)-Dissolved	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	<0.001
Ruthenium (Ru)-Total	mg/L	0.001	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	<0.001	<0.001	0	No	-	<0.001	<0.001
Samarium (Sm)-Dissolved	mg/L	0.001																							

APPENDIX A, TABLE 4

Water chemistry QAQC results, spring 2022.

Analyte	Spring 2022																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A		RPD (%)	>5*RDL ¹	MR2-A		RPD (%)	>5*RDL ¹	RR1-A		RPD (%)	>5*RDL ¹	RP1-A		RPD (%)	>5*RDL ¹	P3-A		RPD (%)	>5*RDL ¹	Filter	Field	Trip
Sample	Duplicate	Sample	Duplicate	Sample			Duplicate	Sample			Duplicate	Sample			Duplicate	Sample			Duplicate	Sample			Duplicate	Sample	Duplicate
Metals																									
Uranium (U)-Total	mg/L	0.00001	0.000087	0.00009	3.4	Yes	0.000112	0.000107	4.6	Yes	0.000114	0.000098	15.1	Yes	0.000012	0.000011	8.7	No	0.000053	0.000051	3.8	Yes	-	<0.00001	<0.00001
Vanadium (V)-Dissolved	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00053	0.0005	5.8	No	0.00051	0.00051	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	0	No	<0.0005	<0.0005	<0.0005
Vanadium (V)-Total	mg/L	0.0005	<0.0005	<0.0005	0	No	0.00068	0.00067	1.5	No	0.00083	0.0007	17.0	No	<0.0005	<0.0005	0	No	0.00061	0.00059	3.3	No	-	<0.0005	<0.0005
Zinc (Zn)-Dissolved	mg/L	0.001	0.0018	0.0013	32.3	No	0.0019	0.0023	19.0	No	0.005	0.0123	84.4	No	0.0015	0.0015	0	No	0.0039	0.0051	26.7	No	0.0017	0.0015	0.0012
Zinc (Zn)-Total	mg/L	0.003	<0.003	<0.003	0	No	<0.003	<0.003	0	No	0.0159	0.004	119.6	No	<0.003	<0.003	0	No	0.0031	<0.003	3.3	No	-	<0.003	<0.003
Zirconium (Zr)-Dissolved	mg/L	0.0002	0.00025	0.00028	11.3	No	0.00029	0.00027	7.1	No	0.00022	0.00022	0	No	<0.0002	<0.0002	0	No	0.00024	0.00024	0	No	<0.0002	<0.0002	<0.0002
Zirconium (Zr)-Total	mg/L	0.0002	<0.0002	<0.0002	0	No	0.00021	0.00021	0	No	<0.0002	<0.0002	0	No	<0.0002	<0.0002	0	No	<0.0002	<0.0002	0	No	-	<0.0002	<0.0002
Other																									
Iodide (I)	mg/L	0.2	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	-	-	-	-	-	-	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Polycyclic Aromatic Hydrocarbons																									
1+2-Methylnaphthalenes	µg/L	0.0283	-	-	-	-	-	-	-	-	-	-	-	-	<0.028	<0.028	0	No	<0.028	<0.028	0	No	-	<0.028	<0.028
1-Methylnaphthalene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
2-Methylnaphthalene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	0.021	<0.02	4.9	No	-	<0.02	<0.02
Acenaphthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Acenaphthylene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(a)anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(a)pyrene	µg/L	0.01 to 0.052	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	0	No	<0.01	<0.01	0	No	-	<0.01	<0.052
Benzo(b&j)fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(g,h,i)perylene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Benzo(k)fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Chrysene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Dibenz(a,h)anthracene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Fluoranthene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Fluorene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Naphthalene	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	0	No	<0.05	<0.05	0	No	-	<0.05	<0.05
Phenanthrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Pyrene	µg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	0	No	<0.02	<0.02	0	No	-	<0.02	<0.02
Radionuclides																									
C-14	Bq/L	6.5 to 7.2	-	-	-	-	<6.6	<6.5	1.5	No	<6.6	<6.7	1.5	No	<6.8	<7.2	5.7	No	<6.9	<6.7	2.9	No	-	<6.8	<6.7
Chlorine 36	Bq/L	0.2 to 0.23	<0.22	-	-	-	<0.22	-	-	-	<0.2	-	-	-	-	-	-	-	<0.23	-	-	-	-	<0.23	<0.23
Co-60	Bq/L	0.22 to 0.44	<0.32	<0.43	29.3	No	<0.29	<0.22	27.5	No	<0.34	<0.35	2.9	No	<0.33	<0.34	3.0	No	<0.36	<0.44	20.0	No	-	<0.31	<0.27
Cs-137	Bq/L	0.21 to 0.36	<0.32	<0.36	11.8	No	<0.26	<0.21	21.3	No	<0.34	<0.35	2.9	No	<0.33	<0.3	9.5	No	<0.31	<0.35	12.1	No	-	<0.34	<0.28
Gross Alpha	Bq/L	0.055 to 0.092	<0.07	<0.072	2.8	No	0.094	<0.055	52.3	No	<0.08	0.072	10.5	No	<0.09	<0.092	2.2	No	<0.091	<0.079	14.1	No	-	<0.073	<0.074
Gross Beta	Bq/L	0.082 to 0.13	<0.12	<0.11	8.7	No	<0.1	<0.096	4.1	No	<0.082	<0.084	2.4	No	<0.12	<0.13	8.0	No	<0.12	<0.11	8.7	No	-	<0.086	<0.098
H-3	Bq/L	12 to 13	<12	<12	0	No	<12	<12	0	No	<13	<13	0	No	<12	<12	0	No	<12	<12	0	No	-	<13	<13
Iodine-129	Bq/L	0.25 to 0.3	<0.3	<0.27	10.5	No	<0.25	<0.25	0	No	<0.25	<0.27	7.7	No	<0.25	<0.27	7.7	No	<0.26	<0.29	10.9	No	-	0.36	<0.28
K-40	Bq/L	4.2 to 9.8	<6.3	<9.8	43.5	No	<6	<4.2	35.3	No	<5	<5.2	3.9	No	<5.7	<5.9	3.4	No	<5.8	<7.5	25.6	No	-	<8.3	<6
Neptunium-237	Bq/L	0.0017 to 0.0036	<0.0019	-	-	-	<0.0017	-	-	-	<0.0025	-	-	-	-	-	-	-	<0.0025	-	-	-	-	<0.0033	<0.0036
Pu-238	Bq/L	0.00026 to 0.0012	<0.00065	-	-	-	<0.00066	-	-	-	<0.001	-	-	-	-	-	-	-	<0.00026	-	-	-	-	0.00082	<0.0012
Pu-239	Bq/L	0.00026 to 0.0018	<0.0011	-	-	-	<0.00083	-	-	-	<0.001	-	-	-	-	-	-	-	0.00029	-	-	-	-	<0.0018	<0.00084
Ra-226	Bq/L	0.004 to 0.0099	<0.0074	<0.0099	28.9	No	<0.004	<0.0063	44.7	No	<0.0065	<0.0045	36.4	No	<0.0078	<0.0081	3.8	No	<0.0068	<0.0065	4.5	No	-	<0.0058	<0.0052
Ru-106	Bq/L	1.9 to 3.3	<3.3	<3.3	0	No	<2.6	<1.9	31.1	No	<2.7	<3	10.5	No	<3.2	<2.8	13.3	No	<3.2	<3.2	0	No	-	<3.2	<2.8
Sr-90	Bq/L	0.0058 to 0.016	<0.015	<0.016	6.5	No	<0.0058	<0.0061	5.0	No	<0.013	<0.013	0	No	<0.015	<0.015	0</								

APPENDIX A, TABLE 4

Water chemistry QAQC results, spring 2022.

Analyte	Spring 2022																								
	Units	RDL	Mennin Lake				Mennin River				Revell River				UWB-08				UWB-03				Blanks		
			ML2-A				MR2-A				RR1-A				RP1-A				P3-A				Filter	Field	Trip
			Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	Sample	Duplicate	RPD (%)	>5*RDL ¹	FB-1A	WB-1A	WB-1B
Semi-Volatile Organic Compounds																									
2,4-Dichlorophenol	µg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.3	0	No	<0.3	<0.3	0	No	-	<0.3	<0.3
2,4-Dimethylphenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
2,4-Dinitrophenol	µg/L	1	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	0	No	<1	<1	0	No	-	<1	<1
2,4-Dinitrotoluene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
2,6-Dinitrotoluene	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
2-Chlorophenol	µg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.3	0	No	<0.3	<0.3	0	No	-	<0.3	<0.3
3,3'-Dichlorobenzidine	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
4-Chloroaniline	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Biphenyl	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Bis(2-chloroethyl)ether	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Bis(2-chloroisopropyl)ether	µg/L	0.4	-	-	-	-	-	-	-	-	-	-	-	-	<0.4	<0.4	0	No	<0.4	<0.4	0	No	-	<0.4	<0.4
Bis(2-ethylhexyl)phthalate	µg/L	2	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	0	No	<2	<2	0	No	-	<2	<2
Diethylphthalate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Dimethylphthalate	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0	No	<0.2	<0.2	0	No	-	<0.2	<0.2
Pentachlorophenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	<0.5	<0.5
Phenol	µg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0	No	<0.5	<0.5	0	No	-	1.3	<0.5

RDL = reportable detection limit; dash = no data.
Relative percent difference (RPD) = | ((Duplicate - Sample)/((Duplicate + Sample)/2))*100 |.
For calculation of RPDs, values <RDL were set equal to the RDL; Grayed cells indicate exceedances of data quality control limits (RPD > 20%, with both samples >5*RDL).
¹Ranking of a "yes" used only if either value is >5*RDL.

APPENDIX A, TABLE 5

Soil chemistry QAQC results, summer 2021 to spring 2022.

Analyte	Units	12-Aug-21				21-Aug-22				25-Aug-22				29-Aug-22				13-Sep-22			
		L2627163-11	L2627163-12	RPD (%)	>5*RDL ¹	L2729576-6	L2729576-5	RPD (%)	>5*RDL ¹	L2730336-1	L2730336-2	RPD (%)	>5*RDL ¹	L2731075-3	L2731075-4	RPD (%)	>5*RDL ¹	L2733144-1	L2733144-2	RPD (%)	>5*RDL ¹
		Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate		
Base SQ																					
Calcium (Ca)	mg/kg	1200	1170	2.5	Yes	1300	1190	8.8	Yes	1130	1120	0.9	Yes	2200	2440	10.3	Yes	3980	4100	3.0	Yes
Chloride	mg/kg	<20	<20	0.0	No	<20	<20	0.0	No	<5	<5	0.0	No	33	32	3.1	No	<5	<5	0.0	No
Chromium, Hexavalent	mg/kg	<0.2	<0.2	0.0	No	0.34	0.69	68.0	No	<0.2	<0.2	0.0	No	<1	<1	0.0	No	<0.2	<0.2	0.0	No
Conductivity	mS/cm	0.021	0.0208	1.0	Yes	0.0256	0.0247	3.6	Yes	0.0501	0.0312	46.5	Yes	0.128	0.111	14.2	Yes	0.05	0.0491	1.8	Yes
Inorganic Carbon	%	0.058	0.061	5.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	0.15	0.136	9.8	No	<0.05	<0.05	0.0	No
Inorganic Carbon (as CaCO3 Equivalent)	%	0.48	0.51	6.1	No	<0.4	<0.4	0.0	No	<0.4	<0.4	0.0	No	1.25	1.13	10.1	No	<0.4	<0.4	0.0	No
Magnesium (Mg)	mg/kg	1260	1240	1.6	Yes	1150	1120	2.6	Yes	1130	1110	1.8	Yes	780	699	11.0	Yes	7950	8140	2.4	Yes
Moisture	%	8.57	8.21	4.3	Yes	24.15	23.05	4.7	Yes	19.2	18.45	4.0	Yes	84.85	85.75	1.1	Yes	14.3	15.15	5.8	Yes
Nitrate and Nitrite as N	mg/kg	<1.4	<1.4	0.0	No	<2	<2	0.0	No	<2	<2	0.0	No	<10	<10	0.0	No	<2	<2	0.0	No
Nitrate (as N)	mg/kg	<1	<1	0.0	No	<2	<2	0.0	No	<2	<2	0.0	No	<10	<10	0.0	No	<2	<2	0.0	No
Nitrite (as N)	mg/kg	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No	<5	<5	0.0	No	<1	<1	0.0	No
pH	pH units	4.82	4.81	0.2	Yes	4.04	4.08	1.0	Yes	4.82	4.85	0.6	Yes	3	2.95	1.7	Yes	4.44	4.42	0.5	Yes
Sodium (Na)	mg/kg	94	101	7.2	No	100	94	6.2	No	93	90	3.3	No	60	55	8.7	No	314	316	0.6	Yes
Sulphate	mg/kg	<20	<20	0.0	No	<20	<20	0.0	No	56	32	54.5	No	61	51	17.9	No	<20	<20	0.0	No
Total Carbon by Combustion	%	0.93	0.97	4.2	Yes	0.46	0.61	28.0	Yes	0.84	0.96	13.3	Yes	45.9	46.6	1.5	Yes	0.67	0.66	1.5	Yes
Total Kjeldahl Nitrogen	%	0.059	0.052	12.6	No	0.024	<0.02	18.2	No	<0.08	<0.06	28.6	No	0.836	0.88	5.1	Yes	0.036	0.039	8.0	No
Total Nitrogen by LECO	%	0.054	0.054	0.0	No	0.065	0.061	6.3	No	0.077	0.104	29.8	No	1.05	1	4.9	Yes	0.063	0.061	3.2	No
Total Organic Carbon	%	0.873	0.913	4.5	Yes	0.457	0.605	27.9	Yes	0.838	0.958	13.4	Yes	45.8	46.5	1.5	Yes	0.666	0.661	0.8	Yes
Base SQ SPE																					
Calcium (Ca)	mg/L	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	3.87	1.01	117.2	No	1.87	0.72	88.8	No	2.62	2.48	5.5	No
Magnesium (Mg)	mg/L	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	0.5	<0.5	0.0	No	1.1	<0.5	75.0	No	1	0.98	2.0	No
SAR	SAR	>0.25	>0.24	4.1	No	>0.43	>0.41	4.8	No	0.16	0.35	74.5	No	0.34	0.59	53.8	No	0.36	0.4	10.5	No
Sodium (Na)	mg/L	1.03	1.02	1.0	No	1.78	1.73	2.8	No	1.25	1.26	0.8	No	2.34	1.81	25.5	No	2.7	2.96	9.2	Yes
Herbicides and Pesticides																					
AMPA	mg/kg	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No
Glyphosate	mg/kg	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No
Hydrocarbons																					
Chrom. To baseline at nC50	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-
F1	mg/kg	<5	<5	0.0	No	<10	<10	0.0	No	<10	<10	0.0	No	-	-	-	-	<10	<10	0.0	No
F1-BTEX	mg/kg	<5	<5	0.0	No	<10	<10	0.0	No	<10	<10	0.0	No	-	-	-	-	<10	<10	0.0	No
F2 (C10-C16)	mg/kg	<10	<10	0.0	No	<25	<25	0.0	No	<25	<25	0.0	No	<130	<130	0.0	No	<25	<25	0.0	No
F2-Naphth	mg/kg	<10	<10	0.0	No	<25	<25	0.0	No	<25	<25	0.0	No	-	-	-	-	<25	<25	0.0	No
F3 (C16-C34)	mg/kg	<50	<50	0.0	No	<50	<50	0.0	No	<50	<50	0.0	No	1080	760	34.8	No	<50	<50	0.0	No
F3-PAH	mg/kg	<50	<50	0.0	No	<50	<50	0.0	No	<50	<50	0.0	No	-	-	-	-	<50	<50	0.0	No
F4 (C34-C50)	mg/kg	<50	<50	0.0	No	<50	<50	0.0	No	<50	<50	0.0	No	700	640	9.0	No	<50	<50	0.0	No
Total Hydrocarbons (C6-C50)	mg/kg	<72	<72	0.0	No	<76	<76	0.0	No	<76	<76	0.0	No	-	-	-	-	<76	<76	0.0	No
Metals																					
Aluminum (Al)	mg/kg	13000	12300	5.5	Yes	10900	9510	13.6	Yes	11900	12800	7.3	Yes	1500	1270	16.6	Yes	19600	20200	3.0	Yes
Antimony (Sb)	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	0.19	0.18	5.4	No	<0.1	<0.1	0.0	No
Arsenic (As)	mg/kg	1.36	1.28	6.1	Yes	1	0.96	4.1	Yes	1.27	1.24	2.4	Yes	1.55	1.18	27.1	Yes	1.42	1.43	0.7	Yes
Barium (Ba)	mg/kg	25.3	25.1	0.8	Yes	24.9	23.4	6.2	Yes	20.2	20.1	0.5	Yes	37.9	33.1	13.5	Yes	69.6	72.6	4.2	Yes
Beryllium (Be)	mg/kg	0.23	0.21	9.1	No	0.13	0.14	7.4	No	0.24	0.23	4.3	No	<0.1	<0.1	0.0	No	0.32	0.37	14.5	No
Bismuth (Bi)	mg/kg	<0.2	<0.2	0.0	No	<0.2	<0.2	0.0	No	<0.2	<0.2	0.0	No	<0.2	<0.2	0.0	No	<0.2	<0.2	0.0	No
Boron (B)	mg/kg	<5	<5	0.0	No	<5	<5	0.0	No	<5	<5	0.0	No	<5	<5	0.0	No	<5	<5	0.0	No
Cadmium (Cd)	mg/kg	<0.02	<0.02	0.0	No	<0.02	<0.02	0.0	No	<0.02	<0.02	0.0	No	0.34	0.39	13.7	Yes	0.041	0.047	13.6	No
Chromium (Cr)	mg/kg	13.1	12.8	2.3	Yes	10.7	10.1	5.8	Yes	11.7	11.8	0.9	Yes	1.47	1.36	7.8	No	40.9	41	0.2	Yes
Cobalt (Co)	mg/kg	2.99	2.93	2.0	Yes	2.19	2.13	2.8	Yes	3.01	2.95	2.0	Yes	0.8	0.64	22.2	Yes	13.3	14	5.1	Yes
Copper (Cu)	mg/kg	2.9	2.92	0.7	Yes	2.1	2.02	3.9	No	2.17	2.04	6.2	No	3.04	3.49	13.8	Yes	15.5	15.6	0.6	Yes
Iron (Fe)	mg/kg	11800	11300	4.3	Yes	8510	8320	2.3	Yes	10900	11400	4.5	Yes	2480	1950	23.9	Yes	23000	23600	2.6	Yes
Lead (Pb)	mg/kg	4.3	4.08	5.3	Yes	4.34	4.06	6.7	Yes	4.3	4.18	2.8	Yes	8.23	10.6	25.2	Yes	7.33	7.82	6.5	Yes
Lithium (Li)	mg/kg	6.7	6.6	1.5	No	5.8	5.6	3.5	No	6.4	6.6	3.1	No	<2	<2	0.0	No	21.3	22	3.2	Yes
Manganese (Mn)	mg/kg	53.9	54.4	0.9	Yes	53.5	56.5	5.5	Yes	52.7	54.7	3.7	Yes	20	34.3	52.7	Yes	392	428	8.8	Yes
Mercury (Hg)	mg/kg	0.019	0.0181	4.9	No	0.0079	0.008	1.3	No	0.0206	0.0224	8.4	No	0.115	0.13	12.2	Yes	0.0122	0.0126	3.2	No
Molybdenum (Mo)	mg/kg	0.4	0.39	2.5	No	0.26	0.25	3.9	No	0.37	0.39	5.3	No	0.33	0.28	16.4	No	0.15	0.16	6.5	No
Nickel (Ni)	mg/kg	6.5	6.52	0.3	Yes	5.11	4.88	4.6	Yes	6.21	6.09	2.0	Yes	1.49	1.24	18.3	No	23.5	24	2.1	Yes

APPENDIX A, TABLE 5

Soil chemistry QAQC results, summer 2021 to spring 2022.

Analyte	Units	12-Aug-21				21-Aug-22				25-Aug-22				29-Aug-22				13-Sep-22			
		L2627163-11	L2627163-12	RPD (%)	>5*RDL ¹	L2729576-6	L2729576-5	RPD (%)	>5*RDL ¹	L2730336-1	L2730336-2	RPD (%)	>5*RDL ¹	L2731075-3	L2731075-4	RPD (%)	>5*RDL ¹	L2733144-1	L2733144-2	RPD (%)	>5*RDL ¹
		Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate						
Metals																					
Phosphorus (P)	mg/kg	191	182	4.8	No	58	71	20.2	No	140	155	10.2	No	475	492	3.5	Yes	163	172	5.4	No
Potassium (K)	mg/kg	210	210	0.0	No	160	140	13.3	No	190	190	0.0	No	560	870	43.4	Yes	1840	1880	2.2	Yes
Rhodium (Rh)	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No
Ruthenium (Ru)	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No
Samarium (Sm)	mg/kg	-	-	-	-	1.11	0.99	11.4	Yes	1.34	1.23	8.6	Yes	0.11	0.14	24.0	No	1.68	1.68	0.0	Yes
Selenium (Se)	mg/kg	0.26	0.28	7.4	No	<0.2	<0.2	0.0	No	0.34	0.41	18.7	No	0.29	0.36	21.5	No	<0.2	<0.2	0.0	No
Silver (Ag)	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No
Strontium (Sr)	mg/kg	7.11	6.94	2.4	Yes	9.26	8.68	6.5	Yes	7.41	7.19	3.0	Yes	27.7	22.9	19.0	Yes	22.1	23.6	6.6	Yes
Sulfur (S)	mg/kg	<1000	<1000	0.0	No	<1000	<1000	0.0	No	<1000	<1000	0.0	No	<1000	<1000	0.0	No	<1000	<1000	0.0	No
Thallium (Tl)	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	0.053	<0.05	5.8	No	<0.05	<0.05	0.0	No	0.192	0.187	2.6	No
Tin (Sn)	mg/kg	<2	<2	0.0	No	<2	<2	0.0	No	<2	<2	0.0	No	<2	<2	0.0	No	<2	<2	0.0	No
Titanium (Ti)	mg/kg	675	659	2.4	Yes	693	648	6.7	Yes	668	661	1.1	Yes	27.3	26.1	4.5	Yes	1370	1410	2.9	Yes
Tungsten (W)	mg/kg	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No
Uranium (U)	mg/kg	0.575	0.559	2.8	Yes	0.489	0.463	5.5	Yes	0.57	0.54	5.4	Yes	0.079	0.072	9.3	No	0.627	0.683	8.5	Yes
Vanadium (V)	mg/kg	28.9	27.7	4.2	Yes	26	26.3	1.1	Yes	26.8	27.4	2.2	Yes	2.51	2.23	11.8	Yes	51.1	53.6	4.8	Yes
Zinc (Zn)	mg/kg	9.4	9.5	1.1	No	8	7.6	5.1	No	9.1	9	1.1	No	13.1	18	31.5	Yes	48.2	50.8	5.3	Yes
Zirconium (Zr)	mg/kg	3.6	3.7	2.7	No	4.6	4.2	9.1	No	4	4.1	2.5	No	<1	<1	0.0	No	6.2	6.3	1.6	Yes
Polycyclic Aromatic Hydrocarbons																					
1+2-Methylnaphthalenes	mg/kg	<0.042	<0.042	0.0	No	<0.042	<0.042	0.0	No	<0.042	<0.042	0.0	No	<0.21	<0.32	41.5	No	<0.042	<0.042	0.0	No
1-Methylnaphthalene	mg/kg	<0.03	<0.03	0.0	No	<0.03	<0.03	0.0	No	<0.03	<0.03	0.0	No	<0.15	<0.23	42.1	No	<0.03	<0.03	0.0	No
2-Methylnaphthalene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Acenaphthylene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Anthracene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Benzo(a)anthracene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Benzo(b&j)fluoranthene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Chrysene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Dibenz(a,h)anthracene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Fluoranthene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Fluorene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Indeno(1.2.3-cd)pyrene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Naphthalene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Phenanthrene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Pyrene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Radionuclides																					
Am-241	Bq/kg	<140	<110	24.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C-14	Bq/kg	<460	<180	87.5	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorine 36	Bq/kg	<86	<75	13.7	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Co-60	Bq/kg	<12	<11	8.7	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cs-137	Bq/kg	<13	<12	8.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Alpha	Bq/kg	120	78	42.4	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Beta	Bq/kg	<58	<55	5.3	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H-3	Bq/kg	<3.4	<3.1	9.2	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodine-129	Bq/kg	<240	<220	8.7	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neptunium-237	Bq/kg	<1.2	<1.3	8.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pu-238	Bq/kg	<0.58	0.35	49.5	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pu-239	Bq/kg	0.51	<0.47	8.2	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ru-106	Bq/kg	<110	<76	36.6	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sr-90	Bq/kg	<6.6	<6.2	6.2	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Semi-Volatile Organic Compounds																					
1,2,4-Trichlorobenzene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
1-Methylnaphthalene	mg/kg	<0.03	<0.03	0.0	No	<0.03	<0.03	0.0	No	<0.03	<0.03	0.0	No	<0.15	<0.23	42.1	No	<0.03	<0.03	0.0	No
2,4+2,6-Dinitrotoluene	mg/kg	<0.14	<0.14	0.0	No	<0.14	<0.14	0.0	No	<0.14	<0.14	0.0	No	<0.71	<1.1	43.1	No	<0.14	<0.14	0.0	No

APPENDIX A, TABLE 5

Soil chemistry QAQC results, summer 2021 to spring 2022.

Analyte	Units	12-Aug-21				21-Aug-22				25-Aug-22				29-Aug-22				13-Sep-22			
		L2627163-11	L2627163-12	RPD (%)	>5*RDL ¹	L2729576-6	L2729576-5	RPD (%)	>5*RDL ¹	L2730336-1	L2730336-2	RPD (%)	>5*RDL ¹	L2731075-3	L2731075-4	RPD (%)	>5*RDL ¹	L2733144-1	L2733144-2	RPD (%)	>5*RDL ¹
		Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate		
Semi-Volatile Organic Compounds																					
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
2,4-Dinitrophenol	mg/kg	<1	<1	0.0	No	<1	<1	0.0	No	<1	<1	0.0	No	<5	<7.5	40.0	No	<1	<1	0.0	No
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
2-Chlorophenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
3,3'-Dichlorobenzidine	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
4-Chloroaniline	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
Biphenyl	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.25	<0.38	41.3	No	<0.05	<0.05	0.0	No
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
Bis(2-chloroisopropyl)ether	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
Dibromochloromethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Diethylphthalate	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
Dimethylphthalate	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
p-Terphenyl d14	%	89.5	89	0.6	Yes	108	105	2.8	Yes	109.4	93.8	15.4	Yes	80.5	78.1	3.0	Yes	86.8	95.3	9.3	Yes
Pentachlorophenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	<0.1	<0.1	0.0	No
Phenol	mg/kg	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	<0.5	<0.75	40.0	No	0.63	<0.1	145.2	No
Volatile Organic Compounds																					
1,1,1,2-Tetrachloroethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,1,1-Trichloroethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,1,2,2-Tetrachloroethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,1,2-Trichloroethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,1-Dichloroethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,1-dichloroethene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,1-Dichloroethylene	mg/kg	<0.05	<0.05	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloropropene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2,3-Trichlorobenzene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2,3-Trichloropropane	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2,4-Trimethylbenzene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2-Dibromo-3-chloropropane	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2-Dibromoethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2-Dichlorobenzene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2-Dichloroethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,2-Dichloropropane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,3,5-Trimethylbenzene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,3-Dichlorobenzene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,3-Dichloropropane	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
1,3-Dichloropropene, cis+trans	mg/kg	<0.042	<0.042	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
2,2-Dichloropropane	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
2-Chlorotoluene	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
2-Hexanone (Methyl butyl ketone)	mg/kg	-	-	-	-	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	-	-	-	-	<0.5	<0.5	0.0	No
4-Chlorotoluene	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
4-Isopropyltoluene	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
Acetone	mg/kg	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	-	-	-	-	<0.5	<0.5	0.0	No
Benzene	mg/kg	<0.0068	<0.0068	0.0	No	<0.005	<0.005	0.0	No	<0.005	<0.005	0.0	No	-	-	-	-	<0.005	<0.005	0.0	No
Bromobenzene	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
Bromochloromethane	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
Bromodichloromethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Bromoform	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Bromomethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Carbondisulfide	mg/kg	-	-	-	-	<0.25</															

APPENDIX A, TABLE 5

Soil chemistry QAQC results, summer 2021 to spring 2022.

Analyte	Units	12-Aug-21				21-Aug-22				25-Aug-22				29-Aug-22				13-Sep-22			
		L2627163-11	L2627163-12	RPD (%)	>5*RDL ¹	L2729576-6	L2729576-5	RPD (%)	>5*RDL ¹	L2730336-1	L2730336-2	RPD (%)	>5*RDL ¹	L2731075-3	L2731075-4	RPD (%)	>5*RDL ¹	L2733144-1	L2733144-2	RPD (%)	>5*RDL ¹
		Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate			Sample	Duplicate		
Volatile Organic Compounds																					
Carbontetrachloride	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Chlorobenzene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Chloroethane	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Chloroform	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Chloromethane	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
cis-1,2-Dichloroethene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
cis-1,2-Dichloroethylene	mg/kg	<0.05	<0.05	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	<0.03	<0.03	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Dibromomethane	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Dichlorodifluoromethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Dichloromethane	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
Ethylbenzene	mg/kg	<0.018	<0.018	0.0	No	<0.015	<0.015	0.0	No	<0.015	<0.015	0.0	No	-	-	-	-	<0.015	<0.015	0.0	No
Hexachlorobutadiene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Hexane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Isopropylbenzene	mg/kg	-	-	-	-	<0.1	<0.1	0.0	No	<0.1	<0.1	0.0	No	-	-	-	-	<0.1	<0.1	0.0	No
M+P-Xylenes	mg/kg	<0.03	<0.03	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Methylene Chloride	mg/kg	<0.05	<0.05	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl Ethyl Ketone	mg/kg	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	-	-	-	-	<0.5	<0.5	0.0	No
Methyl Isobutyl Ketone	mg/kg	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	<0.5	<0.5	0.0	No	-	-	-	-	<0.5	<0.5	0.0	No
MTBE	mg/kg	<0.05	<0.05	0.0	No	<0.2	<0.2	0.0	No	<0.2	<0.2	0.0	No	-	-	-	-	<0.2	<0.2	0.0	No
n-Butylbenzene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
o-Xylene	mg/kg	<0.02	<0.02	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
sec-Butylbenzene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Styrene	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
tert-Butylbenzene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Tetrachloroethene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Tetrachloroethylene	mg/kg	<0.05	<0.05	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	<0.08	<0.08	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
trans-1,2-Dichloroethene	mg/kg	-	-	-	-	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
trans-1,2-Dichloroethylene	mg/kg	<0.05	<0.05	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	<0.03	<0.03	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Trichloroethene	mg/kg	-	-	-	-	<0.01	<0.01	0.0	No	<0.01	<0.01	0.0	No	-	-	-	-	<0.01	<0.01	0.0	No
Trichloroethylene	mg/kg	<0.01	<0.01	0.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Vinyl Chloride	mg/kg	<0.02	<0.02	0.0	No	<0.05	<0.05	0.0	No	<0.05	<0.05	0.0	No	-	-	-	-	<0.05	<0.05	0.0	No
Xylenes (Total)	mg/kg	<0.05	<0.05	0.0	No	<0.071	<0.071	0.0	No	<0.071	<0.071	0.0	No	-	-	-	-	<0.071	<0.071	0.0	No

RDL = reportable detection limit; dash = no data.

Relative percent difference (RPD) = | ((Duplicate - Sample)/((Duplicate + Sample)/2))*100 |.

For calculation of RPDs, values <RDL were set equal to the RDL; Grayed cells indicate exceedances of data quality control limits (RPD > 40%, with both samples >5*RDL).

¹Ranking of a "yes" used only if either value is >5*RDL.

APPENDIX B

DETAILED YEAR 1 SURFACE WATER QUALITY RESULTS

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APPENDIX B. TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Anions, Nutrients, and Physical Properties				
Alkalinity, Bicarbonate (as CaCO3)	mg/L	NG	-	-
Alkalinity, Carbonate (as CaCO3)	mg/L	NG	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	NG	-	-
Alkalinity, Total (as CaCO3)	mg/L	NG	-	Assessed based on change from background
Ammonia, Total (as N)	µg/L	5855	CCME	Dependent on pH and temperature
Ammonia, Un-ionized (as N)	µg/L	16	MECP / CCME	-
Biological Oxygen Demand (BOD)	mg/L	NG	-	-
Bromide (Br)	µg/L	NG	-	-
Chloride (Cl)	µg/L	120,000	CCME	-
Conductivity	mS/cm	0.7	BCMOE	Irrigation. BCMOE attributes to CCME, but not currently supported by CCME
Cyanide, Total	µg/L	5	MECP	-
Dissolved Organic Carbon	mg/L	NG	-	-
Fluoride (F)	µg/L	120	CCME	-
Hardness (as CaCO3)	mg/L	NG	-	-
Ion Balance	-	NG	-	-
Langelier Index	-	NG	-	-
Nitrate (as N)	µg/L	3000	CCME	-
Nitrate and Nitrite (as N)	µg/L	NG	-	-
Nitrite (as N)	µg/L	20	CCME	-
pH	pH units	6.5 - 9	CCME	Range of values
pH (Laboratory)	pH units	6.5 - 9	CCME	Range of values
Phosphorus, Total	µg/L	10	MECP	Applies to lakes, could be 30 for streams
Sulphate (SO4)	µg/L	128000	BCMOE	Dependent on hardness
Total Dissolved Solids	mg/L	500	Health Canada	Drinking water
Total Inorganic Carbon	mg/L	NG	-	-
Total Kjeldahl Nitrogen	mg/L	NG	-	-
Total Organic Carbon	mg/L	NG	-	-
Total Suspended Solids	mg/L	NG	-	-
Turbidity	NTU	50	Health Canada	Drinking water
Bacteriological Tests				
E. Coli	CFU/100mL	100	MECP	-
Total Coliforms	CFU/100mL	NG	-	-
Metals and Trace Elements				
Total				
Aluminum (Al)	µg/L	320	FEQG	Dependent on hardness, DOC, pH
Antimony (Sb)	µg/L	6	Health Canada	Drinking water (lower than MECP value)
Arsenic (As)	µg/L	5	CCME	-
Barium (Ba)	µg/L	1000	BCMOE	-
Beryllium (Be)	µg/L	11	MECP	-
Bismuth (Bi)	µg/L	17500	ECHA PNEC	-
Boron (B)	µg/L	1500	CCME	-
Cadmium (Cd)	µg/L	0.04	CCME	Dependent on hardness
Calcium (Ca)	µg/L	1000000	CCME	Livestock watering
Cesium (Cs)	µg/L	NG	-	-
Chromium (Cr)	µg/L	NG	-	-
Chromium III (Cr3+)	µg/L	8.9	CCME	-
Chromium VI (Cr6+)	µg/L	5	FEQG	-
Cobalt (Co)	µg/L	0.78	FEQG	Dependent on hardness
Copper (Cu)	µg/L	2	CCME	Dependent on hardness, FEQG dissolved should be given preference
Iron (Fe)	µg/L	3300	FEQG	Dependent on pH and DOC
Lead (Pb)	µg/L	1	CCME	Dependent on hardness, FEQG dissolved should be given preference
Lithium (Li)	µg/L	2500	NWMO	-
Magnesium (Mg)	µg/L	82000	NWMO	-
Manganese (Mn)	µg/L	120	CCME	Irrigation. Dissolved also applicable
Mercury (Hg)	µg/L	0.026	CCME	-
Methylmercury (MeHg)	µg/L	0.004	CCME	-

APPENDIX B. TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Metals and Trace Elements				
Total				
Molybdenum (Mo)	µg/L	73	CCME	-
Nickel (Ni)	µg/L	25	CCME	Dependent on hardness
Potassium (K)	µg/L	53000	NWMO	-
Rhodium (Rh)	µg/L	10	NWMO	-
Rubidium (Rb)	µg/L	NG	-	-
Ruthenium (Ru)	µg/L	10	NWMO	-
Samarium (Sm)	µg/L	8.2	NWMO	-
Selenium (Se)	µg/L	1	CCME	-
Silicon (Si)	µg/L	NG	-	-
Silver (Ag)	µg/L	0.25	CCME	-
Sodium (Na)	µg/L	680000	Suter and Tsao	-
Strontium (Sr)	µg/L	7000	BCMOE	FEQG dissolved should be given preference
Sulphur (S)	µg/L	NG	-	-
Tellurium (Te)	µg/L	5.8	NWMO	-
Thallium (Tl)	µg/L	0.8	CCME	-
Thorium (Th)	µg/L	NG	-	-
Tin (Sn)	µg/L	73	Suter and Tsao	-
Titanium (Ti)	µg/L	76	ECHA PNEC	-
Tungsten (W)	µg/L	30	MECP	-
Uranium (U)	µg/L	15	CCME	-
Vanadium (V)	µg/L	120	FEQG	-
Zinc (Zn)	µg/L	20	MECP	CCME dissolved should be given preference
Zirconium (Zr)	µg/L	4	MECP	-
Dissolved				
Aluminum (Al)	µg/L	NG	-	Although an MECP value is available, the FEQG (total) was selected
Antimony (Sb)	µg/L	NG	-	-
Arsenic (As)	µg/L	NG	-	-
Barium (Ba)	µg/L	NG	-	-
Beryllium (Be)	µg/L	NG	-	-
Bismuth (Bi)	µg/L	NG	-	-
Boron (B)	µg/L	NG	-	-
Cadmium (Cd)	µg/L	NG	-	-
Calcium (Ca)	µg/L	NG	-	-
Cesium (Cs)	µg/L	NG	-	-
Chromium (Cr)	µg/L	NG	-	-
Chromium III (Cr3+)	µg/L	NG	-	-
Chromium VI (Cr6+)	µg/L	NG	-	-
Cobalt (Co)	µg/L	NG	-	-
Copper (Cu)	µg/L	0.88	FEQG	Dependent on hardness, DOC, pH and temperature
Iron (Fe)	µg/L	NG	-	-
Lead (Pb)	µg/L	6.5	FEQG	Dependent on hardness and DOC
Lithium (Li)	µg/L	NG	-	-
Magnesium (Mg)	µg/L	NG	-	-
Manganese (Mn)	µg/L	230	CCME	Dependent on hardness and pH
Mercury (Hg)	µg/L	NG	-	Although an MECP value is available, the CCME (total) was selected
Molybdenum (Mo)	µg/L	NG	-	-
Nickel (Ni)	µg/L	NG	-	-
Potassium (K)	µg/L	NG	-	-
Rhodium (Rh)	µg/L	NG	-	-
Rubidium (Rb)	µg/L	NG	-	-
Ruthenium (Ru)	µg/L	NG	-	-
Samarium (Sm)	µg/L	NG	-	-
Selenium (Se)	µg/L	NG	-	-
Silicon (Si)	µg/L	NG	-	-
Silver (Ag)	µg/L	NG	-	-

APPENDIX B. TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Metals and Trace Elements				
Dissolved				
Sodium (Na)	µg/L	NG	-	-
Strontium (Sr)	µg/L	2500	FEQG	-
Sulphur (S)	µg/L	NG	-	-
Tellurium (Te)	µg/L	NG	-	-
Thallium (Tl)	µg/L	NG	-	-
Thorium (Th)	µg/L	NG	-	-
Tin (Sn)	µg/L	NG	-	-
Titanium (Ti)	µg/L	NG	-	-
Tungsten (W)	µg/L	NG	-	-
Uranium (U)	µg/L	NG	-	-
Vanadium (V)	µg/L	NG	-	-
Zinc (Zn)	µg/L	17	CCME	Dependent on hardness, DOC, and pH
Zirconium (Zr)	µg/L	NG	-	-
Volatile Organic Compounds				
Acetone	µg/L	1500	Suter and Tsao	-
Benzene	µg/L	5	Health Canada	Drinking water (lower than MECP value)
Bromodichloromethane	µg/L	200	MECP	-
Bromoform	µg/L	60	MECP	-
Bromomethane	µg/L	0.9	MECP	-
Carbon tetrachloride	µg/L	2	Health Canada	Drinking water (lower than CCME value)
Chlorobenzene	µg/L	1.3	CCME	-
Dibromochloromethane	µg/L	40	MECP	-
Chloroform	µg/L	1.8	CCME	-
1,2-Dibromoethane	µg/L	5	MECP	-
1,2-Dichlorobenzene	µg/L	0.7	CCME	-
1,3-Dichlorobenzene	µg/L	2.5	MECP	-
1,4-Dichlorobenzene	µg/L	4	MECP	-
Dichlorodifluoromethane	µg/L	NG	-	-
1,1-Dichloroethane	µg/L	200	MECP	-
1,2-Dichloroethane	µg/L	5	Health Canada	Drinking water (lower than MECP value)
1,1-Dichloroethylene	µg/L	14	Health Canada	Drinking water (lower than MECP value)
cis-1,2-Dichloroethylene	µg/L	200	MECP	-
trans-1,2-Dichloroethylene	µg/L	200	MECP	-
Methylene Chloride	µg/L	50	Health Canada	Drinking water (lower than CCME value)
1,2-Dichloropropane	µg/L	0.7	MECP	-
cis-1,3-Dichloropropene	µg/L	NG	-	-
trans-1,3-Dichloropropene	µg/L	7	MECP	-
1,3-Dichloropropene (cis & trans)	µg/L	0.2	CCME	-
Ethylbenzene	µg/L	8	MECP	-
n-Hexane	µg/L	0.58	Suter and Tsao	-
Methyl Ethyl Ketone	µg/L	400	MECP	-
Methyl Isobutyl Ketone	µg/L	NG	-	-
MTBE	µg/L	200	MECP	-
Styrene	µg/L	4	MECP	-
1,1,1,2-Tetrachloroethane	µg/L	20	MECP	-
1,1,2,2-Tetrachloroethane	µg/L	70	MECP	-
Tetrachloroethylene	µg/L	10	Health Canada	Drinking water (lower than MECP value)
Toluene	µg/L	0.8	MECP	-
1,1,1-Trichloroethane	µg/L	10	MECP	-
1,1,2-Trichloroethane	µg/L	800	MECP	-
Trichloroethylene	µg/L	5	Health Canada	Drinking water (lower than MECP value)
Trichlorofluoromethane	µg/L	NG	-	-
Vinyl chloride	µg/L	2	Health Canada	Drinking water (lower than MECP value)
o-Xylene	µg/L	40	MECP	-
m+p-Xylenes	µg/L	32	MECP	-
Xylenes (Total)	µg/L	30	BCMOE	-
4-Bromofluorobenzene	µg/L	NG	-	-
1,4-Difluorobenzene	µg/L	NG	-	-

APPENDIX B. TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Petroleum Hydrocarbons				
F1 (C6-C10)	µg/L	150	Alberta	Short-term guideline
F1-BTEX	µg/L	150	Alberta	Short-term guideline
F2 (C10-C16)	µg/L	110	Alberta	Short-term guideline
F2-Naphth	µg/L	110	Alberta	Short-term guideline
F3 (C16-C34)	µg/L	NG	-	-
F3-PAH	µg/L	NG	-	-
F4 (C34-C50)	µg/L	NG	-	-
Total Hydrocarbons (C6-C50)	µg/L	NG	-	-
Chrom. to baseline at nC50	µg/L	NG	-	-
Polycyclic Aromatic Hydrocarbon (PAHs)				
Acenaphthene	µg/L	5.8	CCME	-
Acenaphthylene	µg/L	NG	-	-
Anthracene	µg/L	0.012	CCME	-
Benzo(a)anthracene	µg/L	0.018	CCME	-
Benzo(a)pyrene	µg/L	0.015	CCME	-
Benzo(b&j)fluoranthene	µg/L	NG	-	-
Benzo(g,h,i)perylene	µg/L	NG	-	-
Benzo(k)fluoranthene	µg/L	NG	-	-
Chrysene	µg/L	NG	-	-
Dibenz(a,h)anthracene	µg/L	NG	-	-
Fluoranthene	µg/L	0.04	CCME	-
Fluorene	µg/L	3	CCME	-
Indeno(1,2,3-cd)pyrene	µg/L	NG	-	-
1+2-Methylnaphthalenes	µg/L	NG	-	-
1-Methylnaphthalene	µg/L	526	Suter and Tsao	-
2-Methylnaphthalene	µg/L	NG	-	-
Naphthalene	µg/L	1.1	CCME	-
Phenanthrene	µg/L	0.4	CCME	-
Pyrene	µg/L	0.025	CCME	-
Semi-Volatile Organic Compounds				
Biphenyl	µg/L	0.2	MECP	-
4-Chloroaniline	µg/L	NG	-	-
Bis(2-chloroethyl)ether	µg/L	200	MECP	-
Bis(2-chloroisopropyl)ether	µg/L	NG	-	-
2-Chlorophenol	µg/L	7	MECP	-
3,3-Dichlorobenzidine	µg/L	0.6	MECP	-
2,4-Dichlorophenol	µg/L	0.2	MECP	-
Diethylphthalate	µg/L	210	Suter and Tsao	-
Dimethylphthalate	µg/L	330	Suter and Tsao	-
2,4-Dimethylphenol	µg/L	10	MECP	-
2,4-Dinitrophenol	µg/L	6.2	Suter and Tsao	-
2,4-Dinitrotoluene	µg/L	4	MECP	-
2,6-Dinitrotoluene	µg/L	6	MECP	-
2,4+2,6-Dinitrotoluene	µg/L	10	MECP	-
Bis(2-ethylhexyl)phthalate	µg/L	3	Suter and Tsao	-
Pentachlorophenol	µg/L	0.5	MECP	-
Phenol	µg/L	4	CCME	-
1,2,4-Trichlorobenzene	µg/L	0.5	MECP	-
2,4,5-Trichlorophenol	µg/L	18	MECP	-
2,4,6-Trichlorophenol	µg/L	5	Health Canada	Drinking water (lower than MECP value)
Polychlorinated Biphenyls				
Aroclor 1242	µg/L	0.001	MECP	-
Aroclor 1248	µg/L	0.001	MECP	-
Aroclor 1254	µg/L	0.001	MECP	-
Aroclor 1260	µg/L	0.001	MECP	-
Decachlorobiphenyl	µg/L	NG	-	-
Total PCBs	µg/L	0.001	MECP	-
Tetrachloro-m-xylene	µg/L	NG	-	-

APPENDIX B. TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Dioxins and Furans				
2,3,7,8-TCDD	µg/L	NG	-	-
1,2,3,7,8-PeCDD	µg/L	NG	-	-
1,2,3,4,7,8-HxCDD	µg/L	NG	-	-
1,2,3,6,7,8-HxCDD	µg/L	NG	-	-
1,2,3,7,8,9-HxCDD	µg/L	NG	-	-
1,2,3,4,6,7,8-HpCDD	µg/L	NG	-	-
OCDD	µg/L	NG	-	-
Total-TCDD	µg/L	NG	-	-
Total TCDD # Homologues	µg/L	NG	-	-
Total-PeCDD	µg/L	NG	-	-
Total PeCDD # Homologues	µg/L	NG	-	-
Total-HxCDD	µg/L	NG	-	-
Total HxCDD # Homologues	µg/L	NG	-	-
Total-HpCDD	µg/L	NG	-	-
Total HpCDD # Homologues	µg/L	NG	-	-
2,3,7,8-TCDF	µg/L	NG	-	-
1,2,3,7,8-PeCDF	µg/L	NG	-	-
2,3,4,7,8-PeCDF	µg/L	NG	-	-
1,2,3,4,7,8-HxCDF	µg/L	NG	-	-
1,2,3,6,7,8-HxCDF	µg/L	NG	-	-
1,2,3,7,8,9-HxCDF	µg/L	NG	-	-
2,3,4,6,7,8-HxCDF	µg/L	NG	-	-
1,2,3,4,6,7,8-HpCDF	µg/L	NG	-	-
1,2,3,4,7,8,9-HpCDF	µg/L	NG	-	-
OCDF	µg/L	NG	-	-
Total-TCDF	µg/L	NG	-	-
Total TCDF # Homologues	µg/L	NG	-	-
Total-PeCDF	µg/L	NG	-	-
Total PeCDF # Homologues	µg/L	NG	-	-
Total-HxCDF	µg/L	NG	-	-
Total HxCDF # Homologues	µg/L	NG	-	-
Total-HpCDF	µg/L	NG	-	-
Total HpCDF # Homologues	µg/L	NG	-	-
13C12-2,3,7,8-TCDD	µg/L	NG	-	-
13C12-1,2,3,7,8-PeCDD	µg/L	NG	-	-
13C12-1,2,3,4,7,8-HxCDD	µg/L	NG	-	-
13C12-1,2,3,6,7,8-HxCDD	µg/L	NG	-	-
13C12-1,2,3,4,6,7,8-HpCDD	µg/L	NG	-	-
13C12-OCDD	µg/L	NG	-	-
13C12-2,3,7,8-TCDF	µg/L	NG	-	-
13C12-1,2,3,7,8-PeCDF	µg/L	NG	-	-
13C12-2,3,4,7,8-PeCDF	µg/L	NG	-	-
13C12-1,2,3,4,7,8-HxCDF	µg/L	NG	-	-
13C12-1,2,3,6,7,8-HxCDF	µg/L	NG	-	-
13C12-2,3,4,6,7,8-HxCDF	µg/L	NG	-	-
13C12-1,2,3,7,8,9-HxCDF	µg/L	NG	-	-
13C12-1,2,3,4,6,7,8-HpCDF	µg/L	NG	-	-
13C12-1,2,3,4,7,8,9-HpCDF	µg/L	NG	-	-
37Cl4-2,3,7,8-TCDD (Cleanup)	µg/L	NG	-	-
Lower Bound PCDD/F TEQ (WHO 2005)	µg/L	NG	-	-
Mid Point PCDD/F TEQ (WHO 2005)	µg/L	NG	-	-
Upper Bound PCDD/F TEQ (WHO 2005)	µg/L	NG	-	-
Organochlorine Pesticides				
Aldrin	µg/L	0.001	MECP	-
alpha-BHC	µg/L	2.2	Suter and Tsao	-
beta-BHC	µg/L	2.2	Suter and Tsao	-
gamma-hexachlorocyclohexane	µg/L	0.01	MECP	-
delta-BHC	µg/L	2.2	Suter and Tsao	-
a-chlordane	µg/L	NG	-	-

APPENDIX B, TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Organochlorine Pesticides				
Chlordane (Total)	µg/L	0.006	CCME	-
g-chlordane	µg/L	NG	-	-
o,p-DDD	µg/L	NG	-	-
pp-DDD	µg/L	0.011	Suter and Tsao	-
Total DDD	µg/L	NG	-	-
o,p-DDE	µg/L	NG	-	-
pp-DDE	µg/L	NG	-	-
Total DDE	µg/L	NG	-	-
op-DDT	µg/L	NG	-	-
pp-DDT	µg/L	NG	-	-
Total DDT	µg/L	0.013	Suter and Tsao	-
DDT+Metabolites	µg/L	0.001	CCME	-
Dieldrin	µg/L	0.001	MECP	-
Endosulfan I	µg/L	NG	-	-
Endosulfan II	µg/L	0.056	US EPA	-
Endosulfan Sulfate	µg/L	0.056	US EPA	-
Endosulfan (Total)	µg/L	0.003	MECP	-
Endrin	µg/L	0.002	MECP	-
Endrin Aldehyde	µg/L	NG	-	-
Heptachlor	µg/L	0.001	MECP	-
Heptachlor Epoxide	µg/L	0.001	MECP	-
Hexachlorobenzene	µg/L	0.0065	MECP	-
Hexachlorobutadiene	µg/L	0.009	MECP	-
Hexachloroethane	µg/L	1	MECP	-
Methoxychlor	µg/L	0.04	MECP	-
Mirex	µg/L	0.001	MECP	-
trans-Nonachlor	µg/L	NG	-	-
Oxychlordane	µg/L	NG	-	-
Pentachloronitrobenzene	µg/L	NG	-	-
Decachlorobiphenyl	µg/L	NG	-	-
Tetrachloro-m-xylene	µg/L	NG	-	-
Herbicides and Pesticides				
Glyphosate	µg/L	280	Health Canada	Drinking water (lower than CCME value)
Aminomethylphosphonic acid (AMPA)	µg/L	NG		

APPENDIX B. TABLE 1

Water quality guidelines selected for use in the Year 1 baseline report.

