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SECTION 3

FIRST MINING GOLD

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3.0 ENVIRONMENTAL SETTING

The description of the existing environment provided in this section aims to familiarize the reader with the local setting in relation to the Springpole Gold Project (Project). The section represents a contextual description of the geographic area as a whole, focusing on what potentially interacts with the Project and related alternatives considered for each Project component. This section provides a description of the existing conditions related to the natural, social, cultural, economic and built environment and based on extensive and robust environmental baseline studies that were conducted at the site and in the surrounding area between 2011 and 2023, as well as published information. The baseline data inform Project planning and design, including the assessment of alternatives, and allow a comparison between pre-development and potential future post-development conditions.

Additional information regarding baseline environmental conditions is provided in Section 6 to support the assessment of potential effects for each identified valued component (VC). Environmental baseline reports that provide more detailed information, as referenced in this section, are provided in Appendices G to U.

3.1 Influence of Consultation with Indigenous Communities, Government and the Public

Consultation has been ongoing for several years, prior to and throughout the environmental assessment (EA) process, and will continue with Indigenous communities, government agencies and the public through the life of the Project. Section 2 provides more detail on the extensive consultation process. The Record of Consultation (Appendix D) includes detailed comments received during the development of the final Environmental Impact Statement / Environmental Assessment (EIS/EA).

Feedback received through consultation has been addressed through direct responses (in writing and follow-up meetings) and incorporated into the final EIS/EA, as appropriate. The key comments that influenced the environmental setting between the draft and final EIS/EA is provided below.

Baseline Studies

General comments on baseline investigations on a range of different topics were received from Cat Lake First Nation (CLFN), Lac Seul First Nation (LSFN), Mishkeegogamang Ojibway Nation (MON), Slate Falls Nation (SFN), Northwestern Ontario Métis Community (NWOMC), the Impact Assessment Agency of Canada, Environment and Climate Change Canada, Fisheries and Oceans Canada, the Ministry of the Environment, Conservation and Parks (MECP), the Ministry of Natural Resources and Forestry (MNRF), the Ministry of Mines, and the Ministry of Citizenship and Multiculturalism (MCM). As a result, the baseline programs were refined to incorporate this feedback. Further details on the influence of consultation specific to each VC are provided in Section 6.

Purpose and organization

The MECP requested clarification on the purpose of Section 3 (Existing Environment) and noted that the section should sufficiently detail baseline information to support an assessment of the potential effects of Project alternatives.

Considering this input, the purpose of Section 3 has been clarified in the introduction to note that Section 3 represents a contextual description of the geographic area as a whole, focusing on what is reasonably expected to be affected by the Project and on related alternatives considered for the Project. The key baseline information is provided from the baseline reports prepared for the Project within the baseline investigation area over a period of more than 10 years. This baseline information is sufficient to understand the existing environment that is expected to be affected (directly or indirectly) by the Project, and the alternatives considered for the Project. This information supports the assessment of the potential effects from each alternative and has been used to evaluate and compare the advantages and disadvantages of the alternatives. Additional details of the existing conditions for each VC are provided in Section 6 to support the effects assessment of the preferred Project, as requested by the Impact Assessment Agency of Canada.

Further, the MECP requested that the description of the existing environment in Section 3 be organized by each component of the environment (natural, social, economic, cultural and built). This section has been refined such that it provides a description of the existing environment under the broad components of the environment (natural, social, economic, cultural and built), which is further explained in Section 3.4.

Additional Conservation Reserves

The MECP recommended adding the following provincially regulated conservation reserves to applicable figures in the final EIS/EA: Harth Lake, Whitemud, Bruce Lake, Lac Seul Islands, Trout Lake, Brokenmouth River and Gull-Christina. These have been included in Figure 3.2-1 and included in other applicable figures in the final EIS/EA.

Ambient Light

The MECP recommended including baseline ambient light readings to inform the assessment of potential impacts from the Project. Further, the MECP recommended adjusting receptor locations to areas that are intrinsically dark (i.e., no anthropogenic light sources) for a conservative assessment of potential impacts. The Ambient Light Assessment Report (Appendix J) includes additional information on the ambient light conditions, which has also been summarized in Section 3.4.12. Further, the Ambient Light Assessment Report includes further consideration of mitigation options to address anthropogenic light sources from Project.

List of Studies

The MECP requested that a complete list of studies and/or reports prepared in relation to the proposed Project be included in the EIS/EA. Table 3.3-1 has been added to the final EIS/EA and includes a complete list of studies and reports prepared for the final EIS/EA.

Development of Baseline Investigation Area and Temporal Boundaries, and Related Consultation Input

The MECP requested that a refined overall EA study area be presented in the final EIS/EA that is representative of the geographical area that will be affected or might reasonably be expected to be affected, directly or indirectly, by the proposed Project and the alternatives considered. Further, the MECP requested that a description of the environment within these geographical boundaries be provided, and an explanation of how spatial and temporal boundaries of the overall EA study area were determined. In addition, the MECP requested the identification of all alternatives in the relevant figures in Section 3, not only the preferred Project, to allow a better understanding of environmental conditions in relation to the alternative methods assessed.

In response, the refined overall EA study area is presented in Figure 3.3-1 and described in Section 3.3.1 of the final EIS/EA. Further, the description of the existing environment within these geographic boundaries has been provided in Section 3.4. An explanation of how the spatial and temporal boundaries of the overall EA study area were determined is explained in Section 3.3.1 and Section 2. Relevant figures in Section 3 have been updated to include the location Project alternatives that were considered in Section 4.

Regional Historic Mines

CLFN and LSFN requested additional information on the effect of historic mines in the region (McIntyre Gold Mine, Casummit Mine and Kostynuk Brothers Mine) on the environmental baseline. The surface water quality monitoring program includes several sampling stations in Birch Lake, including upstream of the outlet from Casummit Lake, and downstream of the outlet. Baseline surface water quality monitoring results are presented and discussed in Appendix N-1. Further, several terrestrial baseline studies have been undertaken in the area of these historic mines, including vegetation communities and wetlands, disturbance data, bat surveys, migratory bird surveys and large mammal surveys. These extensive regional baseline studies across multiple disciplines generally show that the baseline environment is representative of a highly functional and productive ecosystem. The main disturbance noted in the baseline environment is due to the forestry industry and natural forest fires. Baseline terrestrial results are presented in Appendix P.

Plant Species Used for Traditional Harvesting

The NWOMC requested clarification of whether plant species of importance to Indigenous communities were surveyed and documented around the Project site. A description of the plant species of importance to the Indigenous communities, including NWOMC, is included in Section 3.4.14.2.

Socioeconomic Baseline Data

The NWOMC requested further information on the socioeconomic baseline data specific to the NWOMC. Based on this input, the Socioeconomic Baseline Report (Appendix Q) has been updated to include specific information related to Métis in the area, and this information is summarized in Section 3.4.11.

General Wildlife Survey and Reporting

The MNR requested clarification on methods used in terrestrial baseline studies and further information on inconsistencies in reporting. The historical data obtained in 2011 and 2012 were used to provide context to inform species presence in species lists, and to avoid confusion, the final EIS/EA will not include these results. The supplemental field studies conducted since 2021 have been used to update the Baseline Terrestrial Resources Report (Appendix P) and are summarized in Section 3.4.9. As a result, inconsistencies between Section 3, Section 6 and Appendix P have been addressed.

Vegetation Species

The MNR requested clarification and further information on the vegetation species list collected during the period of 2011 to 2019. The results for the vegetation surveys in 2019, and subsequently in 2021 and 2022, are more robust and as a result have been emphasized in the final EIS/EA. The historical data obtained in 2011 and 2012 were used to provide context to inform species presence in species lists. Ground-truthing vegetation surveys have been extensively undertaken since 2019, including 90 plots in 2019, 111 plots in 2021 and an additional 288 plots in 2022. This information has been used to further refine local levels of detail per ecosite and is included in the updated Baseline Terrestrial Resources Report (Appendix P), Section 6.11 and Section 3.4.9 of the final EIS/EA. Further, the mapping used in the draft EIS/EA included ecological land classification / forest ecological classification / wetlands and has been subsequently updated in the final EIS/EA.

Wetlands

The MNR requested clarification on the information used to characterize and assess wetlands. The wetland evaluations have been updated in the final EIS/EA and the information used is based on data collected from the 2021 to 2023 field surveys, as described in the updated Baseline Terrestrial Resources Report

(Appendix P-1). The conclusions relative to wetland significance have been subsequently updated and include a re-evaluation of wetland categorizations based on the 2021 to 2023 data. This has been clarified in Section 3.4.9 and Section 6.11.

Eastern Whip-poor-will

The MNR requested surveys for Eastern Whip-poor-will (EWPW) be conducted in person and with autonomous recording units (ARUs) to identity locations of bird use, as well as suitable habitat, particularly inland at the site footprint and along preferred linear corridors.

Baseline surveys for EWPW for the Project have significantly expanded the baseline knowledge for EWPW in both distribution and abundance of this species at risk (SAR) in this region of Ontario. Prior to these baseline survey efforts, there were no confirmed records of EWPW in this region. Given the lack of detections up to 2021 and the uncertainty associated with the prevalence and distribution of this SAR in the boreal region of Ontario. As a result of this input, EWPW surveys were expanded in 2021 in both spatial extent and sampling effort to attempt to detect this species. Survey efforts were expanded in 2022 across a suite of suitable habitat types and were conducted in accordance with the *Draft Survey Protocol for Eastern Whip-poor-will (Caprimulgus vociferus)* Ontario (MNRF 2014a). The ARUs were used in 2022 due to their success in 2021, and as recommended by Environment and Climate Change Canada (ECCC), as this recording method allows the deployment and detection of species in areas during times when point counts could be difficult, un-safe or impractical for human observers to conduct.

In addition, EWPW habitat has been modelled using data from the vegetation and habitat surveys in 2022, as well as a Habitat Suitability Index (HSI) model that was developed in conjunction with the MNR (prior to the MECP adopting the *Endangered Species Act, 2007* [SO 2007, c. 6] program) for linear corridor EAs in northwestern Ontario. The details and resultant model surface pertaining to this HSI for EWPW is provided in the updated Baseline Terrestrial Resources Report (Appendix P) and Section 6.16. This HSI is used to identify the distribution of all suitable habitat for EWPW in the baseline investigation area, irrespective of whether the species has been confirmed in all locations with quality habitat.

Wolverine

The MECP recommended that a Wolverine-specific RSA be developed using the average Wolverine home range size. Further, the MECP recommended that a monitoring program be developed to inform the baseline condition and support longer term monitoring, and monitoring program consider using the hair snag/camera trap study method to be consistent with other recent EAs. In response, a biologically relevant RSA was developed by applying a 50 km buffer to the LSA representing the male Wolverine home range of 1,600 square kilometres (km^2), as described in Section 6.14. Additionally, 25 run pole stations, using the hair snag/camera trap method, were deployed within the baseline investigation area in February 2023. Data were collected on two separate occasions in March and April 2023. Additional information on the methods and results are provided in Section 3.4.10.1 and Appendix P.

Significant Wildlife Habitat

The MNR requested a summary and assessment of significant wildlife habitat likely to be present in the vicinity of the Project. The updated Baseline Terrestrial Resources Report (Appendix P) includes an assessment of candidate and confirmed significant wildlife habitat using provincial guidelines. A summary of the results has been included in Section 3.4.10.

Baseline Fisheries Studies

The MNR requested clarification and further information on the fisheries and aquatic baseline reports, specifically the methods applied to the fish habitat surveys, fish community surveys and fish tissue analysis. Based on this feedback, supplementary studies were conducted for Springpole Lake during 2022, including the north basin where controlled dewatering is proposed. The studies included a full lake broadscale monitoring (BsM) program, ongoing lower trophic level studies, a lake-wide hydroacoustic fish community survey, and multiple environmental DNA (eDNA) metabarcoding surveys. The BsM program was completed on Springpole Lake following standardized provincial protocols but was modified to address the request from the MNR to reduce the number of deepwater net sets in the 12 metres (m) to 35 m strata and to increase the number of net sets in the 1 m to 12 m strata. Subsequent discussion with Fisheries and Oceans Canada lead to additional deep strata nets sets added back into the program.

The additional data collected from these studies, in combination with previously collected aquatic data, supports the previous descriptions of fish communities provided in the draft EIS/EA and further enhances the understanding of fish abundance and distribution throughout the Springpole Lake.

The results from the BsM program and the hydroacoustic program have been updated in the Baseline Aquatic Resources Report (Appendix O-4) and summarized in Section 3.4.8.

Lake Trout Designated Lakes

The MNR requested clarification on the resource management plan identifying the management of Lake Trout. This has been clarified in Section 3.4.8 to note that Springpole and Birch Lakes are listed as naturally reproducing Lake Trout lakes on the provincial List of Lakes Designated for Lake Trout Management. However, MNR noted that dispositions under the *Mining Act* are exempt from the Lake Trout policy.

Fish Tissue

The MNR requested clarification on the sufficiency of mercury reporting to support the assessment of potential effects on the fish communities in Springpole and Birch lakes. Additional mercury sampling during an index netting program was recommended to provide a more representative sample. Considering this feedback, additional fish tissue sampling was completed during the 2022 BsM program on Springpole Lake (Appendix O-4).

Built Heritage Name

The MCM recommended renaming "cultural heritage resources" in this section and the effects assessment section to "built heritage resources and cultural heritage landscapes." Further, the MCM recommended revising the definition of cultural heritage assessments. Based on this feedback, Section 3.4.16 and Section 6.23 were updated as requested.

Cabins

The MCM requested additional clarity on camps in the final EIS/EA to determine whether they were commercial camps or may have been private cabins or camps used by Indigenous communities. Additional studies have been completed for three candidate cabins, which were considered to be private cabins not used by Indigenous communities (Appendix S). The status of the remaining cabins has been clarified in Section 6.23 and Section 3.4.16.

3.2 Local Context

3.2.1 Overview of Historical and Current Land Use

The region in which the Project is situated is underlain by glaciated terrain characteristic of a large part of the Canadian Shield. Land areas are generally of low relief with less than 30 m of local elevation, intersected by numerous lakes and watercourses. Tree cover generally consists of mature Spruce, Balsam, Birch and Poplar, with Black Spruce and muskeg swamps occupying low-lying areas. The use of the lands within and adjoining the site is generally mineral exploration, forestry, commercial and recreational use and traditional land and resource use.

The Project is located in a remote area of northwestern Ontario and there are no nearby industrial / commercial developments. There are also no nearby permanent residences, with only a small number of seasonal cabins present on Birch Lake and Springpole Lake.

There are no dedicated protected areas, conservation reserves or parks within 20 kilometres (km) of the Project. The closest federal lands are associated with First Nation Reserve lands, located approximately 40 to 45 km from the Project (Figure 3.2-1).

3.2.1.1 Mining and Exploration

Exploration in the area surrounding the Project has been carried out during two main periods:

- The first period of exploration occurred between the 1920s to the 1940s, and included trenching and prospecting activities, followed by the advancement of 10 shallow boreholes totalling about 450 m in depth. Once completed, the site lay dormant until the second phase of exploration.
- The second phase of exploration began in the mid-1980s and continues to the present day. Exploration has consisted of both airborne and ground-based geophysical surveys, as well as a comprehensive diamond drill program across the Project site. Information collected during this phase led to the identification of the three currently understood prospect areas, namely the Portage Zone, East Extension Zone and Camp Zone.

In 2015, First Mining Gold Corp. (FMG) acquired 100 percent (%) of the Project from Gold Canyon Resources Inc. The property is being actively explored for additional mineral potential. FMG holds over 70,000 ha of mineral claims in the region.

There is an existing exploration camp at the Project site that can support approximately 40 people with heavy equipment used in the area. The Project site is currently accessible by floatplane direct to Springpole Lake during late spring, summer, and early fall. There are approximately two flights in and out per week during open water season. In winter, the site is accessed by a wheel plane to an ice strip which is constructed on Springpole Lake. During lake ice freeze-up in the fall and breakup in spring, the site is only accessible by helicopter.

Three small historical mines previously operated in the region (see Figure 3.2-1):

- McIntyre Gold Mine, located on the northeast side of Birch Lake (about 7 km away), operated between 1934 and 1945;
- Casey Summit Mine (later renamed the Casummit Mine), located on Casummit Lake, approximately 10 km north of the Springpole Gold Project, operated between 1930 and 1952;

- Kostynuk Brothers Mine, located on the north shore of Richardson Lake, approximately 12 km north of the Springpole Gold Project, operated from 1963 to 1966; and
- South Bay Mine, located on the shore of Confederation Lake, approximately 41 km southwest of the Springpole Gold Project, operated from 1971 to 1981.

There is a concentration of active mineral claims to the north and west of the Project and extending southwest toward Ear Falls and Red Lake. There is another concentration of active mineral claims east of Slate Falls. The closest operating mines are located 110 km west in Red Lake (Evolution Mining Red Lake Complex).

3.2.1.2 Forestry

The Project is located within the Trout Lake Forest Management Area (Figure 3.2-1) and is subject to the Trout Lake Forest Management Plan, pursuant to the *Crown Forest Sustainability Act, 1994* (SO 1994, c. 25), that is administered by the MNR. The Trout Lake Forest Management Area encompasses approximately 10,313 km^2. The total planned harvest area for the ten-year period of the 2021-2031 FMP is 71,699 ha. Harvesting operations within the Trout Lake Forest Management Area are conducted through the Sustainable Forestry Licence, issued to Domtar Corporation (now known as Dryden Fibre), which is responsible for all aspects of forest management planning, harvesting, forest management road access, reforestation and compliance monitoring of forest operations. This licence requires that the licensee carry out renewal and maintenance activities necessary to provide for the long-term sustainability of the Crown forest in the Trout Lake Forest Management Area. The majority of conifer timber produced from the Trout Lake Forest Management Area is delivered to the INTERFOR sawmill in Ear Falls, Ontario. As part of forestry activities, the Wenasaga Road was constructed to support these activities. The road has been extended northwards and is currently within 18 km of the Project site.

The principal disturbance to the terrestrial environment within the baseline investigation area has resulted from wildfires. Five large fires occurred in 1961 that altered over 65,000 hectares (ha), or approximately 10% of the production forest land base in the Trout Lake Forest Management Area. These fires occurred north of Trout Lake, over an area of approximately 30,000 ha (MNRF 2009). Since that time, there have been a number of small fires and blowdowns in the forest but no fires of any high magnitude until 2011, and again in 2019 and 2021, when a forest fire came within close proximity to the exploration camp.

3.2.1.3 Outfitting

The region hosts a small number of remote tourism operations and seasonal camps (Figure 3.2-1). Remote designated tourism lakes identified in the Crown Land Use Policy Atlas Policy Report (MNRF 2018) in the general vicinity of the Project include Birch Lake, Seagrave Lake, Bertha Lake, Dead Dog Lake, Gull Lake, Fawcett Lake and Christina Lake.

3.2.1.4 Existing Water Diversion

Birch Lake flows into Springpole Lake, through the Birch River into Gull Lake and ultimately into Lake St. Joseph, which is located approximately 85 km to the southeast. Historically, Lake St. Joseph discharged into the Albany River, which ultimately flows to James Bay. In 1957, the hydroelectric dam constructed at the lower end of Lake St. Joseph at Rat Rapids (see Figure 3.2-1) was converted to a diversion dam as part of the Manitoba – Ontario Lake St. Joseph Diversion Agreement. The diversion dam has resulted in an average annual water flow of 86 cubic metres per second (m^3/s) being redirected east toward Lac Seul through the Root River, and onwards to the Nelson River watershed to the west from the Albany River.

3.2.2 Indigenous Traditional Territories and Lands

The Indigenous communities engaged in the Project are signatories to Treaty No. 3, Treaty No. 5 or Treaty No. 9. The Project is located within Treaty No. 9, also known as the James Bay Treaty, which was signed in 1905 (Government of Ontario 2018). Adhesions to Treaty No. 9 were signed later in 1929 and in 1937. Three Indigenous communities engaged in the Project are signatories to Treaty No. 9: MON, SFN and CLFN. Treaty No. 3, also known as the North-West Angle Treaty, was signed in 1873 (Filice 2020). Three Indigenous communities engaged in the Project are signatories to Treaty No. 3: LSFN, Ojibway Nation of Saugeen (ONS) and Wabauskang First Nation (WFN). Signatories to Treaty No. 3 also include the NWOMC. Treaty No. 5, referred to as the Winnipeg Treaty, was signed during the years 1875 to 1876 and includes Pikangikum First Nation (PFN) as a signatory. Treaty No. 9 area is located north of the geographical divide between the Great Lakes watershed and the Hudson and James Bay drainage basins, Treaty No. 3 territory is located in present-day northwestern Ontario and eastern Manitoba, and Treaty No. 5 encompasses a substantial portion of present-day central and northern Manitoba, as well as parts of Saskatchewan and Ontario (Figure 3.2-2). These treaties provided the federal government access to lands within the Hudson Bay and James Bay watersheds in exchange for various goods and Indigenous rights to hunting, fishing, and natural resources on reserve lands; provisions of tools; and other rights and privileges (Leslie 2020).

A number of Indigenous communities have initiated development of a community-based land use plan following from the *Far North Act, 2010* (SO 2010, c. 18). This land use planning process determines the most appropriate use of land and water in the Far North of Ontario. A land use plan has been published in association with CLFN, and SFN (NDMNRF 2019) and PFN (2006). The CLFN and SFN community-based land use plan addresses a 1.5 million ha area, encompassing a portion of the communities' self-described traditional territories in the Far North of Ontario. The plan conveys an understanding of Cat Lake and Slate Falls First Nation people's relationship to the land as a primary context for decision making (NDMNRF 2019).

Further information regarding Indigenous communities and ongoing consultation can be found in the following sections of the final EIS/EA:

- Section 2, including specific Indigenous communities and groups identified for consultation on the Project; and
- Section 6.21, including a description of Traditional Knowledge (TK) and Traditional Land Use (TLU) and the effects of the Project on current use of lands and resources for traditional purposes, and on Aboriginal and Treaty Rights.

3.2.3 Designated Land Use

Provincial (Ontario) Crown land use planning assigns Crown lands and waters land use designations with associated general policies, determines the specific uses that may occur in land use areas, and/or establishes broad direction for the land uses. Crown land use planning interprets and applies broad government policies and objectives in the context of local conditions and values.

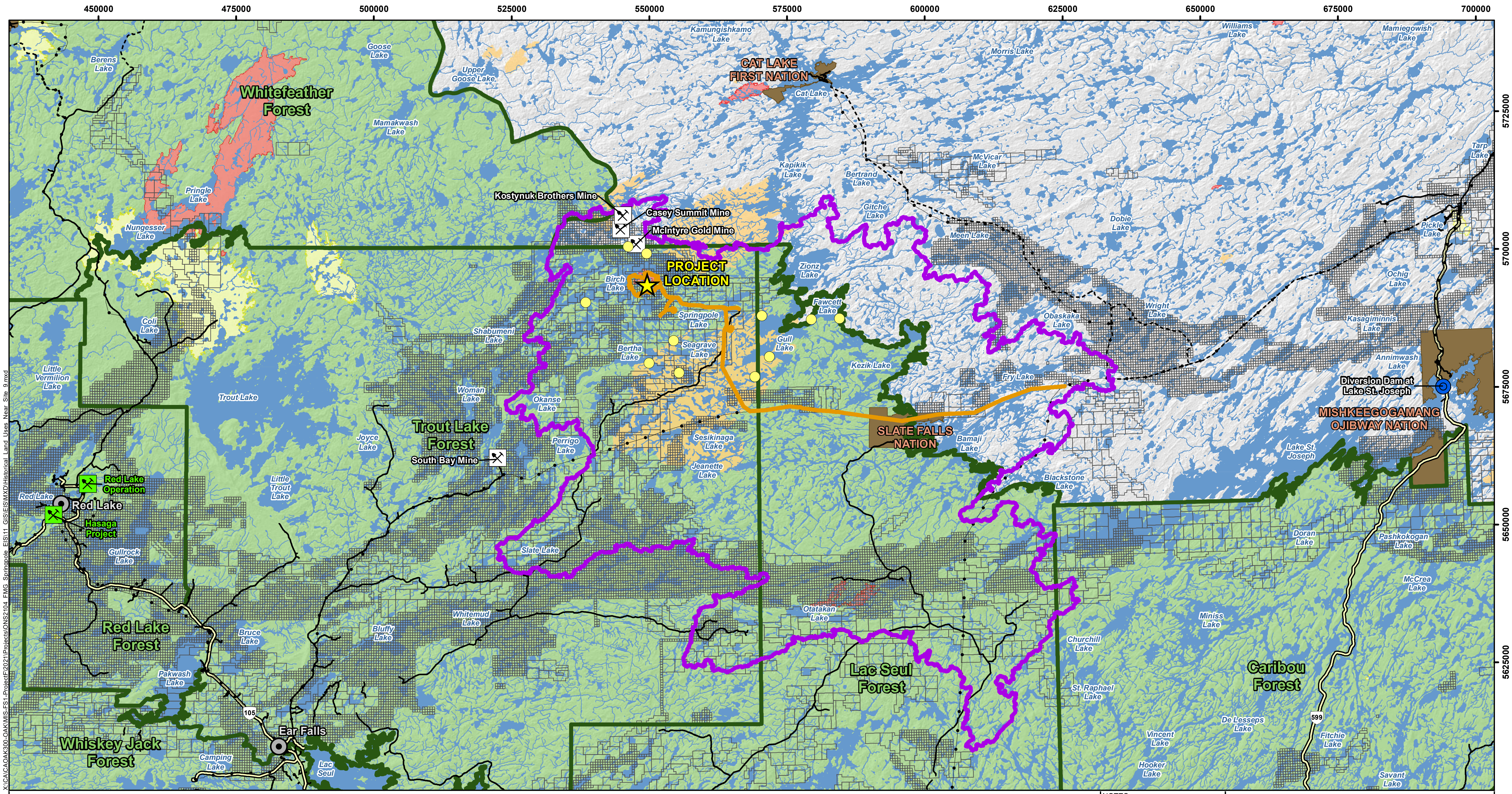
The Project is located on land designated as General Use Area G2514 for the Red Lake, Sioux Lookout District (Government of Ontario 2020). This is a multiple use area that is largely governed by existing provincial policy. Although mining-related land use activities are permitted within this area, all new activities are subject to provincial review and evaluation.

Present uses in General Use Area G2514 include mineral exploration, forestry, cottaging, tourism, recreation, fishing, hunting and fur harvesting. The major industries in the area include mining, forestry and resource-based tourism. The area includes three forest management units: Trout Lake Forest, Red Lake Forest and Whiskey Jack Forest. The area contains a resource-based tourism industry, ranging from road-accessible main base lodges to remote camps. This General Use Area also contains lakes designated for Lake Trout management (MNRF 2015). MNR policies or guidelines may be applied differently to designated Lake Trout lakes depending on the lake classification. Springpole and Birch lakes are listed as naturally reproducing Lake Trout lakes on the provincial list of inland lakes designated for Lake Trout management (MNRF 2015). Further, part of this General Use Area is subject to the *Range Management Policy in Support of Woodland Caribou Conservation and Recovery* (MNRF 2014g).

3.2.4 Land Tenure

At the time FMG acquired 100% of the Project, the Springpole Property consisted of 30 patented mining claims, 300 unpatented contiguous mining claims and six Crown mining leases, totalling an area of approximately 32,448 ha. In 2017, additional claims in the Satterly Lake area were subsequently acquired, bringing the total area to 41,943 ha. As of 2024, the Springpole Property consists of 30 patented mining claims, 282 unpatented mining claims and 13 Crown mining leases, totalling an area of 42,146 ha. The Property boundary and locations of the mining claims, patents and mining leases are illustrated in Figure 3.2-3.

Project development, including construction activities, will not commence until applicable leases and acquisitions are in place. Surface rights within the Project development area will be acquired by FMG prior to the start of construction in those areas.



LEGEND

- Project Location
- Project Development Area
- Regional Study Area for Vegetation Communities and Wetlands
- Diversion Dam at Lake St. Joseph
- Outfitter*
- Operating Mine
- Historic Mine
- Burn Area
  - 2011
  - 2019
  - 2021
- Active Claim Area of Crown Land
- Forest Management Unit
- First Nation Reserve
- Town
- Existing Transmission Line
- Existing Highway
- Existing Road
- Existing Winter Road
- Watercourse
- Waterbody

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.

* Only lcations on selected lakes (Birch Lake, Seagrave Lake, Bertha Lake, Deaddog Lake, Gull Lake, Fawcett Lake, and Christina Lake) shown on the map.

Datum: NAD83
Projection: UTM Zone 15N

FIRST MINING GOLD

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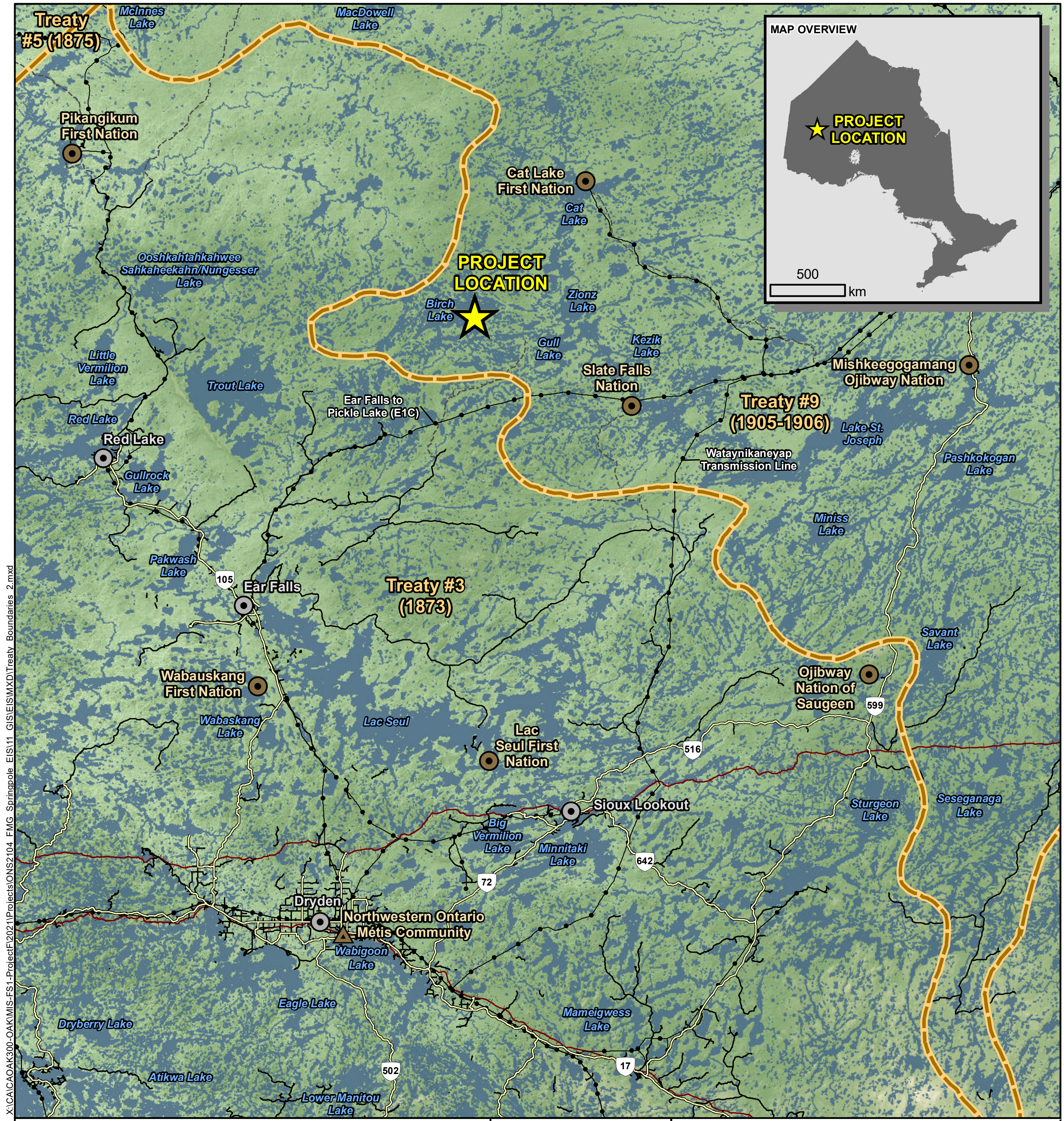
SPRINGPOLE GOLD PROJECT

Land Uses Near the Project Site

PROJECT Nº: ONS2104	FIGURE: 3.2-1
SCALE: 1:650,000	DATE: October 2024



LEGEND

- Project Location
- Town
- First Nation Reserve
- MNO Northwest Métis Council
- Treaty Boundary
- Highway
- Secondary Road
- Resource / Winter Road
- Railway
- Transmission Line

0 12.5 25 50 75 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Treaty boundaries downloaded from Government of Canada Open Government website "Historic treaties", https://open.canada.ca/data/en/dataset/f281b150-0645-48e4-9c30-01f55f93f78e

Datum: NAD83
Projection: UTM Zone 15N

N W E S

FIRST MINING GOLD

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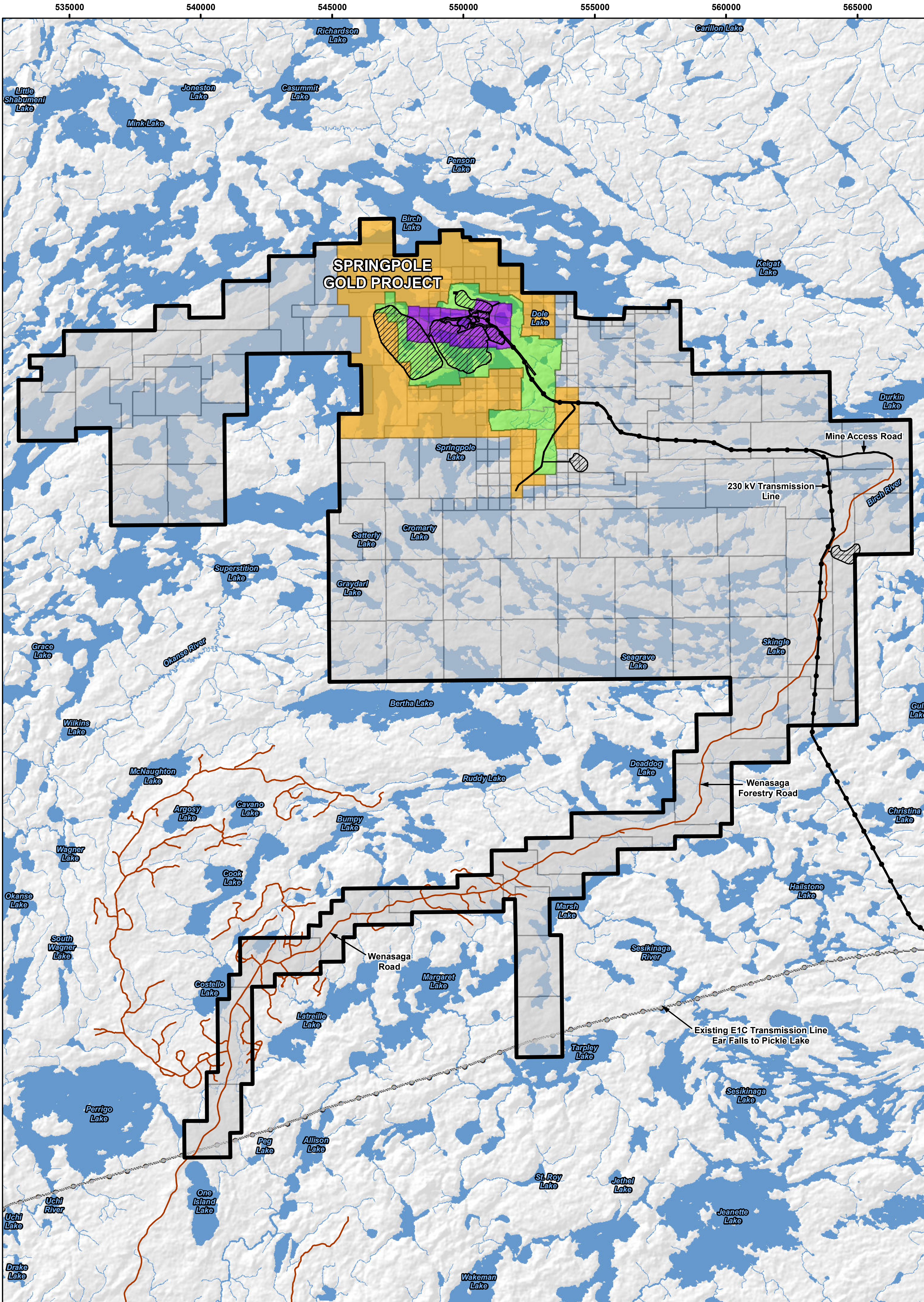
SPRINGPOLE GOLD PROJECT

Indigenous Traditional Treaties

PROJECT N°: ONS2104	**FIGURE: 3.2-2**
SCALE: 1:1,500,000	DATE: August 2024



LEGEND

- Proposed Mine Feature
- Proposed 230 kV Transmission Line
- Existing Transmission Line
- Existing Road
- Watercourse
- Waterbody

First Mining Gold Land Tenure

- Patented Land
- Mining Lease
- Proposed Phase 2 Lease
- Mining Claim

0 1 2 4 6 8 10 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.
- Land tenure provided by First Mining Gold, May 2021/ March 2022 / March2024.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

Land Tenure

PROJECT N°: ONS2104	FIGURE: 3.2-3
SCALE: 1:135,000	DATE: October 2024

3.3 Information Sources and Study Areas

3.3.1 Background and Information Sources

Baseline data to support the final EIS/EA were obtained from published sources, government databases, site-specific studies, and community and Indigenous engagement and TK. Site-specific studies and/or data were obtained regarding the following environmental aspects:

- Meteorology and climate (Appendix M-1);
- Air quality (Appendices G-1 and G-2);
- Light (Appendix J);
- Sound and vibration (Appendices H-1 and H-2);
- Geochemistry (Appendices K-1 and K-2);
- Hydrogeology and groundwater quality (Appendix L-1);
- Hydrology (Appendix M-1);
- Surface water quality (Appendix N-1);
- Aquatic resources (Appendices O-1 to O-3);
- Terrestrial resources (Appendices P-1 to P-2);
- Socioeconomics (Appendix Q-1);
- Land and resource use (Appendix Q-1);
- Archaeology (Appendices S-1 to S-4);
- Cultural heritage (Appendix S-5); and
- Visual aesthetics (Appendix U).

