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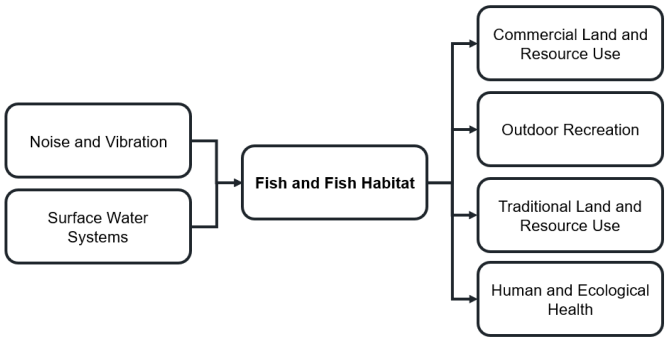
6.10 Fish and Fish Habitat

Fish and fish habitat were selected as a valued component (VC) for assessment because fish and their habitats are key indicators of fishery sustainability, productivity and environmental health. This VC includes fish, the habitat that supports these fish, and the health of these fish populations. Fish habitat means fish-frequented waters on which fish depend directly or indirectly to carry out their life processes.

Given the location of the ore body and the presence of lakes and small waterbodies in the area, avoiding fish habitat altogether is not feasible despite efforts to design the Project to minimize the encroachment on fish habitat. As a result, fish habitat will be overprinted or otherwise potentially impacted by proposed mine related infrastructure and activities. Many of the impacts will be considered and require authorization per Paragraph 35 of the *Fisheries Act* (RSC 1985, c. F-14) or result in waterbodies requiring listing as tailings impoundments in Schedule 2 of the Metal and Diamond Mining Effluent Regulations (MDMER; SOR/2022-222). As such, they will require offsetting or compensation consistent with *Fisheries Act* regulations and policies, as detailed in the Fish Habitat Offset and Compensation Plan (Appendix F).

In the absence of mitigation, the assessment of potential changes in fish and fish habitat is directly linked to other VCs and is informed by the following sections:

- **Noise and Vibration (Section 6.3):** The assessment of potential effects from noise and vibration include changes in instantaneous pressure and/or peak particle velocity due to the use of explosives during the construction and operation of the Project which may affect fish in adjacent fish habitat.
- **Surface Water Systems (Section 6.6 to 6.9):** The assessment of potential effects on surface water systems includes changes in water quality in fish-frequented waterbodies during the construction, operation and closure of the Project which may affect fish habitat and fish health.



In addition, the assessment of potential changes in fish and fish habitat is also directly linked to other VCs, and informs the analysis of the following sections:

- **Commercial Land and Resource Use (Section 6.17):** The assessment of potential effects on commercial land and resource use is informed by changes in fish communities and changes in the amount of fish habitat during the construction and operation of the Project which may affect commercial bait harvesting activities.
- **Outdoor Recreation (Section 6.18):** The assessment of potential effects on outdoor recreation is informed by changes in fish communities and changes in the amount of fish habitat during the construction and operation of the Project which may affect the recreational fishing activities.
- **Traditional Land and Resource Use (Section 6.21):** The assessment of potential effects on traditional land and resource use is informed by changes in fish communities and changes in the amount of fish habitat during construction, operation and closure of the Project which may affect fish species traditionally harvested by Indigenous peoples.

- **Human and Ecological Health (Section 6.24):** The assessment of potential effects on human and ecological health is informed by changes in fish health during the construction and operation of the Project as this may affect the risk to human and ecological health due to changes in the contaminants of potential concern that could be ingested by fish and subsequently consumed by humans.

The assessment of potential changes in fish and fish habitat from the Project are compared against relevant provincial and federal criteria (Section 6.10.1.4) and existing conditions (Section 6.10.2). The aquatic resources technical support documentation is included in Appendix O, which includes the 2023 Aquatic Resources Baseline Report (Appendix O-1), the 2021 Aquatic Resources Baseline Report (Appendix O-2), the 2019 to 2020 Aquatic Resources Assessment (Appendix O-3). Further, Appendix F includes the Fish Habitat Offsetting and Compensation Plan.

6.10.1 Assessment Approach

The approach to the assessment of potential changes in fish and fish habitat includes a description of the relevant regulatory and policy setting, a description of the input obtained through consultation specific to this VC, the identification of criteria and indicators along with the associated rationale, and a description of the spatial and temporal boundaries used for this VC along with a description of the attributes used to determine the significance of any residual adverse effects. The assessment of potential effects is supported by a description of the existing conditions for the VC (Section 6.10.2), the identification and description of applicable pathways of potential effects on the VC (Section 6.10.3) and a description of applicable mitigation measures for the VC (Section 6.10.4). An outline of the analytical methodology conducted for the assessment and the key assumptions and/or conservative approach is found in Section 6.10.5. With the application of mitigation measures to the potential effects on the VC, the residual effects are then characterized in Section 6.10.6 and the significance of the residual effects is determined in Section 6.10.7.

6.10.1.1 Regulatory and Policy Setting

The effects assessment for fish and fish habitat has been prepared in accordance with the requirements of the federal Environmental Impact Statement (EIS) Guidelines (Appendix B-1) and the provincially approved Amended Terms of Reference (Appendix B-3). Concordance tables, indicating where EIS Guidelines and Terms of Reference requirements have been addressed, are provided in Appendix B-2 and B-5, respectively. Government policies, objectives, standards or guidelines most relevant to the VC are summarized below.

Fisheries Act

The responsibility for the management of fisheries resources in Canada under the *Fisheries Act* is administered primarily by Fisheries and Oceans Canada (DFO). Under Section 34.4(1), the *Fisheries Act* prohibits the carrying on of any work, undertaking or activity, other than fishing, that results in the death of fish. Section 35(1) prohibits any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat. The pollution prevention provisions of the *Fisheries Act* (Section 36) are administered by Environment and Climate Change Canada. The fish and fish habitat protection provisions apply to all fish and fish habitat throughout Canada. Fish habitat as defined in Subsection 2(1) of the *Fisheries Act* includes all waters frequented by fish and any other areas upon which fish depend directly or indirectly to carry out their life processes. The types of areas that can directly or indirectly support life processes include but are not limited to spawning grounds and nursery, rearing, food supply and migration areas. Standards and codes of practice developed by DFO under Section 34.2 of the *Fisheries Act* specify procedures, minimum requirements and measures that can be implemented to ensure the protection of

fish and fish habitat. To the extent feasible, proponents are responsible for planning and implementing works, undertakings or activities in a manner that avoids and minimizes impacts to fish and fish habitat.

When impacts to fish and fish habitat can not be fully mitigated, the works, undertakings or activities may be authorized by the Minister of Minister of Fisheries, Oceans and the Canadian Coast Guard under Subsection 34.4(2) or 35(2) of the *Fisheries Act*. The authorization may include the requirement to offset residual impacts that have not been fully mitigated. The offsetting measures counterbalance impacts to fish and fish habitat due to the work, undertaking or activity with the goal of protecting and conserving fish and fish habitat.

Metal and Diamond Mining Effluent Regulations

The MDMER, developed under Section 36 of the *Fisheries Act* and administered by Environment and Climate Change Canada, regulates the deposit of mine effluent into natural waters frequented by fish. The listing of a natural waterbody frequented by fish for use as a tailings impoundment, under Schedule 2, would require compensation (MDMER term for offsetting) for the loss of fish habitat. The regulations form the basis of the federal mine effluent standards by, among other requirements, defining authorized limits for discharging effluent—outlined in Schedule 4 of the MDMER (pH, total suspended solids, arsenic, copper, lead, nickel, zinc, radium-226, cyanide)—from mining operations. In addition, environmental effects monitoring requirements for mining operations are specified in Schedule 5 of the MDMER.

Species at Risk Act

The responsibility for aquatic species under the federal *Species at Risk Act* (SARA; S.C. 2002, c. 29) is delegated to the Minister of Minister of Fisheries, Oceans and the Canadian Coast Guard by the Minister of Environment and Climate Change. SARA is intended to prevent extinction or extirpation of wildlife species and to assist in recovery of Extirpated, Threatened or Endangered species. SARA prohibits killing, harming, capturing or harassing species listed as Endangered, Threatened or Extirpated (where introduction to the wild is recommended) and provides protection for habitat that supports these species. There are no federally or provincially designated aquatic species at risk identified at the Project site. Lake Sturgeon (southern Hudson Bay – James Bay populations) are considered a species of "Special Concern" and there is no specific permit required under SARA.

Endangered Species Act, 2007

The provincial *Endangered Species Act, 2007* (S.O. 2007, c. 6) is administered by the Ministry of Natural Resources (MNR) and has provisions for the protection of provincially listed species at risk. Consistent with the federal designation, Lake Sturgeon (southern Hudson Bay – James Bay populations) are considered a species of Special Concern and there is no specific permit required under the *Endangered Species Act, 2007*.

Lakes and Rivers Improvement Act

The provincial *Lakes and Rivers Improvement Act, 1990* (R.S.O. 1990, c. L. 3) is administered by the MNR and the Ministry of Mines and has provisions for the protection of the management, protection, preservation and use of the waters of the lakes and rivers of Ontario and the land under them. Approval under the *Lakes and Rivers Improvement Act, 1990* is required for the construction of structures that hold back or divert water, including tailings dams, dikes and culverts.

6.10.1.2 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, and responses provided, during the development of the final 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. Key comments that influenced the assessment for fish and fish habitat between the draft and final EIS/EA is provided below.

The draft EIS/EA document review process included targeted meetings / workshops to promote engagement and discussion with Indigenous communities, government agencies and the public on the potential effects on fish and fish habitat, and the proposed offsetting and compensation measures. Key engagement included the following:

- Follow-up meetings and presentation to regulators and Indigenous communities to review and clarify responses to comments received with respect to baseline data, effects assessment and mitigation measures;
- Meeting / workshop with DFO in September 2023 to discuss the proposed fish and fish habitat impacts and offset / compensation measures for the Project;
- Workshop with the Northwestern Ontario Métis Community (NWOMC) in September 2023 to discuss the proposed fish and fish habitat impacts and offset / compensation measures for the Project;
- Technical briefing to the Impact Assessment Agency of Canada (IAAC) and federal agencies on fish and fish habitat – Springpole Gold Project in September 2023;
- Workshop (MON 2023) with the Mishkeegogamang Ojibway Nation (MON) in December 2023 to discuss the proposed fish and fish habitat impacts and offset / compensation measures for the Project;
- Presentation to the MNR in December 2023 to review the proposed fish and fish habitat impacts and offset / compensation measures for the Project (for information only); and
- Workshop with the Slate Falls Nation (SFN) in January 2024 to discuss the proposed fish and fish habitat impacts and offset / compensation measures for the Project.

Based on the engagement, several topics were identified where additional information and clarification was needed as described below.

Baseline Investigations

The MNR requested that a broadscale monitoring (BsM) study be conducted to determine the status of the fish community in Springpole Lake. A full BsM program was completed in 2022 on Springpole Lake following standardized provincial protocols (Appendix O), and modified to address the request from the MNR to reduce the number of deep-water net sets in the 12 to 35 metre (m) strata and to increase the number of net sets in the 1 to 12 m strata.

DFO, the Ministry of the Environment, Conservation and Parks, the MNR, Cat Lake First Nation (CLFN), Lac Seul First Nation (LSFN) and SFN requested additional baseline data to support the assessment. A full lake provincial standard BsM study was completed in 2022 (Appendix O). The BsM was used to calibrate a full lake hydroacoustic fish community study also completed in 2022. Lower trophic level (chlorophyll *a*, phytoplankton and zooplankton) studies (multi-year and multi-season) were completed throughout Springpole Lake and adjacent comparable locations in Birch Lake. Reviewers also requested additional habitat data for the nearshore areas of Birch Lake adjacent to the Project, and therefore supplemental habitat characterization of nearshore areas of Birch Lake was completed in 2022. Further detail on this study is provided in Section 6.10.2.2.

The MNR, DFO, CLFN, LSFN, SFN and MON requested clarification regarding statements that Lake Sturgeon are absent from Springpole Lake or are in extremely low abundance within the Birch River / Cat River system. A full lake BsM and hydroacoustic survey was completed in Springpole Lake in 2022 (Appendix O). To gather more data on Lake Sturgeon, a targeted large mesh netting in Springpole Lake coupled with a two-season (spring and summer) environmental DNA (eDNA) metabarcoding sampling program in Springpole Lake, Birch Lake and regional stations (Cat River) was completed in 2022. Additional targeted eDNA quantitative polymerase chain reaction sampling of historical observations and spawning areas was completed within Springpole Lake, Cat River, Lake St. Joseph outflow, Birch Lake and Birch River in 2023. The studies confirmed that the deep basins within Springpole Lake and Birch lake were similar in fish species composition and lower trophic conditions concluding that temporary isolation of one deep basing will not alter the ability of the remailing 94 percent (%) of Springpole Lake to maintain all resident fish species. Further detail on these studies is provided in Section 6.10.2.

DFO, CLFN and LSFN requested that additional spawning area analysis be extended to include other parts of the lake (outside of the north basin of Springpole Lake). To address this, additional analysis of potential spawning areas was completed with additional field studies to extend the delineated areas of potential spawning areas for Northern Pike, Lake Trout and Lake Whitefish. Further detail on this analysis is provided in 2021 Aquatic Resources Baseline Report (Appendix O-2, Section 3.6.1.2).

Impact Assessment

The MNR, DFO CLFN, LSFN, MON and SFN requested clarification on potential effects on the food web / primary productivity. Detailed investigations and studies have been completed for the Project and provide comparison of lower trophic data and fish community data for Springpole lake and adjacent Birch Lake sufficient to assess the potential effects of the isolated open pit basin. Results show comparable primary resources in the six deep water sample stations in Springpole Lake and two stations in Birch Lake, and a high degree of similarity between the three most northern stations in the north basin of Springpole Lake. CLFN, LSFN, SFN, NWOMC, DFO and Environment and Climate Change Canada requested more information about potential effects on Springpole Lake and Birch Lake from blasting effects. Further, DFO requested more stringent blasting criteria be used in the effects analysis. A revised blasting assessment (Appendix H-4) was completed using more conservative (larger) charges and the more stringent blasting criteria for fish to conservatively identify additional areas of potential impacts as discussed in Section 6.10.3 and the Fish Habitat Offsetting and Compensation Plan (Appendix F).

IAAC and DFO requested more information about potential effects on Birch Lake from groundwater drawdown. Aquatic investigations were completed along the south shore of Birch Lake in 2022 to better describe lake conditions adjacent to the Project (Appendix O-2). Additional groundwater modelling (Appendix L-2) has been completed to support the final EIS/EA and shows the area of drawdown into the

nearshore areas of Birch Lake to assess habitats potentially affected. The additional modelling shows that the effects of groundwater management within the open pit basin does not extend into Birch Lake, as described in the Hydrogeological Modelling Report (Appendix L-2, Section 6.1.1), and that there will be only minor increases in groundwater reporting to Birch Lake from the co-disposal facility (CDF).

The MNR, DFO, MON, SFN and NWOMC requested additional information on how the isolation of the basin and removal of fish from the isolated areas would occur. Additional detail of the isolation procedure including methods, timing and other mitigation measures has been added to Section 5.6.1.2, Section 6.10.4 and the Fish Habitat Offset and Compensation Plan (Appendix F, Section 5.2.3). Detailed discussion on controlled dewatering rates and procedure for the isolated basin has been added. Additional description of the fish removal (mitigation) is also provided, including a strategy suggested by DFO where isolation of the basin during the spring may reduce the number of Lake Trout and Walleye entrained in the basin.