COPC	Units	Water Quality Guideline		
		Value ¹	Source	Comment ²
Radionuclides				
H-3 (Tritium)	Bq/L	7000	MECP	-
C-14	Bq/L	200	Health Canada	Drinking water
Cl-36	Bq/L	NG	-	-
Co-60	Bq/L	40	Health Canada	Drinking water
Cs-137	Bq/L	10	Health Canada	Drinking water
I-129	Bq/L	1	Health Canada	Drinking water
K-40	Bq/L	NG	-	-
Np-237	Bq/L	NG	-	-
Pu-238	Bq/L	0.6	Health Canada	Drinking water
Pu-239	Bq/L	0.6	Health Canada	Drinking water
Ra-226	Bq/L	0.5	Health Canada	Drinking water (lower than MECP value)
Ru-106	Bq/L	20	Health Canada	
Sr-90	Bq/L	5	Health Canada	Drinking water
Th-228	Bq/L	2	Health Canada	Drinking water
Th-230	Bq/L	0.6	Health Canada	Drinking water
Th-232	Bq/L	0.6	Health Canada	Drinking water
U-234	Bq/L	3	Health Canada	Drinking water
U-235	Bq/L	3	Health Canada	Drinking water
U-238	Bq/L	3	Health Canada	Drinking water
Gross Alpha	Bq/L	NG	-	-
Gross Beta	Bq/L	NG	-	-

NG - No Guideline.

¹See Section 3.2.3.1 for the procedure for selecting the water quality guideline.

²Values that are dependent on hardness, pH, dissolved organic carbon (DOC), and temperature are based on the following values:

Hardness 7.4 mg/L CaCO₃. The median hardness ranged from 7.4 mg/L CaCO₃ (Revell Lake) to 18 mg/L CaCO₃ (Reference Pond)

DOC 7.5 mg/L. The median ranged from 7.5 mg/L (Revell Lake) to 23 mg/L (Unnamed AOI Pond)

pH 6.83. The median ranged from 6.83 (Unnamed AOI Pond) to 7.52 (Wabigoon River)

Temperature: 20°C, assumed summer temperature

Alberta: Environmental quality guidelines for Alberta surface waters (GA 2018).

BCMOE: British Columbia Ministry of Environment approved water quality guideline (BCMOE 2023).

CCME: Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guideline (CWQG) for the Protection of Freshwater Aquatic Life, and for the Protection of Agriculture (Irrigation and Livestock) (CCME 2023).

ECHA PNEC: European Chemicals Agency (ECHA) Probable No Effects Concentrations (PNEC) (<https://echa.europa.eu/information-on-chemicals>).

FEQG: Government of Canada Federal Environmental Quality Guideline (FEQG) for surface water quality (GC 2021).

Health Canada: Guideline for Canadian Drinking Water Quality and Recreational Water Quality (Health Canada 2022a).

MECP: Ontario Ministry of Environment, Conservation and Parks (MECP) Provincial Water Quality Objective (MOEE 1994).

NWMO: Nuclear Waste Management Organization interim acceptance criteria (NWMO 2015, 2019).

Suter and Tsao: Suter and Tsao 1996.

US EPA: United States Environmental Protection Agency water quality criteria for aquatic life (US EPA 2022).

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
Mennin Lake													
MenninLake_01	ML1	Spring	2022-06-01	2.0	1.6	0.3	10.36	10.55	94.3	20.3	5.79	324.1	1.55
						0.5	10.35	10.53	94.0	20.3	5.78	320.9	1.60
						1	10.35	10.52	93.9	20.3	5.84	321.4	1.50
		Summer	2021-07-31	1.4	1.4	0.3	22.33	8.23	94.7	24.2	7.22	273.4	1.04
						0.5	22.34	8.23	94.7	24.2	7.21	283.7	0.98
						1	21.72	7.88	89.9	24.4	7.01	300.5	1.54
		Fall	2021-09-25	2.2	1.0	0.3	14.38	7.98	78.1	24.8	6.25	331.8	2.05
						1	14.37	7.97	78.0	24.8	6.24	340.9	2.08
						1.8	14.08	7.92	77.0	24.7	6.23	340.9	2.04
MenninLake_02	ML2	Spring	2022-05-27	14.2	1.5	0.3	11.64	11.10	102.2	19.8	6.25	301.9	1.28
						1	11.42	11.17	102.0	19.8	6.23	315.9	1.36
						2	9.39	11.15	97.5	20.0	6.11	333.3	1.18
						3	9.27	11.07	96.4	20.0	5.90	357.2	1.27
						4	9.16	11.04	95.9	20.0	5.82	363.3	1.22
						5	9.01	11.02	95.3	20.0	5.78	368.7	1.27
						6	8.67	10.98	94.2	20.1	5.74	372.1	1.30
						7	7.80	10.80	90.8	20.1	5.70	375.8	1.28
						8	6.94	10.76	88.6	20.2	5.70	377.2	1.22
						9	6.67	10.53	86.1	20.2	5.69	380.2	1.27
						10	6.43	10.50	85.2	20.3	5.67	381.8	1.30
						11	6.18	10.50	84.7	20.3	5.64	386.0	1.26
						12	5.98	10.43	83.7	20.3	5.60	388.7	1.25
						12.5	5.78	10.12	80.8	20.4	5.58	325.6	1.56
		Summer	2021-08-02	13.3	2.3	0.3	21.72	8.36	95.0	21.2	7.00	184.2	0.93
						1	21.64	8.33	94.6	21.2	6.95	187.3	0.91
						2	21.48	8.27	93.6	21.2	6.90	191.7	0.91
						3	21.34	8.16	92.1	21.2	6.65	218.2	0.97
						4	21.19	8.10	91.2	21.2	6.20	236.5	0.98
						5	17.97	4.54	48.2	21.4	5.53	258.0	1.76
						6	15.33	3.46	34.6	21.3	5.43	263.1	1.73
						7	13.44	3.49	33.4	21.1	5.41	265.3	2.32
		8	11.36	3.99	36.6	20.8	5.39	269.7	2.25				

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
MenninLake_02	ML2	Summer	2021-08-02	13.3	2.3	9	10.01	3.67	32.5	21.0	5.33	275.5	2.31
						10	9.31	3.68	31.9	21.0	5.36	275.4	2.36
						11	8.69	3.27	28.0	21.2	5.26	282.6	2.79
						12	8.34	2.82	24.0	21.5	5.28	281.3	2.78
						13	8.05	1.26	10.7	23.1	5.44	155.3	11.85
		Fall	2021-09-23	14.5	1.6	0.3	16.36	8.64	88.2	24.3	6.72	437.5	1.08
						1	16.32	8.63	88.0	24.3	6.71	430.4	1.13
						2	16.27	8.61	87.7	24.3	6.71	424.2	1.15
						3	16.20	8.59	87.4	24.3	6.70	422.6	1.13
						4	16.11	8.55	86.8	24.3	6.69	422.0	1.07
						5	15.95	8.38	84.9	24.3	6.64	424.3	1.23
						6	15.66	8.01	80.7	24.2	6.45	432.9	1.43
						7	15.57	7.72	77.4	24.2	6.11	451.8	1.56
						8	15.33	7.43	74.3	24.1	5.67	474.8	1.74
						9	14.40	6.21	61.2	24.3	5.30	492.0	2.50
						10	11.74	1.30	13.3	26.7	5.24	495.5	4.03
						11	9.54	0.10	1.1	27.4	5.25	473.0	6.50
						12	8.69	-0.08	-0.6	34.8	5.55	241.5	7.12
						13	8.36	-0.15	-1.3	53.1	5.92	160.9	2.78
MenninLake_03	ML3	Spring	2022-05-26	6.4	2.2	0.3	10.67	11.24	101.5	20.9	6.18	301.6	1.72
						1	9.84	11.21	99.0	21.1	6.03	324.8	1.53
						2	9.66	11.18	98.2	21.2	5.96	333.9	1.39
						3	9.47	11.14	97.5	21.2	5.90	341.3	1.32
						4	9.30	11.07	96.5	21.3	5.85	348.4	1.28
						5	8.96	11.00	95.0	21.3	5.80	353.6	1.29
MenninLake_03	ML3	Summer	2021-07-29	5.5	2.0	0.2	21.82	8.22	93.7	25.0	6.95	242.5	0.95
						1	21.82	8.20	93.5	25.0	6.92	263.4	0.97
						2	21.82	8.20	93.5	25.0	6.92	267.5	0.97
						3	21.81	8.18	93.2	25.0	6.43	302.1	0.98
						4	21.81	8.17	93.1	25.1	6.36	308.9	0.96
						5	21.76	8.20	92.7	25.1	6.22	318.3	1.06
		Fall	2021-09-24	6.1	2.0	0.3	16.04	8.67	88.0	24.0	6.36	305.2	1.63
						1	16.05	8.67	88.0	24.0	6.37	316.4	1.71

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
MenninLake_03	ML3	Fall	2021-09-24	6.1	2.0	2	16.06	8.66	87.9	24.0	6.40	329.2	1.60
						3	16.04	8.62	87.4	24.0	6.42	334.9	1.70
						4	15.90	8.32	84.0	23.8	6.29	345.1	1.80
						5	15.68	7.74	77.9	23.6	6.13	353.9	2.21
						5.5	15.29	7.99	79.8	23.0	6.09	359.5	1.93
Mennin River													
MenninRiver_01	MR1	Spring	2022-05-25	1.0	-	0.3	11.70	10.33	95.2	19.3	6.27	287.7	0.53
		Summer	2021-07-31	0.5	0.5	0.2	23.55	10.99	128.9	23.4	7.43	246.8	0.35
		Fall	2021-09-24	1.0	0.7	0.3	14.01	8.01	77.8	20.4	5.40	358.0	-0.1 ¹
MenninRiver_02	MR2	Spring	2022-05-28	1.2	1.2	0.3	15.37	9.81	98.4	17.7	5.99	308.5	1.60
		Summer	2021-08-01	1.0	0.8	0.3	19.85	7.77	85.2	25.3	6.70	186.9	3.30
						0.5	19.80	7.74	84.8	25.3	6.66	179.8	3.26
						0.7	19.82	7.65	83.9	25.3	6.65	187.4	3.08
		Fall	2021-09-24	1.5	0.9	0.3	14.60	7.61	74.9	22.0	5.63	354.5	1.40
						1	14.59	7.51	73.9	22.0	5.58	354.7	1.57
MenninRiver_03	MR3	Spring	2022-05-23	0.8	-	0.3	8.35	11.54	98.3	19.5	6.11	279.6	1.90
		Summer	2021-08-06	0.9	0.9	0.1	21.57	6.38	72.3	62.0	6.79	182.3	2.28
						0.3	21.28	5.80	65.7	62.6	6.73	183.0	3.12
						0.5	20.65	5.33	58.5	67.3	6.69	184.9	2.74
		Fall	2021-09-27	0.8	-	0.3	13.89	9.09	88.0	24.0	5.85	348.7	2.41
						0.7	13.90	9.08	87.9	24.0	5.89	344.1	2.52
Revell Lake													
RevellLake_01	RL1	Spring	2022-05-19	10.0	3.8	0.3	7.57	10.63	88.8	17.9	5.99	307.8	0.36
						1	7.22	10.62	88.0	17.8	5.93	313.7	0.34
						2	7.02	10.60	87.3	17.9	5.90	321.9	0.39
						3	6.61	10.57	86.2	18.0	5.90	325.3	0.38
						4	6.46	10.61	86.3	18.0	5.90	318.1	0.41
						5	6.23	10.57	85.4	18.1	5.91	328.2	0.38
						6	5.75	10.53	84.0	18.2	5.91	329.1	0.36
						7	5.40	10.34	81.9	18.3	5.92	329.5	0.34
						8	5.13	10.05	79.0	18.5	5.91	330.9	0.45
		Summer	2021-08-07	8.7	4.4	0.3	21.09	8.48	95.4	16.3	7.21	192.5	0.46

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (μS/cm)	pH	ORP (mV)	Turb. (NTU)
RevellLake_01	RL1	Summer	2021-08-07	8.7	4.4	1	21.09	8.48	95.2	16.3	7.19	195.8	0.51
						2	21.08	8.46	95.0	16.3	7.17	200.5	0.51
						3	21.04	8.42	94.4	16.3	7.14	203.6	0.48
						4	20.95	8.34	93.4	16.4	7.09	207.5	0.50
						5	19.72	7.40	80.0	16.4	6.71	222.5	0.40
						6	13.99	6.92	66.7	15.9	6.21	253.8	0.35
						7	10.67	7.07	63.4	15.9	5.90	276.5	0.31
						8	8.31	6.63	56.4	16.1	5.64	260.4	0.36
RevellLake_01	RL1	Fall	2021-09-21	9.1	4.1	0.3	15.97	8.75	88.7	26.4	6.93	237.2	<0.06
						1	15.98	8.75	88.6	26.4	6.90	245.1	<0.08
						2	15.98	8.74	88.5	26.4	6.29	289.0	>0.06
						3	15.99	8.75	88.6	26.4	6.28	293.4	<0.08
						4	15.98	8.73	88.4	26.4	6.21	299.9	<0.04
						5	15.98	8.72	88.4	26.4	6.22	301.9	<0.07
						6	15.98	8.72	88.3	26.4	6.21	304.5	<0.08
						7	15.97	8.71	88.2	26.4	6.18	309.9	<0.06
						8	15.92	8.69	87.9	26.4	6.16	311.3	<0.11
						8.5	10.92	4.73	43.1	27.3	5.34	343.0	<0.12
RevellLake_02	RL2	Spring	2022-05-20	8.6	2.2	0.3	8.86	10.65	91.8	16.7	6.11	314.3	0.40
						1	8.77	10.61	91.3	16.8	6.07	317.2	0.42
						2	8.59	10.61	90.9	16.8	6.01	321.5	0.46
						3	8.50	10.61	90.6	16.8	5.94	325.7	0.42
						4	8.43	10.60	90.4	16.8	5.90	329.3	0.45
						5	8.10	10.38	87.9	17.0	5.81	333.9	0.42
						6	6.96	9.91	81.6	17.2	5.68	345.9	0.46
						7	6.81	9.90	81.2	17.1	5.68	344.7	0.52
		Summer	2021-08-06	7.7	4.1	0.3	21.72	8.21	93.4	16.6	7.00	227.2	0.61
						1	21.72	8.20	93.2	16.6	6.99	240.0	0.52
						2	21.72	8.20	93.2	16.6	6.99	243.6	0.60
						3	21.72	8.18	93.1	16.6	6.99	249.4	0.60
						4	21.72	8.17	92.9	16.6	6.98	257.4	0.61
						5	21.68	8.16	92.7	16.6	6.98	260.5	0.61
						6	19.45	5.17	55.0	17.2	6.33	286.9	1.07

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
RevellLake_02	RL2	Summer	2021-08-06	7.7	4.1	7	15.67	0.00	0.0	29.8	6.14	57.0	0.71
		Fall	2021-09-22	8.1	3.4	0.3	15.66	8.74	87.8	26.8	6.84	407.1	0.08
						1	15.65	8.73	87.8	26.8	6.83	405.1	0.10
						2	15.63	8.71	87.5	26.8	6.82	404.5	0.12
						3	15.64	8.70	87.5	26.8	6.83	403.4	0.15
						4	15.61	8.66	87.0	26.8	6.79	403.4	0.12
						5	15.59	8.64	86.8	26.9	6.30	436.7	0.11
						6	15.53	8.61	86.3	26.9	5.98	446.7	0.10
						7	15.42	8.61	86.2	26.9	6.03	443.5	0.08
						7.5	15.42	8.61	86.2	26.9	5.97	444.9	0.13
Revell River													
RevellRiver_01	RR1	Spring	2022-05-24	1.0	0.0	0.3	10.15	10.70	95.6	47.8	5.91	225.8	1.45
		Summer	2021-08-04	0.8	0.8	0.3	17.21	7.89	82.1	169.6	7.06	239.4	1.70
						0.5	17.22	7.90	82.1	169.6	7.07	242.9	1.70
		Fall	2021-09-21	0.9	0.7	0.3	11.57	7.62	70.0	54.5	5.40	300.7	1.80
						0.6	11.54	7.65	70.3	55.0	5.44	291.7	1.71
Area of Interest Ponds													
UWB_01	P1	Spring	2022-05-31	0.8	0.0	0.3	13.40	8.68	88.8	14.3	5.06	352.1	0.82
		Fall	2021-10-01	0.9	0.5	0.3	17.45	6.57	68.9	26.0	5.15	335.4	3.84
						0.5	17.12	6.07	63.0	26.2	5.18	333.9	3.28
						0.7	16.87	5.74	59.0	26.2	5.17	338.7	4.24
UWB_02	P2	Spring	2022-05-23	2.0	0.8	0.3	11.55	8.88	81.5	13.4	5.31	294.8	0.48
						1	11.47	8.86	81.2	13.5	5.08	300.7	0.46
						1.5	11.37	8.82	80.7	13.5	5.08	303.9	0.46
		Fall	2021-10-01	1.9	0.5	0.3	17.32	6.72	70.0	25.6	5.01	351.6	1.30
						0.5	16.66	6.42	66.7	25.6	5.03	357.2	1.36
						1	14.67	5.44	54.0	26.0	4.97	371.3	1.33
						1.5	13.50	4.49	42.0	26.0	4.94	391.9	1.48
		Winter	2022-02-16	0.8	-	0.5	1.85	4.91	34.5	23.6	5.28	140.2	1.45
UWB_03	P3	Spring	2022-05-21	4.0	1.3	0.3	10.37	9.79	87.3	15.5	5.69	318.6	1.10
						1	10.34	9.61	85.8	15.5	5.63	329.1	1.06
						2	9.64	9.20	81.0	16.1	5.60	336.1	1.20
						3	9.08	8.28	71.4	16.7	5.59	341.9	1.53

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (μS/cm)	pH	ORP (mV)	Turb. (NTU)
UWB_03	P3	Summer	2021-08-03	3.5	1.0	0.3	21.67	7.77	88.2	20.8	6.68	331.2	1.53
						1	21.67	7.76	88.2	20.8	6.70	335.3	1.53
						2	20.85	5.92	66.1	21.3	6.34	349.4	2.29
						3	16.97	0.26	2.7	36.3	6.17	122.6	3.53
		Fall	2021-09-27	3.8	0.9	0.3	14.10	9.29	92.0	22.3	6.38	-	2.81
						0.5	14.10	9.29	92.5	22.6	5.81	-	2.95
						1	14.10	9.20	92.1	23.5	5.78	-	2.90
						1.5	14.10	9.20	91.3	23.6	5.79	-	2.99
						2	14.10	8.98	90.2	23.6	5.78	-	3.07
						2.5	14.00	8.98	89.2	23.6	5.75	-	3.05
						3	14.00	8.95	89.1	23.6	5.76	-	3.50
						3.5	13.70	8.92	89.1	23.3	5.69	-	3.19
		Winter	2022-02-15	2.2	-	0.3	0.55	8.51	58.5	25.9	5.72	174.9	-1.48 ¹
						1	1.96	7.12	51.1	25.5	5.72	188.8	-1.1 ¹
UWB_04	P4	Spring	2022-05-22	3.6	0.9	0.3	10.42	9.12	81.6	15.3	5.17	289.9	0.69
						1	10.32	9.06	80.9	15.3	5.16	299.4	0.76
						2	8.95	8.36	72.4	16.2	4.94	334.3	0.69
						2.5	8.43	7.57	64.1	16.6	4.86	345.2	0.66
		Summer	2021-07-14	3.6	1.0	0.3	22.93	-	92.4	22.4	6.69	-	1.24 ²
						1	22.74	-	91.3	22.4	6.64	-	1.20 ²
						1.5	22.44	-	84.2	22.7	6.46	-	1.45 ²
						2	20.22	-	48.8	23.4	6.00	-	1.65 ²
						2.5	17.65	-	16.7	23.9	5.78	-	3.75 ²
						3	16.35	-	0.6	25.2	5.42	-	10.28 ²
		Fall	2021-09-29	3.0	0.6	0.3	15.37	6.72	67.2	25.5	5.38	339.2	1.10
						0.5	15.30	6.62	66.0	25.5	5.34	348.6	1.18
						1	14.71	6.39	63.4	25.6	5.34	362.3	1.13
						2	13.82	5.94	57.4	25.4	5.28	380.2	1.27
						2.7	13.49	5.28	50.7	26.6	5.02	396.5	1.46
		Winter	2022-02-18	2.1	-	1	3.21	- ²	- ²	29.2	5.41	306.4	0.86

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
UWB_05	P5	Spring	2022-05-22	2.8	1.0	0.3	10.04	9.53	84.9	15.0	5.10	345.6	0.70
						1	9.71	9.18	80.8	15.1	5.02	359.2	0.75
						1.5	9.17	8.70	75.6	15.7	4.92	373.4	0.72
		Fall	2021-09-29	2.5	0.6	0.3	16.03	7.14	72.6	24.5	5.46	359.3	1.29
						0.5	15.65	7.08	71.2	24.5	5.46	354.5	1.25
						1	14.67	6.94	69.1	24.6	5.43	359.6	1.26
					1.5	13.81	6.18	59.2	24.7	5.32	387.0	1.38	
					2	13.77	6.25	60.3	24.7	5.34	379.6	1.36	
UWB_06	P6	Spring	2022-06-02	1.0	-	0.3	15.36	10.06	100.7	13.9	6.26	229.2	1.60
		Fall	2021-09-27	0.9	0.9	0.3	14.72	8.66	85.4	17.0	6.52	262.7	0.74
						0.8	14.68	8.64	85.1	17.0	6.41	280.9	1.48
UWB_07	P7	Spring	2022-05-28	2.7	0.9	0.3	17.34	9.09	94.7	14.3	5.65	332.7	0.67
						1	17.26	9.03	93.8	14.3	5.66	353.8	0.69
						1.5	12.94	8.02	76.0	14.8	5.20	398.9	0.73
						2	11.37	7.20	66.0	15.6	5.29	409.2	1.05
		Fall	2021-09-26	0.9	0.6	0.3	14.88	5.93	58.6	25.3	5.33	305.7	3.43
	0.8					14.88	5.41	52.3	25.9	5.31	303.1	3.82	
Reference Ponds													
UWB_08	RP1	Spring	2022-05-25	3.0	1.1	0.3	14.39	11.24	110.1	45.5	7.21	290.9	1.81
						1	14.30	11.25	109.9	45.5	7.17	292.6	1.79
						2	11.20	10.48	95.6	45.7	6.75	290.9	1.80
		Summer	2021-08-08	4.8	1.5	0.3	21.44	8.46	95.7	56.1	7.61	163.5	1.40
						1	21.43	8.46	95.7	56.1	7.62	166.7	1.36
						2	21.44	95.50	8.4	56.1	7.62	167.7	1.38
						3	19.78	4.04	43.6	57.6	6.78	188.5	2.77
						4	14.86	0.00	0.0	68.7	6.44	64.2	5.07
		Fall	2021-09-26	5.1	0.9	0.3	15.07	8.58	85.2	52.0	7.11	266.3	1.75
						1	14.77	8.31	82.0	51.9	6.99	281.7	1.88
						2	14.70	8.29	81.6	51.9	6.95	300.8	1.83
						3	14.69	8.26	81.7	51.9	6.95	310.8	1.72
						4	14.64	8.38	82.5	52.0	6.95	318.7	1.73
						4.8	14.45	8.16	80.0	52.2	6.95	326.2	1.72
UWB_09	RP2	Spring	2022-05-24	3.8	1.2	0.3	12.13	10.73	99.5	25.5	6.88	287.3	1.24

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
UWB_09	RP2	Spring	2022-05-24	3.8	1.2	1	10.82	10.32	91.9	25.2	6.56	312.0	1.41
						2	8.11	7.04	59.2	30.8	6.01	330.2	2.03
		Summer	2021-08-07	3.4	1.5	0.3	20.84	7.10	79.4	35.4	7.10	260.6	1.02
						1	20.85	35.40	78.7	35.4	7.04	292.5	1.00
						2	20.24	6.14	68.2	35.4	6.25	311.9	1.28
						3	11.75	0.28	2.5	32.4	5.77	269.8	7.12
		Fall	2021-09-26	3.1	1.1	0.3	14.81	8.02	79.3	35.2	7.01	208.8	1.66
						1	14.13	7.97	77.5	35.0	6.64	251.6	1.66
						2	13.86	7.58	73.3	35.1	6.53	275.4	1.60
2.8	13.79					7.28	70.3	35.2	6.47	295.0	1.65		
UWB_10	RP3	Spring	2022-05-29	1.6	1.2	0.3	16.47	9.39	96.1	23.0	6.31	325.3	2.11
						0.9	16.13	9.25	94.1	23.0	6.25	341.2	4.12
		Fall	2021-09-30	0.8	0.8	0.3	16.20	8.83	89.8	25.4	5.52	354.9	3.05
						0.5	16.13	8.73	88.7	25.5	5.57	352.6	6.35
						Unnamed Watercourse							
UWC_01	ML4	Spring	2022-06-01	2.0	1.0	0.3	13.46	9.93	95.3	14.7	5.37	292.8	1.73
						0.5	13.46	9.87	94.6	14.7	5.35	289.3	1.67
						1	13.48	9.85	94.5	14.7	5.37	288.5	1.66
		Summer	2021-08-01	1.7	1.0	0.3	21.25	6.59	74.1	27.0	6.42	332.6	1.72
						1	19.31	5.96	64.6	27.1	6.31	344.1	1.68
						1.3	19.04	5.66	61.9	27.2	6.32	348.4	1.80
		Fall	2021-09-23	2.0	0.5	0.3	13.59	7.70	74.1	22.3	4.85	380.8	2.30
						0.5	13.60	7.69	74.0	22.3	4.76	382.9	2.37
						1	13.61	7.69	73.9	22.3	4.75	385.4	2.38
						1.5	13.62	7.68	73.9	22.3	4.73	385.7	2.58
1.8	13.63	7.68	73.9	22.3	4.71	386.8	2.38						
Wabigoon River													
WabigoonRiver_01	WR1	Spring	2022-05-22	3.4	-	0.3	9.38	11.14	97.3	29.9	5.99	132.5	5.16
						1	9.38	11.13	97.2	29.9	5.94	141.8	5.06
						2	9.38	11.12	97.1	29.9	5.91	148.6	5.37
						3	9.39	11.10	96.4	30.0	5.46	149.5	5.24
		Summer	2021-08-03	0.6	0.6	0.3	18.45	8.23	87.7	63.0	7.23	207.9	3.15
						0.5	18.45	8.23	87.7	63.0	7.23	205.9	3.17

APPENDIX B, TABLE 2

Limnology results for surface water stations sampled during the Year 1 EMBP.

Station ID	Site ID	Season	Date	Station Depth (m)	Secchi Depth (m)	Depth (m)	Temp. (°C)	DO (mg/L)	DO (%)	SPC (µS/cm)	pH	ORP (mV)	Turb. (NTU)
WabigoonRiver_01	WR1	Fall	2021-09-22	0.9	0.6	0.3	12.57	9.89	93.0	38.7	6.46	278.9	2.83
						0.65	12.52	9.93	93.2	38.7	6.43	274.8	2.91
WabigoonRiver_02	WR2	Spring	2022-05-22	2.1	-	0.3	8.59	11.04	94.5	34.5	5.40	149.8	8.02
						1	8.58	11.01	94.3	34.5	5.28	162.2	8.05
						1.5	8.58	11.00	94.2	34.5	5.19	171.5	8.15
		Summer	2021-08-04	0.8	0.8	0.1	19.25	7.89	85.5	100.3	7.21	144.0	2.91
						0.3	19.26	7.90	85.6	100.2	7.21	143.7	2.86
						0.5	19.26	7.89	85.5	100.2	7.21	143.1	2.83
		Fall	2021-09-27	0.9	0.9	0.3	11.90	10.25	95.5	50.9	6.47	- ³	4.41
						0.5	11.90	10.20	94.9	50.1	5.32	- ³	4.57
						1	11.90	9.89	94.6	50.2	5.75	- ³	4.74
WabigoonRiver_03	WR3	Spring	2022-05-29	3.0	-	0.3	15.34	10.14	101.4	34.5	6.38	308.4	5.17
						1	15.34	10.12	101.1	34.8	6.40	307.6	5.42
						2	15.33	10.12	101.1	35.1	6.38	308.2	5.37
		Summer	2021-07-29	1.9	0.2	0.3	20.94	6.97	78.0	114.3	7.23	300.0	2.88
						1	20.78	6.88	76.8	114.4	7.21	302.5	2.91
						1.4	20.75	6.85	76.5	114.4	7.21	304.9	2.93
		Fall	2021-09-25	2.8	-	0.3	13.32	9.65	92.3	39.6	6.57	257.8	4.10
						1	13.32	9.64	92.3	39.5	6.52	292.4	4.89

Temp. = temperature; DO = dissolved oxygen; ORP = oxidation-reduction potential; turb. = turbidity; '-' = no data.

¹Uncertain due to conditions

²Units of turbidity are FNU

³No data due to meter malfunction

APPENDIX B, TABLE 3

Summary of Year 1 surface water chemistry results from Mennin Lake.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	36	1	0	6.66	1.09	5	7.1	7.8	-
Ammonia, Total (as N)	mg/L	36	0.01	13	0.0245	0.0299	<0.01	0.013	0.066	5.855
Anion Sum	me/L	3	NA	0	0.167	0.006	0.16	0.17	0.17	-
Bicarbonate (HCO3)	mg/L	36	1.2	0	8.13	1.34	6.1	8.7	9.5	-
Biochemical Oxygen Demand	mg/L	36	2 to 6	35	2.17	0.74	<2	<2	2.5	-
Bromide (Br)	mg/L	36	0.1	36	<0.1	-	<0.1	<0.1	<0.1	-
Carbonate (CO3)	mg/L	36	0.6	36	<0.6	-	<0.6	<0.6	<0.6	-
Cation Sum	me/L	3	NA	NA	0.26	0	0.26	0.26	0.26	-
Chloride (Cl)	mg/L	36	0.5	0	0.70	0.19	0.57	0.66	0.93	120
Conductivity	umhos/cm	36	1	0	23.8	1.65	21.6	24.3	25.9	700
Cyanide, Total	mg/L	36	0.002	36	0.002	-	<0.002	<0.002	<0.002	0.005
Dissolved Organic Carbon	mg/L	36	0.5	0	12.5	1.39	10.6	12.7	15.0	-
Fluoride (F)	mg/L	36	0.02	0	0.040	0.008	0.034	0.039	0.043	0.12
Hardness (as CaCO3)	mg/L	3	NA	0	9.7	0.16	9.6	9.7	9.9	-
Hydroxide (OH)	mg/L	36	0.34	36	<0.34	-	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	15	0.2	15	<0.2	-	<0.2	<0.2	<0.2	-
Langelier Index	-	3	NA	NA	-3	0	-3	-3	-3	-
Nitrate (as N)	mg/L	36	0.02	19	0.049	0.035	<0.02	0.021	0.11	3
Nitrate and Nitrite as N	mg/L	36	0.07	21	0.077	0.014	0.07	0.07	0.11	-
Nitrite (as N)	mg/L	36	0.01	36	<0.01	-	<0.01	<0.01	<0.01	0.02
pH	pH units	12	0.1	0	6.873	0.105	6.69	6.92	6.95	6.5 to 9.0
Phosphorus (P), Total	mg/L	36	0.003	0	0.015	0.0085	0.0081	0.014	0.024	0.01
Sulfate (SO4)	mg/L	36	0.3	0	1.06	0.17	0.97	1.03	1.19	128
TDS (Calculated)	mg/L	3	NA	NA	11.3	0.058	11.2	11.3	11.3	-
Total Dissolved Solids	mg/L	36	4 to 13.3	0	37.1	3.13	31.3	37.4	40.6	500
Total Inorganic Carbon	mg/L	36	0.5	7	1.00	0.59	<0.5	0.87	1.97	-
Total Kjeldahl Nitrogen	mg/L	36	0.2	1	0.44	0.17	0.23	0.40	0.72	-
Total Organic Carbon	mg/L	36	0.5	0	12.6	1.58	10.7	12.4	15.2	-
Total Suspended Solids	mg/L	36	3	25	3.23	0.64	<3	<3	4.10	-
Turbidity	NTU	36	0.1	0	2.23	2.26	1.20	1.66	3.21	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	36	1	9	11.2	12.2	<1	3.00	30.8	100
Total Coliforms	CFU/100mL	36	1	1	137	86.6	6.25	>200	>200	-
Metals										
Total										
Aluminum (Al)	mg/L	36	0.003	0	0.182	0.055	0.110	0.185	0.250	0.32
Antimony (Sb)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	0.006
Arsenic (As)	mg/L	36	0.0001	0	0.00038	0.00008	0.00031	0.00037	0.00045	0.005
Barium (Ba)	mg/L	36	0.0001	0	0.0061	0.0006	0.0055	0.0060	0.0074	1
Beryllium (Be)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	36	0.00005	36	<0.00005	-	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	36	0.01	36	<0.01	-	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	36	0.000005	1	0.0000087	0.000004	0.0000059	0.0000079	0.000016	0.00004
Calcium (Ca)	mg/L	36	0.05	0	2.70	0.16	2.54	2.65	3.04	1000
Cesium (Cs)	mg/L	36	0.00001	17	0.000011	0.000002	<0.00001	<0.00001	0.000014	-
Chromium (Cr)	mg/L	36	0.0001	0	0.00037	0.00006	0.00029	0.00037	0.00046	-
Chromium III (Cr3+)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	37	0.0005	33	0.00052	0.00005	<0.0005	<0.0005	0.00061	0.005
Cobalt (Co)	mg/L	36	0.0001	17	0.00014	0.00022	<0.0001	<0.0001	0.00012	0.00078
Copper (Cu)	mg/L	36	0.0005	0	0.013	0.064	0.00075	0.00089	0.015	0.002
Iron (Fe)	mg/L	36	0.01	0	0.43	0.51	0.19	0.37	0.48	3.3
Lead (Pb)	mg/L	36	0.00005	0	0.00035	0.0012	0.000077	0.00013	0.00032	0.001
Lithium (Li)	mg/L	36	0.001	35	0.001	0.00002	<0.001	<0.001	<0.001	2.5
Magnesium (Mg)	mg/L	36	0.005	0	0.73	0.053	0.66	0.75	0.80	82
Manganese (Mn)	mg/L	36	0.0001	0	0.042	0.100	0.012	0.025	0.045	0.12
Mercury (Hg)	mg/L	36	0.000005	33	0.000005	0.000003	<0.000005	<0.000005	0.0000053	0.000026
Molybdenum (Mo)	mg/L	36	0.00005	0	0.00032	0.00007	0.00022	0.00030	0.00039	0.073
Nickel (Ni)	mg/L	36	0.0005	33	0.00051	0.00003	<0.0005	<0.0005	0.00055	0.025
Phosphorus (P)	mg/L	36	0.05	36	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	36	0.05	0	0.41	0.015	0.39	0.41	0.43	53
Rhodium (Rh)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	36	0.0002	0	0.0014	0.0001	0.0012	0.0013	0.0015	-
Ruthenium (Ru)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	36	0.00005	0	0.00010	0.00002	0.00008	0.00010	0.00014	0.001
Silicon (Si)	mg/L	36	0.1	0	1.81	0.49	1.24	1.55	2.41	-
Silver (Ag)	mg/L	36	0.00001	35	0.00001	0.000006	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	36	0.05	0	1.20	0.06	1.12	1.20	1.30	680
Strontium (Sr)	mg/L	36	0.0002	0	0.011	0.00054	0.010	0.011	0.012	7
Sulfur (S)	mg/L	36	0.5	27	0.52	0.04	<0.5	<0.5	0.59	-
Tellurium (Te)	mg/L	36	0.0002	36	<0.0002	-	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	36	0.00001	36	<0.00001	-	<0.00001	<0.00001	<0.00001	0.0008
Thorium (Th)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	36	0.0001	33	0.00013	0.00011	<0.0001	<0.0001	0.00028	0.073
Titanium (Ti)	mg/L	36	0.0003	0	0.0029	0.0011	0.0014	0.0029	0.0043	0.076
Tungsten (W)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	36	0.00001	0	0.000097	0.000008	0.000087	0.000097	0.00011	0.015
Vanadium (V)	mg/L	36	0.0005	19	0.00056	0.00017	<0.0005	<0.0005	0.00066	0.12

APPENDIX B, TABLE 3

Summary of Year 1 surface water chemistry results from Mennin Lake.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
Total										
Zinc (Zn)	mg/L	36	0.003	33	0.00908	0.03218	<0.003	<0.003	0.0098	0.02
Zirconium (Zr)	mg/L	36	0.0002	22	0.0002	0.00001	<0.0002	<0.0002	0.00021	0.004
Dissolved										
Aluminum (Al)	mg/L	36	0.001	0	0.144	0.044	0.086	0.143	0.204	-
Antimony (Sb)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	36	0.0001	0	0.00035	0.00005	0.00030	0.00035	0.00039	-
Barium (Ba)	mg/L	36	0.0001	0	0.0056	0.0006	0.0050	0.0054	0.0073	-
Beryllium (Be)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	36	0.00005	36	<0.00005	-	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	36	0.01	36	<0.01	-	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	36	0.000005	9	0.000007	0.000003	<0.000005	0.000006	0.000012	-
Calcium (Ca)	mg/L	36	0.05	0	2.66	0.14	2.47	2.65	2.93	-
Cesium (Cs)	mg/L	36	0.00001	35	0.00001	0.0000002	<0.00001	<0.00001	<0.00001	-
Chromium (Cr)	mg/L	36	0.0001	0	0.00037	0.00028	0.00026	0.00031	0.00059	-
Chromium III (Cr3+)	mg/L	36	0.0005	35	0.00054	0.00021	<0.0005	<0.0005	<0.0005	-
Chromium VI (Cr6+)	mg/L	36	0.0005	29	0.00052	0.00007	<0.0005	<0.0005	0.00065	-
Cobalt (Co)	mg/L	36	0.0001	31	0.00015	0.00021	<0.0001	<0.0001	0.00032	-
Copper (Cu)	mg/L	36	0.0002	0	0.00101	0.00088	0.00067	0.00074	0.00185	0.00088
Iron (Fe)	mg/L	36	0.01	0	0.341	0.349	0.148	0.271	0.734	-
Lead (Pb)	mg/L	36	0.00005	1	0.00011	0.000066	0.000052	0.000082	0.00025	0.0065
Lithium (Li)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	-
Magnesium (Mg)	mg/L	36	0.005	0	0.704	0.050	0.637	0.718	0.763	-
Manganese (Mn)	mg/L	36	0.0001	0	0.040	0.103	0.003	0.017	0.143	0.23
Mercury (Hg)	mg/L	36	0.000005	36	<0.000005	-	<0.000005	<0.000005	<0.000005	-
Molybdenum (Mo)	mg/L	36	0.00005	0	0.00030	0.00005	0.00022	0.00030	0.00037	-
Nickel (Ni)	mg/L	36	0.0005	33	0.00053	0.00011	<0.0005	<0.0005	0.00069	-
Phosphorus (P)	mg/L	36	0.05	36	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	36	0.05	0	0.405	0.019	0.379	0.402	0.434	-
Rhodium (Rh)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	36	0.0002	0	0.0013	0.0001	0.0012	0.0013	0.0014	-
Ruthenium (Ru)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	36	0.001	36	<0.001	-	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	36	0.00005	0	0.00009	0.00001	0.00007	0.00009	0.00012	-
Silicon (Si)	mg/L	36	0.05	0	1.75	0.52	1.20	1.47	2.47	-
Silver (Ag)	mg/L	36	0.00001	36	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	36	0.05	0	1.20	0.09	1.09	1.19	1.38	-
Strontium (Sr)	mg/L	36	0.0002	0	0.0107	0.0006	0.0100	0.0108	0.0116	2.5
Sulfur (S)	mg/L	36	0.5	29	0.51	0.03	<0.5	<0.5	0.58	-
Tellurium (Te)	mg/L	36	0.0002	36	<0.0002	-	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	36	0.00001	36	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	36	0.0001	35	0.0001	0	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	36	0.0003	0	0.0020	0.0008	0.0011	0.0019	0.0034	-
Tungsten (W)	mg/L	36	0.0001	36	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	36	0.00001	0	0.000093	0.000009	0.000083	0.000092	0.000106	-
Vanadium (V)	mg/L	36	0.0005	31	0.00052	0.00005	<0.0005	<0.0005	0.00058	-
Zinc (Zn)	mg/L	36	0.001	6	0.0019	0.0009	<0.001	0.0016	0.0037	0.017
Zirconium (Zr)	mg/L	36	0.0002	7	0.00024	0.00003	<0.0002	0.00024	0.00029	-
Other										
Chlorophyll a	µg/L	36	0.1	0	4.47	2.49	0.78	5.46	8.50	-
Radionuclides										
H-3	Bq/L	36	12 to 13	36	12.3	-	12	12	13	7000
Am-241	Bq/L	7	0.69 to 3.1	7	1.53	-	0.71	0.87	2.86	-
C-14	Bq/L	30	6.6 to 18	29	10.5	5.1	6.6	7.2	18	200
Cl-36	Bq/L	18	0.032 to 0.22	18	0.13	-	0.03	0.14	0.22	-
Co-60	Bq/L	37	0.23 to 0.48	37	0.36	-	0.24	0.36	<i>0.45²</i>	40
Cs-137 ³	Bq/L	37	0.22 to 0.37	37	0.31	-	0.24	0.33	0.37	10
I-129	Bq/L	33	0.15 to 0.3	29	0.21	0.05	0.16	0.19	0.29	1
K-40	Bq/L	36	2.9 to 8.7	35	6.34	3.69	4.55	5.55	8.88	-
Np-237	Bq/L	18	0.00061 to 0.0033	15	0.0025	0.0008	0.0014	0.0025	0.0035	-
Pu-238	Bq/L	18	0.00019 to 0.0018	17	0.00099	0.00044	0.00035	0.00084	0.00172	0.6
Pu-239	Bq/L	18	0.00019 to 0.0019	15	0.00103	0.00057	0.00031	0.00096	0.00193	0.6
Ra-226	Bq/L	36	0.0035 to 0.01	36	0.0063	-	0.0044	0.0063	0.0083	0.5
Ru-106 ³	Bq/L	37	1.9 to 3.8	37	2.96	-	2.06	3.10	3.64	20
Sr-90	Bq/L	36	0.0055 to 0.023	27	0.018	0.011	0.006	0.015	0.042	5
Th-228	Bq/L	36	0.0035 to 0.007	36	0.0048	-	0.0038	0.0047	0.0063	2
Th-230	Bq/L	36	0.0038 to 0.005	33	0.0041	0.0004	0.0038	0.0039	0.0049	0.6
Th-232	Bq/L	36	0.00033 to 0.0032	26	0.0014	0.0005	0.0008	0.0013	0.0022	0.6
U-234	Bq/L	36	0.00025 to 0.0064	8	0.0035	0.0043	0.0015	0.0029	0.0051	3
U-235	Bq/L	36	0.00043 to 0.004	32	0.0014	0.0008	0.0006	0.0012	0.0031	3
U-238	Bq/L	36	0.00057 to 0.0058	21	0.0029	0.0046	0.0013	0.0020	0.0052	3
Gross Alpha	Bq/L	36	0.056 to 0.095	28	0.077	0.011	0.061	0.077	0.094	-
Gross Beta	Bq/L	36	0.096 to 0.14	31	0.12	0.01	0.10	0.11	0.14	-

Bold values indicate guideline exceedance; italicized values indicate conditional guideline exceedance.

¹See Appendix B, Table 1 for detailed water quality guidelines.

²Due to detection limits, guideline exceedance cannot be confirmed.

³A bottom sample was collected for these parameters, but not others, during the fall 2021 sampling survey at Mennin Lake_03 A.