Baseline and supporting studies for environmental aspects required to inform the final EIS/EA are presented in technical support documents (TSDs) in appendices listed above. A full list of baseline studies and reports referenced in the final EIS/EA is provided in Table 3.3-1.

Extensive and robust environmental baseline studies were completed using standard field protocol and scientific methods to accurately document spatial and temporal variability as described in Section 3.4. In designing the programs, the anticipated information needs of regulatory agencies based on the approval required for previous Ontario mining projects was considered.

FMG provided opportunities for Indigenous communities, regulators and other interested parties to review the existing baseline studies and plans for additional fieldwork. More details related to the key meetings with Indigenous communities and regulators related to baseline studies can be found in Section 2.

The collection of TK and TLU information has been supported by FMG, through the provision of capacity funding. These reports include Indigenous Knowledge and Land Use and Socioeconomic Studies for CLFN (CLFN 2024a,b), Indigenous Knowledge and Land Use and Socioeconomic Studies for LSFN (LSFN 2024a,b), a Traditional Land Use and Occupancy and Traditional Ecological Knowledge Study for MON (MON 2023), a Health, Socio-economic, Indigenous Knowledge and Land Use Study for Slate Falls Nation (SFN 2024), a Traditional Knowledge and Use Study for WFN (Morin et al. 2014), a Traditional Knowledge and Land Use

Study for the NWOMC (MNO 2021) and a TKLUS [Traditional Knowledge and Land Use Study] Follow-Up Report from NWOMC (MNO 2023). FMG will consider any additional TK / TLU information made available during the life of the Project. The TK / TLU studies have been reviewed, and non-confidential information has been included in relevant baseline reports, summarized in Section 3.4.13, and incorporated into the assessment of alternatives (Section 4) and the assessment of potential effects on relevant valued components (Section 6).

The environmental baseline reports include tabulated baseline data, figures indicating sampling or monitoring locations, and detailed results.

3.3.2 Baseline Investigation Area

Baseline studies have been completed to accurately document spatial and temporal variability. The spatial areas used for the completion of the baseline investigations are based on a conservative estimate of the overall Project footprint and alternatives considered, including an appropriate buffer based on the VC being studied to support the effects assessment. As Project optimization has progressed, the investigation area has been reviewed and revised as needed so that there is sufficient spatial area coverage. A preliminary baseline investigation area was presented in the approved Amended Terms of Reference and refined by the Project team to account for updated Project details collected through advances in Project design. Feedback received from government agencies, Indigenous communities and the public, was considered however did not result in further changes to the refined overall EA study area. The baseline investigation area used for the refined overall EA study area is presented in Figure 3.3-1.

Temporal variability has been captured during the baseline investigations by the completion of multiple programs over the period between 2011 and 2023 in the pertinent investigation areas.

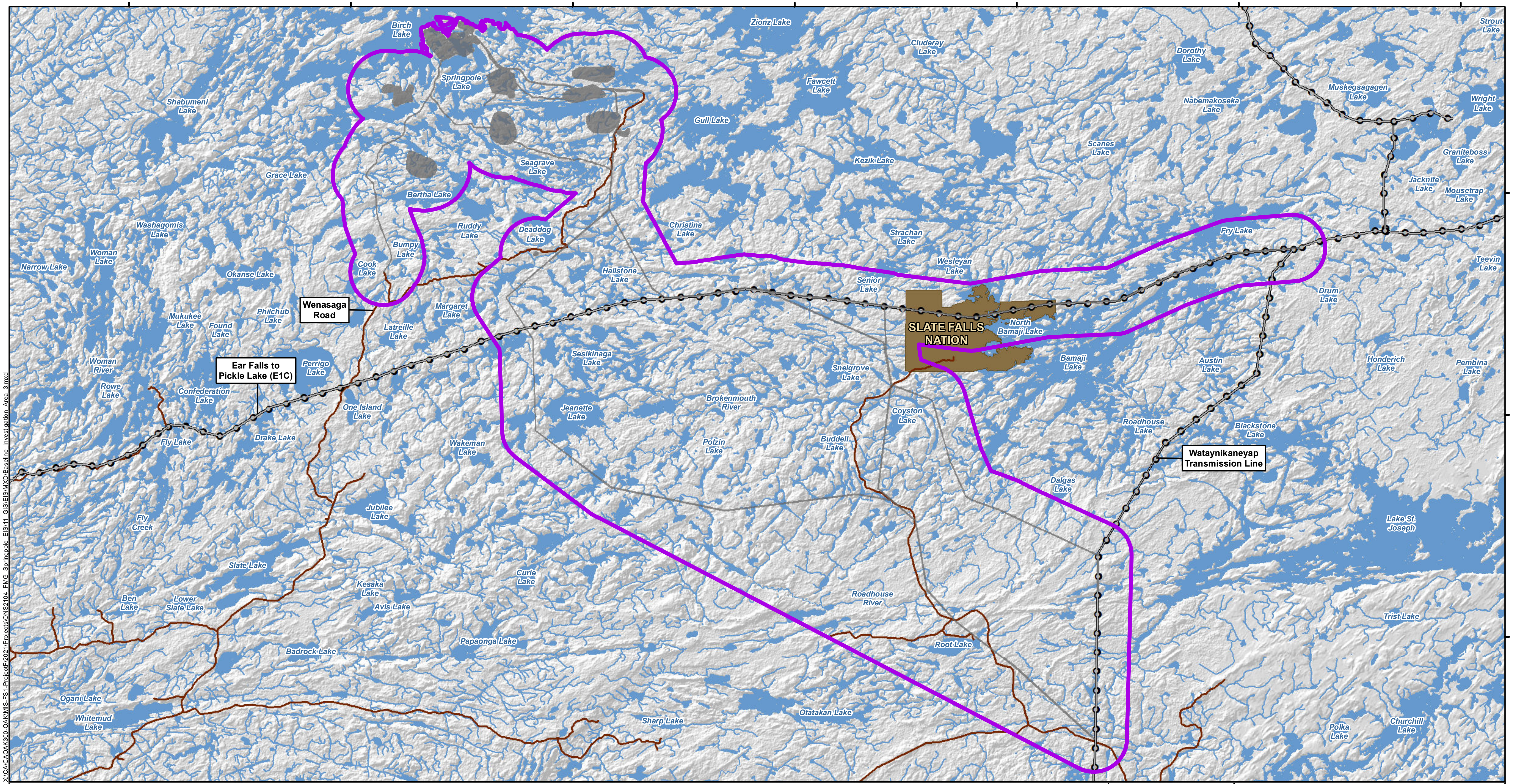
For the purposes of assessing potential Project-related environmental effects and cumulative environmental effects, a description of the spatial boundaries or study areas and temporal boundaries for each VC is provided in Section 6.0.

Table 3.3-1: List of Baseline Studies

Discipline Area	Baseline Study Title	EIS/EA Appendix
Natural Environment	Air Quality Baseline	G-1
	Baseline Sound and Vibration – Leaves Off	H-1
	Baseline Sound and Vibration – Leaves On	H-2
	Ambient Light Assessment	J
	Static Testing Baseline Report	K-1.1
	Tailings ML/ARD Assessment - Static Testing Results (update)	K-1.2
	Kinetic Geochemistry Report	K-1.3
	Overburden Fish Habitat Area Geochemistry Memo	K-1.4
	Static Geochemical Characterization of Springpole Lake Sediment Samples	K-1.5
	Preliminary Geochemical Assessment of CDF Quarry	K-1.6
	Baseline Hydrogeology Report	L-1
	Baseline Hydrology Report	M-1
	Baseline Surface Water Quality Report	N-1
	2022/2023 Aquatic Resources Baseline Report	O-1
	2021 Aquatic Resources Baseline Report	O-3
	2019 – 2020 Aquatic Resource Assessment	O-2
	Baseline Terrestrial Resources Report	P-1
Social and Economic Environment	Baseline Socioeconomic Report Addendum	Q-1
Cultural Environment	Cultural Heritage Research Report	S-6
	Cultural Heritage Baseline Report – CHR1	S-7
	Cultural Heritage Evaluation Report – CHR2 Travel Route	S-8
	Cultural Heritage Evaluation Report – CHR3 Cabin	S-9
	Cultural Heritage Evaluation Report – CHR4 Cabin	S-10
	Cultural Heritage Evaluation Report – CHR5 Cabin	S-11
	Cat Lake First Nation Indigenous Knowledge and Use Study (CLFN 2024a)	N/A
	Cat Lake First Nation Socioeconomic Baseline Study for the Proposed Springpole Gold Mine Project (CLFN 2024b)	N/A
	Lac Seul First Nation Indigenous Knowledge and Use Study (LSFN 2024a)	N/A
	Lac Seul First Nation Socioeconomic Baseline Study for the Proposed Springpole Gold Mine Project (LSFN 2024b)	N/A
	Traditional Land Use and Occupancy and Traditional Ecological Knowledge Study Report for Springpole Gold Mining Project (MON 2023)	N/A

Discipline Area	Baseline Study Title	EIS/EA Appendix
	Health, Socio-economic, Indigenous Knowledge and Land Use Baseline Study (SFN 2024)	N/A
	Wabauskang Traditional Knowledge and Use in the Area of the Springpole Gold Access Corridor Project (Morin et al. 2014)	N/A
	Traditional Knowledge and Land Use Study for the First Mining Gold (FMG) Springpole Mine Project (MNO 2021)	N/A
	Springpole TKLUS Follow-Up Report (NWOMC 2024)	N/A
Built Environment	Stage 1 Archaeology Report - Mine Site	S-1
	Stage 2 Archaeology Report - Mine Site	S-2
	Stage 1 Archaeology Report – Transmission	S-3
	Stage 1 Archaeology Report - Pipeline/road	S-4

Note:
N/A = not applicable



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Baseline Investigation Area
- Existing Road
- Existing Transmission Line
- First Nation Reserve
- Watercourse
- Waterbody

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.

Datum: NAD83
Projection: UTM Zone 15N

0 10 20 40 60 80 100 Kilometres

FIRST MINING GOLD | WSP

SPRINGPOLE GOLD PROJECT

Baseline Investigation Area

PROJECT N°: ONS2104	**FIGURE: 3.3-1**
SCALE: 1:325,000	DATE: October 2024

3.4 Summary of Existing Conditions

The following sections outline the methods used to undertake the baseline studies and provide an overview of the results of the existing natural, social, economic, cultural and built environment conditions, as well as to support the assessment of alternatives in Section 4. Further details related to the existing conditions of the VCs that inform the assessment of effects for the preferred alternative are provided in Section 6 and the TSDs.

The summary of existing conditions is presented according to the components of the environment:

- Natural environment:
  - Meteorological and climate (Section 3.3.1);
  - Air quality (Section 3.3.2);
  - Sound and vibration (Section 3.3.3);
  - Geology and physiography (Section 3.3.4);
  - Hydrogeology (Section 3.3.5);
  - Hydrology (Section 3.3.6);
  - Surface water (Section 3.3.7);
  - Aquatic resources (Section 3.3.8);
  - Vegetation communities and wetlands (Section 3.3.9);
  - Wildlife and wildlife habitat (Section 3.3.10);
- Social environment:
  - Socioeconomics (Section 3.3.11);
- Economic environment:
  - Socioeconomics (Section 3.3.11);
- Built environment:
  - Socioeconomics (Section 3.3.11);
  - Light (Section 3.3.12);
  - Visual aesthetics (Section 3.3.13);
- Cultural environment:
  - TLU Studies (Section 3.3.14);
  - Archaeological resources (Section 3.3.15);
  - Built heritage resources and cultural heritage landscapes (Section 3.3.16).

Project-specific TK information has been considered and incorporated into the existing conditions sections for each VC, where available, while respecting the confidentiality of the information. Further details on the existing conditions in support of the effects assessment are presented in Section 6.0.

3.4.1 Meteorology and Climate

Climate data typically include information on precipitation, temperature and wind and are used in water balance and flood design calculations to assess general site design and operation conditions. This information is also used in air quality and noise modelling to further support the assessments of potential effects on the atmospheric environment.

The meteorology and climate study, including methods, analysis, results and summaries of previous studies, is reported in the Hydrology Baseline Report found in Appendix M-1.

3.4.1.1 Methods

Climate data from site-specific field programs, previous reporting and several regional ECCC stations were used to characterize the climatic conditions in and around the Project.

An onsite weather station (Springpole Station) was installed approximately 100 m northwest of the exploration camp in September 2011. It was programmed to record hourly measurements of temperature, precipitation, snow depth, humidity, air pressure, windspeed and direction. These data, recorded between January 2012 and November 2013, were logged on a Campbell Scientific CR200-200X series data logger. A new onsite weather station was installed near the existing exploration camp site in June 2020 to represent the meteorological and climate data for the Project. It records temperature, rainfall, humidity, air pressure, wind and gust speed, wind direction and evaporation on a 15-minute interval. A heated precipitation gauge was installed onsite in 2022 to record winter precipitation amounts.

Regional climate stations operated by ECCC within 150 km of the site were considered in summarizing the climatic conditions and included Ear Falls, Red Lake, Sioux Lookout and Pickle Lake. Climate data have been collected at these stations for several decades and are summarized as climate normals for 1981 to 2010 for Sioux Lookout A, Red Lake A and Pickle Lake A, and as climate normals for 1971 to 2000 for Ear Falls (ECCC 2021).

Five years (2013 to 2017) of site-specific surface meteorological data and upper air data, processed and provided by the MECP based on the Red Lake A ECCC Station, were used for air quality dispersion modelling. Precipitation data were acquired from Lakes Environmental as a Weather Research Forecast dataset, which was incorporated into the data provided by the MECP.

The meteorological data included hourly wind speed, wind direction, temperature and barometric pressure. The land use surrounding the Project was used to establish appropriate surface roughness, albedo and Bowen ratio values. These data allow the determination of the mixing height and other parameters that influence air dispersion of emissions from sources at the Project site.

3.4.1.2 Overview of Results

Monthly mean precipitation was determined using historical data and data from the onsite weather station and stations surrounding the Project site, as identified above.

The mean annual precipitation for the Project site was determined to be 704 millimetres (mm). The 1-in-25-year, 24-hour storm rainfall was estimated to be 101.5 mm (MTO 2021). Monthly rainfall is normally highest in June and July, when summer showers and thunderstorms occur as shown in Figure 3.4-1. Snow starts to accumulate in October, becomes deepest in January and February and is expected to melt completely by May as shown in Figure 3.4-2.

Climate normals for the Red Lake Airport Station (Red Lake A, Station 6016975, Canadian climate normals 1971 to 2000), which is the closest ECCC weather station to Project site, include an average temperature of 1.3 degrees Celsius (°C), and range from a low of -18.3°C (January) to a high of 18.1°C (July), as shown in Table 3.4-1 and Figure 3.4-3.

The wind data from the site-specific dataset are presented for the five-year period (2013 to 2017) and for the summer months only (Figure 3.4-4). The wind rose does not indicate any wind direction as prevalent, but winds from the east and northeast were least common. The average wind speed for the dataset was 3.4 metres per second (m/s).

In general, the ECCC stations show slightly more precipitation (10% to 22%) than the precipitation recorded at the Springpole station for the period from April 2022 to November 2022. However, all exhibit similar trends, with the greatest precipitation in the spring compared to fall.

3.4.2 Air Quality

Baseline data are used to characterize the local and regional ambient air quality prior to construction in the vicinity of the proposed Project. The baseline air quality study, including methods, analysis, results and summaries of previous studies, is reported in air quality TSDs found in Appendices G-1 and G-3. Further details on the existing conditions in support of the effects assessment are found in Section 6.2.

3.4.2.1 Methods

Data sources used to determine baseline ambient air quality include:

- ECCC National Air Pollution Surveillance Program (NAPS) long-term air monitoring stations;
- Literature values; and
- Onsite measurements.

The Project site is located in a remote area, absent of nearby large urban centres and industrial sources. Baseline air quality is influenced by long-range transport of air contaminants, as well as by natural sources such as forest fires and volatile organic compound emissions from vegetation.

The baseline concentrations used as background concentrations for the air quality assessment were established using regional data collected by regulatory agencies at stations in Thunder Bay and Winnipeg (Ellen Station) that are part of the ECCC NAPS network, as well as published values to provide a complete dataset. Thunder Bay, located approximately 430 km from the Project site, and Winnipeg, located approximately 300 km from the Project site, are considered appropriate for the regional air quality experienced in northwestern Ontario. These urban stations will, however, overestimate air concentrations at the Project site as they are influenced by urban sources and are considered to be a conservative baseline. This is particularly true where the 90th percentile concentrations are used. The 50th percentile better reflects regional air quality at the Project site as it is not influenced by major urban areas.

The background concentrations for particles less than 2.5 micrometres (µm) in diameter ($PM_{2.5}$), nitrogen dioxide and carbon monoxide were determined using three years of hourly monitoring data from the two regional stations identified. Regional sulphur dioxide data from Winnipeg were used as sulphur dioxide is not measured at the Thunder Bay station. For 24-hour and 1-hour averaging times, the 90th percentile of the measured concentrations was used. For annual averages, the average of the data was used.

For $PM_{2.5}$, Health Canada considers 1.8 micrograms per cubic metre (µg/m^3) to be the average background (or baseline) level in Canada (Judek et al. 2004). When there are no site-specific values or measurements, it is appropriate for the air quality assessment to apply this value as the average background level of $PM_{2.5}$ for the annual averaging period. Use of the average monitored data at Thunder Bay and Winnipeg as the regional baseline is conservative in comparison with this average. The Health Canada recommended average background concentration was used for the assessment of diesel particulate matter.

Particles less than 10 µm in diameter (PM_{10}) and suspended particulate matter background concentrations were estimated based upon the hourly $PM_{2.5}$ data from the regional air monitoring stations and an assumed particle size distribution, where 56% of the total particulate is PM_{10} and 30% of the total particulate is $PM_{2.5}$ (Lall et al. 2004).

Background concentrations for metals, or metal-containing substances such as calcium oxide and copper sulphate, were established based on the background air concentrations of particulate, and the conservative assumption that the composition of the particulate matter was consistent with that of the ore and mine rock for which data are available.

An onsite baseline air monitoring program was initiated in 2020 to measure suspended particulate matter, PM_{10}, $PM_{2.5}$, metals, nitrogen dioxide and sulphur dioxide at the Project site to establish existing conditions in the baseline investigation area. The program was expanded in mid-2021 to collect additional data (Figure 3.4-5). The onsite measurements were used to refine background concentration estimates and compared to the regional concentrations used in the air quality assessment.

3.4.2.2 Overview of Results

The results from NAPS Thunder Bay and Winnipeg datasets for the 90th percentile did not exceed the Ontario Ambient Air Quality Criteria / Criterion (AAQC) and in most cases were well below the AAQC.

When compared against the AAQC, PM_{10} and $PM_{2.5}$ were most notable at approximately 36% of their respective 24-hour AAQCs. Air quality at these urban station locations is influenced by higher motor vehicle activity and the proximity of other air emissions sources and is therefore considered to be conservative when used as existing baseline data for the baseline investigation area. In contrast, the Project is located in a remote, primarily wilderness setting.

The onsite data presented in Appendices G-1 and G-2 are comparable with the regional data and the data estimates used for the air quality assessment. As an example, the 90th percentile of both the regional and onsite suspended particulate matter data was 32 µg/m^3 (24 hour averaging time); which is notably lower than the AAQC of 120 µg/m^3. The onsite value may be biased high due to the dataset having fewer values from typically lower particulate seasons (e.g., winter) and from forest fires in the area. The metals 90th percentile concentrations measured on site have been an order of magnitude below their respective AAQC.

Long-term average measurements of nitrogen dioxide and sulphur dioxide indicate concentrations onsite are substantially lower than the AAQCs and regional estimates.

The data from regional monitoring stations and onsite measurements indicate good air quality attributed to the rural setting near the Project.

3.4.3 Sound and Vibration

Sound and vibration data are used to characterize existing conditions so that the potential effects from Project-related noise and vibration levels can be effectively assessed, and applicable MECP noise guideline values can be met at the nearby receptors.

The baseline sound and vibration study, including methods, analysis and results, is reported in the sound and vibration TSDs provided in Appendices H-1 and H-2. Further details on the existing conditions in support of the effects assessment are found in Section 6.3.

3.4.3.1 Methods

Sound and vibration baseline monitoring took place in April and June of 2021. Sound monitoring was conducted in accordance with NPC-300 guidelines (MOECC 2013), and sound level measurements were taken for at least 48 hours. So that measurements would be taken over the quietest hours of a week, measurements were conducted for a seven-day period. Vibration monitoring was conducted in accordance with the NPC-119 guideline (MOE 1977b) for the assessment of potential damages to building structures due to vibration and NPC-207 (MOE 1977c) for the assessment of potential impacts related to human perception of vibrations.

Two locations were selected to be representative of potential receptors within the baseline investigation area based on proximity and directionality in relation to the Project location (Figure 3.4-6):

- SP1, located northwest of the Project (Universal Transverse Mercator [UTM] 547,208 E, 5,694,725 N); and
- SP2, located south of the Project (UTM 549,544 E, 5,690,934 N).

Sound and vibration monitoring was carried out during two events: April 15 to April 22, 2021 (representing natural conditions without leaves on trees), and June 22 to June 29, 2021 (with leaves present on trees). Sound monitoring data were collected for both the daytime (07:00 to 23:00) and nighttime (23:00 to 07:00) periods as defined in NPC-300 (MOECC 2013). Sound parameters were logged every hour over the monitoring period, whereas vibration parameters were logged every second.

Ambient sound level measurements were carried out using a Brüel & Kjær Type 1 Integrating Sound Level Meter set to slow response and programmed to measure one-hour history data for the following metrics:

- LAeq (A-weighted equivalent continuous sound level);
- LASmax (maximum sound level with A-weighted frequency response and slow time constant); and
- LASmin (minimum sound level with A-weighted frequency response and slow time constant).

The sound level meters were each outfitted with a manufacturer-approved pre-amplifier and free-field microphone. Each of the sound monitoring setups was installed in an environmental protection case with the microphone mounted on an external tripod and fitted with an appropriate windscreen. The microphones were set to a typical outdoor listening height of between 1.5 m and 2.0 m above ground. The sound level meter was calibrated by an independent certification lab and was field calibrated with a Brüel & Kjær (Type 4231) acoustical calibrator. The field calibration variance, before and after the monitoring, was less than ±0.5 decibels (dB). Monitoring was carried out with the sound level meter set to the A-weighting scale (denoted as dBA) to simulate the response of the human ear. This scale has several noise level references, for example: thunder and factories usually measure around 110 dBA, the average home or conversation can be recorded at 50 dBA and leaves rustling are at 10 dBA.

Baseline vibration monitoring was conducted using a Brüel & Kjær Vibration Monitoring Terminal set to measure one-second history data of peak particle velocity and root mean square velocity along three orthogonal axes. Each of the vibration monitoring systems was fitted with a triaxial geophone (DIN 2010).

At each of the vibration monitoring locations, the geophone was securely installed on the ground. The geophone was fitted with a three-pronged mount that was pushed firmly into the ground to fix the unit in place. The metrics collected correspond to the assessment of the two areas of potential impact:

- Peak particle velocity for the assessment of potential damage to building structures due to vibration; and
- Root mean square velocity for the assessment of potential impacts related to human perception of vibrations.

Project-specific weather data were collected from the Springpole Station to identify periods when sound monitoring equipment could have been affected by local meteorological conditions. Monitoring data collected during periods of inclement weather (as defined by NPC-103; MOE 1977a) were excluded from the monitoring dataset.

3.4.3.2 Overview of Results

The sound monitoring data indicate that the environment in the study area is characteristic of a rural (Class 3) area, in accordance with Ministry of the Environment and Climate Change guideline publication NPC-300 (MOECC 2013). Average sound levels at both monitoring locations are 25 dBA (nighttime) and 35 dBA (daytime) on a one-hour L_{Aeq} basis. The results of the vibration monitoring, for both locations, indicate that the background vibration peak particle velocity values are under 0.01 millimetres per second (mm/s) for more than 95% of the data collected and the average root mean square velocity is approximately 0.001 mm/s.

3.4.3.3 Traditional Knowledge

SFN noted that forestry was a barrier to hunting, trapping and plant harvesting practices due to clearcutting, which has been expanding north over time. Additionally, our SFN mentioned animal migration changes due to habitat loss and noise from forestry activities (SFN 2024).

3.4.4 Geology and Physiography

Characterization of regional and local geology and physiography provides important context to understand the potential effects that may be related to mining. Geology and physiography are not considered VCs (Section 6.1) but inform key aspects of predictive studies for the EIS/EA.

Additional detail regarding the Project geology and physiography is provided in the hydrogeology TSD in Appendix L-1.

Information regarding the geochemistry of mined materials (Section 5.4.4) and waste mineral products (Section 5.6.4) resulting from mining activities is provided in Section 5.

3.4.4.1 Regional Bedrock Geology

The overall regional bedrock geological setting of the Project is shown in Figure 3.4-7, and described by Devaney (2001) as follows:

> The Birch-Uchi Greenstone Belt is the portion of the Uchi Subprovince with an arcuate, concave to the southeast, (i.e., a major oroclinal bend between the Red Lake and Meen-Dempster portions of the subprovince). Studies of the southern part of the Birch-Uchi greenstone belt as a rootless greenstone belt only a few kilometres thick, have revealed a long (ca. 3.0 to 2.7 Ga), multistage history of crustal development. Based on mapping,

lithogeochemistry, and radiometric dating, the supracrustal rocks of the greenstone belt were subdivided into three stratigraphic group-scale units (listed in decreasing age): the Balmer, Woman and Confederation assemblages. This three-part subdivision was applied to most of the Uchi Subprovince. The Confederation assemblage is thought to be a continental margin (Andean-type) arc succession, versus the less certain tectono-stratigraphic context of the other assemblages. Workers performing recent and ongoing studies of the southern Birch-Uchi greenstone belt and the Red Lake greenstone belt (i.e., the Western Uchi Subprovince NATMAP Project) have proposed some modifications and additions to the Balmer-Woman-Confederation stratigraphic scheme. As discussed herein, some relatively small conglomeratic units likely form a synorogenic, discontinuously distributed, post-Confederation assemblage in the Birch-Uchi greenstone belt. Radiometrically dated plutons within the Birch-Uchi greenstone belt are of post-Confederation assemblage, ca. 2725-2700 Ma age.

The northern margin of the Birch-Uchi greenstone belt forms a pattern of sub-regional scale cusps of supracrustal strata alternating with batholiths. Basaltic units are prominent around the periphery of the greenstone belt and may be part of the Woman assemblage, but the accuracy of this stratigraphic assignment is unknown. Based on a ca. 2740 Ma age of Shabumeni Lake [intermediate to felsic fragmental] volcanic rocks at a site near the northern greenstone belt margin, suggested that Confederation assemblage age rocks make up the bulk of the greenstone belt.

The Archean Orogenic gold deposit model developed by various authors has been applied to the mineral deposits of the Archean Superior Province. Orogenic gold deposits are epigenetic, structurally controlled gold deposits that are hosted in orogenic belts. They are generally accepted as having formed during late stages of continental collision (about 2.6 billion years ago). Most of the discovered orogenic gold deposits in the world occur in greenstone belts situated on the margins or within Archean cratons in North America, Australia and southern Africa.

3.4.4.2 Local Bedrock Geology

The local bedrock geology is shown in Figure 3.4-8 and is composed primarily of three major groupings:

- Trachyte porphyry intrusion that hosts the mineralization zones of the Springpole deposit;
- Metavolcanic and siliciclastic rocks, which are host rocks that pre-date the mineralized intrusion and represent most of the bedrock in the vicinity of the proposed open pit; and
- Metasediments located to the northeast of the proposed open pit.

The zone of intrusive feldspar porphyry (trachyte) that is observed on the northeast shore of Springpole Lake, shown in red (Zone 6D) in Figure 3.4-8, extends out to the south under the footprint of the lake and forms the heart of the Springpole deposit. It is this rock zone that forms of the bulk of what has been deemed the Portage Zone that extends from surface to depths greater than 400 m and in the southeast to depths greater than 1,500 m. Studies conducted in 2009 and 2010 (FracFlow 2020) confirmed that this trachyte intrusion is the dominant lithology within the Portage Zone and host to considerable mineralization.

The Portage Zone bedrock has undergone alteration and metamorphism that has reduced the original porphyry intrusion to a complex alteration assemblage dominated by sericite, biotite, pyrite, calcite / dolomite and quartz. The bedrock of the Portage Zone shares little in common with the surrounding bedrock other than their location in proximity to the Project site.

The metavolcanic host rocks that pre-date the intrusion, shown as grey (Zone 1) and green (Zone 2) in Figure 3.4-8, are composed of a complex sequence of altered and metamorphosed volcanic (primarily andesite) and associated volcaniclastic rocks. These represent the primary rock type that is found in the immediate area of the proposed open pit, outside of the Portage Zone. The andesite, in particular, is observed to be notably competent in comparison to other rock types in the vicinity of the Project site.

A band of clastic metasedimentary rock is present north of the Project location as shown in purple (Zone 3) in Figure 3.4-8. These contain clasts of the trachyte porphyry and are assumed to post-date the mineralized intrusion.

3.4.4.3 Overburden Geology

Geotechnical investigations have been used to characterize the overburden geology at the site as detailed overburden geology mapping is not available from the Ontario Geological Survey for the baseline investigation area. The investigations include the following:

- Geologic descriptions from the 14 geotechnical boreholes, 21 test pits and 9 hand auger locations advanced during the summer 2020 field works; and
- Exploration boreholes that contain information on the total thickness of the overburden across the site (approximately 600 data points across the site).

The overburden geology in the vicinity of the Project generally consists of surficial organics (i.e., peat) and glacial sediments. The overall thickness of overburden can be thin to absent in some locations of higher bedrock topography and tends to become thicker under lakes and ponds (i.e., in low-lying areas).

Overburden / sediment thickness measurements obtained from exploration drillhole logs, test pits and monitoring well locations were used to determine the overburden thickness. On land, overburden thickness values are typically less than 5 m, while lake bottom sediment thickness is often greater than 5 m and, in some locations, greater than 40 m thick. Lake bed sediment thickness in the area of the proposed dike alignments is relatively thin and generally less than 2 m.

The overburden layers (stratigraphy) in the immediate vicinity of the Project can be simplified as follows (in the order they generally occur from ground surface to bedrock):

- **Peat / organics:** The area with the vicinity of the Project is generally covered by a thin layer of dark brown to black peat / organics that is typically less than 1 m on land but is up to approximately 5 m thick at the base of Springpole Lake.
- **Glaciolacustrine clay / silt:** A thin layer of clay / silt is found predominantly in lower lying areas, corresponding to ground surface elevations of less than roughly 405 metres above sea level (masl). It is typically absent in test pits / boreholes drilled at higher elevations. The colour is generally greenish grey and it has variable plasticity. On land, its thickness is generally less than 3 m; however, thicknesses in exploration holes drilled within Springpole Lake have shown presence of more than 10 m of clay at the base of the lake.

- **Glacial till:** A thin layer of glacial till (typically less than 3 m on land, up to at least 20 m under water) is present at the site. The composition is variable, but it generally consists primarily of sand and silt with smaller amounts of other particle sizes.

3.4.4.4 Local Topography and Drainage

Site topography and major site features are shown in Figure 3.4-9. The site topography within the baseline investigation area is typical of northern Ontario and can be characterized as moderately rugged. Overall relief at the site is about 35 m, with the topographic high area (elevation of 426 masl) located to the northwest of what is currently unnamed lake L-3. The elevation of Birch Lake is approximately 2 to 4 m (depending on the season) above Springpole Lake, which has an elevation of 391 masl.

There is a natural watershed divide near the Project. On the west side of the proposed open pit, the surface water divide between Springpole Lake and Birch Lake runs in a north–south direction and east of unnamed lake L-3. The divide continues farther south, along the narrow strip of land that separates Birch Lake from Springpole Lake. The unnamed lake L-3 catchment drains to the southwest and discharges into Birch Lake. Several small ponds and tributaries on the Springpole Lake side of this flow divide discharge into Springpole Lake. On the east side of the proposed open pit, the topography is similar, with the topographical high area (elevation of 414 masl) at the watershed divide located to the southwest of Dole Lake.

3.4.5 Hydrogeology

Baseline hydrogeological conditions at the Project site are described in terms of the geological setting, physical characterization and assessment of groundwater quantity. The hydrogeology baseline study information is used to support water balance calculations and water management strategies. It can also be used as a future reference in identifying environmental changes and for the assessments of potential effects on groundwater regimes.

The hydrogeology baseline study, including methods, analysis, results and summaries of previous studies, is reported in the hydrogeology TSD found in Appendix L-1. Further details on the existing conditions in support of the effects assessment are presented in Section 6.5.

3.4.5.1 Methods

Numerous baseline hydrogeological investigations have been completed within the baseline investigation area to support the Project over the period of 2019 to 2023. The database includes 220 unique measurements of bedrock hydraulic conductivity from rising / falling head tests in monitoring wells and packer tests in boreholes. Additional field programs conducted in the vicinity of the proposed dike alignments also provide hydrogeological data (Tetra Tech 2019). Further to the existing data and information, a supplemental hydrogeological characterization program is planned for 2024 based on feedback from the MECP. This program primarily focuses on the characterization of shallow bedrock hydrogeological conditions in the vicinity of the CDF, as well as the establishment of additional long-term groundwater monitoring wells.

The Hydrogeology Baseline Report (Appendix L-1) compiles the available hydrogeological data into a single report. Data were collected through logging of test pits and boreholes advanced as part of geotechnical / characterization studies, packer and hydraulic testing of both overburden and bedrock (packer tests) and monitoring site groundwater levels. Acoustical televiewer surveys were conducted in selected boreholes to map fracture frequency and orientation with the bedrock. A long-term (30-day) pumping test was also carried out to determine bedrock hydraulic properties and assess drawdown from pumping.

Groundwater quality sampling and stable isotope analysis were conducted as part of the field programs. Groundwater samples were collected from a number of monitoring wells and boreholes to determine if there was any considerable degree of spatial and temporal variability in the local groundwater quality, and to relate any such variability to the geology and the characteristics of the flow system, as applicable (Figure 3.4-10). Groundwater samples were collected from 13 boreholes, at various depths ranging from 40 to 400 m below surface using low flow sampling procedures, as well as seven monitoring wells installed in overburden and 15 multi-level piezometers installed in bedrock (primarily at less than 30 m depth). Groundwater sampling locations for the 2019 to 2023 field programs are shown in Figure 3.4-10. Samples were analyzed for physical-water parameters, major and minor ions, total metals and dissolved metals. A Quality Assurance / Quality Control (QA / QC) program involving the collection of duplicate samples, field blanks and trip blanks was conducted for each monitoring event. There are no criteria that apply to baseline groundwater quality. Groundwater quality results were compared for reference purposes only to the Ontario Generic Site Condition Standards for Use within 30 m of a waterbody (Table 9 in MOE 2011). These criteria do not strictly apply to baseline groundwater.

3.4.5.2 Overview of Results

A site-specific hydrostratigraphic conceptualization has been developed through the synthesis of borehole data, test pits, outcrop mapping and general observations from shoreline mapping. Hydrostratigraphy at site generally consists of overburden, a highly altered unconsolidated granular material (UGM) zone in the immediate vicinity of the open pit, a zone of low rock quality designation rock (Low RQD zone) in the area of the open pit, and the adjacent host rock surrounding the UGM and Low RQD zones. Lithologies of the host rock area generally include various metavolcanic and metasedimentary rocks and a trachyte porphyry intrusion (which is associated with the UGM zone).

Hydraulic conductivity has been assessed at the Project site based on packer testing, single well tests in monitoring wells, and a 30-day pumping test. Based on single well tests and packer tests, the geometric means of bedrock hydraulic conductivity are 5.0×10^{-6} m/s for the UGM zone (four data points), 2.9×10^{6} m/s for the Low RQD zone (33 data points), and 2.1×10^{-7} m/s (183 data points) for the host rock zone. When further broken down by site location, host bedrock hydraulic geometric mean values are 3.2×10^{-8} m/s for the co-disposal facility areas and 4.0×10^{-7} m/s for the rest of site. The hydraulic conductivity of lake bed sediments is very low based on lab testing, and the geometric mean of all other overburden units is 5.9×10^{-6} m/s. Hydraulic conductivity values for overburden and interface materials (excluding the lake bed organics) show a relatively narrow range, with values ranging from 1.0×10^{-6} to 6.0×10^{-5} m/s.

Groundwater levels generally correlate with local topography and decrease from inland topographic highs toward surrounding topographic lows and surface water features. Measured groundwater levels where monitoring wells are present around the site range from approximately 389.8 to 418.8 masl. Shallow / local groundwater flow pathways are likely toward nearby lakes / ponds, while deeper groundwater pathways are likely directed to larger lakes of the area (i.e., Springpole Lake and Birch Lake).

Minimum daily surface water flows measured within the sub-catchments of Springpole Lake provide a quantitative indication of groundwater discharge and, by inference, also groundwater recharge within these sub-catchment areas. For gauging stations closest to the Project site that have summer low flow data, the daily minimum flows essentially drop to zero, indicating that groundwater recharge within these sub-catchments is expected to be quite low.

Collected intermediate to deep groundwater samples from fractured bedrock were alkaline in nature, whereas the samples collected in shallow bedrock and overburden were slightly acidic to neutral. The predominantly alkaline nature of the groundwater samples suggests any natural acidification that is occurring is being neutralized by dissolution of carbonate mineralogy present within the bedrock. The analysis of groundwater also showed naturally elevated levels of sulphate, dissolved arsenic, dissolved iron and other heavy metals in some samples that may be attributed to the interaction between groundwater and the Springpole deposit orebody, which contains zones of sulphide minerals.