Mitigation, Offsetting and Compensation

Fish habitat offsetting and compensation workshops with the MON, SFN and NWOMC informed the updated Fish Habitat Offset and Compensation Plan and the presented offset measures. Outcomes from the workshops included and understanding that the reclaimed open pit basin should be enhanced to support the same species that are currently present, and that there is support for the recovery of Lake Sturgeon in the Birch and Cat River systems. The MNR and DFO requested further details on how the reclaimed basin will provide habitat similar to existing conditions for Lake Trout and Lake Whitefish and, where possible, examples of similar reclamation activities. Additional examples of successful fisheries established in former open pits are provided in the final EIS/EA along with more detailed plans for the fish habitat development area and reclaimed basin. Drawings and descriptions of the grading and surface treatments including habitat features have been added to the Fish Habitat Offsetting and Compensation Plan (Appendix F).

IAAC, CLFN, LSFN and SFN requested additional evaluation of the isolated basin compared to the rest of Springpole Lake and how the remaining area will support the fish community during the life of the mine. IAAC also requested that additional consideration be given to the status of Lake Trout in Springpole Lake and the assessment of the sustainability of Lake Trout populations through the life of mine and during post-closure as a result of the removal and alteration of habitat. Additional fisheries and aquatic data were collected for the entire Springpole Lake and the open pit basin during 2022. The 2022 program included a full lake BsM program, ongoing lower trophic level studies, a lake-wide hydroacoustic fish community survey and multiple eDNA metabarcoding surveys. The additional data, in combination with previously collected aquatic data, increase the confidence that the majority of the Springpole Lake area will remain capable of sustaining all species and all life functions present in the lake and that Lake Trout and the resources they depend on are well distributed in the north basin and not reliant only on the portion that will be isolated. IAAC, DFO, the MNR, CLFN, LSFN, MON, SFN and the NWOMC asked for more details about Lake Sturgeon reintroduction measures and additional documentation and data to describe species absence and the likely cause of Lake Sturgeon absence. In response, this measure has been revised to a two-step measure: 1) collect additional data and information and 2) implement reintroduction / enhancement measures. This has been included in the revised Fish Habitat Offsetting and Compensation Plan (Appendix F).

IAAC requested that suitable habitat for Lake Sturgeon in the area be identified and characterized. In response, it is noted that Birch Lake, Springpole Lake and other surrounding lakes are large, with numerous embayments, deep water refugia and large connecting rivers that are favourable habitats for Lake Sturgeon.

These lakes all have a mixture of relatively shallow and deeper water habitats, with the connecting rivers providing the needed habitat requirements for Lake Sturgeon. Several historical spawning locations have been identified between Lake St. Joseph and Cat Lake. Excluding the dams at Lake St. Joseph, there are no known major works within the waterbodies that would have changed the physical habitats of the upstream waterbodies that historically supported a healthy Lake Sturgeon population.

The MNR, MON and NWOMC requested additional rationale for the strategic stocking and micro-hatchery measure, as well as assurance that it would not unbalance natural communities. Several comments from Indigenous communities and government agencies indicated a lack of support for this measure, and as a result, it has been removed from the preferred offsetting and compensation measures detailed in the revised Fish Habitat Offsetting and Compensation Plan (Appendix F).

IAAC, DFO, the Ministry of the Environment, Conservation and Parks and MON requested additional information on how the potential time lag between impact and the implementation of offset measures is addressed, considering that a large proportion of the offsetting and compensation relies on the reclamation of the open pit basin. Through discussion with government agencies (DFO and the MNR), fish biomass and surrogates to productivity will be used as the measure of impacts and the measure of offsetting success to allow consistent and readily made revisions to the total impact and total required offsets should a delay in reclamation occur. This has been included in the revised Fish Habitat Offsetting and Compensation Plan (Appendix F).

6.10.1.3 Spatial and Temporal Boundaries

The Project Development Area (PDA) is defined as the footprint of the Project, including the mine site area, mine site access road and the transmission line corridor, as well as a buffer in order to allow flexibility for design optimizations during Project permitting. The buffer includes approximately 250 metres (m) around the mine site area. The buffer for the transmission line is included within the 40 m wide corridor and within the 30 m wide corridor for the mine access road. Where the mine access road and transmission line are aligned together, the buffer is included within a 60 m wide corridor.

The spatial boundaries used for the assessment of fish and fish habitat are shown in Figure 6.10-1 and defined as follows:

- **Local Study Area (LSA)**: The LSA for fish and fish habitat extends from the PDA to include the waterbodies and watercourses potentially affected by changes in hydrology and surface water quality, which may result in a potential effect on fish and fish habitat. As with the surface water system VCs, the area is bounded by:
    - Springpole Lake watershed, from the outflow of Cromarty Lake to 1 kilometre (km) downstream of the Birch River crossing at the Wenasaga Road;
    - The northeastern shoreline of Birch Lake, to the north and northeast of the PDA; and
    - A distance of 3 km downstream of the PDA within Birch Lake, to the west.
- **Regional Study Area (RSA):** The RSA for fish and fish habitat encompasses the LSA, as well as the contributing sources of water in the Birch Lake watershed which regional fish populations are anticipated to use. This also extends downstream to the confluence of Birch River with Gull Lake, approximately 8 km downstream of the LSA.

The temporal boundaries for the assessment of fish and fish habitat are defined as:

- **Construction Phase:** Years -3 to -1, representing the construction period for the Project.
- **Operation Phase**: Years 1 to 10, with the first year potentially representing a partial year as the Project transitions from construction into operations. Mining and processing of the ore from the open pit and stockpiles will end in Year 10, at which time the pit will begin refilling with water.
- **Decommissioning and Closure Phase**:
    - **Active Closure:** Years 11 to 15, when final decommissioning and the majority of active reclamation activities are carried out; and
    - **Post-closure:** Years 16+, corresponding to the post-closure monitoring period and when the filled open pit basin will be reconnected to Springpole Lake.

Effects on fish and fish habitat were assessed for each Project phase (i.e., construction, operations and closure).

6.10.1.4 Criteria and Indicators

In undertaking the assessment of fish and fish habitat, the following criteria were used:

- Change in fish communities;
- Change in fish habitat; and
- Change in fish health.

The specific criteria, measurable indicators and the rationale for the selection of criteria are described in Table 6.10-1. To support the effects assessment, indicators are assessed using professional judgment and experience.

6.10.1.5 Description of Residual Effect Attributes

Residual effects for fish and fish habitat are characterized in terms of the following attributes:

- Magnitude;
- Geographic extent;
- Duration;
- Frequency;
- Reversibility; and
- Timing.

These attributes, along with the rankings, are further described in Table 6.10-2.

In addition, the residual effects for fish and fish habitat are characterized according to the ecological and/or social context within which the VC is found. This is a qualitative measure of the sensitivity and/or resilience of the VC to potential change. The following ranking is applicable:

- **Level I:** The VC may or may not be sensitive and is capable of supporting the predicted change with typical mitigation measures.
- **Level II:** The VC is sensitive and requires special measures to support the predicted change.

- **Level III:** The VC is sensitive and unable to support the predicted change even with special measures.

As noted in Section 6.1, a residual effect is defined as significant if both of the following criteria are satisfied:

- A Level II or III rating is attained for all of the attributes involving magnitude, extent, duration, frequency, reversibility and timing; and
- A Level II or III rating is attained for ecological and/or social context.

Conversely, if a Level I rating is achieved for any of the attributes involving magnitude, extent, duration, frequency, reversibility or timing, or if a Level I rating is achieved for the ecological contexts, then the residual effect is considered to be not significant.

In the event there is a significant adverse effect, the likelihood of occurrence is further described.

6.10.2 Existing Conditions

A description of the baseline conditions is presented below to characterize the existing conditions for fish and fish habitat and is based on several years of study that has resulted in a comprehensive dataset for this stage of Project planning. The existing conditions are used to support the assessment of potential effects from the Project on fish and fish habitat, and will support long-term monitoring for the Project. Further baseline information on fish and fish habitat can be found in the technical support documentation (Appendix O) and includes the results of the aquatic resource studies.

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 lakes represent 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 degrees Celsius (°C) and 25°C (Scott and Crossman 1998). Springpole Lake is representative of both a coolwater and 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 sportfish 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.

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 MNR under the *Application Review and Land Disposition Process Policy* (MNRF 2008); however, dispositions of Crown Land under the *Mining Act* (R.S.O. 1990, c. M.14) are exempt from this policy.

Fish and fish habitat studies have been undertaken at the Project and surrounding area since 2011 and include multiple years and multiple seasons of investigation. A description of the studies for Springpole Lake, Birch Lake, small unnamed waterbodies and small tributary watercourses is presented in Sections 6.10.2.1 through 6.10.2.4.

6.10.2.1 Springpole Lake

Springpole Lake has a total surface area of 2,861 hectares (ha), an average depth of 6.3 m and a maximum depth of 35.1 m. The lake is composed of a large oval north basin (4.5 km wide and 6.5 km long) and a 17.7 km long narrow southeast arm (Figure 6.10-2). There are six deep basins within the lake (five in the

north basin and one in the southeast arm) that have maximum depths of 20 to 35.1 m. The deep basins have been shown to provide summer habitat for Lake Trout and other species.

The nearshore substrate composition in Springpole Lake is composed mostly of exposed bedrock and boulders, whereas areas near tributary inflows and sheltered embayments have a greater presence of soft fine-grained sediments. The lake bottoms within shallow embayments support submerged macrophytes, including Watermilfoil and Pondweed, and floating macrophytes such as water lily. The emergent macrophyte community along the shorelines where present is dominated by sedges and rushes, as well as localized areas with Water Horsetail, Cattail and Sweet Flag. Vegetation within the riparian zone includes woody shrub species such as Alder and herbaceous species. Additional detailed descriptions of the substrates and macrophyte presence are provided in Appendix O.

Fish sampling has been completed over multiple seasons and years using a diversity of sampling techniques, such as minnow traps (baited gee style), seine nets, electrofishing, trap nets (hoop / fyke) and gill nets. In response to comments received on the draft EIS/EA, additional comprehensive fish sampling following provincial protocols, including a BsM program and modified River Index Netting (RIN) program, were completed. The RIN program was used to target Lake Sturgeon during the spring and as such required the modified timing (standard protocol is summer effort). Springpole Lake provides habitat for a diverse fish community, including 8 sportfish species (Burbot, Cisco, Lake Trout, Lake Whitefish, Northern Pike, Rock Bass, Walleye and Yellow Perch) and 18 forage and baitfish species (including Shorthead Redhorse and White Sucker). A list of fish species present in local waterbodies is provided in Table 6.10-3.

BsM was undertaken in Springpole Lake during August 2022 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). For this sampling, the Springpole Lake was separated into six focal areas (NB01, NB02, NB03, NB46, CB07 and EB05 [Figure 6.10-3]) to succinctly describe the catch by lake characteristics. Areas NB01, NB02 and NB03 are the large, deep basins at the north end of Springpole Lake, NB46 is the southern half of the north basin, with a maximum depth of approximately 20 m; CB07 is the long, shallow flow path from the Cromarty Lake inflow toward the lake outlet ending around halfway along the southeast arm; and EB05 is the larger, deeper section of the southeast arm closest to the outflow. A total of 1,191 fish were caught across 15 species (Table 6.10-4 and Table 6.10-5), with the relative abundance, measured as catch per unit effort, ranging from 0.0027 for Logperch to 1.0192 for Yellow Perch. The focal deepwater species, Lake Trout and Lake Whitefish, had the highest catch per unit effort in the two deepwater basins adjacent (to the south [NB03] and southeast [NB02]) to the proposed isolated open pit basin, NB01. A total of 16 Lake Trout were captured throughout the BsM program, with captures occurring in all deepwater basins, and the only smaller, "juvenile" fish was caught in NB02. The results demonstrate that the two deep basins adjacent to the open pit basin 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.

Overall, fish caught in Springpole Lake are of average to good condition based upon the condition factor (k) equation: $k = \frac{100{,}000\,W}{L^3}$, where W is weight in grams and L is total length in millimetres (Williams 2000). The target species of Lake Trout, Lake Whitefish and Walleye had 27%, 53% and 2% of fish classified as good (k is greater than [>] 1) and 0%, 7% and 3% as poor (k is less than [<] 0.6), respectively. Northern Pike, however, had 94% of fish captures classified as in the poor condition. This is similar to Birch Lake, which had 0%, 1% and 0% poor condition fish for Lake Trout, Lake Whitefish and Walleye, respectively, and 90% for Northern Pike.

An area-weighted catch per unit effort analysis following MNR protocol (Beach 2024, pers. comm.) determined the overall Springpole Lake relative abundance to be 0.5989 based upon the 2022 BsM cycle. This is nearly identical to Birch Lake BsM cycle 1 conducted in 2009, with a value of 0.5944; however, subsequent Birch Lake cycles saw a lower area-weighted relative abundance of 0.4863 and 0.3629 for cycles 2 and 3, respectively, despite similar effort. Springpole Lake species density estimates using catch data indicate a population density of 0.3 Lake Trout per hectare and 2.5 Walleye per hectare, equating to 49 Lake Trout and 402 Walleye in the NB01 basin and 838 Lake Trout and 6,840 Walleye total in Springpole Lake. These estimates are considered low, as catch data were filtered to include only large mesh catch as small mesh nets are intended for use to characterize small-bodied fish communities and account for retention selectivity (minimum fish sizes for gillnet retention), which removed smaller caught fish from the analysis following MNR protocol (Beach 2024, pers. comm.). Birch Lake density estimates were similarly low, with Lake Trout ranging from 0 to 0.2 fish per hectare and Walleye from 2.4 to 3.1 fish per hectare.

Catch by basin from the BsM program aligned well with data collected during a hydroacoustic study completed September 2022 in Springpole Lake (Milne Technologies 2023), in that fish biomass was not statistically different between areas NB01, NB02 and NB03. Furthermore, the highest average density of non-schooling fish (e.g., Lake Trout, Northern Pike, large Walleye) was found in NB03 (1,085 fish per hectare), followed by NB01 (767 fish per hectare) and then NB02 (483 fish per hectare). In these three deepwater basins when total water depth was greater than 18 m, large, non-schooling fish tended to occupy a pelagic, mid-water layer between 18 to 25 m that closely aligned with the bottom of the thermocline where water temperatures were less than 7°C. This supports the assertion that the three deepwater basins have similar fish community, abundance and biomass. Additional analysis of the BsM and hydroacoustic studies are provided in the 2023 Aquatic Resources Baseline Report (Appendix O-1).

Lake Sturgeon have not been captured in Springpole Lake or adjacent waterbodies as part of the Project fisheries sampling, including targeted Lake Sturgeon netting and eDNA work, or through BsM programs in Birch Lake by conducted by the MNR. Given the absence of Lake Sturgeon, a specific Lake Sturgeon netting program was implemented during the 2022 field season to assess presence in Springpole Lake, and specifically the southeast arm along the flow path between the Cromarty Lake inflow (Birch River) and outflow of Springpole Lake. The assessment used a modified RIN protocol for the capture of Lake Sturgeon, including extra-large RIN nets with stretched mesh sizes of 204, 230, 255 and 306 millimetres (mm; 8, 9, 10 and 12 inches), respectively (Jones and Yunker 2009). Net sets were conducted in spring, as opposed to the standard July 1 to October 1 RIN assessment, to target Lake Sturgeon during the spring migration period as they travel to spawning locations. Concurrent with the RIN netting, eDNA sampling was conducted in the same flow path, and at several of the same sites immediately prior to netting. Samples were submitted for metabarcoding analysis. No nets or eDNA samples captured or detected Lake Sturgeon DNA.

A second Lake Sturgeon–specific eDNA sampling event was undertaken in spring 2023 during their spawning time. This sampling event targeted likely spawning locations identified through aerial surveys and local community knowledge, including noted historical spawning grounds, and deeper water locations in Springpole and Birch lakes to coincide with potential post-spawn movement and residency patterns. Samples were run through a quantitative polymerase chain reaction test using Lake Sturgeon–specific assays by a qualified external laboratory. No Lake Sturgeon were observed during sampling via float plane when flying over potential spawning locations, and no Lake Sturgeon DNA was detected in any samples.