APPENDIX B, TABLE 4

Summary of Year 1 surface water chemistry results from Mennin River.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	27	1	0	8.47	10.3	3.13	4.50	36.4	-
Ammonia, Total (as N)	mg/L	27	0.01	11	0.025	0.026	0.010	0.012	0.050	5.855
Anion Sum	me/L	3	NA	NA	0.17	0	0.17	0.17	0.17	-
Bicarbonate (HCO3)	mg/L	27	1.2	0	10.3	12.5	3.83	5.50	44.4	-
Biochemical Oxygen Demand	mg/L	27	2 to 6	26	2.37	1.38	<2	<2	4.80	-
Bromide (Br)	mg/L	27	0.1	27	<0.1	-	<0.1	<0.1	<0.1	-
Carbonate (CO3)	mg/L	27	0.6	27	<0.6	-	<0.6	<0.6	<0.6	-
Cation Sum	me/L	3	NA	NA	0.237	0.006	0.231	0.240	0.240	-
Chloride (Cl)	mg/L	27	0.5	3	0.75	0.24	<0.5	0.66	1.22	120
Conductivity	umhos/cm	27	1	0	27.4	16.4	18.6	22.1	71.7	700
Cyanide, Total	mg/L	27	0.002	27	<0.002	-	<0.002	<0.002	<0.002	0.005
Dissolved Organic Carbon	mg/L	27	0.5	0	15.7	4.37	8.68	15.3	22.4	-
Fluoride (F)	mg/L	27	0.02	0	0.041	0.006	0.035	0.039	0.056	0.12
Hardness (as CaCO3)	mg/L	3	NA	NA	8.40	0.10	8.30	8.44	8.47	-
Hydroxide (OH)	mg/L	27	<0.34	27	<0.34	-	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	12	0.2	9	0.2	0	<0.2	<0.2	<0.2	-
Langelier Index	-	3	NA	NA	-3	-	-3	-3	-3	-
Nitrate (as N)	mg/L	27	0.02	16	0.034	0.022	<0.02	<0.02	0.060	3
Nitrate and Nitrite as N	mg/L	27	0.07	26	0.072	0.009	<0.07	<0.07	<0.07	-
Nitrite (as N)	mg/L	27	0.01	27	<0.01	-	<0.01	<0.01	<0.01	0.02
pH	pH units	9	0.1	0	7.11	0.31	6.85	6.94	7.53	6.5 to 9.0
Phosphorus (P), Total	mg/L	27	0.003	0	0.016	0.007	0.008	0.014	0.025	0.01
Sulfate (SO4)	mg/L	27	0.3	0	0.88	0.15	0.62	0.89	1.16	128
TDS (Calculated)	mg/L	3	NA	NA	10.9	0	10.9	10.9	10.9	-
Total Dissolved Solids	mg/L	27	4 to 13.3	0	44.5	10.2	31.2	40.5	59.8	500
Total Inorganic Carbon	mg/L	27	0.5	15	1.28	1.94	<0.5	<0.5	6.57	-
Total Kjeldahl Nitrogen	mg/L	27	0.2	0	0.496	0.138	0.299	0.500	0.699	-
Total Organic Carbon	mg/L	27	0.5	0	15.4	4.30	8.31	15.0	21.3	-
Total Suspended Solids	mg/L	27	3	16	3.58	0.88	<3	<3	5.10	-
Turbidity	NTU	27	0.1	0	1.71	1.01	0.53	1.54	3.43	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	27	1	2	39.7	30.8	1.30	37.0	97.6	100
Total Coliforms	CFU/100mL	27	1	0	197	12.1	181	>200	>200	-
Metals										
Total										
Aluminum (Al)	mg/L	27	0.003	0	0.227	0.119	0.036	0.274	0.368	0.32
Antimony (Sb)	mg/L	27	0.0001	26	0.000101	0.000004	<0.0001	<0.0001	<0.0001	0.006
Arsenic (As)	mg/L	27	0.0001	0	0.00039	0.00008	0.00026	0.00040	0.00050	0.005
Barium (Ba)	mg/L	27	0.0001	0	0.0061	0.0009	0.0047	0.0060	0.0072	1
Beryllium (Be)	mg/L	27	0.0001	27	<0.0001	-	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	27	0.00005	27	<0.00005	-	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	27	0.01	27	<0.01	-	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	27	0.000005 to 0.00001	8	0.00001	0.000004	<0.000005	<0.00001	0.000015	0.00004
Calcium (Ca)	mg/L	27	0.05	0	3.12	2.10	2.05	2.37	8.85	1000
Cesium (Cs)	mg/L	27	0.00001	1	0.000017	0.000005	0.000011	0.000017	0.000025	-
Chromium (Cr)	mg/L	27	0.0001	0	0.00041	0.00015	0.00014	0.00039	0.00060	-
Chromium III (Cr3+)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	27	0.0005	19	0.00057	0.00015	<0.0005	<0.0005	0.00094	0.005
Cobalt (Co)	mg/L	27	0.0001	6	0.00018	0.00007	<0.0001	0.00019	0.00030	0.00078
Copper (Cu)	mg/L	27	0.0005	2	0.0014	0.0031	<0.0005	0.0008	0.0013	0.002
Iron (Fe)	mg/L	27	0.01	0	0.451	0.153	0.186	0.438	0.660	3.3
Lead (Pb)	mg/L	27	0.00005	2	0.00014	0.00006	<0.00005	0.00014	0.00024	0.001
Lithium (Li)	mg/L	27	0.001	20	0.001	0.0001	<0.001	<0.001	0.0013	2.5
Magnesium (Mg)	mg/L	27	0.005	0	0.928	0.711	0.502	0.667	2.86	82
Manganese (Mn)	mg/L	27	0.0001	0	0.027	0.017	0.006	0.023	0.069	0.12
Mercury (Hg)	mg/L	27	0.000005	27	<0.000005	-	<0.000005	<0.000005	<0.000005	0.000026
Molybdenum (Mo)	mg/L	27	0.00005	0	0.00018	0.00007	0.00010	0.00019	0.00031	0.073
Nickel (Ni)	mg/L	27	0.0005	14	0.00058	0.00026	<0.0005	<0.0005	0.00064	0.025
Phosphorus (P)	mg/L	27	0.05	27	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	27	0.05	0	0.383	0.121	0.235	0.338	0.588	53
Rhodium (Rh)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	27	0.0002	0	0.0014	0.0003	0.0010	0.0014	0.0020	-
Ruthenium (Ru)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	27	0.00005	1	0.00009	0.00002	0.00006	0.00009	0.00013	0.001
Silicon (Si)	mg/L	27	0.1	0	1.79	0.748	0.579	2.27	2.52	-
Silver (Ag)	mg/L	27	0.00001	27	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	27	0.05	0	1.34	0.299	1.04	1.25	2.05	680
Strontium (Sr)	mg/L	27	0.0002	0	0.013	0.006	0.009	0.011	0.029	7
Sulfur (S)	mg/L	27	0.5	20	0.518	0.054	<0.5	<0.5	0.567	-
Tellurium (Te)	mg/L	27	0.0002	27	<0.0002	-	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	27	0.00001	27	<0.00001	-	<0.00001	<0.00001	<0.00001	0.0008
Thorium (Th)	mg/L	27	0.0001	26	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	27	0.0001	26	0.0001	0.00001	<0.0001	<0.0001	<0.0001	0.073
Titanium (Ti)	mg/L	27	0.0003	0	0.0036	0.0020	0.0007	0.0035	0.0061	0.076
Tungsten (W)	mg/L	27	0.0001	27	<0.0001	-	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	27	0.00001	0	0.00011	0.00004	0.00003	0.00011	0.00017	0.015
Vanadium (V)	mg/L	27	0.0005	10	0.00065	0.00017	<0.0005	0.00064	0.00091	0.12
Zinc (Zn)	mg/L	27	0.003	21	0.0038	0.0024	<0.003	<0.003	0.0082	0.02
Zirconium (Zr)	mg/L	27	0.0002	15	0.00022	0.00003	<0.0002	<0.0002	0.00028	0.004

APPENDIX B, TABLE 4

Summary of Year 1 surface water chemistry results from Mennin River.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
Dissolved										
Aluminum (Al)	mg/L	27	0.001	0	0.186	0.106	0.025	0.212	0.352	-
Antimony (Sb)	mg/L	27	0.0001	26	0.0001	0.00001	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	27	0.0001	0	0.00038	0.00008	0.00026	0.00039	0.00049	-
Barium (Ba)	mg/L	27	0.0001	0	0.0056	0.0008	0.0044	0.0051	0.0069	-
Beryllium (Be)	mg/L	27	0.0001	27	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	27	0.00005	27	<0.00005	-	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	27	0.01	27	<0.01	-	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	27	0.000005	7	0.000008	0.000003	<0.000005	0.000008	0.000014	-
Calcium (Ca)	mg/L	27	0.05	0	3.05	2.10	2.01	2.26	8.82	-
Cesium (Cs)	mg/L	27	0.00001	8	0.000014	0.000004	<0.00001	0.000012	0.000021	-
Chromium (Cr)	mg/L	27	0.0001	0	0.00039	0.00031	0.00012	0.00038	0.00055	-
Chromium III (Cr3+)	mg/L	27	0.0005	26	0.00051	0.0001	<0.0005	<0.0005	<0.0005	-
Chromium VI (Cr6+)	mg/L	27	0.0005	21	0.00057	0.00019	<0.0005	<0.0005	0.00095	-
Cobalt (Co)	mg/L	27	0.0001	9	0.00015	0.00005	0.00010	0.00014	0.00028	-
Copper (Cu)	mg/L	27	0.0002	0	0.00065	0.00020	0.00025	0.00067	0.00090	0.00088
Iron (Fe)	mg/L	27	0.01	0	0.347	0.144	0.145	0.325	0.614	-
Lead (Pb)	mg/L	27	0.00005	3	0.0001	0.00005	<0.00005	0.0001	0.00019	0.0065
Lithium (Li)	mg/L	27	0.001	23	0.0010	0.0001	<0.001	0.002	0.0013	-
Magnesium (Mg)	mg/L	27	0.005	0	0.903	0.704	0.467	0.650	2.83	-
Manganese (Mn)	mg/L	27	0.0001	0	0.021	0.015	0.003	0.02	0.055	0.23
Mercury (Hg)	mg/L	27	0.000005	27	<0.000005	-	<0.000005	<0.000005	<0.000005	-
Molybdenum (Mo)	mg/L	27	0.00005	0	0.00018	0.00008	0.00009	0.00018	0.00032	-
Nickel (Ni)	mg/L	27	0.0005	24	0.00051	0.00003	<0.0005	<0.0005	0.00056	-
Phosphorus (P)	mg/L	27	0.05	27	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	27	0.05	0	0.379	0.120	0.231	0.348	0.589	-
Rhodium (Rh)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	27	0.0002	0	0.0014	0.0003	0.0010	0.0013	0.0020	-
Ruthenium (Ru)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	27	0.001	27	<0.001	-	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	27	0.00005	0	0.00010	0.00003	0.00007	0.00009	0.00014	-
Silicon (Si)	mg/L	27	0.05	0	1.68	0.693	0.489	2.03	2.33	-
Silver (Ag)	mg/L	27	0.00001	27	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	27	0.05	0	1.33	0.302	1.03	1.25	2.05	-
Strontium (Sr)	mg/L	27	0.0002	0	0.013	0.006	0.009	0.011	0.029	2.5
Sulfur (S)	mg/L	27	0.5	23	0.51	0.02	<0.5	<0.6	0.54	-
Tellurium (Te)	mg/L	27	0.0002	27	<0.0002	-	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	27	0.00001	27	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	27	0.0001	20	0.00010	0.00001	<0.0001	<0.0001	0.00013	-
Tin (Sn)	mg/L	27	0.0001	27	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	27	0.0003	0	0.0025	0.0014	0.0005	0.0024	0.0049	-
Tungsten (W)	mg/L	27	0.0001	27	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	27	0.00001	0	0.00010	0.00004	0.00002	0.0001	0.00015	-
Vanadium (V)	mg/L	27	0.0005	15	0.00056	0.00011	<0.0005	<0.0005	0.00082	-
Zinc (Zn)	mg/L	27	0.001	3	0.0021	0.0009	<0.001	0.0018	0.0039	0.017
Zirconium (Zr)	mg/L	27	0.0002	8	0.00025	0.00005	<0.0002	0.00022	0.00034	-
Other										
Chlorophyll a	µg/L	27	0.1	0	3.27	1.88	1.36	2.88	6.64	-
Radionuclides										
H-3	Bq/L	27	12 to 13	27	12.3	-	12.0	12.0	13.0	7000
Am-241	Bq/L	3	2.7 to 3.1	3	2.87	0.208	2.71	2.80	3.07	-
C-14	Bq/L	27	6.4 to 19	27	9.33	-	6.50	6.70	19.0	200
Cl-36	Bq/L	9	0.032 to 0.22	9	0.13	0.08	0.03	0.14	0.22	-
Co-60	Bq/L	27	0.19 to 0.46	27	0.35	-	0.27	0.35	0.44	40
Cs-137	Bq/L	27	0.2 to 0.37	27	0.32	-	0.25	0.33	0.36	10
I-129	Bq/L	27	0.16 to 0.32	25	0.23	0.05	0.17	0.22	0.31	1
K-40	Bq/L	27	4.1 to 9.1	27	5.76	-	4.69	5.60	7.78	-
Np-237	Bq/L	9	0.0007 to 0.0038	7	0.0025	0.0008	0.0016	0.0024	0.0037	-
Pu-238	Bq/L	9	0.00021 to 0.0017	7	0.0008	0.0004	0.0004	0.0007	0.0014	0.6
Pu-239	Bq/L	9	0.00021 to 0.0023	8	0.0010	0.0007	0.0004	0.0007	0.0023	0.6
Ra-226	Bq/L	27	0.0037 to 0.01	26	0.0062	0.0017	0.0038	0.0063	0.0088	0.5
Ru-106	Bq/L	27	1.6 to 3.6	27	2.88	-	2.23	2.90	3.47	20
Sr-90	Bq/L	27	0.0051 to 0.02	24	0.015	0.004	0.006	0.016	0.018	5
Th-228	Bq/L	27	0.0033 to 0.0063	26	0.0045	0.0008	0.0035	0.0045	0.0059	2
Th-230	Bq/L	27	0.0037 to 0.0045	27	0.004	-	0.0037	0.004	0.0045	0.6
Th-232	Bq/L	27	0.00033 to 0.0019	17	0.0013	0.0005	0.0005	0.0014	0.0021	0.6
U-234	Bq/L	27	0.00028 to 0.0054	7	0.0034	0.0012	0.0015	0.0035	0.0052	3
U-235	Bq/L	27	0.00035 to 0.0063	25	0.0022	0.0013	0.0008	0.0018	0.0041	3
U-238	Bq/L	27	0.00079 to 0.0065	16	0.0026	0.0012	0.0012	0.0024	0.0039	3
Gross Alpha	Bq/L	27	0.059 to 0.092	24	0.077	0.008	0.062	0.077	0.091	-
Gross Beta	Bq/L	27	0.089 to 0.13	26	0.111	0.008	0.097	0.110	0.120	-

Bold values indicate guideline exceedance.

¹See Appendix B, Table 1 for detailed water qualtiy guidelines.

APPENDIX B, TABLE 5										
Summary of Year 1 surface water chemistry results from Revell Lake.										
Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	30	1	0	6.02	1.10	4.15	6.50	7.01	-
Ammonia, Total (as N)	mg/L	30	0.01	13	0.024	0.037	<0.01	0.013	0.058	5.855
Anion Sum	me/L	12	NA	0	0.131	0.005	0.126	0.130	0.140	-
Bicarbonate (HCO3)	mg/L	30	1.2	0	7.35	1.34	5.05	7.90	8.57	-
Biochemical Oxygen Demand	mg/L	30	2 to 20	29	2.90	4.93	<2	<2	<2	-
Bromide (Br)	mg/L	30	0.1	30	<0.1	-	<0.1	<0.1	<0.1	-
Carbonate (CO3)	mg/L	30	0.6	30	<0.6	-	<0.6	<0.6	<0.6	-
Cation Sum	me/L	12	NA	0	0.188	0.005	0.180	0.190	0.190	-
Chloride (Cl)	mg/L	30	0.5	30	<0.5	-	<0.5	<0.5	<0.5	120
Conductivity	umhos/cm	30	1	0	19.0	1.16	17.1	19.5	20.3	700
Cyanide, Total	mg/L	29	0.002	29	<0.002	-	<0.002	<0.002	<0.002	0.005
Dissolved Organic Carbon	mg/L	30	0.5	0	7.96	1.21	6.81	7.51	10.3	-
Fluoride (F)	mg/L	30	0.02	0	0.025	0.003	0.021	0.025	0.030	0.12
Hardness (as CaCO3)	mg/L	12	NA	0	7.45	0.17	7.19	7.44	7.68	-
Hydroxide (OH)	mg/L	30	0.34	30	<0.34	-	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	8	0.2	8	<0.2	-	<0.2	<0.2	<0.2	-
Langelier Index	-	12	NA	0	-3	0	-3	-3	-3	-
Nitrate (as N)	mg/L	30	0.02	20	0.040	0.029	<0.02	<0.02	0.086	3
Nitrate and Nitrite as N	mg/L	30	0.07	20	0.074	0.006	<0.07	<0.07	0.086	-
Nitrite (as N)	mg/L	30	0.01	30	<0.01	-	<0.01	<0.01	<0.01	0.02
pH	pH units	12	0.1	0	6.87	0.04	6.82	6.89	6.92	6.5 to 9.0
Phosphorus (P), Total	mg/L	30	0.003	0	0.0084	0.0017	0.006	0.0082	0.0110	0.01
Sulfate (SO4)	mg/L	30	0.3	0	0.991	0.044	0.915	0.995	1.05	128
TDS (Calculated)	mg/L	12	NA	0	8.68	0.17	8.46	8.70	8.95	-
Total Dissolved Solids	mg/L	30	4	0	26.0	2.59	21.4	26.7	29.3	500
Total Inorganic Carbon	mg/L	30	0.5	6	1.06	0.491	<0.5	0.975	1.58	-
Total Kjeldahl Nitrogen	mg/L	30	0.2	4	0.339	0.125	<0.2	0.340	0.562	-
Total Organic Carbon	mg/L	30	0.5	0	8.08	1.77	6.81	7.47	9.94	-
Total Suspended Solids	mg/L	30	3	27	3.13	0.445	<3	<3	4.07	-
Turbidity	NTU	30	0.1	0	0.673	0.180	0.430	0.675	0.931	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	30	1	15	2.57	3.07	<1	<1	9.55	100
Total Coliforms	CFU/100mL	30	1	3	99.6	95.8	<1	26.0	>200	-
Metals										
<i>Total</i>										
Aluminum (Al)	mg/L	30	0.003	0	0.040	0.033	0.016	0.022	0.104	0.32
Antimony (Sb)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	0.006
Arsenic (As)	mg/L	30	0.0001	0	0.00023	0.00002	0.0002	0.00023	0.00028	0.005
Barium (Ba)	mg/L	30	0.0001	0	0.0039	0.0007	0.0031	0.0036	0.0049	1
Beryllium (Be)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	30	0.00005	30	<0.00005	-	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	30	0.01	30	<0.01	-	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	30	0.000005	19	0.0000056	0.000001	<0.000005	<0.000005	0.0000074	0.00004
Calcium (Ca)	mg/L	30	0.05	0	2.24	0.34	2.06	2.18	2.33	1000
Cesium (Cs)	mg/L	30	0.00001	6	0.000012	0.000002	<0.00001	0.000012	0.000015	-
Chromium (Cr)	mg/L	30	0.0001	9	0.00018	0.00013	<0.0001	0.00012	0.00037	-
Chromium III (Cr3+)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	30	0.0005	29	0.0005	0	<0.0005	<0.0005	<0.0005	0.005
Cobalt (Co)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	0.00078
Copper (Cu)	mg/L	30	0.0005	13	0.0011	0.0013	<0.0005	<0.0005	0.0038	0.002
Iron (Fe)	mg/L	30	0.01	0	0.133	0.095	0.041	0.081	0.281	3.3
Lead (Pb)	mg/L	30	0.00005	20	0.000057	0.000012	<0.00005	<0.00005	0.000081	0.001
Lithium (Li)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	2.5
Magnesium (Mg)	mg/L	30	0.005	0	0.462	0.019	0.437	0.460	0.499	82
Manganese (Mn)	mg/L	30	0.0001	0	0.018	0.010	0.007	0.012	0.033	0.12
Mercury (Hg)	mg/L	30	0.000005	30	<0.000005	-	<0.000005	<0.000005	<0.000005	0.000026
Molybdenum (Mo)	mg/L	30	0.00005	28	0.000050	0.000001	<0.00005	<0.00005	0.000051	0.073
Nickel (Ni)	mg/L	30	0.0005	30	<0.0005	-	<0.0005	<0.0005	<0.0005	0.025
Phosphorus (P)	mg/L	30	0.05	30	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	30	0.05	0	0.342	0.023	0.311	0.343	0.381	53
Rhodium (Rh)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	30	0.0002	0	0.00110	0.00009	0.00099	0.00109	0.00123	-
Ruthenium (Ru)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	30	0.00005	0	0.000081	0.000018	0.000058	0.000079	0.000111	0.001
Silicon (Si)	mg/L	30	0.1	0	0.976	0.464	0.630	0.685	1.83	-
Silver (Ag)	mg/L	30	0.00001	30	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	30	0.05	0	0.720	0.163	0.659	0.685	0.779	680
Strontium (Sr)	mg/L	30	0.0002	0	0.0081	0.0005	0.0074	0.0081	0.0087	7
Sulfur (S)	mg/L	30	0.5	29	0.501	0.007	<0.5	<0.5	<0.5	-
Tellurium (Te)	mg/L	30	0.0002	30	<0.0002	-	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	30	0.00001	29	0.00001	0	<0.00001	<0.00001	<0.00001	0.0008
Thorium (Th)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	0.073
Titanium (Ti)	mg/L	30	0.0003 to 0.0012	23	0.00046	0.00028	0.00030	0.00030	0.00097	0.076
Tungsten (W)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	30	0.00001	0	0.000032	0.000004	0.000027	0.000030	0.000038	0.015
Vanadium (V)	mg/L	30	0.0005	30	<0.0005	-	<0.0005	<0.0005	<0.0005	0.12

APPENDIX B, TABLE 5

Summary of Year 1 surface water chemistry results from Revell Lake.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
Total										
Zinc (Zn)	mg/L	30	0.003	28	0.0032	0.0009	<0.003	<0.003	0.0042	0.02
Zirconium (Zr)	mg/L	30	0.0002	30	<0.0002	-	<0.0002	<0.0002	<0.0002	0.004
Dissolved										
Aluminum (Al)	mg/L	30	0.001	0	0.034	0.036	0.009	0.016	0.103	-
Antimony (Sb)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	30	0.0001	0	0.00022	0.00002	0.00018	0.00022	0.00025	-
Barium (Ba)	mg/L	30	0.0001	0	0.0037	0.0008	0.0029	0.0034	0.0050	-
Beryllium (Be)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	30	0.00005	30	<0.00005	-	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	30	0.01	30	<0.01	-	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	30	0.000005	23	0.0000059	0.0000021	<0.000005	<0.000005	0.0000083	-
Calcium (Ca)	mg/L	30	0.05	0	2.18	0.077	2.10	2.16	2.27	-
Cesium (Cs)	mg/L	30	0.00001	8	0.000011	0.000002	<0.00001	0.000011	0.000015	-
Chromium (Cr)	mg/L	30	0.0001	19	0.00013	0.00005	<0.0001	<0.0001	0.00021	-
Chromium III (Cr3+)	mg/L	30	0.0005	30	<0.0005	-	<0.0005	<0.0005	<0.0005	-
Chromium VI (Cr6+)	mg/L	30	0.0005	28	0.00051	0.00006	<0.0005	<0.0005	0.00054	-
Cobalt (Co)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Copper (Cu)	mg/L	30	0.0002	0	0.0007	0.0008	0.0003	0.0004	0.0018	0.00088
Iron (Fe)	mg/L	30	0.01	0	0.078	0.069	0.014	0.036	0.191	-
Lead (Pb)	mg/L	30	0.00005	25	0.000053	0.00001	<0.00005	<0.00005	0.000073	0.0065
Lithium (Li)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	-
Magnesium (Mg)	mg/L	30	0.005	0	0.451	0.015	0.429	0.452	0.473	-
Manganese (Mn)	mg/L	30	0.0001	0	0.0095	0.0117	0.0003	0.0018	0.0276	0.23
Mercury (Hg)	mg/L	30	0.000005	30	<0.000005	-	<0.000005	<0.000005	<0.000005	-
Molybdenum (Mo)	mg/L	30	0.00005	28	0.000064	0.000074	<0.00005	<0.00005	0.000057	-
Nickel (Ni)	mg/L	30	0.0005	30	<0.0005	-	<0.0005	<0.0005	<0.0005	-
Phosphorus (P)	mg/L	30	0.05	30	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	30	0.05	0	0.345	0.034	0.301	0.338	0.407	-
Rhodium (Rh)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	30	0.0002	0	0.00109	0.00007	0.00099	0.00109	0.00119	-
Ruthenium (Ru)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	30	0.001	30	<0.001	-	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	30	0.00005	6	0.000068	0.000013	<0.00005	0.000071	0.000087	-
Silicon (Si)	mg/L	30	0.05	0	0.912	0.481	0.537	0.607	1.78	-
Silver (Ag)	mg/L	30	0.00001	30	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	30	0.05	0	0.688	0.031	0.644	0.686	0.729	-
Strontium (Sr)	mg/L	30	0.0002	0	0.0080	0.0003	0.0075	0.0080	0.0086	2.5
Sulfur (S)	mg/L	30	0.5	30	<0.5	-	<0.5	<0.5	<0.5	-
Tellurium (Te)	mg/L	30	0.0002	30	<0.0002	-	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	30	0.00001	30	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	30	0.0003 to 0.0009	25	0.00041	0.00022	<0.0003	<0.0003	0.00086	-
Tungsten (W)	mg/L	30	0.0001	30	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	30	0.00001	0	0.000029	0.000004	0.000025	0.000028	0.000035	-
Vanadium (V)	mg/L	30	0.0005	30	<0.0005	-	<0.0005	<0.0005	<0.0005	-
Zinc (Zn)	mg/L	30	0.001	21	0.0015	0.0010	<0.001	<0.001	0.0036	0.017
Zirconium (Zr)	mg/L	30	0.0002	30	<0.0002	-	<0.0002	<0.0002	0.0002	-
Other										
Chlorophyll a	µg/L	30	0.1	0	3.35	1.55	1.16	3.14	5.31	-
Radionuclides										
H-3	Bq/L	29	11 to 13	29	12.1	-	11.0	12.0	13.0	7000
Am-241	Bq/L	12	0.66 to 3.2	12	2.16	1.10	0.693	2.60	3.20	-
C-14	Bq/L	29	6.5 to 18	29	9.32	-	6.60	7.20	18.0	200
Co-60	Bq/L	30	0.21 to 0.48	30	0.36	-	0.26	0.37	0.45	-
Cs-137	Bq/L	30	0.21 to 0.37	30	0.31	-	0.24	0.32	0.36	40
I-129	Bq/L	29	0.17 to 0.3	29	0.22	-	0.17	0.20	0.30	10
K-40	Bq/L	30	3.2 to 9.1	29	5.88	1.30	4.29	5.65	8.30	1
Ra-226	Bq/L	30	0.0037 to 0.0091	28	0.0064	0.0013	0.0043	0.0065	0.0079	0.5
Ru-106	Bq/L	30	2 to 3.7	30	2.87	-	2.25	2.85	3.50	20
Sr-90	Bq/L	30	0.0051 to 0.019	25	0.020	0.024	0.006	0.014	0.050	5
Th-228	Bq/L	30	0.0027 to 0.0068	28	0.0048	0.0009	0.0030	0.0049	0.0062	2
Th-230	Bq/L	30	0.0037 to 0.005	26	0.0043	0.0005	0.0038	0.0042	0.0051	0.6
Th-232	Bq/L	30	0.00035 to 0.0038	25	0.0014	0.0007	0.0008	0.0012	0.0026	0.6
U-234	Bq/L	30	0.00054 to 0.0085	20	0.0032	0.0013	0.0020	0.0029	0.0049	3
U-235	Bq/L	30	0.0007 to 0.0047	29	0.0021	0.0009	0.0009	0.0023	0.0037	3
U-238	Bq/L	30	0.0009 to 0.005	27	0.0026	0.0008	0.0016	0.0026	0.0038	3
Gross Alpha	Bq/L	30	0.055 to 0.085	29	0.073	0.009	0.057	0.073	0.084	-
Gross Beta	Bq/L	30	0.088 to 0.12	28	0.105	0.010	0.089	0.100	0.120	-

Bold values indicate guideline exceedance.

¹See Appendix B, Table 1 for detailed water qualtiy guidelines.

APPENDIX B, TABLE 6										
Summary of Year 1 surface water chemistry results from Revell River.										
Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	9	1	0	12.0	11.4	4.10	4.70	27.2	-
Ammonia, Total (as N)	mg/L	9	0.01	0	0.020	0.010	0.012	0.015	0.037	5.855
Bicarbonate (HCO3)	mg/L	9	1.2	0	14.7	13.9	5.00	5.70	33.2	-
Biochemical Oxygen Demand	mg/L	9	2	7	<2	0	<2	<2	<2	-
Bromide (Br)	mg/L	9	0.1	9	<0.1	-	<0.1	<0.1	<0.1	-
Carbonate (CO3)	mg/L	9	0.6	9	<0.6	-	<0.6	<0.6	<0.6	-
Chloride (Cl)	mg/L	9	0.5	0	19.2	17.0	7.38	7.70	42.0	120
Conductivity	umhos/cm	9	1	0	99.5	71.3	44.5	57.6	195	700
Cyanide, Total	mg/L	9	0.002	9	<0.002	-	<0.002	<0.002	<0.002	0.005
Dissolved Organic Carbon	mg/L	9	0.5	0	20.6	12.4	8.45	16.8	36.9	-
Fluoride (F)	mg/L	9	0.02	0	0.029	0.010	0.021	0.022	0.042	0.12
Hydroxide (OH)	mg/L	9	0.34	9	<0.34	-	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	3	0.2	3	<0.2	-	<0.2	<0.2	<0.2	-
Nitrate (as N)	mg/L	9	0.02	0	0.057	0.026	0.021	0.067	0.084	3
Nitrate and Nitrite as N	mg/L	9	0.07	6	0.074	0.006	<0.07	<0.07	0.084	-
Nitrite (as N)	mg/L	9	0.01	9	<0.01	-	<0.01	<0.01	<0.01	0.02
pH	pH units	3	0.1	0	7.48	0.06	7.44	7.48	7.53	6.5 to 9.0
Phosphorus (P), Total	mg/L	9	0.003	0	0.016	0.009	0.009	0.011	0.029	0.01
Sulfate (SO4)	mg/L	9	0.3	0	1.69	0.45	1.09	1.95	2.08	128
Total Dissolved Solids	mg/L	9	4 to 13.3	0	85.8	31.2	42.8	99.0	111	500
Total Inorganic Carbon	mg/L	9	0.5	4	1.63	1.53	<0.5	0.64	3.75	-
Total Kjeldahl Nitrogen	mg/L	9	0.2	0	0.66	0.38	0.27	0.50	1.13	-
Total Organic Carbon	mg/L	9	0.5	0	20.3	12.2	8.46	16.3	36.1	-
Total Suspended Solids	mg/L	9	3	4	4.17	1.56	<3	3.70	6.66	-
Turbidity	NTU	9	0.1	0	1.55	0.65	0.69	1.72	2.20	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	9	1	0	48.1	43.2	11.8	22.0	107	100
Total Coliforms	CFU/100mL	9	1	0	>200	0	200	>200	>200	-
Metals										
<i>Total</i>										
Aluminum (Al)	mg/L	9	0.003	0	0.249	0.159	0.066	0.221	0.436	0.32
Antimony (Sb)	mg/L	9	0.0001	8	0.00014	0.00011	<0.0001	<0.0001	0.00029	0.006
Arsenic (As)	mg/L	9	0.0001	0	0.00039	0.00012	0.00029	0.00033	0.00056	0.005
Barium (Ba)	mg/L	9	0.0001	0	0.0101	0.0039	0.0054	0.0101	0.0146	1
Beryllium (Be)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	9	0.00005	9	<0.00005	-	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	9	0.01	9	<0.01	-	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	9	0.000005	0	0.000014	0.000008	0.000006	0.000009	0.000025	0.00004
Calcium (Ca)	mg/L	9	0.05	0	6.41	3.26	3.07	4.83	10.8	1000
Cesium (Cs)	mg/L	9	0.00001	0	0.000032	0.000007	0.000020	0.000035	0.000038	-
Chromium (Cr)	mg/L	9	0.0001	0	0.00050	0.00015	0.00032	0.00054	0.00067	-
Chromium III (Cr3+)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	9	0.0005	3	0.00059	0.00010	<0.0005	0.00055	0.00074	0.005
Cobalt (Co)	mg/L	9	0.0001	0	0.00019	0.00010	0.00011	0.00013	0.00033	0.00078
Copper (Cu)	mg/L	9	0.0005	3	0.0009	0.0004	<0.0005	0.0008	0.0014	0.002
Iron (Fe)	mg/L	9	0.01	0	0.913	0.418	0.390	0.925	1.40	3.3
Lead (Pb)	mg/L	9	0.00005	0	0.00020	0.00011	0.00011	0.00013	0.00034	0.001
Lithium (Li)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	2.5
Magnesium (Mg)	mg/L	9	0.005	0	0.980	0.483	0.500	0.815	1.61	82
Manganese (Mn)	mg/L	9	0.0001	0	0.0225	0.0083	0.0109	0.0261	0.0300	0.12
Mercury (Hg)	mg/L	9	0.000005	6	0.000007	0.000002	<0.000005	<0.000005	0.000010	0.000026
Molybdenum (Mo)	mg/L	9	0.00005	3	0.000071	0.000016	<0.00005	0.000077	0.000087	0.073
Nickel (Ni)	mg/L	9	0.0005	5	0.0007	0.0003	<0.0005	<0.0005	0.0011	0.025
Phosphorus (P)	mg/L	9	0.05	9	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	9	0.05	0	0.754	0.219	0.487	0.772	1.01	53
Rhodium (Rh)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	9	0.0002	0	0.0024	0.0008	0.0015	0.0023	0.0034	-
Ruthenium (Ru)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	9	0.00005	0	0.00011	0.00003	0.00007	0.00010	0.00015	0.001
Silicon (Si)	mg/L	9	0.1	0	2.88	0.506	2.19	3.15	3.31	-
Silver (Ag)	mg/L	9	0.00001	9	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	9	0.05	0	11.6	9.09	5.31	5.64	23.9	680
Strontium (Sr)	mg/L	9	0.0002	0	0.021	0.012	0.010	0.015	0.037	7
Sulfur (S)	mg/L	9	0.5	2	0.68	0.13	<0.5	0.73	0.81	-
Tellurium (Te)	mg/L	9	0.0002	9	<0.0002	-	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	9	0.00001	6	<0.00001	0.000004	<0.00001	<0.00001	0.000020	0.0008
Thorium (Th)	mg/L	9	0.0001	0	0.00016	0.00002	0.00013	0.00016	0.00019	-
Tin (Sn)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	0.073
Titanium (Ti)	mg/L	9	0.0003	0	0.0045	0.0026	0.0019	0.0036	0.0081	0.076
Tungsten (W)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	9	0.00001	0	0.00011	0.00001	0.00009	0.00011	0.00013	0.015
Vanadium (V)	mg/L	9	0.0005	0	0.0008	0.0002	0.0006	0.0008	0.0011	0.12
Zinc (Zn)	mg/L	9	0.003	4	0.005	0.004	<0.003	0.004	0.011	0.02
Zirconium (Zr)	mg/L	9	0.0002	6	0.00024	0.00007	<0.0002	<0.0002	0.00035	0.004
<i>Dissolved</i>										
Aluminum (Al)	mg/L	9	0.001	0	0.213	0.151	0.054	0.186	0.418	-
Antimony (Sb)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	9	0.0001	0	0.00038	0.00011	0.00029	0.00033	0.00055	-
Barium (Ba)	mg/L	9	0.0001	0	0.0096	0.0039	0.0050	0.0096	0.0141	-
Beryllium (Be)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	-

APPENDIX B, TABLE 6

Summary of Year 1 surface water chemistry results from Revell River.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
Dissolved										
Bismuth (Bi)	mg/L	9	0.00005	9	<0.00005	-	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	9	0.01	9	<0.01	-	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	9	0.000005	1	0.000011	0.000006	<0.000005	0.000010	0.000019	-
Calcium (Ca)	mg/L	9	0.05	0	5.91	2.93	3.11	4.85	9.83	-
Cesium (Cs)	mg/L	9	0.00001	0	0.000027	0.000008	0.000016	0.000031	0.000034	-
Chromium (Cr)	mg/L	9	0.0001	0	0.00041	0.00011	0.00030	0.00036	0.00058	-
Chromium III (Cr3+)	mg/L	9	0.0005	6	0.00052	0.00004	<0.0005	<0.0005	0.00058	-
Chromium VI (Cr6+)	mg/L	9	0.0005	5	0.0007	0.0003	<0.0005	<0.0005	0.0011	-
Cobalt (Co)	mg/L	9	0.0001	1	0.00017	0.00009	<0.0001	0.00011	0.00030	-
Copper (Cu)	mg/L	9	0.0002	0	0.00076	0.00037	0.00033	0.00072	0.00124	0.00088
Iron (Fe)	mg/L	9	0.01	0	0.771	0.346	0.327	0.858	1.13	-
Lead (Pb)	mg/L	9	0.00005	0	0.00015	0.00009	0.00009	0.00009	0.00028	0.0065
Lithium (Li)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	-
Magnesium (Mg)	mg/L	9	0.005	0	0.953	0.460	0.499	0.792	1.55	-
Manganese (Mn)	mg/L	9	0.0001	0	0.020	0.008	0.010	0.023	0.028	0.23
Mercury (Hg)	mg/L	9	0.000005	6	0.0000059	0.0000014	<0.000005	<0.000005	0.0000081	-
Molybdenum (Mo)	mg/L	9	0.00005	3	0.00007	0.00002	<0.00005	0.00007	0.00010	-
Nickel (Ni)	mg/L	9	0.0005	6	0.00054	0.00007	<0.0005	<0.0005	0.00066	-
Phosphorus (P)	mg/L	9	0.05	9	<0.05	-	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	9	0.05	0	0.759	0.226	0.490	0.769	1.04	-
Rhodium (Rh)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	9	0.0002	0	0.0023	0.0008	0.0014	0.0022	0.0033	-
Ruthenium (Ru)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	9	0.001	9	<0.001	-	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	9	0.00005	0	0.00010	0.00003	0.00006	0.00011	0.00013	-
Silicon (Si)	mg/L	9	0.05	0	2.80	0.545	2.07	3.10	3.23	-
Silver (Ag)	mg/L	9	0.00001	9	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	9	0.05	0	11.4	8.77	5.22	5.93	23.2	-
Strontium (Sr)	mg/L	9	0.0002	0	0.020	0.012	0.010	0.015	0.036	2.5
Sulfur (S)	mg/L	9	0.5	1	0.713	0.132	0.528	0.750	0.876	-
Tellurium (Te)	mg/L	9	0.0002	9	<0.0002	-	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	9	0.00001	9	<0.00001	-	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	9	0.0001	0	0.00017	0.00004	0.00013	0.00017	0.00022	-
Tin (Sn)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	9	0.0003	0	0.0029	0.0017	0.0016	0.0019	0.0054	-
Tungsten (W)	mg/L	9	0.0001	9	<0.0001	-	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	9	0.00001	0	0.000097	0.000013	0.000080	0.000101	0.000112	-
Vanadium (V)	mg/L	9	0.0005	2	0.00069	0.00017	<0.0005	0.00067	0.00092	-
Zinc (Zn)	mg/L	9	0.001	0	0.0043	0.0029	0.0014	0.0040	0.0087	0.017
Zirconium (Zr)	mg/L	9	0.0002	0	0.00027	0.00007	0.00020	0.00022	0.00036	-
Other										
Chlorophyll a	µg/L	9	0.1	0	1.04	0.407	0.510	1.22	1.46	-
Radionuclides										
H-3	Bq/L	9	11 to 13	9	12.0	-	11.0	12.0	13.0	7000
Am-241	Bq/L	3	2 to 3	3	2.40	-	2.02	2.20	2.92	-
C-14	Bq/L	9	6.2 to 8.7	9	7.07	-	6.36	6.70	8.62	200
Cl-36	Bq/L	9	0.032 to 0.22	9	0.12	-	0.03	0.14	0.21	-
Co-60	Bq/L	9	0.27 to 0.47	9	0.38	-	0.29	0.39	0.46	40
Cs-137	Bq/L	9	0.21 to 0.37	9	0.32	-	0.24	0.34	0.37	10
I-129	Bq/L	9	0.18 to 0.27	9	0.22	-	0.18	0.22	0.26	1
K-40	Bq/L	9	4.8 to 7.2	9	5.81	-	4.88	5.70	6.92	-
Np-237	Bq/L	9	0.0013 to 0.0035	9	0.0027	-	0.0017	0.0027	0.0035	-
Pu-238	Bq/L	9	0.00029 to 0.0023	8	0.0013	0.0006	0.0006	0.0012	0.0021	0.6
Pu-239	Bq/L	9	0.00035 to 0.0029	9	0.0012	-	0.0004	0.0010	0.0024	0.6
Ra-226	Bq/L	9	0.0043 to 0.0085	7	0.0074	0.0014	0.0059	0.0069	0.0091	0.5
Ru-106	Bq/L	9	2.2 to 3.7	9	3.07	-	2.32	3.10	3.66	20
Sr-90	Bq/L	9	0.0055 to 0.017	9	0.011	-	0.006	0.013	0.016	5
Th-228	Bq/L	9	0.0042 to 0.01	5	0.008	0.002	0.005	0.008	0.011	2
Th-230	Bq/L	9	0.0038 to 0.0062	7	0.0049	0.0009	0.0039	0.0048	0.0061	0.6
Th-232	Bq/L	9	0.0006 to 0.003	7	0.0018	0.0007	0.0010	0.0016	0.0028	0.6
U-234	Bq/L	9	0.00054 to 0.0021	2	0.0027	0.0008	0.0015	0.0029	0.0037	3
U-235	Bq/L	9	0.00054 to 0.0025	8	0.0015	0.0006	0.0006	0.0017	0.0023	3
U-238	Bq/L	9	0.0013 to 0.0022	3	0.0020	0.0009	0.0014	0.0017	0.0036	3
Gross Alpha	Bq/L	9	0.059 to 0.091	8	0.076	0.009	0.063	0.074	0.089	-
Gross Beta	Bq/L	9	0.082 to 0.11	8	0.100	0.012	0.084	0.100	0.116	-

Bold values indicate guideline exceedance.

¹See Appendix B, Table 1 for detailed water qualtiy guidelines.

APPENDIX B, TABLE 7										
Summary of Year 1 surface water chemistry results from the Reference Ponds.										
Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	18	1	0	14.7	8.837	3.58	11.8	27.9	-
Ammonia, Total (as N)	mg/L	18	0.01	5	0.023	0.0196	0.010	0.018	0.049	5.855
Anion Sum	me/L	2	NA	0	0.26	0.042	0.23	0.26	0.29	-
Bicarbonate (HCO3)	mg/L	18	1.2	0	18.0	10.79	4.4	14.4	34.1	-
Biochemical Oxygen Demand	mg/L	18	2	15	2.0	0.09	2.0	2.0	2.1	-
Bromide (Br)	mg/L	18	0.1	18	<0.1	0	<0.1	<0.1	<0.1	-
Carbonate (CO3)	mg/L	18	0.6	18	<0.6	0	<0.6	<0.6	<0.6	-
Cation Sum	me/L	2	NA	0	0.42	0.021	0.40	0.42	0.43	-
Chloride (Cl)	mg/L	18	0.5	14	1.17	1.28	0.50	0.50	3.49	120
Conductivity	umhos/cm	18	1	0	39.6	12.4	25.8	35.9	58	700
Cyanide, Total	mg/L	18	0.002	18	<0.002	0	<0.002	<0.002	<0.002	0.005
Dissolved Organic Carbon	mg/L	18	0.5	0	16.9	2.124	13.8	17.1	19.2	-
Fluoride (F)	mg/L	18	0.02	0	0.052	0.0214	0.025	0.056	0.08	0.12
Hardness (as CaCO3)	mg/L	2	NA	0	18	0.9	18	18	19	-
Hydroxide (OH)	mg/L	18	0.34	18	<0.34	0	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	11	0.2	7	0.2	0	0.2	0.2	0.2	-
Langelier Index	-	2	NA	0	-2	0	-2	-2	-2	-
Nitrate (as N)	mg/L	18	0.02	16	0.026	0.0233	0.020	0.020	0.036	3
Nitrate and Nitrite as N	mg/L	18	0.07	17	0.0727	0.01155	0.070	0.070	0.0774	-
Nitrite (as N)	mg/L	18	0.01	18	<0.01	0	<0.01	<0.01	<0.01	0.02
pH	pH units	4	0.1	0	7.34	0.3205	6.99	7.36	7.65	6.5 - 9.0
Phosphorus (P), Total	mg/L	18	0.003	0	0.0203	0.003812	0.0144	0.0211	0.0247	0.01
Sulfate (SO4)	mg/L	18	0.3	0	0.979	0.5267	0.499	0.650	1.76	128
TDS (Calculated)	mg/L	2	NA	0	18	2.1	17	18	20	-
Total Dissolved Solids	mg/L	18	4	0	49.4	10.65	35.5	52.7	61.8	-
Total Inorganic Carbon	mg/L	18	0.5	2	2.27	1.5	0.50	1.68	4.2	-
Total Kjeldahl Nitrogen	mg/L	18	0.2	0	0.73	0.187	0.47	0.72	1.1	-
Total Organic Carbon	mg/L	18	0.5	0	16.3	2.223	12	16.5	18.8	-
Total Suspended Solids	mg/L	18	3	5	4.04	1.168	3.00	3.8	6.19	-
Turbidity	NTU	18	0.1	0	2.43	0.6373	1.76	2.23	3.68	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	18	1	3	12	13.5	1.0	7.5	39	100
Total Coliforms	CFU/100mL	18	1	0	160	61.6	61	>200	>200	-
Metals										
Total										
Aluminum (Al)	mg/L	18	0.003	0	0.130	0.07767	0.0187	0.136	0.257	0.32
Antimony (Sb)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	0.006
Arsenic (As)	mg/L	18	0.0001	0	0.00036	0.0000442	0.00028	0.00037	0.0004	0.005
Barium (Ba)	mg/L	18	0.0001	0	0.0067	0.001046	0.00551	0.00654	0.00775	1
Beryllium (Be)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	18	0.00005	18	<0.00005	0	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	18	0.01	18	<0.01	0	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	18	0.000005	13	0.00000526	0.000000467	0.00000500	0.00000500	0.00000616	0.00004
Calcium (Ca)	mg/L	18	0.05	0	5.7	2.544	1.57	6.2	8.5	1000
Cesium (Cs)	mg/L	18	0.00001	7	0.000023	0.0000135	0.00001	0.000022	0.000045	-
Chromium (Cr)	mg/L	18	0.0001	1	0.00033	0.000166	0.00012	0.0003	0.00054	-
Chromium III (Cr3+)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	18	0.0005	14	0.00056	0.000126	0.00050	0.00050	0.00078	0.005
Cobalt (Co)	mg/L	18	0.0001	9	0.00013	0.0000536	0.00010	0.00010	0.00021	0.00078
Copper (Cu)	mg/L	18	0.0005	6	0.000857	0.0003737	0.000500	0.000785	0.00146	0.002
Iron (Fe)	mg/L	18	0.01	0	0.201	0.07731	0.0900	0.198	0.348	3.3
Lead (Pb)	mg/L	18	0.00005	5	0.0000888	0.00005834	0.00005	0.000062	0.000202	0.001
Lithium (Li)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	2.5
Magnesium (Mg)	mg/L	18	0.005	0	0.952	0.491	0.400	0.763	1.61	82
Manganese (Mn)	mg/L	18	0.0001	0	0.0283	0.02225	0.0117	0.0247	0.0432	0.12
Mercury (Hg)	mg/L	18	0.000005	18	<0.000005	0	<0.000005	<0.000005	<0.000005	0.000026
Molybdenum (Mo)	mg/L	18	0.00005	4	0.000478	0.0005471	0.00005	0.000069	0.00125	0.073
Nickel (Ni)	mg/L	18	0.0005	11	0.000743	0.0004905	0.0005	0.0005	0.00125	0.025
Phosphorus (P)	mg/L	18	0.003 to 0.05	18	<0.05	0	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	18	0.05	0	0.487	0.1187	0.349	0.460	0.641	53
Rhodium (Rh)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	18	0.0002	0	0.00151	0.0002861	0.00118	0.00144	0.00200	-
Ruthenium (Ru)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	18	0.00005	0	0.0000943	0.00002676	0.0000613	0.0000895	0.000135	0.001
Silicon (Si)	mg/L	18	0.1	0	1.3	0.7499	0.409	1.07	2.78	-
Silver (Ag)	mg/L	18	0.00001	18	<0.00001	0	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	18	0.05	0	1.46	0.6958	0.833	1.34	2.71	680
Strontium (Sr)	mg/L	18	0.0002	0	0.014	0.003271	0.00914	0.0151	0.0182	7
Sulfur (S)	mg/L	18	0.5	9	0.62	0.177	0.50	0.51	0.98	-
Tellurium (Te)	mg/L	18	0.0002	18	<0.0002	0	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	18	0.00001	18	<0.00001	0	<0.00001	<0.00001	<0.00001	0.0008
Thorium (Th)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	0.073
Titanium (Ti)	mg/L	18	0.0003	2	0.00185	0.001097	0.000300	0.00186	0.00379	0.076
Tungsten (W)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	18	0.00001	5	0.0000301	0.00002068	0.0000100	0.0000290	0.0000700	0.015
Vanadium (V)	mg/L	18	0.0005	18	<0.0005	0	<0.0005	<0.0005	<0.0005	0.12
Zinc (Zn)	mg/L	18	0.003	16	0.00316	0.0005192	0.00300	0.00300	0.00400	0.02
Zirconium (Zr)	mg/L	18	0.0002	13	0.00021	0.0000195	0.00020	0.00020	0.00026	0.004

APPENDIX B, TABLE 7										
Summary of Year 1 surface water chemistry results from the Reference Ponds.										
Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Water Quality Guideline ¹
Metals										
<i>Dissolved</i>										
Aluminum (Al)	mg/L	18	0.001	0	0.0947	0.06267	0.0109	0.100	0.182	-
Antimony (Sb)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	18	0.0001	0	0.00034	0.0000419	0.00028	0.00035	0.00039	-
Barium (Ba)	mg/L	18	0.0001	0	0.00590	0.0006815	0.00486	0.00602	0.00684	-
Beryllium (Be)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	18	0.00005	18	<0.00005	0	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	18	0.01	18	<0.01	0	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	18	0.000005	14	0.00000519	0.000000448	0.00000500	0.00000500	0.00000594	-
Calcium (Ca)	mg/L	18	0.05	0	5.59	2.488	1.53	5.95	8.26	-
Cesium (Cs)	mg/L	18	0.00001	7	0.000020	0.0000112	0.000010	0.000018	0.00004	-
Chromium (Cr)	mg/L	18	0.0001	2	0.00036	0.000495	0.00010	0.00023	0.00076	-
Chromium III (Cr3+)	mg/L	18	0.0005	17	0.00057	0.000304	0.00050	0.00050	0.00069	-
Chromium VI (Cr6+)	mg/L	18	0.0005	18	<0.0005	0	<0.0005	<0.0005	<0.0005	-
Cobalt (Co)	mg/L	18	0.0001	16	0.00011	0.000033	0.00010	0.00010	0.00012	-
Copper (Cu)	mg/L	18	0.0002	0	0.000672	0.0003958	0.00033	0.00045	0.0014	0.00088
Iron (Fe)	mg/L	18	0.01	0	0.107	0.05598	0.0246	0.102	0.199	-
Lead (Pb)	mg/L	18	0.00005	14	0.0000626	0.00002521	0.0000500	0.0000500	0.000109	0.0065
Lithium (Li)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	-
Magnesium (Mg)	mg/L	18	0.005	0	0.923	0.476	0.404	0.721	1.59	-
Manganese (Mn)	mg/L	18	0.0001	0	0.0107	0.02099	0.000539	0.00379	0.0306	0.23
Mercury (Hg)	mg/L	18	0.000005	18	<0.000005	0	<0.000005	<0.000005	<0.000005	-
Molybdenum (Mo)	mg/L	18	0.00005	5	0.000439	0.0005012	0.0000500	0.0000585	0.00112	-
Nickel (Ni)	mg/L	18	0.0005	10	0.00066	0.000209	0.000500	0.000500	0.00093	-
Phosphorus (P)	mg/L	18	0.05	18	<0.05	0	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	18	0.05	0	0.476	0.1158	0.336	0.442	0.641	-
Rhodium (Rh)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	18	0.0002	0	0.00141	0.0002435	0.00110	0.00133	0.00177	-
Ruthenium (Ru)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	18	0.001	18	<0.001	0	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	18	0.00005	1	0.0000902	0.00002302	0.0000551	0.0000905	0.000121	-
Silicon (Si)	mg/L	18	0.05	0	1.2	0.6994	0.359	1.02	2.54	-
Silver (Ag)	mg/L	18	0.00001	18	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	18	0.05	0	1.46	0.7212	0.727	1.31	2.71	-
Strontium (Sr)	mg/L	18	0.0002	0	0.0137	0.003192	0.0094	0.0146	0.0183	2.5
Sulfur (S)	mg/L	18	0.5	9	0.60	0.12	0.50	0.52	0.8	-
Tellurium (Te)	mg/L	18	0.0002	18	<0.0002	0	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	18	0.00001	18	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Tin (Sn)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	18	0.0003	3	0.00101	0.0005879	0.000300	0.00107	0.00176	-
Tungsten (W)	mg/L	18	0.0001	18	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	18	0.00001	7	0.0000269	0.00001766	0.00001	0.000025	0.0000585	-
Vanadium (V)	mg/L	18	0.0005	18	<0.0005	0	<0.0005	<0.0005	<0.0005	-
Zinc (Zn)	mg/L	18	0.001	3	0.0016	0.000441	0.0010	0.0015	0.0023	0.017
Zirconium (Zr)	mg/L	18	0.0002	12	0.00022	0.0000316	0.00020	0.00020	0.00028	-
Other										
Chlorophyll a	µg/L	18	0.1	0	12.8	5.032	6.36	12.3	19.2	-
Polycyclic Aromatic Hydrocarbons										
1+2-Methylnaphthalenes	µg/L	18	0.0283	18	<0.028	0	<0.028	<0.028	<0.028	-
1-Methylnaphthalene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	526
2-Methylnaphthalene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Acenaphthene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	5.8
Acenaphthylene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Anthracene	µg/L	18	0.02	18	<0.02 ²	0	<0.02 ²	<0.02 ²	<0.02 ²	0.012
Benzo(a)anthracene	µg/L	18	0.02	18	<0.02 ²	0	<0.02 ²	<0.02 ²	<0.02 ²	0.018
Benzo(a)pyrene	µg/L	18	0.01	18	<0.01	0	<0.01	<0.01	<0.01	0.015
Benzo(b&j)fluoranthene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Benzo(g,h,i)perylene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Benzo(k)fluoranthene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Chrysene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Dibenz(a,h)anthracene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Fluoranthene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	0.04
Fluorene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	3
Indeno(1,2,3-cd)pyrene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	-
Naphthalene	µg/L	18	0.05	17	0.050	0.0014	0.050	0.050	0.051	1.1
Phenanthrene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	0.4
Pyrene	µg/L	18	0.02	18	<0.02	0	<0.02	<0.02	<0.02	0.025
Semi-Volatile Organic Compounds										
1,2,4-Trichlorobenzene	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	0.5
2,4,5-Trichlorophenol	µg/L	18	0.2 to 0.4	18	0.21	0.0471	0.20	0.20	0.23	18
2,4,6-Trichlorophenol	µg/L	18	0.2 to 0.4	18	0.21	0.0471	0.20	0.20	0.23	5
2,4+2,6-Dinitrotoluene	µg/L	18	0.566 to 1.13	18	0.6	0.125	0.57	0.57	0.65	10
2,4-Dichlorophenol	µg/L	18	0.3 to 0.6	18	0.32 ²	0.0707	0.30 ²	0.30 ²	0.35 ²	0.2
2,4-Dimethylphenol	µg/L	18	0.5 to 1	18	0.53	0.118	0.50	0.50	0.58	10
2,4-Dinitrophenol	µg/L	18	1 to 2	18	1.2	0.428	1.00	1.00	2	6.2
2,4-Dinitrotoluene	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	4
2,6-Dinitrotoluene	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	6
2-Chlorophenol	µg/L	18	0.3 to 0.6	18	0.32	0.0707	0.30	0.30	0.35	7
3,3'-Dichlorobenzidine	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	0.6

APPENDIX B, TABLE 7

Summary of Year 1 surface water chemistry results from the Reference Ponds.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Water Quality Guideline ¹
Semi-Volatile Organic Compounds										
4-Chloroaniline	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	-
Biphenyl	µg/L	18	0.4 to 0.8	18	<i>0.42</i> ²	0.0943	<i>0.40</i> ²	<i>0.40</i> ²	<i>0.46</i> ²	0.2
Bis(2-chloroethyl)ether	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	200
Bis(2-chloroisopropyl)ether	µg/L	18	0.4 to 0.8	18	0.42	0.0943	0.40	0.40	0.46	-
Bis(2-ethylhexyl)phthalate	µg/L	18	2 to 4	18	2.1	0.471	2.00	2.00	2.3	3
Diethylphthalate	µg/L	18	0.2 to 0.4	18	0.21	0.0471	0.20	0.20	0.23	210
Dimethylphthalate	µg/L	18	0.2 to 0.4	18	0.21	0.0471	0.20	0.20	0.23	330
Pentachlorophenol	µg/L	18	0.5 to 1	18	0.53	0.118	0.50	0.50	0.58	0.5
Phenol	µg/L	18	0.5 to 1	17	0.71	0.872	0.50	0.50	1.1	4
Herbicides and Pesticides										
Aminomethylphosphonic acid (AMPA)	µg/L	18	0.5	18	<0.5	0	<0.5	<0.5	<0.5	-
Glyphosate	µg/L	18	0.2	18	<0.2	0	<0.2	<0.2	<0.2	280
Radionuclides										
H-3	Bq/L	17	11 to 13	17	12	0.529	11	12	12	7000
Am-241	Bq/L	6	0.56 to 3	6	2	1.11	0.59	2.5	3	-
C-14	Bq/L	14	6.7 to 7.9	14	7.1	0.389	6.8	7.0	7.9	200
Co-60	Bq/L	20	0.25 to 0.47	20	0.36	0.0573	0.26	0.37	0.42	40
Cs-137	Bq/L	20	0.25 to 0.37	20	0.32	0.0358	0.26	0.33	0.36	10
I-129	Bq/L	17	0.16 to 0.31	17	0.25	0.0468	0.16	0.26	0.3	1
K-40	Bq/L	18	4.6 to 6.3	18	5.4	0.464	4.6	5.5	5.9	-
Ra-226	Bq/L	18	0.0038 to 0.012	17	0.0072	0.00185	0.005	0.0072	0.0096	0.5
Ru-106	Bq/L	20	2.2 to 3.8	20	2.9	0.456	2.2	3	3.7	20
Sr-90	Bq/L	18	0.012 to 0.019	15	0.016	0.00253	0.013	0.016	0.021	5
Th-228	Bq/L	18	0.003 to 0.0075	18	0.0049	0.00103	0.0039	0.0048	0.0067	2
Th-230	Bq/L	18	0.0036 to 0.0051	18	0.0042	0.000394	0.0037	0.0041	0.0049	0.6
Th-232	Bq/L	18	0.00037 to 0.0024	15	0.0015	0.00033	0.0011	0.0015	0.002	0.6
U-234	Bq/L	18	0.0014 to 0.0038	13	0.003	0.000911	0.0019	0.0028	0.0047	3
U-235	Bq/L	18	0.0012 to 0.0045	17	0.0023	0.00109	0.0012	0.0023	0.0042	3
U-238	Bq/L	18	0.002 to 0.0045	18	0.0032	0.000826	0.0021	0.003	0.0044	3
Gross Alpha	Bq/L	18	0.056 to 0.092	18	0.073	0.0112	0.059	0.073	0.09	-
Gross Beta	Bq/L	18	0.087 to 0.12	18	0.11	0.0116	0.088	0.11	0.12	-

Bold values indicate guideline exceedance; italicized values indicate conditional guideline exceedance.
¹See Appendix B, Table 1 for detailed water quality guidelines.
²Due to detection limits, guideline exceedance cannot be confirmed.