Daily groundwater samples were collected during the long-term aquifer pumping test conducted at borehole location SP20-001. The test well was constructed as a long open interval in a fractured bedrock setting that likely intersects with several water producing features along its length. It is anticipated that these features may produce fresh water near surface and progressively more mineralized water at depth.

3.4.5.3 Traditional Knowledge

CLFN noted that access to clean drinking water from natural sources is an important practice when spending time on the land. CLFN members reported collecting water year-round, including the winter, from Birch Lake, Springpole Lake, Keesic Lake, Gull Lake, Swayne Lake, and Zionz Lake (CLFN 2024a). In some cases, the collection of clean water was done in preparing traditional medicines. CLFN noted that there are spring water collection sites within the proposed Project footprint, although these appear to be further southeast and away from the CDF (CLFN 2024a). Further, CLFN noted there are spring water sites and drinking water collection sites in the local area for their TK study, but the exact location and frequency of use was not specified.

LSFN emphasized the importance of the English River water system in the territory for the ability to collect drinking water safely, and for supporting healthy fish habitats (LSFN 2024a). LSFN members indicated that waters of northern lakes closer to the Project were important and valued as places where water was cleaner, compared to waterbodies closer to their community (LSFN 2024a). LSFN noted the importance of wild rice harvesting in waterbodies adjacent to Lac Seul communities, where flooding had historically occurred due to hydroelectric development. LSFN noted a spring water site within the Project footprint, which appears to be upstream of the proposed treated effluent discharge location. Spring water sites were also observed in the local and regional study areas for their TK study, but the exact locations and frequency of use was not described.

3.4.6 Hydrology

The information from the baseline hydrology study will aid in the assessment of potential water quality and water taking / discharging effects on fish and aquatic habitat and provides a reference to identify environmental changes. Hydrological data are used in water balance calculations and engineering design input to determine the receiving water assimilative capacity.

The hydrology baseline study, including methods, analysis, results and summaries of previous studies, is reported in the hydrology TSD in Appendix M-1. Further details on the existing conditions in support of the effects assessment are presented in and Sections 6.7 and 6.8.

3.4.6.1 Methods

Baseline surface water hydrology programs have been conducted within the baseline investigation area since 2011. The Hydrology Baseline Report (Appendix M-1) compiled climate and hydrology data from site-specific field programs, regional ECCC stations and the Water Survey of Canada, as well as other sources, are summarized in previous reporting.

The first hydrometric field program was initiated in June 2011, during which five hydrometric monitoring stations were installed at and near the Project site (SPR-HS1 to SPR-HS5). An additional hydrometric field program was completed in 2020. Sixteen flow monitoring stations were established at the sites of the former stations at that time, as well as at several new locations. Eight lake level logging stations were installed in Springpole Lake, three of which continued in 2021.

A third hydrometric field program was initiated in May 2021. During 2021, a number of flow and level stations from the previous monitoring programs were re-established. This included the flow monitoring stations at the inflow and outflow of Springpole Lake (F7-HS1, F8-HS7), smaller local watersheds (F11-HS2, F13) and the lake level monitoring stations in Springpole Lake (L1B-FFC, L7-FFC). In addition, new lake level monitoring stations were established in Birch Lake and local inland waterbodies near the Project site (L10, L11, L12 and L13). Manual flow and water level measurements were conducted approximately monthly during the open water season (June to February). Furthermore, during low flow periods, spot flow measurements were conducted at stations F5-HS5 and F3-HS4. Lowest flows were generally observed between August and September. Two winter monitoring programs were also conducted in February 2022 and February 2023 to document winter low flows and visually inspect ice conditions across Springpole Lake.

Between May 2021 and February 2023, 12 additional stage-discharge measurements were collected at station F7-HS1 (Springpole Lake inflow) and 14 additional stage-discharge measurements at F8-HS7 (Springpole Lake outflow). Information regarding all of the hydrology stations is detailed in Appendix M-1.

Design return period storm events were determined through the intensity duration frequency (IDF) curves obtained from either the selected ECCC climate stations or from the Ministry of Transportation (MTO) web-based application, the IDF Curve Lookup tool (MTO 2021). Historical climate data from Red Lake stations were used for the analysis of wet and dry years with various return periods. The return period wet year analysis was performed using the Gumbel distribution with the Method of Moments. The Weibull distribution with the Method of Moments was used for the return period dry year analysis. The average annual lake evaporation was interpolated based on data from *Hydrological Atlas of Canada* (Fisheries and Environment Canada 1978) with monthly distributions based on distributions derived from the calculations of potential evapotranspiration using Hargreaves equation.

3.4.6.2 Overview of Results

The Project is situated between Birch Lake and Springpole Lake as shown in Figure 3.4-11.

Birch Lake is a regional lake with a watershed area of approximately 1,050 km^2. Birch Lake has a surface area of 11,823 ha and is irregular in shape. The maximum depth is 37 m, with an average depth of 7.4 m. The east end of the lake is deeper and more open than the west, which is characterized by narrow channels and comparatively shallow water. It flows west then south before discharging into Satterly Lake. From there, it flows into Cromarty Lake and joins the Springpole Lake watershed through the Birch River. The Birch River continues south until it meets Lake St. Joseph.

Springpole Lake has a large, generally circular northern basin connected to the long, narrow east arm of the lake by a narrow channel. Overall, Springpole Lake has a maximum depth of 35.1 m and an average depth of 6.3 m. Springpole Lake has a surface area of 2,556.8 ha (28.6 km^2), watershed area of approximately 98.2 km^2, and an estimated volume of approximately 190 million cubic metres (Mm^3). The outlet of Springpole Lake is at the east end, where it flows into the Birch River and discharges into Gull Lake. Water level data collected in 2021 to 2022 from the three stations within the north basin, the southeast arm and outlet of Springpole Lake exhibited a consistent trend throughout their shared monitoring period. This illustrates that Springpole Lake functions as one continuous body of water.

Beginning in May 2022, a large and sudden increase in the water levels of Birch, Cromarty and Springpole lakes was observed. This was likely a result of high snowfall and consistent low temperatures during the 2021 to 2022 winter followed by a rapid and late snowmelt. The increase in water level during this period was approximately 2.5 times larger than any peak water level observed in the previous two monitoring campaigns.

The 1-in-25 year, 24-hour storm rainfall was estimated to be 101.5 mm (MTO 2021) as shown in Table 3.4-2. Annual precipitation for wet and dry years for various return periods is summarized in Table 3.4-3. The average annual lake evaporation was determined to be 460 mm, and the monthly distributions are shown in Table 3.4-4.

The Water Survey of Canada station at Sturgeon River at McDougall Mills (Station ID: 05QA004) was selected as a basis for the development of flow statistics for the Project site to characterize local runoff characteristics. Based on the nearest ECCC station at Sioux Lookout, located adjacent to the Sturgeon River at McDougall Mills watershed, the calculated average annual runoff is approximately 282 mm, with a runoff coefficient of 0.36. Monthly and annual runoff statistics for Sturgeon River at McDougall Mills were pro-rated to the Springpole Lake catchment areas. The mean annual runoff is 281.2 mm, with a high in May and low in March, as shown in Table 3.4-5. Low flow analyses are presented in Table 3.4-6 for Springpole Lake.

Springpole Lake Inlet Flows

The catchment area reporting to the inlet of Springpole Lake is approximately 1,274 km^2. Based on available flow data from monitoring stations established at the inlet of Springpole Lake (from Cromarty Lake) and the outlet (into Gull Lake), surface water flows are highest in June and July and lowest between October and March. During the 2011/2012 field program, eight manual flow measurements were conducted at the inlet with flows ranging between 2 and 24 m^3/s.

Springpole Lake North Basin

The average monthly flows are expected to be highest in May (22.2 m^3/s) and June (22.9 m^3/s), following the spring freshet, and lowest during the late winter months of February (6.2 m^3/s) and March (5.4 m^3/s). A low flow frequency hydrologic analysis was also conducted, and the resulting seven-day low flow value for the Springpole Lake inlet (F7-HS1) is 1.2 m^3/s for 7Q20 (the lowest consecutive seven-day average flow expected over a 20-year period), and for the outlet (F8-HS7) is 1.35 m^3/s for the 7Q20, as shown in Table 3.4-6.

Springpole Lake Southeast Arm

The north basin of Springpole Lake flows south into the southeast arm of Springpole Lake, which extends 17.7 km from inlet to outlet, with the majority of the waterbody being a narrow channel. The total watershed reporting to the southeast arm of Springpole Lake is approximately 1,319 km^2. The watershed area at the

Springpole Lake outlet is 1,367 km^2. Average monthly flows are expected to be highest in May (21.4 m^3/s) and June (22.1 m^3/s), following the spring freshet, and lowest during the late winter months of February (5.9 m^3/s) and March (5.2 m^3/s).

Local Inland Waterbodies

Numerous local inland waterbodies (lakes / ponds) and watercourses within the baseline investigation area were surveyed between 2012 and 2023. Results of the baseline hydrology program are for key stations and watercourses that were identified as potentially affected by the Project; however, these are also representative of the waterbodies and watercourses within the baseline investigation area.

Flow monitoring stations with smaller catchment areas were established within the Springpole Lake watershed during the 2011/2012 and 2020 field programs. Seasonal trends indicate that some of the smaller sub-watersheds respond quickly to precipitation events and may produce zero flow during the early spring and late summer / fall.

3.4.6.3 Traditional Knowledge

CLFN noted that members have experienced unpredictable fluctuations in the water levels of lakes and rivers, that have impacted travel routes and the accessibility of some areas. These lower water levels lead to exposed hazards (i.e., reefs, rocks) within the water that interfere with safe, unhindered passage throughout these freshwater environments, especially in the narrow or shallow passages which occur between some of the commonly used and important lakes (CLFN 2024a).

LSFN noted that a critical turning point in changes to LSFN's way of life was in 1929, when a dam for power hydroelectricity generation in Manitoba led to using Lac Seul as a water reservoir (LSFN 2024a). Lac Seul's water levels were raised by 10 feet, and LSFN's reserve lands, homes, farms, wild rice fields, and gravesites were lost. Although the hydro-dams and other control structures are used to control water levels, generate power, and avoid seasonal flooding, the LSFN have noted that there has been frequent changes in the water levels of Lac Seul and surrounding and connected waterbodies (LSFN 2024a). LSFN members have experienced the flooding of important areas, the destruction of camps and other lands through the flooding or erosion of the foreshore, interruptions to navigation through changing depths. In some cases, water level fluctuations were eight to ten feet (CLFN 2024a). These widely fluctuating water levels (especially high waters) have caused past damage to land-fast infrastructure, and result in constantly having to repair infrastructure like docks that support a range of water-based activities (including travel, fishing and hunting) (LSFN 2024a). It was noted that the fluctuating water levels have radically reshaped the Lac Seul basin, causing damage to infrastructure, erosion, impacts to fish habitat, and navigation risks for the LSFN members who use the lake.

SFN noted that it is also important that water volume in the Cat River System is adequate to support lands and their way of life. The rivers and lake systems are noted as being used as travel routes by SFN members. Changes in water levels have had vast impacts on the ability of SFN members to navigate the rivers and lakes. For example, in the summer of 2023, SFN members' ability to access traditional boating routes was notably limited due to abnormally low water levels (SFN 2024). These changing water levels have disrupted some of SFN's permanent camps and limited the ability to set up camps. Further, the changes in water levels limit other traditional uses such as several plant harvesting locations that are not accessible when the lake systems are flooded, and traditional foods such as wild rice that cannot go to seed when water levels are high. When water levels are low (SFN 2024). SFN members have experienced challenges travelling along more rocky water routes and several members have experienced damage to their boats from rocks. SFN has also noted that algae has been identified to bloom more abundantly when water levels are low and stagnant, leading to other ecosystem changes and impacting deep water fishing for Lake Trout and Lake Sturgeon (SFN 2024).

3.4.7 Surface Water

Water quality is an important parameter for both the physical and biological environments, helping to define the health of aquatic ecosystems and providing a basis for calculating effluent discharge loadings, design input for potable water treatment systems, and for the assessment of potential effects.

Baseline surface water quality programs have been conducted in the baseline investigation area since 2011. Sample collection, analytical methods and baseline water quality monitoring results are summarized in this section.

The surface water quality baseline study, including methods, analysis, results and summaries of previous studies, is reported in the water quality TSD provided in Appendix N-1. Further details on the existing conditions in support of the effects assessment are found in Sections 6.6 to Section 6.9.

3.4.7.1 Methods

Initial baseline surface water quality monitoring occurred from 2011 to 2020, with 327 samples collected from 29 sampling locations. An additional eight sampling locations were added in the 2021 sampling program, and the sampling program was further expanded in 2022 in response to community feedback to include three regional sampling locations downstream of the Project. These regional sampling locations were representative of drainages associated with CLFN and SFN. In total, 1,136 samples were collected from 2011 to 2023, including QA / QC samples (Figure 3.4-12 and Table 3.4-7).

Surface water samples were collected from less than 1 m below the water surface and placed in laboratory supplied-bottles, pre-charged with preservatives and field-filtered (to less than 0.45 µm), as necessary. Temperature, pH, dissolved oxygen and conductivity were recorded in the field using a field meter (Horiba U-22 or YSI multiparameter). Samples were analyzed in a laboratory for a broad set of parameters including acidity, conductivity, alkalinity, total hardness, total suspended solids, total dissolved solids, chloride, sulphate, ammonia, nitrate, nitrite, phosphorus, orthophosphate, dissolved and total organic carbon, and a wide spectrum of metals by inductively coupled plasma mass spectrometry (ICP-MS).

Water column profile samples were collected for Springpole Lake, Birch Lake and Seagrave Lake to monitor temperature, dissolved oxygen and pH and to describe the natural stratification characteristics of each lake. Samples were collected at 1 m increments from surface to bottom with a YSI multiparameter sonde.

Water quality samples were also collected during the aquatic resources sampling programs to document water quality conditions at the aquatics field program. This sampling included field measurements for dissolved oxygen, conductivity, pH and temperature.

Analytical results from all sampling programs were compared to available Ontario Provincial Water Quality Guidelines (PWQO) or interim PWQO (iPWQO) for the protection of aquatic life. Where PWQO were not available, Canadian Water Quality Guidelines (CWQG) were generally used. Water quality objectives / guidelines are chemical and physical indicators that have been set to establish a measurable level of water quality that is protective of all aquatic life and life cycle stages.

3.4.7.2 Overview of Results

Water quality results indicate that the surface waters in all monitored waterbodies are typical of oligotrophic lakes in northwestern Ontario, demonstrating limited nutrient availability, low turbidity and saturated to near-saturated dissolved oxygen concentrations. Levels of total suspended solids and total dissolved solids were generally very low. Water column profile results indicate that most lakes experience a turnover during the year and but remain stratified throughout the summer months.

Concentrations of total and dissolved metals are very low, often at or below analytical detection limits. There were a few occasions where measured baseline concentrations were higher than available water quality guidelines / objectives (iPWQO, PWQO or CWQG) for sampled waterbodies. These occurrences were irregular, generally associated with elevated total suspended solids levels and are considered representative of the natural heterogeneity of these lake systems. Parameters with concentrations greater than guidelines in the baseline condition include pH, total aluminum, phosphorus, total iron and total copper.

3.4.8 Aquatic Resources

Fisheries and benthos data were used to characterize local aquatic ecosystems, determine environmental sensitivities to potential adverse effects and to provide a basis for developing fish habitat offsetting measures where adverse effects on aquatic ecosystems are otherwise unavoidable. The aquatic resources baseline study describes and characterizes the aquatic resources in the baseline investigation area, including fish habitat, fish communities and benthic invertebrates.

The aquatic resources investigations, including methods, analysis, results and summaries of previous studies, are reported in the aquatic resources TSD found in Appendix O. Further details on the existing conditions in support of the effects assessment are presented in Section 6.10.

3.4.8.1 Methods

Aquatic assessments of 15 waterbodies and eight watercourses within the local area of the Project were conducted between 2009 and 2019 (Appendix O-1). These assessments included bathymetry, water quality, fish habitat surveys, fish community surveys, spawning surveys, fish tissue analysis and tagging. The 2019 baseline assessments included fish community and fish habitat surveys, and contaminants in fish tissue for inland waterbodies southeast of the Project site, as well as previously unsampled watercourses within the mine site footprint. For ease of discussion, the waterbodies were grouped into large waterbodies, small waterbodies and small watercourses as follows:

- Large waterbodies: Birch Lake, Springpole Lake and Seagrave Lake (Figure 3.4-12);
- Small unnamed waterbodies: L-1, L-2, L-3, L-4, L-5, L-6, L-10, L-11, L-12, L-13, L-14 and L-16 (Figure 3.4-13); and
- Small unnamed watercourses (tributaries): S-9, S-16, S-17, S-20, S-25, S-26, S-27, S-28 and S-29 (Figure 3.4-13).

In addition, further assessment was conducted for aquatic habitat, fisheries community surveys, sediment sampling and analysis, and benthic invertebrate community surveys during the summer of 2020. These assessments were conducted on the following named and unnamed waterbodies:

- Large waterbody: Springpole Lake;
- Small unnamed waterbodies: S-9, L-2, L-5, L-6 and L-16; and
- Small unnamed, and named watercourses: UNX01, UNX03, UNX07 and Birch River.

Bathymetry and substrate surveys were also conducted along nearshore and midbasin portions of Springpole Lake.

In 2021, an aquatic resources assessment field program was undertaken to assess and/or re-assess the small unnamed inland lakes within the baseline investigation area (Figure 3.4-14). The 2021 fish community assessments were conducted at six locations during spring, summer and fall periods, using gill nets, minnow traps and seine nets. The summer biological field study was partially completed due to a regional forest fire that required evacuations. The residual components, including the assessment of small inland waterbodies, were completed during the 2022 field season. The 2023 aquatic resources field studies supplemented previously collected data and addressed optimizations in the Project footprint.

Bathymetric mapping was collected in 2012 and 2013 using a Hummingbird 798ci HD Side Imaging Sonar with internal Global Positioning System (GPS). This was used to log georeferenced sonar return information from transects totalling approximately 200 km in length. Most of these transects were used for calculating both depth and bottom hardness. Differences in Springpole Lake water levels between collection dates were determined at a standard location and used to adjust the logged depths accordingly. An accurate georeferenced shoreline was traced from orthorectified aerial photographs in Manifold System 8 (Build 8.0.28.0 Copyright 1993-2012) geographic information system software and exported to DrDepth bathymetry mapping software (PC version 5.0.8 Copyright 2005-2012) for use in the preparation of the depth and hardness maps.

Field water quality measurements were recorded at each aquatic biota and sediment sampling location using a handheld portable water quality meter. These instruments were calibrated daily as needed and used to measure in-field temperature, pH, conductivity and dissolved oxygen.

Habitat evaluations conducted during sampling events used standard habitat evaluation procedures. Surface areas for waterbodies were determined from digitized aerial photographs using appropriate computer software. The wetted area / perimeter of each waterbody was visually assessed by boat. Spot depths were measured using a portable sounding unit, or metre stick for shallow ponds and creeks. For watercourses, fish habitat assessments and identification of habitat types was conducted using qualitative descriptions of the riparian zone, as well as in-stream observations such as the following:

- Presence of coarse woody debris / logs, boulders and bedrock;
- General stream morphology (run, riffle, pool or flat) and stream flow (stagnant, low or turbulent);
- Wetted width, bankfull width and total depth; and
- Presence of beaver dams limiting or impeding flow.

Fish community surveys used a variety of gear to collect fish using non-lethal techniques, including boat and backpack electrofishing, hoop nets, fyke nets, short-duration gill net sets, minnow traps and seine nets and angling. During each sampling event, fishing techniques and equipment were selected based on the habitat of the given waterbody (e.g., size and depth, creek versus lake) and the target species (e.g., large versus small bodied).

To supplement existing fisheries community data, the 2022 field studies included a summer provincial broadscale monitoring (BsM) program in coordination with Fisheries and Oceans Canada to characterize the fish community in Springpole Lake. Three rounds of BsM data have already been collected in Birch Lake (2009, 2014 and 2019), but no BsM surveys wre completed in Springpole Lake. The standardized, repeatable BsM assessment in Springpole Lake allows equitable comparison of these results to other provincial BsM data to support comparison to future assessments and monitoring efforts. Total catch per species and catch per unit effort (CPUE) were calculated for the BsM program in Springpole Lake and further characterized by basin, including six distinct basins throughout the lake.

A netting program for Lake Sturgeon was completed on Springpole Lake during the summers of 2012 and 2013. The study area consisted of Springpole Lake and sections of the Birch River, extending upstream from Springpole Lake to the outflow of Satterly Lake and downstream to the entrance of Gull Lake. Overnight sets of extra-large mesh gill nets were fished at various locations within the study area. The net gangs of 100 m in length were composed of four 25 m panels of 8-, 9-, 10- and 12-inch stretched mesh. Each 200 m strap consisted of two separate gangs connected by a bridal. Set locations included both random site selection using a 400 m by 400 m grid and targeted sets based on field observations of habitat conditions. Nets were set overnight at a variety of depths and set duration did not exceed 24 hours. All by-catch was recorded, measured, weighed and live released, whenever possible. An additional netting program specific to Lake Sturgeon was implemented during the 2022 field season to assess presence in Springpole Lake, specifically the southeast arm along the flow path between the Cromarty Lake inflow (Birch River) and the outflow of Springpole Lake. Net sets were conducted in spring to target Lake Sturgeon during the spring migration period as they travel to potential spawning locations.

A visual survey of the shoreline, islands, and reefs was completed in the fall of 2012, 2013 and 2014 to identify Lake Trout habitat within the northern portion of Springpole Lake. A visual survey was also completed in 2015 and 2017 to identify Walleye and Lake Whitefish spawning near the site. During these surveys, submersible LED spotlights were used with an aluminum boat to scan the bottom substrates along each shoreline segment for spawning groups of fish. All surveys were completed at night when surface waters in the lake were within a suitable water temperature range for spawning to occur.

A visual survey of the shoreline was completed by boat during daylight hours in 2015 and 2017 to identify Northern Pike spawning habitat. Areas with dense aquatic vegetation were observed for a period of time to count fish present and note indicators of spawning activity, including splashing, boils or other disturbance in the shallow water. All observations of the target species were recorded and marked by handheld GPS. Observations were coded in the field as to whether spawning behaviour was observed or not. Additional Northern Pike spawning habitat surveys were conducted during May and June 2022 on Springpole Lake.

A telemetry study was undertaken in June 2012 to investigate the habitat use and movements of Walleye and Lake Trout. In 2012 and 2013, acoustic tags (transmitters) were implanted in Walleye and Lake Trout captured in the location of the proposed open pit basin. The transmitters implanted in 2012 and 2013 expired in 2015 and 2016. In 2015, an additional program was completed and acoustic tags were implanted in Lake Trout captured at four known Lake Trout spawning areas in Springpole Lake, including locations that would be isolated and dewatered and others that would not.

Ten VEMCO model VR2W underwater receivers were deployed in June 2012 (Stations SPR1 to SPR10), prior to any transmitters being implanted in fish. Three more stations were added in October 2012 (Station SPR11, SPR13 and SPR14). These receivers were attached with cable ties to a rope with an anchor at one end and a float attached to the other and approximately 1 m of rope between the two. The float keeps the rope taut and maintains the receiver in an upright position. Each anchor was tethered to a tree along the shore with 4.7 mm diameter polyvinyl chloride (PVC)-coated galvanized steel cable. VEMCO V13-1L coded sonic transmitters (tags) were used for the program, which emit a coded acoustic ping of 69 kilohertz (kHz) at nominal 90-second intervals when the tag is identified. A total of 14 Walleye and 67 Lake Trout were tagged between 2012 and 2015. The date, time and tag identification were recorded each time a receiver detected a transmission. The transmitter detection data were retrieved periodically from the receivers using the proprietary VUE software (VEMCO), and batteries were periodically replaced. All of the receivers operated normally and were capable of detecting transmitters throughout their deployment with the exception of the receiver at SPR4.

Environmental DNA (eDNA) sampling was included in the 2022 field season to aid in Lake Sturgeon detection efforts and characterize the fish communities within Springpole Lake, Birch Lake and surrounding waterbodies. Samples were taken at a total of 15 locations, 12 in spring and 15 in summer, across Springpole Lake, Birch Lake, S-16 and the baseline investigation area. Detailed sampling and analysis information can be found in Appendix O-3. The other five eDNA sample locations in Springpole Lake, and two locations in Birch Lake, were collected at the deepwater basin locations, consistent with the surface water quality monitoring locations. Composite samples were taken at 1 m below surface, mid-column, 1 m from bottom, and nearshore with another grab 1 m from near-bottom. This sampling protocol was intended to capture as much eDNA as possible. The only stream location, S-16, was sampled mid-channel with a single grab.

Sampling for Lake Sturgeon eDNA was continued in 2023, with a Lake Sturgeon specific quantitative polymerase chain analysis (qPCR). This program was conducted in spring 2023 once the water temperature reached 10°C to align with Lake Sturgeon spawning temperature. Potential and historical spawning locations were targeted, based on information provided by the MNR and local First Nations (MNRF 2016), imagery review of the Birch and Cat River systems, and sites selected where suitable float plane access was possible. During perceived post-spawn timing, once water temperatures had risen, sampling shifted toward deep (10 to 20 m) holes in Springpole and Birch Lakes to sample areas anticipated to provide suitable late-spring and summer habitat for Lake Sturgeon.

Sediment sampling was conducted concurrent with benthic invertebrate community samples using a Petite Ponar grab sampler during the fall sampling programs in 2012, 2021 and 2022. Each ponar grab sample was placed in a clean (rinsed with lake water) glass dish and jarred in laboratory supplied clean glass jars with a Teflon lid. All samples were placed in a cooler, supplied with ice, and maintained at approximately 4°C. Sediment samples were submitted to Maxxam Analytics in 2012 and ALS Environmental in 2021 and 2022 for the analysis of grain size distribution, inorganics and ICP-MS metals. The substrate physiochemical properties at each benthic sampling location (i.e., metal and nutrient concentrations) were characterized to further support interpretation of the benthic community. Analytical sediment results were compared to the Ontario Provincial Sediment Quality Guidelines (PSQG) and Canadian Sediment Quality Guidelines (CSQG) for the protection of aquatic life.

Benthic invertebrate community sampling was completed at eight locations in Springpole Lake, Birch Lake and Seagrave Lake in October 2012. At each location, three ponar grab samples were reduced and placed into one laboratory supplied container. Samples were preserved in 10% formalin and sent to Entomogen, a certified laboratory for benthic invertebrate identification. The 2021 field program collected samples from 11 locations: two from Birch Lake, six from Springpole Lake and three from small inland unnamed lakes. The 2022 field program collected samples from seven locations: five from Birch Lake, one from Springpole Lake and one from inland lake S-16.

Fish tissue samples were collected from Walleye captured in Springpole Lake in conjunction with the fish community survey in the summer of 2012 and followed the *Metal Mining Technical Guidance for Environmental Effects Monitoring* (Environment Canada 2012a). The samples were analyzed to determine concentrations of arsenic, lead, mercury and selenium. Tissue analysis methods included mercury and metals. During the 2019 sampling event, small-bodied sentinel fish species that were retained for tissue analysis included Finescale Dace, Northern Redbelly Dace and Northern Pearl Dace. Tissues were also analyzed for large-bodied fish species, Northern Pike and Yellow Perch. Another fish tissue sampling program was completed in 2021 on whole-body composite samples of small-bodied species: Finescale Dace, Northern Redbelly Dace, Bluntnose Minnow, young-of-the-year Yellow Perch, Blacknose Shiner, Mimic Shiner, Spottail Shiner, Brook Stickleback and Fathead Minnow. Small-bodied sentinel fish species retained for tissue analysis during the spring 2022 field studies included young-of-the-year Yellow Perch and Blacknose Shiner. Large-bodied fish tissue samples were also taken during the summer 2022 program.

Fish tissue samples collected during the 2021 and 2022 field studies were submitted to ALS Environmental in Thunder Bay, Ontario, for analysis of total metals, as well as mercury, methylmercury and selenium speciation.

3.4.8.2 Overview of Results

Regional Setting

Lakes within the region surrounding the Project are characterized by intermediate mean depths, medium mean surface area and intermediate morphoedaphic index (potential fish yield) scores. These tea-stained lakes represent one of two general fish community types found in the region: coolwater and coldwater. Coolwater communities are most often found in more productive, shallow waters and are characterized by fish species with optimum growth occurring between 15°C and 25°C (Scott and Crossman 1998). Common sport fish in coolwater communities include Walleye and Northern Pike.

Springpole Lake represents a coldwater fish community. Coldwater communities are found in clear, cold, deep oligotrophic lakes and support fish species with optimal growth temperatures below 15°C (Scott and Crossman 1998). Lake Trout and Lake Whitefish are common sport fish in coldwater lakes. The fish community structure can be diverse in coldwater lakes and may contain species that are more commonly associated with coolwater lakes, such as Walleye and Northern Pike, both of which occur in Springpole Lake.

This regional area contains lakes designated for Lake Trout management. MNR policies or guidelines may be applied differently to designated Lake Trout lakes depending on the lake classification. Springpole Lake and Birch Lake have been designated natural Lake Trout lakes under *Inland Ontario Lakes Designated for Lake Trout Management* (NDMNRF 2015). Lake Trout lakes are managed by the MNRF under Policy PL 4.02.01, Application Review and Land Disposition Process Policy (MNRF 2008) however dispositions of Crown Land under the *Mining Act* are exempt from this policy.

Springpole Lake

Springpole Lake has a surface area of 2,860 ha and a large, generally circular, northern basin connected to the long, narrow southeast arm of the lake by a narrow channel. It is predominantly rocky, has a very heterogeneous shoreline, and contains numerous islands and rocky shoals. There are a number of tributary streams flowing into Springpole Lake, including the Birch River, which enters at the southwest end through a short section of rapids below Cromarty Lake. The outflow of Springpole Lake is also through the Birch River, at the east end, into Gull Lake. Most of the deepwater habitat in Springpole Lake is found in the northern portion of lake.

Thermoclines were typically 1 to 2 m thick and found at depths ranging from 7 m to a maximum of 13 m in the summer of 2011. Water temperature in the epilimnion (i.e., upper layer of water) of Springpole Lake ranged from 16°C to 20°C, and from 3°C to 16°C in the hypolimnion (i.e., lower layer of water). The average dissolved oxygen concentrations for Springpole Lake were above 3 milligrams per litre (mg/L) throughout the water column, and at depths less than 30 m they ranged between 7.4 and 10.1 mg/L.

In general terms, the conditions measured throughout the water column in Springpole Lake are suitable to support fish populations. The Springpole Lake fish community includes Walleye, Northern Pike, Yellow Perch, Rock Bass, Log Perch, Common White Sucker, Shorthead Redhorse, Common Shiner, Spottail Shiner, Lake Whitefish, Lake Herring, Lake Trout, Finescale Dace, Golden Shiner and Burbot.

Lake Sturgeon surveys during 2012 and 2013 used 52 net sets; however, no Lake Sturgeon were captured during the surveys. Likewise, no Lake Sturgeon have been caught in any other fish capture gear used in fish community surveys or in the 2022 Lake Sturgeon netting surveys conducted in Springpole Lake. There are also no known recent anecdotal observations or reports of angling catches in Springpole Lake. Spring 2023 qPCR analysis did not detect Lake Sturgeon DNA in any eDNA samples, including those taken in Springpole Lake, Birch Lake, Lake St. Joseph, and in the Cat River System. Seven locations were sampled in triplicate (21 samples total) in the Springpole Lake area, one at the Springpole Lake outflow, one at the Cromarty Lake inflow, one in the southeast arm of Springpole Lake arm, and four in the north basin of Springpole Lake. To date, no eDNA samples have included Lake Sturgeon DNA. Given these multiple sources of information, Lake Sturgeon, a fish Species at Risk (SAR), is not considered to be present or in limited numbers in Springpole Lake.

Lake Trout spawning was confirmed in the north basin of Springpole Lake during survey years 2012, 2013 and 2014. Spawning sites had boulder or coarse rock rubble substrate and were proximal to deepwater basins and less than 5 m deep. There were no observations of spawning Walleye in the north basin of Springpole Lake during surveys conducted in 2015 and 2017. Movement patterns documented as part of the acoustic telemetry program indicate Walleye from Springpole Lake congregate in the Birch River upstream of Springpole Lake during the early spring, but the spawning location is not known.

Sediment samples collected in 2012 at Springpole Lake were found to have elevated mean concentrations of arsenic, cadmium, chromium, copper, iron, manganese, nickel and phosphorus when compared to PSQG lower effects level (LEL). Total organic carbon (TOC) and total Kjeldahl nitrogen (TKN) were elevated above PSQG LEL and severe effects level (SEL). Sediment samples were also collected from Springpole Lake during the 2021 and 2022 fall field programs. Nutrient and total metal parameters met some PSQG and CSQG concentrations, with several values greater than the PSQG LEL, as well as concentrations greater than the PSQG SEL and CSQG PEL. Elevated concentrations of TOC, TKN, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, phosphorus and zinc were found at sampling locations.

The benthic invertebrate communities generally had a low number and diversity of taxa, with amphipods, pisidiidae and chironomids dominating. When combined with the sediment chemistry, the results the low density of organisms may correlate with the relatively high levels of metals present in the sediment (DST 2013a).

Metabarcoding analysis identified DNA from 26 species during spring 2022 and 22 species during summer 2022 in water samples from Springpole Lake. Of these fish species, only Coregonus (Lake Whitefish or Cisco), Cottidae (sculpins) and Rhinichthys (Eastern Blacknose Dace or Longnose Dace in this region) were identified to the genus taxa level and Salmonidae (Lake Trout, Lake Whitefish or Cisco) to the family taxa level. The DNA from a total of 27 species were identified across both sampling events; all of these species were previously captured using conventional fish community survey gear and standard sampling techniques.

The Springpole Lake BsM program was undertaken from 16 to 23 August 2023, to characterize the fish community and follow provincial monitoring standards (Sandstrom et al. 2013), which allow comparison between lakes, even of different sizes (i.e., between Birch Lake, which has three cycles of BsM completed, and Springpole Lake). A total of 1,191 fish were caught across 15 species, with individual basins showing varying catch success. The focal deepwater species, Lake Trout and Lake Whitefish, were most abundant in NB02 (Lake Trout) and NB03 (Lake Whitefish), while Walleye and Northern Pike, commonly targeted sportfish, were most abundant in NB46, EB05 and CB07.

Catch results and hydroacoustic information suggest that the northern deep basins provide important summer habitat for cold water species (including Lake Trout and Lake Whitefish) and that fish densities are similar among these basins. Netting efforts and CPUE demonstrate that the two deep basins adjacent to the open pit basin (NB02 and NB03) support equal or greater abundance of Lake Trout and Lake Whitefish. This provides confidence in the expectation that the undisturbed (94%) majority of Springpole Lake will continue to support all resident species through the Project and into closure.

Coolwater species (e.g., Walleye, Yellow Perch, Northern Pike, White Sucker and others) were found abundantly in the NB46, CB07 and EB05 basins compared to cold water species (e.g., Lake Trout, Lake Whitefish, Burbot, Cisco) that inhabited the deeper northern basins.

Birch Lake

Birch Lake has a surface area of 11,823 ha, with an irregular shape and a predominantly rocky shoreline. The maximum depth is 37 m, with an average depth of 7.4 m. The east end of the lake is deeper and more open than the west, which is characterized by narrow channels and comparatively shallow water.

The fish community reported for Birch Lake based on a review of previous studies includes 19 different species: Lake Trout, Lake Whitefish, Northern Pike, Walleye, Yellow Perch, Lake Herring, Common White Sucker, Shorthead Redhorse, Greater Redhorse, Emerald Shiner, Blacknose Shiner, Spottail Shiner, Iowa Darter, Log Perch, Finescale Dace, Ninespine Stickleback, Northern Redbelly Dace, River Darter and Northern Mottled Sculpin.

Metabarcoding analysis identified DNA from 19 species from water samples taken in Birch Lake taken during the spring of 2022and 20 species taken from water samples in the summer of 2022. All were identified to species except Cottidae (sculpins), which were identified to genus and Salmonidae (Lake Trout or Lake Whitefish) to family. Shorthead Redhorse and Emerald Shiner DNA were found only during summer and Common Shiner DNA only in spring. A total of 21 species DNA were identified across both sampling events, all of which were previously documented with standard capture techniques.

Spring 2023 qPCR analysis of eDNA samples did not detect Lake Sturgeon DNA from any samples taken in Birch Lake. Four locations were sampled in triplicate (12 samples total) in the Birch Lake area, one upstream at the inflow to Birch Lake from Shabumeni Lake, two in potential Lake Sturgeon habitat within Birch Lake, and one downstream in the Birch River between Birch Lake and Springpole Lake.

Baseline sediment samples collected in 2012 at Birch Lake were found to have elevated mean concentrations of arsenic, cadmium, chromium, copper, iron, manganese, nickel and phosphorus when compared to PSQG LEL. TOC and TKN baseline levels were elevated above PSQG LEL and SEL. The results of the 2021 and 2022 monitoring programs were consistent with previous studies, with baseline nutrient and total metal parameters meeting some PSQG and CSQG concentrations and with several values greater than the PSQG LEL, as well as concentrations greater than the PSQG SEL. Elevated baseline concentrations of TOC, TKN, arsenic, cadmium, copper, chromium, iron, lead and phosphorus were found at various sampling locations.

The benthic invertebrate communities generally had a low number and diversity of taxa, with chaoboridae, amphipods, Oligochaeta and chironomids dominating. The benthic invertebrate community in Birch Lake is composed of highly tolerant species, with few species indicative of good water quality (DST 2013a).