Lake Sturgeon are listed as a Special Concern under SARA and the *Endangered Species Act, 2007*. They have also been noted as being valued by local Indigenous communities, and Lake Sturgeon have been identified as a species that occurred historically in the Birch Lake watershed. Lake Sturgeon have been observed in

adjacent waters by anecdotal records provided by the MNR in 1997 and documented as likely present through Traditional Knowledge (Cat Lake / Slate Falls / MNRF 2016) and a fish habitat workshop held in December 2023 with members of MON (Appendix D). Although aquatic investigations carried out for the Project to date have not identified Lake Sturgeon in any of the areas sampled, including Birch Lake and Springpole Lake, the habitat for Lake Sturgeon in the Birch Lake watershed is being investigated as part of the Fish Habitat Offsetting and Compensation Plan (Appendix F) to determine if there are opportunities to restore the population.

Spawning surveys were conducted in the north basin of Springpole Lake for four sportfish species: Lake Trout (fall 2012 to 2014); Northern Pike (spring 2013, 2015, 2017 and 2022); Walleye (spring 2015 and 2017); and Lake Whitefish (fall 2012). No Walleye were observed during the spring surveys, and telemetry data determined that tagged Walleye emigrated from Springpole Lake and moved upstream into the Birch River during the early spring to spawn. Results of the spawning surveys for Lake Trout, Lake Whitefish and Northern Pike indicate some spawning areas occur within the area that would be impacted by the Project. More detailed assessments of potential spawning areas in the north basin of Springpole Lake are provided in the 2021 Existing Conditions Report (Appendix O-3, Section 3.1.6). Surveys in 2021 identified additional potential Lake Trout and Lake Whitefish spawning shoals in the southeast arm.

Composite fish tissue samples collected from Springpole Lake outlet and Springpole Lake were submitted for contaminants analysis. The methylmercury concentrations from the composite samples collected in the Springpole Lake outlet ranged from 0.176 to 0.229 micrograms per gram (µg/g). All fish tissue samples from Yellow Perch, Blacknose Shiner, Mimic Shiner and Spottail Shiner were found to have fish tissue concentrations of methylmercury greater than the Canadian Council of Ministers of the Environment (CCME 2000) *Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota* (0.033 µg/g), which is commonly observed for fish in northern Ontario lakes. The concentrations of methylmercury from the composite samples collected in Springpole Lake ranged from 0.061 to 0.109 µg/g (Yellow Perch samples) and 0.611 to 4.47 µg/g (Northern Pike samples), which also exceed the CCME (2020) guidelines.

A total of 86 individual fish tissue samples which included 14 Lake Trout, 18 Lake Whitefish, 23 Northern Pike and 16 Walleye were analyzed from the 2022 BsM program in Springpole Lake. All total mercury concentrations were less than the Ontario consumption guidelines developed for the general population (1.8 µg/g), yet concentrations in 8 Lake Trout, 11 Northern Pike and 2 Walleye exceeded the consumption guideline for women of child-bearing age and children (0.5 µg/g), as well as the Health Canada maximum contaminant concentration (0.5 µg/g). All methylmercury concentrations exceeded the methylmercury guideline for the protection of wildlife consumers of aquatic biota (0.033 µg/g; CCME 2000). Additional details on fish tissue samples and results can be found in the 2023 Aquatic Resources Baseline Report (Appendix O-1, Section 3.1.3).

The benthic invertebrate community sampled included nearshore samples (collected in approximately 16 m total water depth) and offshore samples (collected in approximately 26 m total water depth) from 2019 to 2021. A total of seven groups of taxa were identified in the Springpole Lake nearshore samples, with *Pontoporeiidae* (water scud) being the most abundant, followed by *Ostracoda* (seed shrimp) and *Sphaeriidae* (bivalve clams). Seven taxa groups were identified in the Springpole Lake offshore samples, with Chironomidae (non-biting midges) being the most abundant, followed by *Naididae* (aquatic oligochaete worms) and *Pontoporeiidae* (water scud). The benthic invertebrate community was further sampled in 2022 in a nearshore (11 to 12 m total water depth) environment. During this time, nine different taxa groups were

identified, with *Chaoboridae* (phantom midges) being the most abundant, followed by *Chironomidae* (midges).

The lower trophic community in Springpole Lake was sampled during 2021, 2022 and 2023 at the six deep basin locations (L-15-B1 to B6). Laboratory results from 2021, 2022 and 2023 show consistent metrics across the deep basins of Springpole Lake. The chlorophyl *a* concentration, phytoplankton biovolume, density, relative biovolume, relative density, zooplankton biomass, density and relative density are provided in Appendix O, showing annually changing biovolume / biomass but consistent inter-annual variation between stations. For example, zooplankton biomass for all sites was lower than 250 micrograms per litre wet weight (µg/L wwt) in 2021, but closer to 750 µg/L wwt in 2022. This shows that annual variation in the lower trophic community occurs, but when it occurs community composition and relative density does not change between sites. This trend held true for phytoplankton and chlorophyll *a* as well.

Additional detailed descriptions of fish presence and fish habitat can be found in Section 3.1 of the 2023 Aquatic Resources Baseline Report (Appendix O-1).

6.10.2.2 Birch Lake

Birch Lake has a total surface area of 11,623 ha, an average depth of 7.4 m and a maximum depth of 39.5 m. The lake is a complex of irregular shoreline and basins, measuring approximately 18 km wide (north to south) and 27 km long (west to east). There are deep basins present within the lake, similar to those described for Springpole Lake. The lake is generally deeper in the east portion of the lake than the west.

The fish community in Birch Lake has been assessed on numerous occasions, including past baseline studies for the Project, BsM studies by the MNR (2009, 2014 and 2019) and studies completed by WSP Canada Inc. (Appendix O-1 to O-3). Studies conducted by WSP Canada Inc. involve standard capture techniques (e.g., gillnets, dip nets, seine nets, angling), including lethal sampling for small-bodied forage fish for metals analysis and eDNA sampling.

The MNR BsM program in Birch Lake was conducted for three complete cycles of monitoring (2009, 2014 and 2019). Detailed fish community metrics were collected using large and small mesh gill nets to characterize both the small-bodied and large-bodied species present in the lake (Table 6.10-6 and Table 6.10-7). Similar to Springpole Lake, Walleye, Northern Pike, Cisco and Yellow Perch made up the majority of catch; however, in Birch Lake Burbot made up a large portion of catch, as opposed to the 11 individuals caught in Springpole Lake. In 2014, 77 Burbot were caught between the large and small mesh nets.

Analysis of Birch Lake BsM data using MNR protocols (Beach 2024, pers. comm.) determined an area-weighted catch per unit effort in 2009 to be 0.5944, closely matching the 2022 Springpole Lake survey; however, subsequent Birch Lake cycles saw lower values of 0.4863 and 0.3629 in 2014 and 2019, respectively. Density estimates ranged from 0 to 0.2 Lake Trout per hectare and 2.4 to 3.1 Walleye per hectare by cycle. This is similar to Springpole Lake, with 0.3 Lake Trout and 2.5 Walleye per hectare, which aligns with the depth strata proportions between Birch and Springpole lakes (Table 6.10-8). The deeper strata are slightly higher proportionally in Springpole Lake, potentially influencing the higher Lake Trout and lower Walleye numbers.

Sampling for eDNA to characterize fish community during 2022 identified 21 different species, across two sampling events. Samples were collected at the two deep basin locations typically sampled for surface water quality, including composite grabs at depth and near shore. All species were previously identified through

standard capture techniques. In total, 30 species of fish have been documented in Birch Lake. A list of fish species present in local waterbodies near the Project is provided in Table 6.10-3.

Composite fish tissue samples collected in 2021 and 2022 from Bluntnose Minnow and Yellow Perch were submitted for contaminants analysis. Composite methylmercury values ranged from 0.024 to 0.0289 milligrams per kilogram wet weight (mg/kg wwt), averaging 0.0266 mg/kg wwt for Bluntnose Minnow composite fish tissue samples, and 0.0151 to 0.0333 mg/kg wwt averaging 0.0226 mg/kg wwt for Yellow Perch composite fish tissue samples. All the composite samples for Bluntnose Minnow had methylmercury concentrations less than the CCME (2020) *Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota* (0.033 µg/g). All but one Yellow Perch composite sample (0.333 mg/kg wwt) also had concentrations less than the CCME (2020) guidelines.

The benthic invertebrate community sampled in 2022 included nearshore samples along the CDF shoreline, ranging from 0.6 to 12.5 m. Total taxa groups ranged from 6 to 21, with the greatest number found at shallower depths (less than 1 m). The *Chironomidae* (midges) taxa group was the most abundant, followed by *Ostracoda* (seed shrimp).

The lower trophic community in Birch Lake was sampled during 2021, 2022 and 2023 at the two deep basin locations (B1 and B2). Laboratory results from 2021, 2022 and 2023 show similar community composition, density and biovolume / biomass between locations. Similar to Springpole Lake, 2022 results showed greater productivity, with an increase in all metrics. There is no discernible difference between the sample locations in Birch Lake and Springpole Lake for lower trophic level communities, density or biovolume / biomass.

Additional detailed descriptions of fish presence and fish habitat can be found in Section 3.2 of the 2023 Aquatic Resources Baseline Report (Appendix O-1).

6.10.2.3 Small Unnamed Waterbodies

Numerous small unnamed waterbodies (lakes / ponds) in the vicinity of the Project were surveyed between 2012 and 2022. These waterbodies are generally characterized by:

- Low fish diversity and abundance;
- Small lake size (less than 15 ha);
- Soft organic sediments;
- Shorelines consisting predominantly of floating vegetation mats with small outcrops of bedrock; and
- A high density of submergent macrophytes in shallow areas with floating macrophytes throughout the open water.

The maximum waterbody depth ranges greatly, from 1 to 27 m, but typical the maximum depth is 5 to 7 m. Many of the small waterbodies were found to contain only small-bodied fish such as Brook Stickleback, Iowa Darter, Fathead Minnow and Finescale Dace. Others included larger piscivorous species such as Northern Pike and Yellow Perch, but in most cases species richness (number of species present) was low. A list of fish species present in local waterbodies is provided in Table 6.10-3.

Composite fish tissue samples collected from Finescale Dace, Northern Redbelly Dace and Northern Pearl Dace species in the surrounding small unnamed tributaries were submitted for contaminants analysis during the 2019 to 2021 field investigations. The composite methylmercury concentrations ranged from 0.0231 to

0.1210 µg/g, which is greater than the CCME (2020) guidelines (0.033 µg/g). Additional details on fish tissue samples and results can be found in Appendix O.

The benthic community sampling reported a number of taxa groups with observed populations not limited to *Nemata* (roundworms), *Naididae* and *Enchytraeidae* (worms), *Erpobdellidae* (leeches), *Caenidae* (mayflies), *Corduliidae* (dragonflies), *Leptoceridae* (caddisflies), *Chironomidaeus* (Chironominaemidges), *Chaoboridae* (phantom midges), *Pionidae* (mites), *Hydrobiidae* (snails) and *Sphaeriidae* (clams).

Additional detailed descriptions of fish presence and fish habitat can be found in Sections 3.3 through Section 3.11 of the 2023 Aquatic Resources Baseline Report (Appendix O-1).

6.10.2.4 Small Tributary Watercourses

A large number of unnamed, smaller watercourses (tributaries of Springpole Lake and Birch Lake) were surveyed between 2012 and 2022. These small watercourses are often ephemeral or intermittent in flow regime (due to small drainage areas typically less than 1 square kilometre [km^2]); are influenced by beaver activity; and are typically characterized by low velocity, shallow depth, soft organic sediment and poorly defined to undefined channels. Watercourse channels are shown in Figure 6.10-2 as provided in the Ontario Hydro Network Provincial watercourse spatial data layer (MNRF 2021). Some headwater watercourses shown may only reflect perceived channelization resulting from topographic and/or aerial imagery flow accumulation models and may not reflect the actual ground watercourse channelization. Several of these site watercourses are shown in provincial base mapping but within reaches, or in their entirety, are determined to be not fish frequented based on observations to date that defined channels are not present and as such fish presence is not possible.

Additional detailed descriptions of fish presence and fish habitat can be found in Sections 3.3 through Section 3.11 of the 2023 Aquatic Resources Baseline Report (Appendix O-1)

6.10.2.5 Traditional Knowledge

As part of the Project, all eight Indigenous communities were contacted to participate in the EA process, and to provide Traditional Knowledge and Traditional Land Use information. To date, six Indigenous communities—CLFN, LSFN, MON, SFN, Wabauskang First Nation (WFN) and the NWOMC—have provided Traditional Knowledge and Traditional Land Use information. Specific Traditional Knowledge and Traditional Land Use information relevant to fish and fish habitat is described below.

CLFN reported harvesting a diverse range of fish species within the study area of the Traditional Land Use Study, including trout, Northern Pike, whitefish, Pickerel (Walleye), suckers and sturgeon. Traditional fish harvesting has been source of sustenance for CLFN members, who engage in fishing activities year-round, including ice fishing during winter months. Current and historical fishing occurs in areas such as Birch Lake and Springpole Lake, where deep waters support preferred species such as whitefish and Lake Trout. Historically, the commercial fishing industry was important within their Traditional Knowledge study area.

SFN noted key harvesting areas for Walleye and whitefish include Bamaji Lake, Lake St. Joseph, Kezik Lake, Fawcett Lake and Fry Lake. Other species such as suckers, Northern Pike and Lake Trout are harvested for personal consumption and community sharing. Sturgeon have become extremely rare, with no recent sightings or catches reported by community members. Important spawning areas for fish are located in river rapids, including Devils Rapids, Slate Falls Rapids, Weslyan Rapids and Gull Rapids. Walleye, a dietary staple, is the most commonly harvested fish for personal and commercial use, with fishing occurring year-round except when ice cover is too thin for safe ice fishing. Whitefish is also commonly fished for

consumption. It was observed that algae blooms, more abundant during low and stagnant water levels, lead to potential ecosystem changes and changes in deep water fishing for lake trout and sturgeon.

LSFN reported harvesting a diverse array of fish species, including Walleye (Pickerel), whitefish, Lake Trout, muskies, bass and sturgeon. LSFN noted the fishing provides a source of food, but also contributes to preserving cultural values through community sharing and passing down harvesting knowledge to younger generations. Various productive fishing locations were identified, including Springpole Lake, Trout Lake, Lake St. Joseph, Little Vermillion Lake and Richardson Lake. LSFN noted their experiences of fishing at Springpole Lake, including the variety of fish caught, such as Walleye and Lake Trout, particularly in the spring. LSFN noted the importance of understanding fish habitat in these areas, as some areas provide important habitat for species such as Lake Trout, Pickerel and Lake Whitefish. LSFN noted that some species, like sturgeon, have reportedly disappeared from the Lac Seul system.

The Lake Sturgeon population has been noted as being valued by local Indigenous communities and occurred historically in the Birch Lake watershed. Lake Sturgeon have been observed in adjacent waters by anecdotal records provided by the MNR as recently as 1997 (Cat Lake / Slate Falls / MNRF n.d.) and documented as likely present through Traditional Knowledge (MON 2023).

WFN noted the types of fish species harvested include sturgeon, Pickerel, Northern Pike, whitefish and trout. Several fishing areas were identified by WFN outside the RSA for fish and fish habitat, including the Wabigoon River, Pikangikum Lake, Joyce Lake (noted for trout), Coli Lake, Red Lake, Upper Chukuni, Wabaskang Lake and Aerobus Lake (noted for whitefish). WFN also described the sequence of spawning, starting with sucker followed by Walleye, and identified key spawning locations including Parker Falls and Red Lake.