APPENDIX B, TABLE 8

Summary of Year 1 surface water chemistry results from the AOI Ponds.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	34	1	1	3.76	1.944	1.07	3.90	6.65	-
Ammonia, Total (as N)	mg/L	34	0.01 to 0.02	6	0.028	0.0206	0.01	0.021	0.077	5.855
Bicarbonate (HCO3)	mg/L	34	1.2	1	4.59	2.374	1.27	4.80	8.12	-
Biochemical Oxygen Demand	mg/L	34	2	33	2.0	0.0171	2.0	2.0	2.0	-
Bromide (Br)	mg/L	34	0.1	34	<0.1	0	<0.1	<0.1	<0.1	-
Carbonate (CO3)	mg/L	34	0.6	34	<0.6	0	<0.6	<0.6	<0.6	-
Chloride (Cl)	mg/L	34	0.5	16	0.631	0.1611	0.500	0.570	0.911	120
Conductivity	umhos/cm	34	1	0	21.9	4.609	14.6	24.1	26.0	700
Cyanide, Total	mg/L	34	0.002	33	0.00439	0.01396	0.002	0.002	0.002	0.005
Dissolved Organic Carbon	mg/L	34	0.5	0	23.3	7.357	10.0	23.2	34.7	-
Fluoride (F)	mg/L	34	0.02	3	0.028	0.00414	0.020	0.029	0.035	0.12
Hydroxide (OH)	mg/L	34	0.34	34	<0.34	0	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	11	0.2	11	<0.2	0	<0.2	<0.2	<0.2	-
Nitrate (as N)	mg/L	34	0.02	21	0.029	0.0215	0.020	0.020	0.083	3
Nitrate and Nitrite as N	mg/L	34	0.07	31	0.072	0.007717	0.0700	0.0700	0.0827	-
Nitrite (as N)	mg/L	34	0.01	34	<0.01	0	<0.01	<0.01	<0.01	0.02
pH	pH units	2	0.1	0	6.83	0.2051	6.69	6.83	6.96	6.5 - 9
Phosphorus (P), Total	mg/L	34	0.003	0	0.0205	0.00902	0.00956	0.0194	0.0368	0.01
Sulfate (SO4)	mg/L	34	0.3	1	0.673	0.2234	0.399	0.670	1.07	128
Total Dissolved Solids	mg/L	34	4	0	54.5	18.58	25.9	53.3	83.5	500
Total Inorganic Carbon	mg/L	34	0.5	23	0.716	0.5523	0.500	0.500	1.64	-
Total Kjeldahl Nitrogen	mg/L	34	0.2	0	0.60	0.199	0.31	0.59	0.87	-
Total Organic Carbon	mg/L	34	0.5	0	23.1	7.631	9.44	23.7	35.1	-
Total Suspended Solids	mg/L	34	3	27	3.38	0.964	3.00	3.00	5.75	-
Turbidity	NTU	34	0.1	1	1.74	0.771	0.831	1.72	3.05	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	34	1	4	13	13.2	1.0	7.5	38	100
Total Coliforms	CFU/100mL	34	1	1	160	69.9	9.9	>200	>200	-
Metals										
<i>Total</i>										
Aluminum (Al)	mg/L	34	0.003	0	0.390	0.1652	0.0637	0.397	0.622	0.32
Antimony (Sb)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	0.006
Arsenic (As)	mg/L	34	0.0001	0	0.00046	0.0000942	0.00032	0.00049	0.00057	0.005
Barium (Ba)	mg/L	34	0.0001	0	0.00591	0.001978	0.00179	0.00638	0.00821	1
Beryllium (Be)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	34	0.00005	34	<0.00005	0	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	34	0.01	34	<0.01	0	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	34	0.000005	2	0.0000153	0.00000492	0.00000572	0.00001580	0.0000215	0.00004
Calcium (Ca)	mg/L	34	0.05	0	2.18	0.549	1.29	2.49	2.68	1000
Cesium (Cs)	mg/L	34	0.00001	0	0.000023	0.00000791	0.0000110	0.0000250	0.000036	-
Chromium (Cr)	mg/L	34	0.0001	0	0.00058	0.000201	0.00013	0.00062	0.00085	-
Chromium III (Cr3+)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	34	0.0005	20	0.00055	0.000119	0.00050	0.00050	0.00072	0.005
Cobalt (Co)	mg/L	34	0.0001	4	0.00033	0.00015	0.00010	0.00030	0.00057	0.00078
Copper (Cu)	mg/L	34	0.0005	4	0.000879	0.0009039	0.000500	0.000730	0.00102	0.002
Iron (Fe)	mg/L	34	0.01	0	0.745	0.2647	0.261	0.822	1.05	3.3
Lead (Pb)	mg/L	34	0.00005	0	0.000283	0.0001066	0.0000649	0.000301	0.000413	0.001
Lithium (Li)	mg/L	34	0.001	13	0.0012	0.000196	0.0010	0.0011	0.0015	2.5
Magnesium (Mg)	mg/L	34	0.005	0	0.734	0.194	0.428	0.773	0.969	82
Manganese (Mn)	mg/L	34	0.0001	0	0.0255	0.008076	0.0150	0.0244	0.0384	0.12
Mercury (Hg)	mg/L	34	0.000005	20	0.00000585	0.00000173	0.00000500	0.00000500	0.0000101	0.000026
Molybdenum (Mo)	mg/L	34	0.00005	32	0.0000502	0.0000008	0.0000500	0.0000500	0.0000511	0.073
Nickel (Ni)	mg/L	34	0.0005	14	0.000648	0.0001819	0.000500	0.000565	0.000991	0.025
Phosphorus (P)	mg/L	34	0.003 to 0.05	34	<0.05	0	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	34	0.05	0	0.656	0.2448	0.252	0.768	1.01	53
Rhodium (Rh)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	34	0.0002	0	0.0022	0.0008607	0.00103	0.00252	0.00389	-
Ruthenium (Ru)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	34	0.00005	0	0.000109	0.00002771	0.0000603	0.000104	0.000144	0.001
Silicon (Si)	mg/L	34	0.1	0	2.75	1.114	0.883	2.67	3.83	-
Silver (Ag)	mg/L	34	0.00001	34	<0.00001	0	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	34	0.05	0	1.10	0.196	0.793	1.16	1.35	680
Strontium (Sr)	mg/L	34	0.0002	0	0.0101	0.002572	0.006	0.0103	0.0132	7
Sulfur (S)	mg/L	34	0.5	25	0.52	0.0533	0.50	0.50	0.65	-
Tellurium (Te)	mg/L	34	0.0002	34	<0.0002	0	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	34	0.00001	31	0.000010	0.00000017	0.000010	0.000010	0.000010	0.0008
Thorium (Th)	mg/L	34	0.0001	17	0.00011	0.0000175	0.00010	0.00010	0.00014	-
Tin (Sn)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	0.073
Titanium (Ti)	mg/L	34	0.0003	0	0.00517	0.002444	0.000591	0.00536	0.00887	0.076
Tungsten (W)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	34	0.00001	0	0.0000633	0.00002544	0.0000277	0.0000610	0.000106	0.015
Vanadium (V)	mg/L	34	0.0005	4	0.000925	0.0002695	0.000500	0.000925	0.00129	0.12
Zinc (Zn)	mg/L	34	0.003	15	0.00344	0.0007003	0.00300	0.00310	0.00497	0.02
Zirconium (Zr)	mg/L	34	0.0002	5	0.00029	0.0000757	0.00020	0.00028	0.00039	0.004
<i>Dissolved</i>										
Aluminum (Al)	mg/L	34	0.001	0	0.357	0.163	0.0436	0.384	0.586	-
Antimony (Sb)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	34	0.0001	0	0.00043	0.0000899	0.0003	0.00046	0.00055	-
Barium (Ba)	mg/L	34	0.0001	0	0.00576	0.002058	0.00151	0.00567	0.00824	-
Beryllium (Be)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	34	0.00005	34	<0.00005	0	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	34	0.01	34	<0.01	0	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	34	0.000005	3	0.0000137	0.0000044	0.000005	0.0000145	0.0000201	-
Calcium (Ca)	mg/L	34	0.05	0	2.15	0.535	1.30	2.40	2.70	-
Cesium (Cs)	mg/L	34	0.00001	4	0.000020	0.00000722	0.000010	0.000022	0.000033	-
Chromium (Cr)	mg/L	34	0.0001	0	0.00054	0.000187	0.00016	0.00057	0.00079	-
Chromium III (Cr3+)	mg/L	34	0.0005	21	0.00055	0.0000761	0.00050	0.00050	0.00070	-
Chromium VI (Cr6+)	mg/L	34	0.0005	22	0.000565	0.0001309	0.00050	0.00050	0.000804	-
Cobalt (Co)	mg/L	34	0.0001	5	0.0003	0.000148	0.0001	0.00029	0.00057	-
Copper (Cu)	mg/L	34	0.0002	1	0.00066	0.0002412	0.00024	0.00068	0.000937	0.00088
Iron (Fe)	mg/L	34	0.01	0	0.628	0.2513	0.120	0.703	0.888	-
Lead (Pb)	mg/L	34	0.00005	3	0.000246	0.0001032	0.00005	0.000242	0.000375	0.0065
Lithium (Li)	mg/L	34	0.001	14	0.0011	0.000173	0.0010	0.0010	0.0014	-
Magnesium (Mg)	mg/L	34	0.005	0	0.735	0.2062	0.440	0.774	1.01	-
Manganese (Mn)	mg/L	34	0.0001	0	0.0222	0.008093	0.00854	0.0233	0.0295	0.23
Mercury (Hg)	mg/L	34	0.000005	26	0.0000052	0.000000644	0.0000050	0.0000050	0.0000062	-
Molybdenum (Mo)	mg/L	34	0.00005	34	<0.00005	0	<0.00005	<0.00005	<0.00005	-

APPENDIX B, TABLE 8

Summary of Year 1 surface water chemistry results from the AOI Ponds.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
Total										
Nickel (Ni)	mg/L	34	0.0005	17	0.00060	0.000144	0.00050	0.00052	0.00089	-
Phosphorus (P)	mg/L	34	0.05	34	<0.05	0	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	34	0.05	0	0.66	0.2487	0.246	0.772	1	-
Rhodium (Rh)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	34	0.0002	0	0.00221	0.000944	0.000946	0.00232	0.00415	-
Ruthenium (Ru)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	34	0.001	34	<0.001	0	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	34	0.00005	1	0.0000947	0.00002373	0.0000626	0.0000955	0.000132	-
Silicon (Si)	mg/L	34	0.05	0	2.63	1.123	0.813	2.58	3.58	-
Silver (Ag)	mg/L	34	0.00001	34	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	34	0.05	0	1.13	0.225	0.786	1.18	1.4	2.5
Strontium (Sr)	mg/L	34	0.0002	0	0.0099	0.002551	0.00581	0.0101	0.0128	-
Sulfur (S)	mg/L	34	0.5	27	0.51	0.0372	0.50	0.50	0.58	-
Tellurium (Te)	mg/L	34	0.0002	34	<0.0002	0	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	34	0.00001	34	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	34	0.0001	17	0.00011	0.0000149	0.00010	0.00011	0.00013	-
Tin (Sn)	mg/L	34	0.0001	33	0.00010	0	0.00010	0.00010	0.00010	-
Titanium (Ti)	mg/L	34	0.0003	3	0.00425	0.002228	0.0003	0.00431	0.00761	-
Tungsten (W)	mg/L	34	0.0001	34	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	34	0.00001	0	0.0000589	0.00002523	0.0000240	0.0000550	0.000103	-
Vanadium (V)	mg/L	34	0.0005	7	0.000800	0.0002322	0.000500	0.000795	0.00110	0.017
Zinc (Zn)	mg/L	34	0.001	2	0.0032	0.00140	0.0013	0.0032	0.0056	-
Zirconium (Zr)	mg/L	34	0.0002	4	0.00032	0.0000708	0.00020	0.00033	0.00041	-
Other										
Chlorophyll a	µg/L	34	0.1	0	4.14	2.679	1.01	3.78	6.68	-
Polycyclic Aromatic Hydrocarbon (PAHs)										
1+2-Methylnaphthalenes	µg/L	33	0.0283	33	<0.028	0	<0.028	<0.028	<0.028	-
1-Methylnaphthalene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	526
2-Methylnaphthalene	µg/L	34	0.02	33	0.020	0.0002	0.020	0.020	0.020	-
Acenaphthene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	5.8
Acenaphthylene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Anthracene	µg/L	34	0.02	34	<0.02 ²	0	<0.02 ²	<0.02 ²	<0.02 ²	0.012
Benzo(a)anthracene	µg/L	34	0.02	34	<0.02 ²	0	<0.02 ²	<0.02 ²	<0.02 ²	0.018
Benzo(a)pyrene	µg/L	34	0.01	34	<0.01	0	<0.01	<0.01	<0.01	0.015
Benzo(b&j)fluoranthene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Benzo(g,h,i)perylene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Benzo(k)fluoranthene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Chrysene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Dibenz(a,h)anthracene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Fluoranthene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	0.04
Fluorene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	3
Indeno(1,2,3-cd)pyrene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	-
Naphthalene	µg/L	34	0.05	33	0.050	0.0022	<0.05	0.050	0.050	1.1
Phenanthrene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	0.4
Pyrene	µg/L	34	0.02	34	<0.02	0	<0.02	<0.02	<0.02	0.025
Semi-Volatile Organic Compounds										
1,2,4-Trichlorobenzene	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	0.5
2,4,5-Trichlorophenol	µg/L	32	0.2	32	<0.2	0	<0.2	<0.2	<0.2	18
2,4,6-Trichlorophenol	µg/L	32	0.2	32	<0.2	0	<0.2	<0.2	<0.2	5
2,4+2,6-Dinitrotoluene	µg/L	32	0.566	32	<0.57	0	<0.57	<0.57	<0.57	10
2,4-Dichlorophenol	µg/L	32	0.3	32	<0.3 ²	0	<0.3 ²	<0.3 ²	<0.3 ²	0.2
2,4-Dimethylphenol	µg/L	32	0.5	32	<0.5	0	<0.5	<0.5	<0.5	10
2,4-Dinitrophenol	µg/L	32	1 to 2	32	1.4	0.50	1.00	1.00	2.00	6.2
2,4-Dinitrotoluene	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	4
2,6-Dinitrotoluene	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	6
2-Chlorophenol	µg/L	32	0.3	32	<0.3	0	<0.3	<0.3	<0.3	7
3,3'-Dichlorobenzidine	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	0.6
4-Chloroaniline	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	-
Biphenyl	µg/L	32	0.4	32	<0.4 ²	0	<0.4 ²	<0.4 ²	<0.4 ²	0.2
Bis(2-chloroethyl)ether	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	200
Bis(2-chloroisopropyl)ether	µg/L	32	0.4	32	<0.4	0	<0.4	<0.4	<0.4	-
Bis(2-ethylhexyl)phthalate	µg/L	32	2	32	<2	0	<2	<2	<2	3
Diethylphthalate	µg/L	32	0.2 to 0.4	32	0.21	0.044	<0.2	<0.2	0.27	210
Dimethylphthalate	µg/L	32	0.2	32	<0.2	0	<0.2	<0.2	<0.2	330
Pentachlorophenol	µg/L	32	0.5 to 1.3	32	0.57	0.219	<0.5	<0.5	1.2	0.5
Phenol	µg/L	32	0.5	31	0.51	0.0778	<0.5	<0.5	<0.5	4
Herbicides and Pesticides										
Aminomethylphosphonic acid (AMPA)	µg/L	25	0.5	25	<0.5	0	<0.5	<0.5	<0.5	280
Glyphosate	µg/L	34	0.2 to 5	34	1.5	2.15	0.20	0.20	5.0	-
Radionuclides										
H-3	Bq/L	34	12 to 13	34	12	0.5	12	12	13	7000
Am-241	Bq/L	2	0.8 to 2.5	2	1.7	1.20	0.89	1.7	2.4	-
C-14	Bq/L	34	4.1 to 19	34	11	5.7	5.4	7.6	19	200
Cl-36	Bq/L	7	0.033 to 0.28	7	0.18	0.10	0.034	0.22	0.27	-
Co-60	Bq/L	36	0.28 to 0.5	36	0.38	0.061	0.28	0.38	0.49	40
Cs-137	Bq/L	36	0.24 to 0.39	35	0.33	0.044	0.25	0.35	0.37	10
I-129	Bq/L	34	0.17 to 0.37	34	0.27	0.038	0.23	0.27	0.33	1
K-40	Bq/L	34	4 to 9	33	6.0	1.07	4.4	5.9	7.7	-
Np-237	Bq/L	7	0.0013 to 0.0035	6	0.0031	0.000524	0.0024	0.0031	0.0038	-
Pu-238	Bq/L	7	0.00026 to 0.0026	7	0.0010	0.000782	0.00028	0.00091	0.0022	0.6
Pu-239	Bq/L	7	0.00026 to 0.0019	5	0.00084	0.000593	0.00031	0.00077	0.0017	0.6
Ra-226	Bq/L	34	0.0036 to 0.013	31	0.0067	0.00191	0.0043	0.0067	0.010	0.5
Ru-106	Bq/L	36	2.3 to 3.7	36	3.1	0.36	2.4	3.2	3.6	20
Sr-90	Bq/L	34	0.005 to 0.023	31	0.015	0.00401	0.0061	0.015	0.02	5
Th-228	Bq/L	34	0.0035 to 0.0093	33	0.0052	0.0012	0.0040	0.0049	0.0079	2
Th-230	Bq/L	34	0.0039 to 0.0062	33	0.0043	0.000602	0.0039	0.0042	0.0058	0.6
Th-232	Bq/L	34	0.0004 to 0.0046	26	0.0017	0.000735	0.0010	0.0016	0.0030	0.6
U-234	Bq/L	34	0.001 to 0.006	21	0.0039	0.00219	0.0017	0.0035	0.0081	3
U-235	Bq/L	34	0.00049 to 0.0051	31	0.0025	0.00135	0.00055	0.0029	0.0045	3
U-238	Bq/L	34	0.00043 to 0.0066	30	0.0029	0.00114	0.0013	0.0029	0.0046	3
Gross Alpha	Bq/L	34	0.052 to 0.11	27	0.076	0.0112	0.062	0.074	0.096	-
Gross Beta	Bq/L	34	0.071 to 0.13	29	0.11	0.0189	0.084	0.10	0.14	-

Bold values indicate guideline exceedance; italicized values indicate conditional guideline exceedance.

¹See Appendix B, Table 1 for detailed water quality guidelines.

²Due to detection limits, guideline exceedance cannot be confirmed.

APPENDIX B, TABLE 9

Summary of Year 1 surface water chemistry results from the Unnamed Watercourse.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	9	1	0	5.12	3.938	2.28	2.6	10.5	-
Ammonia, Total (as N)	mg/L	9	0.01	4	0.026	0.042	0.010	0.010	0.090	5.855
Bicarbonate (HCO3)	mg/L	9	1.2	0	6.26	4.789	2.78	3.20	12.8	-
Biochemical Oxygen Demand	mg/L	9	2	8	2.1	0.367	2.0	2.0	2.7	-
Bromide (Br)	mg/L	9	0.1	8	0.11	0.0233	0.10	0.10	0.14	-
Carbonate (CO3)	mg/L	9	0.6	9	<0.6	0	<0.6	<0.6	<0.6	-
Chloride (Cl)	mg/L	9	0.5	3	34.4	98.49	0.50	0.86	181	120
Conductivity	umhos/cm	9	1	0	23.1	6.361	15.8	22.9	30.7	700
Cyanide, Total	mg/L	9	0.002	9	<0.002	0	<0.002	<0.002	<0.002	0.005
Dissolved Organic Carbon	mg/L	9	0.5	0	21.4	5.311	15.0	21.9	27.5	-
Fluoride (F)	mg/L	9	0.02	0	0.048	0.037	0.025	0.032	0.11	0.12
Hydroxide (OH)	mg/L	9	0.34	9	<0.34	0	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	6	0.2	6	<0.2	0	<0.2	<0.2	<0.2	<0.2
Nitrate (as N)	mg/L	9	0.02	7	0.02	0.000333	0.020	0.020	0.021	3
Nitrate and Nitrite as N	mg/L	9	0.07	9	<0.07	0	<0.07	<0.07	<0.07	-
Nitrite (as N)	mg/L	9	0.01	9	<0.01	0	<0.01	<0.01	<0.01	<0.01
pH	pH units	3	0.1	0	6.99	0.01528	6.97	6.99	7.00	-
Phosphorus (P), Total	mg/L	9	0.003	0	0.0269	0.01174	0.0137	0.0232	0.0455	0.01
Sulfate (SO4)	mg/L	9	0.3	0	11.7	31.5	0.580	0.610	59.4	128
Total Dissolved Solids	mg/L	9	4	0	53.1	8.952	44.6	49.0	65.3	500
Total Inorganic Carbon	mg/L	9	0.5	6	0.807	0.5721	0.500	0.500	1.83	-
Total Kjeldahl Nitrogen	mg/L	9	0.2	0	0.58	0.138	0.40	0.54	0.74	-
Total Organic Carbon	mg/L	9	0.5	0	20.5	5.711	14.3	19.6	27.5	-
Total Suspended Solids	mg/L	9	3	3	3.82	1.028	3.00	3.60	5.44	-
Turbidity	NTU	9	0.1	0	2.13	0.3386	1.60	2.17	2.47	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	9	1	0	120	28.6	74	130	150	100
Total Coliforms	CFU/100mL	9	1	0	>200	0	200	>200	>200	-
Metals										
Total										
Aluminum (Al)	mg/L	9	0.003	0	0.375	0.1376	0.194	0.419	0.514	0.32
Antimony (Sb)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	0.006
Arsenic (As)	mg/L	9	0.0001	0	0.00046	0.0000638	0.00035	0.00049	0.00052	0.005
Barium (Ba)	mg/L	9	0.0001	0	0.00634	0.001198	0.00537	0.0057	0.00806	1
Beryllium (Be)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	9	0.00005	9	<0.00005	0	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	9	0.01	9	<0.01	0	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	9	0.000005	0	0.000014	0.0000035	0.0000090	0.000014	0.000019	0.00004
Calcium (Ca)	mg/L	9	0.05	0	2.46	0.5756	1.89	2.28	3.2	1000
Cesium (Cs)	mg/L	9	0.00001	0	0.000026	0.00000731	0.000020	0.000021	0.000036	-
Chromium (Cr)	mg/L	9	0.0001	0	0.00062	0.0000966	0.00048	0.00065	0.00071	-
Chromium III (Cr3+)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	9	0.0005	8	0.00050	0.0000133	0.00050	0.00050	0.00052	0.005
Cobalt (Co)	mg/L	9	0.0001	0	0.00034	0.000057	0.00029	0.00030	0.00042	0.00078
Copper (Cu)	mg/L	9	0.0005	0	0.00147	0.0009524	0.00078	0.00106	0.00313	0.002
Iron (Fe)	mg/L	9	0.01	0	0.73	0.1431	0.534	0.803	0.849	3.3
Lead (Pb)	mg/L	9	0.00005	0	0.000255	0.00007553	0.000181	0.000222	0.000366	0.001
Lithium (Li)	mg/L	9	0.001	0	0.0011	0.0000601	0.0010	0.0011	0.0012	2.5
Magnesium (Mg)	mg/L	9	0.005	0	0.833	0.258	0.545	0.809	1.15	82
Manganese (Mn)	mg/L	9	0.0001	0	0.0299	0.007534	0.0200	0.0329	0.0369	0.12
Mercury (Hg)	mg/L	9	0.000005	4	0.00000624	0.00000147	0.00000500	0.00000620	0.00000862	0.000026
Molybdenum (Mo)	mg/L	9	0.00005	0	0.0000919	0.00001450	0.0000754	0.0000890	0.000111	0.073
Nickel (Ni)	mg/L	9	0.0005	2	0.000592	0.00009947	0.000500	0.000530	0.000720	0.025
Phosphorus (P)	mg/L	9	0.003 to 0.05	9	0.050	0	0.050	0.050	0.050	-
Potassium (K)	mg/L	9	0.05	0	0.478	0.1175	0.336	0.480	0.617	53
Rhodium (Rh)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	<0.001
Rubidium (Rb)	mg/L	9	0.0002	0	0.00162	0.0004878	0.00112	0.00152	0.00226	-
Ruthenium (Ru)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	9	0.00005	0	0.000121	0.0000327	0.0000858	0.000116	0.000172	0.001
Silicon (Si)	mg/L	9	0.1	0	2.28	0.8477	1.13	2.78	2.91	-
Silver (Ag)	mg/L	9	0.00001	9	<0.00001	0	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	9	0.05	0	1.18	0.2119	0.922	1.14	1.45	680
Strontium (Sr)	mg/L	9	0.0002	0	0.0118	0.003353	0.00826	0.0111	0.0162	7
Sulfur (S)	mg/L	9	0.5	6	0.52	0.043	0.50	0.50	0.60	-
Tellurium (Te)	mg/L	9	0.0002	9	<0.0002	0	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	9	0.00001	9	<0.00001	0	<0.00001	<0.00001	<0.00001	0.0008
Thorium (Th)	mg/L	9	0.0001	6	0.00011	0.00001	0.00010	0.00010	0.00012	-
Tin (Sn)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	0.073
Titanium (Ti)	mg/L	9	0.0003	0	0.00657	0.001655	0.00472	0.00627	0.00878	0.076
Tungsten (W)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	9	0.00001	0	0.000149	0.00001768	0.000128	0.000149	0.000171	0.015
Vanadium (V)	mg/L	9	0.0005	0	0.00101	0.0001545	0.000844	0.00102	0.00121	0.12
Zinc (Zn)	mg/L	9	0.003	5	0.00317	0.0002236	0.00300	0.00300	0.00352	0.02
Zirconium (Zr)	mg/L	9	0.0002	0	0.00026	0.0000318	0.00022	0.00026	0.00030	0.004
Dissolved										
Aluminum (Al)	mg/L	9	0.001	0	0.299	0.08356	0.188	0.331	0.387	-
Antimony (Sb)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Arsenic (As)	mg/L	9	0.0001	0	0.00043	0.0000937	0.00030	0.00047	0.00053	-
Barium (Ba)	mg/L	9	0.0001	0	0.00579	0.0009256	0.00476	0.00564	0.00713	-
Beryllium (Be)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	9	0.00005	9	<0.00005	0	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	9	0.01	9	<0.01	0	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	9	0.000005	0	0.000012	0.000002909	0.00000816	0.0000126	0.0000157	-
Calcium (Ca)	mg/L	9	0.05	0	2.45	0.6346	1.85	2.22	3.32	-
Cesium (Cs)	mg/L	9	0.00001	0	0.000019	0.00000395	0.000014	0.000018	0.000025	-
Chromium (Cr)	mg/L	9	0.0001	0	0.00052	0.0000442	0.00049	0.00051	0.0006	-
Chromium III (Cr3+)	mg/L	9	0.0005	5	0.00051	0.00000882	0.00050	0.00050	0.00052	-
Chromium VI (Cr6+)	mg/L	9	0.0005	9	<0.0005	0	<0.0005	<0.0005	<0.0005	-
Cobalt (Co)	mg/L	9	0.0001	0	0.00029	0.0000283	0.00026	0.00027	0.00033	-
Copper (Cu)	mg/L	9	0.0002	0	0.00102	0.0003399	0.000762	0.00095	0.00156	0.00088

APPENDIX B, TABLE 9

Summary of Year 1 surface water chemistry results from the Unnamed Watercourse.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
<i>Dissolved</i>										
Iron (Fe)	mg/L	9	0.01	0	0.577	0.1142	0.424	0.638	0.693	-
Lead (Pb)	mg/L	9	0.00005	0	0.000196	0.00004266	0.000151	0.000189	0.000251	0.0065
Lithium (Li)	mg/L	9	0.001	5	0.0010	0.000050	0.0010	0.0010	0.0011	-
Magnesium (Mg)	mg/L	9	0.005	0	0.778	0.2613	0.515	0.717	1.12	-
Manganese (Mn)	mg/L	9	0.0001	0	0.0259	0.005722	0.0186	0.0278	0.0321	0.23
Mercury (Hg)	mg/L	9	0.000005	7	0.0000053	0.000000767	0.0000050	0.0000050	0.0000064	-
Molybdenum (Mo)	mg/L	9	0.00005	0	0.0000961	0.00002859	0.0000662	0.000086	0.000134	-
Nickel (Ni)	mg/L	9	0.0005	5	0.00052	0.0000235	0.00050	0.00050	0.00055	-
Phosphorus (P)	mg/L	9	0.05	9	<0.05	0	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	9	0.05	0	0.446	0.09421	0.326	0.47	0.555	-
Rhodium (Rh)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	9	0.0002	0	0.00158	0.0004352	0.00107	0.00161	0.00216	-
Ruthenium (Ru)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	9	0.001	9	<0.001	0	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	9	0.00005	0	0.000108	0.00002877	0.0000734	0.000109	0.000152	-
Silicon (Si)	mg/L	9	0.05	0	2.14	0.6744	1.24	2.51	2.7	-
Silver (Ag)	mg/L	9	0.00001	9	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	9	0.05	0	1.15	0.2291	0.895	1.1	1.45	-
Strontium (Sr)	mg/L	9	0.0002	0	0.0111	0.00304	0.00821	0.00994	0.0152	2.5
Sulfur (S)	mg/L	9	0.5	9	<0.5	0	<0.5	<0.5	<0.5	-
Tellurium (Te)	mg/L	9	0.0002	9	<0.0002	0	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	9	0.00001	9	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	9	0.0001	0	0.00014	0.0000109	0.00012	0.00014	0.00015	-
Tin (Sn)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	9	0.0003	0	0.00461	0.0005626	0.00391	0.00494	0.00513	-
Tungsten (W)	mg/L	9	0.0001	9	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	9	0.00001	0	0.000145	0.00001996	0.000121	0.000142	0.000171	-
Vanadium (V)	mg/L	9	0.0005	0	0.000788	0.00005118	0.000738	0.00078	0.000872	-
Zinc (Zn)	mg/L	9	0.001	0	0.0030	0.00115	0.0017	0.0028	0.0047	0.017
Zirconium (Zr)	mg/L	9	0.0002	0	0.00034	0.0000222	0.00031	0.00034	0.00037	-
Other										
Chlorophyll a	µg/L	9	0.1	0	5.50	4.58	2.02	3.60	13.4	-
Radionuclides										
H-3	Bq/L	9	12 to 13	9	12	0.50	12	12	13	7000
C-14	Bq/L	9	6.5 to 18	9	11	5.58	6.5	7.1	18	200
Co-60	Bq/L	9	0.26 to 0.43	9	0.33	0.0632	0.26	0.30	0.42	40
Cs-137	Bq/L	9	0.21 to 0.37	9	0.27	0.0499	0.22	0.25	0.35	10
I-129	Bq/L	9	0.16 to 0.32	9	0.23	0.0615	0.16	0.23	0.31	1
K-40	Bq/L	9	4.6 to 8.2	9	5.90	1.16	4.70	5.30	7.60	-
Ra-226	Bq/L	9	0.0044 to 0.011	9	0.0069	0.00206	0.0047	0.0068	0.010	0.5
Ru-106	Bq/L	9	2.2 to 3.1	9	2.6	0.387	2.2	2.6	3.1	20
Sr-90	Bq/L	9	0.0056 to 0.014	7	0.012	0.00488	0.0057	0.013	0.018	5
Th-228	Bq/L	9	0.0036 to 0.0056	7	0.0047	0.000619	0.0038	0.0047	0.0055	2
Th-230	Bq/L	9	0.0037 to 0.0043	9	0.004	0.000194	0.0037	0.0040	0.0043	0.6
Th-232	Bq/L	9	0.00036 to 0.0017	6	0.0015	0.000304	0.0012	0.0014	0.0019	0.6
U-234	Bq/L	9	0.0016 to 0.004	3	0.0042	0.00114	0.0031	0.0040	0.006	3
U-235	Bq/L	9	0.00085 to 0.0043	8	0.0024	0.00095	0.0012	0.0025	0.0038	3
U-238	Bq/L	9	0.00052 to 0.0038	7	0.0029	0.000743	0.0020	0.0029	0.0039	3
Gross Alpha	Bq/L	9	0.065 to 0.09	7	0.080	0.0141	0.066	0.074	0.10	-
Gross Beta	Bq/L	9	0.096 to 0.12	8	0.11	0.00984	0.098	0.11	0.12	-

Bold values indicate guideline exceedance.

¹See Appendix B, Table 1 for detailed water qualtiy guidelines.

APPENDIX B, TABLE 10										
Summary of Year 1 surface water chemistry results from Wabigoon River.										
Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Water Quality Guideline ¹
Anions, Nutrients, and Physical Properties										
Alkalinity, Total (as CaCO3)	mg/L	27	1.0	0	14.6	11.55	8.8	3.46	31.4	-
Ammonia, Total (as N)	mg/L	27	0.010	6	0.021	0.0183	0.018	0.010	0.047	5.855
Bicarbonate (HCO3)	mg/L	27	1.2	0	17.8	14.09	10.7	4.19	38.3	-
Biochemical Oxygen Demand	mg/L	27	2 to 20	25	3.8	7.96	2.0	2.0	7	-
Bromide (Br)	mg/L	27	0.10	27	<0.10	0	<0.10	<0.10	<0.10	-
Carbonate (CO3)	mg/L	27	0.60	27	<0.60	0	<0.60	<0.60	<0.60	-
Chloride (Cl)	mg/L	27	0.50	0	7.17	5.093	5.13	2.69	16.9	120
Conductivity	umhos/cm	27	1	0	61.5	33.81	41.2	31	119	700
Cyanide, Total	mg/L	27	0.0020	26	4.82	25.02	0.002	0.002	0.002	0.005
Dissolved Organic Carbon	mg/L	27	0.5	0	17.6	7.337	18.0	8.73	27.1	-
Fluoride (F)	mg/L	27	0.02	0	0.04	0.0163	0.033	0.023	0.064	0.12
Hydroxide (OH)	mg/L	27	0.34	27	<0.34	<0.34	<0.34	<0.34	<0.34	-
Iodide (I)	mg/L	9	0.2	9	<0.2	<0.2	<0.2	<0.2	<0.2	-
Nitrate (as N)	mg/L	27	0.020	17	0.027	0.0148	0.020	0.020	0.047	3
Nitrate and Nitrite as N	mg/L	27	0.070	26	0.0707	0.003849	0.070	0.070	0.070	-
Nitrite (as N)	mg/L	27	0.010	27	<0.01	0	<0.01	<0.01	<0.01	0.02
pH	pH units	9	0.1	0	7.52	0.02167	7.52	7.48	7.54	6.5 - 9
Phosphorus (P), Total	mg/L	27	0.003	0	0.0173	0.005047	0.017	0.0112	0.0249	0.01
Sulfate (SO4)	mg/L	27	0.3	0	0.99	0.1782	0.960	0.743	1.25	128
Total Dissolved Solids	mg/L	27	4 to 13.3	0	64.9	15.24	71	46.0	87.4	500
Total Inorganic Carbon	mg/L	27	0.5	9	2.09	2.221	0.790	0.500	5.71	-
Total Kjeldahl Nitrogen	mg/L	27	0.2	0	0.53	0.268	0.41	0.25	0.95	-
Total Organic Carbon	mg/L	27	0.5	0	17.4	7.466	16.3	8.7	27.8	-
Total Suspended Solids	mg/L	27	3	9	14.6	12.91	9.10	3.00	37.2	-
Turbidity	NTU	27	0.1	0	3.29	0.8021	3.30	2.12	4.97	50
Bacteriological Tests										
Escherichia Coli	CFU/100mL	27	1	0	45	31.8	1	37	100	100
Total Coliforms	CFU/100mL	27	1	0	180	51.9	47	>200	>200	-
Metals										
<i>Total</i>										
Aluminum (Al)	mg/L	27	0.003	0	0.213	0.1241	0.0424	0.248	0.386	0.32
Antimony (Sb)	mg/L	27	0.0001	26	0.0001	0.000025	0.0001	0.0001	0.0001	0.006
Arsenic (As)	mg/L	27	0.0001	0	0.00041	0.0000756	0.00032	0.00039	0.00053	0.005
Barium (Ba)	mg/L	27	0.0001	0	0.00758	0.001497	0.00531	0.00735	0.00949	1
Beryllium (Be)	mg/L	27	0.0001	27	<0.0001	0	<0.0001	<0.0001	<0.0001	0.011
Bismuth (Bi)	mg/L	27	0.00005	27	<0.00005	0	<0.00005	<0.00005	<0.00005	17.5
Boron (B)	mg/L	27	0.01	27	<0.01	0	<0.01	<0.01	<0.01	1.5
Cadmium (Cd)	mg/L	27	0.000005	8	0.00000975	0.00000397	0.00000500	0.0000105	0.0000158	0.00004
Calcium (Ca)	mg/L	27	0.05	0	5.52	2.491	2.42	5.53	9.29	1000
Cesium (Cs)	mg/L	27	0.00001	0	0.000031	0.00000603	0.000023	0.000029	0.000041	-
Chromium (Cr)	mg/L	27	0.0001	0	0.0005	0.000135	0.00035	0.0005	0.00068	-
Chromium III (Cr3+)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	0.0089
Chromium VI (Cr6+)	mg/L	27	0.0005	19	0.00055	0.000108	0.0005	0.0005	0.00077	0.005
Cobalt (Co)	mg/L	27	0.0001	6	0.00018	0.0000613	0.0001	0.00018	0.00027	0.00078
Copper (Cu)	mg/L	27	0.0005	5	0.000897	0.0002961	0.0005	0.00088	0.00141	0.002
Iron (Fe)	mg/L	27	0.01	0	0.996	0.2867	0.595	1.02	1.34	3.3
Lead (Pb)	mg/L	27	0.00005	0	0.000178	0.00005027	0.000116	0.000182	0.000258	0.001
Lithium (Li)	mg/L	27	0.001	18	0.001	0.0000694	0.001	0.001	0.0012	2.5
Magnesium (Mg)	mg/L	27	0.005	0	1.15	0.5109	0.556	1.01	2.1	82
Manganese (Mn)	mg/L	27	0.0001	0	0.0279	0.007889	0.0168	0.0269	0.0408	0.12
Mercury (Hg)	mg/L	27	0.000005	19	0.00000532	0.000000625	0.000005	0.000005	0.00000671	0.000026
Molybdenum (Mo)	mg/L	27	0.00005	7	0.0000818	0.00002794	0.00005	0.000091	0.000121	0.073
Nickel (Ni)	mg/L	27	0.0005	17	0.000544	0.00009447	0.0005	0.0005	0.000678	0.025
Phosphorus (P)	mg/L	27	0.003 to 0.05	27	0.05	0	0.05	0.05	0.05	-
Potassium (K)	mg/L	27	0.05	0	0.621	0.09195	0.498	0.64	0.755	53
Rhodium (Rh)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	0.01
Rubidium (Rb)	mg/L	27	0.0002	0	0.00206	0.0003072	0.00169	0.00199	0.00254	-
Ruthenium (Ru)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	0.01
Samarium (Sm)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	0.0082
Selenium (Se)	mg/L	27	0.00005	1	0.0000838	0.00002595	0.0000532	0.000076	0.000126	0.001
Silicon (Si)	mg/L	27	0.1	0	2.76	0.2355	2.43	2.73	3.06	-
Silver (Ag)	mg/L	27	0.00001	27	<0.00001	0	<0.00001	<0.00001	<0.00001	0.00025
Sodium (Na)	mg/L	27	0.05	0	5.12	2.959	2.25	4.03	10.5	680
Strontium (Sr)	mg/L	27	0.0002	0	0.0174	0.008451	0.00747	0.0145	0.0304	7
Sulfur (S)	mg/L	27	0.5	20	0.53	0.0643	0.5	0.5	0.67	-
Tellurium (Te)	mg/L	27	0.0002	27	<0.0002	0	<0.0002	<0.0002	<0.0002	0.0058
Thallium (Tl)	mg/L	27	0.00001	27	<0.00001	0	<0.00001	<0.00001	<0.00001	0.0008
Thorium (Th)	mg/L	27	0.0001	0	0.00017	0.0000337	0.00013	0.00017	0.00022	-
Tin (Sn)	mg/L	27	0.0001	26	0.0001	0.00000192	0.0001	0.0001	0.0001	0.073
Titanium (Ti)	mg/L	27	0.0003	0	0.0053	0.003061	0.00164	0.0043	0.00958	0.076
Tungsten (W)	mg/L	27	0.0001	27	<0.0001	0	<0.0001	<0.0001	<0.0001	0.03
Uranium (U)	mg/L	27	0.00001	0	0.00018	0.00003896	0.000138	0.00017	0.000263	0.015
Vanadium (V)	mg/L	27	0.0005	0	0.000987	0.000109	0.000833	0.00102	0.00114	0.12
Zinc (Zn)	mg/L	27	0.003	19	0.00412	0.00508	0.003	0.003	0.00407	0.02
Zirconium (Zr)	mg/L	27	0.0002	2	0.00025	0.0000432	0.0002	0.00023	0.00033	0.004
<i>Dissolved</i>										
Aluminum (Al)	mg/L	27	0.001	0	0.148	0.08555	0.0396	0.16	0.301	-
Antimony (Sb)	mg/L	27	0.0001	27	<0.0001	0	<0.0001	<0.0001	<0.0001	-

APPENDIX B, TABLE 10

Summary of Year 1 surface water chemistry results from Wabigoon River.

Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Perecentile	Water Quality Guideline ¹
Metals										
Dissolved										
Arsenic (As)	mg/L	27	0.0001	0	0.00039	0.0000718	0.0003	0.00037	0.00049	-
Barium (Ba)	mg/L	27	0.0001	0	0.00686	0.001728	0.00442	0.00687	0.00957	-
Beryllium (Be)	mg/L	27	0.0001	27	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Bismuth (Bi)	mg/L	27	0.00005	27	<0.00005	0	<0.00005	<0.00005	<0.00005	-
Boron (B)	mg/L	27	0.01	27	<0.01	0	<0.01	<0.01	<0.01	-
Cadmium (Cd)	mg/L	27	0.000005	9	0.00000812	0.00000275	0.00000500	0.0000085	0.0000123	-
Calcium (Ca)	mg/L	27	0.05	0	5.46	2.546	2.26	5.47	9.15	-
Cesium (Cs)	mg/L	27	0.00001	0	0.000022	0.00000456	0.000015	0.000024	0.000027	-
Chromium (Cr)	mg/L	27	0.0001	0	0.00037	0.0000529	0.00031	0.00036	0.00048	-
Chromium III (Cr3+)	mg/L	27	0.0005	27	<0.0005	0	<0.0005	<0.0005	<0.0005	-
Chromium VI (Cr6+)	mg/L	27	0.0005	23	0.000524	0.00006812	0.0005	0.0005	0.00063	-
Cobalt (Co)	mg/L	27	0.0001	8	0.00013	0.0000345	0.0001	0.00012	0.00021	-
Copper (Cu)	mg/L	27	0.0002	0	0.000695	0.0002195	0.00039	0.00072	0.00103	0.00088
Iron (Fe)	mg/L	27	0.01	0	0.832	0.342	0.421	0.828	1.38	-
Lead (Pb)	mg/L	27	0.00005	0	0.000118	0.0000245	0.0000933	0.00011	0.000166	0.0065
Lithium (Li)	mg/L	27	0.001	18	0.001	0.0000694	0.001	0.001	0.0012	-
Magnesium (Mg)	mg/L	27	0.005	0	1.1	0.5229	0.484	0.967	2.05	-
Manganese (Mn)	mg/L	27	0.0001	0	0.0237	0.006308	0.0155	0.0222	0.0361	0.23
Mercury (Hg)	mg/L	27	0.000005	27	<0.000005	0	<0.000005	<0.000005	<0.000005	-
Molybdenum (Mo)	mg/L	27	0.00005	9	0.0000941	0.00004822	0.00005	0.000091	0.000191	-
Nickel (Ni)	mg/L	27	0.0005	24	0.00051	0.000033	0.0005	0.0005	0.00052	-
Phosphorus (P)	mg/L	27	0.05	27	<0.05	0	<0.05	<0.05	<0.05	-
Potassium (K)	mg/L	27	0.05	0	0.614	0.09357	0.493	0.635	0.751	-
Rhodium (Rh)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	-
Rubidium (Rb)	mg/L	27	0.0002	0	0.0019	0.0003271	0.00155	0.00179	0.00251	-
Ruthenium (Ru)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	-
Samarium (Sm)	mg/L	27	0.001	27	<0.001	0	<0.001	<0.001	<0.001	-
Selenium (Se)	mg/L	27	0.00005	3	0.0000876	0.00002663	0.00005	0.000082	0.000136	-
Silicon (Si)	mg/L	27	0.05	0	2.6	0.2481	2.2	2.65	2.9	-
Silver (Ag)	mg/L	27	0.00001	27	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Sodium (Na)	mg/L	27	0.05	0	4.97	2.877	2.19	4.03	10.3	-
Strontium (Sr)	mg/L	27	0.0002	0	0.017	0.008638	0.00672	0.0143	0.0299	2.5
Sulfur (S)	mg/L	27	0.5	19	0.53	0.0458	0.5	0.5	0.62	-
Tellurium (Te)	mg/L	27	0.0002	27	<0.0002	0	<0.0002	<0.0002	<0.0002	-
Thallium (Tl)	mg/L	27	0.00001	27	<0.00001	0	<0.00001	<0.00001	<0.00001	-
Thorium (Th)	mg/L	27	0.0001	0	0.00017	0.0000302	0.00013	0.00017	0.00023	-
Tin (Sn)	mg/L	27	0.0001	27	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Titanium (Ti)	mg/L	27	0.0003	0	0.00233	0.0008412	0.00137	0.00231	0.00399	-
Tungsten (W)	mg/L	27	0.0001	27	<0.0001	0	<0.0001	<0.0001	<0.0001	-
Uranium (U)	mg/L	27	0.00001	0	0.000157	0.0000355	0.000121	0.000144	0.000246	-
Vanadium (V)	mg/L	27	0.0005	0	0.000761	0.0001779	0.000553	0.0007	0.00103	-
Zinc (Zn)	mg/L	27	0.001	2	0.0025	0.00109	0.001	0.0025	0.0041	0.017
Zirconium (Zr)	mg/L	27	0.0002	0	0.00026	0.0000422	0.0002	0.00026	0.00033	-
Other										
Chlorophyll a	µg/L	27	0.1	0	1.86	1.494	0.676	1.89	2.58	-
Radionuclides										
H-3	Bq/L	26	11 to 13	26	12	0.634	11	12	13	7000
Am-241	Bq/L	6	0.44 to 3.1	6	2.2	0.981	0.86	2.4	3.1	-
C-14	Bq/L	26	6.4 to 11	26	7.6	1.3	6.5	7	11	200
Co-60	Bq/L	27	0.23 to 0.48	27	0.37	0.0679	0.25	0.39	0.47	40
Cs-137	Bq/L	27	0.2 to 0.37	27	0.32	0.0454	0.23	0.34	0.36	10
I-129	Bq/L	23	0.17 to 0.3	23	0.22	0.0405	0.17	0.21	0.28	1
K-40	Bq/L	27	4 to 9.6	27	5.8	1.2	4.2	5.8	8.2	-
Ra-226	Bq/L	27	0.004 to 0.0088	23	0.0063	0.00121	0.0046	0.0065	0.0085	0.5
Ru-106	Bq/L	27	1.9 to 3.6	27	3.1	0.459	2.3	3.1	3.6	20
Sr-90	Bq/L	27	0.0052 to 0.022	26	0.014	0.00467	0.0055	0.015	0.021	5
Th-228	Bq/L	27	0.0039 to 0.0086	10	0.0077	0.00294	0.0048	0.0069	0.013	2
Th-230	Bq/L	27	0.0037 to 0.0059	20	0.0046	0.000771	0.0039	0.0043	0.0057	0.6
Th-232	Bq/L	27	0.00037 to 0.0043	11	0.0019	0.000772	0.001	0.0017	0.0033	0.6
U-234	Bq/L	27	0.00096 to 0.004	12	0.0037	0.00119	0.0024	0.0036	0.0062	3
U-235	Bq/L	27	0.0011 to 0.0039	24	0.0023	0.000925	0.0011	0.0024	0.0037	3
U-238	Bq/L	27	0.00091 to 0.0041	12	0.0033	0.00102	0.002	0.0033	0.005	3
Gross Alpha	Bq/L	27	0.058 to 0.093	19	0.08	0.0103	0.067	0.08	0.094	-
Gross Beta	Bq/L	27	0.084 to 0.12	23	0.1	0.0126	0.088	0.11	0.12	-

Bold values indicate guideline exceedance.