Seagrave Lake

Seagrave Lake is located upstream of Springpole Lake and connected to the Birch River between Birch Lake and Springpole Lake by means of Seagrave Creek. Among the three lakes, Seagrave Lake has the smallest surface area (1,931 ha) but is the deepest, with a maximum depth of 41.5 m and mean depth of 6.4 m. Seagrave Lake has four deep basins that have generally east–west orientations and are connected by narrow channels. The average thermocline depth was found to be between 8 and 9 m, and dissolved oxygen was greater than 6 mg/L throughout the water column. Average pH throughout the water column was 6.11.

The fish community for Seagrave Lake includes Walleye, Lake Trout, Northern Pike, Lake Whitefish, Yellow Perch, Common White Sucker, Burbot and Cisco.

Baseline metal concentrations in sediment samples collected at Seagrave Lake in 2012 were found to have elevated mean concentrations of arsenic, chromium, copper and nickel, and at one location cadmium (SG SED5) and at one location zinc (SG SED5), when compared to PSQG LEL. Mean metal concentrations for iron, manganese and phosphorus were elevated at baseline when compared to PSQG for SEL. TOC and TKN baseline levels were elevated above PSQG LEL and SEL. The benthic invertebrate communities generally had a low number and diversity of taxa with chironomids, amphipods, pisidiidae, chaoboridae and dominating. Seagrave Lake had very low density of benthic invertebrates in most of the samples collected, and the conditions are similar to those of Springpole and Birch Lake (DST 2013a).

Regional (Gull Lake)

Metabarcoding analysis identified 16 species' DNA in water samples from Gull Lake taken during summer 2022: White Sucker, Northern Pearl Dace, Emerald Shiner, Spottail Shiner, Northern Pike, Burbot, Brook Stickleback, Johnny Darter, Yellow Perch, Logperch, Sauger, Walleye, Trout-Perch, Coregonus, Lake Trout and Cottidae.

Regional (Cat River System)

Metabarcoding analysis identified 18 species' DNA in water samples from the Cat River system at RSW-3 taken during summer 2022: White Sucker, Silver Redhorse, Shorthead Redhorse, Common Shiner, Emerald Shiner, Blacknose Shiner, Spottail Shiner, Mimic Shiner, either Eastern Blacknose Dace or Longnose Dace, Northern Pike, Burbot, Johnny Darter, Yellow Perch, Logperch, Sauger, Walleye, Trout-Perch, and Cottidae (Figure 3.4-12). The Silver Redhorse was identified at this location and not found at other locations sampled during the 2022 program.

Small Waterbodies

An additional 11 small (less than 20 ha) waterbodies near the Project site were sampled between 2012 and 2017. The small unnamed inland lakes L-17, L-18, L-19 and L-20 were assessed as part of the 2021 monitoring program. Inland lakes L-1, L-2, L-3, L-5, L-16, L-17, L-18 and L-19 were assessed as part of the 2022 monitoring program. Fish species among these lakes typically included Yellow Perch, Northern Pike, Common White Sucker, Spottail Shiner, Finescale Dace, Brook Stickleback, Northern Redbelly Dace, Fathead Minnow and Iowa Darter. Baseline nutrient and total metal parameters met some PSQG and CSQG concentrations with few values greater than the PSQG LEL, as well as concentrations greater than the PSQG SEL and/or CSQG PEL.

Small Tributaries

Nine small tributaries that flow into Springpole Lake were surveyed for fish community and habitat between 2012 and 2017. Fish species among these watercourses typically included Common White Sucker, Brook Stickleback, Iowa Darters, Trout-Perch, Finescale Dace, Log Perch, Northern Pike, Longnose Dace, Yellow Perch, Blacknose Shiner, Pearl Dace and Northern Mottled Sculpin. Stream S-16 was assessed as part of the 2022 monitoring program and included spring and summer fish community assessments, summer habitat assessment and an eDNA fish community assessment in spring and summer.

3.4.8.3 Traditional Knowledge

CLFN reported harvesting an abundance and variety of fish species in the throughout the CLFN territory. Preferred species include, but are not limited to, trout, northern pike, whitefish, pickerel (walleye), suckers, and sturgeon. CLFN described the location and environmental conditions (i.e., reed beds) of various spawning habitat locations for northern pike, suckers and walleye, such as Grassy Narrows and Whale Island (CLFN 2024a). CLFN reported decreased fish populations in some waterbodies. and specifically mentioned changes to fish populations in Kapikik Lake, which is a preferred fishing area for many CLFN members (CLFN 2024a).

LSFN noted various locations that are productive for fishing. These areas include specific parts of Lac Seul like North and South Bay or Pine Point, as well as lakes close to Lac Seul like Tuktegweik Lake, Twain Lake, and Wapesi Lake (LSFN 2024a). Other regional lakes referenced by LSFN included Springpole Lake, Trout Lake and Lake Saint Joseph to the north and to the south, Little Vermillion Lake and Richardson Lake. Other areas used include the lakes and rivers around Lac Seul by Silver Dollar, Ignace and Manitou Falls. LSFN reports harvesting a variety of fish species, including walleye (pickerel), whitefish, lake trout, muskies, bass, and sturgeon (LSFN 2024a).

For SFN, key harvesting areas for walleye and whitefish include Bamaji Lake, Lake St. Joseph, Kezik Lake, Fawcett Lake, and Fry Lake (SFN 2024). Fish, including suckers, northern pike, and lake trout are harvested from lakes and rivers throughout SFN's traditional territory. Some of the most important spawning areas for fish are in river rapids including the Devils Rapids, Slate Falls Rapids, Weslyan Rapids, and Gull Rapids. SFN noted that spawning habitats are disturbed by fluctuating water levels due to the hydroelectricity dam (SFN 2024). SFN also noted that sturgeon have become extremely rare for the same reason. Algae has been identified to bloom more abundantly when water levels are low and stagnant, leading to other ecosystem changes and impacting deep water fishing for lake trout and sturgeon (SFN 2024).

3.4.9 Vegetation Communities and Wetlands

Baseline vegetation communities and wetlands were investigated to identify and assess the existing vegetative assemblages and habitat, including plant SAR. The information will support the assessment of environmental effects and provide a comparison for environmental changes. Wetland evaluations following the Ontario Wetland Evaluation System for northern Ontario (MNRF 2014e) were completed to acquire baseline wetlands data to map and describe wetlands in the baseline investigation area and identify any provincially significant wetlands.

The vegetation baseline investigation, including methods, analysis, results and summaries of previous studies, is reported in terrestrial resources TSD included in Appendix P. Further details on the existing conditions in support of the effects assessment are presented in Section 6.11.

3.4.9.1 Methods

Vegetation Communities

Vegetation assessments were conducted using the ecological land classification system to define ecosites based on digital Ontario Forest Resource Inventory (FRI) data for the Trout Lake forest, initially obtained from the MNR in 2011. The total area of each ecosite was determined, and field plots were assigned to ecosites based on a combination of access and their overall ranking (e.g., if an ecosite covered 20% of the area of investigation, then approximately 20% of the field plots would be placed in that ecosite).

Vegetation sampling plots were located within ecosite polygons using FRI digital data and aerial / satellite imagery, and a representative proportion was ground-truthed. The results were then compared to the FRI data. These plots consisted of a non-fixed radius vegetative and soil assessment conducted at a predetermined location within each polygon sampled. At each sampling plot, the ecosite was verified (or determined in the case of the unclassified areas) using the *Terrestrial and Wetland Ecosites of Northwestern Ontario* field guide (Racey et al. 1996). The ecosite was then classified into a V-type or W-type according to the *Field Guide to the Forest Ecosystem Classification for Northwestern Ontario* (Sims et al. 1997), or the *Field Guide to the Wetland Ecosystem Classification for Northwestern Ontario* (Harris et al. 1996), respectively. Data were collected during both the spring and summer months to account for the cover of deciduous trees and understory plant species.

At each sampling plot, a soil sample was collected using a soil auger to determine soil texture, moisture regime and pore patterns. The results of the soil sampling were used to confirm ecosite and V- or W-type designations. Canopy composition and understory vegetation were surveyed at each sampling plot and categorized with the most common species across the polygon. Each polygon was investigated to determine general vegetation and topographical patterns.

In 2012, vegetation baseline surveys were conducted to determine common vegetative assemblages associated with habitat types including riparian, upland and wetland (Appendix P). Data were collected during the summer months to enable the determination of the cover of deciduous trees and understory plant species, and to determine the practicality of soil sampling. Within the area of investigation, 75 field plots were located along six transects in the environs of the Project. Each field plot consisted of a 1 square metre (m^2) plot. Plant species, canopy species composition, canopy cover, soil type, soil depth and depth of organic matter were recorded and the site type identified (i.e., upland, riparian or wetland). Data were then analyzed for species richness (total number of species present), evenness (a measure of the abundance of the species making up richness) and diversity (a measure that considers richness and evenness).

In 2019, a series of vegetation surveys were conducted to target previously underrepresented ecosites so that all ecosites were surveyed in relative proportion to their abundance across the entire baseline data collection period (2011 to 2019; Appendix P). Surveys were conducted specifically to develop a vegetation species list. The vegetation surveys used modified ecosite calibration plots. Three discrete plots were surveyed in each ecosite polygon. A total of 30 ecosites were surveyed as part of the vegetation survey, for a total of 90 vegetation plots.

In 2021, 318 supplemental vegetation community surveys (Figure 3.4-15) were completed throughout the baseline investigation area to update existing information (Appendix P). A complete list of all plant species encountered was recorded. In 2022, an additional 270 targeted vegetation surveys were conducted to add to the existing data repository and incorporate consultation input within the baseline studies completed to date to support the EIS/EA.

Significant wildlife habitat was also recorded, including:

- Temporary or permanent waterbodies that may support large numbers of migratory waterbirds;
- Tree cavities with the potential to support bat colonies; and
- Features that may provide access to hibernation sites for bats or snakes, such as caves, mines, talus or old foundations.

During the 2021 and 2022 programs, other environmental information was tabulated such as:

- Evidence of colonial bird nesting, raptor and turtle nests, vernal pools, seeps and springs;
- Evidence of amphibian breeding; and
- Mammal dens.

In September 2023, an updated FRI data was provided by the MNRF, allowing increased spatial coverage and updated ecosite characterization, including disturbance areas largely due to commercial forestry and forest fires. This FRI data has been used in the Baseline Terrestrial Report (Appendix P) and in the assessment of potential effects on vegetation communities and wetlands (Section 6.11).

Wetlands

Prior to initiating field work in 2012, LiDAR digital images of each wetland were examined along with available published information, such as mapping, geographic information sources and previous studies. Eighteen wetlands with an area greater than 0.5 ha, as identified through FRI maps, were surveyed in 2012 (Appendix P). Site visits included ground-truthing all accessible portions of each wetland to confirm vegetation community boundaries and to identify vegetation forms and species. The wetland boundaries and vegetation community boundaries on the LiDAR images were corrected as required in the field. Data collected during field observations included the following:

- Plants present (i.e., vegetation forms, common species and identification of rare plants) and vegetation communities;
- Soil / substrate types;
- Wetland boundaries and types;
- Presence of special features (e.g., wildlife, furbearers, wild rice); and
- Fish habitat information.

Wetlands identified were evaluated for significance via a wetland functions assessment. A wetland functions assessment considers key information on wetlands important for the EA of the proposed Project (Hanson et al. 2008). The wetland functions assessment is adapted from assessment protocols outlined within the *Ontario Wetland Evaluation System Northern Manual* (MNRF 2022) and reflects the discourse on wetland evaluations from the Canadian Wildlife Service Technical Report Series document *Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson et al. 2008).

An additional wetland survey was completed during the 2019 field season to assess wetland ecosites that had the possibility of being overprinted by the Project footprint (Appendix P). Forty-eight wetland ecosites were surveyed during the 2019 vegetation surveys, using the method described above. Further studies were completed in 2021 and 2022 (Appendix P) (Figure 3.4-16). Sites were inventoried during field visits as feasible, and targeted surveys in areas expected to be directly impacted by Project components were completed from late August to early September 2021 and throughout 2022.

3.4.9.2 Overview of Results

During the 2011, 2012, 2019, 2021 and 2022 vegetation surveys, 397 species of plants were identified. Eleven species of plants are classified as rare in Ontario: Black Ash, Northern Marsh Violet, Floating Marsh Marigold, Alpine Woodsia, Nahanni Oak Fern, Small Yellow Pond-lily, Lakecress, Smooth-margin Nitrogen Moss, Red Dung Moss, Yellow Dung Moss and Cruet Dung Moss. One SAR was documented: Black Ash was found in the southern extent of the baseline investigation area. The most commonly encountered species in 2012 were Speckled Alder, Labrador Tea, Bunch Berry, Sparse-flower Sedge, Stiff Clubmoss, Schreber's Moss and Green Reindeer Lichen. During the 2019 vegetation survey, the most commonly encountered plant species were Schreber's Moss, Peat Moss, Creeping Snowberry, Labrador Tea, Black Spruce, Knight's Plume Moss, Grey Alder, Lingonberry and Mountain Fern Moss

Terrestrial ecosites comprised approximately 67% of the of the baseline investigation area and the dominant vegetation community is coniferous forest. Most areas are heavily dominated by Black Spruce and Jack Pine, with the spruce being more common in moister and more mature forests, while Jack Pine is more common in drier, rockier settings and in areas regenerating from fires and logging. Small amounts of White Spruce, White Birch and Trembling Aspen may be mixed into coniferous forests. Balsam Fir may be common in the sub-canopy and understory of coniferous forests but is rarely present in the canopy. Low shrubs, including Labrador Tea and blueberries, are often abundant, but taller shrubs such as Green Alder are less common. Small Black Spruce and Balsam Fir are often abundant in coniferous forests. Ground layers of coniferous forest may have little plant growth besides moss or contain a diverse array of other plants. Typical species include Bunchberry, clubmosses, Creeping Snowberry, Mountain Cranberry, Wild Sarsaparilla and Twinflower. Sparse treed, deciduous / mixed tree and bedrock ecosites are also present.

Wetland ecosites comprised approximately 34% of the baseline investigation area. The wetland communities surveyed include swamps, marshes, and bogs and fens. Wetlands exist in different site types including palustrine (inland with no flow or intermittent inflow and either permanent or intermittent outflow), lacustrine (associated with a lake), and isolated (e.g., fens and bogs). During the 2012 wetland evaluations (DST 2013b, 75.1% of the wetlands were lacustrine sites, 23.4% were palustrine, and 2.2% were isolated. Based on the 2023 FRI data, 47.3% of the wetlands were lacustrine sites, 36.1% were palustrine, and 16.7% were isolated. Lacustrine sites are often associated with marshes. Marshes, in the boreal forest, are often found as a transition between open water and shorelines and contain dominant species such as robust emergent and submerged plant species.

3.4.9.3 Traditional Knowledge

CLFN noted that poplar wood, used to smoke moose meat, is increasingly harder to find and requires further travel into remote areas (CLFN 2024a).

SLN noted that mines such as Pickle Lake Gold, Golden Patricia, or McIntyre Gold are near or within the Cat River Watershed and although these mines are no longer operating, SFN noted that no vegetation grows on these sites (SFN 2024).

LSFN noted that natural stands of wild rice, once common in the Lac Seul area, are still carefully stewarded to this day where they have survived the flooding and water level changes (LSFN 2024a). LSFN also indicated that the quantity of plants and medicines and harvestable areas have been reduced over the years (particularly around LSFN reserve lands) and as such, healthy and intact ecosystem areas are of increased importance to the community's plant and medicine harvesting values today (LSFN 2024a). The current condition of plants and medicines is characterised by a loss of suitable plant habitats and thus plant abundance due to flooding caused by hydroelectric dams, as well as clear-cutting practices, and a loss of plant health and abundance due to herbicide spraying and contamination from roads (LSFN 2024a).

3.4.10 Wildlife and Wildlife Habitat

Wildlife baseline studies were conducted to identify the different animal species in the area of the Project, their habitat, and to identify SAR. This information supports the assessment of environmental effects and provides a baseline to assess environmental effects. The baseline wildlife study, including methods, analysis, results and summaries of previous studies, is reported in terrestrial resources TSD in Appendix P. Further details on the existing conditions in support of the effects assessment are found in Section 6.12 to Section 6.16.

3.4.10.1 Methods

Wildlife species and habitat types were evaluated by means of fieldwork and helicopter aerial surveys along selected routes, transects and survey / sampling points within the baseline investigation area between 2011 and 2024. Where TK was shared by Indigenous communities, it was reviewed to identify wildlife and habitat used for TLU activities. Summaries of the survey methods including maps of survey locations are provided in Appendix P. Incidental wildlife observations were recorded throughout the course of all field surveys and are included in the detailed reports in Appendix P, wherever applicable.

Migratory Bird Surveys

Breeding bird surveys, including point count surveys, were conducted in the baseline investigation area in 2011, 2012, 2018 and 2019 field seasons. Point count surveys followed the Ontario Breeding Bird Atlas (OBBA) Protocol (Cadman et al. 2007). This protocol requires two site visits during the breeding season for the area. Forest fires near the Project site in 2011 prevented the second round of surveys from occurring that year.

Point count surveys consisted of a 10-minute listening period during which all bird species seen or heard were recorded. Survey locations were distributed to represent the range of habitat categories found throughout the area of investigation. As per the OBBA Protocol, all surveys were conducted between sunrise and 10:00 under conditions where the wind did not exceed 15 kilometres per hour (km/h) and there was no continuous rain.

Point count surveys were completed over multiple years and programs: nine surveys were conducted in 2011; 37 surveys in 2012 on May 24 and June 17; 83 point counts across eight days during June 2018 (site area and proposed transmission line route); and 17 point counts in successional habitat in June 2019 that was previously underrepresented. Survey locations are shown in Figure 3.4-17. ARUs were used to survey songbirds in conjunction with the EWPW, marsh birds and bat surveys, discussed below.

Additional surveys were completed in 2021 and 2022 to update the existing information. Breeding bird survey stations were distributed to sample all habitat types within the baseline investigation area, including locations within the area that will be directly or indirectly impacted by the Project (Figure 3.4-17). Breeding bird surveys were based on the OBBA Protocol and carried out between June 1 and July 1, the peak breeding season for most species. Within this period, two point counts were completed at each station, with at least 10 days between consecutive surveys. Point counts lasted for 10 minutes and were completed no earlier than 30 minutes before sunrise and no later than five hours after sunrise. Point counts were not completed during rain, thick fog or winds greater than 19 km/h. Upon arrival at each breeding bird station, project and point count information was recorded. During the 10-minute point count, all bird activity seen and heard was recorded. Bird observations included the following:

- Distance from the station to the birds;
- Timing of the bird observation;
- Number of individuals observed; and
- Breeding evidence.

In 2021, breeding bird surveys were conducted at 21 locations within the baseline investigation area (Figure 3.4-17): 13 located along the proposed transmission line routes and road alternatives, and eight reference locations 2 to 10 km away from these routes. In each location, between eight and 13 point count stations were visited. Overall, 220 point counts were completed on the first visit and 225 on the second visit.

In 2022, breeding bird surveys were conducted at 13 areas within the baseline investigation area (Figure 3.4-17): 9 areas located along the proposed transmission line routes and road alternatives, and 4 reference areas located 2 to 10 km away from these routes. Overall, 133 point counts were completed on the first visit and 71 on the second visit.

Eastern Whip-poor-will Surveys

Surveys targeting EWPW were conducted in 2011. EWPW surveys are typically conducted at night within one week (before or after) of a full moon. Triangulation is used to locate nesting birds or birds maintaining their territories (Hunt 2000).

Given the logistical challenges of nocturnal surveys relating primarily to remoteness, ease of access and personnel safety, it was determined through consultations with the MNR SAR Biologist, Red Lake District Office, that ARUs could be used as an alternative means of determining EWPW presence. If EWPW were recorded by the ARUs, then targeted triangulation surveys would be undertaken to identify the specific locations of the individuals.

No suitable EWPW nesting habitat was identified in 2011; however, surveys were still conducted near the Project exploration camp. ARUs were installed in two locations, programmed to record for 10 minutes every hour during the night (from 20:00 to 05:30) on June 17, 2011.

The ARUs were also deployed in 2019 at eight locations targeting successional habitat, which is more likely to be suitable EWPW nesting habitat, and areas that may be overprinted by the Project. A further two surveys were conducted by boat toward the north end of Springpole Lake following the EWPW survey protocol (Bird Studies Canada 2014).

In June 2022, eight ARUs were deployed in locations to specifically target EWPW. In July 2022, 13 additional ARUs went out to target additional EWPW habitat and other locations. ARUs were programmed to record from 60 minutes before sunrise to 60 minutes after sunrise and from 30 minutes before sunset to 90 minutes after sunset.

EWPW and Common Nighthawk were also surveyed in 2021 and 2022 in accordance with the Canadian Nightjar Survey Protocol (WildResearch 2019).

Marsh Bird Surveys

Marsh bird survey locations were established in key habitat areas, located along edges of open water marsh wetlands in the baseline investigation area. Call-playback surveys were conducted after 18:00 and completed before sunset. Surveys followed the Bird Studies Canada (2000) protocol, which consists of a five-minute silent listening period upon arriving at survey site, followed by five minutes of call-playback. Marsh birds on the playback tape were Least Bittern, Sora, Virginia Rail, American Coot and Pied-billed Grebe. After the calls were played, a second five-minute period of silent listening was employed. Standardized field data sheets were used to record observed species, wetland features and weather conditions.

Four marsh bird survey locations were visited both in May and June 2012. The June surveys were to target the more secretive species associated with wetland habitats. Marsh bird surveys in 2018 were performed using a combination of call-playback surveys and ARUs, while the 2019 surveys used the call-playback method to target remaining potential marsh habitat in the area of investigation. The 2018 and 2019 marsh bird surveys were conducted in key habitat areas, located along edges of open water marsh wetlands associated with Springpole Lake.

Waterfowl Surveys

Waterfowl surveys were conducted at 16 locations on Springpole Lake, Birch Lake and some of the surrounding unnamed lakes in 2012. Shorelines and bays on larger lakes were scanned by boat, paying extra attention to marsh and sheltered areas, and several smaller lakes and ponds were hiked into in June 2012. Waterfowl, nests and incidental species were recorded, as well as species number and social structure. A second visit to each waterfowl survey site was performed in July 2012 to confirm breeding and note broods as applicable.

Aerial waterfowl surveys were conducted via rotary wing aircraft in the spring and fall 2017 stopover use of the baseline investigation area. These surveys focused primarily on Springpole Lake, but also extended into adjacent lakes including Birch Lake, Cromarty Lake, Satterly Lake and Seagrave Lake. Low-altitude passes were made, and the birds were recorded and/or photographed for later identification.

Owl Surveys

An Ontario Nocturnal Owl survey was completed in April 2012 following OBBA Protocol (Cadman et al. 2007) at 11 locations along Springpole Lake shorelines and trails. The survey method involves playing a standardized recording issued by Bird Studies Canada and listening for owl callback. Northern Boreal Owl and Barred Owl call recordings were used, each with designated play times and listening times. The total for each recording and listening session was 12 minutes. The protocol suggests that surveys be completed in spring (April) as this is when owls are most territorial and most likely to respond to calls. The 2012 surveys were conducted on April 30 and May 1. Additional surveys were conducted at seven stations in the baseline investigation area on February 24 to March 6, 2022, for resident owls and 12 stations on May 4 to May 10, 2022, for breeding owls.

Nest Surveys

Bird nests were identified opportunistically across all field surveys. Aerial surveys served as the most effective means of identifying large stick nests commonly used by raptors. Aerial surveys were completed in 2011, 2013, 2020, 2021 and 2022.

Provincial data on known raptor stick nest locations were used as inputs into flight paths taken for each transect during the 2021 aerial survey (Appendix P). Nests in the provincial database were reconfirmed and confirmed if extant or active. New nests were also detected, classified based on nest size, material type and size, and placement within the tree / structure, and mapped as they were encountered, primarily in forested areas around open water.

Aerial transects occurred between February 27 and March 7, 2021, and between February 24 and March 6, 2022, during daylight and good to fair weather conditions. Transects were flown at approximately 120 km/h, and the pilot was instructed to speed up, slow down, fly lower or higher, and circle as needed to scrutinize the area. A three-person crew (plus pilot) consisting of skilled biologists, two covering each side of the helicopter and the third covering navigation / data recording / observation was used to maximize observations.

Amphibian and Reptile Surveys

Reptiles and amphibians were surveyed during baseline investigations following the amphibian road call-count method (Konze and McLaren 1997), as well as through incidental visual encounters observed during other surveys. The amphibian road call count is based on a road transect with unlimited distance point counts at regular intervals. The surveys are conducted at night, during the breeding season to detect early and late breeding species. In northern Ontario, the suggested dates for survey one is between May 1 and May 15, between June 1 and June 15 for survey two and between July 1 and July 15 for survey three (Konze and McLaren 1997). Surveyors wait approximately 30 seconds after arriving at each survey location to allow disturbed frogs and toads to resume calling. For the next three minutes, the surveyor records the species of all frogs and toads observed or heard.

Call-count surveys were conducted at seven locations, across two sampling periods in 2012 (May 15 to 20 and June 21 to 26), consistent with the protocol requirements. Survey sites were distributed throughout the area of investigation near wetland habitats that seemed likely to harbour amphibians.

The ARUs were used in place of in-person surveys where access at night in remote locations was not feasible. From May 2022 to June 2022, 30 ARUs were deployed at marsh / wetland sites to record marsh birds and calling amphibians. ARUs were placed within a wider distribution area, including along linear corridors compared to previous assessments. ARU data were then processed for calling amphibian species. Surveyors also searched for egg masses along wetland shores, while installing and refurbishing ARUs and recorded the species of the egg mass and the approximate number of eggs it contained.

Small Mammal and Furbearer Surveys

Small mammal trapping was conducted in the baseline investigation area during the 2011 and 2012 field seasons. Sherman life traps (model LNATDG; 235 mm by 80 mm by 90 mm) were spaced 50 m apart along trails and baited with a peanut butter and oatmeal mixture. Traps were provisioned with cotton to provide nesting and insulative value to captured animals. Where possible, traps were placed in a shaded area to prevent overheating by sunlight. Each trap was set for 48 hours. Sex and reproductive condition were recorded (when possible) for each captured animal.

CPUE was measured based on the individual animals captured per trap night and is determined by the calculation:

$$\text{CPUE} = \frac{\text{Number of individuals captured}}{\text{Total number of trap nights}}$$

A total of 35 traps were set between June 23 and June 24, 2011, for a total of 72 trap nights in 2011. A further 50 traps were set for 48 hour periods over a six-night period between May 16 and 21, 2012, for a total of 136 trap nights in 2012.

An aerial furbearer survey was conducted in conjunction with the 2019 fall waterfowl survey, targeting Beaver activity. The locations of lodges (active and identified historical), dams and animal sightings were mapped throughout the survey area. Historical trapping records from the last 30 years were requested from the MNR for trapping areas in the vicinity of the Project. Trapping values can be used as a surrogate for population density, assuming trapping pressure is consistent among years. These data were used to describe local and regional furbearer population trends where possible.

Trail cameras were placed at 14 locations throughout the baseline investigation area in 2012 and 2013. Cameras were installed throughout the area, and where possible targeted game trails to maximize the likelihood of capturing wildlife. One camera was specifically established to target Woodland Caribou (Boreal population) based on recent tracks at the time.

Observations of furbearers were also made during the 2021 and 2022 aerial surveys based on tracks and other evidence (Appendix P). Wolf, Wolverine and other furbearers including Otter, Beaver and Marten signs (e.g., track sets, beaver lodges) were all recorded within the baseline investigation area.

A 2022 country foods sampling program was developed based on data available from available TK / TLU studies from the region and from the First Nations Food, Nutrition and Environment Study, Wabauskang Traditional Knowledge and Land Use, along with knowledge from other projects in the area and the Cat Lake Slate Falls Land Use Plan. The inventory of small mammals encountered was included in the baseline knowledge of species presence. Additionally, during the surveys outlined above, opportunistic surveys and incidental sightings of wildlife and evidence or signs of wildlife use were recorded to further document animal use.

Wolverine

Wolverine surveys, including aerial surveys and run pole stations (tree-mounted platforms equipped with remote cameras), were used to inform demographics (number of unique females [lactating/nonlactating] and males); estimate occupancy/population density, habitat use, and dispersal; and identify areas of concentration/activity centres. Aerial surveys were completed concurrent with the Woodland Caribou aerial surveys. Wolverine tracks were investigated relative to the mine access road alternative routes south of the Project and at five locations along the transmission line alternative routes. No maternal or natal dens were detected.

In 2023 and 2024, twenty-five run pole stations were deployed within the baseline investigation area between February and April. Run pole stations were visited monthly to collect hair, change batteries, refresh bait, and replace memory cards. Where hair was detected within a trigger clip, it was placed in a small coin envelope and labelled with a collection and trigger clip number that included the date, camera site, and clip position on the run pole. Trigger clips were mounted so they could be seen on the photographs, so that it was evident which clips were set and which ones were triggered, both before and after a visit by a Wolverine, thereby allowing the determination of which individual Wolverine was associated with each triggered clip and allowing for the ability to link genotypes with the unique ventral patterns of the Wolverine photographed at the stations.

Bat Surveys

Three bat species identified by the Committee on the Status of Endangered Wildlife in Canada as critically endangered were identified in 2012 as potentially occurring at or near the Project site: Tri-coloured Bat, Little Brown Myotis and Northern Myotis. A modified version of the bat monitoring protocol from the *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF 2011) was used to conduct bat surveys in 2012. Ultrasonic ARUs were installed primarily to survey ecosites known to represent potential Little Brown Myotis and Northern Myotis maternal roosting habitat (as defined by the MNR), but also included a variety of habitat types suitable for bat foraging and commuting corridors. These ecosites include open water, forests, treelines, scrub and grasslands with an abundant supply and diversity of invertebrate prey.

The ARUs were installed roughly 2 m from the ground to facilitate detection of individuals that might fly high over the survey areas. ARUs were deployed at six locations in 2012, a further six locations in 2018, and 14 locations in 2019 (Appendix P). Species identification was conducted through an analysis of sonograms from recordings using Kaleidoscope software (Wildlife Acoustics) following the guidelines presented in Reichert et al. (2018). A subset of recordings (roughly 20%) were manually vetted to confirm accurate species identification.

The likelihood of encountering bat hibernacula was assessed through a desktop mapping exercise. The mapping exercise aimed to identify two land features that could conceivably provide suitable bat hibernacula: abandoned mines and near-vertical rock faces that might contain deep cracks or crevasses. The identification of abandoned mines was completed using the provincial Abandoned Mines Information System (NDMNRF 2021). To determine the locations of near-vertical rock faces, the provincial digital elevation model was analyzed for the following characteristics: relief (vertical elevation), ruggedness (terrain heterogeneity) and slope (angle of inclination).

Updated bat acoustic surveys were completed in 2021, with 37 bat detectors deployed across 19 sites during the peak breeding season for most species (June 1 to June 30) to detect nocturnal bat activity during the maternal brood-rearing period (Figure 3.4-18). In areas with potential hibernacula, swarming surveys to detect hibernacula occurred between August 26 and September 7, 2021. Within this period, the bat detectors recorded after dusk and continued for five hours. All nocturnal bat activity was recorded from 30 minutes before sunset to 30 minutes after sunrise. Songmeter SM2Bat and SM4Bat (Wildlife Acoustics Inc.) ultrasonic recording detectors were paired with ultrasonic microphones (Wildlife Acoustics Inc.) throughout the baseline investigation area. Microphones were positioned as high as possible at locations where higher bat activity levels were likely to occur, such as habitat edges created by winter roads, logging trails or natural corridors to potential feeding areas. Bat detectors were configured to begin recording when ultrasonic signals greater than 18 dB above the noise floor rolling average were detected. Upon trigger, a two- to five-second recording was saved and then processed to retain portions resembling bat echolocation. In 2022, 37 bat detectors were deployed, of which 15 were deployed at sites (one per site) from 2021 and the remaining 22 were deployed at new sites not surveyed in 2021. In 2023, single bat detectors were deployed at 26 survey sites, of which 4 were sites from 2021 not re-surveyed in 2022 and eight were sites from 2022 (Figure 3.4-18). Similar to 2021, bat detectors were deployed in two rounds and moved between rounds to improve coverage. All nocturnal bat activity was recorded from 30 minutes before sunset to 30 minutes after sunrise.

Bat maternity roost habitat survey locations were targeted at mature mixed and deciduous forests to assess the suitability of forests in the baseline investigation area for bat maternity roosting habitat. FRI data and the Far North Land Class data were used to identify areas of mature growth deciduous / mixed wood stands or old growth deciduous / mixed wood stands with a significant component of Birch, Poplar and/or Ash trees. Locations were further refined by helicopter or by foot based on vegetation surveys and ground-truthing. Thirty-four survey locations (22 in 2021, 12 in 2022, and 19 in 2023) with a total of 125 survey plots were completed in the baseline investigation area.

A visual assessment of the buildings within the existing exploration camp was also undertaken in July 2022 for evidence of potential bat maternity roosting within the buildings. The buildings evaluated included the kitchen, the core shack, the geo-shack, the workshop and the office, as well as any other wooden or metal buildings. None of the buildings harboured signs of occupation by bats, which could have included evidence such as guano or ammonia staining. The kitchen, core shack, geo-shack, workshop and office all had gaps between the steel roof and the underlying plywood. To confirm whether bats were using these buildings, five bat detectors (Wildlife Acoustics SM4BAT FS coupled with an SMM-U2 microphone) were deployed from July 6 to 8, 2022.

Ungulate Surveys

Winter aerial surveys targeting Moose and Woodland Caribou were conducted in 2011 (81 km^2), 2013 (870 km^2) and 2020 (990 km^2) as detailed in Appendix P. Surveys were conducted via rotary wing aircraft on transects spaced 500 m (2011) or 1 km (2013 and 2020) apart and followed the MNR *Moose Aerial Observation Manual* (Klass 1997). Survey crews consisted of experienced aerial surveyors and the pilot during all surveys, and a representative from the community of SFN also attended the 2013 and 2020 aerial surveys. Surveys were undertaken on February 5, 2011; January 14 to 16, 2013; and March 9 and 10, 2020. As per the MNR *Moose Aerial Observation Manual* (Klass 1997), surveys were conducted between 10:00 and 14:00 within 72 hours of a fresh snowfall. Age, sex and location data were recorded for every ungulate observed. All sightings of stick nests and animal tracks were also documented.

Surveys to identify Woodland Caribou calving habitat were conducted between July 30 and August 7, 2012. Survey locations included islands and shoreline sections of Springpole Lake, Seagrave Lake, Dead Dog Lake, Skingle Lake, Birch River and Durkin Lake. These areas were investigated for signs of calving and nursery use. Sites were investigated for signs of use, including sightings, tracks, trails, scat, browse, hair and beds. All areas investigated were documented, regardless of whether Woodland Caribou signs were present (Appendix P).

Trail cameras were placed at 14 locations throughout the baseline investigation area in 2012 and 2013. Cameras were installed throughout the baseline investigation area, and where possible targeted game trails to maximize the likelihood of capturing wildlife. One camera was specifically established to target Woodland Caribou based on recent tracks.

An additional aerial survey was completed between February 27 and March 7, 2021, to update existing information (Appendix P). Calf recruitment, population structure and distribution field observations were collected in accordance with provincial and federal protocols for monitoring Woodland Caribou and Moose (Gasaway et al. 1986; Buckland et al. 2001; Thomas et al. 2010; MNRF 2013a,b, 2014b,c,d,f,g; National Boreal Caribou Knowledge Consortium 2020). The current provincially recognized and standardized ungulate aerial surveys was employed, which require a three-person crew configuration (plus pilot) with a minimum of two experienced / provincially approved biologists covering each side of the helicopter and a third biologist with navigation, data recording and observation experience so that main observers are free to focus on the primary observation tasks, to minimize bias in detection, observation and group classification.

The 2021 survey extent composed of 43 flight lines in an east–west orientation, spaced at 2 km intervals covering 5,804 km^2 over known Woodland Caribou overwintering areas, as well as adjacent areas of mature coniferous forest blocks (suitable habitat) and potential future habitat areas regenerating from older past wildfires or forestry operations (Figure 3.4-19). The MECP was consulted to confirm known locations of recent or past concentrations of Woodland Caribou activity. Areas up to 120 km from the Project site were surveyed. The aerial survey extent also included portions of the Kinloch Range to allow Caribou population structure and vital rates to be included from the neighbouring range to the north, moving forward.

In 2022, based on previous survey results, the survey extent was expanded to 12,253 km^2 (Figure 3.4-19) using the same 2 km strip transect design and survey methods applied to the larger survey area. The expanded survey extent was composed of six survey blocks and 145 flight lines of varying lengths in an east–west orientation, spaced at 2 km intervals. To delineate the 2022 survey area, a 40 km radius buffer was applied to the Project mine site features and a 20 km radius buffer was applied to all linear Project features, representing two to four times the expected threshold response distance for caribou for a mine development. The buffer distances applied to inform the survey area delineation were conservative and precautionary, so that sufficient spatial extent is reasonably considered in relation to threshold disturbance responses of caribou at the local and landscape scales (Environment Canada 2008, 2011, 2012b).

Provincial caribou satellite telemetry data and kernels of individual seasonal core use areas (wintering and calving / nursery) from all three local populations (Berens, Churchill and Kinloch) were acquired from the MECP. The telemetry kernel dataset represents all collared adult female caribou that potentially interacted with the general area in the vicinity of the Project in recent years and had a presence within and/or adjacent to the buffered area (winter or calving / nursery seasonal kernel proximity to the 20/40 km buffer of the proposed Project). This included the space used by caribou cows that chose to calve within the general area in the vicinity of the Project. These data were overlaid on the 20/40 km buffered area, along with known Category 1 caribou habitat (overwintering and calving-nursery areas) and clusters of winter caribou observations from an aerial survey conducted in February 2021. A minimum convex polygon was then generated using the telemetry data for caribou using Category 1 habitat within and proximate to the buffered Project to inform final delineation of the revised and expanded survey area.

In 2023, the survey extent was adjusted to an area of 16,276 km^2 (Figure 3.4-19) based on results of the 2022 survey, with modification primarily on the Kinloch and Churchill portions of the survey area and adherence to the 2 km strip transect design and survey methods used in the previous surveys. The survey was undertaken to locate caribou groups with cows within 100 km of the Project in advance of a satellite telemetry collar deployment.