NWOMC reported 41 fishing locations within the study areas of the Traditional Knowledge and Traditional Land Use study, with only one within the LSA. Walleye (Pickerel), Northern Pike, and trout were particularly popular fish to catch, and NWOMC also noted that they fished for perch, sauger, and whitefish, as well as minnows for bait.

6.10.3 Identification of Potential Effect Pathways

The initial step in the assessment process is to identify interactions with the Project that may result in pathways to potential effects on fish and fish habitat. These potential effects may be direct or indirect and may be negative or positive. DFO has developed detailed pathway of effects diagrams that are used to describe development proposals in terms of the activities that are involved, the type of cause-effect relationships that are known to exist and the mechanisms by which stressors ultimately lead to effects in the aquatic environment (DFO 2024). Table 6.10-9 includes the potential interactions of the Project with fish and fish habitat, prior to the application of the mitigation measures. The professional judgment of technical experts with experience in mine projects in Ontario and other parts of Canada, as well as input from Indigenous communities, government agencies and the public, informed the identification of those interactions that are likely to result in a pathway to a potential effect due to a measurable change to fish and fish habitat. These pathways to potential effects are further described in Sections 6.10.3.1 to 6.10.3.3 for each phase of the Project, along with the rationale for those interactions excluded from further assessment. Section 6.16.4 and Table 6.10-10 provide a description of the mitigation measures applied to these pathways to potential effects during all phases of the Project. The residual effects, after the application of the mitigation measures, are then described and further evaluated in Section 6.10.6, using the criteria and indicators identified in Section 6.10.1.4.

Construction Phase

The construction phase of the Project is expected to occur over a three-year period and will include preparation of the site and the construction of mine infrastructure. The following interactions with the Project result in pathways to potential effects on fish and fish habitat as described below. After mitigation is applied to each pathway, as described in Table 6.10-10, the residual effects are assessed using the criteria identified for each pathway:

- Site preparation activities for the mine site, including clearing, grubbing and bulk earthworks, will interact with fish and fish habitat. These land based activities can result in pathways to potential effects due to a change in erosion from ground disturbance activities in the PDA that could change concentrations of nutrients and suspended solids as well as changes in bank structure and thermal inputs in the surrounding waterbodies from vegetation clearing and ground disturbance which may affect fish habitat and fish health. The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.
- The construction of the mine access road, airstrip, transmission line, onsite haul roads, water intake and an effluent discharge pipeline interacts with fish and fish habitat.
    - These activities result in pathways to potential effects on fish and fish habitat due to the following:
        - The use of equipment in fish habitat could affect fish communities and active spawning areas.
        - The disturbance of the bed and banks of watercourses and/or waterbodies due to the installation of water crossing structures, the water intake structure and the effluent discharge structure could affect fish habitat and surface water flows, thereby affecting fish passage.
        - The disturbance of the bed and banks of watercourses and/or waterbodies may also lead to erosion and sedimentation that could change water quality and affect fish health.
    - The assessment of potential effects on fish and fish habitat includes changes in fish communities, changes in fish habitat and changes in fish health from these pathways.
- The construction of the fish habitat development area interacts with fish and fish habitat.
    - This activity results in pathways to potential effects on fish and fish habitat due to the following:
        - Changes in catchment areas and the interception of surface water from local watercourses could affect downstream fish habitat for local fisheries.
        - The excavation of the fish habitat development area will require the use of explosives adjacent to fish habitat that will create instantaneous pressure changes that could affect fish communities.
    - The assessment of potential effects on fish and fish habitat includes changes in fish communities and changes in fish habitat from these pathways.

- The construction of two dikes in the north basin of Springpole Lake to support the development of the open pit basin interacts with fish and fish habitat.
    - This activity results in pathways to potential effects on fish and fish habitat due to the following:
        - The use of equipment in fish habitat could affect fish communities and active spawning areas.
        - The placement of materials to construct the dikes could introduce sediment into fish habitat, thereby changing water quality, which may affect adjacent fish habitat and fish health.
        - The footprint of the dike may affect fish habitat.
    - The assessment of potential effects on fish and fish habitat includes changes in fish communities, changes in fish habitat and changes in fish health from these pathways.
- The construction of the central water storage pond (CWSP) to manage mine site water interacts with fish and fish habitat.
- This activity will result in pathways to potential effects on fish and fish habitat due to the overprinting of the structure on a fish-bearing waterbody which may affect fish habitat, and the introduction of mine site water into the CWSP may affect fish health.
- The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.
- The controlled dewatering of the open pit basin will require the operation of the pumps to lower the water level, and will interact with fish and fish habitat.
    - This activity will result in pathways to potential effects on fish and fish habitat due to the following:
        - The operation of the pumps could impinge or entrain fish into the water intake and may affect fish communities.
        - Elevated levels of suspended solids may be entrained into the water column from the lake bed as the water level is lowered, which may affect fish habitat and fish health in the open pit basin and the water discharge location.
    - The assessment of potential effects on fish and fish habitat includes changes in fish communities, changes in fish habitat and changes in fish health from these pathways.
- The construction of the starter embankment for the CDF interacts with fish and fish habitat.
    - This activity will result in pathways to potential effects on fish and fish habitat due to the following:
        - Changes in catchment areas and the interception of surface water from local watercourses could affect downstream fish habitat for local fisheries.
        - The overprinting of watercourses and waterbodies within the footprint of the CDF may affect fish habitat.

  - Changes in erosion from ground disturbance activities in the PDA may change concentrations of suspended solids in the surrounding waterbodies due to sedimentation, which may affect fish habitat and fish health due to changes in water quality.
- The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.

The development of the temporary construction accommodations complex and staging areas, the construction of buildings and onsite infrastructure, and the commissioning of the process plant will not overprint fish habitat, and there are no anticipated interactions. Stripping of lake bed sediment and overburden at the open pit and the initiation of pit development in rock will occur after the open pit basin has been developed and fish removed, and therefore additional interactions with fish and fish habitat are not possible. Development of the surficial soil stockpile and initiation of stockpiling of ore will not overprint fish habitat, and there are no anticipated interactions. The establishment and operation of water management and treatment facilities will be completed concurrently with the initial site preparation, and additional interactions with fish and fish habitat are not possible. There is no plausible interaction between the employment and expenditures activities and fish and fish habitat during any Project phase.

Operations Phase

The operations phase is anticipated to extend over a 10-year period, after the construction phase when the majority of potential effects on fish and fish habitat will occur. The following interactions with the Project result in pathways to potential effects on fish and fish habitat as described below. After mitigation is applied to each pathway, as described in Table 6.10-10, the residual effects are assessed using the criteria identified for each pathway:

- The operation of the open pit mine interacts with fish and fish habitat.
  - This activity will result in pathways to potential effects on fish and fish habitat due to the following:
    - Ongoing water management in the open pit basin changes groundwater inputs to local waterbodies and watercourse and may continue to affect fish habitat.
    - The use of explosives within the open pit to excavate ore for processing may result in changes in instantaneous pressure and vibration levels that may affect fish communities in nearby fish habitat.
  - The assessment of potential effects on fish and fish habitat includes changes in fish communities and changes in fish habitat from these pathways.
- The operation and management of the ore stockpiles, overburden stockpile and CDF interacts with fish and fish habitat.
  - This activity will result in pathways to potential effects on fish and fish habitat due to the following:
    - Runoff from these facilities may cause erosion and elevated suspended solids in the surrounding waterbodies, which may affect fish habitat and fish health.
    - The ongoing management of mine site and contact water within the footprint of the stockpiles and CDF could change surface water flows to local watercourses, thereby affecting downstream fish habitat for local fisheries.

  - The change in water quality because of seepage from the stockpiles and CDF may affect fish health.
- The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.

- The operation of the water management and treatment facilities, specifically the water intake and effluent treatment plant, interacts with fish and fish habitat.
  - This activity will result in pathways to potential effects on fish and fish habitat due to the following:
    - The operation of the water intake could impinge or entrain fish and may affect fish communities.
    - The change in water quality from the discharge of treated effluent to the southeast arm of Springpole Lake and potential erosion may affect fish health.
  - The assessment of potential effects on fish and fish habitat includes changes in fish communities and changes in fish health from these pathways.
  - Progressive reclamation activities within the PDA interact with fish and fish habitat. This activity will result in pathways to potential effects on fish and fish habitat due to a change in erosion from ground disturbance activities in the PDA that could change concentrations of suspended solids in the surrounding waterbodies due to sedimentation which may affect fish habitat and fish health. The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.

The commissioning and operation of the process plant, operation of the accommodations complex, and the operation and maintenance of mine site infrastructure will not interact with fish and fish habitat. The progressive reclamation activities are not anticipated to interact with fish and fish habitat as these will be limited during the operations phase.

Decommissioning and Closure Phase

Activities occurring during the active closure phase, which is expected to occur over a five-year period, include regrading, placement of covers and revegetation. The following interactions with the Project result in pathways to potential effects on fish and fish habitat as described below. After mitigation is applied to each pathway, as described in Table 6.10-10, the residual effects are assessed using the criteria identified for each pathway:

- Infrastructure will be removed from the site, and final reclamation activities will be undertaken to stabilize the PDA.
  - These activities interact with fish and fish habitat, and result in pathways to potential effects due to the following:
    - A change in erosion from ground disturbance activities in the PDA could change concentrations of suspended solids in the surrounding waterbodies due to sedimentation, which may affect fish habitat and fish health.
    - The implementation of the remaining fish habitat offsetting measures may affect fish habitat.

  - The change in water quality because of ongoing seepage from the CDF may affect fish health.
- The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.

- Once the removal of ore from the open pit has been completed, the open pit will be filled with water over a three- to five-year period before being reconnected to Springpole Lake. This activity interacts with fish and fish habitat and results in pathways to potential effects due to the potential change in water levels in the north basin of Springpole Lake thereby affecting fish habitat, and changes in water quality and sediments in the refilled open pit area prior to reconnection which may affect fish health. The assessment of potential effects on fish and fish habitat includes changes in fish habitat and changes in fish health from these pathways.

During decommissioning and closure, the removal of assets, demolition of remaining materials and the disposal of demolition related wastes is not expected to have an interaction with fish and fish habitat. Beyond closure, the activities will be primarily monitoring, and there are no anticipated interactions with fish and fish habitat.

6.10.4 Mitigation and Offsetting Measures

Measures to be implemented to avoid or minimize the effects of the Project on fish and fish habitat include:

- Minimize the mine site footprint and overprinting of waterbodies where possible.
- During construction (and other phases as applicable), implement a site-specific Erosion and Sediment Control Plan (ESCP) to mitigate the entry of sediment into surrounding waterbodies.
- Install isolation measures for in-water works associated with the construction of the dikes in the north basin of Springpole Lake and water crossings following the guidance of DFO's Interim Standard: In-Water Site Isolation (DFO 2023a).
- Design culverts to provide fish passage and naturalized substrates to mitigate habitat impacts.
- Relocate fish from the work area prior to undertaking in-water works for the construction of Project infrastructure.
- Prior to dewatering the open pit basin area, conduct a comprehensive fish removal program (fish-out) within the basin to minimize the unintentional death of fish.
- Complete required maintenance of in-water structures following the guidance of DFO's *Interim Code of Practice: Repair and Maintenance of In-Water Structures* (DFO 2023b).
- Undertake in-water construction activities outside of the fish spawning and egg incubation periods to reduce the potential for effect on fish as per DFO's *Measures to Protect Fish and Fish Habitat* (DFO 2023c) and the MNR's in-water timing windows (MNR 2013), unless exempt.
- Implement the measures outlined in the Fish Habitat Offsetting and Compensation Plan (Appendix F), including:
  - Overbuild and integrate spawning shoals along the active lake-facing embankments of the dikes to replace Lake Trout and Lake Whitefish spawning opportunities lost within the dewatered basin.

- Coordinate with the provincial government (Ministry of Mines) to implement the reclamation of fish habitat at the abandoned South Bay Mine.
- Implement the investigation and study of Lake Sturgeon in the Birch River and Cat River system and consider measures to reinstate or augment the population.
- Place coarse wood structure along Springpole Lake shorelines currently lacking structural diversity.
- Construct a new and significant embayment (46 ha fish habitat development area) to the east of the dewatered area to be functional at closure.
- Enhance the open pit basin (dewatered) area for selected key species (determined during engagement and consultation) by modifying cover, structure and substrates to improve habitat suitability where appropriate.
- Contour the north end of the main open pit and the Phase 1 pit and optimize fish habitat structures, substrates and depth for selected key species as determined during engagement and consultation.
- Restore flow to unnamed lake L-1 on completion of mining and filling of the dewatered basin.

- Prohibit fishing and hunting within the controlled access portion of the PDA by Project personnel while working or residing on site, during construction, operations and closure phases.
- Prior to construction, develop a detailed blasting management plan for areas adjacent to fish habitat that meets DFO criteria or alternate values derived in consultation with DFO.
- Install screens or use other measures at water intakes to prevent entrainment or impingement of fish as per the DFO Code of Practice (DFO 2020).
- Implement the measures to mitigate effects on surface water, as outlined in Section 6.6, including the treatment of mine effluent prior to discharging to the southeast arm of Springpole Lake, and the collection and management of runoff and seepage water from the perimeter of the CDF and ore stockpiles.

The application of mitigation measures to specific pathways and phases is illustrated in Table 6.10-10. Mitigation measures described in this section are expected to be effective for their intended purposes given their effective implementation at similar projects.

Monitoring programs will be implemented to verify the accuracy of the predicted effects and assess the effectiveness of the implemented mitigation measures, and may be further optimized in response to monitoring data. Extensive monitoring programs are in place for the Project, with several years of data collection completed. Monitoring for the Project going forward is further described in Section 12 and will be refined during the permitting phase to incorporate conditions of approvals and permits. Consultation on the monitoring programs is expected to continue through all phases of the Project.

6.10.5 Analytical Methodology

The predicted effects on fish and fish habitat were evaluated by using a quantitative method to assess the effects from the Project. The methods evaluated the potential changes to fish and fish habitat during the construction, operations, active closure and post-closure phases of the Project. The quantitative methods for assessment included the following:

- The areal extent of fish habitat affected by the Project was determined using geographic information system (GIS) mapping of disturbed or overprinted areas (e.g., bankfull width multiplied by length of stream overprinted).
- Watercourse widths were measured in the field when present and accessible, or determined from measurements using high resolution imagery. When channels were not discernible in the field or from imagery (such as small channels described in Section 6.10.2.4) a minimum width of 0.5 m was assigned.
- Flow reductions potentially affecting fish were estimated based on the calculated changes to the drainage areas using GIS and modelled groundwater interactions.
- The assessment of fish populations and abundance was determined using fish sampling surveys that were completed in waterbodies potentially affected by the Project. Fish sampling was completed over multiple years and seasons to evaluate fish species, relative abundance and health. Fish abundance, biomass and health (condition factor) were calculated from provincial standard BsM protocols for Springpole Lake and Birch Lake.
- Sediment and surface water quality was sampled and analyzed using industry standard approaches and qualified laboratories.
- Water quality modelling predicted changes in water quality and compared the results to the applicable regulatory guidelines for the protection of aquatic life.
- Calculations for the changes in instantaneous pressure change and peak particle velocity on fish from the use of explosives within the PDA (Appendix H-4).

6.10.5.1 Assumptions and the Conservative Approach

A conservative approach was used to support the effects assessment for fish and fish habitat. The following assumptions were used during the effects assessment:

- The maximum footprint of the mine site area of the Project was assumed for the evaluation of fish habitat effects.
- All areas within the mine site area of the PDA that are overprinted were assumed to have a complete loss of fish habitat and areas require offsetting measures.
- A value of 50 kilopascals (kPa) was used to assess potential blasting impacts to fish compared to the 100 kPa value referenced in the current pathways of effects guidance. This increases the area of potential effects into Birch Lake, which will be accommodated by the Fish Habitat Offset and Compensation Plan (Appendix F) and detailed blasting plan.
- Fish that have been documented to be present in one portion of a watercourse were assumed to be present throughout the entire habitat area.
- Changes to streamflow and water quality changes were assumed to have effects on fish and fish habitat.
- Where there is uncertainty in the potential effects on fish habitat, a precautionary approach was taken and it was assumed that effects would occur and fish offsetting measures were developed.