¹See Appendix B, Table 1 for detailed water qualtiy guidelines.

APPENDIX C

SITE PHOTOGRAPHS

LIST OF PHOTOGRAPHS

Photo 1	Mennin Lake area 1 (ML1) water quality station, June 2022.
Photo 2	Mennin Lake area 2 (ML2) water quality station, May 2022.
Photo 3	Mennin Lake area 3 (ML3) water quality station, May 2022.
Photo 4	Mennin River area 1 (MR1) water quality station, May 2022.
Photo 5	Mennin River area 2 (MR2) water quality station, May 2022.
Photo 6	Mennin River area 3 (MR3) water quality station, May 2022.
Photo 7	Revell Lake area 1 (RL1) water quality station, May 2022.
Photo 8	Revell Lake area 2 (RL2) water quality station, May 2022.
Photo 9	Revell River area 1 (RR1) water quality station, May 2022.
Photo 10	Unnamed Waterbody area 1 (P1) water quality station, May 2022.
Photo 11	Unnamed Waterbody area 2 (P2) water quality station, May 2022.
Photo 12	Unnamed Waterbody area 3 (P3) water quality station, May 2022.
Photo 13	Unnamed Waterbody area 4 (P4) water quality station, May 2022.
Photo 14	Unnamed Waterbody area 5 (P5) water quality station, May 2022.
Photo 15	Unnamed Waterbody area 6 (P6) water quality station, June 2022.
Photo 16	Unnamed Waterbody area 7 (P7) water quality station, May 2022.
Photo 17	Unnamed Waterbody area 8 (RP1) water quality station, May 2022.
Photo 18	Unnamed Waterbody area 9 (RP2) water quality station, May 2022.
Photo 19	Unnamed Waterbody area 10 (RP3) water quality station, May 2022..
Photo 20	Unnamed Watercourse area 1 (ML4) water quality station, June 2022.
Photo 21	Wabigoon River area 1 (WR1) water quality station, May 2022.
Photo 22	Wabigoon River area 2 (WR2) water quality station, May 2022.
Photo 23	Wabigoon River area 3 (WR3) water quality station, May 2022.

Photo 24	Grid of soil station P15NE01.
Photo 25	Soil horizon of soil station P15NE01.
Photo 26	Grid of soil station P15NE02.
Photo 27	Soil horizon of soil station P15NE02.
Photo 28	Grid of soil station P15NE03.
Photo 29	Soil horizon of soil station P15NE03.
Photo 30	Grid of soil station P15NE04.
Photo 31	Soil horizon of soil station P15NE04.
Photo 32	Grid of soil station P15NE05.
Photo 33	Soil horizon of soil station P15NE05.
Photo 34	Grid of soil station P15NE06.
Photo 35	Soil horizon of soil station P15NE06.
Photo 36	Grid of soil station P15NE07.
Photo 37	Soil horizon of soil station P15NE07.
Photo 38	Grid of soil station P15NW01.
Photo 39	Soil horizon of soil station P15NW01.
Photo 40	Grid of soil station P15NW02.
Photo 41	Soil horizon of soil station P15NW02.
Photo 42	Grid of soil station P15NW04.
Photo 43	Soil horizon of soil station P15NW04.
Photo 44	Grid of soil station P15SE01.
Photo 45	Soil horizon of soil station P15SE01.
Photo 46	Grid of soil station P15SE02.
Photo 47	Soil horizon of soil station P15SE02.

Photo 48	Grid of soil station P15SE03.
Photo 49	Soil horizon of soil station P15SE03.
Photo 50	Grid of soil station P15SE04.
Photo 51	Soil horizon of soil station P15SE04.
Photo 52	Grid of soil station P15SW02.
Photo 53	Soil horizon of soil station P15SW02.
Photo 54	Grid of soil station P15SW03.
Photo 55	Soil horizon of soil station P15SW03.
Photo 56	Grid of soil station P94NE01.
Photo 57	Soil horizon of soil station P94NE01.
Photo 58	Grid of soil station P94NW03.
Photo 59	Soil horizon of soil station P94NW03.
Photo 60	Grid of soil station P94NW04.
Photo 61	Soil horizon of soil station P94NW04.
Photo 62	Grid of soil station P94SE02.
Photo 63	Soil horizon of soil station P94SE02.
Photo 64	Grid of soil station P94SE03.
Photo 65	Soil horizon of soil station P94SE03.
Photo 66	Grid of soil station P94SW01.
Photo 67	Soil horizon of soil station P94SW01.
Photo 68	Grid of soil station P94SW02.
Photo 69	Soil horizon of soil station P94SW02.
Photo 70	Grid of soil station P94SW03.
Photo 71	Soil horizon of soil station P94SW03.

Photo 72	Grid of soil station S94NE01.
Photo 73	Soil horizon of soil station S94NE01.
Photo 74	Grid of soil station S94NE03.
Photo 75	Soil horizon of soil station S94NE03.
Photo 76	Grid of soil station S94NE04.
Photo 77	Soil horizon of soil station S94NE04.
Photo 78	Grid of soil station S94NW01.
Photo 79	Soil horizon of soil station S94NW01.
Photo 80	Grid of soil station S94NW02.
Photo 81	Soil horizon of soil station S94NW02.
Photo 82	Grid of soil station S94SW01.
Photo 83	Soil horizon of soil station S94SW01.
Photo 84	Grid of soil station S94SW03.
Photo 85	Soil horizon of soil station S94SW03.
Photo 86	Grid of soil station S94SW05.
Photo 87	Soil horizon of soil station S94SW05.
Photo 88	Grid of soil station WS90NE2.
Photo 89	Soil horizon of soil station WS90NE2.
Photo 90	Grid of soil station WS90NE3.
Photo 91	Soil horizon of soil station WS90NE3.
Photo 92	Grid of soil station WS90NW1.
Photo 93	Soil horizon of soil station WS90NW1.
Photo 94	Grid of soil station WS90NW3.
Photo 95	Soil horizon of soil station WS90NW3.

- Photo 96 Grid of soil station WS90SE1.
- Photo 97 Soil horizon of soil station WS90SE1.
- Photo 98 Grid of soil station WS90SE2.
- Photo 99 Soil horizon of soil station WS90SE2.
- Photo 100 Grid of soil station WS90SW1.
- Photo 101 Soil horizon of soil station WS90SW1.
- Photo 102 Grid of soil station WS90SW2.
- Photo 103 Soil horizon of soil station WS90SW2.



Photo 1. Mennin Lake area 1 (ML1) water quality station, June 2022.



Photo 2. Mennin Lake area 2 (ML2) water quality station, May 2022.



Photo 3. Mennin Lake area 3 (ML3) water quality station, May 2022.



Photo 4. Mennin River area 1 (MR1) water quality station, May 2022.



Photo 5. Mennin River area 2 (MR2) water quality station, May 2022.



Photo 6. Mennin River area 3 (MR3) water quality station, May 2022.



Photo 7. Revell Lake area 1 (RL1) water quality station, May 2022.



Photo 8. Revell Lake area 2 (RL2) water quality station, May 2022.



Photo 9. Revell River area 1 (RR1) water quality station, May 2022.



Photo 10. Unnamed Waterbody area 1 (P1) water quality station, May 2022.



Photo 11. Unnamed Waterbody area 2 (P2) water quality station, May 2022.



Photo 12. Unnamed Waterbody area 3 (P3) water quality station, May 2022.



Photo 13. Unnamed Waterbody area 4 (P4) water quality station, May 2022.



Photo 14. Unnamed Waterbody area 5 (P5) water quality station, May 2022.



Photo 15. Unnamed Waterbody area 6 (P6) water quality station, June 2022.



Photo 16. Unnamed Waterbody area 7 (P7) water quality station, May 2022.



Photo 17. Unnamed Waterbody area 8 (RP1) water quality station, May 2022.



Photo 18. Unnamed Waterbody area 9 (RP2) water quality station, May 2022.



Photo 19. Unnamed Waterbody area 10 (RP3) water quality station, May 2022.



Photo 20. Unnamed Watercourse area 1 (ML4) water quality station, June 2022.



Photo 21. Wabigoon River area 1 (WR1) water quality station, May 2022.



Photo 22. Wabigoon River area 2 (WR2) water quality station, May 2022.



Photo 23. Wabigoon River area 3 (WR3) water quality station, May 2022.



Photo 24. Grid of soil station P15NE01.



Photo 25. Soil horizon of soil station P15NE01.



Photo 26. Grid of soil station P15NE02.



Photo 27. Soil horizon of soil station P15NE02.



Photo 28. Grid of soil station P15NE03.



Photo 29. Soil horizon of soil station P15NE03.



Photo 30. Grid of soil station P15NE04.



Photo 31. Soil horizon of soil station P15NE04.



Photo 32. Grid of soil station P15NE05.



Photo 33. Soil horizon of soil station P15NE05.



Photo 34. Grid of soil station P15NE06.



Photo 35. Soil horizon of soil station P15NE06.



Photo 36. Grid of soil station P15NE07.



Photo 37. Soil horizon of soil station P15NE07.



Photo 38. Grid of soil station P15NW01.



Photo 39. Soil horizon of soil station P15NW01.



Photo 40. Grid of soil station P15NW02.



Photo 41. Soil horizon of soil station P15NW02.



Photo 42. Grid of soil station P15NW04.



Photo 43. Soil horizon of soil station P15NW04.



Photo 44. Grid of soil station P15SE01.



Photo 45. Soil horizon of soil station P15SE01.



Photo 46. Grid of soil station P15SE02.



Photo 47. Soil horizon of soil station P15SE02.



Photo 48. Grid of soil station P15SE03.



Photo 49. Soil horizon of soil station P15SE03.



Photo 50. Grid of soil station P15SE04.



Photo 51. Soil horizon of soil station P15SE04.



Photo 52. Grid of soil station P15SW02.



Photo 53. Soil horizon of soil station P15SW02.



Photo 54. Grid of soil station P15SW03.



Photo 55. Soil horizon of soil station P15SW03.



Photo 56. Grid of soil station P94NE01.



Photo 57. Soil horizon of soil station P94NE01.



Photo 58. Grid of soil station P94NW03.



Photo 59. Soil horizon of soil station P94NW03.



Photo 60. Grid of soil station P94NW04.



Photo 61. Soil horizon of soil station P94NW04.



Photo 62. Grid of soil station P94SE02.



Photo 63. Soil horizon of soil station P94SE02.

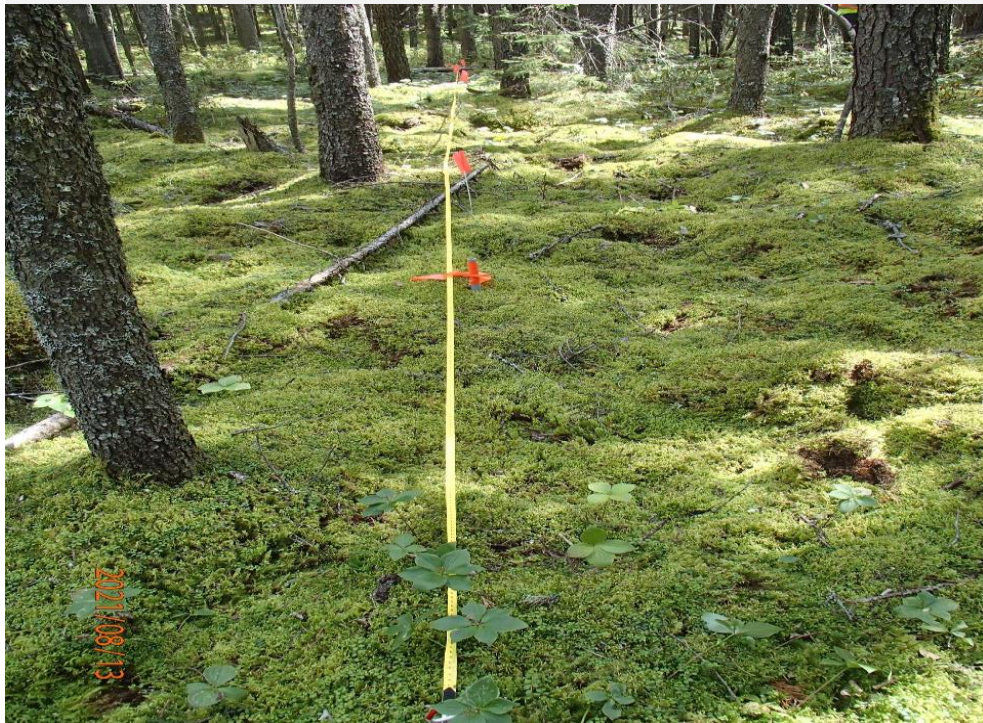


Photo 64. Grid of soil station P94SE03.



Photo 65. Soil horizon of soil station P94SE03.



Photo 66. Grid of soil station P94SW01.



Photo 67. Soil horizon of soil station P94SW01.



Photo 68. Grid of soil station P94SW02.



Photo 69. Soil horizon of soil station P94SW02.



Photo 70. Grid of soil station P94SW03.



Photo 71. Soil horizon of soil station P94SW03.



Photo 72. Grid of soil station S94NE01.



Photo 73. Soil horizon of soil station S94NE01.



Photo 74. Grid of soil station S94NE03.



Photo 75. Soil horizon of soil station S94NE03.



Photo 76. Grid of soil station S94NE04.



Photo 77. Soil horizon of soil station S94NE04.



Photo 78. Grid of soil station S94NW01.



Photo 79. Soil horizon of soil station S94NW01.



Photo 80. Grid of soil station S94NW02.



Photo 81. Soil horizon of soil station S94NW02.



Photo 82. Grid of soil station S94SW01.



Photo 83. Soil horizon of soil station S94SW01.



Photo 84. Grid of soil station S94SW03.



Photo 85. Soil horizon of soil station S94SW03.



Photo 86. Grid of soil station S94SW05.



Photo 87. Soil horizon of soil station S94SW05.



Photo 88. Grid of soil station WS90NE2.



Photo 89. Soil horizon of soil station WS90NE2.



Photo 90. Grid of soil station WS90NE3.



Photo 91. Soil horizon of soil station WS90NE3.



Photo 92. Grid of soil station WS90NW1.



Photo 93. Soil horizon of soil station WS90NW1.



Photo 94. Grid of soil station WS90NW3.



Photo 95. Soil horizon of soil station WS90NW3.



Photo 96. Grid of soil station WS90SE1.



Photo 97. Soil horizon of soil station WS90SE1.



Photo 98. Grid of soil station WS90SE2.



Photo 99. Soil horizon of soil station WS90SE2.



Photo 100. Grid of soil station WS90SW1.



Photo 101. Soil horizon of soil station WS90SW1.



Photo 102. Grid of soil station WS90SW2.



Photo 103. Soil horizon of soil station WS90SW2.

APPENDIX D

PHYTOPLANKTON AND ZOOPLANKTON ENUMERATION RESULTS

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Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Bacillariophyceae								
Achnanthes								
Achnanthaceae								
Achnanthes								
Bacillariales								
Bacillariaceae								
Nitzschia	1,000	0.004	15,000	0.01			16,000	0.01
Fragilariales								
Fragilariaceae								
Synedra	183,000	0.80	85,000	0.06	30,000	0.06	298,000	0.15
Melosirales								
Melosiraceae								
Melosira	10,000	0.04	574,000	0.44	357,000	0.77	941,000	0.47
Naviculales								
Naviculaceae								
Navicula	4,000	0.02	5,000	0.00			9,000	0.004
Rhabdonematales								
Tabellariaceae								
Asterionella								
formosa	1,000	0.004	150,000	0.11	384,000	0.83	535,000	0.27
Diatoma			549,000	0.42	480,000	1.03	1,029,000	0.51
Tabellaria	45,000	0.20	409,000	0.312	432,000	0.93	886,000	0.44
Rhizosoleniales								
Rhizosoleniaceae								
Rhizosolenia			468,000	0.36	228,000	0.49	696,000	0.35
Stephanodiscales								
Stephanodiscaceae								
Cyclotella	7,000	0.03	178,000	0.14	178,000	0.38	363,000	0.18
Stephanodiscus					2,000	0.00	2,000	0.001
Surirellales								
Surirellaceae								

APPENDIX D, TABLE 1

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Surirella	1,000	0.004					1,000	0.0005
Thalassiophysales								
Catenulaceae								
Amphora	1,000	0.004					1,000	0.0005
Chlorophyceae								
Sphaeropleales								
Hydrodictyaceae								
Pediastrum								
tetras			42,000	0.03	7,000	0.02	49,000	0.02
Tetraedron								
minimum			70,000	0.05	55,000	0.12	125,000	0.06
Neochloridaceae								
Golenkinia			5,000	0.004			5,000	0.002
Scenedesmaceae								
Scenedesmus								
quadricauda					20,000	0.04	20,000	0.01
Scenedesmus unid.	4,000	0.02			40,000	0.09	44,000	0.02
Selenastraceae								
Ankistrodesmus			247,000	0.19	490,000	1.06	737,000	0.37
Kirchneriella			5,000	0.004	15,000	0.03	20,000	0.01
Monoraphidium	31,000	0.14					31,000	0.02
Quadrigula			122,000	0.09	56,000	0.12	178,000	0.09
Trebouxiales								
Botryococcaceae								
Botryococcus			20,000	0.02	26,000	0.06	46,000	0.02
Chlorophyceae unid	1,000	0.004	624,000	0.48	501,000	1.08	1,126,000	0.56
Chrysophyceae								
Chromulinales								
Dinobryaceae								
Dinobryon								
bavaricum	17,000	0.07	649,000	0.50	185,000	0.40	851,000	0.42

APPENDIX D, TABLE 1

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Dinobryon unid	13,000	0.06	532,000	0.41	21,000	0.05	566,000	0.28
Chrysosaccales								
Stylococcaceae								
Bitrichia			90,000	0.07	20,000	0.04	110,000	0.05
Paraphysomonadales								
Chrysosphaerellaceae								
Chrysosphaerella								
longispina								
Chrysosphaerella unid			49,000	0.04			49,000	0.02
Phaeothamniales								
Phaeothamniaceae								
Stichogloea								
Synurales								
Mallomonadaceae								
Mallomonas	56,000	0.25	133,000	0.10	10,000	0.02	199,000	0.10
Synura			3,095,000	2.36	64,000	0.14	3,159,000	1.58
Chrysophyceae unid	17,138,000	75.11	20,710,000	15.81	10,554,000	22.75	48,402,000	24.17
Cryptophyceae								
Cryptomonadales								
Cryptomonadaceae								
Cryptomonas	202,000	0.89	233,000	0.18	267,000	0.58	702,000	0.35
Cryptophyceae unid	5,091,000	22.31	2,267,000	1.73	1,521,000	3.28	8,879,000	4.43
Cyanophyceae								
Chroococcales								
Chroococcaceae								
Chroococcus			875,000	0.67	10,000	0.02	885,000	0.44
Gomphosphaeria			20,000	0.02			20,000	0.01
Gomphosphaeriaceae								
Gomphosphaeria			64,000	0.05	68,000	0.15	132,000	0.07
Microcystaceae								
Aphanocapsa			25,000	0.02	158,000	0.34	183,000	0.09

APPENDIX D, TABLE 1

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Aphanothece			2,713,000	2.07	174,000	0.38	2,887,000	1.44
Merismopedia			94,370,000	72.02	29,190,000	62.92	123,560,000	61.71
Geitlerinematales								
Geitlerinemataceae								
Geitlerinema								
Leptolyngbyales								
Leptolyngbyaceae								
Planktolyngbya	4,000	0.02	118,000	0.1	77,000	0.2	199,000	0.1
Nodosilineales								
Cymatolegaceae								
Cyanodictyon			313,000	0.24	25,000	0.05	338,000	0.17
Rhabdoderma			377,000	0.29			377,000	0.19
Nostocales								
Aphanizomenonaceae								
Anabaena			45,000	0.03	2,000	0.00	47,000	0.02
Aphanizomenon			20,000	0.02			20,000	0.01
Nostocaceae								
Aphanizomenon			1,000	0.001			1,000	0.0005
Pseudanabaenales								
Pseudanabaenaceae								
Pseudanabaena	1,000	0.00	5,000	0.004	1,000	0.00	7,000	0.0035
Synechococcales								
Coelosphaeriaceae								
Woronichinia			1,000	0.001			1,000	0.0005
Dinophyceae								
Gonyaulacales								
Ceratiaceae								
Ceratium								
hirundinella			1,000	0.001			1,000	0.0005
Gymnodiniales								
Gymnodiniaceae								

APPENDIX D, TABLE 1

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Gymnodinium	2,000	0.01	114,000	0.09			116,000	0.06
Peridinales								
Peridiniaceae								
Peridinium			121,000	0.09	11,000	0.02	132,000	0.07
Euglenophyceae								
Euglenales								
Euglenaceae								
Euglena	1,000	0.004			1,000	0.00	2,000	0.001
Trachelomonas					2,000	0.00	2,000	0.001
Phacaceae								
Phacus					1,000	0.00	1,000	0.0005
Klebsormidiophyceae								
Klebsormidiales								
Elakatotrichaceae								
Elakatothrix			122,000	0.09	90,000	0.19	212,000	0.11
Trebouxiophyceae								
Chlorellales								
Chlorellaceae								
Closteriopsis					1,000	0.002	1,000	0.0005
Dictyosphaerium			1,000	0.001	1,000	0.002	2,000	0.001
Oocystaceae								
Oocystis			69,000	0.05	45,000	0.10	114,000	0.06
Planctonema								
lauterbornii			57,000	0.04			57,000	0.03
Trebouxiophyceae ordo incertae sedis								
Trebouxiophyceae incertae sedis								
Crucigenia								
quadrata			98,000	0.07	196,000	0.42	294,000	0.15
tetrapedia	4,000	0.02	44,000	0.034	308,000	0.66	356,000	0.178
Crucigenia unid			29,000	0.02	44,000	0.09	73,000	0.036
Zygnematophyceae								

APPENDIX D, TABLE 1

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Desmidiales								
Desmidiaceae								
Cosmarium			78,000	0.06	12,000	0.03	90,000	0.04
Euastrum								
Spondylosium					4,000	0.009	4,000	0.002
Staurastrum			3,000	0.002	4,000	0.01	7,000	0.003
Staurodesmus			22,000	0.02	22,000	0.05	44,000	0.02
Grand Total	22,818,000	100.00	131,032,000	100.00	46,390,000	100.00	200,240,000	100.00

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 2

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Bacillariophyceae								
Achnanthales								
Achnanthaceae								
Bacillariales								
Bacillariaceae	1,000	0.004	15,000	0.01			16,000	0.01
Fragilariales								
Fragilariaceae	183,000	0.80	85,000	0.06	30,000	0.06	298,000	0.15
Melosirales								
Melosiraceae	10,000	0.04	574,000	0.44	357,000	0.77	941,000	0.48
Naviculales								
Naviculaceae	4,000	0.02	5,000	0.004			9,000	0.005
Rhabdonematales								
Tabellariaceae	46,000	0.20	1,108,000	0.85	1,296,000	2.79	2,450,000	1.25
Rhizosoleniales								
Rhizosoleniaceae			468,000	0.36	228,000	0.49	696,000	0.35
Stephanodiscales								
Stephanodiscaceae	7,000	0.03	178,000	0.14	180,000	0.39	363,000	0.18
Surirellales								
Surirellaceae	1,000	0.004					1,000	0.001
Thalassiosiphysales								
Catenulaceae	1,000	0.004					1,000	0.001
Chlorophyceae								
Sphaeropleales								
Neochloridaceae			5,000	0.004			5,000	0.003
Hydrodictyaceae			112,000	0.09	62,000	0.13	174,000	0.09

APPENDIX D, TABLE 2

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Scenedesmaceae	4,000	0.02			60,000	0.13	64,000	0.03
Selenastraceae	31,000	0.14	374,000	0.29	561,000	1.21	229,000	0.12
Trebouxiales								
Botryococcaceae			20,000	0.02	26,000	0.06	46,000	0.02
Chlorophyceae unid	1,000	0.004	624,000	0.48	501,000	1.08	1,126,000	0.57
Chrysophyceae								
Chromulinales								
Dinobryaceae	30,000	0.13	1,181,000	0.90	206,000	0.44	1,417,000	0.72
Chrysosaccales								
Stylococcaceae			90,000	0.07	20,000	0.04	110,000	0.06
Paraphysomonadales								
Chrysosphaerellaceae			49,000	0.04			49,000	0.02
Phaeothamniales								
Phaeothamniaceae								
Synurales								
Mallomonadaceae	56,000	0.25	3,228,000	2.46	74,000	0.16	3,358,000	1.71
Chrysophyceae unid.	17,138,000	75.11	20,710,000	15.81	10,554,000	22.75	48,402,000	24.62
Cryptophyceae								
Cryptomonadales								
Cryptomonadaceae	202,000	0.89	233,000	0.18	267,000	0.58	702,000	0.36
Cryptophyceae unid.	5,091,000	22.31	2,267,000	1.73	1,521,000	3.28	8,879,000	4.52
Cyanophyceae								
Chroococcales								
Chroococcaceae			895,000	0.68	10,000	0.02	905,000	0.46
Gomphosphaeriaceae			64,000	0.05	68,000	0.15	132,000	0.07

APPENDIX D, TABLE 2

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Microcystaceae			97,108,000	74.11	29,522,000	63.64	123,743,000	62.94
Geitlerinematales								
Geitlerinemataceae								
Leptolyngbyales								
Leptolyngbyaceae	4,000	0.02	118,000	0.09	77,000	0.17	199,000	0.10
Nodosilineales								
Cymatolegaceae			690,000	0.53	25,000	0.05	715,000	0.36
Nostocales								
Aphanizomenonaceae			65,000	0.05	2,000	0.004	67,000	0.03
Nostocaceae			1,000	0.001			1,000	0.001
Pseudanabaenales								
Pseudanabaenaceae	1,000	0.004	5,000	0.004	1,000	0.002	7,000	0.004
Synechococcales								
Coelosphaeriaceae			1,000	0.001			1,000	0.001
Dinophyceae								
Gonyaulacales								
Ceratiaceae			1,000	0.001			1,000	0.001
Gymnodiniales								
Gymnodiniaceae	2,000	0.01	114,000	0.09			116,000	0.06
Peridinales								
Peridiniaceae			121,000	0.09	11,000	0.02	132,000	0.07
Euglenophyceae								
Euglenales								
Euglenaceae	1,000	0.004			3,000	0.01	4,000	0.002
Phacaceae					1,000	0.002	1,000	0.001

APPENDIX D, TABLE 2

Seasonal phytoplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=9)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Klebsormidiophyceae								
Klebsormidiales								
Elakatotrichaceae			122,000	0.09	90,000	0.19	212,000	0.11
Trebouxiophyceae								
Chlorellales								
Chlorellaceae			1,000	0.001	2,000	0.004	3,000	0.002
Oocystaceae			126,000	0.10	45,000	0.10	171,000	0.09
Trebouxiophyceae ordo incertae sedis								
Trebouxiophyceae incertae sedis	4,000	0.02	171,000	0.13	548,000	1.18	723,000	0.37
Zygnematophyceae								
Desmidiiales								
Desmidiaceae			103,000	0.08	42,000	0.09	145,000	0.07
TOTAL	22,818,000	100	131,032,000	100	46,390,000	100	196,614,000	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 3

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Bacillariophyceae								
Achnanthes								
Achnanthes								
Achnanthes					5,000	0.02	5,000	0.01
Bacillariales								
Bacillariaceae								
Nitzschia			6,000	0.02	5,000	0.02	11,000	0.02
Fragilariales								
Fragilariaceae								
Synedra	1,000	0.01	98,000	0.33	59,000	0.28	158,000	0.26
Melosirales								
Melosiraceae								
Melosira			30,000	0.10	1,000	0.00	31,000	0.05
Naviculales								
Naviculaceae								
Navicula	1,000	0.01					1,000	0.002
Rhabdonematales								
Tabellariaceae								
Asterionella								
formosa	1,000	0.01	40,000	0.14	200,000	0.93	241,000	0.40
Diatoma								
Tabellaria			68,000	0.23	18,000	0.08	86,000	0.14
Rhizosoleniales								
Rhizosoleniaceae								
Rhizosolenia			986,000	3.34	120,000	0.56	1,106,000	1.82
Stephanodiscales								
Stephanodiscaceae								
Cyclotella			143,000	0.48	11,000	0.05	154,000	0.25
Stephanodiscus								
Surirellales								

APPENDIX D, TABLE 3

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Surirellaceae								
Surirella								
Thalassiophysales								
Catenulaceae								
Amphora								
Chlorophyceae								
Sphaeropleales								
Hydrodictyaceae								
Pediastrum								
tetras			1,000	0.003	3,000	0.01	4,000	0.01
Tetraedron								
minimum					10,000	0.05	10,000	0.02
Neochloridaceae								
Golenkinia								
Scenedesmaceae								
Scenedesmus								
quadricauda								
Scenedesmus unid					10,000	0.05	10,000	0.02
Selenastraceae								
Ankistrodesmus								
Kirchneriella								
Monoraphidium					10,000	0.05	10,000	0.02
Quadrigula					80,000	0.37	80,000	0.13
Trebouxiales								
Botryococcaceae								
Botryococcus	1,000	0.01	6,000	0.02	5,000	0.02	12,000	0.02
Chlorophyceae unid			482,000	1.63	506,000	2.36	988,000	1.63
Chrysophyceae								
Chromulinales								
Dinobryaceae								

APPENDIX D, TABLE 3

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Dinobryon								
bavaricum	2,000	0.02	159,000	0.54	150,000	0.70	311,000	0.51
Dinobryon unid	161,000	1.64	305,000	1.03	351,000	1.64	817,000	1.34
Chrysosaccales								
Stylococcaceae								
Bitrichia					138,000	0.64	138,000	0.23
Paraphysomonadales								
Chrysosphaerellaceae								
Chrysosphaerella								
longispina	2,000	0.02			64,000	0.30	66,000	0.11
Chrysosphaerella unid.			468,000	1.58			468,000	0.77
Phaeothamniales								
Phaeothamniaceae								
Stichogloea					8,000	0.04	8,000	0.01
Synurales								
Mallomonadaceae								
Mallomonas			158,000	0.53	12,000	0.06	170,000	0.28
Synura	27,000	0.28	84,000	0.28	74,000	0.35	185,000	0.3
Chrysophyceae unid	9,156,000	93.54	9,153,000	30.97	10,868,000	50.69	29,177,000	48.00
Cryptophyceae								
Cryptomonadales								
Cryptomonadaceae								
Cryptomonas	50,000	0.51	61,000	0.21	139,000	0.65	250,000	0.41
Cryptophyceae unid	205,000	2.09	508,000	1.72	422,000	1.97	1,135,000	1.87
Cyanophyceae								
Chroococcales								
Chroococcaceae								
Chroococcus			98,000	0.33	89,000	0.42	187,000	0.31
Gomphosphaeria			6,000	0.02	5,000	0.02	11,000	0.02
Gomphosphaeriaceae								

APPENDIX D, TABLE 3

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Gomphosphaeria					16,000	0.07	16,000	0.03
Microcystaceae								
Aphanocapsa			43,000	0.15	118,000	0.55	161,000	0.26
Aphanothece			47,000	0.16	60,000	0.28	107,000	0.18
Merismopedia			16,339,000	55.28	7,469,000	34.84	23,808,000	39.17
Geitlerinematales								
Geitlerinemataceae								
Geitlerinema					2,000	0.01	2,000	0.003
Leptolyngbyales								
Leptolyngbyaceae								
Planktolyngbya	181,000	1.85	1,000	0.003			182,000	0.30
Nodosilineales								
Cymatolegaceae								
Cyanodictyon			69,000	0.23	70,000	0.33	139,000	0.23
Rhabdoderma			25,000	0.08			25,000	0.04
Nostocales								
Aphanizomenonaceae								
Anabaena			7,000	0.02	10,000	0.05	17,000	0.03
Aphanizomenon								
Nostocaceae								
Aphanizomenon								
Pseudanabaenales								
Pseudanabaenaceae								
Pseudanabaena					1,000	0.00	1,000	0.002
Synechococcales								
Coelosphaeriaceae								
Woronichinia								
Dinophyceae								
Gonyaulacales								
Ceratiaceae								

APPENDIX D, TABLE 3

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Ceratium								
hirundinella								
Gymnodiniales								
Gymnodiniaceae								
Gymnodinium			25,000	0.08	3,000	0.01	28,000	0.05
Peridinales								
Peridiniaceae								
Peridinium			40,000	0.14			40,000	0.07
Euglenophyceae								
Euglenales								
Euglenaceae								
Euglena								
Trachelomonas								
Phacaceae								
Klebs Phacus								
Klebsormidiales								
Elakatotrichaceae								
Elakatothrix			28,000	0.09	216,000	1.01	244,000	0.40
Trebouxiophyceae								
Chlorellales								
Chlorellaceae								
Closteriopsis								
Dictyosphaerium			1,000	0.003			1,000	0.002
Oocystaceae								
Oocystis			15,000	0.05	60,000	0.28	75,000	0.12
Planctonema								
lauterbornii								
Trebouxiophyceae ordo incertae sedis								
Trebouxiophyceae incertae sedis								
Crucigenia								

APPENDIX D, TABLE 3

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
quadrata			20,000	0.07	24,000	0.11	44,000	0.07
tetrapedia								
Zygnematophyceae								
Crucigenia unid								
Desmidiaceae								
Desmidiales								
Cosmarium			11,000	0.04	16,000	0.07	27,000	0.04
Euastrum			2,000	0.01	1,000	0.005	3,000	0.005
Spondylosium			1,000	0.003			1,000	0.002
Staurastrum			16,000	0.05	2,000	0.01	18,000	0.03
Stauroidesmus			5,000	0.02	9,000	0.04	14,000	0.02
Grand Total	9,788,000	100	29,555,000	100	21,440,000	100	60,783,000	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 4

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Bacillariophyceae								
Achnanthales								
Achnanthaceae					5,000	0.02	5,000	0.01
Bacillariales								
Bacillariaceae			6,000	0.02	5,000	0.02	11,000	0.02
Fragilariales								
Fragilariaceae	1,000	0.01	98,000	0.33	59,000	0.28	158,000	0.26
Melosirales								
Melosiraceae			30,000	0.10	1,000	0.005	31,000	0.05
Naviculales								
Naviculaceae	1,000	0.01					1,000	0.002
Rhabdonematales								
Tabellariaceae	1,000	0.01	108,000	0.37	218,000	1.02	327,000	0.54
Rhizosoleniales								
Rhizosoleniaceae			986,000	3.34	120,000	0.56	1,106,000	1.82
Stephanodiscales								
Stephanodiscaceae			143,000	0.48	11,000	0.05	154,000	0.25
Surirellales								
Surirellaceae								
Thalassiosiphysales								
Catenulaceae								
Chlorophyceae								
Sphaeropleales								
Neochloridaceae								
Hydrodictyaceae			1,000	0.003	13,000	0.06	14,000	0.02

APPENDIX D, TABLE 4

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Scenedesmaceae					10,000	0.05	10,000	0.02
Selenastraceae					90,000	0.42	90,000	0.15
Trebouxiales								
Botryococcaceae	1,000	0.01	6,000	0.02	5,000	0.02	12,000	0.02
Chlorophyceae unid			482,000	1.63	506,000	2.36	988,000	1.63
Chrysophyceae								
Chromulinales								
Dinobryaceae	163,000	1.67	464,000	1.57	501,000	2.34	1,128,000	1.86
Chrysosaccales								
Stylococcaceae					138,000	0.64	138,000	0.23
Paraphysomonadales								
Chrysosphaerellaceae	2,000	0.02	468,000	1.58	64,000	0.30	534,000	0.88
Phaeothamniales								
Phaeothamniaceae					8,000	0.04	8,000	0.01
Synurales								
Mallomonadaceae	27,000	0.28	242,000	0.82	86,000	0.40	355,000	0.58
Chrysophyceae unid.	9,156,000	93.54	9,153,000	30.97	10,868,000	50.69	29,177,000	48.00
Cryptophyceae								
Cryptomonadales								
Cryptomonadaceae	50,000	0.51	61,000	0.21	139,000	0.65	250,000	0.41
Cryptophyceae unid.	205,000	2.09	508,000	1.72	422,000	1.97	1,135,000	1.87
Cyanophyceae								
Chroococcales								
Chroococcaceae			104,000	0.35	94,000	0.44	187,000	0.31
Gomphosphaeriaceae					16,000	0.07	16,000	0.03

APPENDIX D, TABLE 4

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Microcystaceae			16,429,000	55.59	7,647,000	35.67	23,969,000	39.43
Geitlerinematales								
Geitlerinemataceae					2,000	0.01	2,000	0.003
Leptolyngbyales								
Leptolyngbyaceae	181,000	1.85	1,000	0.003			182,000	0.30
Nodosilineales								
Cymatolegaceae			94,000	0.32	70,000	0.33	164,000	0.27
Nostocales								
Aphanizomenonaceae			7,000	0.02	10,000	0.05	17,000	0.03
Nostocaceae								
Pseudanabaenales								
Pseudanabaenaceae					1,000	0.005	1,000	0.002
Synechococcales								
Coelosphaeriaceae								
Dinophyceae								
Gonyaulacales								
Ceratiaceae								
Gymnodiniales								
Gymnodiniaceae			25,000	0.08	3,000	0.01	28,000	0.05
Peridinales								
Peridiniaceae			40,000	0.14			40,000	0.07
Euglenophyceae								
Euglenales								
Euglenaceae								
Phacaceae								

APPENDIX D, TABLE 4

Seasonal phytoplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Klebsormidiophyceae								
Klebsormidiales								
Elakatotrichaceae			28,000	0.09	216,000	1.01	244,000	0.40
Trebouxiophyceae								
Chlorellales								
Chlorellaceae			1,000	0.003			1,000	0.002
Oocystaceae			15,000	0.05	60,000	0.28	75,000	0.12
Trebouxiophyceae ordo incertae sedis								
Trebouxiophyceae incertae sedis			20,000	0.07	24,000	0.11	44,000	0.07
Zygnematophyceae								
Desmidiiales								
Desmidiaceae			35,000	0.12	28,000	0.13	60,000	0.10
TOTAL	9,788,000	100	29,555,000	100	21,440,000	100	60,783,000	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 5

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Arachnida								
Arachnida								
Hydracarina								
Hydracarina unid.								
Arthropoda								
Insecta								
Diptera								
Chironomidae								
Unidentified								
Chironomidae unid.								
Crustacea								
Branchiopoda								
Cladocera								
Bosminidae								
Bosmina	0.52	0.40	12.7	2.23	3.07	2.96	16.3	2.02
Chydoridae								
Chydorus					0.16	0.15	0.16	0.02
Graptoleberis								
testudinaria								
Daphniidae								
Ceriodaphnia					0.03	0.03	0.03	0.003
Daphnia	0.50	0.38	0.27	0.05	0.35	0.34	1.12	0.14
Holopediidae								

APPENDIX D, TABLE 5

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Holopedium	2.41	1.84	1.02	0.18	1.23	1.19	4.67	0.58
Leptodoridae								
Leptodora								
kindtii	0.04	0.03	0.10	0.02			0.14	0.02
Sididae								
Diaphanosoma			3.26	0.57	0.30	0.29	3.56	0.44
Sida								
crystallina								
Copepoda								
Calanoida								
Diaptomidae								
Leptodiaptomus	5.09	3.88	2.52	0.44	0.61	0.59	8.22	1.02
Skistodiaptomus	2.85	2.18			0.76	0.73	3.61	0.45
To young to ID	0.09	0.07	7.69	1.35	3.00	2.89	10.8	1.34
Unidentified Female			0.36	0.06	0.38	0.36	0.74	0.09
Cyclopoida								
Cyclopidae								
Cyclops	0.23	0.18					0.23	0.03
Diacyclops	0.17	0.13					0.17	0.02
Mesocyclops			0.44	0.08			0.44	0.05
Microcyclops								
To young to ID	13.8	10.5	47.6	8.34	13.1	12.6	74.5	9.25
Unidentified Male	2.33	1.77	0.58	0.10			2.91	0.36

APPENDIX D, TABLE 5

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Nauplii	39.9	30.4	72.3	12.7	4.43	4.26	117	14.5
Protozoa								
Ciliata								
Peritrichida								
Epistylidae								
Epistylis	31.7	24.2			0.78	0.76	32.5	4.03
Vorticellidae								
Vorticella			106	18.5	40.7	39.1	146	18.2
Spirotrichida								
Codonellidae								
Codonella			0.17	0.03	0.60	0.57	0.77	0.10
Ciliata unid.	1.22	0.93			2.54	2.45	3.76	0.47
Heliozoa								
Actinophryida								
Actinosphaeridae								
Actinosphaerium			0.06	0.01	3.78	3.63	3.84	0.48
Lobosa								
Arcellinida								
Diffugiidae								
Diffugia	0.04	0.03	26.9	4.72	1.23	1.19	28.2	3.50
Rotifera								
Monogononta								
Collothecaceae								

APPENDIX D, TABLE 5

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Collothecidae								
Collotheca			15.0	2.63	3.99	3.84	19.0	2.36
Flosculariaceae								
Conochilidae								
Conochilus	6.62	5.04	11.8	2.07	1.96	1.89	20.4	2.53
Filiniidae								
Filinia	0.14	0.11					0.14	0.02
Ploima								
Asplanchnidae								
Asplanchna			5.25	0.92			5.25	0.65
Brachionidae								
Kellicottia								
longispina	5.85	4.46	13.5	2.37	2.99	2.88	22.3	2.77
Keratella								
hiemalis	0.23	0.18					0.23	0.03
Keratella unid.	3.94	3.01	168	29.5	5.55	5.34	178	22.1
Gastropodidae								
Ascomorpha			0.35	0.06			0.35	0.04
Gastropus	0.10	0.07	58.4	10.2	1.60	1.54	60.1	7.45
Lecanidae								
Lecane	0.07	0.05					0.07	0.01
Monostyla	0.17	0.13			0.03	0.03	0.20	0.02
Synchaetidae								

APPENDIX D, TABLE 5

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the lowest practical taxonomic level, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Ploesoma			4.50	0.79	0.03	0.03	4.53	0.56
Polyarthra	8.82	6.72	0.60	0.11	8.88	8.54	18.3	2.27
Trichocercidae								
Trichocerca	0.09	0.07	7.25	1.27	0.20	0.20	7.54	0.94
Trichotriidae								
Trichotria								
Rotifera unid.	4.21	3.21	4.19	0.73	1.68	1.61	10.1	1.25
TOTAL	131	100	571	100	104	100	806	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 6

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Arachnida								
Arachnida								
Hydracarina								
Hydracarina unid.								
Arthropoda								
Insecta								
Diptera								
Chironomidae								
Crustacea								
Branchiopoda								
Cladocera								
Bosminidae	0.52	0.40	12.7	2.23	3.07	2.96	16.3	2.02
Chydoridae					0.16	0.15	0.16	0.02
Daphniidae	0.50	0.38	0.27	0.05	0.38	0.36	1.15	0.14
Holopediidae	2.41	1.84	1.02	0.18	1.23	1.19	4.67	0.58
Leptodoridae	0.04	0.03	0.10	0.02			0.14	0.02
Sididae			3.26	0.57	0.30	0.29	3.56	0.44
Copepoda								
Calanoida								
Diaptomidae	7.94	6.05	8.08	1.42	4.75	4.57	20.8	2.58
Diaptomidae unid.	0.09	0.07	2.48	0.44			2.57	0.32
Cyclopoida								
Cyclopidae	0.40	0.30	0.44	0.08			0.84	0.10
Cyclopidae unid.	16.2	12.3	48.2	8.44	13.1	12.6	77.4	9.61
Copepod unid.	39.9	30.4	72.3	12.7	4.43	4.26	117	14.5

APPENDIX D, TABLE 6

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Protozoa								
Ciliata								
Peritrichida								
Epistylidae	31.7	24.2			0.78	0.76	32.5	4.03
Vorticellidae			106	18.5	40.7	39.1	146	18.2
Spirotrichida								
Codonellidae			0.17	0.03	0.60	0.57	0.77	0.10
Ciliata unid.	1.22	0.93			2.54	2.45	3.76	0.47
Heliozoa								
Actinophryida								
Actinosphaeridae			0.06	0.01	3.78	3.63	3.84	0.48
Lobosa								
Arcellinida								
Diffugiidae	0.04	0.03	26.9	4.72	1.23	1.19	28.2	3.50
Rotifera								
Monogononta								
Collothecaceae								
Collothecidae			15.0	2.63	3.99	3.84	19.0	2.36
Flosculariaceae								
Conochilidae	6.62	5.04	11.8	2.07	1.96	1.89	20.4	2.53
Filiniidae	0.14	0.11					0.14	0.02
Ploima								
Asplanchnidae			5.25	0.92			5.25	0.65
Brachionidae	10.0	7.64	182	31.8	8.54	8.22	200	24.9
Gastropodidae	0.10	0.07	58.7	10.3	1.60	1.54	60.4	7.50

APPENDIX D, TABLE 6

Seasonal zooplankton enumeration and percent composition results from Mennin Lake at the taxonomic level of family or higher, 2021.