In February 2023, a total of 50 GPS satellite collars equipped with a collar release mechanism were deployed on adult female Caribou within a 100 km radius of the Project. Collars were deployed in the Churchill (19 Caribou), Kinloch (15 Caribou) and Berens (16 Caribou) ranges. All collars were programmed to collect 3 GPS fixes/day until the programmed drop of date of Mar 31, 2027. Hair, blood and fecal samples were collected from each collared Caribou. No Caribou were injured by the capture or handling efforts and there were no capture mortalities. Caribou within 50 km of the Project site were priorities for capture and targeted collar deployment. However, animals up to 100 km from the Project site were selected based on Caribou distribution during the capture/collaring portion of the survey program.

The 2024 survey area and effort were modified to reflect a focused search effort of a high probability Boreal Caribou detection strata including all known wintering areas from provincial data as well as kernels from previous winter aerial surveys and recent winter telemetry locations, and adjacent areas, aided by telemetry relocation of collared caribou.

Observed Woodland Caribou and Moose encountered during the 2021 to 2024 surveys were classified with respect to sex and age categories based on physical attributes and behaviour (within group association). The number of calves, number of adult females, number of adult males and number unclassified were recorded.

Moose aquatic feeding areas are areas within a waterbody or wetland where Moose are known to, or potentially, feed on certain species of aquatic vegetation. Moose are generally attracted to these species of aquatic vegetation to obtain concentrations of nutrients such as sodium that are not prevalent in their land browsing diet. Moose aquatic feeding areas are typically characterized by slow moving water that supports aquatic vegetation such as Water lilies, Pondweeds, Mare's tail and Milfoil. Areas are assigned a moose aquatic feeding area rating of 0 (nil potential) to 4 (very high potential) following the guidelines outlined in the *Selected Wildlife and Habitat Features: Inventory Manual for Use in Forest Management Planning* (Ranta 1997). Aquatic areas, namely wetlands and shoreline habitat, were assigned moose aquatic feeding area ratings during the 2019 wetland and waterfowl surveys. An additional effort was made to visit and characterize previously known moose aquatic feeding areas in 2022. Five general locations occur in the northern portion of the baseline investigation area, and numerous moose aquatic feeding areas occur in the southern portion.

3.4.10.2 Overview of Results

Birds

During the bird surveys between 2011 and 2019, 68 bird species were observed from the 958 individuals recorded. An additional 32 bird species not recorded within point counts were observed during other surveys or incidentally, bringing the total bird species to 100. During the 2021 survey, 95 species of birds were recorded from 228 point count stations, with an additional 13 recorded during other field investigations. The most common bird species encountered during all field surveys were Ruby-crowned Kinglet, White-throated Sparrow, Nashville Warbler, Yellow-rumped Warbler, Magnolia Warbler, Winter Wren, Swainson's Thrush, Least Flycatcher, Red-breasted Nuthatch and Hermit Thrush. No EWPW were observed in targeted surveys in 2011 or 2019. Common Nighthawk were recorded at seven locations.

In 2021 and 2022, breeding bird surveys were conducted to characterize the nature, extent and importance of avian usage within the baseline investigation area for wildlife and SAR birds. In 2021, a total of 95 bird species were recorded during breeding bird survey point counts from the 228 point count stations. In 2022, a total of 85 bird species (and 2 unknown species) were recorded during breeding bird survey point counts from the 141 point count stations. A combined total of 103 species were recorded during the 2021 and 2022 breeding bird surveys, with the most frequently observed including Ruby-crowned Kinglet, Nashville Warbler, White-throated Sparrow, Dark-eyed Junco, Golden-crowned Kinglet and Yellow-rumped Warbler. No target marsh bird species were encountered in any of the 2012, 2018 or 2019 marsh monitoring surveys.

Waterfowl were observed at 18 survey locations in 2012, 11 locations in 2017 and 21 locations in 2019. The most abundant waterfowl species were Common Merganser, Mallard, Canada Goose, Common Goldeneye and Hooded Merganser.

Two owl species, Boreal Owl and Northern Saw-whet Owl, were recorded during the 2012 nocturnal call-playback survey. A Barred Owl was also heard opportunistically during the 2012 field season and a pair were observed during the 2018 breeding bird point count surveys. Boreal Owl and the Northern Saw-whet Owl were also documented during surveys.

Raptor nests for Bald Eagle and Osprey were observed within the baseline investigation area during the 2021 aerial survey.

Under the *Endangered Species Act, 2007*, specific individual and habitat protections are in place for Threatened and Endangered species. Two Threatened species, the Eastern Whip-poor-will and Lesser Yellowlegs, have been observed in the investigation area. Additionally, six species of Special Concern, including the Bald Eagle, Barn Swallow, Canada Warbler, Common Nighthawk, Olive-sided Flycatcher, and Rusty Blackbird, have also been observed in the vicinity of the Project. Only Bald Eagle was observed close to the Project site (Figure 3.4-20).

Amphibians and Reptiles

Three amphibian species were identified within the baseline investigation area: Gray Treefrog, Spring Peeper and Wood Frog. Amphibian species identified are all considered provincially and federally secure. Spring Peeper, Gray Treefrog, Wood Frog, American Toad, Northern Leopard Frog and Blue-spotted Salamander were spotted within the baseline investigation area.

Common Gartersnake was observed frequently throughout the baseline investigation area. No other snake species are expected to occur in the baseline investigation area as no other species range occurs beyond the southern edge of the boreal forest.

No turtles were observed during field investigations, and the Project site is farther north than the northern range for most turtles in Canada; Western Painted Turtle and Snapping Turtle occur around Sioux Lookout and Ear Falls and may be found around the baseline investigation area.

Furbearers and Small Mammals

Small mammal species captured during surveys included Southern Red-backed Vole, Deer Mouse, Least Chipmunk, Red Squirrel and Masked Shrew. Furbearers observed in the baseline investigation area during surveys included Grey Wolf, River Otter, Snowshoe Hare, American Marten, Red Fox, Canada Lynx, Black Bear and Beaver. During the 2011 aerial surveys, high concentrations of Grey Wolf tracks were observed at the south end of Springpole Lake. Several observations of other furbearers or their tracks were recorded during the 2013, 2020, 2021, 2022 and 2023 aerial surveys. Beavers appear to be relatively abundant in the baseline investigation area.

Wolverine

Early baseline investigations documented two separate locations of Wolverine tracks near the Project site during aerial surveys conducted in 2011 (DST 2012). During subsequent aerial surveys, Wolverine tracks were documented near the Project site (DST 2013b). DST (2013b) noted that Wolverine were reported in the area six times between 1982 and 2000, and that all observations for Wolverine in the Natural Heritage Information Centre database occurred in the winter. Additionally, it was reported that 13 Wolverines were trapped over 25 years (1993 to 2017) within the Lake St. Joseph Ecoregion, of which one Wolverine trapping record was within 5 km of the mine site watershed catchments. There are no known historical records or observations of natal or maternal denning sites in the near the Project site, though these sites are notoriously difficult to detect on the landscape and are poorly described in Ontario outside of WCS efforts.

During the March 2020 aerial survey, Wolverine tracks were recorded on Springpole Lake and a Wolverine was observed on Seagrave Lake (Appendix P). Winter habitat use by Wolverine was confirmed at multiple locations within the near the Project site during a winter aerial survey in February 2021 through track observations. Most observed Wolverine activity was more than 40 km east of the mine site. There was no evidence of Wolverine or Wolverine use along the proposed mine access road corridor. Wolverine tracks were detected along the proposed transmission line corridor, approximately 2 km southwest of Bamaji Lake. These detections are shown in Figure 6.14-2. Although individual animals have been observed on Springpole Lake, there are currently no known denning sites near the Project development area.

Evidence of Wolverine (e.g., tracks) were recorded along the edges of lakes and streams in a number of locations during various (targeted and non-targeted) winter aerial programs. In the 2023 and 2024 winter camera trap and run pole program, Wolverine were detected at 12 stations. Of these detections, eight individuals were identified through genetic analysis of hair snag samples. Of these individuals, sex was determined as male for four of the individuals and female for two of the individuals.

Bats

Bat maternity roosting habitat assessment results indicate that nearly all deciduous, mixed and coniferous forests in the baseline investigation area have sufficient cavities to support bat maternity roosts. Five species of bat were identified in the baseline investigation area in 2019: Eastern Red Bat, Hoary Bat, Silver-haired Bat, Northern Myotis (SAR) and Little Brown Myotis (SAR). Acoustic surveys conducted in 2021 confirmed these findings.

Ungulates

During the aerial surveys, 8 Moose were observed in 2011, 127 in 2013, 42 in 2020, 32 in 2021, 46 in 2022 and 36 in 2023. Moose were also detected at four remote trail camera stations. The area around Springpole Lake was found to have some high-quality Moose habitat. More than 90 moose aquatic feeding areas were assessed through the course of the baseline survey programs and documented use in many. Sixty-four moose aquatic feeding areas within the baseline investigation area were of high (42) or very high (22) potential and are considered Significant Wildlife Habitat.

No Woodland Caribou (Boreal population) were observed in proximity to the mine site portion of the baseline investigation area during any aerial winter surveys. Evidence of potential calving and/or nursery for Woodland Caribou use were found on Springpole Lake, Seagrave Lake and Dead Dog Lake. Woodland Caribou overwintering habitat adjacent to the mine site is minimal, with vegetation cover generally consisting of early successional conifer dominant stands which result in poor habitat quality because of recent disturbance by wildfire. High-quality tracts of mature coniferous forest do occur south and southeast of the mine site, portions of which have been provincially classified as Category 1 overwintering areas for Woodland Caribou (Boreal population). These known overwintering areas all had confirmed use during the 2021 survey. In addition, several potentially new wintering areas in the south and southeast corners of the baseline investigation area were identified.

Woodland Caribou were detected at one remote trail camera station established on a beach where Caribou tracks had previously been observed on the western shore of the north basin of Springpole Lake, near the southern tip of Johnson Island. Several observations of Woodland Caribou signs were also seen over the course of the baseline survey including eight observations of scat, two trails and one incidental sighting. During the 2021 aerial survey, 10 Woodland Caribou groups were recorded for a total of 92 individuals observed. In 2022, 26 groups for a total of 161 individuals were observed, in 2023, 40 groups for a total of

364 individuals were observed and in 2024, 51 groups for a total of 313 individuals were observed. Caribou were typically observed in areas with contiguous mature coniferous forest blocks; activity was rarely associated with disturbed areas.

Mortality Investigations of collared Boreal Caribou are undertaken as an ESA permit requirement. As of the timing of this EA/EIS, there were 5 mortality signals in 2023 and 3 mortality signals as of August 6, 2024. One additional mortality signal was determined to be a mechanical collar failure and not a Caribou mortality.

Significant Wildlife Habitat

SWH is considered of provincial significance in Ontario. Development in SWH is prohibited unless it can be demonstrated that development will have no negative impact on features and functions. Wildlife habitat is considered "significant" if it is deemed ecologically important in terms of feature, function, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (MMAH 2020). The SWH screening evaluated which indicator wildlife species were confirmed present, based on field surveys and background review, and which indicator ecosites were present in the FRI provided September 2023 (Appendix P). A SWH type was determined Not Present if 1) either vegetation communities and/or indicator species are not documented in the RSA through field surveys and background review; or 2) indicator species and ecosites are present, but field surveys were completed, and the defining criteria were not met. A SWH type was determined as Candidate if the site has the potential to be a specific SWH type based on the presence of certain vegetation communities and indicator species, but further field surveys or observations are needed to confirm whether the defining criteria for that SWH type are met. Lastly, SWH types are confirmed if indicator species, indicator ecosites, and defining criteria are met or documented through ministry mapping (i.e., the Natural Heritage Information Centre).

Significant wildlife habitat was assessed in accordance with provincial guidance (MNR 2000; MNRF 2010, 2014h) for the baseline investigation area; 17 habitats have been evaluated as candidate and 11 as confirmed (Figure 3.4-21). The SWH discussed below were determined to be confirmed.

- **Waterfowl Stopover and Staging Areas (aquatic):** An aquatic seasonal construction area for waterfowl stopover and staging area was confirmed based on field investigations in 2022.
- **Colonially Nesting Bird Breeding Habitat (Tree / Shrub)**: Mixed Wader Nesting Colony is confirmed from the Natural Heritage Information Centre data in the baseline investigation area.
- **Colonially Nesting Bird Breeding Habitat (Ground)**: Colonial Waterbird Nesting Areas are confirmed with the Natural Heritage Information Centre data within the baseline investigation area.
- **Bat Maternity Colonies**: This significant wildlife habitat type is confirmed in the baseline investigation area. As determined during 2021 field surveys, suitable cavities for bats are locally common in many mixed and deciduous forests in the baseline investigation area, and therefore all Mixed Treed and Deciduous Treed in the Far North Land Cover classifications are considered significant wildlife habitat.
- **Bat Hibernaculum**: Based on field investigations, four features could not be eliminated from the list of identified potential bat hibernacula: Cliff 1, M3, M5, and M6. As such, these four features are considered confirmed bat hibernacula SWH. Cliff 1 comprises the cliff along the north shore of Springpole Lake. The remaining features (M3, M5, and M6) are within 600 m of each other and are located approximately 9km northwest of the Project site.

- **Regionally Rare Plant Species:** Regionally rare plant species are considered locally rare due to limited available habitat. Confirmed species include Nahanni Oak Fern, Alpine Woodsia, Red Dung Moss, and Smooth-margin Nitrogen Moss. In addition, several wetlands have been designated as SWH as they supported Floating Marsh Marigold, Northern Marsh Violet, Red Dug Moss, Smooth-margin Nitrogen Moss, and/or Yellow Pond-Lily. The FRI ecosite has Yellow Dung Moss and Cruet Dung Moss.
- **Wild Rice Stand:** Confirmed SWH was documented by WSP in 2022 in one location.
- **Bald Eagle and Osprey Nesting Habitat**: Bald Eagles and Ospreys are present throughout the baseline investigation area. Aerial surveys confirmed 20 raptor nests including those for Bald Eagle and Osprey.
- **Aquatic Feeding Habitat**: Aquatic feeding habitats are an extremely important habitat component for Moose and other wildlife as they supply important nutrients. Thirty-one locations occur in the baseline investigation area, according to the Natural Heritage Information Centre, in the southern extension. Ten sites were rated high and one site was rated very high.
- **Marsh Bird Breeding Habitat**: Ecosites B135, B136, B137, B138, B139, B140, B141, B142, B148, B150 and B152 are present within the baseline investigation area and provide rich wetlands that are productive breeding habitats for marsh bird species. Field Investigations in 2021 found Common Loon, Ring-necked Duck, Sandhill Crane, Sedge Wren, Sora, Spotted Sandpiper and Trumpeter Swan. Trumpeter Swan was found nesting at two locations and a pair was found at one location.
- **Habitats of Species of Conservation Concern:** All Special Concern species documented as confirmed in the SAR screening or with a high probability of occurring are confirmed SWH.

3.4.10.3 Traditional Knowledge

LSFN noted that Tuktegweik Bay is a preferred location for moose hunting due to an abundance of vegetation, and north of Kejick Bay is known to be abundant for fur-bearing species (LSFN 2024a). Muskeg areas and their shorelines are especially productive habitats for both ungulates and furbearing species. Changes observed by the LSFN over time include an overall decrease in the abundance of animal species in LSFN's territory, and that logging and mining are frequent causes of disturbance (LSFN 2024a). The quality of game species has also been affected by the prevalence of disease in certain animals, such as parasites in ungulates, introduced by an influx of deer in the area. A major stressor impacting LSFN's ability to hunt and trap today is the wildlife habitats have been drastically altered or lost from flooding for hydroelectricity, and land clearing for forestry (LSFN 2024a). LSFN also indicated that invasive species are changing the prevalence of typical animals in the environment.

Land clearing around Lac Seul and Wapesi has led to dispersal and therefore, reduced presence of moose and caribou in those areas; more moose are now found further north, such as around Cat Lake LSFN 2024a). Members explained that all animals, including moose, leave the area when clear cuts occur, because there is no browse available for them. Animals will only return when the forest properly regrows. LSFN also witnessed changes in animal movements and the presence of moose when water levels are abnormally high from dam releases (LSFN 2024a).

SFN noted that some of their hunters and Elders are concerned about a general decline in moose populations over the past few decades. Some causes of the moose decline are believed to be related to mining, forestry, shifting water levels, and climate change (SFN 2024). Ducks and other birds are mainly hunted in the spring and fall but the SFN have noticed a decline in the length of the bird hunting seasons. SFN indicated that these changes are likely due to climate change-related seasonal shifts, climate change-related storms causing trees to blow down, and clear cutting from forestry (SFN 2024).

SFN noted that caribou populations have moved northward due to habitat impacts from forestry, development, and climate change. Forest fires have also caused a change in animal migration patterns resulting in a need to shift hunting and trapping practices (SFN 2024). In addition, SFN indicated that powerline corridor have limited the abundance of wildlife in some traditional harvesting areas and have also increased wolf populations as they can now more easily capture their prey along the corridors (SFN 2024).

NWOMC described that the caribou migrate through the area - they have birth areas where they go to have their young, and then they have low snow impact areas where they spend the winter (NWOMC 2024). NWOCM also indicated that caribou have a low tolerance to noise so when a road is constructed the caribou will be gone from that area until the noise goes away. They had the same observations with forestry and that when the trees are cut down, the caribou move away (NWOMC 2024).

NWOMC described the local area as "the nursery" because of the large number of cow moose found there, and because it is a prime habitat for the animals (MWOMC 2024). NWOMC shared their concerns regarding observed changes in animal populations during their lifetimes and that moose had moved out of traditional areas in the years before 2021 (MWOMC 2024). Participants indicated that deer and moose in the region were being impacted by growing wolf populations. Participants also reported that changes to animal populations were making traditional food sources more difficult to access.

3.4.11 Socioeconomics

The socioeconomic baseline study describes the current socioeconomic conditions in the area around the Project site that may be influenced by the Project. Socioeconomic conditions include regional community population size and demographics, the economy, community services and infrastructure (e.g., education, health care, utilities, transportation systems). The study also provides information regarding land and resource uses.

The socioeconomic baseline study, including methods, analysis, and results, is reported in the socioeconomic TSD in Appendix Q-1. Further details on the existing socioeconomic conditions in support of the effects assessment are found in Section 6.17 to Section 6.21.

3.4.11.1 Methods

Data were collected initially through secondary sources such as statistical data, published reports, community and organization websites, and media reports. Interviews were conducted with local contacts to validate information collected through secondary research and to gather additional information on social determinants of health, community resources, community infrastructure and services, and the economy.

Information was also gathered informally during public consultation and discussions with Indigenous communities, local public and through interviews conducted with local and regional land and resource users.

Several Indigenous communities prepared socioeconomic reports related to the Project. Information from these reports has been incorporated in the summary below and included in relevant sections of the EIS. These reports include:

- Cat Lake First Nation Socio-economic Baseline Study for the Proposed Springpole Gold Mine Project (CLFN 2024b);
- Lac Seul First Nation Socio-economic Baseline Study for the Proposed Springpole Gold Mine Project (LSFN 2024b); and
- Slate Falls Nation – Health, Socio-economic, Indigenous Knowledge and Land Use Baseline Study (SFN 2024).
- Wabauskang Traditional Knowledge and Use in the area of Springpole Gold Access Corridor Project (ArrowBlade 2014);
- Traditional Land Use and Occupancy and Traditional Ecological Knowledge Study Report for the Springpole Gold Project (MON 2023); and
- Springpole TKLUS Follow-up Report for NWOMC Completed by Know History Inc. (NWOMC 2024).

3.4.11.2 Overview of Results

The three closest municipalities to the Project are Ear Falls, Red Lake and Sioux Lookout.

- Ear Falls is located approximately 270 km north of Kenora and has a population of 924 (2021 Census) with an average age of 42. It consists mostly of rural residential areas. Economic growth is linked to resource development activity.
- Red Lake is located north of the English River and has a population of 4,094 (2021 Census) with an average age of 39. Mining is its primary industry in Red Lake.
- Sioux Lookout is located approximately 65 km north of the Trans-Canada Highway between Thunder Bay and Kenora and has a population of 5,839 (2021 Census) with an average age of 39. The top five employment industries in Sioux Lookout are health care and social assistance, retail trade, transportation and warehousing, and educational services which comprise 68% of Sioux Lookout employment.

The Indigenous communities closest to the Project are: CLFN, LSFN, MON, ONS, PFN, SFN, WFN and NWOMC.

In 2021, the median age of the population in CLFN, SFN, LSFN, MON, ONS and WFN was between 19 and 30. PFN age characteristics were not available. According to the most recent Census data available (2021), the median age of the Métis population living in Ear Falls, Red Lake and Sioux Lookout was between 31 and 54 years of age and the average age ranged between 35 and 54.

Social Environment

Land and resource use was investigated to assess how people use the land and the resources within the area surrounding the Project site. Examples of land and resource use include hunting, fishing, forestry, plant harvesting, snowmobiling, camping and boating.

The study area overlaps five General Use Areas, designated in the Crown Land Use Policy Atlas (Government of Ontario 2022). Generally, the approved uses are mining, forestry, cottaging, Crown land recreation, fishing, hunting and fur harvesting. The major resources are mining, forestry and resource-based tourism.

There are campgrounds, outfitters, lodges and wilderness resorts in the region and cabins targeted at hunters and anglers.

Recreational fishing is active throughout the region, with available species including Brook Trout, Crappie, Lake Sturgeon, Lake Trout, Lake Whitefish, Largemouth Bass, Smallmouth Bass, Muskellunge, Northern Pike, Rainbow Trout, Splake, Walleye, Sauger, Yellow Perch and Northern Sunfish. The region is also used for hunting and trapping of large and small game, including Moose, White-tailed deer, Black Bear, Ruffed and Spruce Grouse, Sharp-tailed Grouse, Ptarmigan, Double-crested Cormorant, Snowshoe Hare, Arctic Fox, Red Fox, Opossum, Raccoon, Skunk and Weasel.

SFN maintain close ties to the land, hunting, fishing, and trapping regularly. The Choose Life program provides on-the-land experience for youth with support from knowledge holders to teach snaring, setting up fish nets, hide tanning and other skills.

Cultural continuity in CLFN and LSFN is a critical component of overall wellness with most cultural learning occurring on the land, where knowledge and experiences are passed between generations through programs such as Jordan's Principle, Choose Life, and Oshki-Pimanche-O-win. CLFN's sense of place is derived from an affinity with the traditional territory, which is intimately connected to Anishinaabe identity, spirituality, history, and ancestry. CLFN's cultural continuity is sustained by spiritual places and encounters on their territory, maintain traditional harvesting practices and protocols, and the transmission of knowledge and teaching among generations. Stewardship over the lands, waters, and *Kakinakitinawemaakaninaanak* (all our relations) is an important cultural value and Anishinaabe teaching for LSFN. Learning through doing and observing are important parts of cultural continuity for the LSFN.

MFN members' land use and occupancy is holistic and encompasses food harvesting, medicine gathering, cultural and sacred ceremonies, family camps, language and traditional knowledge, and other recreational activities that together sustain the Anishinaabe identity and way of life. Their knowledge and experiences have been molded by teachings, which they have adapted over time to fit their surrounding environment. Their knowledge and experiences are driven by Anishinaabe law, teachings, and protocols on Aki.

WFN spoke of how stewardship practices had been taught to them, and about the importance of plants, fish, and animals for both sustenance and spiritual purposes. The WFN has a rich history and current practice of moving through their territory, which connects to important aspects of WFN such as cultural strength and solidarity through ceremonial practices.

Metis communities throughout Ontario have deep connections to their traditional territories. These connections are the core of the identity and culture of NWOMC. The health and well-being of the land correlates directly with that of the people whose history, present, and future are tied to it. Being on the land and water in their traditional territory is critical to NWOMC's identity. Carrying out traditional practices on the land is a means of passing on skills and knowledge to the younger and future generations and is an important way for members to spend time with their family.

Economic Environment

Ear Falls and Red Lake are dependent on resource development and extraction; in the case of Red Lake, that is predominantly mining. Sioux Lookout has diversified from its former reliance on the resource economy to an economy that includes forestry, railroad, tourism, professional sectors, air transportation, retail, bulk fuel supply and delivery, construction, hotels, restaurants, government services, health care and services and Indigenous agencies.

As a result, the workforce in Ear Falls and Red Lake is dominated by the mining and manufacturing industries, followed by sales and service, trades, transport, equipment operators and related occupations.

In contrast, the workforce in Sioux Lookout is focused on health care and social assistance, public administration, transportation and retail trade, with only a small proportion directly related to mining. The three communities have similar participation rates compared to Ontario (62.8%) and low unemployment rates compared to Ontario (12.2%). The level of apprenticeships or trades certificates are higher in Ear Falls and Red Lake than in Sioux Lookout (Statistics Canada 2023).

The 2021 Census data indicate that the income composition indicators for the residents of these municipalities is higher than that of Ontario (67.4%), with employment income comprising 68.0% of the income received in Ear Falls, 75.2% of the income received in Red Lake and 74.0% of the income received in Sioux Lookout (Statistics Canada 2023).

The workforce in the communities of CLFN, LSFN, MON, ONS, PFN, SFN, WFN and the NWOMC is focused on the primary industries of public administration, health care and social assistance.

Members of CLFN, SFN, LSFN, MON, ONS and WFN who attained a degree, certificate or diploma ranged from 16.7% to 66.7% (Statistics Canada 2023). In 2016, Métis living in Ear Falls, Red Lake and Sioux Lookout who attained a degree, certificate or diploma ranged from 52.6% to 84.4% (Statistics Canada 2018).

WFN had the highest participation rate in the labour force (77.8%) and CLFN had the lowest (32.5%) in 2021. The Métis population of Sioux Lookout had a higher labour participation rate (93.5%) than those in Red Lake (69.5%) and Ear Falls (80%) in 2016 (Statistics Canada 2018).

The employment income composition indicator is higher (67.4%) for Ontario than CLFN (49.0%), LSFN (65.0%), and MON (39.0%) and almost the same for SFN (68%) based on available 2021 Census data (Statistics Canada 2023). In 2016, the Métis population in Ear Falls had the highest proportion of income from employment (92.6%), followed by Sioux Lookout (87.4%) and Red Lake (84.5%; Statistics Canada 2018). Census data were not available to present income composition for ONS, PFN and WFN.

Employment in SFN includes administration, education, health, and economic development departments, with other revenue sources including catering, tourist guides, trapping and fishing. The Bamaji Lake Economic Development Corporation and Sioux Lookout Friendship Accord Economic Development Corporation provide economic development and training support.

The predominant employment in CLFN is with the band office, the health authority, and the school. Additional local jobs include the Northern Store, the Nishnawbe Aski Police Services, Tikinagan Child & Family Services, hydro (Watay Power). There are three or four commercial fishers still operating in CLFN, but without supporting fisheries structures. CLFN has partnerships with various organizations including Wataypower Transmission, Musselwhite Mine, forestry-related companies, and health-related companies. Training is provided by government sponsored organizations and Oshki-Wenjack, Sioux Lookout Friendship Accord. Many of the private sector companies offer on-the-job training as well as economic spinoff opportunities for local businesses or entrepreneurs.

Employment in LSFN members includes teaching, administration, housekeeping, cooking, mining, firefighting, guiding, bookkeeping, forestry and logging. The Chi Mino Ozhitoowin is an Indigenous-oriented organization partnered with Valard Construction LP to promote work opportunities to interested Indigenous peoples. In addition, LSFN Training Centre of Excellence also offers training programs, and focuses on certification courses and skills for students interested in careers in mining, construction, forestry, hospitality, and resource industries. On-site training opportunities are also available depending on the industry. Mining partnerships offer trainers or on-site work experience/training.

Built Environment

Educational infrastructure and services in Ear Falls, Red Lake and Sioux Lookout includes seven elementary schools, three high schools, two campuses for Confederation College, adult learning centres and Indigenous learning centres. There is at least one elementary school in each of the Indigenous communities of CLFN, LSFN, MON, ONS, PFN, SFN and WFN. SFN has an elementary school and a virtual high school, and students may attend schools in Sioux Lookout and Thunder Bay. CLFN has two elementary schools, distance education for high school and in-person high school offered at Pelican Falls First Nation or other Sioux Lookoutschools. LSFN has three elementary schools located in the community.

Community services and recreation infrastructure for Ear Falls, Red Lake and Sioux Lookout includes recreation centres, arenas, golf courses, boat launches, parks, libraries, heritage centre, tennis courts, sports complexes, ski trails, multi-purpose hub for community arts and culture, beaches, soccer fields, baseball diamonds and community halls. Recreational facilities in CLFN, LSFN, MON, ONS, PFN, SFN and WFN range from outdoor rinks, arenas, community centres, multiplex facility, community halls and a library.

Health infrastructure for Ear Falls, Red Lake and Sioux Lookout includes health units that provide a range of services, including baby wellness clinics, dental screening and prevention, mobile dental clinics, immunization clinics, sexual health clinics, speech and language clinics, nutrition and healthy living classes, prenatal and parenting classes. In 2024, the Ear Falls has a community health centre was destroyed by fire and services are being provided in the wellness centre. Red Lake has an 18-bed hospital that provides 24-hour emergency care, inpatient acute and chronic care, low-risk obstetrics, and mental health and addictions counselling services. Other medical facilities in Red Lake include a medical centre, dental clinic, elderly care, and counselling and addiction services. Sioux Lookout has a 60-bed hospital with a 20-bed extended care facility and offers a range of services including diabetes care, stroke prevention, mental health counselling, addiction services and acute outpatient programs. Community child and family services are available to most Indigenous communities, and the communities are serviced by a range of health facilities and services including health authorities, health and wellness centres, nursing stations, health clinics and treatment centres. SFN has a health clinic, and provides services from doctors, dental care professionals, primary care teams, and optometrists. CLFN offers programs and services in the community, including health, youth, economic, well-being, education, housing, substance abuse, employment. LSFN has health department that oversees the operation of community health services and facilities.

Childcare services are offered in Ear Falls, Red Lake and Sioux Lookout.

Municipal services offered in Ear Falls, Red Lake and Sioux Lookout include water and wastewater treatment; waste disposal with landfills in Hidden Lake, Red Lake and Ear Falls; internet; telephone; radio; cable; and newspaper. Further, Ear Falls is served by the Ontario Power Generation Ear Falls Generating station, whereas Sioux Lookout is served by Sioux Lookout Hydro and Red Lake has a six-megawatt distribution station. Natural gas is available in Ear Falls and Red Lake. Winter access is provided to CLFN and PFN, with the other communities having all season access. With the exception of LSFN, ONS and WFN, the communities have some form of air access. Police services are provided for each community, with emergency services provided to at least SFN and LSFN.

The 230 kilovolt (kV) Wataynikaneyap Power and 115 kV E1C transmission lines service the local communities. The provincial highway network connects to Ear Falls, Red Lake and Sioux Lookout, and there are airports in Red Lake and Sioux Lookout. The local municipalities are served by the Ontario Provincial Police, with detachments in Ear Falls, Red Lake and Sioux Lookout. Fire and ambulance services are provided in all municipalities. Electrical power is provided to SFN from the E1C transmission line that runs through the reserve and is operated by Hydro One Networks Incorporated. CLFN is connected to the regional grid.

Temporary accommodations are available in Ear Falls, Red Lake and Sioux Lookout. There are limited temporary accommodations in most communities, although CLFN has a motel.

3.4.12 Light

Ambient light refers to the amount of available light in an environment. Light is measured in units referred to as lux, where one unit of lux is equivalent to one lumen per square metre. Natural sources of ambient nighttime light include moonlight and to a lesser extent starlight. Artificial light, related to anthropogenic light pollution, results in sky glow (artificial light that is scattered and reflected to the earth by the atmosphere) that affects the natural nighttime ambient light regime.

The ambient light TSD, including methods, analysis and results, is provided in Appendix J.

3.4.12.1 Methods

Due to the minimal presence of existing anthropogenic light sources at the Project site, site-specific baseline studies for anthropogenic light sources were not completed for the Project. The ambient baseline conditions for the Project were assessed in a semi-qualitative study completed in 2021, based on information published by the International Commission on Illumination. Measurements could not be taken at receptor locations due to safety (accessing remote locations at night); measurements were instead taken 400 m from the exploration camp in an area that was intrinsically dark.

3.4.12.2 Overview of Results

The average brightness was measured on August 8, 2021, within 400 m of the existing exploration camp, determined to be 21.86 magnitudes per square arcsecond (mag/arc-sec^2) in the 0- to 30-degree zenith angle; fine particulate matter from nearby wildfires may have had an effect on the measurements.

Based on the Visible Infrared Imaging Radiometer Suite data, onsite measurements and visual descriptions of the nighttime conditions, the measured sky brightness is expected to be toward the higher (darker) end of the E1 Lighting Zone (21.50 to 21.90 mag/arc-sec^2).

Based on the location of the Project, and the minimal presence of anthropogenic sources of light, the Project site can be characterized as natural or intrinsically dark.

3.4.13 Visual Aesthetics

The visual aesthetics study characterizes the existing landscape and view from locations near the proposed Project site, by means of photographs taken from vantage or receptor point locations that may have the potential to view some of the Project components during the various Project phases. This description is used for the quantitative and qualitative assessment of visual effects.

The visual aesthetics study, including methods, analysis and results, is reported in visual assessment TSD in Appendix U.

3.4.13.1 Methods

A fieldwork campaign was carried out to capture the existing visual landscape directed toward key components of the Project that have the potential to be seen by potential receptors.

Five potential receptor locations whose visual aesthetics could potentially be affected by Project components were visited during the field campaign. This includes four locations that straddle the visual aesthetics study area boundary along the four cardinal directions and one distal location west of the site, outside of the visual aesthetics study area. All sites were located on Birch Lake and Springpole Lake. One or more photographs were taken in the direction of the Project for each of the receptor locations.

Mine site 3D geospatial data, LiDAR, provincial digital elevation model data and tree stand heights were obtained to support the viewshed analysis by merging the data to create a 3D landscape within the viewshed study area (Figure 3.4-22). Photo renderings from the model were compared to the baseline photographs.

3.4.13.2 Overview of Results

The existing landscape at and around the Project site is typical of the northern Ontario landscape, characterized by densely populated coniferous and deciduous trees, rivers and lakes. Viewer sensitivity considers the social environment through which a viewer experiences a viewscape. It considers aspects such as public awareness, values, and expectations of the scenic quality. The viewscapes in the vicinity of the Project are considered to have low viewer sensitivity, which means these are locations that have an infrequent number of viewers for brief time periods (i.e., travellers and/or workers passing through) and these viewers have minimal expectations for visual quality.

Further details on the existing conditions in support of the effects assessment are found in Appendix U.

3.4.14 Traditional Land Use Studies

Indigenous TLU studies describe Indigenous (First Nations and Métis) traditional land and resource uses in the area surrounding the Project site that could be affected by the Project. The activities practised by Indigenous peoples considered in the baseline study include hunting, fishing, harvesting of plants, and cultural and ceremonial practices. The resources that are needed to continue these uses are also described.

Further details on the existing conditions in support of the effects assessment are found in Section 6.21.

3.4.14.1 Methods

The description of TLU for the Project relies on non-confidential information made available through engagement with Indigenous communities, including CLFN, LSFN, MON, ONS, PFN, SFN, WFN and NWOMC.

Data were collected initially through secondary sources such as available TLU studies, land use plans completed to date, supplementary reports from adjacent projects and land use activities such as forest management. Interviews were conducted within local Indigenous communities during TK / TLU studies to gather information on TLU activities.

3.4.14.2 Overview of Results

Eight Indigenous communities were contacted to participate in Indigenous engagement for the Project and to gather available TLU information. To date, seven Indigenous communities (CLFN, LSFN, MON, SFN, PFN, WFN and NWOMC) have produced either TK / TLU studies or community land use planning documents. SFN also shared the Master of Arts thesis Slate Falls: Through Memory and Material (Kunicky 2021), an archaeological and ethnographic study of the Old Slate Falls Village. FMG is continuing to work with Indigenous communities to gather additional TLU information and consider the data, as made available. In addition, FMG will continue to document and address comments related to TLU activities identified by Indigenous communities during the engagement activities for the Project.

Hunting and trapping locations are common around lakes and take advantage of trails and resource movement patterns within the surrounding forest. Information gathered to date has identified hunting and trapping as TLU activities taking place within the baseline investigation area and commonly hunted and trapped animals include Bear, Beaver, Bobcat, Caribou, Deer, Duck, Ducks, Fisher, Fox, Goose, Grouse, Lynx, Marten, Mink, Moose, Muskrat, Otter, Partridge, Rabbit, Skunk, Spruce Grouse, Squirrel, Weasel, Wolf and Wolverine (CLFN 2024a; LSFN 2024a; MON 2023; NWOMC 2021; SFN 2024; Morin et al. 2014).

Preferred fishing locations were identified around waterbodies and watercourses where habitat, including Birch Lake and Springpole Lake, would support the various stages of aquatic resource, including spawning sites. Within the baseline investigation area, traditionally fished species include Lake Sturgeon, Lake Trout, Northern Pike, Perch, Sauger, Tulibee, White Sucker, Walleye and Whitefish (CLFN 2024a; LSFN 2024a; MON 2023; NWOMC 2021; SFN 2024; Morin et al. 2014).

Indigenous communities place high value on a variety of plant species for their nutritional benefits, medicinal purposes and ceremonial uses, including wild rice, rat root, wild carrots, bulrush, strawberries, saskatoon berries, blueberries, raspberries, blackberries, cherries, cranberries, juniper, sage, sweet grass, willow, cedar, pine, balsam fir, alder, fiddleheads, yarrow, Labrador tea, mint, rosehip, Chaga, nuts, mushrooms and various tree barks (CLFN 2024a; LSFN 2024a; MON 2023; NWOMC 2021; SFN 2024; Morin et al. 2014). Other trees and plants are used as tools and building materials, including poplar, spruce, ash, jack pine, and moss.