Additional conservative assumptions related to groundwater and surface water are detailed in Section 6.5 and Section 6.6, respectively.

6.10.6 Characterization of Potential Residual Effects

The potential residual effects on fish and fish habitat include the change in fish habitat, changes in fish communities and changes in fish health.

6.10.6.1 Changes in Fish Habitat

Construction of the east and west dikes is required to allow the dewatering of a portion of the north basin of Springpole Lake to allow the development of the open pit. These dikes are essential for the safe and controlled dewatering of the pit area in advance of mining operations and have been successfully implemented at several other mines in Canada. This will result in the temporary loss of fish habitat in Springpole Lake within the footprint of the dikes and subsequently the dewatered portion of the north basin of Springpole Lake. Two dikes (west dike and east dike) will be constructed in the north basin of Springpole Lake and result in the disruption of 156 ha of fish habitat, which makes up approximately 6% of the surface area of Springpole Lake. Once the portion of the north basin of Springpole Lake is isolated, clean water will be pumped over the dikes back into Springpole Lake. Controlled dewatering is expected to take approximately six months to complete, based on continuous (24-hour, 7-day per week) pumping. The pumped water from the portion of the north basin of Springpole Lake will be monitored for suspended solids. As the water level lowers it is anticipated that the water will likely become elevated in suspended solids at which time the water will be pumped to the CWSP for settling prior to discharge.

The direct effect of isolating and the controlled dewatering of the basin to establish the open pit will result in the following effects on fish habitat:

- Alteration of 71 ha of existing lake area for the footprint of the open pit: This area will be altered in terms of depth, substrate and water quality at depth, and includes a portion of one of the six deep basins in Springpole Lake.
- Disruption of 85 ha of existing lake area associated with construction of two dikes (7.2 ha) and dewatering the area surrounding the open pit footprint (77.8 ha): This area will be isolated from the main lake for the life of mine and until the dewatered open pit basin is refilled. Lake sediments will be temporarily stored in this area but the basin morphology will remain largely unaltered from existing conditions once reconnected to the main lake. This disrupted area will undergo habitat enhancements as discussed below.
- Overprinting of small watercourses reporting to unnamed lake L-1 and a small watercourse reporting to Springpole Lake: Both watercourses are delineated by the provincial mapping but do not have defined channels and are considered to be not fish frequented but are conservatively included as a loss of fish habitat.

As a result, the construction of the dikes and controlled dewatering will affect a portion of the north basin of Springpole Lake and associated fish and fish habitat (Table 6.10-11), which will require mitigation in the form of offsetting measures.

Springpole Lake is part of a large system with a drainage area of approximately 1,289 km^2 at its inflow. Once mining concludes in approximately Year 10, the open pit basin will start to fill with water by direct precipitation and groundwater infiltration from the surrounding bedrock. Without enhancement, it would take decades (approximately 30 to 40 years) for the open pit basin to refill to the same level as Springpole Lake. To significantly reduce the filling time, supplemental water from Springpole Lake is planned to be transferred to the pit in a controlled manner while maintaining lake water levels within natural variation. The proposed active filling rate would be adjustable to reflect up to 10% of the inflows to Springpole Lake.

Based on guidance provided by the DFO's (2013) *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada* and Locke and Paul's (2011) *A Desk-top Method for Establishing Environmental Flows in Alberta Rivers and Streams*, a 10% to 15% reduction in instantaneous flows is unlikely to have detectable ecological effects on downstream habitat. Using the more conservative DFO guidance and a proposed active filling rate of up to 10%, the combined dewatered open pit / fish habitat area basin would require three to five years to fill using the current average elevation of Springpole Lake (elevation 391 m above mean sea level) under average flow conditions during those years. With isolation of the basin occurring in the first year of construction (Year -2) and filling beginning in Year 10, the basin can be filled and ready for reconnection to Springpole Lake in approximately Year 13 to Year 15 of the Project. The reclaimed basin is expected to support the same fish community in the same or greater abundance as baseline conditions while increasing the total lake surface area by approximately 3.5% and the total lake volume to a 30 m depth by approximately 16%. The reclaimed basin is only one component of the comprehensive fish habitat offset and compensation plan developed to counterbalance and mitigate effects on fish habitat. As a result, there will be no residual effects on fish and fish habitat following reclamation and refilling of the open pit basin.

The CDF has been designed to minimize the Project footprint by co-locating the tailings and mine rock; however, development of the CDF will directly overprint or alter waterbodies L-3, L-4, L-5, L-6, L-16, L-17 and L-18 and their associated watercourses L-6-Out, S-16, S-17, S-18, S-19, S-21 and S-23 shown in Figure 6.10-4. Of these features, waterbody L-6 and watercourse L-6-Out have been confirmed through extensive sampling as being not fish frequented and are therefore not included as areas quantified as impacted habitat. Several other waterbodies and watercourses are also suspected to be not fish frequented, but have been conservatively included in the current quantity estimate. The CDF will result in most downstream channels experiencing catchment reductions, and as such, the entire area of the impacted channels downstream of the CDF is considered to be affected fish habitat. Overall, the combined overprinting and flow reduction will result in a loss of 35.3 ha of fish habitat in these waterbodies (Table 6.10-11). The loss of this fish habitat may affect fish spawning, juvenile rearing, adult forage and overwintering for local species. However, fish productivity in these systems will be partially mitigated by relocating fish that occur in the affected waterbodies to downstream habitats prior to constructing the CDF. Further, the loss of fish habitat will be mitigated with the offsetting measures noted below.

The CWSP will be required early in mine life to manage site runoff and store surplus water. Due to pit dewatering and catchment reduction, it is predicted through groundwater and surface water modelling that unnamed waterbody L-2 will be altered considerably by flow reductions. The CWSP will also overprint unnamed waterbody L-2 (11.5 ha). During the closure phase, the unnamed waterbody L-2 is proposed to be reclaimed. However, the loss of fish habitat (Table 6.10-11) during operations will be mitigated with the offsetting measures noted below.

The diversion of non-contact water around the mine site and the collection of contact water within the mine site for the Project will decrease flows to local downstream watercourses resulting in an alteration of habitat. The loss of flows in these watercourses will be mitigated through the offsetting measures noted below. As a result, no residual effects on fish habitat due to loss of flows are anticipated.

A water intake structure will be constructed in Birch Lake northeast of the ore stockpiles. The water intake structure has been conservatively assumed to have a footprint of 0.005 ha (approximately 50 square metres [m^2]) in Birch Lake and would result in a loss of fish habitat. Water taking may disrupt the lake bed sediments and fish habitat in the local area of the intake pipeline. The intake structure would be designed consistent with guidance from DFO's *Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water*

Intakes in Freshwater to Prevent Fish Entrainment (DFO 2020). The combined water taking results in a total annual water taking from Birch Lake of 3.96 million cubic metres per year (Mm^3/yr) (annual average rate: 0.126 cubic metres per second [m^3/s]), the maximum under all modelled scenarios (Appendix M-2). Even under extreme dry flow conditions (e.g., 100-year dry), the proposed water taking from Birch Lake would be less than 5% of the flow from the lake and is not expected to result in measurable changes to lake levels or downstream water levels. Under average conditions, Birch Lake provides monthly flows between 3.0 and 13.0 m^3/s, which corresponds to a water taking of between 1.0% and 4.2%. As a result, no residual effects on fish habitat due to water taking during operations are anticipated

A discharge structure for treated effluent will be constructed in the southeast arm of Springpole Lake. As with the water intake, it has been assumed to have a footprint of 0.005 ha (approximately 50 m^2) in Springpole Lake and would also result in a loss of fish habitat (Table 6.10-11). The effluent will be discharged at a maximum predicted rate of 382 litres per second (L/s); however, by using the integrated water management system, the flow of treated effluent discharged to the southeast arm of Springpole Lake will be attenuated to reduce erosive forces. Further, the discharge pipe will be designed and oriented to mitigate erosion from discharge. Both the water intake and treated effluent discharge structures would be mitigated with the proposed offsetting measures described below, although these structures would be removed at closure and the area restored.

The offsetting measures as described in the Fish Habitat Offset and Compensation Plan (Appendix F), or as amended based on consultation, will be implemented during the construction and operations phases of the Project, and will include several of the following, to be finalized in permitting through discussions with communities and regulators:

- Overbuild and integrate spawning shoals along the active lake-facing embankments of the dikes to replace Lake Trout and Lake Whitefish spawning opportunities lost within the dewatered basin.
- Coordinate with the provincial government (Ministry of Mines) to implement the reclamation of the abandoned South Bay Mine.
- Implement the investigation and study of Lake Sturgeon in the Birch River and Cat River system and consider measures to reinstate or augment the population.
- Place coarse wood structures along Springpole Lake shorelines currently lacking structural diversity.
- Construct a new and significant embayment (46 ha fish habitat development area) to the east of the dewatered area to be functional at closure.
- Enhance the open pit basin (dewatered) area for selected key species (determined during engagement and consultation) by modifying cover, structure and substrates to improve habitat suitability where appropriate.
- Contour the north end of the main open pit and the Phase 1 pit and optimize fish habitat structures, substrates and depth for selected key species as determined during engagement and consultation.
- Restore flow to unnamed lake L-1 on completion of mining and filling of the dewatered basin.

It is anticipated that a combination of offset and compensation measures (Table 6.10-12), will mitigate for the 213.2 ha of impacted fish habitat and as a result, there will be no residual effects on fish habitat following the implementation of the Fish Habitat Offsetting and Compensation Plan (Appendix F).

The construction of Project roads has been designed to avoid watercourse crossings where practicable. It was previously identified that there were up to four potential watercourse crossings on the mine access road and two watercourse crossings on the haul roads. Additional site investigation and review of the alignment has reduced the number of crossings to one crossing of the mine access road and one crossing of the co-located mine access road and airstrip. Both crossings are anticipated to be culverts due to the small catchments. In-water works will be mitigated with best management practices, including erosion and sedimentation control measures to minimize effects on fish habitat. The footprint of the watercourse crossings has been included as a loss of fish habitat (Table 6.10-11) and mitigated with the offsetting measures noted above. As a result, no residual effects on fish habitat are anticipated due to the construction of the watercourse crossings.

The transmission line was proposed to span a total of 46 water crossings in the draft EIS/EA. Optimization of the transmission line route has reduced the total number of crossings by three including small, medium and large watercourses (total approximately 43 crossings) as summarized in Table 6.10-13.

The transmission line is expected to be constructed primarily in the winter, from temporary winter roads that avoid construction during sensitive periods for fish, as much as practicable. The poles used for the transmission line will be located above the high-water mark to avoid in-water structures and a direct loss of fish habitat. The maintenance of vegetation within the transmission line corridor will restrict vegetation heights; however, riparian vegetation is expected to remain adequate to prevent long-term ground erosion and sedimentation to adjacent waterbodies. The transmission line represents a small and localized interaction with the waterbodies, and no permanent change to banks or beds of the waterbodies is expected. Although minor changes to riparian vegetation may occur, the small extent relative to the overall length of the channels or waterbody is not considered to impact habitat quality such as temperature, cover, nutrients or food supply to an extent that would be harmful to resident fish. As a result, there are no residual effects on fish habitat predicted as a result of the transmission line.

The plant site and ore stockpiles are located northeast and east of the open pit. The ore stockpiles will not overprint waterbodies; however, the plant site will overprint a small watercourse that reports to unnamed lakes L-1 and L-2. The watercourse is presumed to be not fish frequented but is conservatively included as a loss of fish habitat (Table 6.10-11). This area will be mitigated with the proposed offsetting measures. As a result, there are no residual effects on fish habitat predicted due to the plant site and ore stockpiles.

6.10.6.2 Changes to Fish Communities

During construction, once the portion of the north basin of Springpole Lake is isolated, clean water will be pumped over the dikes back into Springpole Lake. Prior to dewatering this area, a comprehensive fish removal program (fish-out) is proposed to minimize the unintentional death of fish associated with dike construction and dewatering of the isolated basin. Fish removals are a common mitigation measure for projects impacting waterbodies, including large-scale lake removals, and each project requires individual consideration as to the best methods and preferred objectives.

Lessons learned from other large lake fish relocation efforts have suggested that a fish transfer should only be considered when fish are transferred from a smaller, isolated portion of a lake to a larger main waterbody (Tyson et al. 2011) and the Project meets this description (approximately 6% of the lake isolated). The DFO report by Tyson et al. (2011) on fish-out protocol provides other potential end uses such as community distribution as objectives to be considered. The protocol further proposes that "the guiding principle of the fish-out program is to ensure that both the ecological data and fish specimens that are collected can be used to their fullest extent."

Although a commitment to completing a fish relocation (fish-out) program is made, the objectives and end use of the fish will be determined through further engagement with Indigenous communities and federal and provincial regulators. With the implementation of mitigation measures, including the offsetting measures noted above, the predicted changes in local fish communities will be effectively mitigated, and no residual effects on fish are anticipated due to the relocation of fish.

The detonation of explosives near waterbodies can produce post-detonation shock waves which result in a pressure deficit referred to as overpressure that can cause impacts in fish (Wright and Hopky 1998). According to Wright and Hopky (1998), an overpressure in excess of 100 kPa can result in effects on fish. Vibrations can also harm fish eggs and larvae, and a limit of a peak particle velocity no greater than 13 $mm \cdot s^{-1}$ is allowed in a spawning bed during the period of egg incubation. Consultation has resulted in DFO requesting the Project consider the use of a more protective overpressure value of 50 kPa per Cott and Hanna (2005). A site-specific blasting assessment has been completed for the Project (Appendix H-4) to calculate the potential extent of blasting effects based on a typical explosive charge, the updated site plan and the more protective overpressure value. The blasting analysis determined that using typical blasting charges would see potential overpressure and vibration effects extending into Birch Lake over an area of 1.4 and 3.4 ha, respectively. Potential effects extend into Lakes L-1 and L-2 as well, but these lakes are expected to be altered by dewatering activities and already compensated for in the Fish Habitat Offsetting and Compensation Plan (Appendix F). Charge per delay values presented in the blasting assessment are not to be considered a fixed limit but are meant to be representative of typical open pit blasting and used by the Project team to develop a blasting plan that meets the DFO criteria, or alternate values derived in consultation with DFO. Smaller charges may be used near water or during sensitive periods to reduce the predicted extent of impact. As a conservative approach, the 1.4 ha of potential overpressure effects have been included as impacts (Table 6.10-7). With the implementation of the blasting plan and implementation of offset measures that meets DFO criteria, no residual effects on fish communities due to blasting are anticipated.

During the operations phase, a water intake structure will be constructed in Birch Lake northeast of the ore stockpiles to provide freshwater for the process plant and accommodations complex. To mitigate the potential effects on fish communities due to entrainment or impingement from the operation of water intakes during all phases, a screen or other deterrents at the pump intakes will be implemented per DFO (2020) Code of Practice or equivalent review / assessment. As a result, no residual effects on fish are anticipated due to entrainment or impingement.