Taxon	Mennin Lake						Total (Orgs/L)	%
	Spring (n=9)		Summer (n=6)		Fall (n=9)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Lecanidae	0.24	0.18			0.03	0.03	0.27	0.03
Synchaetidae	8.82	6.72	5.10	0.89	8.91	8.57	22.8	2.83
Trichocercidae	0.09	0.07	7.25	1.27	0.20	0.20	7.54	0.94
Trichotriidae								
Rotifera unid.	4.21	3.21	4.19	0.73	1.68	1.61	10.08	1.25
TOTAL	131	100	571	100	104	100	806	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 7

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Arachnida								
Arachnida								
Hydracarina								
Hydracarina unid.			0.02	0.03	0.02	0.03	0.04	0.02
Arthropoda								
Insecta								
Diptera								
Chironomidae								
Unidentified								
Chironomidae unid.					0.02	0.03	0.02	0.01
Crustacea								
Branchiopoda								
Cladocera								
Bosminidae								
Bosmina	1.75	1.77	9.17	12.8	13.7	22.0	24.6	10.6
Chydoridae								
Chydorus	0.03	0.03	0.21	0.29	3.62	5.82	3.86	1.66
Graptoleberis								
testudinaria					0.01	0.02	0.01	0.01
Daphniidae								
Ceriodaphnia					0.03	0.05	0.03	0.01
Daphnia	0.90	0.91	0.02	0.03	0.11	0.17	1.03	0.44
Holopediidae								
Holopedium	1.35	1.36	0.04	0.06	1.21	1.94	2.60	1.11

APPENDIX D, TABLE 7

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Leptodoridae								
Leptodora								
kindtii								
Sididae								
Diaphanosoma	0.47	0.47	6.82	9.50	1.67	2.68	8.96	3.84
Sida								
crystallina			0.02	0.02			0.02	0.01
Copepoda								
Calanoida								
Diaptomidae								
Leptodiaptomus	10.6	10.7	8.56	11.9	8.55	13.7	27.7	11.9
Skistodiaptomus	0.77	0.78			0.09	0.15	0.87	0.37
To young to ID			6.86	9.55	1.71	2.74	8.57	3.67
Unidentified Female								
Cyclopoida								
Cyclopidae								
Cyclops								
Diacyclops	0.23	0.23			0.04	0.07	0.27	0.12
Mesocyclops	0.33	0.33	0.32	0.44	0.06	0.10	0.70	0.30
Microcyclops			0.23	0.32			0.23	0.10
To young to ID	4.15	4.19	5.71	7.95	4.54	7.28	14.4	6.17
Unidentified Male	0.75	0.76					0.75	0.32
Nauplii	46.8	47.3	17.2	23.9	1.70	2.73	65.7	28.2
Protozoa								

APPENDIX D, TABLE 7

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Ciliata								
Peritrichida								
Epistylidae								
Epistylis	13.9	14.1					13.9	5.97
Vorticellidae								
Vorticella	0.35	0.35	0.13	0.18	8.79	14.1	9.26	3.97
Spirotrichida								
Codonellidae								
Codonella								
Ciliata unid.	0.08	0.08			0.07	0.11	0.15	0.06
Heliozoa								
Actinophryida								
Actinosphaeridae								
Actinosphaerium					0.07	0.11	0.07	0.03
Lobosa								
Arcellinida								
Diffugiidae								
Diffugia	0.12	0.12	0.60	0.84	0.09	0.15	0.82	0.35
Rotifera								
Monogononta								
Collothecaceae								
Collothecidae								
Collotheca			0.67	0.94			0.67	0.29
Flosculariaceae								

APPENDIX D, TABLE 7

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Conochilidae								
Conochilus	5.43	5.48	0.95	1.32	6.05	9.71	12.4	5.33
Filiniidae								
Filinia	1.02	1.03					1.02	0.44
Ploima								
Asplanchnidae								
Asplanchna	0.04	0.04	0.67	0.93	0.24	0.39	0.95	0.41
Brachionidae								
Kellicottia								
longispina	4.26	4.30	0.32	0.44	1.04	1.66	5.62	2.41
Keratella								
hiemalis	0.24	0.24					0.24	0.10
Keratella unid.	2.05	2.07	8.65	12.04	7.03	11.3	17.7	7.60
Gastropodidae								
Ascomorpha								
Gastropus	0.04	0.04	1.11	1.54	0.40	0.65	1.55	0.67
Lecanidae								
Lecane								
Monostyla	0.06	0.06					0.06	0.03
Synchaetidae								
Ploesoma			1.91	2.65	0.01	0.02	1.92	0.82
Polyarthra	2.21	2.23	0.51	0.71	0.99	1.59	3.71	1.59
Trichocercidae								
Trichocerca			1.21	1.68	0.13	0.21	1.34	0.57

APPENDIX D, TABLE 7

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the lowest practical taxonomic level, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Trichotriidae								
Trichotria	0.11	0.11					0.11	0.05
Rotifera unid.	0.92	0.93			0.32	0.52	1.24	0.53
TOTAL	99.1	100	71.8	100	62.3	100	233	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX D, TABLE 8

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Arachnida								
Arachnida								
Hydracarina								
Hydracarina unid.			0.02	0.03	0.02	0.03	0.04	0.02
Arthropoda								
Insecta								
Diptera								
Chironomidae					0.02	0.03	0.02	0.01
Crustacea								
Branchiopoda								
Cladocera								
Bosminidae	1.75	1.77	9.17	12.8	13.7	22.0	24.6	10.6
Chydoridae	0.03	0.03	0.21	0.29	3.64	5.84	3.88	1.66
Daphniidae	0.90	0.91	0.02	0.03	0.14	0.23	1.06	0.45
Holopediidae	1.35	1.36	0.04	0.06	1.21	1.94	2.60	1.11
Leptodoridae								
Sididae	0.47	0.47	6.84	9.52	1.67	2.68	8.98	3.85
Copepoda								
Calanoida								
Diaptomidae	11.4	11.5	13.5	18.8	10.4	16.6	35.3	15.1
Diaptomidae unid.			1.88	2.62			1.88	0.81
Cyclopoida								
Cyclopidae	0.56	0.56	0.54	0.76	0.10	0.16	1.20	0.52
Cyclopidae unid.	4.90	4.94	5.71	7.95	4.54	7.28	15.1	6.49
Copepod unid.	46.8	47.3	17.2	23.9	1.70	2.73	65.7	28.2

APPENDIX D, TABLE 8

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Protozoa								
Ciliata								
Peritrichida								
Epistylidae	13.9	14.1					13.9	5.97
Vorticellidae	0.35	0.35	0.13	0.18	8.79	14.1	9.26	3.97
Spirotrichida								
Codonellidae								
Ciliata unid.	0.08	0.08			0.07	0.11	0.15	0.06
Heliozoa								
Actinophryida								
Actinosphaeridae					0.07	0.11	0.07	0.03
Lobosa								
Arcellinida								
Diffugiidae	0.12	0.12	0.60	0.84	0.09	0.15	0.82	0.35
Rotifera								
Monogononta								
Collothecaceae								
Collothecidae			0.67	0.94			0.67	0.29
Flosculariaceae								
Conochilidae	5.43	5.48	0.95	1.32	6.05	9.71	12.4	5.33
Filiniidae	1.02	1.03					1.02	0.44
Ploima								
Asplanchnidae	0.04	0.04	0.67	0.93	0.24	0.39	0.95	0.41
Brachionidae	6.55	6.62	8.96	12.5	8.07	12.9	23.6	10.1
Gastropodidae	0.04	0.04	1.11	1.54	0.40	0.65	1.55	0.67

APPENDIX D, TABLE 8

Seasonal zooplankton enumeration and percent composition results from Revell Lake at the taxonomic level of family or higher, 2021.

Taxon	Revell Lake						Total (Orgs/L)	%
	Spring (n=6)		Summer (n=6)		Fall (n=6)			
	Orgs/L	%	Orgs/L	%	Orgs/L	%		
Lecanidae	0.06	0.06					0.06	0.03
Synchaetidae	2.21	2.23	2.42	3.36	1.01	1.62	5.63	2.42
Trichocercidae			1.21	1.68	0.13	0.21	1.34	0.57
Trichotriidae	0.11	0.11					0.11	0.05
Rotifera unid.	0.92	0.93			0.32	0.52	1.24	0.53
TOTAL	99.1	100	71.8	100	62.3	100	233	100

n = number of samples; Orgs/L = number of organisms per Liter; % = percent composition.

APPENDIX E

DETAILED YEAR 1 SOIL QUALITY RESULTS

LIST OF TABLES

Table 1 Summary of Year 1 Soil Results.

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Anions, Nutrients, Organics, Inorganics & Physical Properties											
P	Chloride	mg/kg	24	20,5	23	16.4	6.4	5	20	20	-
S	Chloride	mg/kg	8	20,5	8	14.4	7.8	5	20	20	-
WS	Chloride	mg/kg	8	20,5,10	1	33.8	15.4	12.9	35.7	53.6	-
P	Conductivity	mS/cm	24	0.004	0	0.03	0.02	0.01	0.03	0.06	0.57
S	Conductivity	mS/cm	8	0.004	0	0.03	0.01	0.02	0.03	0.04	0.57
WS	Conductivity	mS/cm	8	0.004,0.008	0	0.19	0.15	0.04	0.12	0.40	0.57
P	Inorganic Carbon	%	24	0.05	11	0.06	0.01	0.05	0.05	0.08	-
S	Inorganic Carbon	%	8	0.05	5	0.06	0.01	0.05	0.05	0.07	-
WS	Inorganic Carbon	%	8	0.05	1	0.13	0.04	0.07	0.14	0.18	-
P	Inorganic Carbon (as CaCO3 Equivalent)	%	24	0.4	10	0.47	0.10	0.4	0.46	0.66	-
S	Inorganic Carbon (as CaCO3 Equivalent)	%	8	0.4	4	0.45	0.09	0.4	0.41	0.60	-
WS	Inorganic Carbon (as CaCO3 Equivalent)	%	8	0.4	1	1.1	0.36	0.56	1.2	1.5	-
P	Nitrate-N	mg/kg	24	1,2	23	2.5	4.1	1	2	2	-
S	Nitrate-N	mg/kg	8	1,2	8	1.63	0.52	1	2	2	-
WS	Nitrate-N	mg/kg	8	2,10,4	8	7.3	3.8	2	10	10	-
P	Nitrate and Nitrite as N	mg/kg	24	1,4,2	23	2.6	4.1	1.4	2	2	-
S	Nitrate and Nitrite as N	mg/kg	8	1,4,2	8	1.8	0.31	1.4	2	2	-
WS	Nitrate and Nitrite as N	mg/kg	8	2,10,4	8	7.3	3.8	2	10	10	-
P	Nitrite-N	mg/kg	24	1	24	1	0	1	1	1	-
S	Nitrite-N	mg/kg	8	1	8	1	0	1	1	1	-
WS	Nitrite-N	mg/kg	8	1,5,2	7	4.9	4.49	1	5	11.5	-
P	pH	pH units	24	0.1	NA	4.51	0.32	4.14	4.49	5.08	6-9
S	pH	pH units	8	0.1	NA	4.20	0.18	3.99	4.15	4.43	6-9
WS	pH	pH units	8	0.1	NA	3.38	0.34	2.97	3.40	3.85	6-9
P	% Moisture	%	36	0.25,0.1	NA	19.4	5.94	8.29	20	29.05	-
S	% Moisture	%	11	0.25,0.1	NA	16.1	2.76	12.5	15.9	19.8	-
WS	% Moisture	%	10	0.25,0.1	NA	80.4	21.5	48.8	87.3	89.1	-
P	SAR	SAR	24	0.1	NA	0.20	0.17	0.1	0.1	0.54	2.4
S	SAR	SAR	8	0.1	NA	0.35	0.27	0.1	0.30	0.76	2.4
WS	SAR	SAR	8	0.1	NA	0.34	0.18	0.1	0.33	0.58	2.4
P	Sulphate	mg/kg	24	20	20	24.04	13.10	20	20	51.2	-
S	Sulphate	mg/kg	8	20	8	20	0	20	20	20	-
WS	Sulphate	mg/kg	8	20,40	1	88.13	36.83	34.35	90	134	-
P	Total Carbon by Combustion	%	24	0.05	NA	1.09	0.42	0.60	1.04	1.79	-
S	Total Carbon by Combustion	%	8	0.05	NA	0.97	0.43	0.61	0.81	1.62	-
WS	Total Carbon by Combustion	%	8	0.05	NA	38.3	15.3	14.7	43.9	45.4	-
P	Total Kjeldahl Nitrogen	%	24	0.02,0.08,0.06	NA	0.06	0.02	0.02	0.06	0.08	-
S	Total Kjeldahl Nitrogen	%	8	0.02,0.08	NA	0.06	0.04	0.03	0.05	0.13	-
WS	Total Kjeldahl Nitrogen	%	8	0.3,0.02,0.2,0.14,0.16,0.08	NA	0.96	0.42	0.31	1.15	1.28	-
P	Total Nitrogen By LECO	%	24	0.02	NA	0.07	0.02	0.04	0.07	0.09	-
S	Total Nitrogen By LECO	%	7	0.02	NA	0.05	0.01	0.04	0.05	0.06	-
WS	Total Nitrogen By LECO	%	8	0.02	NA	1.13	0.46	0.39	1.27	1.47	-
P	Total Organic Carbon	%	24	0.05,0.075	NA	1.06	0.40	0.60	0.98	1.72	-
S	Total Organic Carbon	%	8	0.05,0.075	NA	0.94	0.42	0.57	0.77	1.59	-
WS	Total Organic Carbon	%	8	0.05,0.075	NA	38.18	15.28	14.67	43.75	45.35	-
Metals											
P	Aluminum (Al)-Total	mg/kg	24	50	0	12597	2443.2	9275	12100	15910	50
S	Aluminum (Al)-Total	mg/kg	8	50	0	12774	3774.8	8235	12950	18200	50
WS	Aluminum (Al)-Total	mg/kg	8	50	0	3591	1549.2	1626	3890	5329	50

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Metals											
P	Antimony (Sb)-Total	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	1
S	Antimony (Sb)-Total	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	1
WS	Antimony (Sb)-Total	mg/kg	8	0.1	1	0.13	0.03	0.10	0.13	0.18	1
P	Arsenic (As)-Total	mg/kg	24	0.1	0	1.26	0.23	0.88	1.27	1.60	11
S	Arsenic (As)-Total	mg/kg	8	0.1	0	1.01	0.38	0.55	1.00	1.56	11
WS	Arsenic (As)-Total	mg/kg	8	0.1	0	1.45	0.48	0.72	1.53	1.87	11
P	Barium (Ba)-Total	mg/kg	24	0.5	0	23.5	7.2	14.7	21.8	32.8	210
S	Barium (Ba)-Total	mg/kg	8	0.5	0	37.1	15.9	20.9	36.0	60.4	210
WS	Barium (Ba)-Total	mg/kg	8	0.5	0	39.1	12.9	21.9	38.5	57.1	210
P	Beryllium (Be)-Total	mg/kg	24	0.1	0	0.21	0.06	0.11	0.23	0.30	2.5
S	Beryllium (Be)-Total	mg/kg	8	0.1	1	0.20	0.07	0.10	0.22	0.30	2.5
WS	Beryllium (Be)-Total	mg/kg	8	0.1	5	0.10	0.00	0.1	0.1	0.11	2.5
P	Bismuth (Bi)-Total	mg/kg	24	0.2	24	0.2	0	0.2	0.2	0.2	20
S	Bismuth (Bi)-Total	mg/kg	8	0.2	8	0.2	0	0.2	0.2	0.2	20
WS	Bismuth (Bi)-Total	mg/kg	8	0.2	8	0.2	0	0.2	0.2	0.2	20
P	Boron (B)-Total	mg/kg	24	5	24	5	0	5	5	5	1.5
S	Boron (B)-Total	mg/kg	8	5	8	5	0	5	5	5	1.5
WS	Boron (B)-Total	mg/kg	8	5	8	5	0	5	5	5	1.5
P	Calcium (Ca)-Total	mg/kg	24	50	0	1299	653	797	1165	1755	-
P	Calcium (Ca)-Total	mg/kg	8	50	0	1979	1156	1044	1410	3777	-
S	Calcium (Ca)-Total	mg/kg	8	50	0	2439	1555	977	2020	4873	-
P	Cadmium (Cd)-Total	mg/kg	24	0.02	19	0.02	0.00	0.02	0.02	0.02	1
S	Cadmium (Cd)-Total	mg/kg	8	0.02	2	0.03	0.01	0.02	0.02	0.04	1
WS	Cadmium (Cd)-Total	mg/kg	8	0.02	1	0.46	0.29	0.12	0.37	0.83	1
P	Chromium (Cr)-Total	mg/kg	24	0.5	0	12.9	4.30	9.6	11.7	17.4	0.4
S	Chromium (Cr)-Total	mg/kg	8	0.5	0	19.0	9.62	10.2	17.8	33.9	0.4
WS	Chromium (Cr)-Total	mg/kg	8	0.5	0	2.88	2.03	1.31	2.01	6.23	0.4
P	Cobalt (Co)-Total	mg/kg	24	0.1	0	2.87	1.36	1.69	2.73	4.10	19
S	Cobalt (Co)-Total	mg/kg	8	0.1	0	4.77	3.57	2.13	3.98	10.27	19
WS	Cobalt (Co)-Total	mg/kg	8	0.1	0	2.31	1.08	0.98	2.43	3.48	19
P	Copper (Cu)-Total	mg/kg	24	0.5	0	3.43	1.81	2.12	3.03	4.72	62
S	Copper (Cu)-Total	mg/kg	8	0.5	0	7.52	3.81	3.91	6.68	13.26	62
WS	Copper (Cu)-Total	mg/kg	8	0.5	0	4.12	1.20	3.11	3.62	6.10	62
P	Chromium, Hexavalent	mg/kg	24	0.2	23	0.21	0.03	0.2	0.2	0.2	0.4
S	Chromium, Hexavalent	mg/kg	8	0.2	5	0.26	0.12	0.2	0.2	0.47	0.4
WS	Chromium, Hexavalent	mg/kg	8	e	8	1.4	1.48	0.48	1	3.6	0.4
P	Iron (Fe)-Total	mg/kg	24	50	0	10925	2283	7677	11050	13340	200
S	Iron (Fe)-Total	mg/kg	8	50	0	12356	5106	6572	12000	19885	200
WS	Iron (Fe)-Total	mg/kg	8	50	0	4180	1323	2648	4430	5956	200
P	Lead (Pb)-Total	mg/kg	24	0.5	0	4.35	0.59	3.57	4.3	5.17	45
S	Lead (Pb)-Total	mg/kg	8	0.5	0	4.63	1.26	3.32	4.49	6.56	45
WS	Lead (Pb)-Total	mg/kg	8	0.5	0	10.06	3.62	4.36	10.85	13.36	45
P	Lithium (Li)-Total	mg/kg	24	2	0	7.43	2.08	5.46	7.15	9.1	2
S	Lithium (Li)-Total	mg/kg	8	2	0	12.1	4.80	7.1	11.1	19.2	2
WS	Lithium (Li)-Total	mg/kg	8	2	7	2.28	0.78	2	2	3.43	2
P	Magnesium (Mg)-Total	mg/kg	24	20	0	1368	997	948	1130	1837	-
S	Magnesium (Mg)-Total	mg/kg	8	20	0	3203	2053	1523	2830	6347	-
WS	Magnesium (Mg)-Total	mg/kg	8	20	0	803	379	416	744	1384	-
P	Manganese (Mn)-Total	mg/kg	24	1	0	60.7	47.4	40.7	48.8	72.5	100

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Metals											
S	Manganese (Mn)-Total	mg/kg	8	1	0	132	111	52	107	309	100
WS	Manganese (Mn)-Total	mg/kg	8	1	0	21.8	9.1	11.2	19.8	35.0	100
P	Mercury (Hg)-Total	mg/kg	24	0.005	0	0.02	0.01	0.01	0.02	0.03	0.16
S	Mercury (Hg)-Total	mg/kg	8	0.005	0	0.01	0.01	0.01	0.01	0.03	0.16
WS	Mercury (Hg)-Total	mg/kg	8	0.005	0	0.10	0.04	0.03	0.10	0.15	0.16
P	Molybdenum (Mo)-Total	mg/kg	24	0.1	0	0.36	0.11	0.19	0.37	0.48	2
S	Molybdenum (Mo)-Total	mg/kg	8	0.1	0	0.24	0.09	0.15	0.19	0.38	2
WS	Molybdenum (Mo)-Total	mg/kg	8	0.1	1	0.84	1.29	0.17	0.33	2.93	2
P	Nickel (Ni)-Total	mg/kg	24	0.5	0	6.42	2.62	4.21	6.23	9.14	37
S	Nickel (Ni)-Total	mg/kg	8	0.5	0	10.55	5.68	5.40	9.39	19.41	37
WS	Nickel (Ni)-Total	mg/kg	8	0.5	0	2.76	0.87	1.67	2.59	3.86	37
P	Phosphorus (P)-Total	mg/kg	24	50	0	161	62.0	90.1	158	309	-
S	Phosphorus (P)-Total	mg/kg	8	50	0	161	67.2	91.9	146	267	-
WS	Phosphorus (P)-Total	mg/kg	8	50	0	638	241.2	240	724	827	-
P	Potassium (K)-Total	mg/kg	24	100	0	228	230.6	140	185	249	-
S	Potassium (K)-Total	mg/kg	8	100	0	610	513.8	259	470	1417	-
WS	Potassium (K)-Total	mg/kg	8	100	0	560	172.3	314	565	753	-
P	Rhodium (Rh)-Total	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	2.2
S	Rhodium (Rh)-Total	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	2.2
WS	Rhodium (Rh)-Total	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	2.2
P	Ruthenium (Ru)-Total	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	1
S	Ruthenium (Ru)-Total	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	1
WS	Ruthenium (Ru)-Total	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	1
P	Samarium (Sm)-Total	mg/kg	14	0.1	0	1.34	0.26	1.05	1.28	1.75	-
S	Samarium (Sm)-Total	mg/kg	3	0.1	0	1.49	0.22	1.28	1.55	1.67	-
WS	Samarium (Sm)-Total	mg/kg	8	0.1	0	0.63	0.37	0.18	0.66	1.15	-
P	Selenium (Se)-Total	mg/kg	24	0.2	5	0.28	0.06	0.2	0.27	0.35	1
S	Selenium (Se)-Total	mg/kg	8	0.2	7	0.22	0.06	0.2	0.2	0.31	1
WS	Selenium (Se)-Total	mg/kg	8	0.2	1	0.32	0.08	0.21	0.35	0.4	1
P	Sodium (Na)-Total	mg/kg	24	50	0	103	49.7	72.2	90.5	128	-
S	Sodium (Na)-Total	mg/kg	8	50	0	147	87.4	76.9	100.5	286	-
WS	Sodium (Na)-Total	mg/kg	8	50	0	67.8	11.2	53.8	67	82.55	-
P	Silver (Ag)-Total	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	Silver (Ag)-Total	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	Silver (Ag)-Total	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
P	Strontium (Sr)-Total	mg/kg	24	0.5	0	8.06	3.60	4.78	7.21	10.83	33000
S	Strontium (Sr)-Total	mg/kg	8	0.5	0	11.64	6.23	5.86	9.9	21.47	33000
WS	Strontium (Sr)-Total	mg/kg	8	0.5	0	22.80	10.44	9.01	22.9	36.00	33000
P	Sulfur (S)-Total	mg/kg	24	1000	24	1000	0	1000	1000	1000	500
S	Sulfur (S)-Total	mg/kg	8	1000	8	1000	0	1000	1000	1000	500
WS	Sulfur (S)-Total	mg/kg	8	1000	2	1162.5	168.50	1000	1100	1430	500
P	Thallium (Tl)-Total	mg/kg	24	0.05	20	0.05	0.02	0.05	0.05	0.06	1
S	Thallium (Tl)-Total	mg/kg	8	0.05	1	0.08	0.05	0.05	0.07	0.15	1
WS	Thallium (Tl)-Total	mg/kg	8	0.05	4	0.06	0.01	0.05	0.05	0.06	1
P	Tin (Sn)-Total	mg/kg	24	2	24	2	0	2	2	2	5
S	Tin (Sn)-Total	mg/kg	8	2	8	2	0	2	2	2	5
WS	Tin (Sn)-Total	mg/kg	8	2	8	2	0	2	2	2	5
P	Titanium (Ti)-Total	mg/kg	24	1	0	667	149	542	611	885	1000
S	Titanium (Ti)-Total	mg/kg	8	1	0	777	288	506	750	1235	1000

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Metals											
WS	Titanium (Ti)-Total	mg/kg	8	1	0	84.0	112	28.1	39.1	258	1000
P	Tungsten (W)-Total	mg/kg	24	0.5	24	0.5	0	0.5	0.5	0.5	400
S	Tungsten (W)-Total	mg/kg	8	0.5	8	0.5	0	0.5	0.5	0.5	400
WS	Tungsten (W)-Total	mg/kg	8	0.5	8	0.5	0	0.5	0.5	0.5	400
P	Uranium (U)-Total	mg/kg	24	0.05	0	0.61	0.18	0.43	0.55	0.99	1.9
S	Uranium (U)-Total	mg/kg	8	0.05	0	0.59	0.27	0.38	0.53	1.01	1.9
WS	Uranium (U)-Total	mg/kg	8	0.05	0	0.53	0.38	0.17	0.42	1.15	1.9
P	Vanadium (V)-Total	mg/kg	24	0.2	0	27.89	4.43	21.99	27.15	36.11	86
S	Vanadium (V)-Total	mg/kg	8	0.2	0	27.09	11.30	14.31	27.3	43.09	86
WS	Vanadium (V)-Total	mg/kg	8	0.2	0	4.34	2.44	2.58	3.435	8.37	86
P	Zinc (Zn)-Total	mg/kg	24	2	0	9.93	5.24	7.22	8.7	12.23	200
S	Zinc (Zn)-Total	mg/kg	8	2	0	21.35	12.05	10.96	18.25	40.99	200
WS	Zinc (Zn)-Total	mg/kg	8	2	0	11.35	3.65	5.88	12.3	15.38	200
P	Zirconium (Zr)-Total	mg/kg	24	1	0	3.55	1.29	2.22	3	5.97	97
S	Zirconium (Zr)-Total	mg/kg	8	1	0	3.26	1.39	1.81	3.15	5.43	97
WS	Zirconium (Zr)-Total	mg/kg	8	1	5	1.11	0.24	1	1	1.49	97
Volatile Organic Compounds											
P	1,1,1,2-Tetrachloroethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,1,1,2-Tetrachloroethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,1,1,2-Tetrachloroethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,1,1-Trichloroethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,1,1-Trichloroethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,1,1-Trichloroethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,1,2,2-Tetrachloroethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,1,2,2-Tetrachloroethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,1,2,2-Tetrachloroethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,1,2-Trichloroethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,1,2-Trichloroethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,1,2-Trichloroethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,1-Dichloroethane	mg/kg	38	0.05	38	0.05	0	0.05	0.05	0.05	0.05
S	1,1-Dichloroethane	mg/kg	11	0.05	11	0.05	0	0.05	0.05	0.05	0.05
WS	1,1-Dichloroethane	mg/kg	2	0.05	2	0.05	0	0.05	0.05	0.05	0.05
P	1,1-Dichloroethylene	mg/kg	10	0.05	10	0.05	0	0.05	0.05	0.05	0.05
S	1,1-Dichloroethylene	mg/kg	5	0.05	5	0.05	0	0.05	0.05	0.05	0.05
P	1,1-Dichloropropene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	1,1-Dichloropropene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	1,1-Dichloropropene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	1,2,3-Trichlorobenzene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	0.05
S	1,2,3-Trichlorobenzene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	0.05
WS	1,2,3-Trichlorobenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,2,3-Trichloropropane	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	1,2,3-Trichloropropane	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	1,2,3-Trichloropropane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	1,2,4-Trimethylbenzene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	1,2,4-Trimethylbenzene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	1,2,4-Trimethylbenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	1,2-Dibromo-3-chloropropane	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	1,2-Dibromo-3-chloropropane	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	1,2-Dibromo-3-chloropropane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Volatile Organic Compounds											
P	1,2-Dibromoethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	-
S	1,2-Dibromoethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	-
WS	1,2-Dibromoethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	1,2-Dichlorobenzene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,2-Dichlorobenzene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,2-Dichlorobenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,2-Dichloroethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,2-Dichloroethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,2-Dichloroethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,2-Dichloropropane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,2-Dichloropropane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,2-Dichloropropane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,3,5-Trimethylbenzene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	1,3,5-Trimethylbenzene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	1,3,5-Trimethylbenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	1,3-Dichlorobenzene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,3-Dichlorobenzene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,3-Dichlorobenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,3-Dichloropropane	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	0.05
S	1,3-Dichloropropane	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	0.05
WS	1,3-Dichloropropane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	1,3-Dichloropropene (cis & trans)	mg/kg	10	0.042	10	0.04	0	0.04	0.04	0.04	5
S	1,3-Dichloropropene (cis & trans)	mg/kg	5	0.042	5	0.04	0	0.04	0.04	0.04	5
P	1,4-Dichlorobenzene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	1,4-Dichlorobenzene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	1,4-Dichlorobenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	2,2-Dichloropropane	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	2,2-Dichloropropane	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	2,2-Dichloropropane	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	2-Chlorotoluene	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	2-Chlorotoluene	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	2-Chlorotoluene	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	2-Hexanone (Methyl butyl ketone)	mg/kg	14	0.5	14	0.5	0	0.5	0.5	0.5	-
S	2-Hexanone (Methyl butyl ketone)	mg/kg	3	0.5	3	0.5	0	0.5	0.5	0.5	-
WS	2-Hexanone (Methyl butyl ketone)	mg/kg	1	0.5	1	0.5	NA	0.5	0.5	0.5	-
P	4-Chlorotoluene	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	4-Chlorotoluene	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	4-Chlorotoluene	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	4-Isopropyltoluene	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	4-Isopropyltoluene	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	4-Isopropyltoluene	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	Acetone	mg/kg	24	0.5	24	0.5	0	0.5	0.5	0.5	0.5
S	Acetone	mg/kg	8	0.5	8	0.5	0	0.5	0.5	0.5	0.5
WS	Acetone	mg/kg	1	0.5	1	0.5	NA	0.5	0.5	0.5	0.5
P	Benzene	mg/kg	24	0.0068,0.005	24	0.01	0.00	0.01	0.01	0.01	0.02
S	Benzene	mg/kg	8	0.0068,0.005	8	0.01	0.00	0.01	0.01	0.01	0.02
WS	Benzene	mg/kg	2	0.005,0.02	2	0.01	0.01	0.01	0.01	0.02	0.02
P	Bromobenzene	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	Bromobenzene	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Volatile Organic Compounds											
WS	Bromobenzene	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	Bromochloromethane	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	Bromochloromethane	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	Bromochloromethane	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	Bromodichloromethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Bromodichloromethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Bromodichloromethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Bromoform	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Bromoform	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Bromoform	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Bromomethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Bromomethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Bromomethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Carbon disulfide	mg/kg	14	0.25	14	0.25	0	0.25	0.25	0.25	-
S	Carbon disulfide	mg/kg	3	0.25	3	0.25	0	0.25	0.25	0.25	-
WS	Carbon disulfide	mg/kg	1	0.25	1	0.25	NA	0.25	0.25	0.25	-
P	Carbon tetrachloride	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Carbon tetrachloride	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Carbon tetrachloride	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Chlorobenzene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Chlorobenzene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Chlorobenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Chloroethane	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	Chloroethane	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	Chloroethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	Chloroform	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Chloroform	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Chloroform	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Chloromethane	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	Chloromethane	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	Chloromethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	cis-1,2-Dichloroethylene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	cis-1,2-Dichloroethylene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	cis-1,2-Dichloroethylene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	cis-1,3-Dichloropropene	mg/kg	24	0.03,0.05	24	0.04	0.01	0.03	0.05	0.05	0.05
S	cis-1,3-Dichloropropene	mg/kg	8	0.03,0.05	8	0.04	0.01	0.03	0.03	0.05	0.05
WS	cis-1,3-Dichloropropene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Dibromochloromethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Dibromochloromethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Dibromochloromethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Dibromomethane	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	Dibromomethane	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	Dibromomethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	Dichlorodifluoromethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Dichlorodifluoromethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Dichlorodifluoromethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Dichloromethane	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	Dichloromethane	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	Dichloromethane	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Volatile Organic Compounds											
P	Ethylbenzene	mg/kg	24	0.018,0.015	24	0.02	0.00	0.02	0.02	0.02	0.05
S	Ethylbenzene	mg/kg	8	0.018,0.015	8	0.02	0.00	0.02	0.02	0.02	0.05
WS	Ethylbenzene	mg/kg	2	0.015,0.05	2	0.03	0.02	0.02	0.03	0.05	0.05
P	Hexachlorobutadiene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	0.01
S	Hexachlorobutadiene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	0.01
WS	Hexachlorobutadiene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.01
P	Hexane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Hexane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Hexane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Isopropylbenzene	mg/kg	14	0.1	14	0.1	0	0.1	0.1	0.1	-
S	Isopropylbenzene	mg/kg	3	0.1	3	0.1	0	0.1	0.1	0.1	-
WS	Isopropylbenzene	mg/kg	1	0.1	1	0.1	NA	0.1	0.1	0.1	-
P	m+p-Xylenes	mg/kg	24	0.03,0.05	24	0.04	0.01	0.03	0.05	0.05	0.05
S	m+p-Xylenes	mg/kg	8	0.03,0.05	8	0.04	0.01	0.03	0.03	0.05	0.05
WS	m+p-Xylenes	mg/kg	2	0.05,0.1	2	0.08	0.04	0.05	0.08	0.10	0.05
P	Methyl Ethyl Ketone	mg/kg	24	0.5	24	0.5	0	0.5	0.5	0.5	0.5
S	Methyl Ethyl Ketone	mg/kg	8	0.5	8	0.5	0	0.5	0.5	0.5	0.5
WS	Methyl Ethyl Ketone	mg/kg	1	0.5	1	0.5	NA	0.5	0.5	0.5	0.5
P	Methyl Isobutyl Ketone	mg/kg	24	0.5	24	0.5	0	0.5	0.5	0.5	0.5
S	Methyl Isobutyl Ketone	mg/kg	8	0.5	8	0.5	0	0.5	0.5	0.5	0.5
WS	Methyl Isobutyl Ketone	mg/kg	1	0.5	1	0.5	NA	0.5	0.5	0.5	0.5
P	Methylene Chloride	mg/kg	10	0.05	10	0.05	0	0.05	0.05	0.05	0.05
S	Methylene Chloride	mg/kg	5	0.05	5	0.05	0	0.05	0.05	0.05	0.05
P	MTBE	mg/kg	24	0.05,0.2	24	0.14	0.08	0.05	0.2	0.2	0.05
S	MTBE	mg/kg	8	0.05,0.2	8	0.11	0.08	0.05	0.2	0.2	0.05
WS	MTBE	mg/kg	1	0.2	1	0.2	NA	0.2	0.2	0.2	0.05
P	n-Butylbenzene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	n-Butylbenzene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	n-Butylbenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	o-Xylene	mg/kg	24	0.02,0.05	24	0.04	0.02	0.02	0.05	0.05	0.05
S	o-Xylene	mg/kg	8	0.02,0.05	8	0.03	0.02	0.02	0.02	0.05	0.05
WS	o-Xylene	mg/kg	2	0.05,0.1	2	0.08	0.04	0.05	0.08	0.10	0.05
P	sec-Butylbenzene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	sec-Butylbenzene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	sec-Butylbenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	Styrene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Styrene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Styrene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	tert-Butylbenzene	mg/kg	14	0.05	14	0.05	0	0.05	0.05	0.05	-
S	tert-Butylbenzene	mg/kg	3	0.05	3	0.05	0	0.05	0.05	0.05	-
WS	tert-Butylbenzene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	-
P	Tetrachloroethylene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Tetrachloroethylene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Tetrachloroethylene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Toluene	mg/kg	24	0.08,0.05	24	0.06	0.02	0.05	0.05	0.08	0.2
S	Toluene	mg/kg	8	0.08,0.05	8	0.07	0.02	0.05	0.08	0.08	0.2
WS	Toluene	mg/kg	2	0.05,0.1	2	0.08	0.04	0.05	0.08	0.10	0.2
P	trans-1,2-Dichloroethylene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	trans-1,2-Dichloroethylene	mg/kg	7	0.05	8	0.05	0	0.05	0.05	0.05	0.05

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Volatile Organic Compounds											
WS	trans-1,2-Dichloroethylene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	trans-1,3-Dichloropropene	mg/kg	24	0.03,0.05	24	0.04	0.01	0.03	0.05	0.05	0.05
S	trans-1,3-Dichloropropene	mg/kg	8	0.03,0.05	8	0.04	0.01	0.03	0.03	0.05	0.05
WS	trans-1,3-Dichloropropene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.05
P	Trichloroethylene	mg/kg	24	0.01	24	0.01	0	0.01	0.01	0.01	0.05
S	Trichloroethylene	mg/kg	8	0.01	8	0.01	0	0.01	0.01	0.01	0.05
WS	Trichloroethylene	mg/kg	1	0.01	1	0.01	NA	0.01	0.01	0.01	0.05
P	Trichlorofluoromethane	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.25
S	Trichlorofluoromethane	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.25
WS	Trichlorofluoromethane	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.25
P	Vinyl chloride	mg/kg	24	0.02,0.05	24	0.04	0.02	0.02	0.05	0.05	0.02
S	Vinyl chloride	mg/kg	8	0.02,0.05	8	0.03	0.02	0.02	0.02	0.05	0.02
WS	Vinyl chloride	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.02
P	Xylenes (Total)	mg/kg	24	0.05,0.071	24	0.06	0.01	0.05	0.07	0.07	0.05
S	Xylenes (Total)	mg/kg	8	0.05,0.071	8	0.06	0.01	0.05	0.05	0.07	0.05
WS	Xylenes (Total)	mg/kg	2	0.071,0.14	2	0.11	0.05	0.07	0.11	0.14	0.05
Hydrocarbons											
P	F1 (C6-C10)	mg/kg	24	5,10	24	7.92	2.52	5	10	10	25
S	F1 (C6-C10)	mg/kg	8	5,10	8	6.88	2.59	5	5	10	25
WS	F1 (C6-C10)	mg/kg	2	10,20	2	15	7.07	10.5	15	19.5	25
P	F1-BTEX	mg/kg	24	5,10	24	7.92	2.52	5	10	10	25
S	F1-BTEX	mg/kg	8	5,10	8	6.88	2.59	5	5	10	25
WS	F1-BTEX	mg/kg	2	10,20	2	15	7.07	10.5	15	19.5	25
P	F2 (C10-C16)	mg/kg	24	10,25	24	18.8	7.55	10	25	25	10
S	F2 (C10-C16)	mg/kg	8	10,25	8	15.6	7.76	10	10	25	10
WS	F2 (C10-C16)	mg/kg	8	25,175,125	6	118	57.3	38.3	125	175	10
P	F2-Naphth	mg/kg	24	10,25	24	18.8	7.55	10	25	25	-
S	F2-Naphth	mg/kg	8	10,25	8	15.6	7.76	10	10	25	-
WS	F2-Naphth	mg/kg	5	25,180	4	125.6	75.7	32.6	180	180	-
P	F3 (C16-C34)	mg/kg	24	50	24	50	0	50	50	50	240
S	F3 (C16-C34)	mg/kg	8	50	8	50	0	50	50	50	240
WS	F3 (C16-C34)	mg/kg	8	50,350,250	1	1006	490	302	1105	1593.5	240
P	F3-PAH	mg/kg	24	50	24	50	0	50	50	50	-
S	F3-PAH	mg/kg	8	50	8	50	0	50	50	50	-
WS	F3-PAH	mg/kg	5	50,350	1	886	511	194	1130	1300	-
P	F4 (C34-C50)	mg/kg	24	50	24	50	0	50	50	50	120
S	F4 (C34-C50)	mg/kg	8	50	8	50	0	50	50	50	120
WS	F4 (C34-C50)	mg/kg	8	50,350,250	1	690	332	207.5	705	1074.5	120
P	Total Hydrocarbons (C6-C50)	mg/kg	24	72,76	24	74.3	2.01	72	76	76	-
S	Total Hydrocarbons (C6-C50)	mg/kg	8	72,76	8	73.5	2.07	72	76	76	-
WS	Total Hydrocarbons (C6-C50)	mg/kg	2	76,78	1	1078	1417	176.2	1078	1979.8	-
Semi-Volatile Organics											
P	1,2,4-Trichlorobenzene	mg/kg	38	0.05	38	0.05	0	0.05	0.05	0.05	0.05
S	1,2,4-Trichlorobenzene	mg/kg	11	0.05	11	0.05	0	0.05	0.05	0.05	0.05
WS	1,2,4-Trichlorobenzene	mg/kg	9	0.375,0.05,0.25	9	0.29	0.14	0.05	0.38	0.38	0.05
P	1+2-Methylnaphthalenes	mg/kg	24	0.0424	24	0.04	0	0.04	0.04	0.04	-
S	1+2-Methylnaphthalenes	mg/kg	8	0.0424	8	0.04	0	0.04	0.04	0.04	-
WS	1+2-Methylnaphthalenes	mg/kg	8	0.318,0.0424,0.212	8	0.27	0.10	0.10	0.32	0.32	-
P	1-Methylnaphthalene	mg/kg	24	0.03	24	0.03	0	0.03	0.03	0.03	0.59

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Semi-Volatile Organics											
S	1-Methylnaphthalene	mg/kg	8	0.03	8	0.03	0	0.03	0.03	0.03	0.59
WS	1-Methylnaphthalene	mg/kg	8	0.225,0.03,0.15	8	0.19	0.07	0.07	0.23	0.23	0.59
P	2,4,5-Trichlorophenol	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.1
S	2,4,5-Trichlorophenol	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.1
WS	2,4,5-Trichlorophenol	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.1
P	2,4,6-Trichlorophenol	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.1
S	2,4,6-Trichlorophenol	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.1
WS	2,4,6-Trichlorophenol	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.1
P	2,4+2,6-Dinitrotoluene	mg/kg	24	0.141	24	0.14	0	0.14	0.14	0.14	0.5
S	2,4+2,6-Dinitrotoluene	mg/kg	8	0.141	8	0.14	0	0.14	0.14	0.14	0.5
WS	2,4+2,6-Dinitrotoluene	mg/kg	8	1.06,0.141,0.707	8	0.90	0.33	0.34	1.06	1.06	0.5
P	2,4-Dichlorophenol	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.1
S	2,4-Dichlorophenol	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.1
WS	2,4-Dichlorophenol	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.1
P	2,4-Dimethylphenol	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.2
S	2,4-Dimethylphenol	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.2
WS	2,4-Dimethylphenol	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.2
P	2,4-Dinitrophenol	mg/kg	24	1	24	1	0	1	1	1	2
S	2,4-Dinitrophenol	mg/kg	8	1	8	1	0	1	1	1	2
WS	2,4-Dinitrophenol	mg/kg	8	7.5,1,5	8	6.38	2.34	2.4	7.5	7.5	2
P	2,4-Dinitrotoluene	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	2,4-Dinitrotoluene	mg/kg	8	0.1	8	0.1	0	0.1	0.10	0.1	0.5
WS	2,4-Dinitrotoluene	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.5
P	2,6-Dinitrotoluene	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	2,6-Dinitrotoluene	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	2,6-Dinitrotoluene	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.5
P	2-Chlorophenol	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.1
S	2-Chlorophenol	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.1
WS	2-Chlorophenol	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.1
P	2-Methylnaphthalene	mg/kg	24	0.03	24	0.03	0	0.03	0.03	0.03	0.59
S	2-Methylnaphthalene	mg/kg	8	0.03	8	0.03	0	0.03	0.03	0.03	0.59
WS	2-Methylnaphthalene	mg/kg	8	0.225,0.03,0.15	8	0.19	0.07	0.07	0.23	0.23	0.59
P	3,3'-Dichlorobenzidine	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	1
S	3,3'-Dichlorobenzidine	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	1
WS	3,3'-Dichlorobenzidine	mg/kg	7	7.5,0.1,0.75,0.5	7	1.59	2.62	0.22	0.75	5.48	1
P	4-Chloroaniline	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	4-Chloroaniline	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	4-Chloroaniline	mg/kg	7	7.5,0.1,0.75,0.5	7	1.59	2.62	0.22	0.75	5.48	0.5
P	Acenaphthene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.072
S	Acenaphthene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.072
WS	Acenaphthene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.072
P	Acenaphthylene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.093
S	Acenaphthylene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.093
WS	Acenaphthylene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.093
P	Anthracene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.16
S	Anthracene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.16
WS	Anthracene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.16
P	Benzo(a)anthracene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.36
S	Benzo(a)anthracene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.36

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Semi-Volatile Organics											
WS	Benzo(a)anthracene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.36
P	Benzo(a)pyrene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.3
S	Benzo(a)pyrene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.3
WS	Benzo(a)pyrene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.3
P	Benzo(b)fluoranthene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.47
S	Benzo(b)fluoranthene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.47
WS	Benzo(b)fluoranthene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.47
P	Benzo(ghi)perylene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.68
S	Benzo(ghi)perylene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.68
WS	Benzo(ghi)perylene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.68
P	Benzo(k)fluoranthene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.48
S	Benzo(k)fluoranthene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.48
WS	Benzo(k)fluoranthene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.48
P	Biphenyl	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.05
S	Biphenyl	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.05
WS	Biphenyl	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.375	0.375	0.05
P	Bis(2-chloroethyl)ether	mg/kg	24	0.1,0.2	24	0.10	0.02	0.1	0.1	0.1	0.5
S	Bis(2-chloroethyl)ether	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	Bis(2-chloroethyl)ether	mg/kg	8	0.75,0.1,0.5,1.5	8	0.73	0.39	0.24	0.75	1.24	0.5
P	Bis(2-chloroisopropyl)ether	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	Bis(2-chloroisopropyl)ether	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	Bis(2-chloroisopropyl)ether	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.5
P	Bis(2-ethylhexyl)phthalate	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	5
S	Bis(2-ethylhexyl)phthalate	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	5
WS	Bis(2-ethylhexyl)phthalate	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	5
P	Chrysene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	2.8
S	Chrysene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	2.8
WS	Chrysene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	2.8
S	Dibenzo(a,h)anthracene	mg/kg	1	0.05	1	0.05	NA	0.05	0.05	0.05	0.1
P	Dibenzo(a,h)anthracene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.1
S	Dibenzo(a,h)anthracene	mg/kg	7	0.05	7	0.05	0	0.05	0.05	0.05	0.1
WS	Dibenzo(a,h)anthracene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.1
P	Diethylphthalate	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	Diethylphthalate	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	Diethylphthalate	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.5
P	Dimethylphthalate	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.5
S	Dimethylphthalate	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.5
WS	Dimethylphthalate	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.5
P	Fluoranthene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.56
S	Fluoranthene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.56
WS	Fluoranthene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.56
P	Fluorene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.12
S	Fluorene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.12
WS	Fluorene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.12
P	Indeno(1,2,3-cd)pyrene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.23
S	Indeno(1,2,3-cd)pyrene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.23
WS	Indeno(1,2,3-cd)pyrene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.23
P	Naphthalene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.09
S	Naphthalene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.09

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Semi-Volatile Organics											
WS	Naphthalene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.09
P	Pentachlorophenol	mg/kg	24	0.1	24	0.1	0	0.1	0.1	0.1	0.1
S	Pentachlorophenol	mg/kg	8	0.1	8	0.1	0	0.1	0.1	0.1	0.1
WS	Pentachlorophenol	mg/kg	8	0.75,0.1,0.5	8	0.64	0.23	0.24	0.75	0.75	0.1
P	Phenanthrene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	0.69
S	Phenanthrene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	0.69
WS	Phenanthrene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	0.69
P	Phenol	mg/kg	24	0.1	23	0.17	0.34	0.1	0.1	0.1	0.5
S	Phenol	mg/kg	8	0.1	5	0.34	0.50	0.1	0.1	1.20	0.5
WS	Phenol	mg/kg	8	0.75,0.1,0.5	7	0.73	0.10	0.59	0.75	0.82	0.5
P	Pyrene	mg/kg	24	0.05	24	0.05	0	0.05	0.05	0.05	1
S	Pyrene	mg/kg	8	0.05	8	0.05	0	0.05	0.05	0.05	1
WS	Pyrene	mg/kg	8	0.375,0.05,0.25	8	0.32	0.12	0.12	0.38	0.38	1
Herbicides											
P	AMPA	mg/kg	24	1	24	1	0	1	1	1	-
S	AMPA	mg/kg	8	1	8	1	0	1	1	1	-
WS	AMPA	mg/kg	8	1	8	1	0	1	1	1	-
Pesticides											
P	Glyphosate	mg/kg	24	1	24	1	0	1	1	1	-
S	Glyphosate	mg/kg	8	1	8	1	0	1	1	1	-
WS	Glyphosate	mg/kg	8	2,1	8	1.13	0.35	1	1	1.65	-
Radiological Parameters (Misc.)											
P	Am-241	Bq/kg	10	54,110,52,140,120,56,46,53	10	82.3	39.9	48.7	55	140	-
S	Am-241	Bq/kg	5	57,76,110,42,120	5	81	33.5	45	76	118	-
P	C-14	Bq/kg	10	460,180,190,110,440,430	10	337	150	141.5	435	460	-
S	C-14	Bq/kg	5	170,460,180,110,550	5	294	197	122	180	532	-
P	Chlorine 36	Bq/kg	10	99,80,85,86,74,79,94,160,96,110	10	96.3	24.8	76.25	90	137.5	-
S	Chlorine 36	Bq/kg	5	110,84,82,100	5	97.2	13.6	82.4	100	110	-
P	Co-60	Bq/kg	10	16,18,15,12,9,14,9,8,8,4	10	13.8	3.81	8.67	14.5	18	-
S	Co-60	Bq/kg	5	10,11,8,8,8,5	5	9.86	1.18	8.56	10	11	-
P	Cs-137	Bq/kg	10	12,11,13,8,1,5,6,9,5,10	10	10.5	2.32	6.73	11	13	-
S	Cs-137	Bq/kg	5	8,9,10,9,5,8,7,8,2	5	9.06	0.70	8.3	8.9	9.9	-
P	Gross Alpha	Bq/kg	10	43,41,42,45,46,49,39,26	0	91.4	21.0	63.6	90	120	-
S	Gross Alpha	Bq/kg	5	43,45,40,27,38	0	84.4	34.7	46.2	74	120	-
P	Gross Beta	Bq/kg	10	54,56,58,57,53,69,38	6	60.6	11.8	45.2	57	75.85	-
S	Gross Beta	Bq/kg	5	55,58,37,54	2	59.6	16.5	40.6	60	79	-
P	H-3	Bq/kg	10	3,1,2,7,3,4,2,9,3,2,5,2,7,6,	10	4.18	1.96	2.79	3.15	7.66	-
S	H-3	Bq/kg	5	7,4,3,2,8,5,5,9	5	4.82	1.95	2.84	5	7.1	-
P	Iodine 129	Bq/kg	9	170,220,240,280,300,160,120,130	9	222	69.1	124	240	292	-
S	Iodine 129	Bq/kg	5	160,220,180,170,150	5	176	27.0	152	170	212	-
P	Neptunium 237	Bq/kg	10	1.3,1.7,1.2,1,0.96,1.4,1.6,0.82,0.48	10	1.18	0.37	0.63	1.25	1.66	-
S	Neptunium 237	Bq/kg	5	0.95,0.99,1.1,1.8,0.53	5	1.07	0.46	0.61	0.99	1.66	-
P	Pu-238	Bq/kg	10	0.46,0.47,0.52,0.58,0.65,0.17,0.67,0.72,0.69,0.28	9	0.53	0.17	0.28	0.55	0.71	-
S	Pu-238	Bq/kg	5	0.73,0.4,0.66,0.71,0.53	5	0.61	0.14	0.43	0.66	0.73	-

APPENDIX E, TABLE 1
Summary of Year 1 Soil Results.