Indigenous communities noted that camps and cabins used for habitation, cultural practices and as spiritual sites are commonly found along lakeshores, including within the baseline investigation area on Birch Lake and Springpole Lake (CLFN 2024a; LSFN 2024a; MON 2023; NWOMC 2021; SFN 2024; Morin et al. 2014). A portage route was identified within the baseline investigation area (CLFN 2024a).

Additional description of TLU activities specific to each Indigenous community is provided in Section 6.21. The incorporation of available TK / TLU into the final EIS/EA is presented for each VC in Section 6.

3.4.15 Archeological Resources

Archaeological baseline studies have been completed by a licensed archaeologist who assessed the potential for cultural, physical features and sites that may have historical or cultural value or interest for Indigenous and non-Indigenous communities and society, within or near the proposed Project site where there may be potential for these features or sites to be disturbed by Project-related activities.

Identification of archaeological resources for the Project is presented in the archaeology TSDs provided in Appendices S-1 to S-4.

3.4.15.1 Methods

Stage 1 and 2 Archaeological Resource Assessment studies were completed in the vicinity of the Project site in 2020, 2021 and 2023. These studies were carried out in accordance with the *Ontario Heritage Act* (RSO 1990, c. O.18), and the Ontario MCM *Standards and Guidelines for Consultant Archaeologists* (MCM 2011).

The 2020 Stage 1 archaeological assessment consisted of a detailed evaluation of the archaeological potential around the Project site to determine the likelihood that the Project could potentially affect areas containing archaeological resources, such as near water sources, early transportation routes, and previously identified historic sites. The evaluation consisted of background and overview studies that relied on desktop research and some property inspection. This preliminary work identified high potential areas and existing sites for Stage 2 work.

In 2021, a Stage 1 archaeological assessment was conducted along four proposed transmission line corridor alternatives in 2021, which identified additional areas with archaeological potential. Future Stage 2 field work will be carried out to assess these areas.

Stage 2 work in 2021 included extensive subsurface testing (73 test pits) in areas around the mine identified as having high archaeological potential for pre-contact Indigenous and early historical mining archaeological sites.

In 2023, a Stage 1 archeological assessment was conducted for portions of the Project footprint that extend outside the lands assessed by two previous studies corresponding to two aggregate source pits, the effluent discharge pipeline and portions of alternative access road routes.

It should be noted that no baseline study was conducted for paleontological resources. Fossils are not expected to be present given that the rocks in the area are from the Late Archean and pre-date any plant or animal life on earth.

3.4.15.2 Overview of Results

Archaeological assessments conducted for the Project followed applicable regulations and guidelines. Some of the prime areas of potential tested in 2021 included areas adjacent to the major water sources (Springpole Lake), as well as the smaller, mapped inland streams and ponds inland.

The 2021 Stage 2 fieldwork found no archaeological resources within the areas identified in the 2020 Stage 1 report. Two pictograph sites were identified, though not within the proposed development areas. A Stage 2 assessment of the bay surrounding the pictograph sites found no archaeological resources. Due to the steep rocky terrain, the area was considered generally undesirable for habitation.

The 2023 Stage 1 archaeological assessment identified no areas with archaeological potential, and no further archaeological assessment of the area was required.

Further details on the existing conditions in support of the effects assessment are found in Section 6.22.

3.4.16 Built Heritage Resources and Cultural Heritage Landscapes

Cultural heritage assessments assess known and potential built heritage resources and cultural heritage landscapes within the baseline investigation area based on historical summary of the development of the study area, screening criteria developed by the MCM and professional judgment. This is an accepted federal and provincial practice for the preliminary identification and assessment of cultural heritage landscapes and built heritage resources that may be of cultural heritage value or interest. Data collected are used to assess the potential effects of the Project on built heritage resources and cultural heritage landscapes.

Identification of cultural heritage resources is presented in the cultural heritage TSD in Appendix S-4.

3.4.16.1 Methods

Surveys of built heritage resources and cultural heritage landscapes were conducted in 2020 and 2021 on the Springpole Property when weather and lighting conditions permitted good visibility of land features. A GPS device was used to record the locations of diagnostic artifacts and all fixed reference landmarks. All field activities and conditions were mapped and photo-documented.

Built heritage consists of individual, person-made or modified buildings or structures including, but not limited to:

- Residences;
- Industrial, institutional, religious, agricultural and commercial buildings;
- Bridges; and
- Monuments.

Examples of cultural heritage landscapes include historical settlements, farm complexes, waterscapes, roadscapes and railways. These landscapes emphasize the interrelationship between people and the natural environment and convey information about the processes and activities that have shaped a community.

Built heritage and cultural heritage landscape evaluations were conducted in 2023 on three cabins and the Springpole–Birch Lake Portage and followed the guidelines outlined by the MCM.

3.4.16.2 Overview of Results

Built heritage resources in or near the vicinity of the Project include a travel route, portages and eight cabins or camps, consisting of small, framed buildings, generally less than 50 years old, with a kitchen, dining area, and living quarters, which were used as camps. Three cabins were further evaluated and determined to not have cultural heritage value.

Two other cultural heritage landscapes were determined to have potential and assessed in the 2021 report:

- Springpole–Birch Lake Portage cultural heritage landscape, a trade route dating to the 1700s; and
- Springpole exploration camp, a mining camp with multiple structures and circulation routes, dating to 1928.

The built heritage and cultural heritage landscape evaluation determined that the Springpole exploration camp did not have cultural heritage value; however, the Springpole–Birch Lake Portage was assessed to have cultural heritage value.

Table 3.4-1: Climate Normal Air Temperature Statistics for Red Lake A Station

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-18.3	-15	-7.4	2.2	9.6	15.1	18.1	17	11	3.7	-5.7	-15.3	1.3
Standard Deviation	3.7	4	3	2.8	2.2	1.9	1.4	1.6	1.7	1.7	3.5	3.9	1.2
Daily Maximum (°C)	-12.7	-8.6	-0.8	8.6	16	21.1	23.8	22.7	16	7.8	-2	-10.5	6.8
Daily Minimum (°C)	-23.9	-21.3	-13.9	-4.2	3.1	9.1	12.4	11.4	5.9	-0.4	-9.4	-20	-4.3

Source:
ECCC (2021).

Table 3.4-2: Intensity Duration Frequency Statistics for Project Site

Duration	Rainfall Depth (mm)								
	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
2-year	9.8	12.1	13.6	16.8	20.7	25.5	35.5	43.7	53.9
5-year	13.3	16.3	18.4	22.7	28	34.5	48	59.2	72.9
10-year	15.6	19.2	21.7	26.7	32.9	40.5	56.4	69.5	85.6
25-year	18.5	22.7	25.7	31.7	39	48	66.9	82.4	101.5
50-year	20.6	25.4	28.7	35.3	43.5	53.6	74.6	91.9	113.2
100-year	22.7	27.9	31.6	38.9	47.9	59	82.1	101.2	124.7

Note:
IDF information for the Project site was obtained from MTO (2021) using Project site coordinates (51.395833, -92.295833).

Table 3.4-3: Wet and Dry Years for Various Return Periods

Return Period (Year)	Annual Precipitation (mm)	
	Wet Year	Dry Year
Mean Annual Precipitation	667.0	
Climate Normals (1981 to 2010)	686.4	
5 years	756	565
10 years	828	502
25 years	920	432
50 years	988	386
100 years	1,050	345
200 years	1,120	309

Note:
Wet and dry year analysis is based on 48 years of records from Red Lake stations.

Table 3.4-4: Average Annual Lake Evaporation for Project Site

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Lake Evaporation (mm)	0.8	2.6	16.6	39.0	67.6	85.4	105.9	78.7	44.7	13.5	4.0	1.2	460.0

Source:
Ausenco (2020).

Table 3.4-5: Annualized Monthly and Annual Flow Statistics for Springpole Lake

Pro-rated Monthly Flows (m^3/s) at F7-HS1
Watershed Area = 1,274 km^2

	Flow (m^3/s)													Mean Annual Runoff (mm)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	
Mean	6.7	5.7	5.0	7.2	20.8	21.3	15.7	11.4	10.9	11.2	10.8	8.5	11.3	280.1
5th Percentile(1)	3.7	3.1	2.8	4.0	11.5	11.8	8.7	6.3	6.0	6.2	6.0	4.7	6.3	155.0
95th Percentile(1)	11.0	9.3	8.1	11.8	34.0	34.8	25.6	18.6	17.8	18.2	17.7	13.8	18.5	457.7

Pro-rated Monthly Flows (m^3/s) at F8-HS7
Watershed Area = 1,372 km^2

	Flow (m^3/s)													Mean Annual Runoff (mm)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean	
Mean	7.3	6.1	5.4	7.8	22.4	22.9	16.9	12.3	11.7	12.0	11.7	9.1	12.2	280.1
5th Percentile(1)	4.0	3.4	3.0	4.3	12.4	12.7	9.4	6.8	6.5	6.7	6.5	5.0	6.7	155.0
95th Percentile(1)	11.9	10.0	8.8	12.7	36.6	37.5	27.6	20.0	19.2	19.6	19.0	14.9	19.9	457.7

Note:

(1) The 5th and 95th percentile monthly values are annualized monthly values, pro-rated using annual flow statistics, not 5th and 95th percentile values calculated from individual monthly data. For example, the mean monthly F7-HS1 runoff values were multiplied by a factor of (21.8/39.4), where 21.8 m^3/s is the 5th percentile annual flow and 39.4 m^3/s is the mean annual flow.

Table 3.4-6: Estimated Springpole Lake Low Flow Indices

Station	Springpole Lake Inlet (HS1)		Springpole Lake Southeast Arm		Springpole Lake Outlet (HS7)	
Catchment (km^2)	1,289 km^2		1,319 km^2		1,367 km^2	
7-Day Low Flows	m^3/s	m^3/d	m^3/s	m^3/day	m^3/s	m^3/d
7Q2	2.69	232,525	2.3	201,568	3.00	259,103
7Q5	1.83	158,315	1.6	138,713	2.05	177,359
7Q10	1.50	129,623	1.3	114,103	1.69	145,672
7Q20	1.20	103,678	1.1	97,123	1.35	116,831

Table 3.4-7: Baseline Surface Water Quality Sampling for Springpole Gold Project

Waterbody	Number of Sampling Locations	Period of Record
Birch Lake	8	10 years including 2011, 2012, 2013, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023
Springpole Lake	12	10 years including 2011, 2012, 2013, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023
Seagrave Lake	6	5 years including 2011, 2012, 2013, 2019, and 2020
Small Area Lakes and Tributaries	10	7 years including 2011, 2012, 2013, 2017, 2018, 2020, 2021, 2022 and 2023
Regional Downstream Locations	3	2022 and 2023

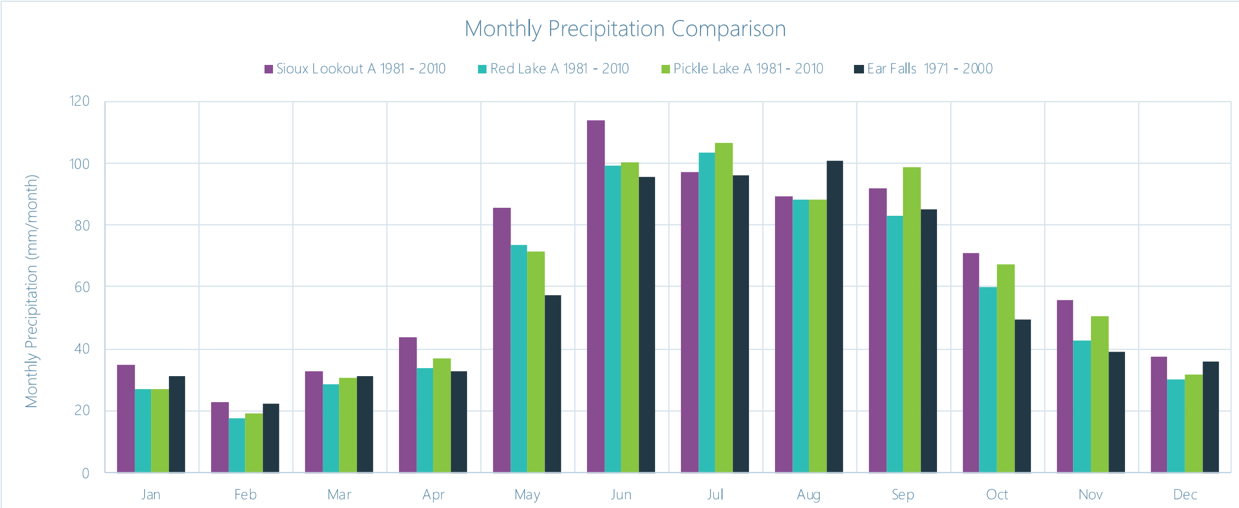


Figure 3.4-1: Monthly Precipitation for Selected Environment and Climate Change Canada Climate Stations

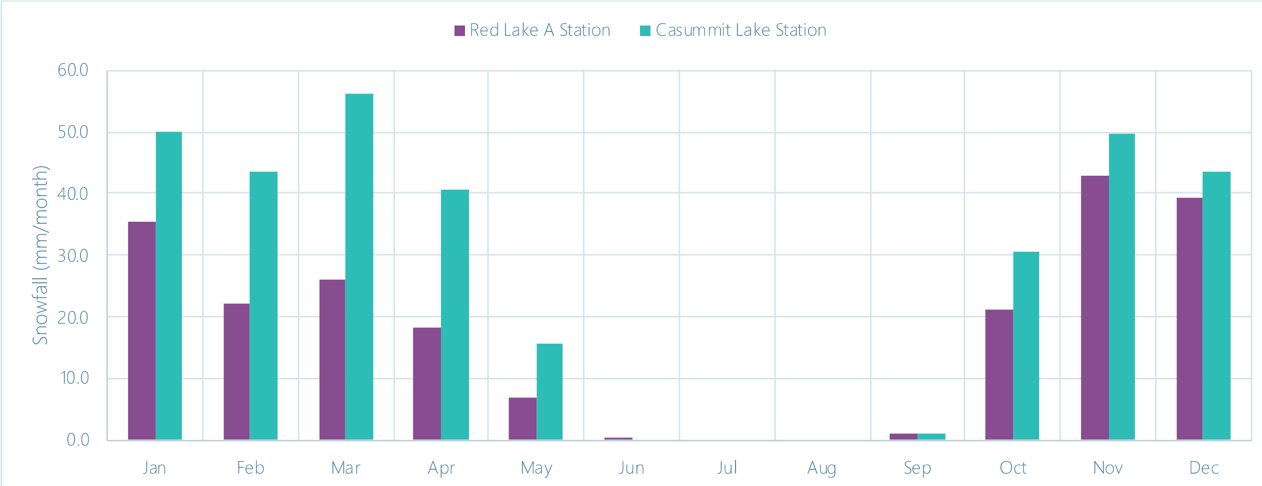


Figure 3.4-2: Snowfall at Regional Stations

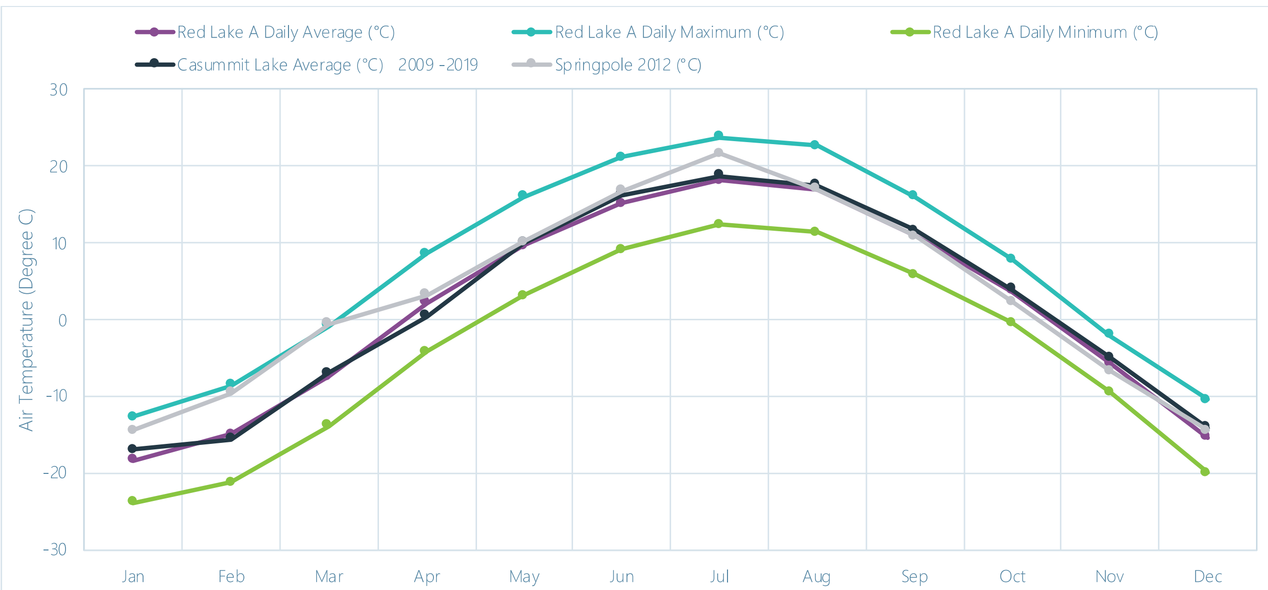


Figure 3.4-3: Air Temperature at Regional Stations

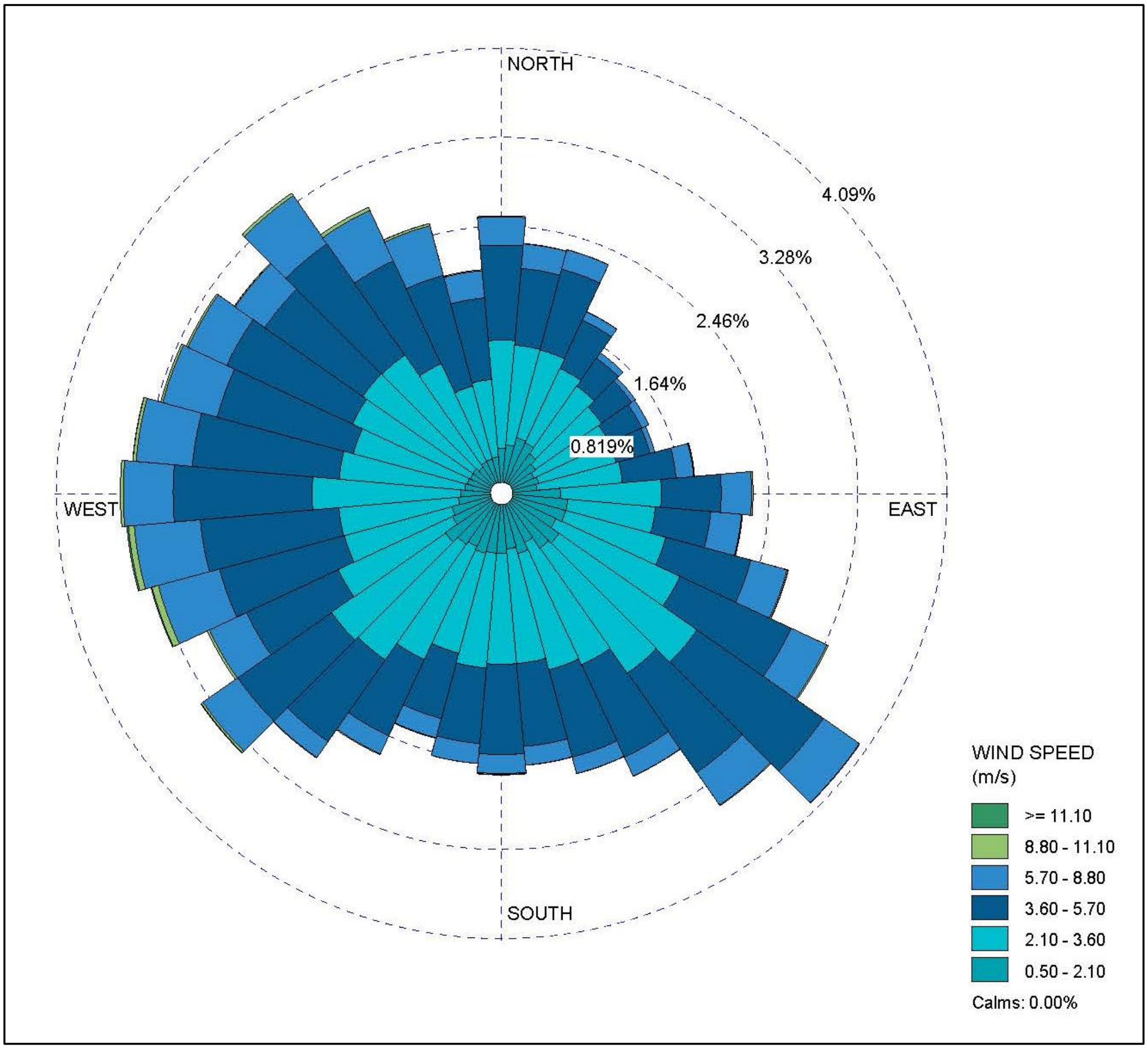


Figure 3.4-4: Five-Year Red Lake Wind Rose (2013–2017)

LEGEND

- Project Location
- Air Quality Monitoring Stations
- Watercourse

NOTES:
- Topographic information extracted from LIO, MNRF.
- Aerial imagery provided by First Mining Gold, 2020.

Datum: NAD83
Projection: UTM Zone 15N

0 100 200 400 600 800 1,000 Metres

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SPRINGPOLE GOLD PROJECT

Air Quality Monitoring Locations

PROJECT N°: ONS2104	**FIGURE: 3.4-5**
SCALE: 1:10,000	DATE: December 2023

LEGEND

- Project Location
- Sound and Vibration Monitoring Locations
- Watercourse

NOTES:
- Topographic information extracted from LIO, MNRF.
- Aerial imagery provided by First Mining Gold, 2020.

Datum: NAD83
Projection: UTM Zone 15N

0 250 500 1,000 1,500 2,000 Metres

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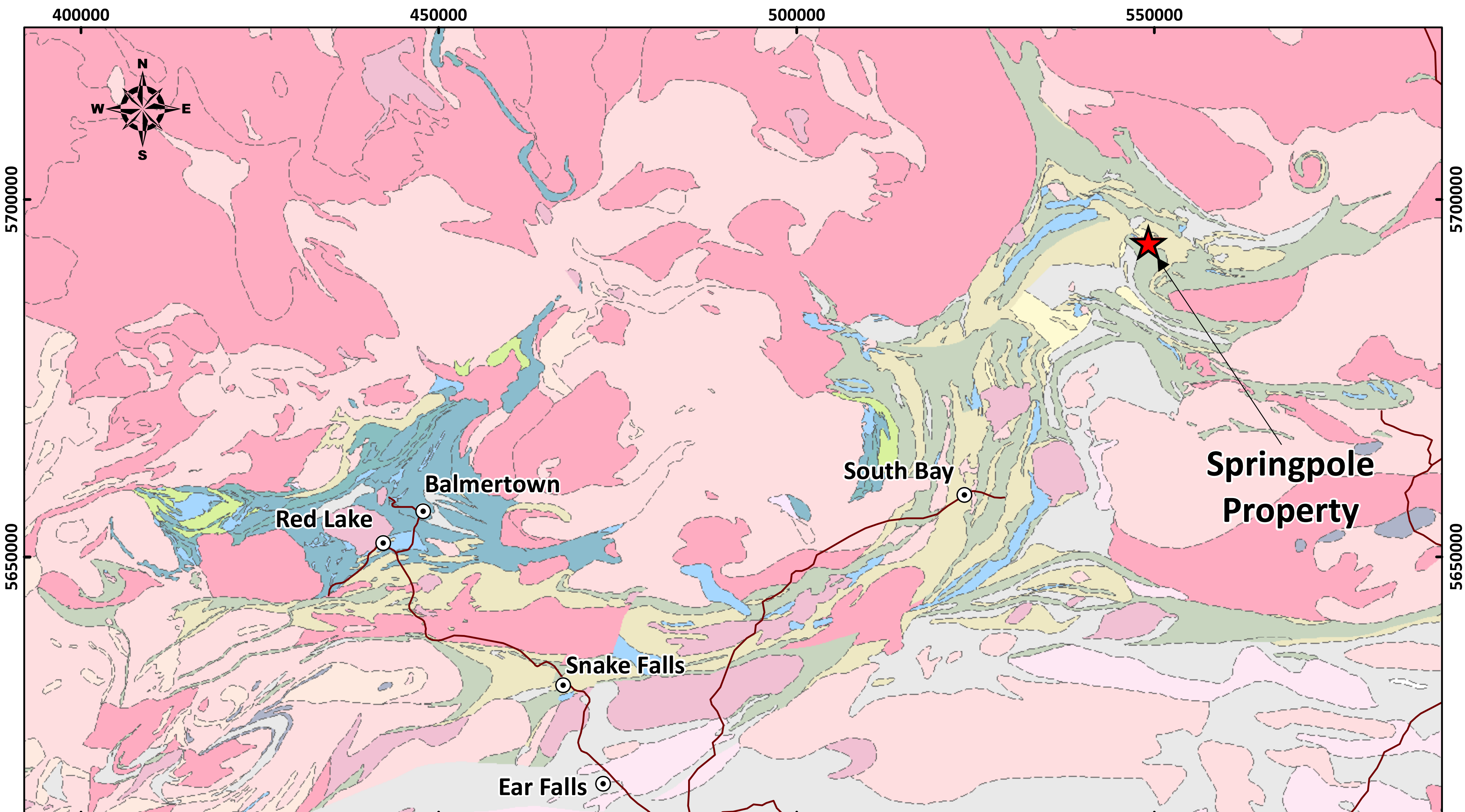
SPRINGPOLE GOLD PROJECT

Baseline Sound and Vibration Monitoring Locations

PROJECT N°: ONS2104	**FIGURE: 3.4-6**
SCALE: 1:36,000	DATE: October 2024



Intrusive Contact

NEOARCHEAN

- Hornblendite - nepheline syenite suite

NEO TO MESOARCHEAN

- Massive granodiorite to granite
- Diorite-monzodiorite-granodiorite suite
- Muscovite-bearing granitic rocks
- Foliated tonalite suite
- Gneissic tonalite suite
- Mafic and ultramafic rocks

Supercrustal Rocks

NEOARCHEAN

- Coarse clastic metasedimentary rocks

NEO TO MESOARCHEAN

- Migmatized supracrustal rocks
- Metasedimentary rocks
- Felsic to intermediate metavolcanic rocks
- Mafic to intermediate metavolcanic rocks
- Mafic metavolcanic and metasedimentary rocks
- Felsic to intermediate metavolcanic rocks
- Metasedimentary rocks

- Project Location
- Town / Community
- Road

First Mining Gold

Springpole Gold Project

Regional Bedrock Geology

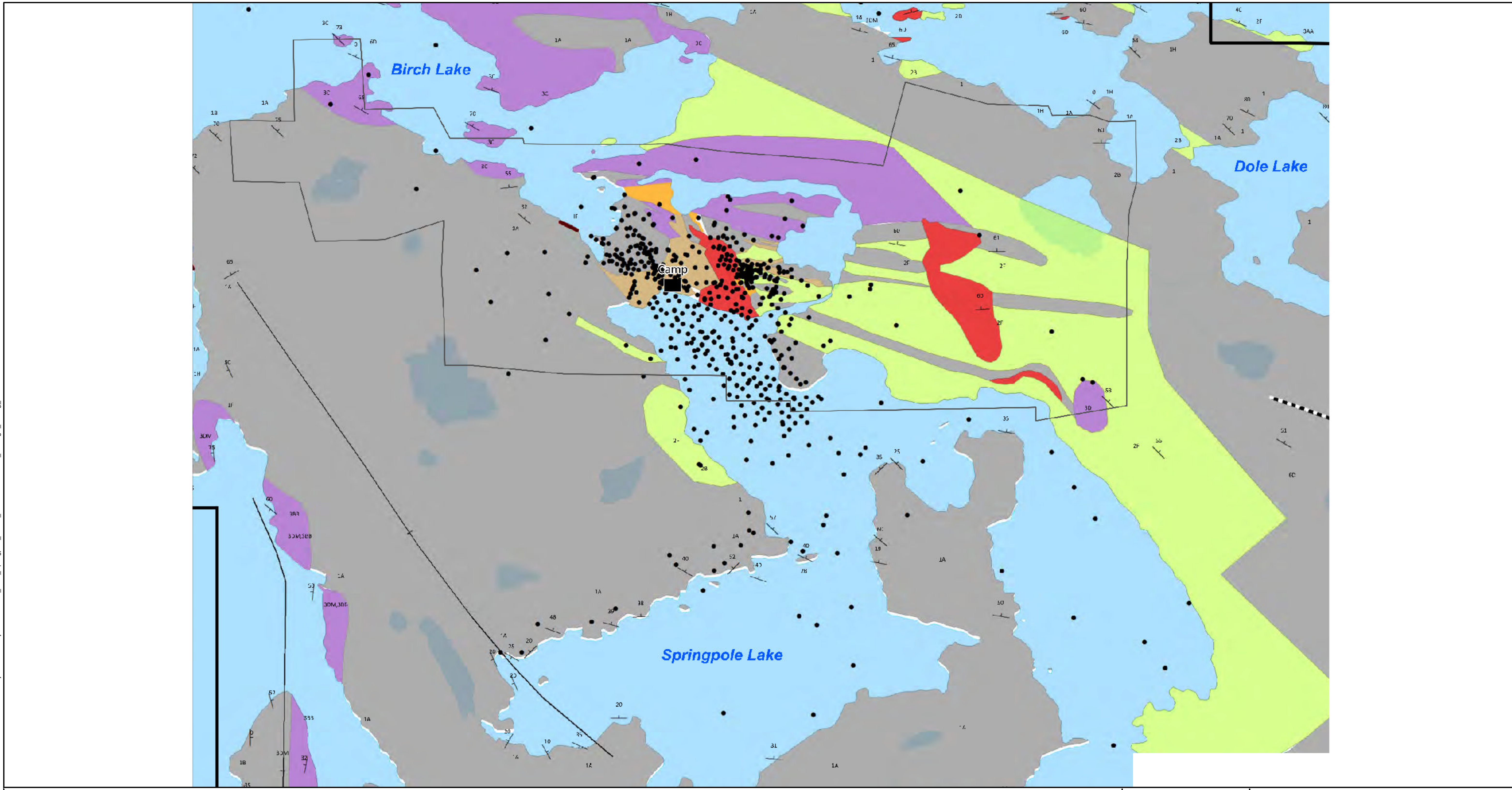
Figure 3.4-7

Kenora District, Ontario

December 2023 | NAD83 UTMz15 | Scale 1 : 750,000

0 Kilometers 40

X:\CA\CAOAK300-OAK\MIS-FS1-Project\F\2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\Regional_Bedrock_Geology_FMG_TOR_2.mxd



LEGEND

- • Drillhole Collar
- ■ Camp
- Property Outline
- Patents Outline

Geology Mapping 20k Scale

- 1-Mafic to Intermediate Metavolanics; 1A-Massive Lava
- 2-Intermediate to Felsic Metavolcanics; 2B-Intermediate to Felsic Tuff
- 2A-Rhyolite
- 3AA-Clastic Sediment; 3C-Conglomerate; 3DM-Metasediments; 3BB-Siltstone and Greywacke; 3
- 6B-Quatz Porphyry
- 6D-Feldspar Porphyry
- B
- O
- Lithology Observation
- Structure Strike/Dip
- BIF
- Shear
- Anticline
- Syncline

NOTES:
- Site bedrock geology provided by FracFlow Consultants Inc., Hydrogeology Baseline Report 19 February 2021.

Datum: NAD83
Projection: UTM Zone 15N

0 0.5 1 2 3 4 5 Kilometres

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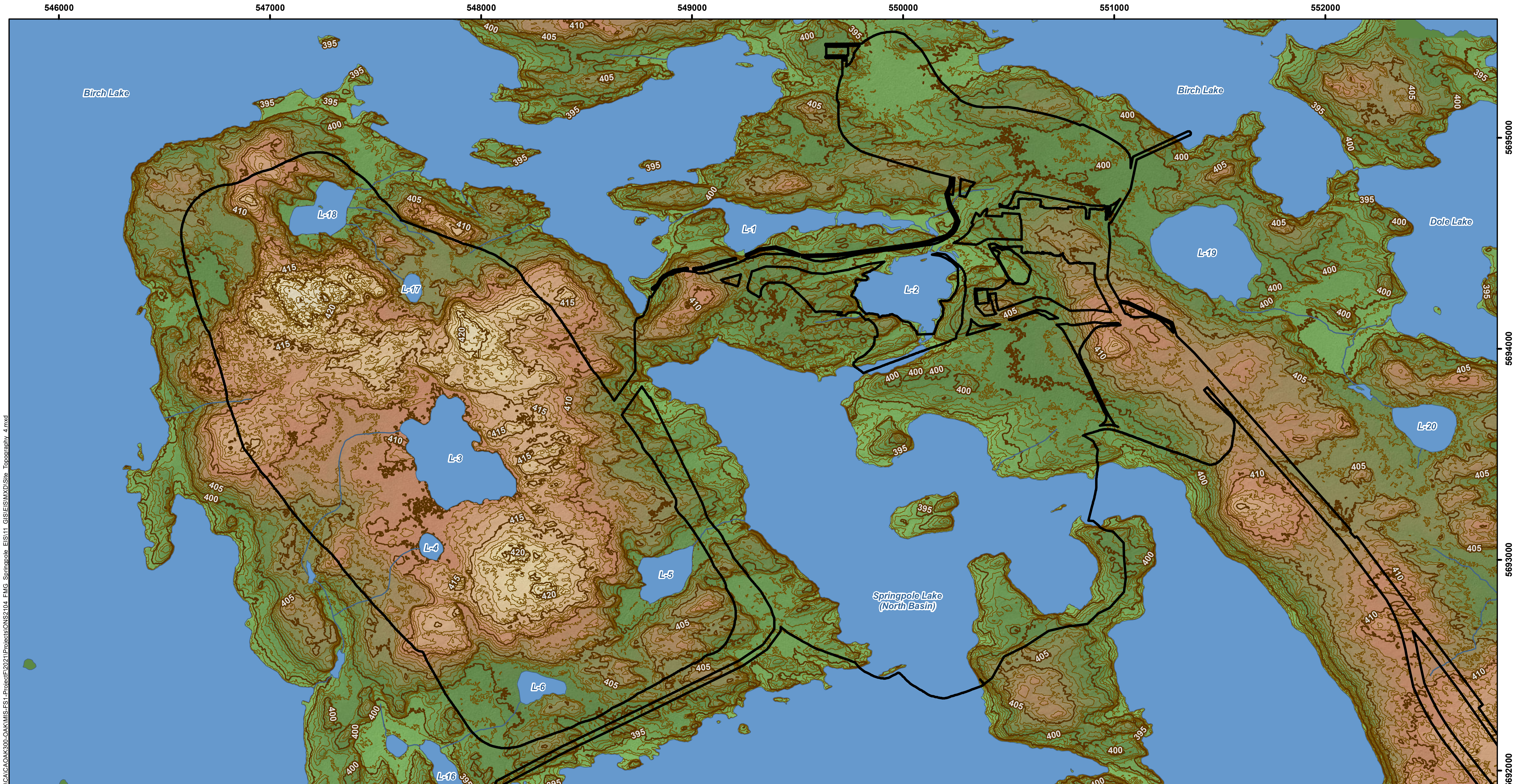
SPRINGPOLE GOLD PROJECT

Local Geologic Setting

PROJECT Nº: ONS2104	**FIGURE: 3.4-8**
SCALE: 1:21,000	DATE: December 2023

X:\CA\CAOAK300-OAK\MIS-FS1-Project\F2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\Local_Geologic_Setting_2.mxd



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Watercourse
- Waterbody
- Major Contours (5 m interval)
- Minor Contours (1 m interval)

Existing Ground Elevation

High Ground (443.5 masl)

Low Ground (388 masl)

NOTES:
- Contours extracted from 2020 LiDAR survey.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.