6.10.6.3 Changes in Fish Health

Site preparation is anticipated to include grubbing and stripping and general earthworks potentially resulting in erosion of fines and sedimentation to nearby fish habitat. Prior to construction, a site-specific preliminary ESCP will be developed for the Project. The ESCP will evaluate the construction efforts that may produce erosion and include mitigation measures such as diversion berms, sedimentation ponds, grading recommendations to manage erosion, and other erosion and sediment control measures to minimize the risk of fines entering local waterbodies and increasing suspended solids. Further, mitigation will be implemented during the dewatering of the isolated portion of Springpole Lake so that suspended sediments levels do not exceed discharge criteria for the receiving environment. The construction phase of the Project is anticipated to be completed within a period of three years and the potential effects on fish health due to sedimentation are not predicted to extend beyond this period. In-water construction works will be completed to avoid spawning and egg incubation periods where feasible to further reduce the potential for effects on fish and fish habitat. Sedimentation from the construction and operation of stockpiles will be

mitigated with the implementation of perimeter ditching and drainage controls around the PDA and the measures in the ESCP. Earthworks are anticipated to be completed seasonally, and the risk of elevated sediments in waterbodies following mitigation measures is anticipated to be short term and limited to localized areas; therefore, residual effects on fish health are not predicted.

As described in Section 6.8, treated effluent from the Project will be discharged to the southeast arm of Springpole Lake during operations and decommissioning and closure. The treated effluent will meet the requirements of the MDMER and provincial approvals and will be protective of aquatic life, including fish and benthic invertebrates. This will be verified with monitoring required by the MDMER and provincial approvals, which includes water quality, benthic invertebrates and fish tissue sampling. By using the integrated water management system, the flow of treated effluent discharged to the southeast arm of Springpole Lake will be attenuated and diffused to reduce erosion and sedimentation and improve mixing. As such, water quality is not anticipated to have a residual effect on fish health as the applicable regulatory requirements will be protective of aquatic life.

During the operation and closure of the CDF and the operation of the ore stockpiles, there is potential for runoff and seepage to affect the health of fish in the surrounding waterbodies due to changes in water quality. During operations, runoff and seepage water will be collected by ditches around the perimeter of the CDF and ore stockpiles, then pumped to the internal CDF pond and contact water management ponds, respectively. As necessary, this water may be transferred to the CWSP and/or the process plant for re-use or treated in the effluent treatment plant prior to discharge. The CDF and ore stockpiles will maintain a setback of 120 m from adjacent waterbodies (with exception of those identified as impacted above). During the final three years of mining and operations, the ore stockpiles will be drawn down by ongoing processing and the stockpile areas will be progressively rehabilitated. During the decommissioning and closure phase, runoff and seepage water from the CDF will be collected by the perimeter ditching and redirected to the effluent treatment plant until conditions allow direct runoff. As a result of these measures, no residual effects on fish health from seepage are anticipated.

6.10.7 Significance of Residual Effects

As required by federal legislation and policy, the temporary change to 213 ha of fish habitat will be counterbalanced as a component of the Project and is considered mitigation in the context of the EA. With the proposed design, mitigation and implemented offsetting measures, residual effects on fish and fish habitat are not predicted, and therefore a determination of significance is not required.

6.10.8 Confidence Prediction

The level of confidence in the prediction is considered to be high. The predicted effects are based on previous experience, in which the potential effects and mitigation measures are well understood. In addition, the data used in the assessment are based on extensive field studies carried out since 2011. Further, the assessment of effects on fish and fish habitat uses a conservative and precautionary approach such as including watercourses in the impacted area total despite a low probability of being fish frequented, and assuming a 100% impact to waterbodies only partially affected. Areas have been calculated using current geographic information systems and databases. These and other conservative assumptions have contributed to increase the level of confidence in the conclusions.

6.10.9 References

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Table 6.10-1: Fish and Fish Habitat Criteria, Indicators and Rationale

Criteria	Indicator	Rationale
Change in fish habitat	• Areal extents of fish habitat, measured in hectares • Change to surface water levels, measured in metres • Change in drainage areas, measured in hectares	The Project has the potential to affect the quality of fish habitat by altering characteristics such as in-stream cover. Further, water diversion or withdrawal can directly alter habitat quality and availability and influence temperature and dissolved oxygen levels.
Change to fish communities	• Change in relative abundance of fish species • Change in fish community structure • Change in lower trophic community within Birch Lake and Springpole Lake • Change in absolute density of Lake Trout and Walleye within Birch Lake and Springpole Lake • Change in absolute biomass of Lake Trout and Walleye within Birch Lake and Springpole Lake	Work in or around water can cause direct mortality of fish, which are protected by the *Fisheries Act*. The use of explosives can cause lethal or sub-lethal effects on fish eggs and larval fish. In addition, instantaneous pressure changes may cause internal injury to fish including damage to their organs and swim airbladders and can be lethal. Changes in lower trophic communities can result in differences in fish community structure and abundance.
Change in fish health	• Change in water quality, measured in milligrams per litre • Change in fish tissue quality, measured in micrograms per milligram • Change in condition factor for species within Birch Lake and Springpole Lake	The Project may result in changes in water quality, which may result in the bioaccumulation of parameters of potential concern in fish tissue and affect fish health (e.g., condition and reproductive success), thereby affecting fishery productivity. Condition factor is a ratio of fish weight at a given size and reflects physical, biological and physiological conditions. Changes in condition factor can demonstrate differences in environmental conditions affect overall health.

Table 6.10-2: Significant Determination Attributes for Fish and Fish Habitat

Attribute	Description	Category
Magnitude	A qualitative or quantitative measure to describe the size or degree of the residual effects relative to baseline conditions	**Level I:** Measurable residual effect on fish habitat, fish health or fish populations that would be offset with measures required under the *Fisheries Act* and/or is not likely to affect the sustainability of local fish populations. **Level II:** Measurable residual effect on fish habitat, fish health or fish populations that would not be offset with measures required under the *Fisheries Act* and/or may affect the sustainability of local fish populations. **Level III:** Measurable residual effect on fish habitat, fish health or fish populations that would not be offset with measures required under the *Fisheries Act* and/or may affect the sustainability of regional fish populations.
Geographic extent	The spatial extent over which the residual effect will take place	**Level I:** Effect is restricted to the LSA. **Level II:** Effect extends beyond the LSA. **Level III:** Effect extends beyond the RSA.
Duration	The time period over which the residual effect will or is expected to occur	**Level I:** Effect occurs over the short term: less than or equal to 3 years. **Level II:** Effect occurs over the medium term: more than 3 years but less than 20 years. **Level III:** Effect occurs over the long term: more than 20 years.
Frequency	The rate of occurrence of the residual effect	**Level I:** Effect occurs once, infrequently or not at all. **Level II:** Effect occurs intermittently or with a certain degree of regularity. **Level III:** Effect occurs frequently or continuously.
Reversibility	The extent to which the residual effect can be reversed	**Level I:** Effect is fully reversible. **Level II:** Effect is partially reversible or potentially reversible with difficulty. **Level III:** Effect is not reversible.
Timing	A measure of whether the residual effect occurs during a sensitive period of the year	**Level I**: Effects do not occur during a sensitive period; or related effects are fully mitigated **Level II**: Effects occur during a sensitive period and related effects are partially mitigated **Level III**: Effects do not occur during a sensitive period; or related effects cannot be mitigated

Table 6.10-3: Fish Species Present in Local Waterbodies

Waterbody / Watercourse	Richness	Blacknose Shiner	Bluntnose minnow	Brook Stickleback	Burbot	Cisco sp.	Common Shiner	Emerald Shiner	Fathead Minnow	Finescale Dace	Golden Shiner	Iowa Darter	Johnny Darter	Lake Chub	Lake Sturgeon	Lake Trout	Lake Whitefish	Logperch	Longnose Dace	Mimic Shiner	Mottled Sculpin	Moxostoma sp.	Ninespine Stickleback	Northern Pearl Dace	Northern Pike	Northern Redbelly Dace	Rock Bass	River Darter	Shorthead Redhorse	Slimy Sculpin	Spoonhead Sculpin	Spottail Shiner	Trout-perch	Walleye	White Sucker	Yellow Perch
Birch Lake	30	X	X	X	X	X	X	X		X		X	X	X	H	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Springpole Lake (L-15)	26	X	X	X	X	X	X	X	X	X	X	X	X		H	X	X	X		X	X				X		X	X	X			X	X	X	X
Seagrave Lake	22	Xi	Xi	Xi	X	X	Xi	Xi				Xi	Xi		H	X	X	Xi		Xi	Xi				X		Xi		Xi			Xi	Xi	X	X	X
Birch River	9											X			H	Xi			X						X		X						X	Xi	Xi	X
Lake L-1	3																								X										X	X
Lake L-2	10	X						X			X													X	X				X			X	X		X	X
Lake L-3	3			X						X																X										
Lake L-4	0																																			
Lake L-5	6			X					X	X		X												X		X										
Lake L-6	0																																			
Lake L-6-Out	0																																			
Lake L-10	2																								X											X
Lake L-11	4			X								X													X											X
Lake L-12	2			X								X																								
Lake L-13	2			X								X																								
Lake L-14	2																								X											X
Lake L-16	2									X															X											X
Lake L-17	1									X																										
Lake L-18	3			X						X																X										
Lake S-19	3			X					X																	X										
Stream S-7	2			X																																X
Stream S-9	13	X		X					X	X								X	X		X			X	X	X								X	X	X
Stream S-16/17	6			X								X												X	X									X	X	
Stream S-20	1									X																										
Stream S-25	0																																			
Stream S-26	2									X																									X	
Stream S-27	2	X																																		X
Stream S-28	1																		X																	
Stream S-29	1																		X																	

Notes:
Fish species' presence include those caught during the baseline studies and the MNR's BsM studies within Birch Lake.
Species' presence includes baseline survey results from 2009 to 2022.
H = historical records of Lake Sturgeon presence within watershed exist (MNR pers. comm.) and remnant depleted population may still exist; X = species present; Xi = species inferred based on adjacent waterbodies and habitat type.

Table 6.10-4: Springpole Lake Large Mesh Broadscale Monitoring Catch Results

Area	Depth Strata	Total Sets	Total Effort (h)	Species Catch																Total Catch	Proportion of Catch				Proportion of Total Catch
				Burbot	Cisco	Common White Sucker	Finescale Dace	Golden Shiner	Lake Trout	Lake Whitefish	Logperch	Northern Pike	Rock Bass	Shorthead Redhorse	Spottail Shiner	Trout-perch	Walleye	White Sucker	Yellow Perch		Cisco	Lake Trout	Walleye	Yellow Perch	
NB01	1 to 3 m	1	17.08									7		3			30		11	51			58.8	21.6	80.4
	3 to 6 m	1	16.50									5	1				21	2		29			72.4		72.4
	6 to 12 m	0	0																	0					0.0
	12 to 20 m	0	0																	0					0.0
	>20 m	2	32	3	14				2											19	73.7	10.5			84.2
Area total		4	65.58	**3**	**14**	**0**	**0**	**0**	**2**	**0**	**0**	**12**	**1**	**3**	**0**	**0**	**51**	**2**	**11**	**99**					
NB02	1 to 3 m	0	0																	0					0.0
	3 to 6 m	0	0																	0					0.0
	6 to 12 m	0	0																	0					0.0
	12 to 20 m	1	19.92		6				2	3							2			13	46.2	15.4	15.4		76.9
	>20 m	3	55.58	2	32				6	4		1								45	71.1	13.3			84.4
Area total		4	75.50	**2**	**38**	**0**	**0**	**0**	**8**	**7**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**58**					
NB03	1 to 3 m	0	0																	0					0.0
	3 to 6 m	0	0																	0					0.0
	6 to 12 m	0	0																	0					0.0
	12 to 20 m	1	19.75	2	12				2	3		1					9			29	41.4	6.9	31.0		79.3
	>20 m	1	18		8					2										10	80.0				80.0
Area total		2	37.75	**2**	**20**	**0**	**0**	**0**	**2**	**5**	**0**	**1**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**39**					
NB46	1 to 3 m	1	19.75									7					30	3	9	49			61.2	18.4	79.6
	3 to 6 m	1	16.50									2					13	4	1	20			65.0	5.0	70.0
	6 to 12 m	1	16.67		3					1		2					15	2		23	13.0		65.2		78.3
	12 to 20 m	2	36.75		35				1			1					3			40	87.5	2.5	7.5		97.5
	>20 m	0	0																	0					0.0
Area total		5	89.67	**0**	**38**	**0**	**0**	**0**	**1**	**1**	**0**	**12**	**0**	**0**	**0**	**0**	**61**	**9**	**10**	**132**					
CB07	1 to 3 m	1	18.42									6		1			16	3	7	33			48.5	21.2	69.7
	3 to 6 m	2	37.25		3							3					35	13	2	56	5.4		62.5	3.6	71.4
	6 to 12 m	2	33.75														4	1		5			80.0		80.0
	12 to 20 m	0	0																	0					0.0
	>20 m	0	0																	0					0.0
Area total		5	89.42	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**1**	**0**	**0**	**55**	**17**	**9**	**94**					
EB05	1 to 3 m	0	0																	0					0.0
	3 to 6 m	1	17.50		1							2					10			13	7.7		76.9		84.6
	6 to 12 m	2	38.50									10					32	10	3	55			58.2	5.5	63.6
	12 to 20 m	0	0																	0					0.0
	>20 m	4	75.83	4	45				1	4							10			64	70.3	1.6	15.6		87.5
Area total		7	131.83	**4**	**46**	**0**	**0**	**0**	**1**	**4**	**0**	**12**	**0**	**0**	**0**	**0**	**52**	**10**	**3**	**132**					
Cycle #1 total	1 to 3 m	3	55.25									20		4			76	6	27	133			57.1	20.3	77.4
	3 to 6 m	5	87.75		4							12	1				79	19	3	118	3.4		67.0	2.5	72.9
	6 to 12 m	5	88.92		3					1		12					51	13	3	83	3.6		61.5	3.6	68.7
	12 to 20 m	4	76.42	2	53				5	6		2					14			82	64.6	6.1	17.1		87.8
	>20 m	10	181.41	9	99				9	10		1					10			138	71.7	6.5	7.3		85.5
Cycle total		27	489.75	**11**	**159**	**0**	**0**	**0**	**14**	**17**	**0**	**47**	**1**	**4**	**0**	**0**	**230**	**38**	**33**	**554**					