Habitat Type	Parameter	Units	n	DL	n<DL	Mean	SD	5th Percentile	Median	95th Percentile	Guideline
Radiological Parameters (Misc.)											
P	Pu-239	Bq/kg	10	0.74,0.19,0.17,0.47,0.18,0.42, 0.21,0.89,0.28	6	0.42	0.24	0.17	0.38	0.82	-
S	Pu-239	Bq/kg	5	0.19,0.4,0.53,0.7,0.66	4	0.54	0.14	0.40	0.53	0.69	-
P	Ru-106	Bq/kg	10	84,110,92,97,95,62,75,120	10	95.5	18.0	67.85	96	115.5	-
S	Ru-106	Bq/kg	5	72,75,96,82,91	5	83.2	10.2	72.6	82	95	-
P	Sr-90	Bq/kg	10	6.8,6.3,6.9,6.6,6.5,8.7,11	10	7.88	1.87	6.3	6.85	11.00	-
S	Sr-90	Bq/kg	5	4.6,6.5,6.6,9.1,11	4	67.7	135	4.98	6.6	250.2	-
Leach Parameters (Misc.)											
S	Calcium (Ca)-Leach	mg/L	24	0.5	NA	1.41	2.32	0.5	0.5	4.45	-
WS	Calcium (Ca)-Leach	mg/L	8	0.5	NA	0.88	0.72	0.5	0.62	2.02	-
WS	Calcium (Ca)-Leach	mg/L	8	0.5	NA	1.22	0.60	0.5	1.27	1.96	-
P	Magnesium (Mg)-Leach	mg/L	24	0.5	NA	0.69	0.68	0.5	0.5	1.81	-
S	Magnesium (Mg)-Leach	mg/L	8	0.5	NA	0.72	0.30	0.5	0.59	1.20	-
WS	Magnesium (Mg)-Leach	mg/L	8	0.5	NA	0.77	0.28	0.5	0.72	1.15	-
P	Sodium (Na)-Leach	mg/L	24	0.5	NA	1.42	0.61	0.92	1.29	2.68	-
S	Sodium (Na)-Leach	mg/L	8	0.5	NA	1.67	0.70	0.80	1.63	2.55	-
WS	Sodium (Na)-Leach	mg/L	8	0.5	NA	2.19	0.89	1.09	2.12	3.45	-

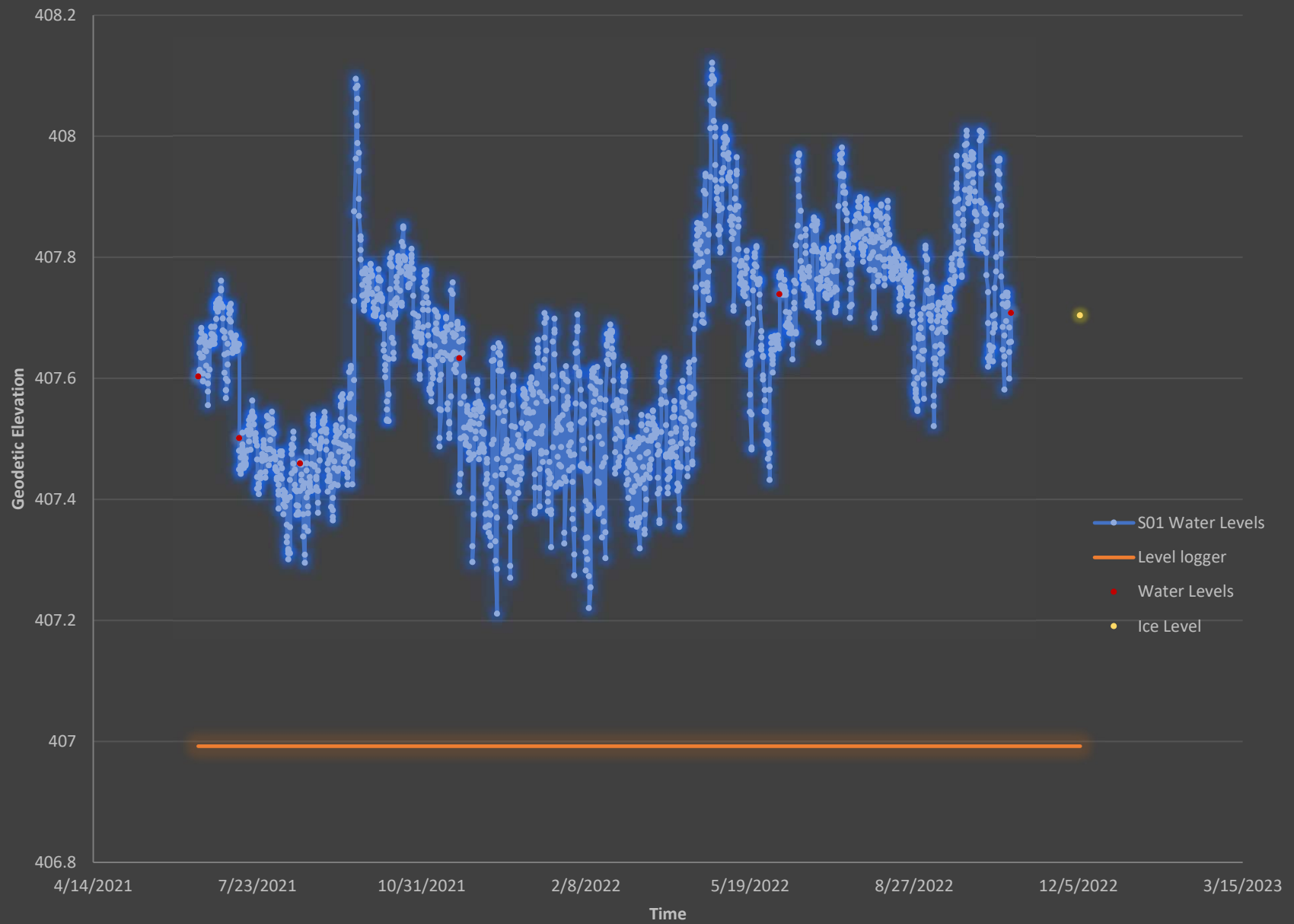
Note: Values in **bold** are above the selected guideline

APPENDIX F

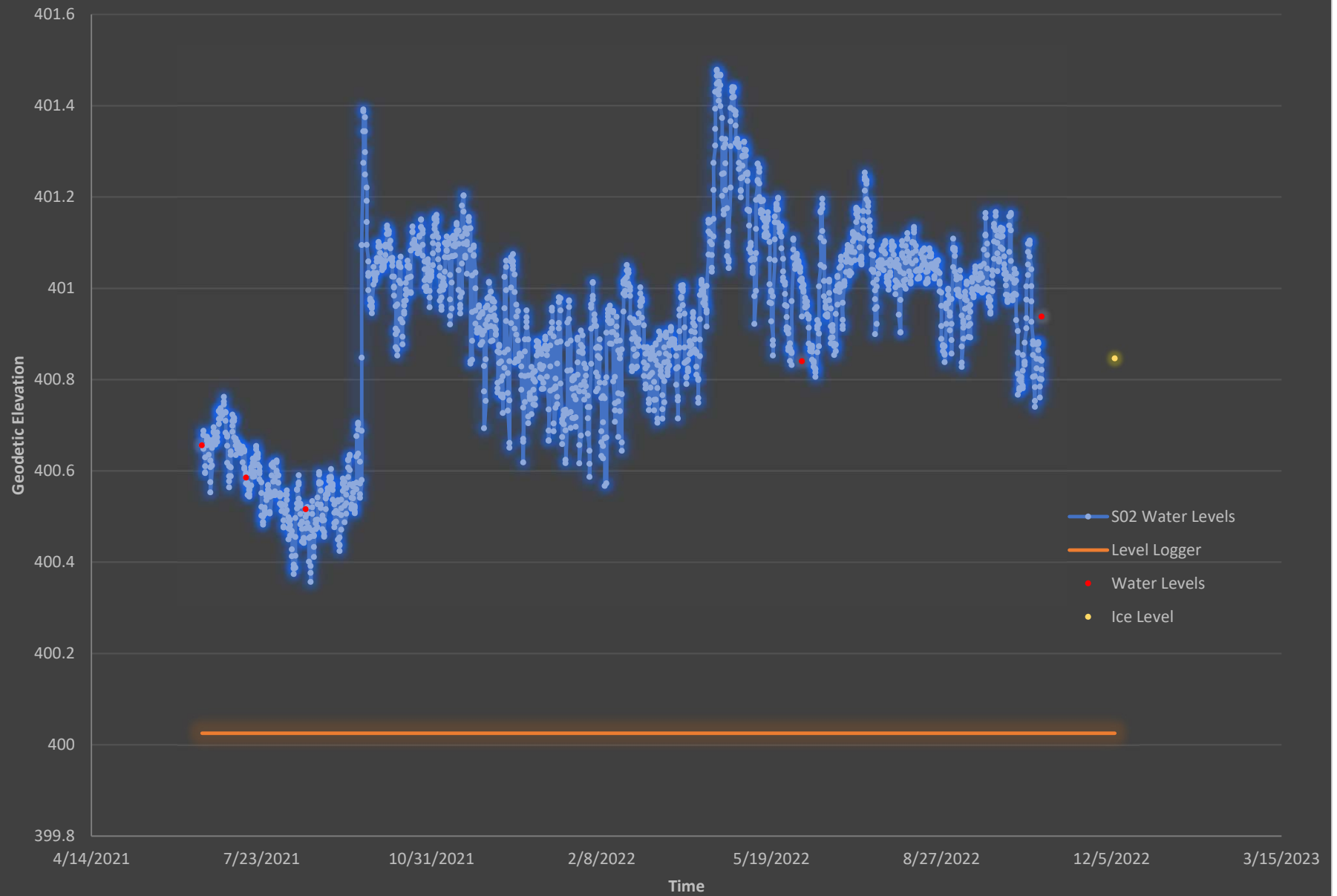
DATA FROM HYDROLOGY PROGRAM

APPENDIX F1
Water Level Logger Data

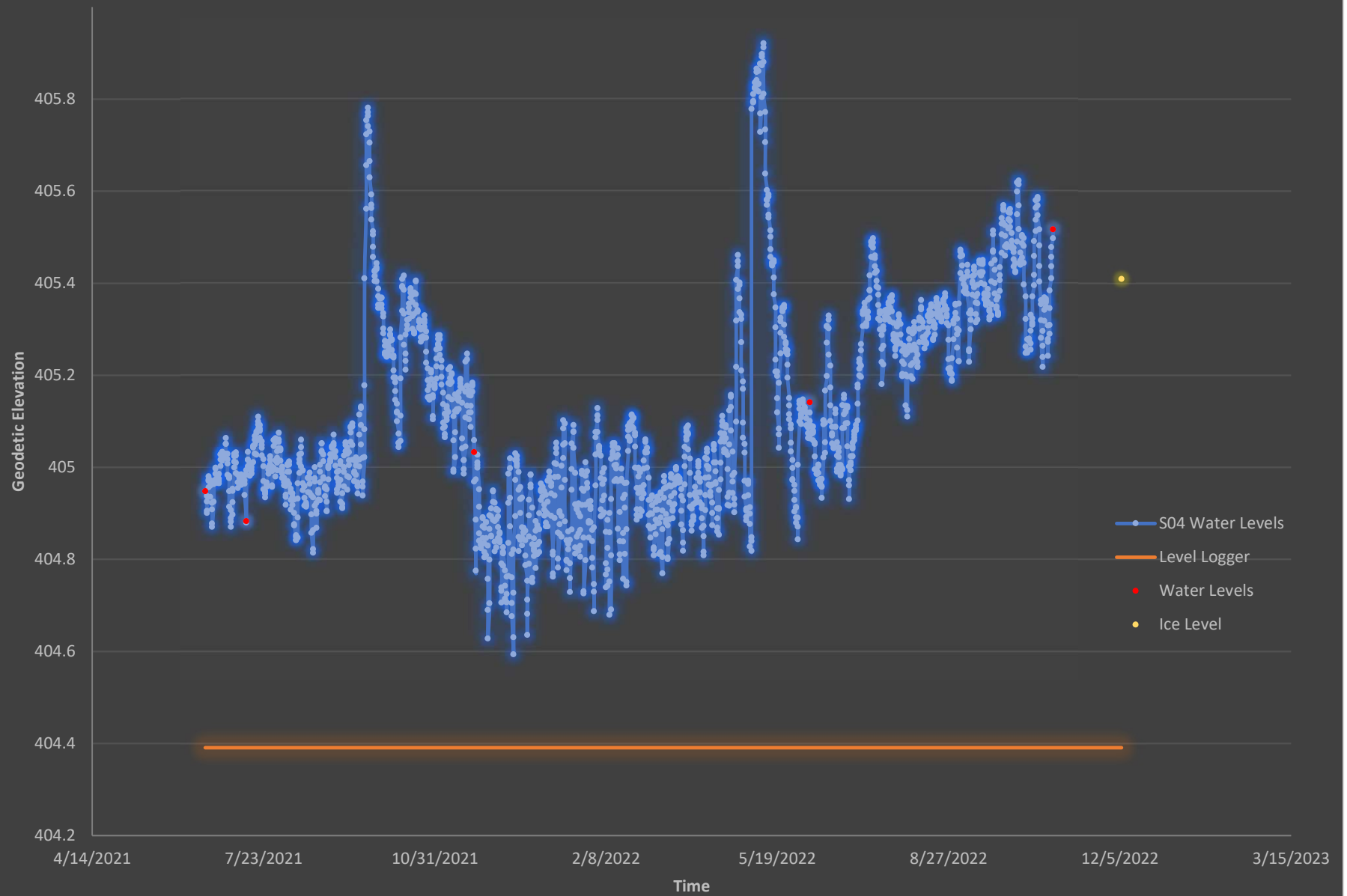
S01 Water Levels



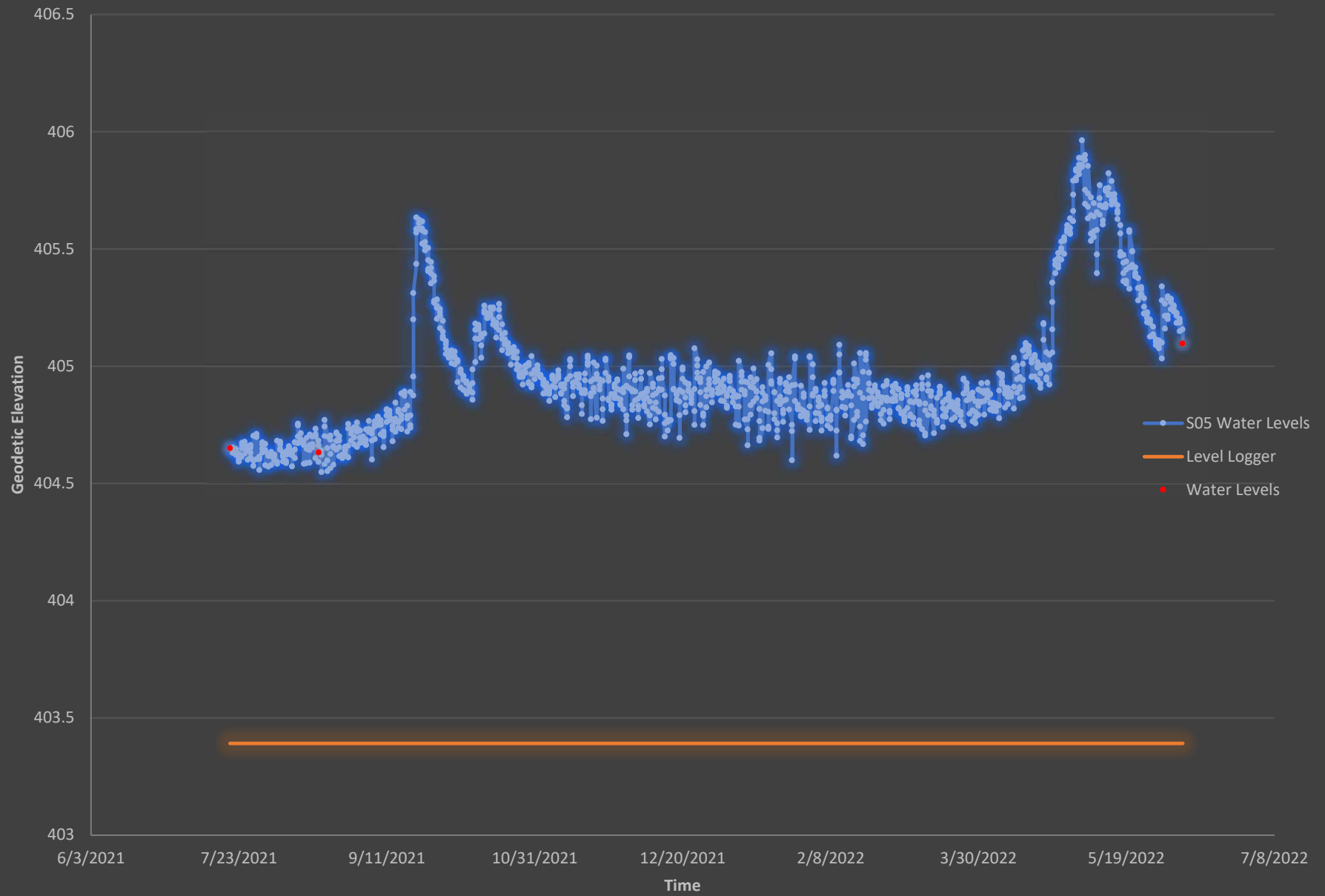
S02 Water Levels



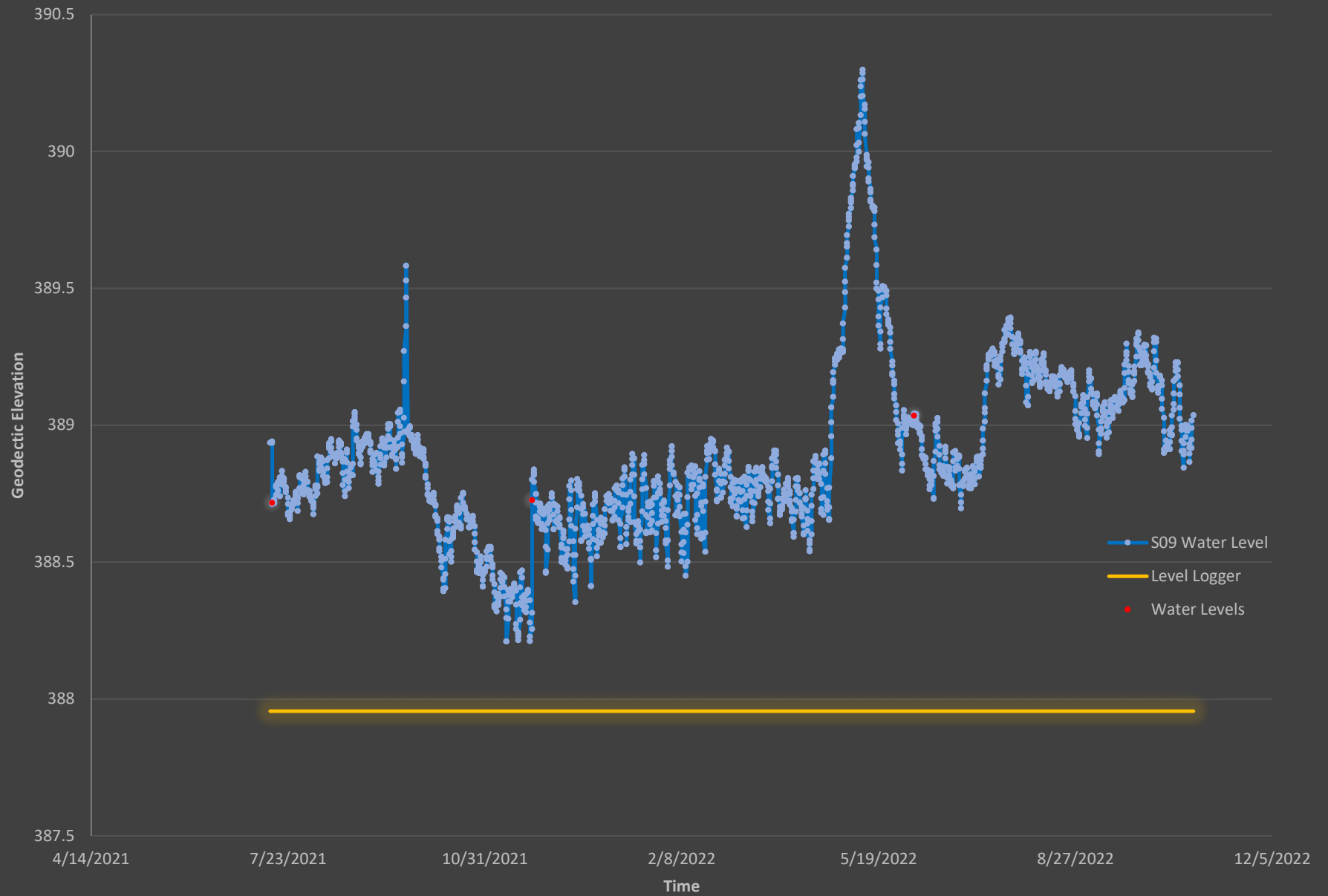
S04 Water Levels



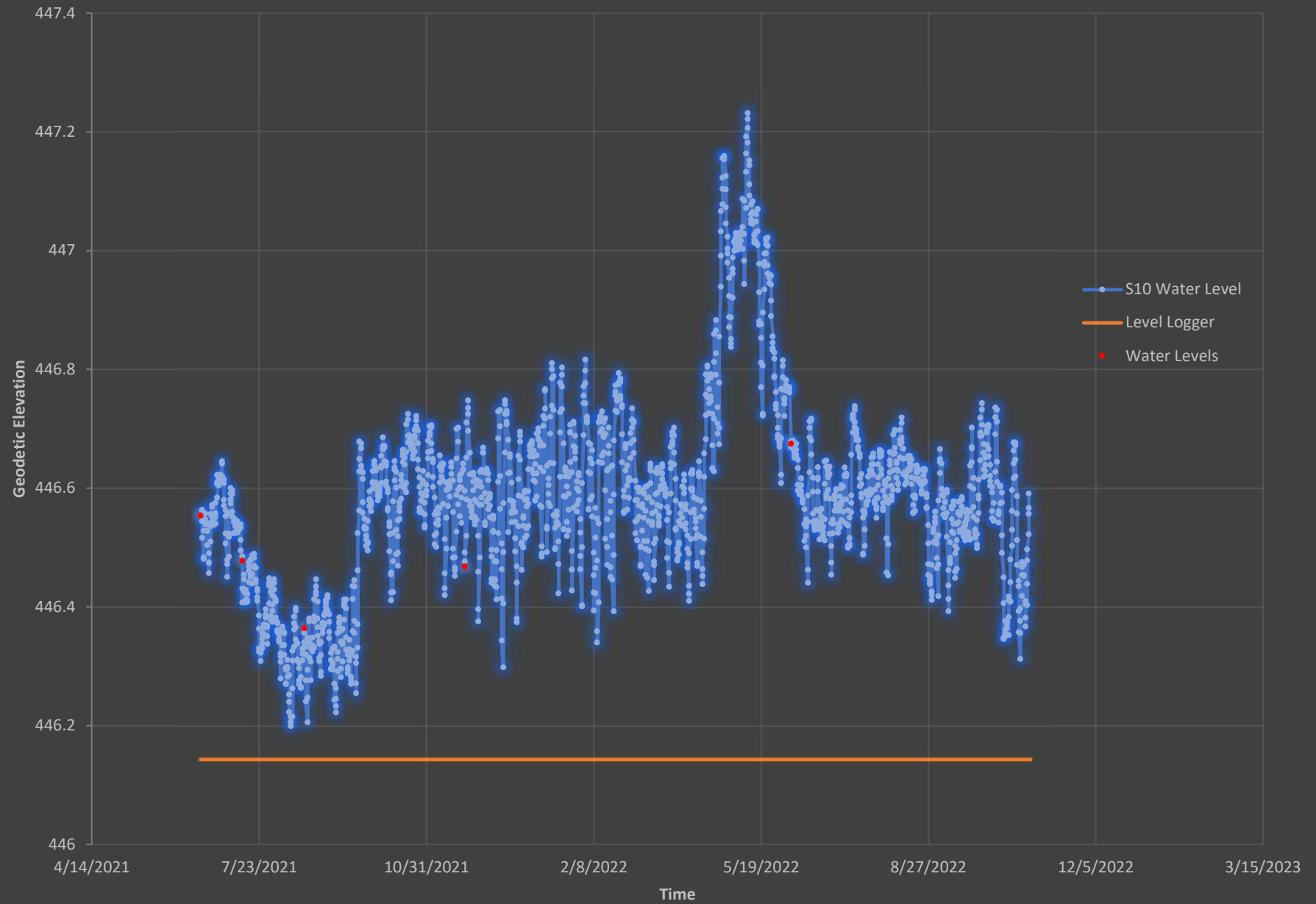
S05 Water Levels



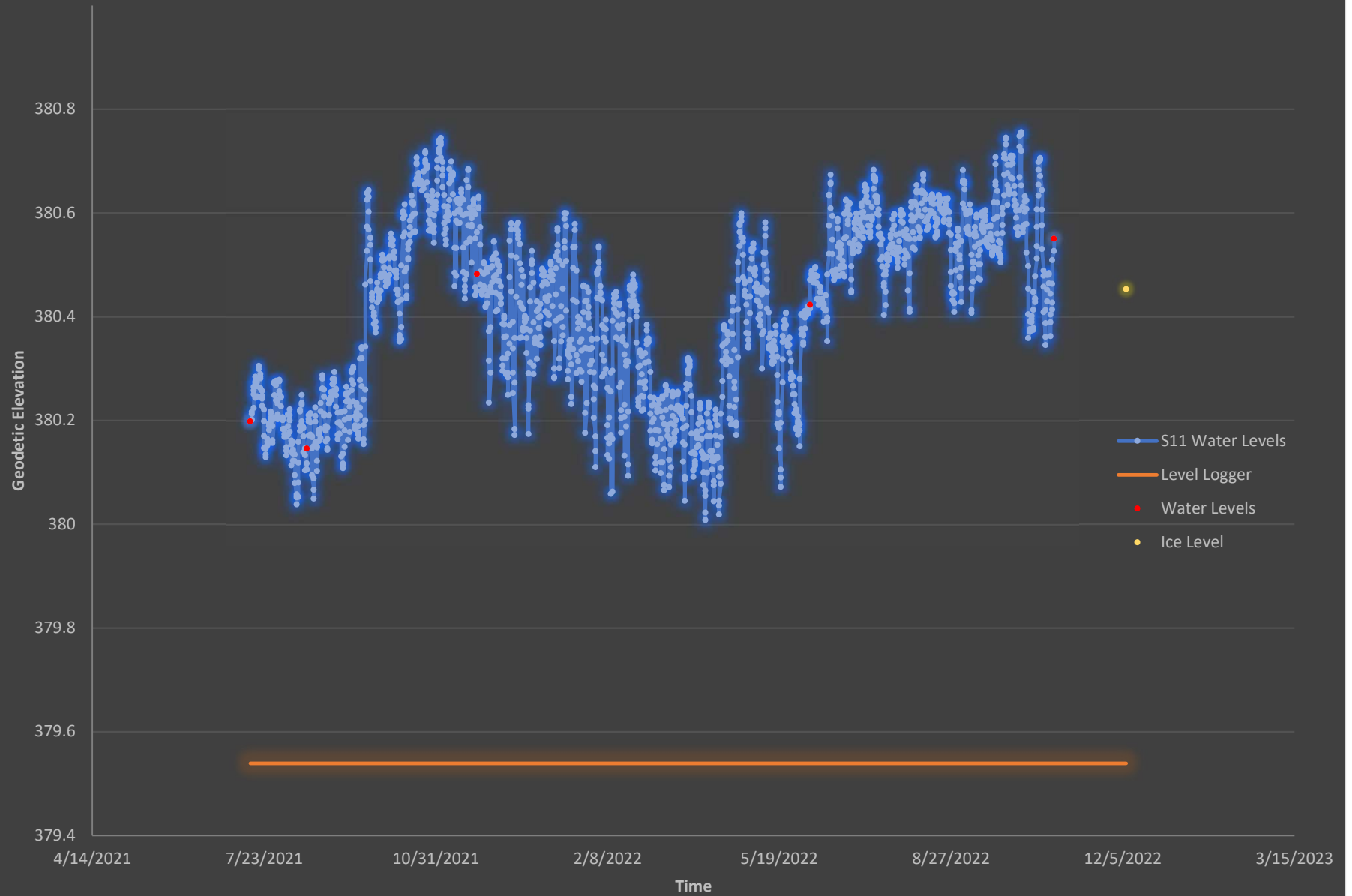
S09 Water Levels



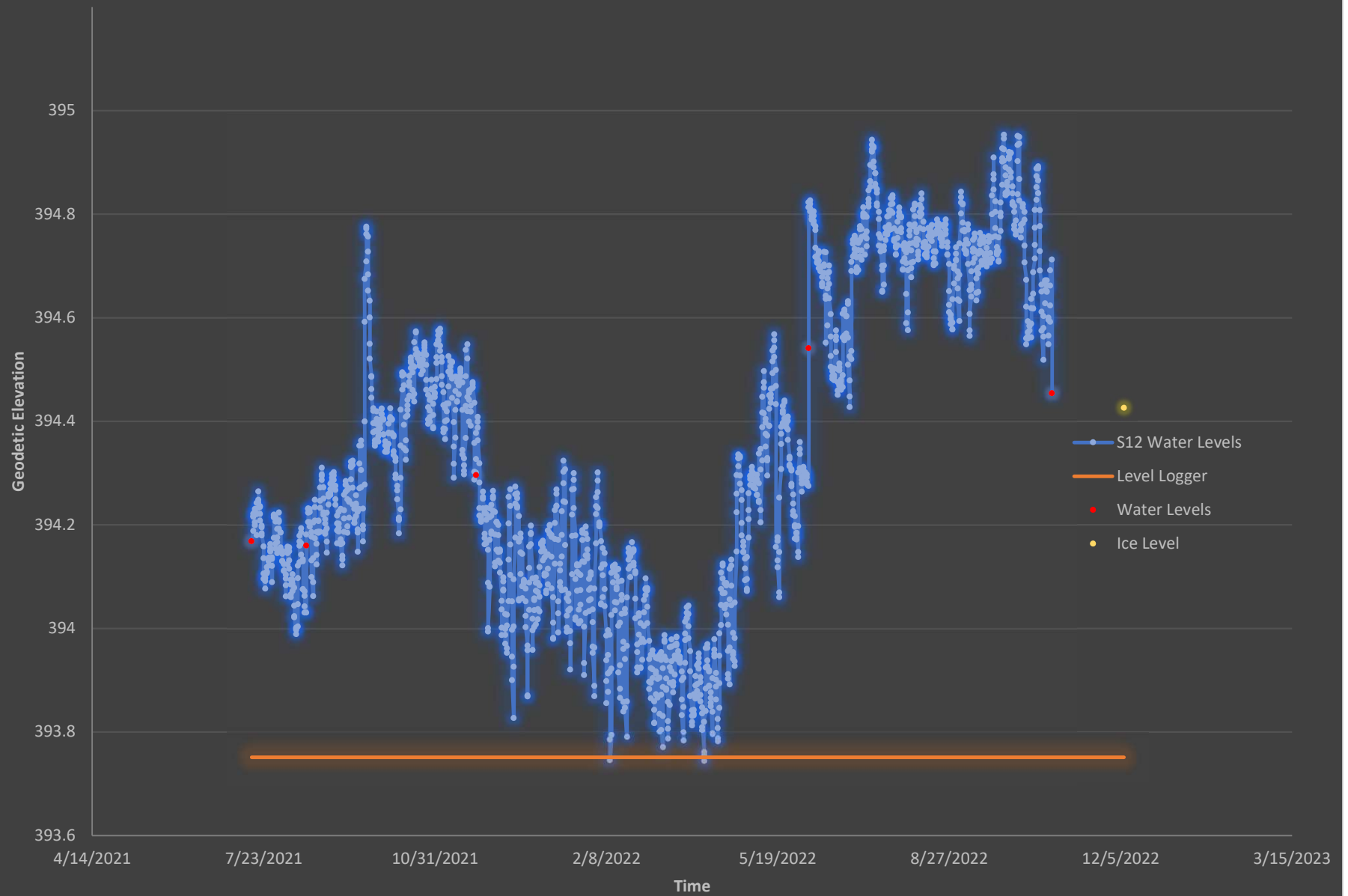
S10 Water Levels



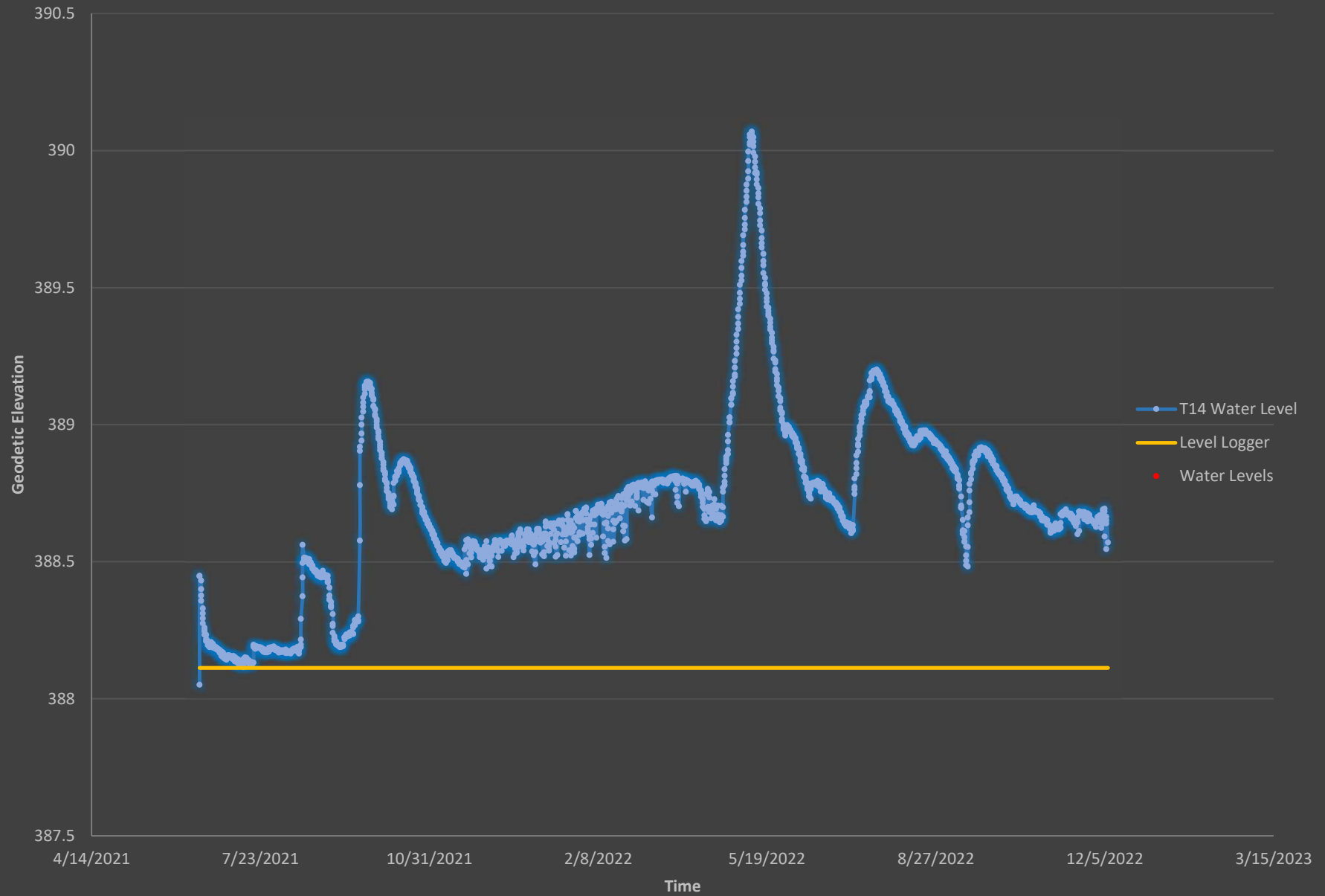
S11 Water Levels



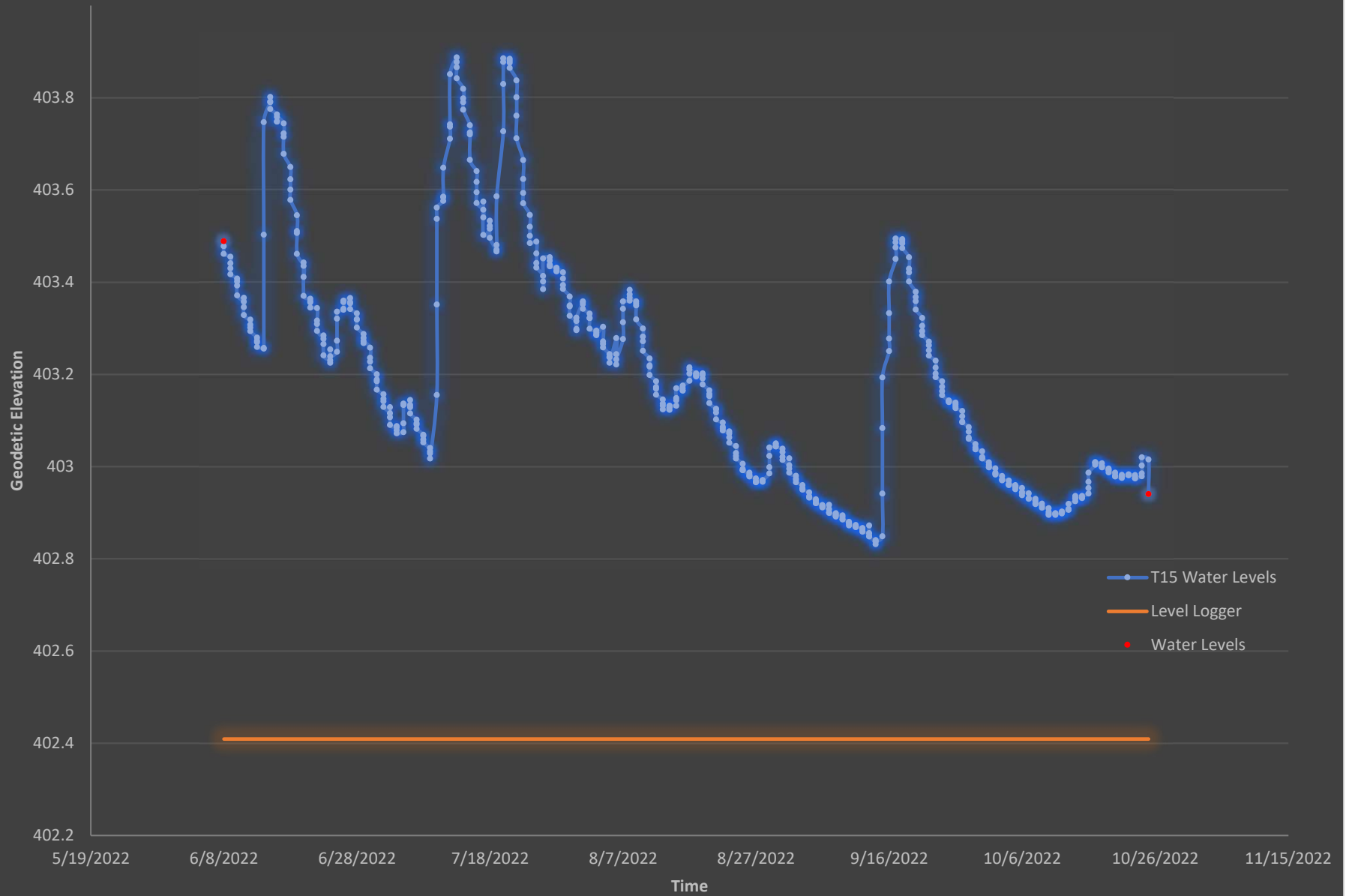
S12 Water Levels



T14 Water Levels



T15 Water Levels



APPENDIX F2
Discrete Flow Measurements

Flow Metering Data (cubic meters per second)

Date	FM14	FM15	FM16	FM17	FM18	FM19	FM20
21-Jun-21	0.04	0.43	0.008		0.006		
22-Jun-21						0.20	
14-Jul-21	~0	0.13					
13-Oct-21	3.33	2.62	Unsafe*	0.056	0.287		
14-Oct-21						2.02	0.48
28-Jun-22	N/A	1.53	0.071		0.020		
29-Jun-22						0.93	
08-Aug-22	N/A	1.65	0.013		0.021		
09-Aug-22						0.76	
02-Nov-22	N/A	0.43	0.013		0.074		
03-Nov-22						0.21	

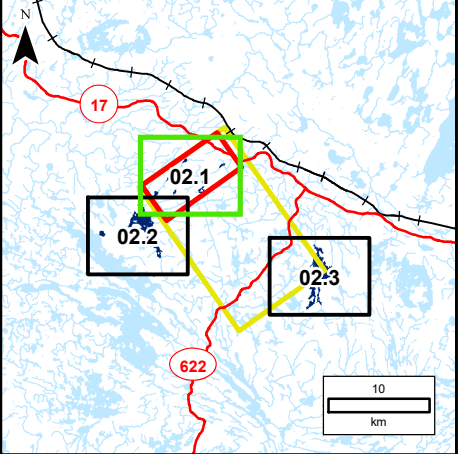
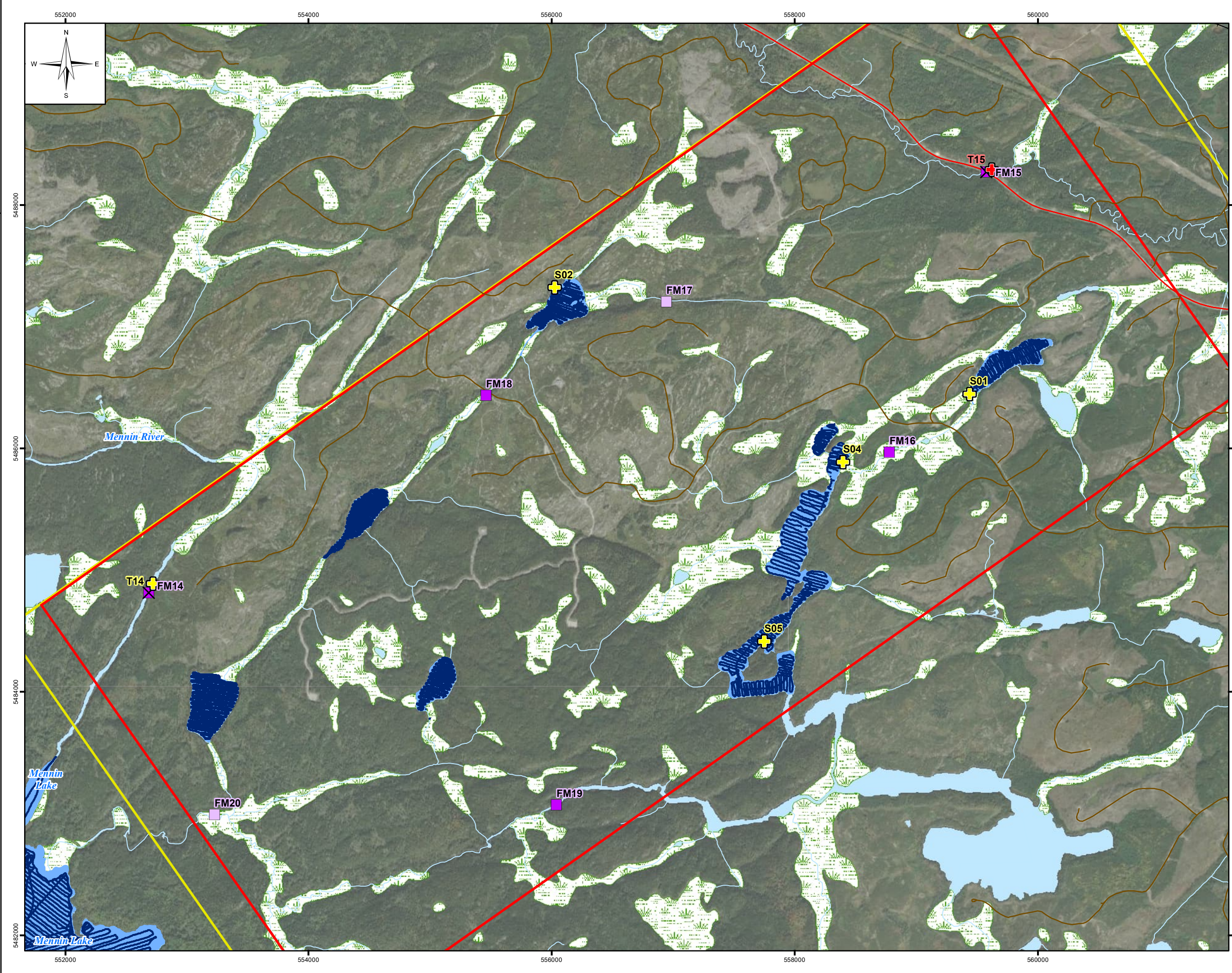
Note 1: ~0 indicates a near zero value.

Note 2: N/A indicates the site was inaccessible, due to the presence of a beaver dam.

Note 3: Unsafe* indicates conditions that were unsafe for the operator to enter or traverse the stream.

Note 4: (blue) Uncertainty exceeds USGS standards for ADCP measurement; flow should be considered as approximate.

APPENDIX F3
Lake Bathymetry



LEGEND:

- Bathymetry Survey Point (KGS Group, June 16 to Oct 15, 2021)
- Water Level Logger
- Water Level Loggers with Telemetry Sites
- Flow Measurement Sites
 - Large River Site with Telemetry, Completed
 - Small River Site, Completed
 - Small River Site, Not Completed
- Major Highway
- Logging Road or Trail
- Railway
- Watercourse
- Waterbody
- Lake with Completed Bathymetry Survey
- Wetland
- LSA Boundary
- RSA Boundary

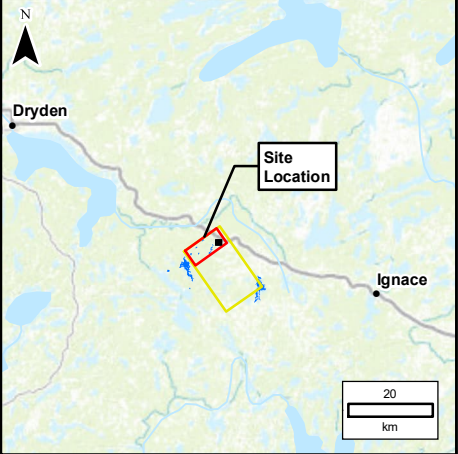
NOTES:
1. Imagery Source: ESRI/IMAXAR and dated 2018.
2. All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15.
Elevations are in metres above sea level (MASL).

DRAFT

300 0 300 600 900 1,200
Metres

SCALE: 1:30,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMMDD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NORTH WESTERN ONTARIO ENVIRONMENTAL FIELD DATA COLLECTION				
LOGGER LOCATION INSTALLS AND BATHYMETRY AREAS DETAIL LEVEL				
May 2023		FIGURE 02.1		REV: A



- LEGEND:**
- Water Level Logger
 - RSA Boundary
 - LSA Boundary
 - Edge of Water (407.5 m)

S01 Results

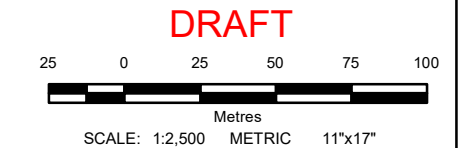
Bottom Elevation (m)	
	402.5 - 403.0
	403.0 - 403.5
	403.5 - 404.0
	404.0 - 404.5
	404.5 - 405.0
	405.0 - 405.5
	405.5 - 406.0
	406.0 - 406.5
	406.5 - 407.0
	407.0 - 407.5
	407.5 - 408.0

NOTES:

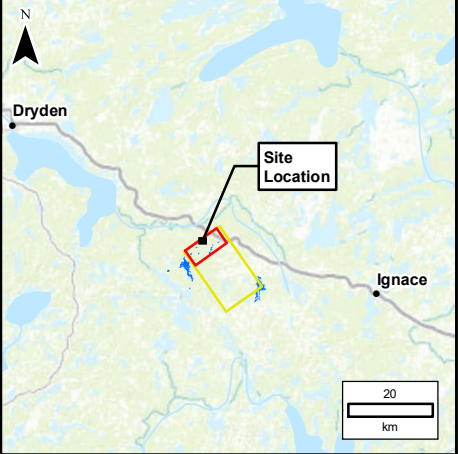
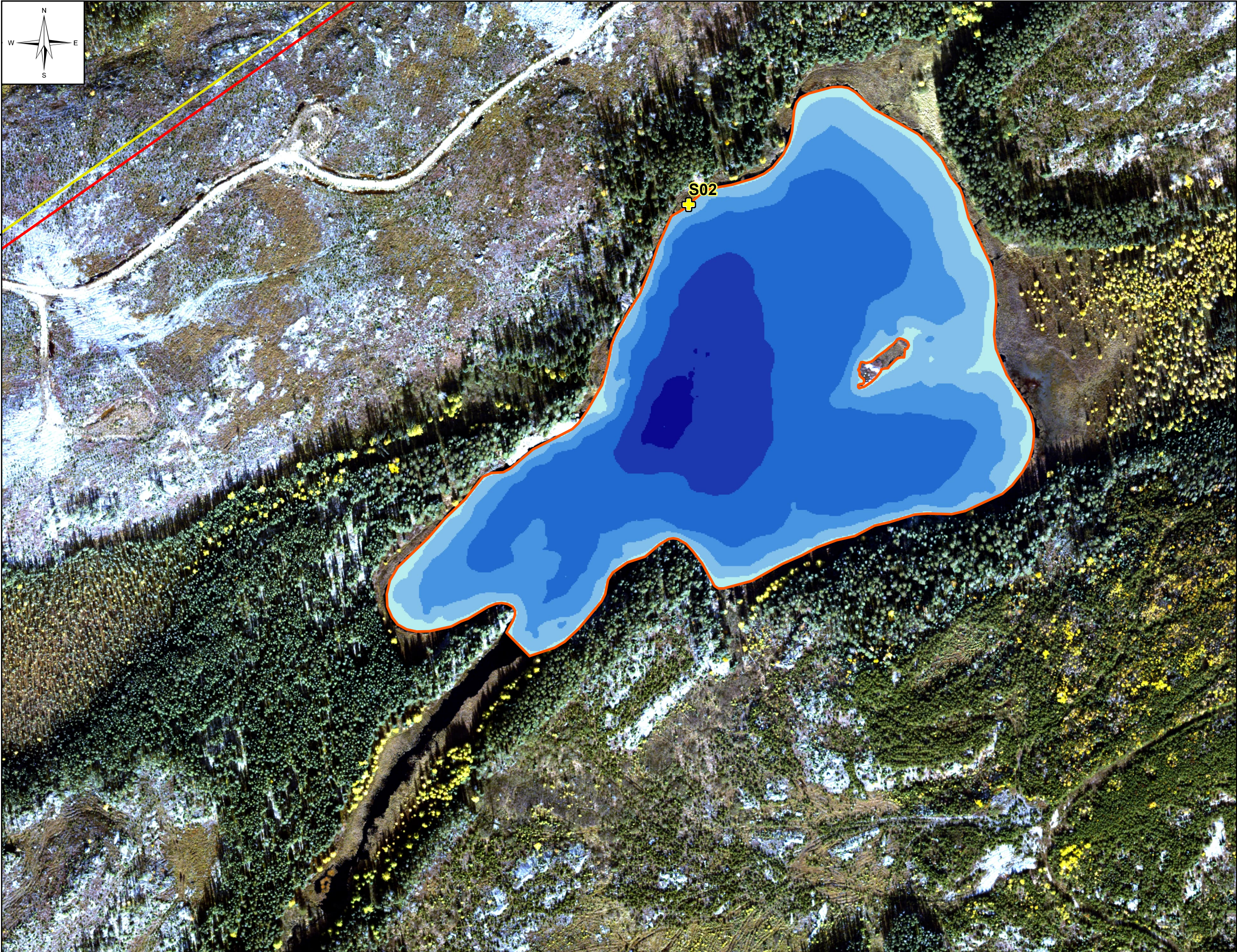
1. Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.

2. All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).

3. Bathymetric survey was completed between June-October 2021. Water level at the time of survey was 407.5 m.



A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S01 BATHYMETRY SURVEY SHEET 1 OF 16				
MAY 2023		FIGURE 01.1	REV:	A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (400.6 m)

S02 Results

Bottom Elevation (m)

	398.0 - 398.5
	398.5 - 399.0
	399.0 - 399.5
	399.5 - 400.0
	400.0 - 400.5
	400.5 - 401.0

NOTES:

1. Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.