Datum: NAD83
Projection: UTM Zone 15N

N, E, S, W

0 0.5 1 2 3 4 5 Kilometres

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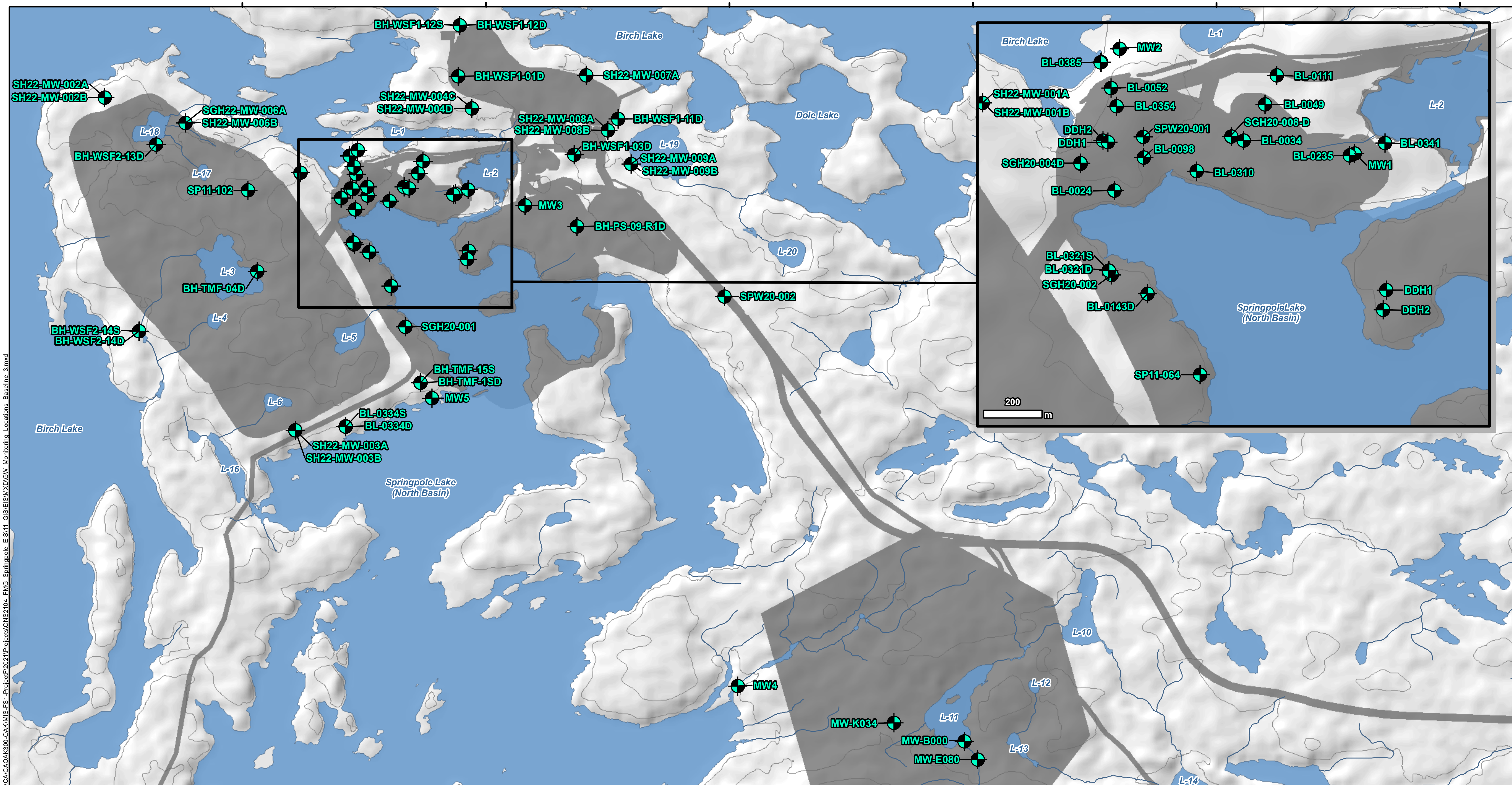
SPRINGPOLE GOLD PROJECT

Local Topography

PROJECT Nº: ONS2104	FIGURE: 3.4-9
SCALE: 1:17,000	DATE: August 2024



LEGEND

- Groundwater Sampling Locations
- Proposed Mine Features and Project Component Alternatives
- Contour (10 m intervals)
- Watercourse
- Waterbody

0 0.5 1 2 3 4 5 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.

Datum: NAD83
Projection: UTM Zone 15N

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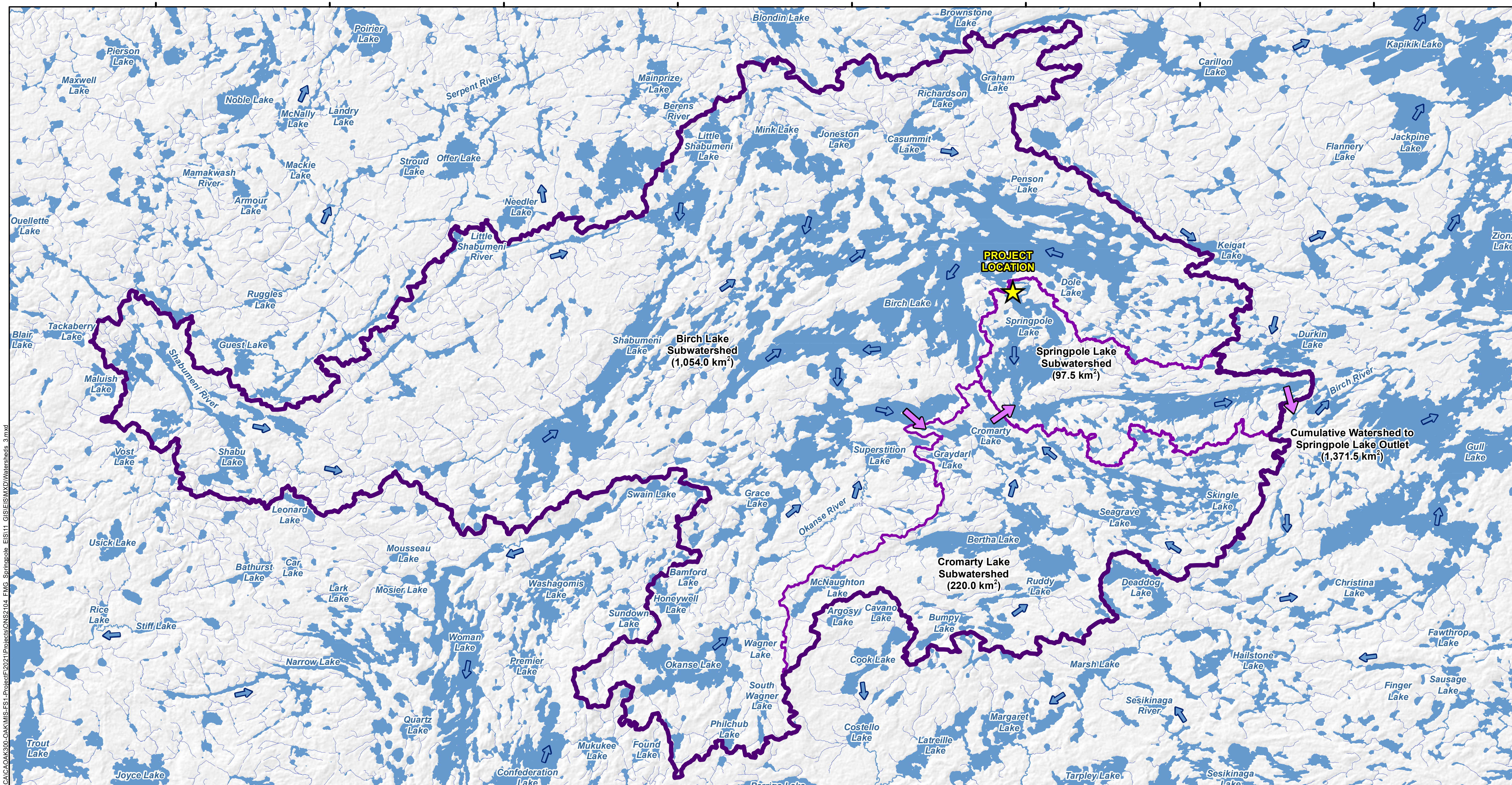
SPRINGPOLE GOLD PROJECT

Groundwater Sampling Locations

PROJECT N°: ONS2104	**FIGURE: 3.4-10**
SCALE: 1:30,000	DATE: December 2023

X:\CA\CAOAK300-OAK\MIS-FS1-ProjectF\2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\GW_Monitoring_Locations_Baseline_3.mxd



LEGEND

- ★ Project Location
- Cumulative Watershed to Springpole Lake Oulet (1,371.5 km²)
- Subwatershed (Labelled with Name and Local Area)
- Watercourse
- Waterbody
- Flow Direction
- Watershed Outlet Flow Direction

0 5 10 20 30 40 50 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Watershed delineations based on data provided by Aquasphera, data obtained through the Ontario Flow Assessment Tool (OFAT) and LiDAR provided by First Mining Gold, 2020.

Datum: NAD83
Projection: UTM Zone 15N

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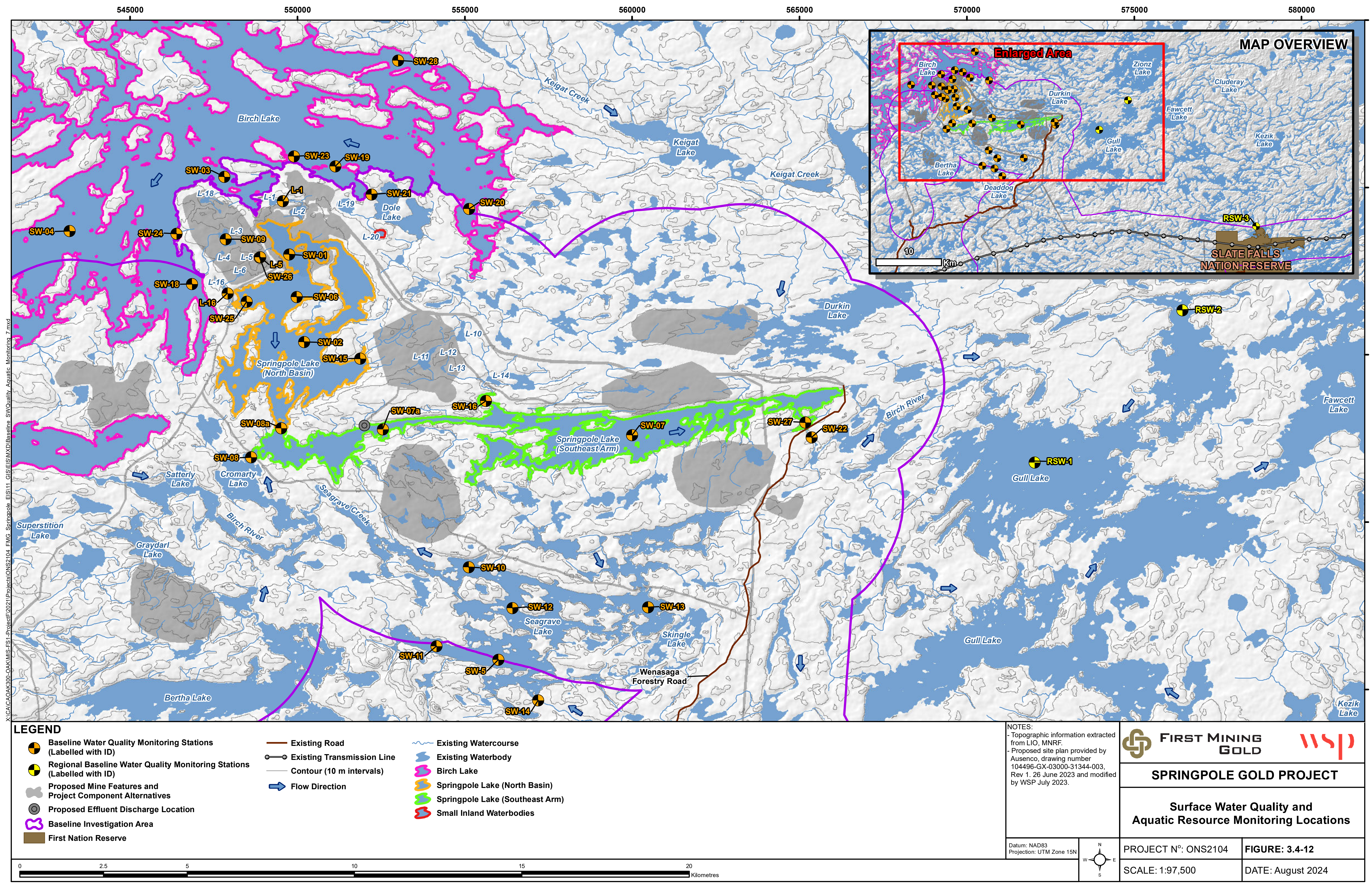
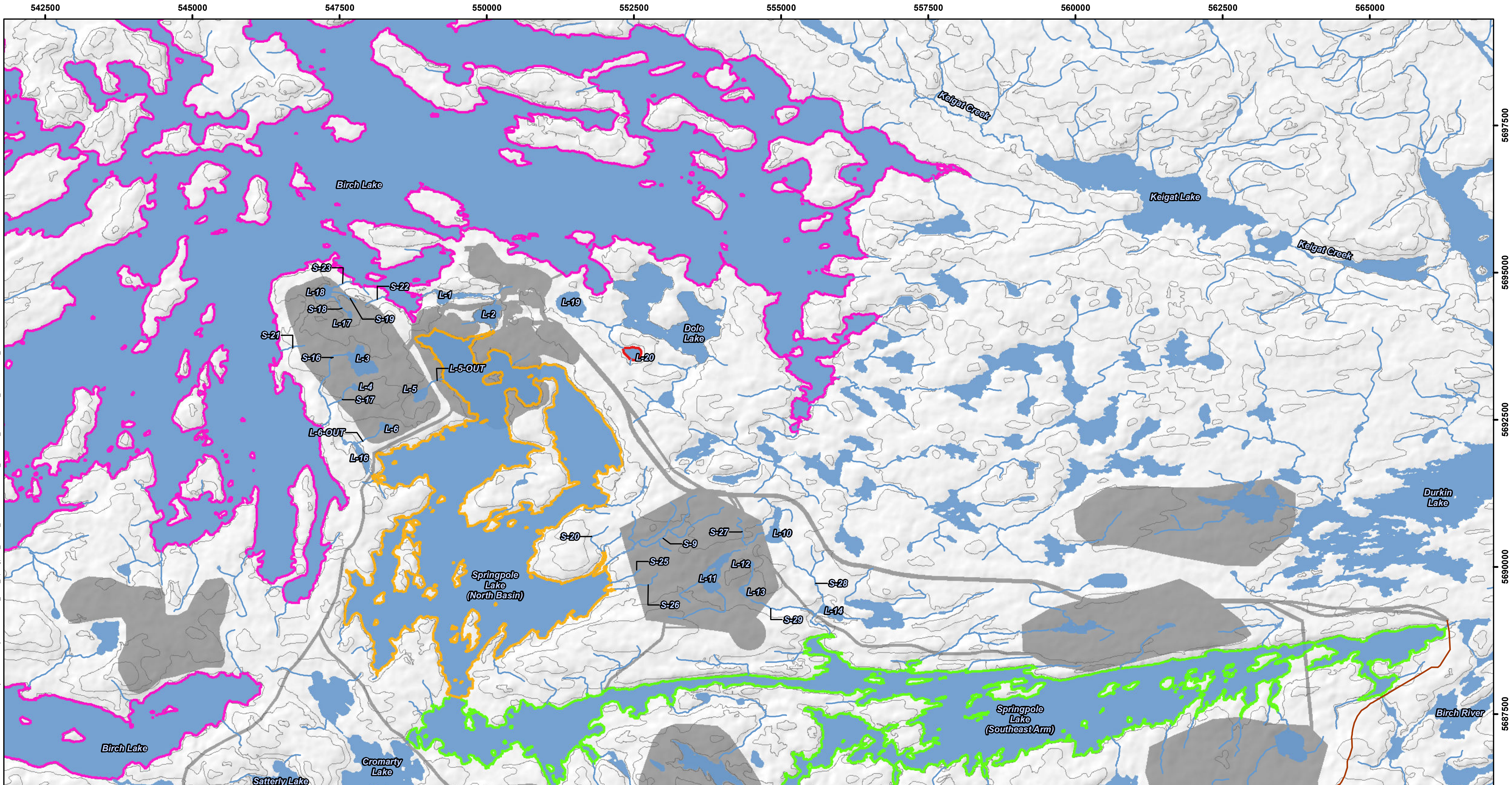
SPRINGPOLE GOLD PROJECT

Local Watersheds

PROJECT Nº: ONS2104	FIGURE: 3.4-11
SCALE: 1:210,000	DATE: December 2023



545000
550000
555000
560000
565000
570000
575000
580000
5700000
5695000
5690000
5685000
5680000
MAP OVERVIEW
Enlarged Area
Birch Lake
Durkin Lake
Zionz Lake
Cluderay Lake
Fawcett Lake
Kezik Lake
Gull Lake
Bertha Lake
Deaddog Lake
RSW-3
SLATE FALLS NATION RESERVE
10
Km
SW-28
Keigat Creek
Keigat Lake
Birch Lake
SW-23
SW-19
SW-03
SW-21
SW-20
L-18
L-1
L-2
L-19
Dole Lake
L-20
SW-04
SW-24
L-3
SW-09
SW-01
L-4
L-5
L-6
SW-26
SW-18
L-16
SW-06
SW-25
SW-02
SW-15
Springpole Lake (North Basin)
L-10
L-11
L-12
L-13
L-14
Durkin Lake
RSW-2
SW-16
SW-07a
SW-08a
SW-07
Springpole Lake (Southeast Arm)
SW-27
SW-22
Birch River
Fawcett Lake
RSW-1
Gull Lake
SW-08
Satterly Lake
Cromarty Lake
Seagrave Creek
Superstition Lake
Birch River
Graydarl Lake
SW-10
SW-12
Seagrave Lake
SW-13
Skingle Lake
Gull Lake
SW-11
SW-5
Wenasaga Forestry Road
Bertha Lake
SW-14
Kezik Lake
LEGEND
Baseline Water Quality Monitoring Stations (Labelled with ID)
Regional Baseline Water Quality Monitoring Stations (Labelled with ID)
Proposed Mine Features and Project Component Alternatives
Proposed Effluent Discharge Location
Baseline Investigation Area
First Nation Reserve
Existing Road
Existing Transmission Line
Contour (10 m intervals)
Flow Direction
Existing Watercourse
Existing Waterbody
Birch Lake
Springpole Lake (North Basin)
Springpole Lake (Southeast Arm)
Small Inland Waterbodies
NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
Datum: NAD83
Projection: UTM Zone 15N
0
2.5
5
10
15
20
Kilometres
FIRST MINING GOLD
WSP
SPRINGPOLE GOLD PROJECT
Surface Water Quality and Aquatic Resource Monitoring Locations
PROJECT Nº: ONS2104
FIGURE: 3.4-12
SCALE: 1:97,500
DATE: August 2024



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Wenasaga Forestry Road
- Contour (10 m intervals)
- Existing Watercourse
- Existing Waterbody
- Birch Lake
- Springpole Lake (North Basin)
- Springpole Lake (Southeast Arm)
- Small Inland Waterbodies

NOTES:
- Topographic information extracted from LIO, MNRF
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 8 10 Kilometres

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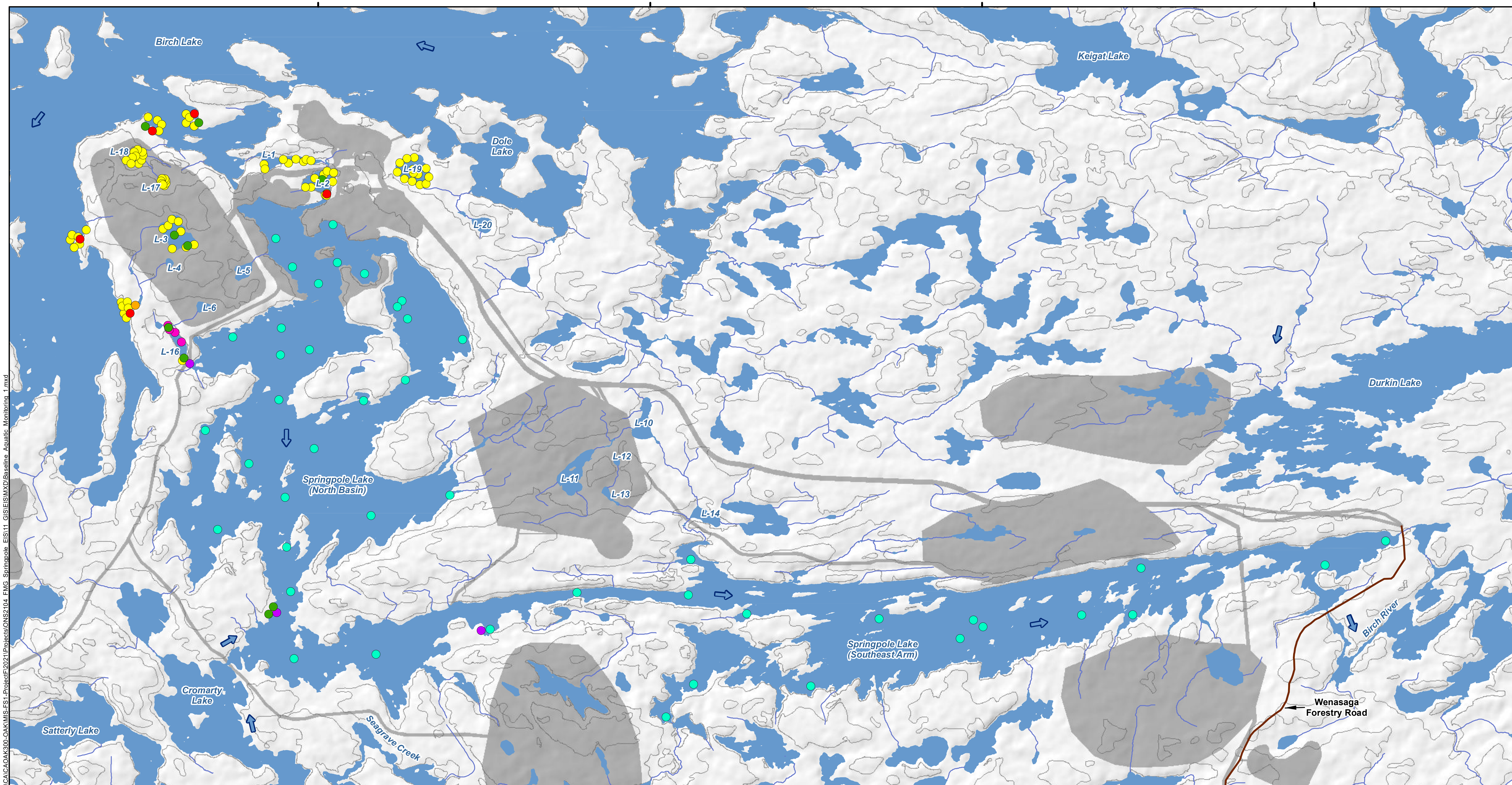
Small Unnamed Waterbodies and Watercourses

PROJECT Nº: ONS2104	**FIGURE: 3.4-13**
SCALE: 1:61,000	DATE: August 2024



LEGEND

- Proposed Mine Features and Project Component Alternatives
- First Nation Reserve
- Existing Road
- Existing Transmission Line
- Contour (10 m intervals)
- Watercourse
- Waterbody
- Flow Direction

Baseline Aquatic Monitoring Locations

- Angling
- Dip Net
- Electrofishing
- Gill Net
- Minnow Trap
- Seine Net
- Broadscale

0 1 2 4 6 8 10 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.

Datum: NAD83
Projection: UTM Zone 15N

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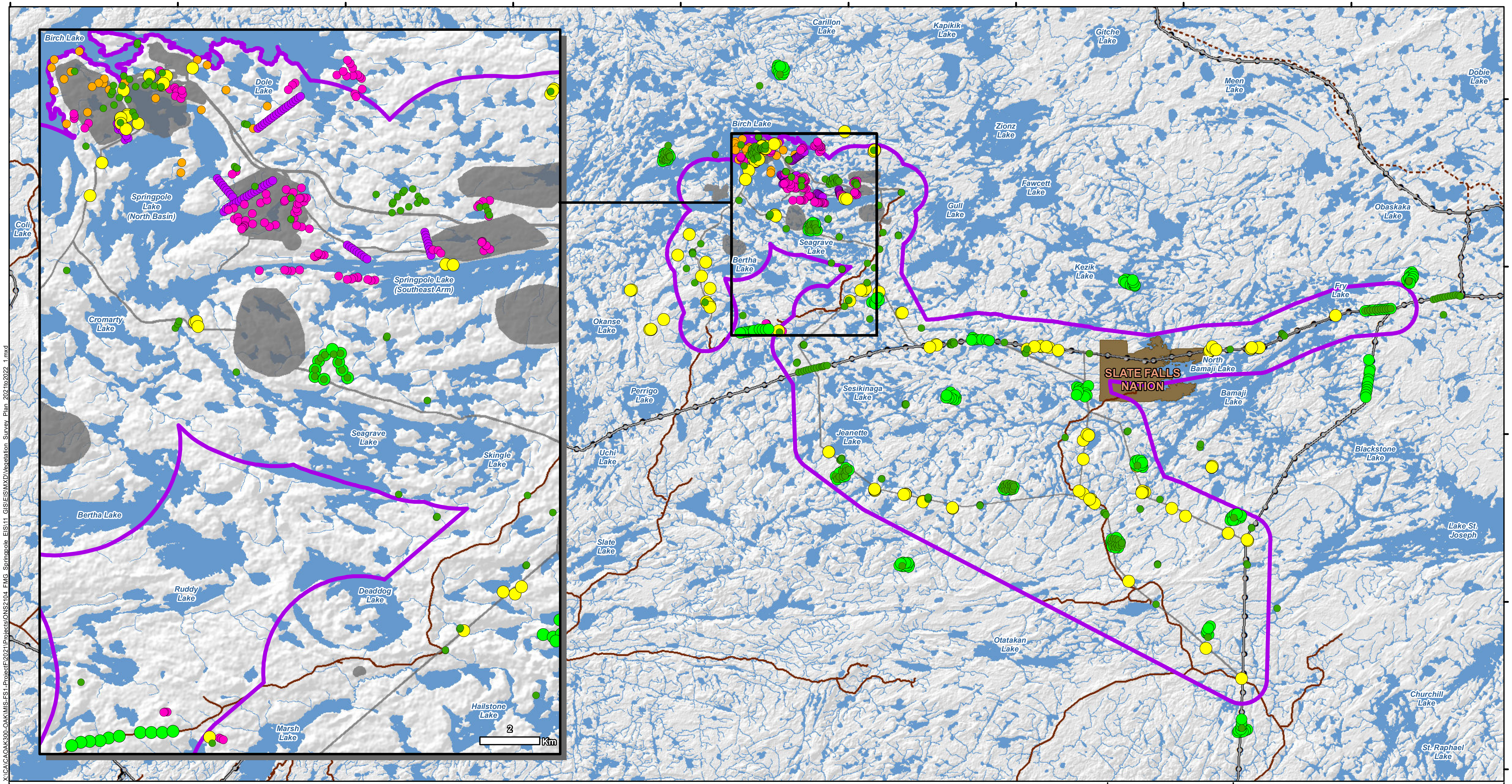
SPRINGPOLE GOLD PROJECT

2021 - 2023 Aquatic Sampling Locations

PROJECT N°: ONS2104 | **FIGURE: 3.4-14**

SCALE: 1:55,000 | DATE: August 2024



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Baseline Investigation Area
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Vegetation Sampling Locations (2022)
- Vegetation Sampling Locations (June/July 2021)
- Targeted Vegetation Sampling Locations (Fall 2021)
- Vegetation Sampling Locations (2019)
- Vegetation Sampling Locations (2012)
- Vegetation Sampling Locations (2011)

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Vegetation survey plots (2011-2019) conducted by NorthWinds Environmental Services.

Datum: NAD83
Projection: UTM Zone 15N

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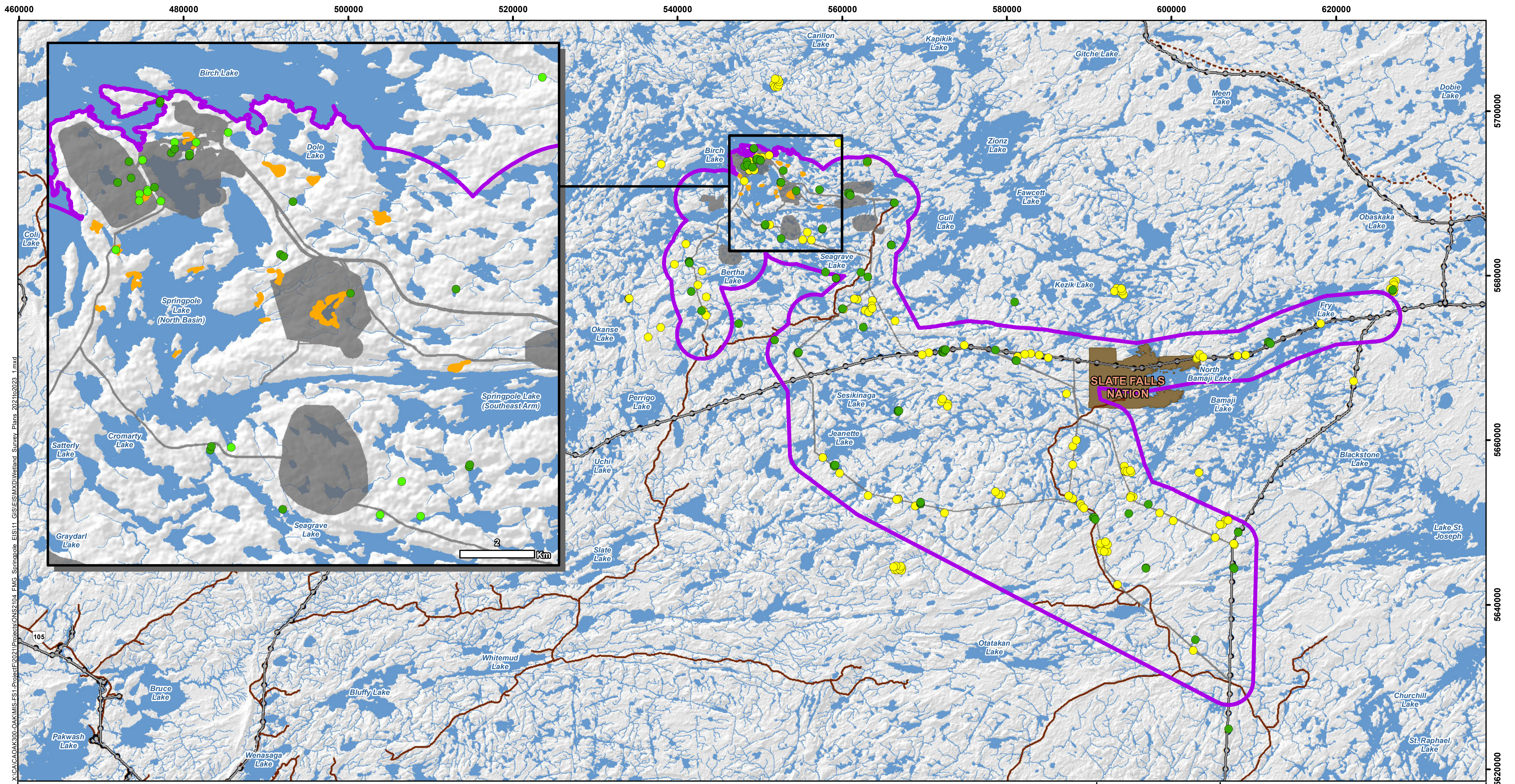
SPRINGPOLE GOLD PROJECT

2021 - 2022 Vegetation Sampling Locations

PROJECT N°: ONS2104	**FIGURE: 3.4-15**
SCALE: 1:430,000	DATE: October 2024



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Baseline Investigation Area
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Wetland Survey Plots (2022)
- Wetland Survey Plots (2021)
- Surveyed Wetlands (2012)

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Surveyed Wetlands (2012) conducted by DST Consulting Engineers

Datum: NAD83
Projection: UTM Zone 15N

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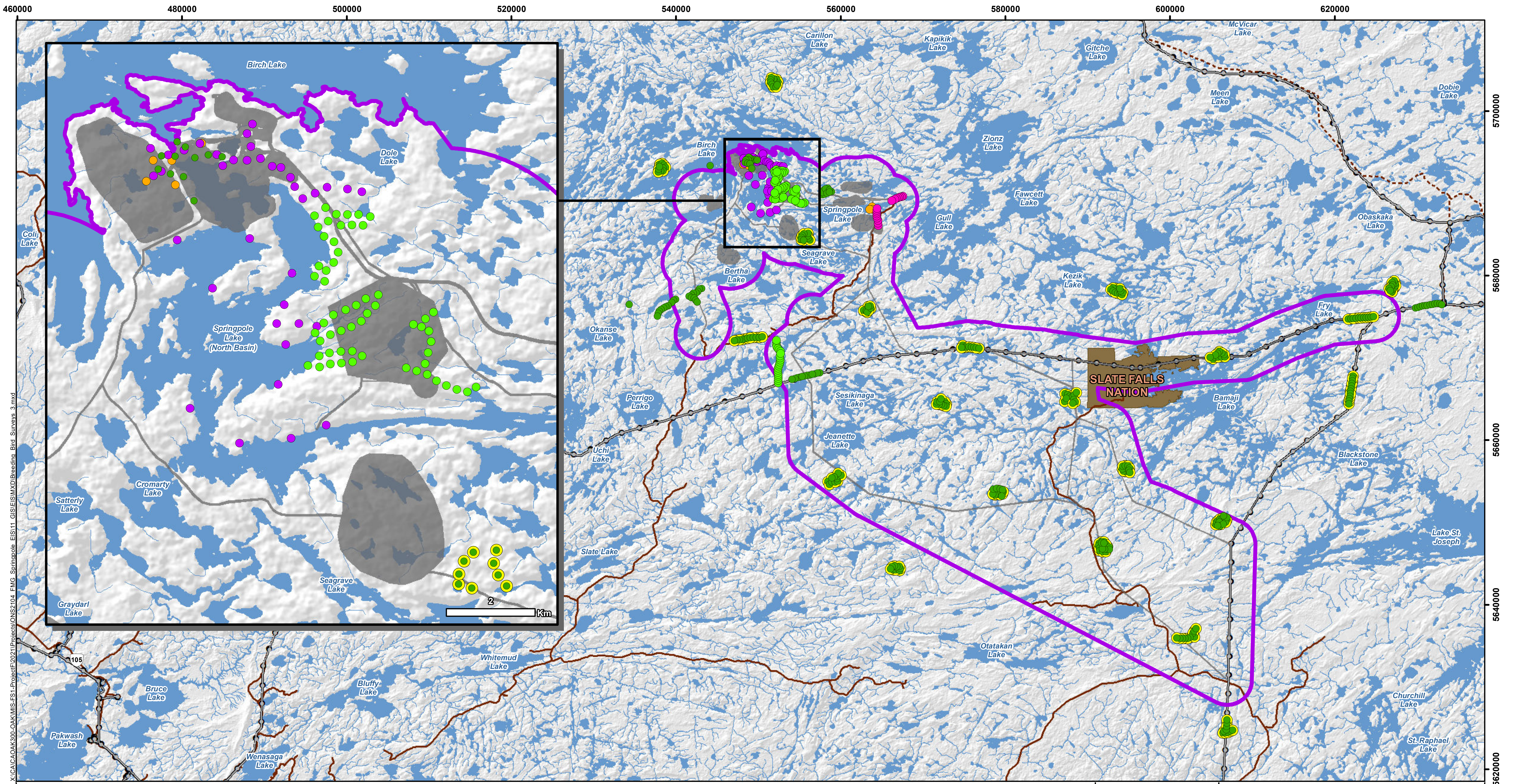
SPRINGPOLE GOLD PROJECT

2021 - 2022 Wetland Survey Locations

PROJECT Nº: ONS2104	**FIGURE: 3.4-16**
SCALE: 1:430,000	DATE: December 2023



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Baseline Investigation Area
- First Nation Reserve
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- Watercourse
- Waterbody
- Breeding Bird Survey Locations (2022)
- Breeding Bird Survey Locations (2021)
- Breeding Bird Survey Locations (2019)
- Breeding Bird Survey Locations (2018)
- Breeding Bird Survey Locations (2012)
- Breeding Bird Survey Locations (2011)

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Breeding bird survey locations (2011-2019) conducted by NorthWinds Environmental Services.