Table 6.10-5: Springpole Lake Small Mesh Broadscale Monitoring Catch Results

Area	Depth Strata	Total Sets	Total Effort (h)	Species Catch																Total Catch	Proportion of Catch				Proportion of Total Catch
				Burbot	Cisco	Common White Sucker	Finescale Dace	Golden Shiner	Lake Trout	Lake Whitefish	Logperch	Northern Pike	Rock Bass	Shorthead Redhorse	Spottail Shiner	Trout-perch	Walleye	White Sucker	Yellow Perch		Cisco	Lake Trout	Walleye	Yellow Perch	
NB01	1 to 3 m	*0*	*0*																	0					0.0
	3 to 6 m	*0*	*0*																	0					0.0
	6 to 12 m	*1*	*20.83*		8												3		1	12	66.7		25.0	8.3	100.0
	12 to 20 m	*0*	*0*																	0					0.0
	>20 m	*1*	*16.75*		7				1											8	87.5	12.5			100.0
Area total		***2***	***37.58***	**0**	**15**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**1**	**20**					
NB02	1 to 3 m	*0*	*0*																	0					0.0
	3 to 6 m	*0*	*0*																	0					0.0
	6 to 12 m	*0*	*0*																	0					0.0
	12 to 20 m	*0*	*0*																	0					0.0
	>20 m	*0*	*0*																	0					0.0
Area total		***0***	***0.00***	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**					
NB03	1 to 3 m	*0*	*0*																	0					0.0
	3 to 6 m	*0*	*0*																	0					0.0
	6 to 12 m	*1*	*19.5*		6							1					6			13	46.2		46.2		92.3
	12 to 20 m	*0*	*0*																	0					0.0
	>20 m	*1*	*16*		25				1											26	96.2	3.9			100.0
Area total		***2***	***35.50***	**0**	**31**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**39**					
NB46	1 to 3 m	*2*	*33.67*				2	1				9			3		15	3	55	88			17.1	62.5	79.6
	3 to 6 m	*3*	*57.08*								1	1			22	3	61	9	106	203			30.1	52.2	82.3
	6 to 12 m	*1*	*19*							1							15		2	18			83.3	11.1	94.4
	12 to 20 m	*1*	*16.5*		27							1					5			33	81.8		15.2		97.0
	>20 m	*0*	*0*																	0					0.0
Area total		***7***	***126.25***	**0**	**27**	**0**	**2**	**1**	**0**	**1**	**1**	**11**	**0**	**0**	**25**	**3**	**96**	**12**	**163**	**342**					
CB07	1 to 3 m	*1*	*17.92*									1			1		5		33	40			12.5	82.5	95.0
	3 to 6 m	*0*	*0*																	0					0.0
	6 to 12 m	*1*	*22*		5							4			6	4	4	1	26	50	10.0		8.0	52.0	70.0
	12 to 20 m	*0*	*0*																	0					0.0
	>20 m	*0*	*0*																	0					0.0
Area total		***2***	***39.92***	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**7**	**4**	**9**	**1**	**59**	**90**					
EB05	1 to 3 m	*2*	*34.5*									3			21		18		71	113			15.9	62.8	78.8
	3 to 6 m	*1*	*17.12*												2	2	26		2	32			81.3	6.3	87.5
	6 to 12 m	*0*	*0*																	0					0.0
	12 to 20 m	*2*	*37*																	0					0.0
	>20 m	*0*	*0*																	0					0.0
Area total		***5***	***88.62***	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**23**	**2**	**44**	**0**	**73**	**145**					
Cycle #1 total	1 to 3 m	*5*	*86.09*				2	1				13			25		38	3	159	241			15.8	66.0	81.8
	3 to 6 m	*4*	*74.20*								1	1			24	5	87	9	108	235			37.0	46.0	83.0
	6 to 12 m	*4*	*81.33*		19					1		5			6	4	28	1	29	93	20.4		30.1	31.2	81.7
	12 to 20 m	*3*	*53.5*		27							1					5			33	81.8		15.2		97.0
	>20 m	*2*	*32.75*		32				2											34	94.1	5.9			100.0
Cycle total		***18***	***327.87***	**0**	**78**	**0**	**2**	**1**	**2**	**1**	**1**	**20**	**0**	**0**	**55**	**9**	**158**	**13**	**296**	**636**					

Table 6.10-6: Birch Lake Ministry of Natural Resources Large Mesh Broadscale Monitoring Catch Results

BsM Cycle	Depth Strata	Total Sets	Total Effort (h)	Species Catch																				Total Catch	Proportion of Catch				Proportion of Total Catch
				Blacknose Shiner	Burbot	Cisco	Common Shiner	Emerald Shiner	Iowa Darter	Lake Chub	Lake Trout	Lake Whitefish	Logperch	Mottled Sculpin	Moxostoma sp	Northern Pike	Rock Bass	Shorthead Redhorse	Slimy Sculpin	Spoonhead Sculpin	Spottail Shiner	Trout-perch	Walleye	White Sucker	Yellow Perch		Cisco	Lake Trout	Walleye	Yellow Perch	
Cycle #1	1 to 3 m	*6*	*112.45*			31						9				19	1	2					76	13	2	153	20.3		49.7	1.3	71.2
	3 to 6 m	*7*	*130.47*			8						5				18	3	1					138	38		211	3.8		65.4		69.2
	6 to 12 m	*7*	*133.87*		4	22						12			3	14	1						174	17		247	8.9		70.5		79.4
	12 to 20 m	*6*	*112.67*		10	29					3	12				8							88	2		152	19.1	2.0	57.9		78.9
	>20 m	*5*	*93.93*		43	27					2	32											7			111	24.3	1.8	6.3		32.4
Cycle total		***31***	***583.38***	**0**	**57**	**117**	**0**	**0**	**0**	**0**	**5**	**70**	**0**	**0**	**3**	**59**	**5**	**3**	**0**	**0**	**0**	**0**	**483**	**70**	**2**	**874**					
Cycle #2	1 to 3 m	*4*	*73.58*									4				12	1						86	5		108			79.6		79.6
	3 to 6 m	*8*	*147.92*									1				16	1						157	12	4	191			82.2	2.1	84.3
	6 to 12 m	*7*	*125.80*		4	8					1	10				12							123	6		164	4.9	0.6	75.0		80.5
	12 to 20 m	*6*	*108.45*		19	31					4	18				1							18	1		92	33.7	4.4	19.6		57.6
	>20 m	*5*	*86.23*		40	8					3	19											3			73	11.0	4.1	4.1		19.2
Cycle total		***30***	***541.98***	**0**	**63**	**47**	**0**	**0**	**0**	**0**	**8**	**52**	**0**	**0**	**0**	**41**	**2**	**0**	**0**	**0**	**0**	**0**	**387**	**24**	**4**	**628**					
Cycle #3	1 to 3 m	*9*	*172.72*													29	1	6					139	2	10	187			74.3	5.4	79.7
	3 to 6 m	*8*	*152.70*													11	2						127	10	4	154			82.5	2.6	85.1
	6 to 12 m	*8*	*149.62*			5						1				9							123	7		145	3.5		84.8		88.3
	12 to 20 m	*3*	*56.98*		6	1										5							29	3		44	2.3		65.9		68.2
	>20 m	*3*	*57.25*		25	12						4														41	29.3				29.3
Cycle total		***31***	***589.27***	**0**	**31**	**18**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**54**	**3**	**6**	**0**	**0**	**0**	**0**	**418**	**22**	**14**	**571**					

Note:
Numbers may not add to the totals shown due to rounding.

Table 6.10-7: Birch Lake Ministry of Natural Resources Small Mesh Broadscale Monitoring Catch Results

BsM Cycle	Depth Strata	Total Sets	Total Effort (h)	Species Catch																						Total Catch	Proportion of Catch				Proportion of Total Catch
				Blacknose Shiner	Burbot	Cisco	Common Shiner	Emerald Shiner	Iowa Darter	Lake Chub	Lake Trout	Lake Whitefish	Logperch	Mottled Sculpin	Moxostoma sp	Northern Pike	Rock Bass	Shorthead Redhorse	Slimy Sculpin	Spoonhead Sculpin	Spottail Shiner	Trout-perch	Walleye	White Sucker	Yellow Perch		Cisco	Lake Trout	Walleye	Yellow Perch	
Cycle #1	1 to 3 m	*8*	*147.93*	19		5		11	2	1		4	2			5					9	3	18	2	40	121	4.1		14.9	33.1	52.1
	3 to 6 m	*8*	*149.33*			3		1				1				3	1					4	44	6	12	75	4.0		58.7	16.0	78.7
	6 to 12 m	*6*	*110.20*			12						1		1		7						25	68		15	129	9.3		52.7	11.6	73.6
	12 to 20 m	*5*	*90.15*		4	14					1	2		2		3						13	20			59	23.7	1.7	33.9		59.3
	>20 m	*0*	*0.00*	19	4	34		12	2	1	1	8	2	3		18	1				9	45	150	8	67	384	8.9	0.3	39.1	17.5	65.6
Cycle total		***27***	***497.62***	**38**	**8**	**68**	**0**	**24**	**4**	**2**	**2**	**16**	**4**	**6**	**0**	**36**	**2**	**0**	**0**	**0**	**18**	**90**	**300**	**16**	**134**	**768**					
Cycle #2	1 to 3 m	*7*	*132.53*	4		1	1						1			4					4	1	48		9	73	1.4		65.8	12.3	79.5
	3 to 6 m	*8*	*140.52*			5		1					1			1	1					7	57	2	9	84	6.0		67.9	10.7	84.5
	6 to 12 m	*6*	*110.70*			16		1				1						1	1			3	26	2	9	60	26.7		43.3	15.0	85.0
	12 to 20 m	*5*	*89.28*			16					1					1						3	15			36	44.4	2.8	41.7		88.9
	>20 m	*4*	*69.73*		14	5														1						20	25.0				25.0
Cycle total		***30***	***542.77***	**4**	**14**	**43**	**1**	**2**	**0**	**0**	**1**	**1**	**2**	**0**	**0**	**6**	**1**	**1**	**1**	**1**	**4**	**14**	**146**	**4**	**27**	**273**					
Cycle #3	1 to 3 m	*7*	*134.13*																				6			6			100.0		100.0
	3 to 6 m	*6*	*113.40*														1	1					2			4			50.0		50.0
	6 to 12 m	*5*	*95.23*																				3			3			100.0		100.0
	12 to 20 m	*3*	*56.25*		5																					5					0.0
	>20 m	*3*	*57.13*																												0.0
Cycle total		***24***	***456.15***	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**18**					

Note:
Numbers may not add to the totals shown due to rounding.
h = ***; > = greater than.

Table 6.10-8: Fish Density Estimates for Springpole Lake and Birch Lake

Depth Strata (m)	Springpole Lake (fish per hectare)	Birch Lake (fish per hectare)
0 to 1	0.03	0.13
1 to 3	0.12	0.15
3 to 6	0.33	0.20
6 to 12	0.29	0.34
12 to 20	0.16	0.14
20+	0.07	0.05

Table 6.10-9: Potential Interactions of Project Components with Fish and Fish Habitat

Project Component / Activity	Fish and Fish Habitat
Construction Phase	
Site preparation activities, including clearing, grubbing and bulk earthworks	Yes
Construction of the mine site access road and airstrip, including the development and operation of aggregate resource areas	Yes
Development of temporary construction accommodations complex and staging areas	-
Construction of the fish habitat development area	Yes
Construction of the transmission line to the Project site	Yes
Construction of the onsite haul and access roads	Yes
Construction of the dikes in north basin of Springpole Lake	Yes
Construction of buildings and onsite infrastructure	-
Construction of the water storage pond	Yes
Controlled dewatering of the open pit basin	Yes
Construction of the starter embankments for the CDF	Yes
Stripping of lake bed sediment and overburden at the open pit	-
Development of the surficial soil stockpile	-
Initiation of pit development in rock	-
Initiation of stockpiling of ore	-
Establishment and operation of water management and treatment facilities	-
Commissioning of the process plant	-
Employment and expenditures	-
Operations Phase	
Operation of the process plant	-
Operation of open pit mine	Yes
Management of overburden, mine rock, tailings and ore in designated facilities	Yes
Operation of water management and treatment facilities	Yes
Accommodations complex operations	-
Operation and maintenance of mine site infrastructure, including fuel farm	-
Progressive reclamation activities	-
Employment and expenditures	-
Decommissioning and Closure Phase	
Removal of assets that can be salvaged	-
Demolition and recycling and/or disposal of remaining materials	-
Removal and disposal of demolition-related wastes in approved facilities	-
Reclamation of impacted areas, such as by regrading, placement of cover and revegetation	Yes
Filling of the open pit with water	Yes
Monitoring and maintenance	-
Employment and expenditures	-

Notes:
- = interaction not expected and no further assessment is warranted.

Table 6.10-10: Proposed Mitigation Measures for Potential Fish and Fish Habitat Effects

Pathways to Potential Effect / Criteria	Phase			Proposed Mitigation Measure
	Con.	Op.	Cl.	
Change to fish communities	•	–	–	Install isolation measures for in-water works associated with the construction of the dikes in the north basin of Springpole Lake and water crossings following the guidance of DFO's Interim Standard: In-Water Site Isolation (DFO 2023a).
	•	•	•	Relocate fish from the work area prior to undertaking in-water works for the construction of Project infrastructure.
	•	–	–	Prior to dewatering the open pit basin area, conduct a comprehensive fish removal program (fish-out) within the basin to minimize the unintentional death of fish.
	•	•	•	Undertake in-water construction activities outside of the fish spawning and egg incubation periods to reduce the potential for effect on fish as per DFO's *Measures to Protect Fish and Fish Habitat* (DFO 2023c) and the MNR's in-water timing windows (MNR 2013), unless exempt.
	•	•	•	Prohibit fishing and hunting within the controlled access portion of the PDA by Project personnel while working or residing on site.
	•	•	•	Prior to construction, develop a detailed blasting management plan for areas adjacent to fish habitat that meets DFO criteria or alternate values derived in consultation with DFO.
	•	•	•	Install screens or use other measures at water intakes to prevent entrainment or impingement of fish as per the DFO Code of Practice (DFO 2020).

Table 6.10-10: Proposed Mitigation Measures for Potential Fish and Fish Habitat Effects

Pathways to Potential Effect / Criteria	Phase			Proposed Mitigation Measure
	Con.	Op.	Cl.	
Change in fish habitat	●	●	●	Minimize the mine site footprint and overprinting of waterbodies where possible.
	●	●	●	During construction (and other phases as applicable), implement a site-specific ESCP to mitigate the entry of sediment into surrounding waterbodies.
	●	–	–	Install isolation measures for in-water works associated with the construction of the dikes in the north basin of Springpole Lake and water crossings following the guidance of DFO's Interim Standard: In-Water Site Isolation (DFO 2023a).
	●	●	●	Complete required maintenance of in-water structures following the guidance of DFO's *Interim Code of Practice: Repair and Maintenance of In-Water Structures* (DFO 2023b).
	●	●	●	Implement the measures outlined in the Fish Habitat Offsetting and Compensation Plan (Appendix F), including: ○ Overbuild and integrate spawning shoals along the active lake-facing embankments of the dikes to replace Lake Trout and Lake Whitefish spawning opportunities lost within the dewatered basin. ○ Coordinate with the provincial government (Ministry of Mines) to implement the reclamation of fish habitat at the abandoned South Bay Mine. ○ Implement the investigation and study of Lake Sturgeon in the Birch River and Cat River system and consider measures to reinstate or augment the population. ○ Place coarse wood structure along Springpole Lake shorelines currently lacking structural diversity. ○ Construct a new and significant embayment (46 ha fish habitat development area) to the east of the dewatered area to be functional at closure. ○ Enhance the open pit basin (dewatered) area for selected key species (determined during engagement and consultation) by modifying cover, structure and substrates to improve habitat suitability where appropriate. ○ Contour the north end of the main open pit and the Phase 1 pit and optimize fish habitat structures, substrates and depth for selected key species as determined during engagement and consultation. ○ Restore flow to unnamed lake L-1 on completion of mining and filling of the dewatered basin.
Change in fish health	●	●	●	During construction (and other phases as applicable), implement a site-specific ESCP to mitigate the entry of sediment into surrounding waterbodies.
	●	●	–	Design culverts to provide fish passage and naturalized substrates to mitigate habitat impacts.
	●	●	●	Implement the measures to mitigate effects on surface water, as outlined in Section 6.6, including the treatment of mine effluent prior to discharging to the southeast arm of Springpole Lake, and the collection and management of runoff and seepage water from the perimeter of the CDF and ore stockpiles.

Notes:
Con = construction; Op = Operation; Cl = closure; ● = mitigation is applicable; – = mitigation is not applicable.