2. All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15.
Elevations are in metres (CGVD2013).

3. Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 400.58 to 400.60 m.

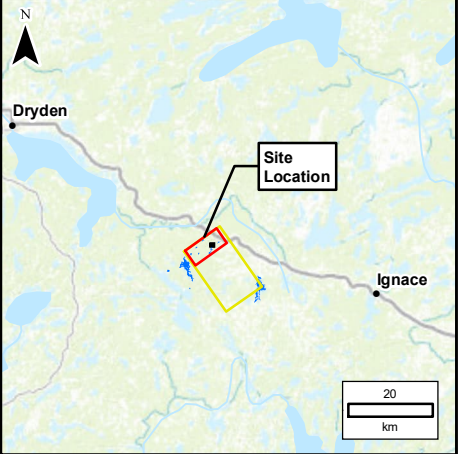
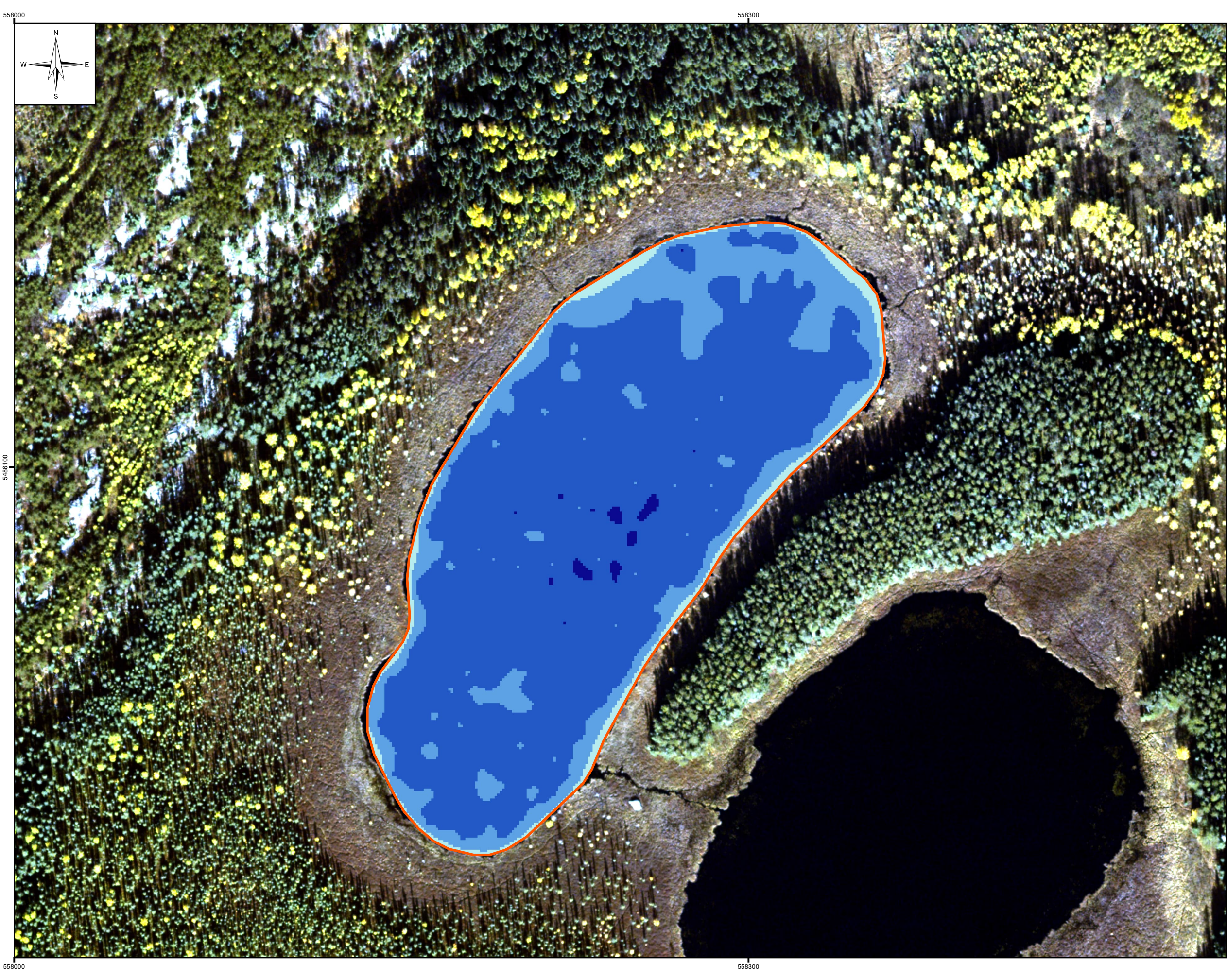
DRAFT

30 0 30 60 90 120

Metres

SCALE: 1:3,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S02 BATHYMETRY SURVEY SHEET 2 OF 16				
MAY 2023		FIGURE 01.2	REV:	A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (405.3 m)

S03 Results

Bottom Elevation (m)

- 403.5 - 404.0
- 404.0 - 404.5
- 404.5 - 405.0
- 405.0 - 405.5

NOTES:

- Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
- All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15.
Elevations are in metres (CGVD2013).
- Bathymetric survey was completed between June-October 2021. Water level at the time of survey was 405.3 m.

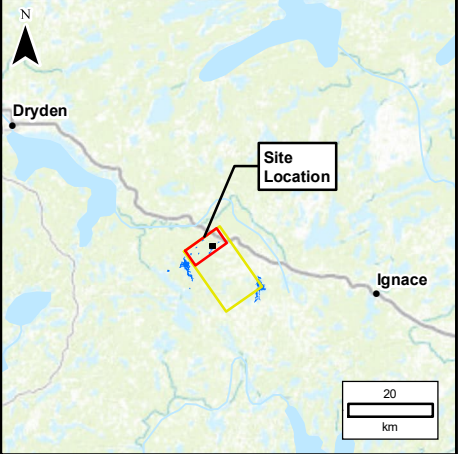
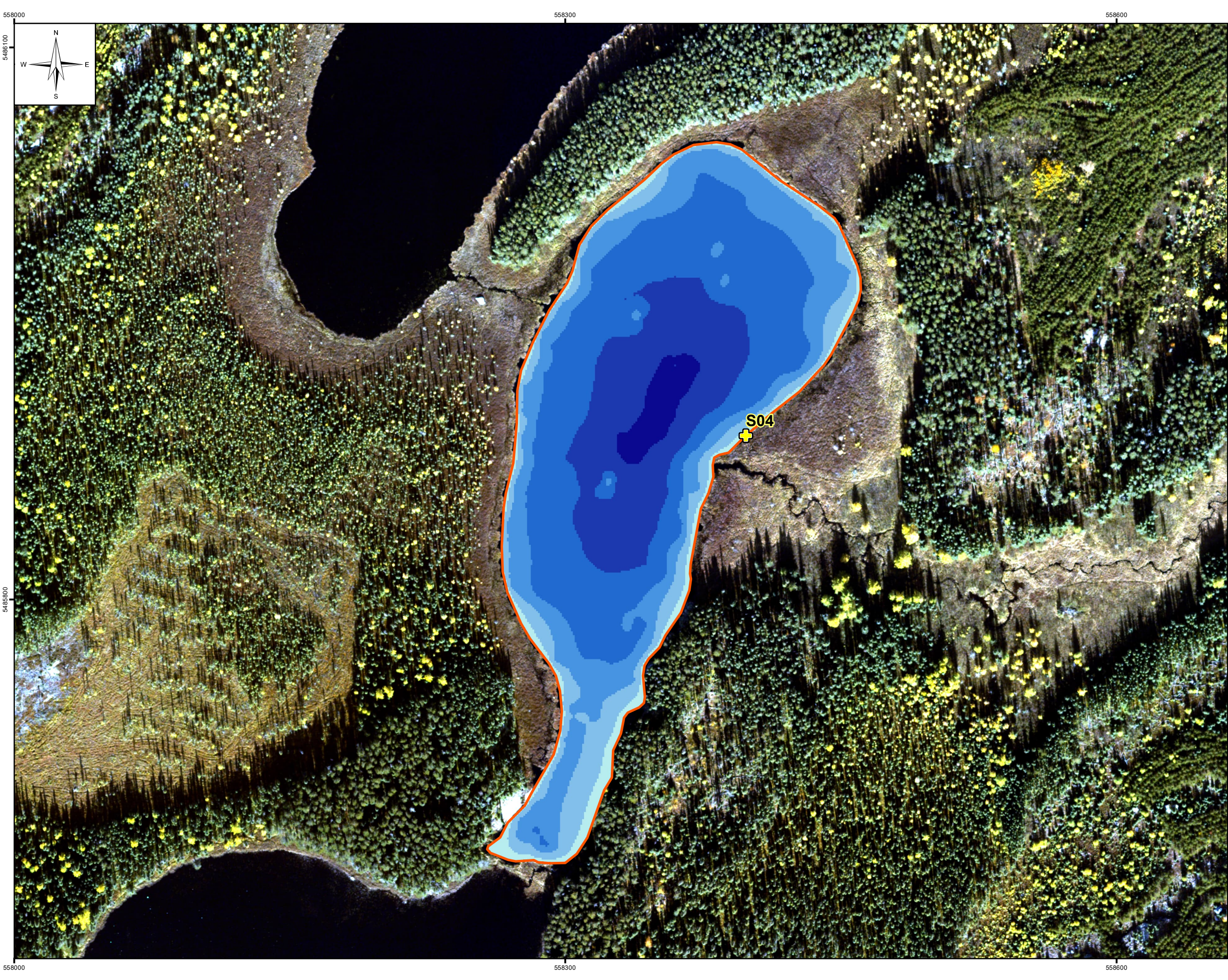
DRAFT

10 0 10 20 30 40

Metres

SCALE: 1:1,500 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S03 BATHYMETRY SURVEY SHEET 3 OF 16				
MAY 2023		FIGURE 01.3	REV:	A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (405.2 m)

S04 Results

Bottom Elevation (m)

- 402.5 - 403.0
- 403.0 - 403.5
- 403.5 - 404.0
- 404.0 - 404.5
- 404.5 - 405.0
- 405.0 - 405.5

NOTES:

- Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
- All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
- Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 405.2 to 405.21 m.

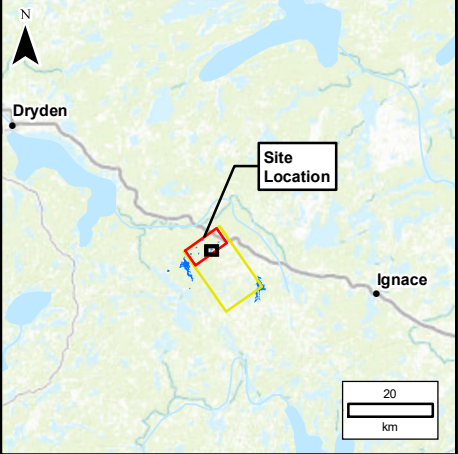
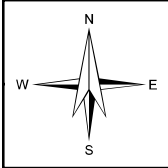
DRAFT

20 0 20 40 60 80

Metres

SCALE: 1:2,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S04 BATHYMETRY SURVEY SHEET 4 OF 16				
MAY 2023		FIGURE 01.4	REV:	A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (405.1 m)

S05 Results

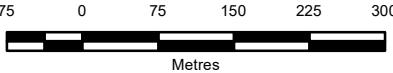
Bottom Elevation (m)

- 400.5 - 401.0
- 401.0 - 401.5
- 401.5 - 402.0
- 402.0 - 402.5
- 402.5 - 403.0
- 403.0 - 403.5
- 403.5 - 404.0
- 404.0 - 404.5
- 404.5 - 405.0
- 405.0 - 405.5

NOTES:

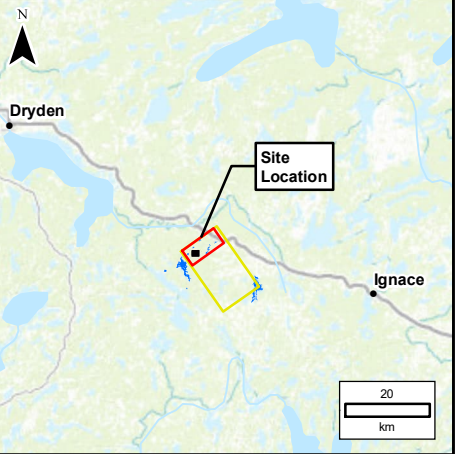
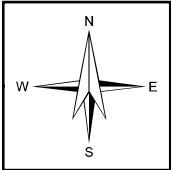
- Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
- All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
- Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 405.05 to 405.1 m.

DRAFT



SCALE: 1:7,500 METRIC 11"x17"

➡	A	23/05/10	ISSUED FOR INFORMATION		JWM	MSW
	NO.	YYMM/DD	DESCRIPTION		ISSUED BY	CHECK BY
REVISIONS / ISSUE						
						
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION						
S05 BATHYMETRY SURVEY SHEET 5 OF 16						
MAY 2023			FIGURE 01.5		REV:	A



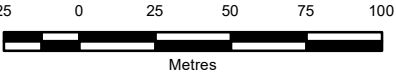
- LEGEND:**
- Water Level Logger
 - RSA Boundary
 - LSA Boundary
 - Edge of Water (408.6 m)

S06 Results

Bottom Elevation (m)	
	402.5 - 403.0
	403.0 - 403.5
	403.5 - 404.0
	404.0 - 404.5
	404.5 - 405.5
	405.0 - 405.5
	405.5 - 406.5
	406.0 - 406.5
	406.5 - 407.0
	407.0 - 407.5
	407.5 - 408.0
	408.0 - 408.5
	408.5 - 409.0

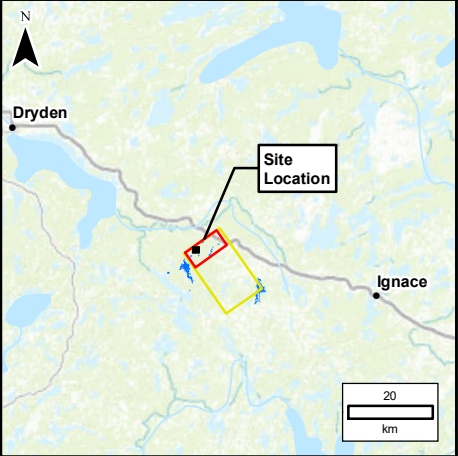
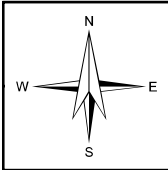
- NOTES:**
- Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
 - All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
 - Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 408.62 to 408.63 m.

DRAFT



SCALE: 1:2,500 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S06 BATHYMETRY SURVEY SHEET 6 OF 16				
MAY 2023		FIGURE 01.6		REV: A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (397.6 m)

S07 Results

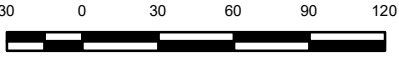
Bottom Elevation (m)

	395.0 - 395.5
	395.5 - 396.0
	396.0 - 396.5
	396.5 - 397.0
	397.0 - 397.5
	397.5 - 398.0

NOTES:

- Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
- All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
- Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 397.12 to 397.75 m.

DRAFT



SCALE: 1:3,000 METRIC 11"x17"

➔	A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
	NO.	YYMMDD	DESCRIPTION	ISSUED BY	CHECK BY

REVISIONS / ISSUE

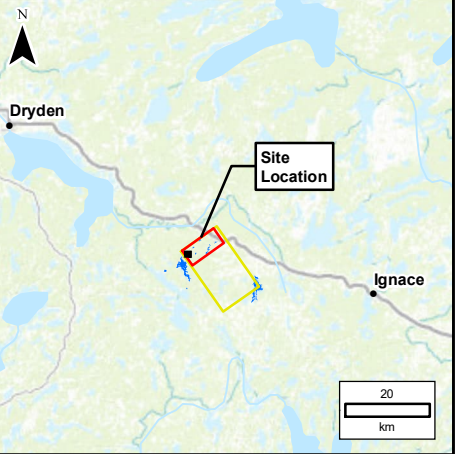
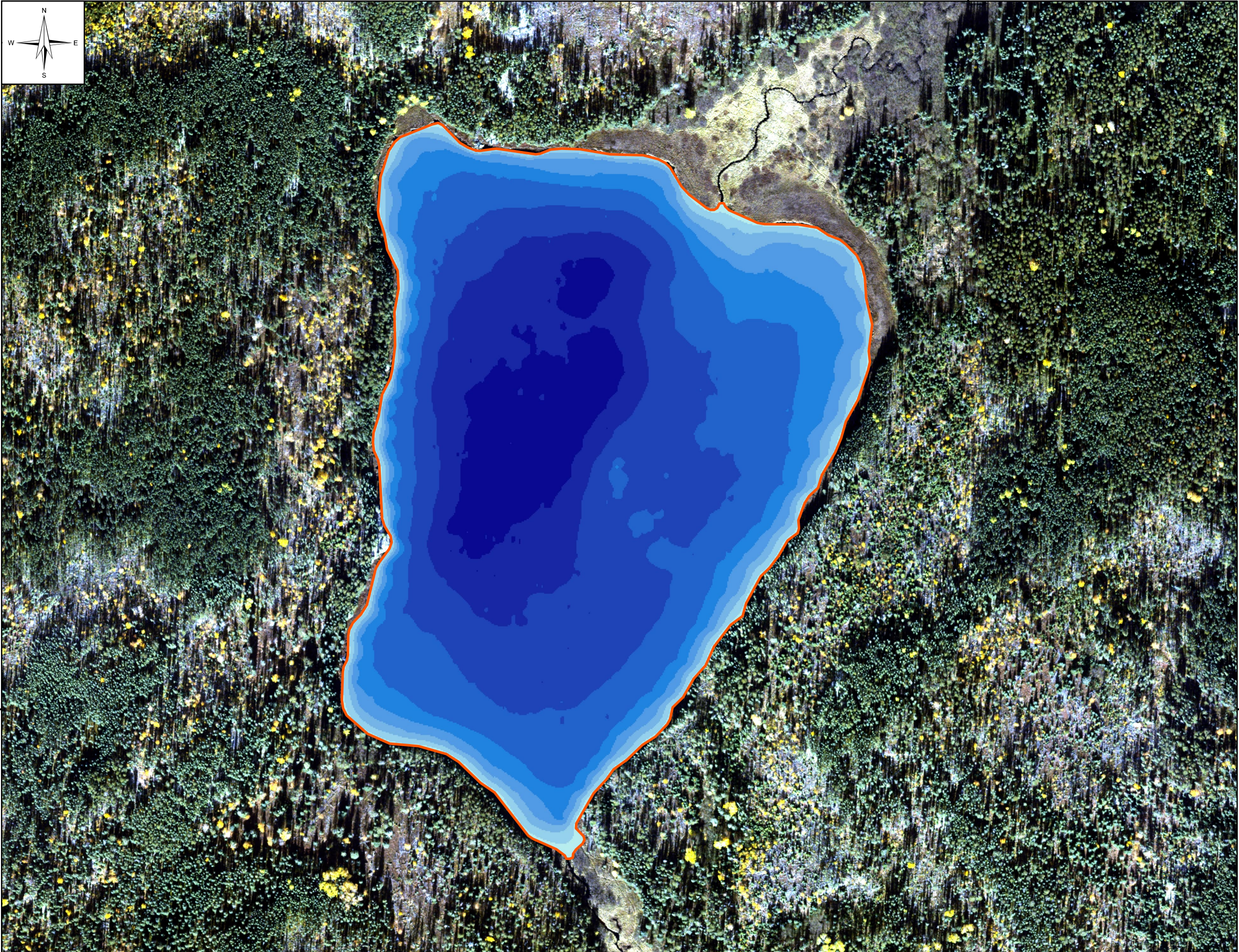
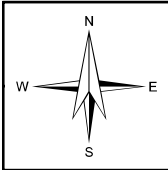
KGS
GROUP

nwmo
NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

NWMO ENVIRONMENTAL BASELINE
SAMPLE COLLECTION

S07 BATHYMETRY SURVEY
SHEET 7 OF 16

MAY 2023	FIGURE 01.7	REV: A
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LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (395.2 m)

S08 Results

Bottom Elevation (m)

	391.0 - 391.5
	391.5 - 392.0
	392.0 - 392.5
	392.5 - 393.0
	393.0 - 393.5
	393.5 - 394.0
	394.0 - 394.5
	394.5 - 395.0
	395.0 - 395.5

NOTES:

- Imagery Source: NWMO 2017 Ontario Regional Imagery
Ortophoto.
- All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator,
NAD 1983 CSRS, Zone 15.
Elevations are in metres (CGVD2013).
- Bathymetric survey was completed between June-October
2021. Water level at the time of survey ranged from 395.15
to 395.20 m.

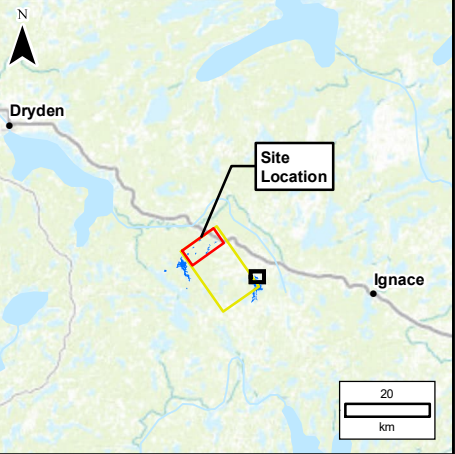
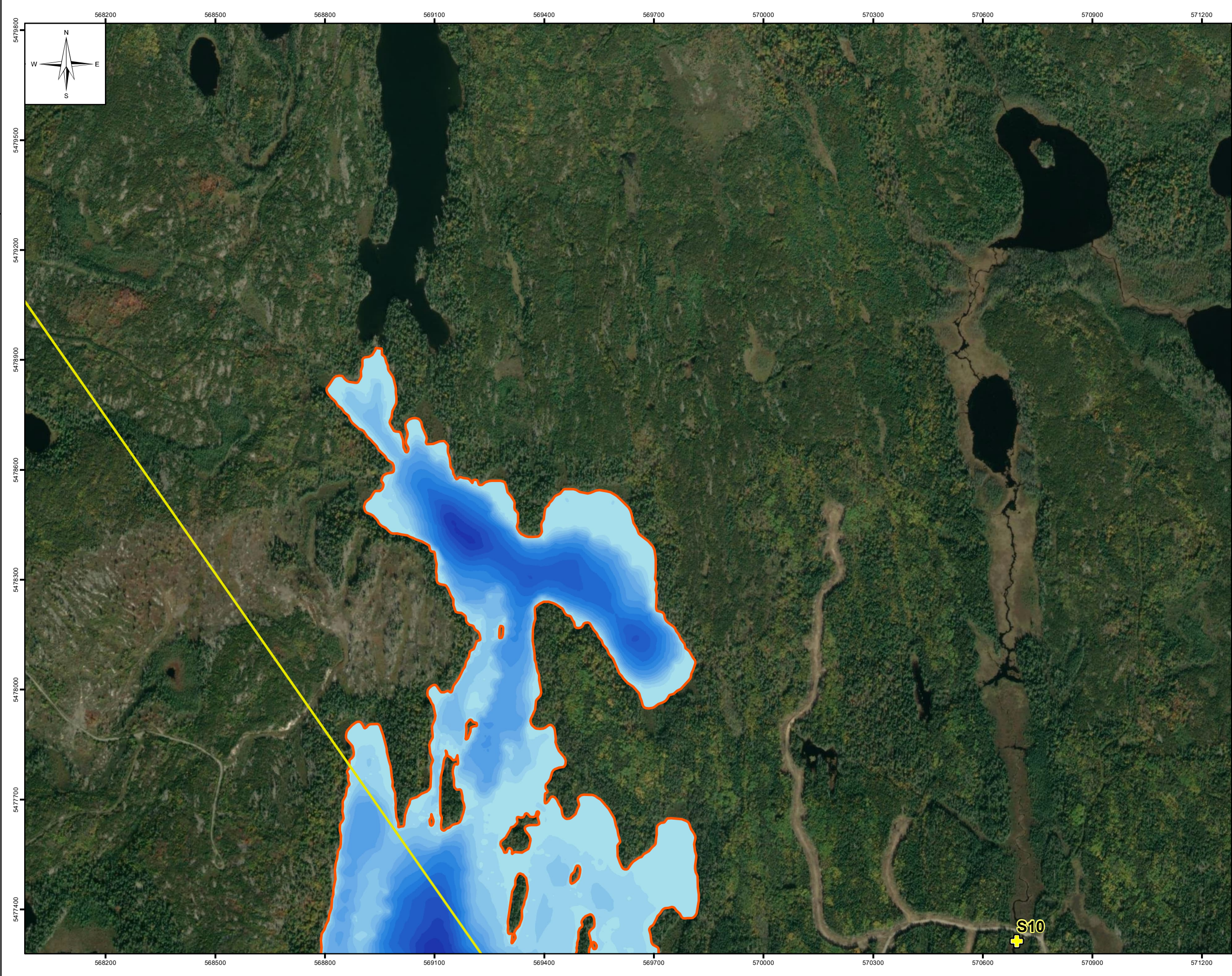
DRAFT

30 0 30 60 90 120

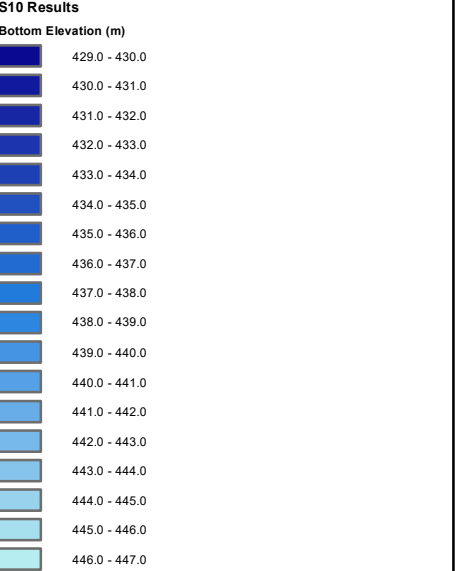
Metres

SCALE: 1:3,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S08 BATHYMETRY SURVEY SHEET 8 OF 16				
MAY 2023		FIGURE 01.8		REV: A



- LEGEND:**
- Water Level Logger
 - RSA Boundary
 - LSA Boundary
 - Edge of Water (445.9 m)



NOTES:

- All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator,
NAD 1983 CSRS, Zone 15.
Elevations are in metres (CGVD2013).
- Bathymetric survey was completed between June-October
2021. Water level at the time of survey ranged from 442.81
to 446.48 m.

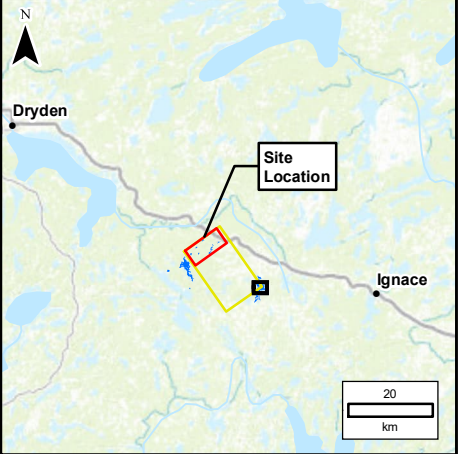
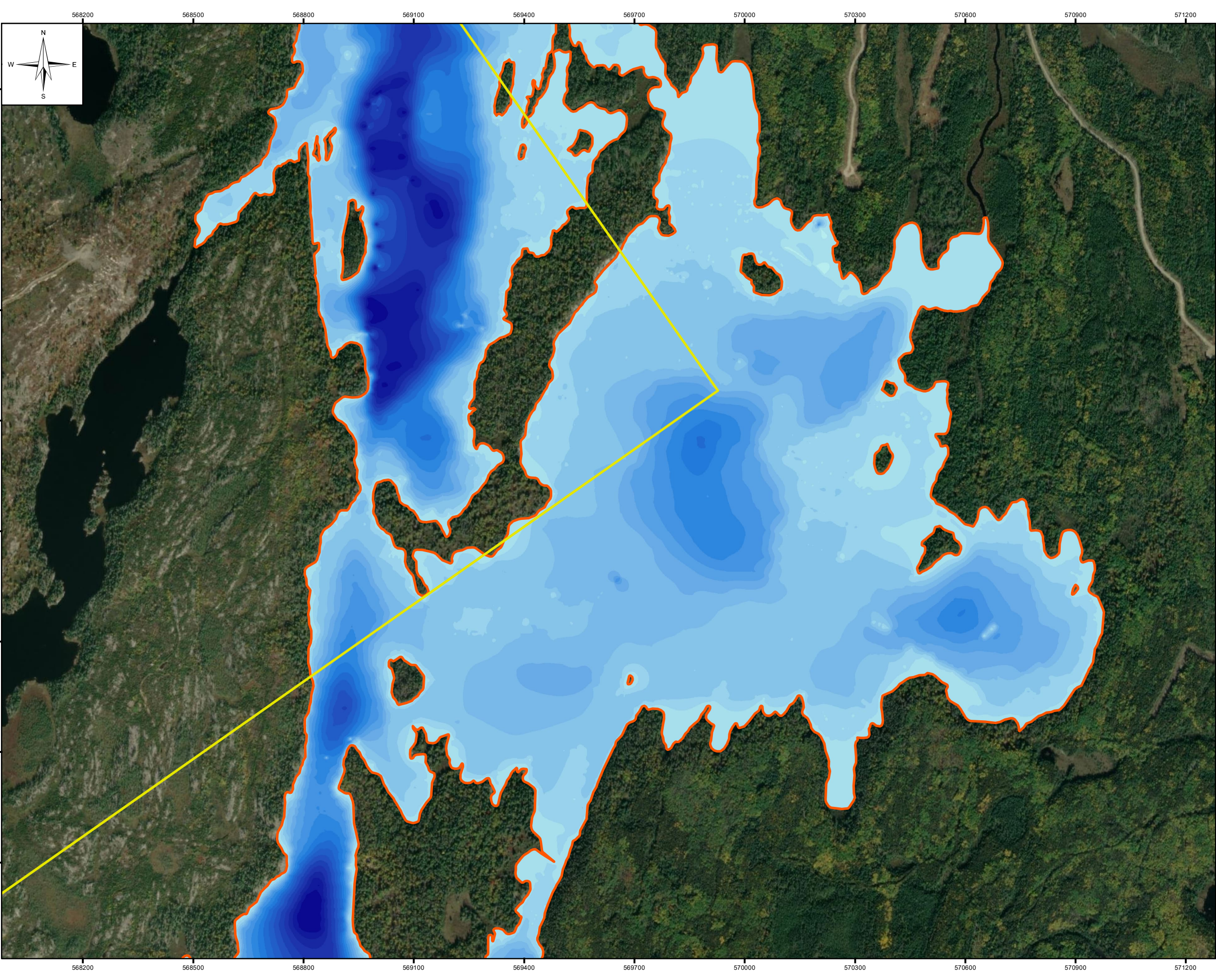
DRAFT

100 0 100 200 300 400

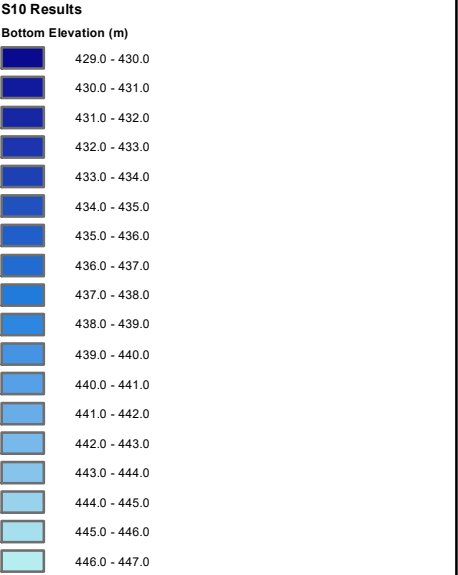
Metres

SCALE: 1:10,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION		JWM	MSW
NO.	YYMM/DD	DESCRIPTION		ISSUED BY	CHECK BY
REVISIONS / ISSUE					
					
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION					
S10 BATHYMETRY SURVEY SHEET 11 OF 16					
MAY 2023		FIGURE 01.11			REV: A



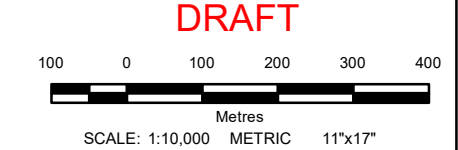
- LEGEND:**
- Water Level Logger
 - RSA Boundary
 - LSA Boundary
 - Edge of Water (445.9 m)



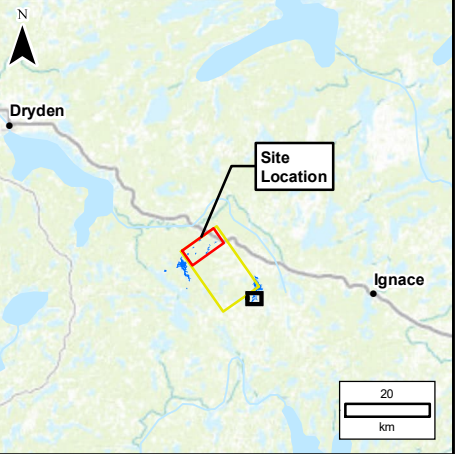
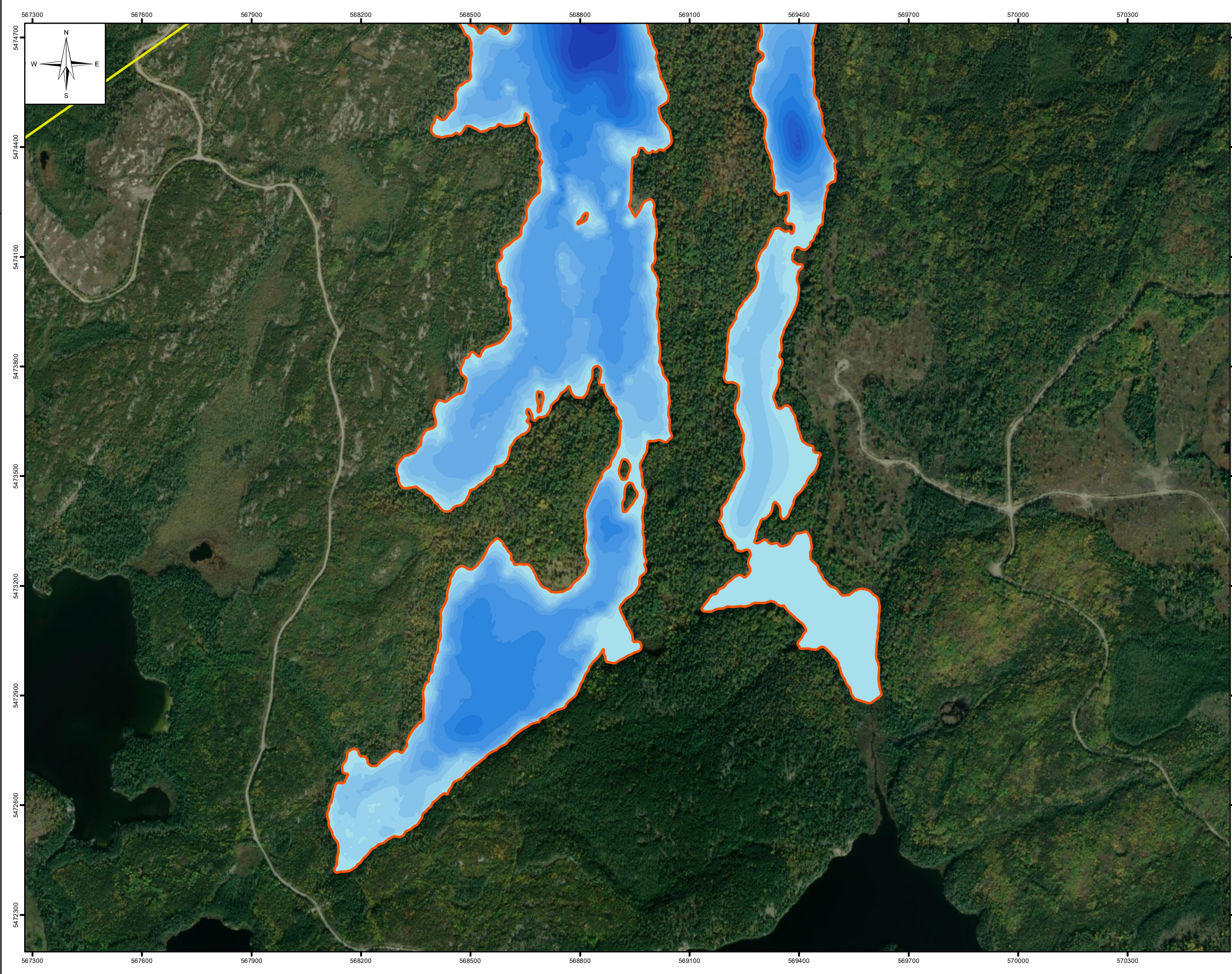
NOTES:

1. All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator,
NAD 1983 CSRS, Zone 15.
Elevations are in metres (CGVD2013).

2. Bathymetric survey was completed between June-October
2021. Water level at the time of survey ranged from 442.81
to 446.48 m.



A	23/05/10	ISSUED FOR INFORMATION		JWM	MSW
NO.	YYMM/DD	DESCRIPTION		ISSUED BY	CHECK BY
REVISIONS / ISSUE					
					
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION					
S10 BATHYMETRY SURVEY SHEET 12 OF 16					
MAY 2023		FIGURE 01.12		REV:	A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (445.9 m)

S10 Results

Bottom Elevation (m)

	429.0 - 430.0
	430.0 - 431.0
	431.0 - 432.0
	432.0 - 433.0
	433.0 - 434.0
	434.0 - 435.0
	435.0 - 436.0
	436.0 - 437.0
	437.0 - 438.0
	438.0 - 439.0
	439.0 - 440.0
	440.0 - 441.0
	441.0 - 442.0
	442.0 - 443.0
	443.0 - 444.0
	444.0 - 445.0
	445.0 - 446.0
	446.0 - 447.0

NOTES:

1. All units are metric and in metres unless otherwise specified.
Map Projection shown is Universal Transverse Mercator,
NAD 1983 CSRS, Zone 15.
Elevations are in metres (CGVD2013).

2. Bathymetric survey was completed between June-October
2021. Water level at the time of survey ranged from 442.81
to 446.48 m.

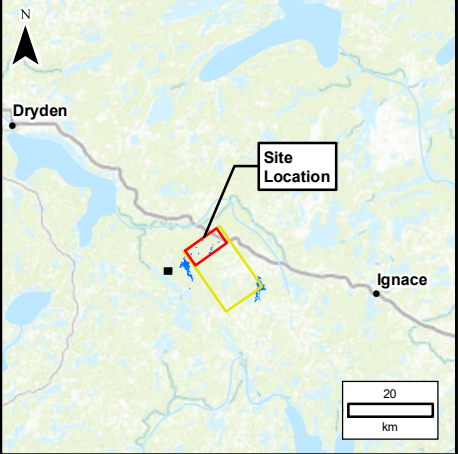
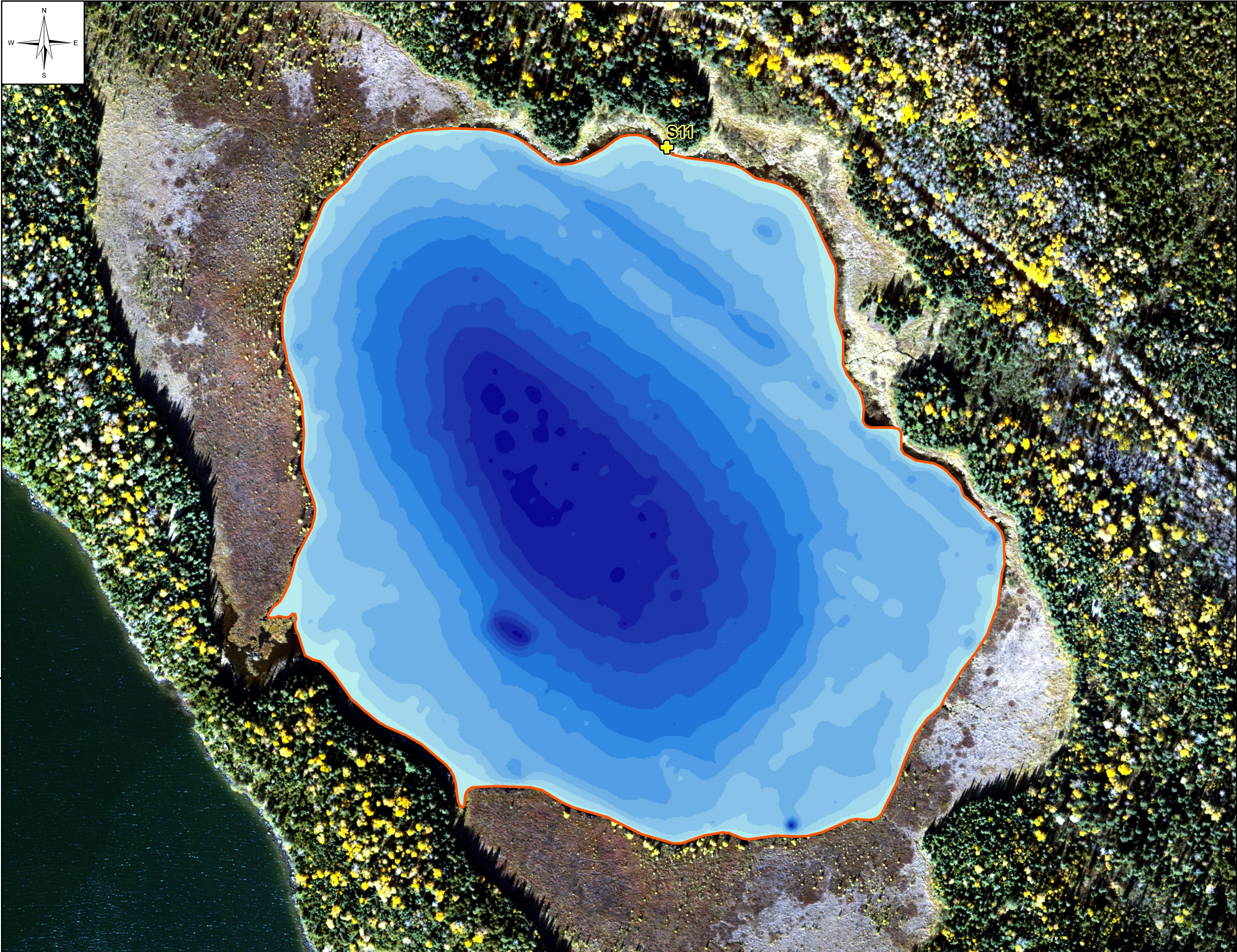
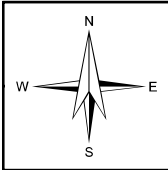
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100 0 100 200 300 400

Metres

SCALE: 1:10,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION		JWM	MSW
NO.	YYMMDD	DESCRIPTION		ISSUED BY	CHECK BY
REVISIONS / ISSUE					
					
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION					
S10 BATHYMETRY SURVEY SHEET 13 OF 16					
MAY 2023		FIGURE 01.13		REV:	A



- LEGEND:**
- Water Level Logger
 - RSA Boundary
 - LSA Boundary
 - Edge of Water (380.2 m)

S11 Results

Bottom Elevation (m)	
	374.5 - 375.0
	375.0 - 375.5
	375.5 - 376.0
	376.0 - 376.5
	376.5 - 377.0
	377.0 - 377.5
	377.5 - 378.0
	378.0 - 378.5
	378.5 - 379.0
	379.0 - 379.5
	379.5 - 380.0
	380.0 - 380.5

- NOTES:**
- Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
 - All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
 - Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 380.17 to 380.20 m.

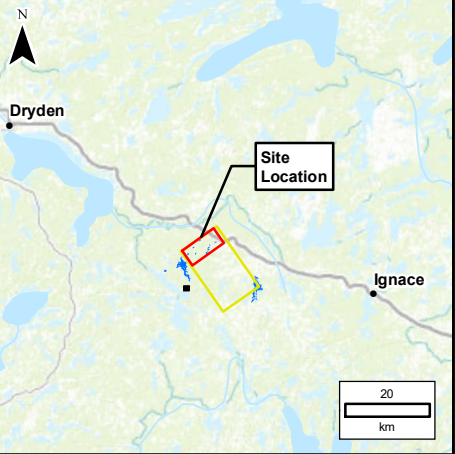
DRAFT

30 0 30 60 90 120

Metres

SCALE: 1:3,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S11 BATHYMETRY SURVEY SHEET 14 OF 16				
MAY 2023		FIGURE 01.14		REV: A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (394.1 m)

S12 Results

Bottom Elevation (m)

	389.5 - 390.0
	390.0 - 390.5
	390.5 - 391.0
	391.0 - 391.5
	391.5 - 392.0
	392.0 - 392.5
	392.5 - 393.0
	393.0 - 393.5
	393.5 - 394.0
	394.0 - 394.5

NOTES:

1. Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
2. All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
3. Bathymetric survey was completed between June-October 2021. Water level at the time of survey was 394.14 m.

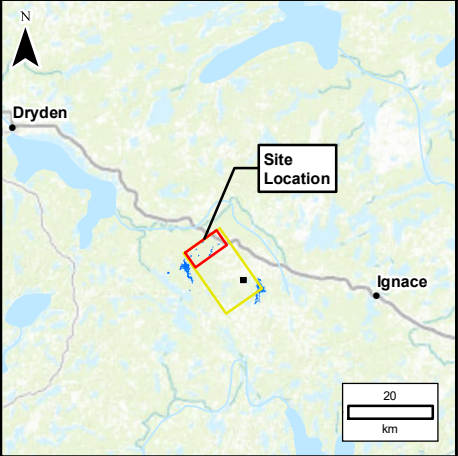
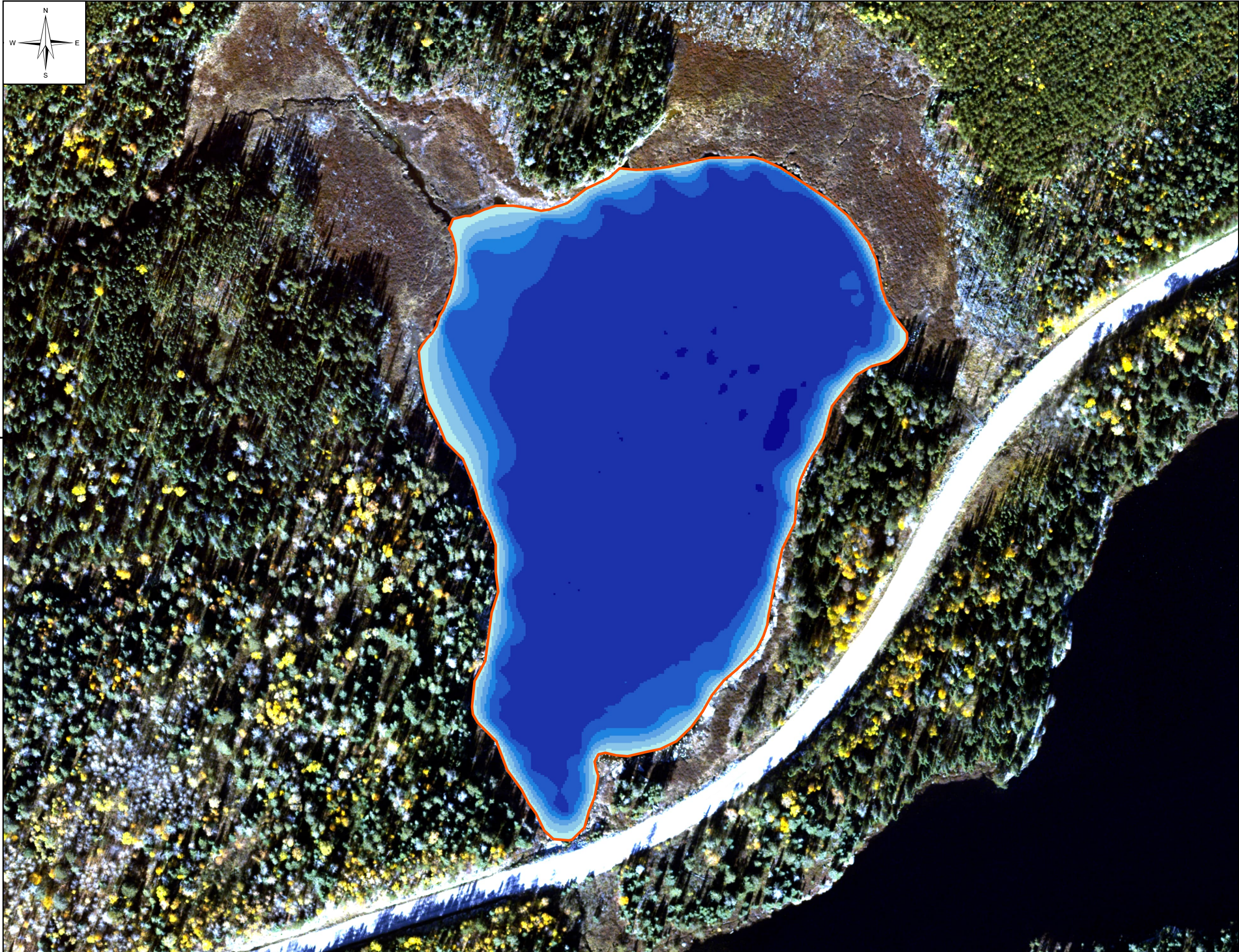
DRAFT

20 0 20 40 60 80

Metres

SCALE: 1:2,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S12 BATHYMETRY SURVEY SHEET 15 OF 16				
MAY 2023		FIGURE 01.15		REV: A



LEGEND:

- Water Level Logger
- RSA Boundary
- LSA Boundary
- Edge of Water (445.3 m)

S13 Results

Bottom Elevation (m)

- 442.0 - 442.5
- 442.5 - 443.0
- 443.0 - 443.5
- 443.5 - 444.0
- 444.0 - 444.5
- 444.5 - 445.0
- 445.0 - 445.5

- NOTES:**
1. Imagery Source: NWMO 2017 Ontario Regional Imagery Orthophoto.
 2. All units are metric and in metres unless otherwise specified. Map Projection shown is Universal Transverse Mercator, NAD 1983 CSRS, Zone 15. Elevations are in metres (CGVD2013).
 3. Bathymetric survey was completed between June-October 2021. Water level at the time of survey ranged from 445.32 to 445.33 m.

DRAFT

20 0 20 40 60 80

Metres

SCALE: 1:2,000 METRIC 11"x17"

A	23/05/10	ISSUED FOR INFORMATION	JWM	MSW
NO.	YYMM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
				
NWMO ENVIRONMENTAL BASELINE SAMPLE COLLECTION				
S13 BATHYMETRY SURVEY SHEET 16 OF 16				
MAY 2023		FIGURE 01.16	REV:	A