Datum: NAD83
Projection: UTM Zone 15N

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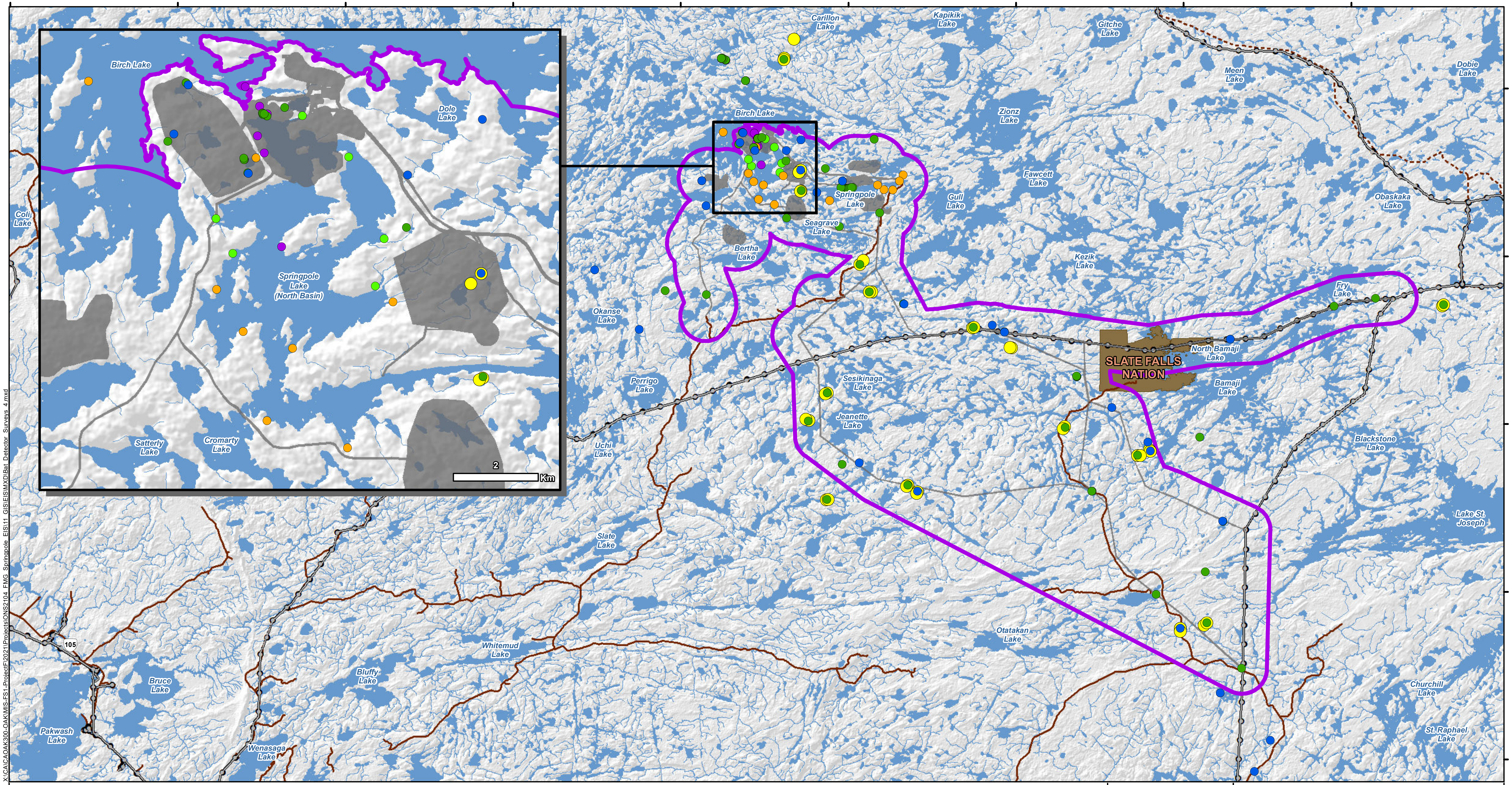
SPRINGPOLE GOLD PROJECT

2021 - 2022 Breeding Bird Survey Locations

PROJECT Nº: ONS2104	FIGURE: 3.4-17
SCALE: 1:430,000	DATE: December 2023



LEGEND

- Proposed Mine Features and Project Component Alternatives
- Baseline Investigation Area
- First Nation Reserve
- Existing Transmission Line
- Existing Road
- Existing Winter Road
- Watercourse
- Waterbody
- Bat Detector Survey Locations (2023)
- Bat Detector Survey Locations (2022)
- Bat Hibernacula Detector Survey Locations (Fall 2021)
- Bat Detector Survey Locations (Spring 2021)
- Bat Detector Survey Locations (2019)
- Bat Detector Survey Locations (2018)
- Bat Detector Survey Locations (2012)

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- Bat detector survey locations (2011-2019) conducted by NorthWinds Environmental Services.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

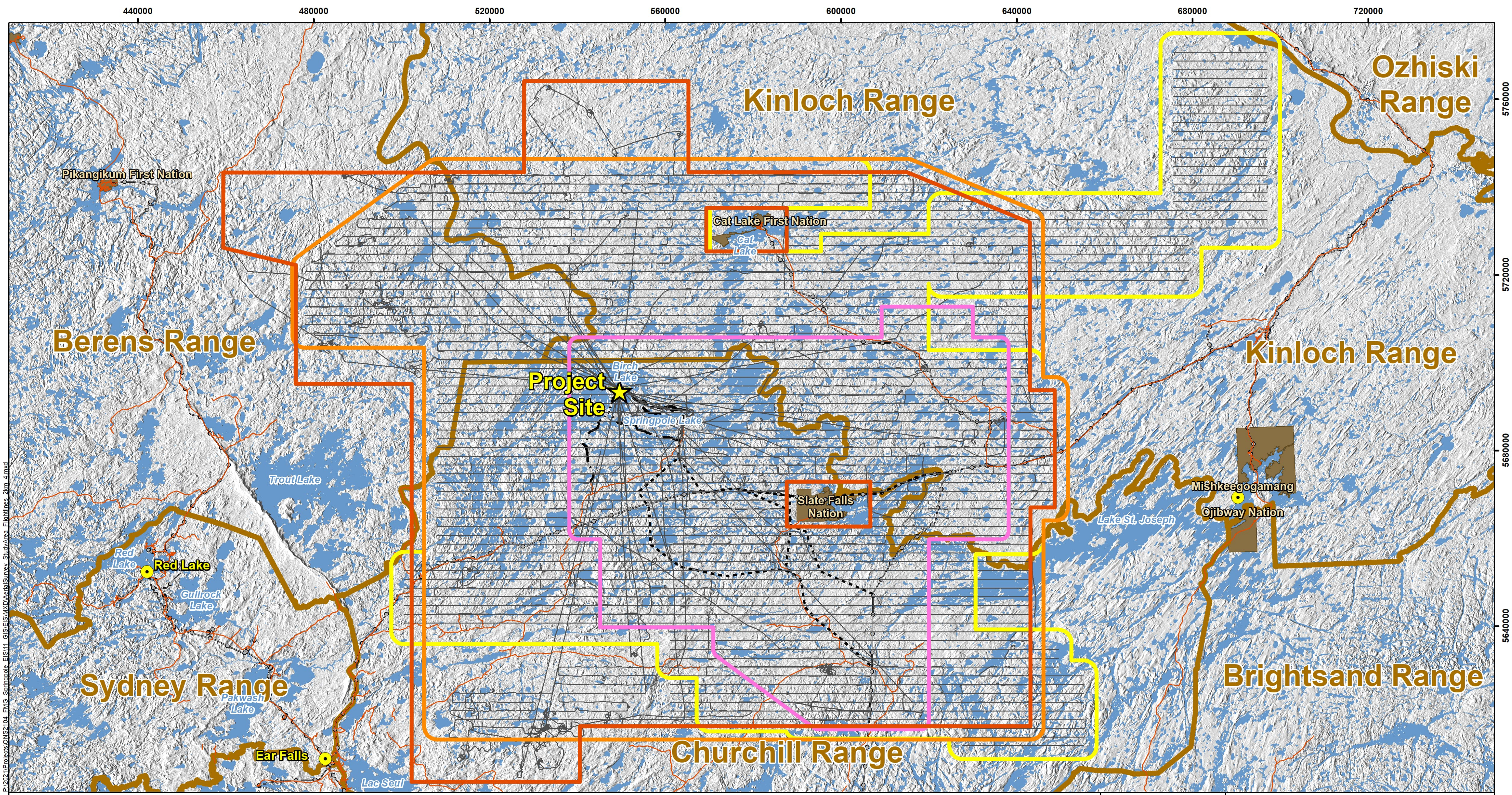
FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

2021 - 2023 Bat Survey Locations

PROJECT N°: ONS2104	**FIGURE: 3.4-18**
SCALE: 1:430,000	DATE: December 2023



LEGEND

- Springpole Project Location
- Proposed Transmission Line Alternatives
- Mine Access Road Alternatives
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Waterbody
- Aerial Survey Study Area (2024)
- Aerial Survey Study Area (2023)
- Aerial Survey Study Area (2022)
- Aerial Survey Study Area (2021)
- Flight Lines (2 km spacing)

0 25 50 100 150 200 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Aerial survey was conducted between Feb. 24, 2022 and March 6, 2022
- Aerial survey was conducted between Jan. 26, 2023 and Feb. 6, 2023
- Aerial survey was conducted between Feb. 17 and Feb. 25, 2024

Datum: NAD83
Projection: UTM Zone 15N

N S W E

FIRST MINING GOLD

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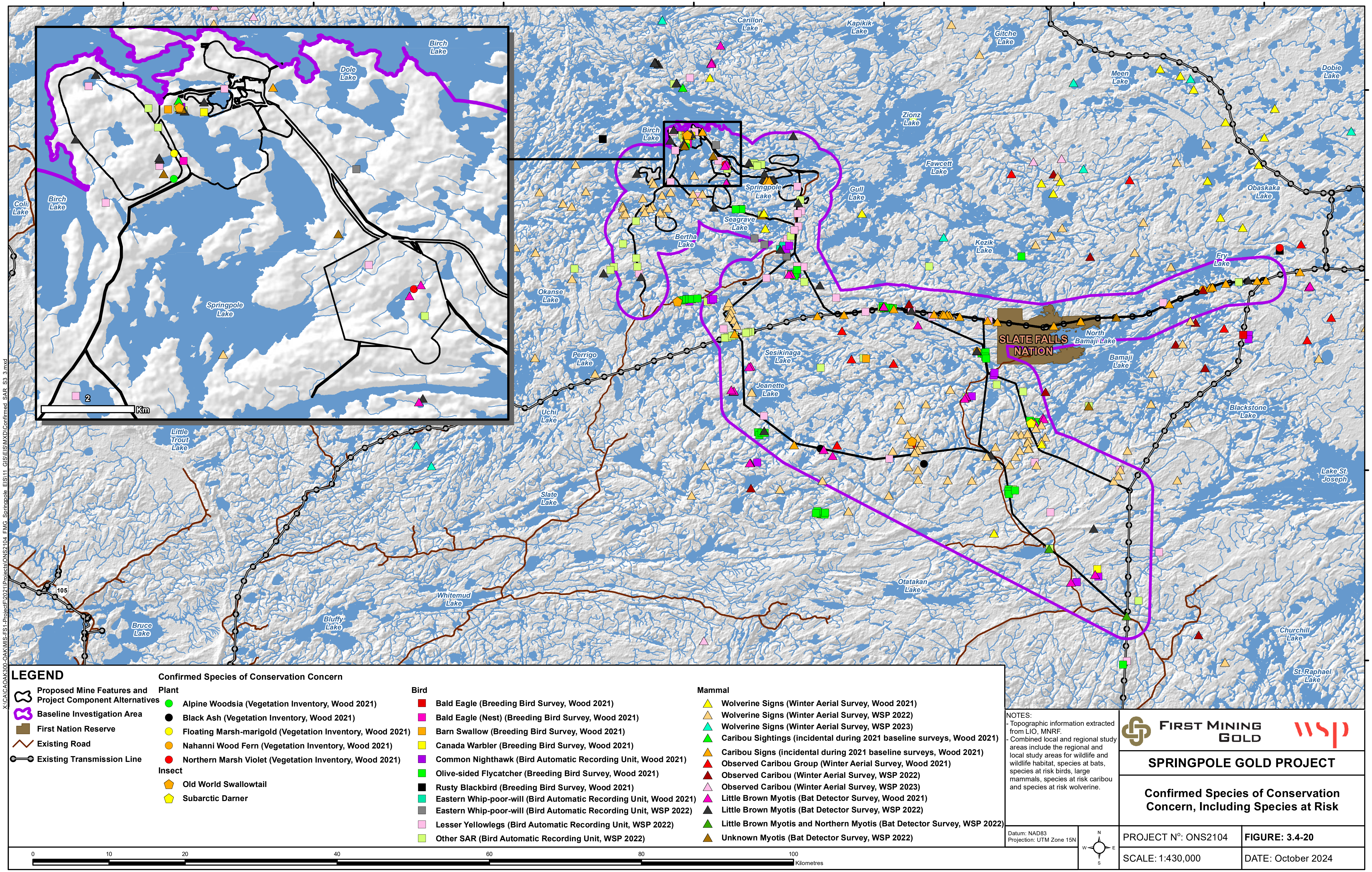
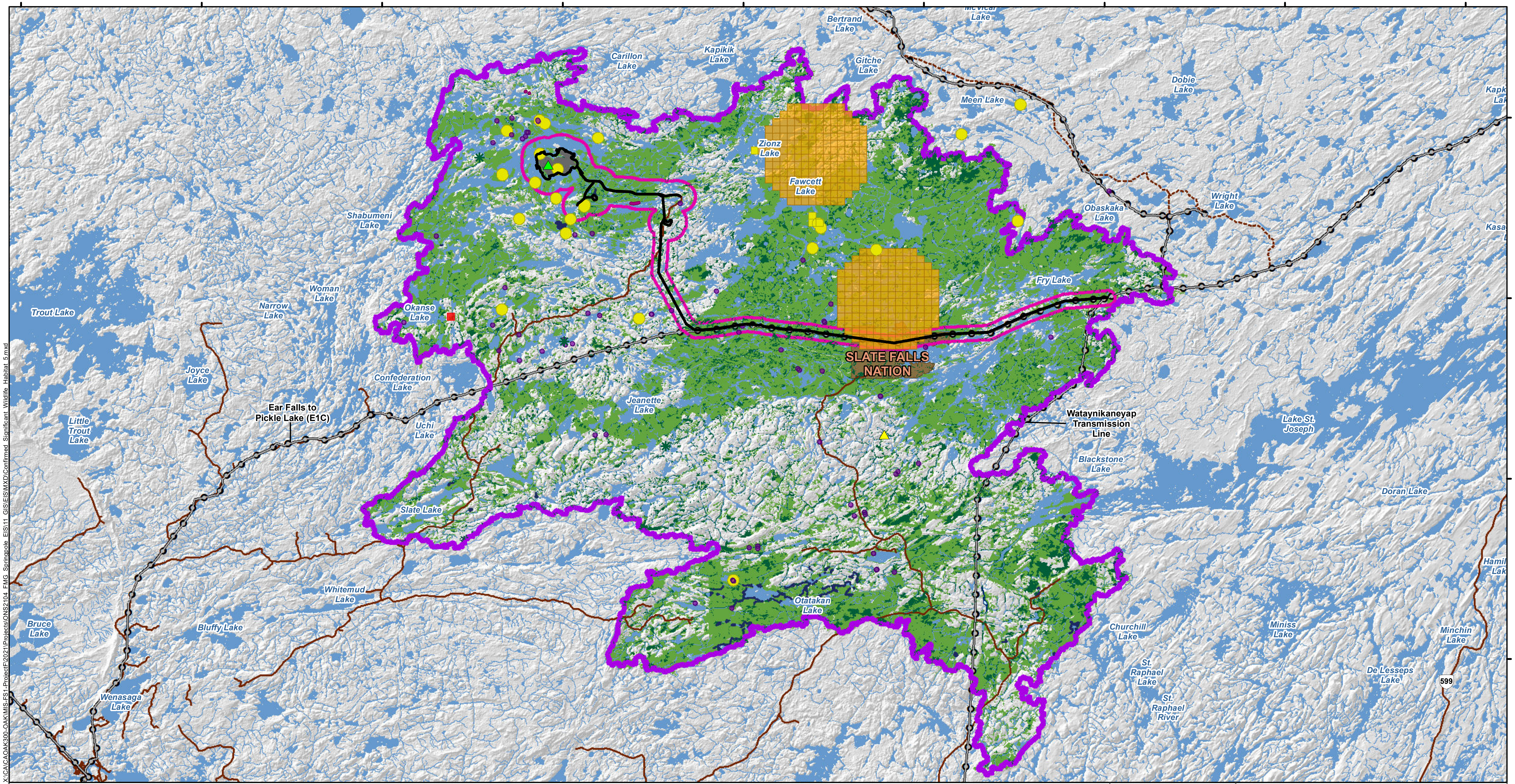
SPRINGPOLE GOLD PROJECT

Aerial Survey Study Area and Flight Lines (Winter 2021, 2022, 2023 and 2024)

PROJECT Nº: ONS2104	**FIGURE: 3.4-19**
SCALE: 1:815,000	DATE: August 2024



475000
500000
525000
550000
575000
600000
625000
5700000
5675000
5650000
5625000
SLATE FALLS NATION
Birch Lake
Dole Lake
Springpole Lake
Carillon Lake
Kapikik Lake
Gitche Lake
Meen Lake
Dobie Lake
Zionz Lake
Fawcett Lake
Gull Lake
Obaskaka Lake
Coli Lake
Seagrave Lake
Bertha Lake
Kezik Lake
Fry Lake
Okanse Lake
North Bamaji Lake
Bamaji Lake
Sesikinaga Lake
Perrigo Lake
Jeanette Lake
Uchi Lake
Little Trout Lake
Blackstone Lake
Lake St. Joseph
Slate Lake
Otatakan Lake
Whitemud Lake
Bluffy Lake
Bruce Lake
Churchill Lake
St. Raphael Lake
105
2
Km
X:\CA\CAOA\K300-OAKMIS-FS1-Project\F\2021\Projects\ONS2104 FMG Springpole EIS\11 GIS\EIS\MXD\Confirmed SAR S3 3.mxd
LEGEND
Proposed Mine Features and Project Component Alternatives
Baseline Investigation Area
First Nation Reserve
Existing Road
Existing Transmission Line
Confirmed Species of Conservation Concern
Plant
Alpine Woodsia (Vegetation Inventory, Wood 2021)
Black Ash (Vegetation Inventory, Wood 2021)
Floating Marsh-marigold (Vegetation Inventory, Wood 2021)
Nahanni Wood Fern (Vegetation Inventory, Wood 2021)
Northern Marsh Violet (Vegetation Inventory, Wood 2021)
Insect
Old World Swallowtail
Subarctic Darner
Bird
Bald Eagle (Breeding Bird Survey, Wood 2021)
Bald Eagle (Nest) (Breeding Bird Survey, Wood 2021)
Barn Swallow (Breeding Bird Survey, Wood 2021)
Canada Warbler (Breeding Bird Survey, Wood 2021)
Common Nighthawk (Bird Automatic Recording Unit, Wood 2021)
Olive-sided Flycatcher (Breeding Bird Survey, Wood 2021)
Rusty Blackbird (Breeding Bird Survey, Wood 2021)
Eastern Whip-poor-will (Bird Automatic Recording Unit, Wood 2021)
Eastern Whip-poor-will (Bird Automatic Recording Unit, WSP 2022)
Lesser Yellowlegs (Bird Automatic Recording Unit, WSP 2022)
Other SAR (Bird Automatic Recording Unit, WSP 2022)
Mammal
Wolverine Signs (Winter Aerial Survey, Wood 2021)
Wolverine Signs (Winter Aerial Survey, WSP 2022)
Wolverine Signs (Winter Aerial Survey, WSP 2023)
Caribou Sightings (incidental during 2021 baseline surveys, Wood 2021)
Caribou Signs (incidental during 2021 baseline surveys, Wood 2021)
Observed Caribou Group (Winter Aerial Survey, Wood 2021)
Observed Caribou (Winter Aerial Survey, WSP 2022)
Observed Caribou (Winter Aerial Survey, WSP 2023)
Little Brown Myotis (Bat Detector Survey, Wood 2021)
Little Brown Myotis (Bat Detector Survey, WSP 2022)
Little Brown Myotis and Northern Myotis (Bat Detector Survey, WSP 2022)
Unknown Myotis (Bat Detector Survey, WSP 2022)
NOTES:
- Topographic information extracted from LIO, MNRF.
- Combined local and regional study areas include the regional and local study areas for wildlife and wildlife habitat, species at bats, species at risk birds, large mammals, species at risk caribou and species at risk wolverine.
Datum: NAD83
Projection: UTM Zone 15N
N
S
E
W
0
10
20
40
60
80
100
Kilometres
FIRST MINING GOLD
wsp
SPRINGPOLE GOLD PROJECT
Confirmed Species of Conservation Concern, Including Species at Risk
PROJECT Nº: ONS2104
FIGURE: 3.4-20
SCALE: 1:430,000
DATE: October 2024



LEGEND

- Proposed Mine Features
- Project Development Area
- Wildlife Local Study Area
- Wildlife Regional Study Area
- Existing Road
- Existing Winter Road
- Existing Transmission Line
- First Nation Reserve
- Watercourse
- Waterbody

Observations
- Bonaparte's Gull Colony (DST, 2012)
- Bonaparte's Gull Nests (Wood, 2021)

Significant Wildlife Habitat within the Wildlife Regional Study Area
- Aquatic Feeding Habitat
- Colonially Nesting Bird Breeding Habitat: Ground (NHIC Square)
- Colonially Nesting Bird Breeding Habitat: Tree/Shrub (NHIC Square)
- Eagle Habitat
- Osprey Habitat
- Marsh Bird Breeding Habitat
- Bat Maternity Colony Habitat
- Bat Hibernaculum
- Waterfowl Stopover and Staging
- Wild Rice Stand

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.

Datum: NAD83
Projection: UTM Zone 15N

FIRST MINING GOLD

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SPRINGPOLE GOLD PROJECT

Significant Wildlife Habitat

PROJECT N°: ONS2104

FIGURE: 3.4-21

SCALE: 1:500,000

DATE: October 2024

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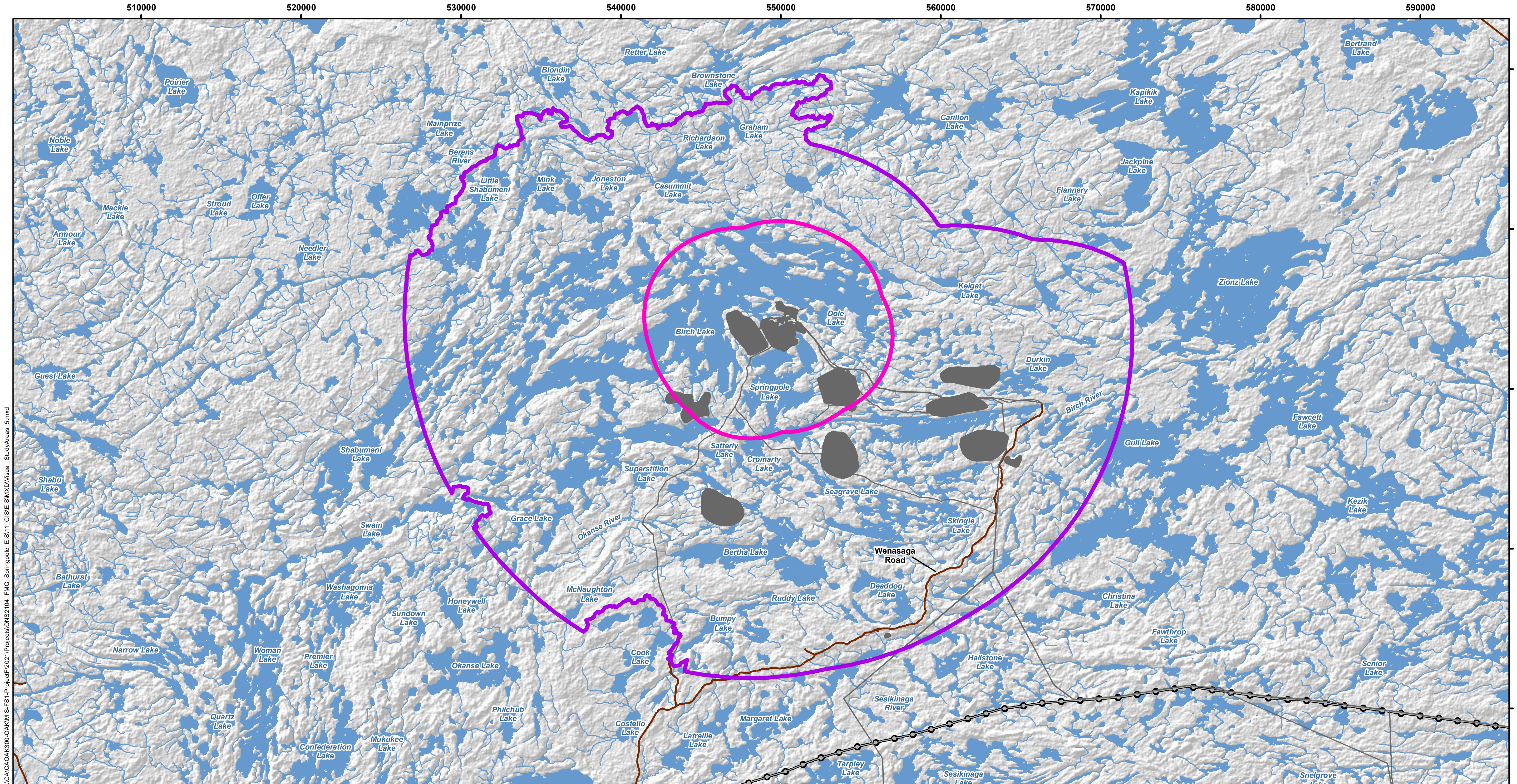

LEGEND

- Proposed Mine Features and Project Component Alternatives
- Local Study Area (Visual Aesthetics Study Area)
- Regional Study Area (Viewshed Analysis Study Area)
- Existing Road
- Existing Transmission Line
- Watercourse
- Waterbody

NOTES:
- Topographic information extracted from LIO, MNRF.

Datum: NAD83
Projection: UTM Zone 15N

0 5 10 20 30 40 50 Kilometres

N W E S

FIRST MINING GOLD

wsp

SPRINGPOLE GOLD PROJECT

Visual Effects Assessment Study Areas

PROJECT Nº: ONS2104	**FIGURE: 3.4-22**
SCALE: 1:225,000	DATE: October 2024

3.5 References

AGP Mining Consultants Inc. (AGP). 2021. First Mining Gold Corp. NI 43-101 Technical Report and Pre-Feasibility Study on the Springpole Gold Project, Ontario.

Bird Studies Canada. 2000. The Marsh Monitoring Program. https://www.bsc-eoc.org/download/mmpqualplan.pdf.

Bird Studies Canada. 2014. Guidelines for Conducting Eastern Whip-poor-will Roadside Surveys in Ontario. https://www.birdscanada.org/birdmon/wpwi/main.jsp.

Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L., Borchers, D.L. and Thomas, L. 2001. Introduction to Distance Sampling, Oxford University. Press, Oxford.

Cadman, M.D., Sutherland, D.A., Beck, G.G., Lepage, D. and A.R. Coutuier, editors. 2007. Atlas of the Breeding Birds of Ontario 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto. 706 pp.

Cat Lake First Nation (CLFN). 2024a. Cat Lake First Nation Indigenous Knowledge and Use Study. April 15, 2024.

Cat Lake First Nation (CLFN). 2024b. Cat Lake First Nation Socioeconomic Baseline Study for the Proposed Springpole Gold Mine Project. May 27, 2024.

Devaney, J.R. 2001. Sedimentary and Volcanology of Selected Tectonized Stratigraphic Units, Southern Birch Uchi Greenstone Belt, Uchi Subprovince: Ontario Geological Survey, Open File report 6031, 47p.

DST Consulting Engineers Inc. (DST). 2012. Gold Canyon Resources Project 2011 Terrestrial Baseline Study Draft Report. DST File No.: OE-KN-012948

DST Consulting Engineers Inc. (DST). 2013a. Springpole Gold Project Aquatic 2012 Baseline Study Report – Draft.

DST Consulting Engineers Inc. (DST). 2013b. Springpole Gold Project Wetlands And Vegetation 2012 Baseline Study Report Draft Report. DST File No.: OE-KN-014468.

Deutsches Institut für Normung (DIN). 2010. DIN 45669-1, Measurement of vibration emission – Part 1: Vibration meters – Requirements and tests. Acoustics, Noise Control and Vibration Engineering Standards Committee in (DIN) and VDI.

Environment and Climate Change Canada (ECCC). 2021. Historical Data. Accessed from: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html, retrieved in March 2021.

Environment Canada. 2008. Scientific Review for the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou) Boreal Population, in Canada. August 2008. Environment Canada, Ottawa, Canada. 72 pp. plus appendices.

Environment Canada. 2011. Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou) Boreal Population, in Canada: 2011 Update. Environment Canada, Ottawa, Canada. 102 pp. plus appendices

Environment Canada. 2012a. Metal Mining Technical Guidance for Environmental Effects Monitoring.

Environment Canada. 2012b. Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. xi + 138 pp.

Filice, M. 2020. Treaty 3. In The Canadian Encyclopedia. https://www.thecanadianencyclopedia.ca/en/article/treaty-3

Fisheries and Environment Canada. 1978. Hydrological Atlas of Canada, pp 5-7.

FracFlow Consultants Inc. (FracFlow). 2020. Final Factual Report, Geotechnical Program, Winter- Summer 2020. FFC-NL-3134-005. November 26, 2020.

FracFlow Consultants Inc. (FracFlow). 2021. Hydrogeological Baseline Report – First Mining Gold, Gold Canyon Resources. Springpole Lake Project Site, Ontario. FFC-NL-3134-002. March 26, 2021.

Gasaway, WC., DuBois, SD., Reed, DJ. and SJ Harbo. 1986. Estimating Moose Population Parameters from Aerial Surveys. Alaska University.

Government of Ontario. 2018. Map of Ontario Treaties and Reserves. https://www.ontario.ca/page/map-ontario-treaties-and-reserves#t3.

Government of Ontario. 2020. Guide for Crown Land Use Planning: Part II: Provincial Policies for Crown Land Use Designations — 12.0 Overview of Crown Land Use Designations. https://www.ontario.ca/document/guide-crown-land-use-planning/part-ii-provincial-policies-crown-land-use-designations-120-overview-crown-land-use-designations.

Government of Ontario. 2022. Crown Land Use Policy Atlas. https://www.ontario.ca/page/crown-land-use-policy-atlas.

Harris, A.G., McMurray, S.C., Uhlig, P.W.C., Jeglum, J.K., Foster, R.F. and G.D. Racey. 1996. Field Guide to the Wetland Ecosystem Classification for Northwestern Ontario. O, MNR Thunder Bay, ON Field Guide FG-01. 74 pp + Append.

Hunt, P. 2000. Instructions for Conducting Whip-poor-Will Triangulation Surveys. Audubon Society, Concord NH.

Judek, S., B. Jessiman, D. Stieb and R. Vet. 2004. Estimated Number of Excess Deaths in Canada Due To Air Pollution. Health Canada and Environment Canada. (as published in the Guidance for Evaluating Human Health Impacts in Environmental Assessment: AIR QUALITY. 2016)

Klass, O. 1997. Moose Aerial Observation Manual. Ontario Ministry of Natural Resources. Science and Technology. 95 pp.

Knight Piésold Ltd. (Knight Piésold). 2021. Springpole Gold Project: Prefeasibility Design of Coffer Dams. VA101-567/2-1 Rev. 0. March 5, 2021.

Konze, K. and M. McLaren. 1997. Wildlife Monitoring Programs and Inventory Techniques for Ontario. Ontario Ministry of Natural Resources. Northeast Science and Technology. Technical Manual TM-009 139 pp.

Kunicky, Hudson 2021. Slate Falls: Through Memory and Material. Lakehead University, Ontario.

Lac Seul First Nation (LSFN). 2024a. Lac Seul First Nation Indigenous Knowledge and Use Study. April 15, 2024.

Lac Seul First Nation (LSFN). 2024b. Lac Seul First Nation Socioeconomic Baseline Study for the Proposed Springpole Gold Mine Project. May 27, 2024.

Lall, R., M. Kendall, K. Ito and G. Thurson. 2004. Estimation of Historical Annual $PM_{2.5}$ Exposures for Health Effects Assessment. Atmospheric Environment 38 5217-5226.

Leslie, J. 2020. Treaty 9. Retrieved from The Canadian Encyclopedia. https://www.thecanadianencyclopedia.ca/en/article/treaty-9.

Métis Nation of Ontario (MNO). 2021. Traditional Knowledge and Land Use Study for the First Mining Gold (FMG) Springpole Mine Project. Completed by Know History Inc. Historical Services.

Ministry of Citizenship and Multiculturalism (MCM) 2011. Standards and Guidelines for Consultant Archaeologists.

Ministry of Natural Resources (MNR). 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch, Wildlife Section, Science Development and Transfer Branch, South-central Sciences Section. https://www.ontario.ca/document/guide-significant-wildlife-habitat

Ministry of Natural Resources and Forestry (MNRF). 2008. Application Review and Land Disposition Process Policy. PL 4.02.01. Compiled by Lands & Waters Branch, Land Management Section. July 24, 2008. https://www.ontario.ca/page/application-review-and-land-disposition-process-policy.

Ministry of Natural Resources and Forestry (MNRF). 2016. Cat Lake/Slate Falls 2015/2016 Species at Risk Stewardship Fund Project: Collection of Aboriginal Traditional Knowledge (ATK) of Wolverine, Lake Sturgeon, and their Habitat within the Community-Based Land Use Planning Area of Cat Lake (First Nation) and Slate Falls (Nations).

Ministry of Natural Resources and Forestry (MNRF). 2009. Trout Lake Forest Management Plan. Supporting Documentation 6.1 Historic Forest Condition.

Ministry of Natural Resources and Forestry (MNRF). 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp. https://www.ontario.ca/document/natural-heritage-reference-manual

Ministry of Natural Resources and Forestry (MNRF). 2011. Bats and Bat Habitats: Guidelines for Wind Power Projects. MNR number 52696.

Ministry of Natural Resources and Forestry (MNRF). 2013a. General Habitat Description for the Woodland Caribou (Forest-dwelling boreal population) (*Rangifer tarandus* caribou). Government of Ontario, Peterborough, Ontario. 27pp.

Ministry of Natural Resources and Forestry (MNRF). 2013b. Sector Specific Best Management Practices for Woodland Caribou. Government of Ontario, Peterborough, Ontario.

Ministry of Natural Resources and Forestry (MNRF). 2014a. DRAFT Survey Protocol for Eastern Whip-poor-will (*Caprimulgus vociferus*) in Ontario.

Ministry of Natural Resources and Forestry (MNRF). 2014b. Delineation Report for Woodland Caribou Ranges in Ontario. Species at Risk Branch, Thunder Bay, Ontario. xxpp.

Ministry of Natural Resources and Forestry (MNRF). 2014c. Integrated Range Assessment for Woodland Caribou and their Habitat: Churchill Range 2013. Species at Risk Branch. Thunder Bay, Ontario. xi + 83 pp.

Ministry of Natural Resources and Forestry (MNRF). 2014d. Integrated Assessment Protocol for Woodland Caribou Ranges in Ontario. Species at Risk Branch, Thunder Bay, Ontario. xxpp.

Ministry of Natural Resources and Forestry (MNRF). 2014e. Ontario Wetland Evaluation System, v1.4. http://files.ontario.ca/environment-and-energy/parks-and-protected-areas/ontario-wetland-evaluationsystem- northern-manual-2014.pdf.

Ministry of Natural Resources and Forestry (MNRF). 2014f. Policy Guidance on Harm and Harass under the *Endangered Species Act*.

Ministry of Natural Resources and Forestry (MNRF). 2014g. Range Management Policy in Support of Woodland Caribou Conservation and Recovery. https://dr6j45jk9xcmk.cloudfront.net/documents/3945/caribou-range-management-en-finaldecember- 2014.pdf.

Ministry of Natural Resources and Forestry (MNRF). 2014h. Significant Wildlife Habitat Mitigation Support Tool. Version 2014. https://www.ontario.ca/document/significant-wildlife-habitat-mitigation-support-tool

Ministry of Natural Resources and Forestry (MNRF). 2015. Inland Ontario Lakes Designated for Lake Trout Management, July 2015.

Ministry of Natural Resources and Forestry (MNRF). 2018. Ministry of Natural Resources Crown Land Use Policy Atlas Policy Report G2514: Red Lake. https://www.ontario.ca/document/operations-manual-air-quality-monitoring-ontario-0#section-0.

Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF). 2019. Cat Lake and Slate Falls First Nations Community Based Land Use Plan 2011. https://www.ontario.ca/page/cat-lake-and-slate-falls-first-nations-community-based-land-use-plan.

Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF). 2015. Inland Ontario Lakes Designated for Lake Trout Management.

Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF). 2021. Abandoned Mines Information System Description. https://www.geologyontario.mndm.gov.on.ca/AMIS_Description.html.

Ministry of the Environment (MOE). 1977a. Publication NPC-103 Procedures, published under the Model Municipal Noise Control Bylaw.

Ministry of the Environment (MOE). 1977b. Publication NPC-119 Blasting, published under the Model Municipal Noise Control Bylaw. Revision Oct. 1982.

Ministry of the Environment (MOE). 1977c. Publication NPC-207 Impulsive Vibration in Residential Buildings, published under the Model Municipal Noise Control Bylaw. Revision Jan. 1988.

Ministry of the Environment (MOE). 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*

Ministry of the Environment and Climate Change (MOECC). 2013. Publication NPC-300, Noise Assessment Criteria for Stationary Sources and for Land Use Planning. August 2013.

Ministry of Transportation Ontario (MTO). 2021. IDF Curve Lookup. http://www.mto.gov.on.ca/IDF_Curves/map_acquisition.shtml, Retrieved in March 2021.

Mishkeegogamang Ojibway Nation (MON). 2023. Traditional Land Use and Occupancy and Traditional Ecological Knowledge Study Report for Springpole Gold Mining Project. November 24, 2023.

Morin, N., Scott, K. and T. Cameron. 2014. Wabauskang Traditional Knowledge and Use in the Area of the Springpole Gold Access Corridor Project. ArrowBlade Consulting Services

National Boreal Caribou Knowledge Consortium. 2020. Monitoring guidelines in development

Northwestern Ontario Métis Community (NWOMC). 2024. Springpole TKLUS Follow-Up Report. January 23, 2024.

Pikangikum First Nation (PFN). 2006. Keeping the Land: A Land Use Strategy for Whitefeather Forest and Adjacent Areas. Prepared by Pikangikum First Nation in cooperation with the Ontario Ministry of Natural Resources. June 26, 2006.

Racey, G.D., Harris, A.G., Jeglum, J.K., Foster, R.F. and G.M. Wickware. 1996. Terrestrial and Wetland Ecosites of Northwestern Ontario. MNR Field Guide. FG-02. 94 pp + Append.

Ranta, W.B. 1997. Selected Wildlife and Habitat Features: Inventory Manual for Use in Forest Management Planning. https://dr6j45jk9xcmk.cloudfront.net/documents/2812/guide-wildlife-habitat.pdf.

Reichert, B., Lausen, C., Loeb, S., Weller, T., Allen, R., Britzke, E., Hohoff, T., Siemers, F., Burkholder, B., Herzog, C. and M. Verant. 2018. A Guide to Processing Bat Acoustic Data for the North American Bat Monitoring Program (NABat). Geological Survey Open-File Report 2018–1068, 33 p., https://doi.org/10.3133/ofr20181068.

Scott, W.B. and E.J. Crossman. 1998. Freshwater Fishes of Canada.

Sims, R.A., Towil, W.D., Baldwin, K.A., Uhlig P. and G.M. Wickware. 1997. Field Guide to the Forested Ecosystem Classification for Northwestern Ontario. OMNR Thunder Bay, ON Field Guide FG-03. 176 pp.

Slate Falls Nation (SFN). 2024. Health, Socio-economic, Indigenous Knowledge and Land Use Baseline Study. May 2, 2024.

Statistics Canada. (2018). Aboriginal Population Profile. Retrieved from: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/abpopprof/index.cfm?Lang=E

Statistics Canada. (2023). Census Profile. 2021 Census of Population. Retrieved from: https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E

Tetra Tech Canada (Tetra Tech). 2019. Winter 2018 Geotechnical Site Investigation Data Report. ENG. EARC03100-01. July 2, 2019.

Thomas, L., Buckland, S.T., Rexstad, E.A., Laake, J.L., Strindberg, S., Headley, S.L., Bishop, J.R.B., Marques, T.A. and K.P. Burnham. 2010. Distance Software: Design and Analysis of Distance Sampling Surveys for Estimating Population Size. J. Appl. Ecol. 47:5-14.

WildResearch. 2019. Canadian Nightjar Survey Protocol 2019.