Table 6.10-11: Summary of Fish Habitat Impacts on Waterbodies

Impact Segment ID	Name / Location Description	Mine Feature	Area (ha)
IS-D	L-3	CDF	16.2
IS-E	S-16	CDF	0.02
IS-L	L-4	CDF	1.03
IS-M	S-17	CDF	0.01
IS-Q	L-17	CDF	0.72
IS-R	S-18	CDF	0.003
IS-U	L-18	CDF	2.100
IS-Y	L-5	CDF	2.1
IS-AG	L-2	CWSP	11.6
IS-AH	L-2	CWSP	0.03
Schedule 2 total			**33.8**
IS-AW	Birch Lake	Fresh water intake	0.01
IS-BJ	Birch Lake	Overpressure (blast)	1.40
IS-A	Inflow to L-16	Flow reduction	0.01
IS-B	Inflow to L-16	Flow reduction	0.73
IS-C	Inflow to L-16	Flow reduction	0.003
IS-AA	Inflow to L-2	Plant site	0.01
IS-AB	Inflow to L-2	Plant site	0.002
IS-AC	Inflow to L-2	Haul road	0.003
IS-AD	Inflow to L-2	Flow reduction	0.01
IS-AE	Inflow to L-2	Flow reduction	0.003
IS-AF	Inflow to L-2	Haul road	0.003
IS-AI	Inflow to L-2	Phase 1 pit	0.01
IS-AJ	Inflow to Springpole Lake	Flow reduction	0.001
IS-AN	Inflow to Springpole Lake	Fish habitat development area / high-mid grade ore stockpile	0.02
IS-AT	L-1	Flow reduction	0.001
IS-AY	L-1	Flow reduction	1.86
IS-AZ	L-1	Flow reduction	6.97
IS-BA	L-16	Flow reduction	5.95
IS-BH	L-17	CDF – embankment	0.19
IS-BI	L-18	CDF – embankment	2.87

Table 6.10-11: Summary of Fish Habitat Impacts on Waterbodies

Impact Segment ID	Name / Location Description	Mine Feature	Area (ha)
IS-BG	L-5	CDF – embankment	2.51
IS-Z	L-5-OUT	Haul road	0.02
IS-AU	Outflow from L-1	Flow reduction	0.004
IS-AV	Outflow from L-1	Flow reduction	0.15
IS-BB	Outflow from L-16	Flow reduction	0.002
IS-BD	Outflow from L-19	Flow reduction	0.03
IS-BE	Outflow from L-19	Flow reduction	0.02
IS-F	S-16	Flow reduction	0.01
IS-G	S-16	Flow reduction	0.24
IS-H	S-16	Flow reduction	0.01
IS-I	S-16	Flow reduction	0.02
IS-J	S-16	Flow reduction	0.43
IS-K	S-16	Flow reduction	0.01
IS-AR	S-16	CDF embankment / access road / ditch	0.01
IS-N	S-17	Flow reduction	0.01
IS-BF	S-17	CDF embankment / access road / ditch	0.01
IS-AS	S-18	CDF embankment	0.02
IS-S	S-19	CDF embankment / access road / ditch	0.02
IS-O	S-21	CDF embankment / access road / ditch	0.01
IS-P	S-21	Flow reduction	0.02
IS-T	S-22	CDF embankment / access road / ditch	0.002
IS-X	S-22	Flow reduction	0.02
IS-V	S-23	CDF embankment / access road / ditch	0.005
IS-W	S-23	Flow reduction	0.01
IS-AK	Springpole Lake	Dewatering	1.53
IS-AL	Springpole Lake	Dewatering	0.48
IS-AM	Springpole Lake	Main open pit	71.12
IS-AO	Springpole Lake	Dewatering	82.63
IS-AX	Springpole Lake	Effluent discharge	0.005
IS-AP	UNX03	Water crossing	0.00
IS-AQ	Unnamed watercourse	Water crossing	0.00
Paragraph 35 total			**179.4**

Table 6.10-12: Summary of Fish Habitat Offset and Compensation Measures

Proposed Offset / Compensation Measure	Type of Offset Measure [1]	Approximate Offset Measure Area or Area Equivalent (ha)	Project Phase of Implementation[3] and/or Duration
Overbuilding of dikes and development of new spawning and rearing shoals in Springpole Lake	Habitat restoration and enhancement	10	Construction
South Bay Mine – reclamation of impacted lakes	Habitat restoration and enhancement	87	Operations
Lake Sturgeon Program – Stage 1, Lake Research Program	Complementary measure	25[2a]	Construction through closure
Lake Sturgeon Program – Stage 2, Population Support – reintroduction of Lake Sturgeon in selected previously inhabited waters	Biological manipulations	200[2b]	Construction through closure
Fish habitat development area – new fish habitat area excavated east of the dewatered basin	Habitat creation	46	Closure
Reclaimed and enhanced dewatered area	Habitat restoration and enhancement	82.6	Closure
Restoration of flows to unnamed lake L-1	Habitat restoration and enhancement	9	Closure
Phase 1 pit backfill and recontour	Habitat creation	9	Closure
Backfilling and contouring of north end of open pit	Habitat creation	2.14	Closure
Reclaimed main open pit area (pelagic habitat)	Habitat restoration and enhancement	105	Closure
Total potential area of new, reclaimed or enhanced fish habitat		**Up to 575.7**	Varies

Notes:

(1) Grouped per *Fish and Fish Habitat Protection Policy Statement* (DFO 2019).

(2a) Lake Sturgeon research program to better define the current status of Lake Sturgeon in the Project area and possible sources of population decline. Considered a complementary measure and area equivalent calculated as 10% of the offset area required.

(2b) Reintroduction and restoration efforts for Lake Sturgeon in selected previously inhabited lakes. Credit calculated as 2% of a targeted 10,000 ha lake area including lakes such as Cat Lake, Springpole Lake, Birch Lake and Seagrave Lake.

(3) The temporal boundaries for the Project phases are defined as follows:

- Construction Phase: Years -3 to -1, representing the construction period for the Project.
- Operations Phase: Years 1 to 10, with the first year potentially representing a partial year as the Project transitions from construction into operations.
- Closure Phase:
  - Active Closure: Preliminary timing of Years 11 to 15, when final decommissioning and the majority of active reclamation activities are carried out; and
  - Post-closure: Years 16+, corresponding to primarily the monitoring period for the Project but also when the filled open pit basin will be reconnected to Springpole Lake.

Table 6.10-13: Number of Water Crossings by Mine Access Road and Transmission Line

Section of the PDA	Small (<5 m)	Medium (5 to 20 m)	Large (>20 m)	Total
Mine access road	2	N/A	N/A	2
Transmission line	28	4	11	43
Total	**30**	**4**	**11**	**45**

Note:
N/A = not applicable; < = less than; > = greater than.

500000 510000 520000 530000 540000 550000 560000 570000 580000

5710000 5700000 5690000 5680000 5670000

Retter Lake
Bertrand Lake
Blondin Lake
Brownstone Lake
Poirier Lake
Kapikik Lake
Pierson Lake
Carillon Lake
Mainprize Lake
Graham Lake
Maxwell Lake
Noble Lake
Richardson Lake
Berens River
Jackpine Lake
Little Shabumeni Lake
Mink Lake
Joneston Lake
Casummit Lake
Flannery Lake
Mackie Lake
Stroud Lake
Offer Lake
Penson Lake
Armour Lake
Needler Lake
Zionz Lake
Keigat Lake
Dole Lake
Birch Lake
Durkin Lake
Springpole Lake
Guest Lake
Birch River
Maluish Lake
Fawcett Lake
Gull Lake
Shabumeni Lake
Satterly Lake
Cromarty Lake
Superstition Lake
Graydarl Lake
Vost Lake
Shabu Lake
Seagrave Lake
Kezik Lake
Grace Lake
Okanse River
Swain Lake
Skingle Lake
Usick Lake
Bertha Lake
Bathurst Lake
Washagomis Lake
McNaughton Lake
Deaddog Lake
Christina Lake
Honeywell Lake
Sundown Lake
Ruddy Lake
Bumpy Lake
Stiff Lake
Fawthrop Lake
Cook Lake
Hailstone Lake
Narrow Lake
Woman Lake
Premier Lake
Okanse Lake
Marsh Lake
Senior Lake
Sesikinaga River
Quartz Lake
Philchub Lake
Margaret Lake
Costello Lake
Latreille Lake
Confederation Lake
Mukukee Lake
Tarpley Lake
Joyce Lake
Sesikinaga Lake
Snelgrove Lake
Perrigo Lake
Allison Lake

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LEGEND

- Proposed Mine Feature
- Project Development Area
- Local Study Area for Fish and Fish Habitat
- Regional Study Area for Fish and Fish Habitat
- Existing Road
- Existing Transmission Line
- Watercourse
- Waterbody

0 5 10 20 30 40 50 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.

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

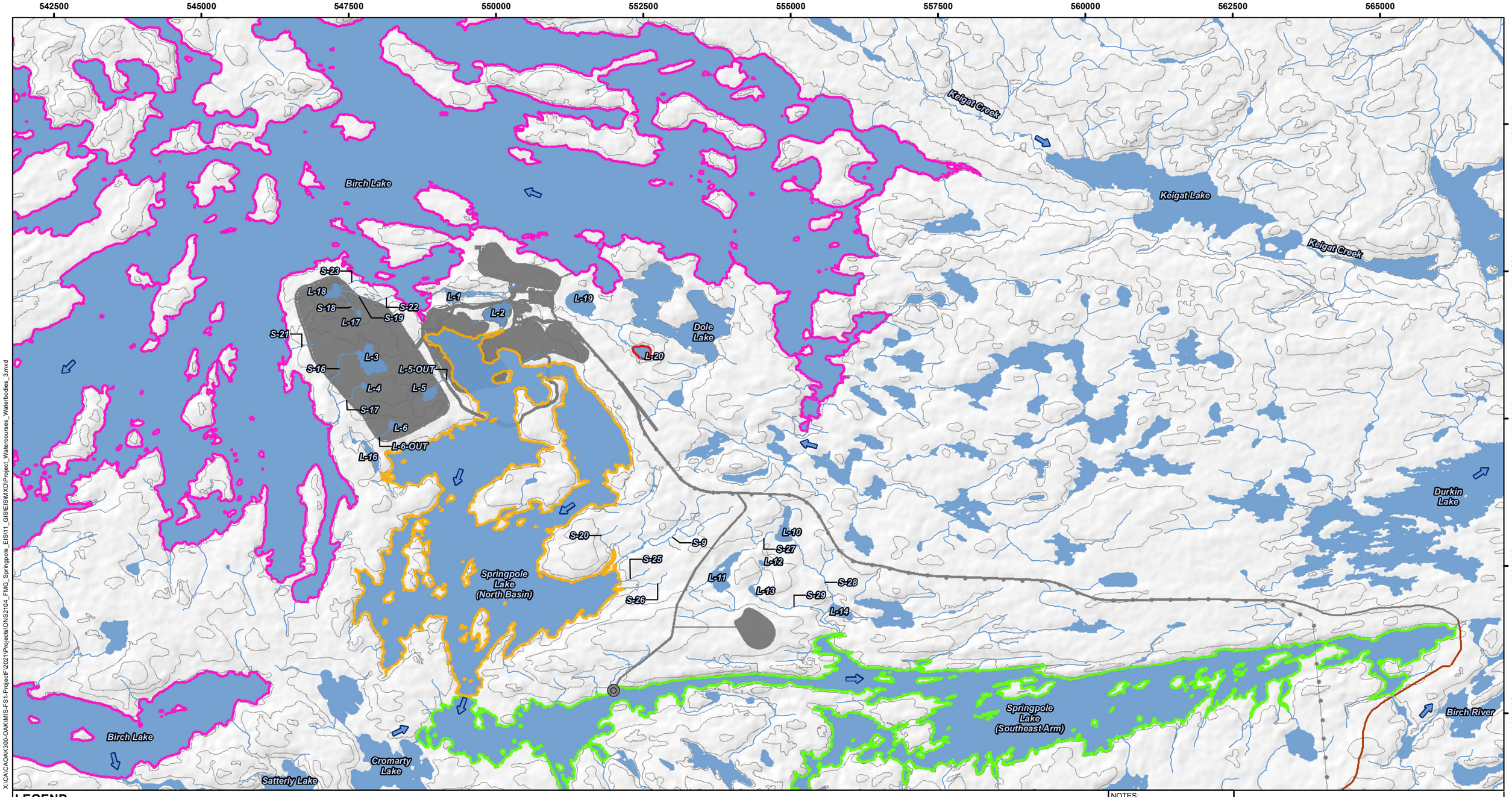
Local and Regional Study Areas for Fish and Fish Habitat

Datum: NAD83
Projection: UTM Zone 15N

N W E S

PROJECT N°: ONS2104 | **FIGURE: 6.10-1**

SCALE: 1:225,000 | DATE: October 2024



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LEGEND

- Proposed Mine Feature
- Proposed Effluent Discharge Location
- Wenasaga Forestry Road
- Contour (10 m intervals)
- Existing Watercourse
- Existing Waterbody
- Flow Direction
- 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.
- 230 kV transmission line provided by First Mining Gold, April 2024.

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SPRINGPOLE GOLD PROJECT

Site Hydrological Map

Datum: NAD83
Projection: UTM Zone 15N

N
W E
S

0 1 2 4 6 8 10 Kilometres

PROJECT N°: ONS2104

FIGURE: 6.10-2

SCALE: 1:61,000

DATE: October 2024

547500 550000 552500 555000 557500 560000 562500 565000

5695000 5692500 5690000 5687500

Birch Lake
Dole Lake
Durkin Lake
Springpole Lake (North Basin)
Springpole Lake (Southeast Arm)
Birch River
Cromarty Lake
Satterly Lake
Seagrave Lake

L-1 L-2 L-3 L-4 L-5 L-6 L-10 L-11 L-12 L-13 L-14 L-16 L-17 L-18 L-19 L-20

NB01 NB02 NB03 NB46 CB07 EB05

PROJECT LOCATION

NB-LG-GN1 NB-LG-GN2 NB-LG-GN3 NB-LG-GN4 NB-LG-GN5 NB-LG-GN6 NB-LG-GN7 NB-LG-GN8 NB-LG-GN9 NB-LG-GN10 NB-LG-GN11 NB-LG-GN12 NB-LG-GN13 NB-LG-GN14 NB-LG-GN15
NB-SM-GN1 NB-SM-GN2 NB-SM-GN3 NB-SM-GN4a NB-SM-GN4b NB-SM-GN5a NB-SM-GN5b NB-SM-GN6 NB-SM-GN7 NB-SM-GN8 NB-SM-GN9
EB-LG-GN1 EB-LG-GN2 EB-LG-GN3 EB-LG-GN4 EB-LG-GN5 EB-LG-GN6 EB-LG-GN7 EB-LG-GN8 EB-LG-GN9 EB-LG-GN10 EB-LG-GN11 EB-LG-GN12
EB-SM-GN1 EB-SM-GN2 EB-SM-GN3 EB-SM-GN4 EB-SM-GN5 EB-SM-GN6 EB-SM-GN7

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LEGEND

- Project Location
- Contour (10 m intervals)
- Watercourse
- Waterbody
- Flow Direction

Broadscale Monitoring Sample Locations
(Depth Below Water Level, Metres)

- 1 - 3
- 3 - 6
- 6 - 12
- 12 - 20
- 20 - 35

- Springpole Lake
- Springpole Lake Basin

Springpole Lake Bathymetry
(Filled Contours, Metres)

- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 12
- 12 - 20
- 20 - 35
- > 35

NOTES:
- Topographic information extracted from LIO, MNRF.
- Springpole Lake bathymetry provided by Story Environmental Inc, 2017/2019.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 8 10 Kilometres

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SPRINGPOLE GOLD PROJECT

2022 Broadscale Monitoring Netting Locations

PROJECT N°: ONS2104 | **FIGURE: 2-3**

SCALE: 1:50,000 | DATE: February 2024

546000 547000 548000 549000 550000 551000 552000 553000

5695000 5694000 5693000 5692000

Explosive Storage
Birch Lake
Low Grade Ore Stockpile
IS-AW
Fresh Water Intake Pipeline
IS-AB
IS-AA
IS-AV
IS-AU
IS-AC
IS-AD
IS-AE
IS-AH
IS-AF
IS-AG
Process Plant Area
Plant Site Pond
IS-BC
L-19
Dole Lake
IS-BD
IS-BE
Accommodations Complex
IS-AT
IS-BJ
IS-AZ
L-1
IS-AY
Central Water Storage Pond (CWSP)
L-2
IS-AI
Phase 1 Pit
IS-AJ
IS-AK
Fish Habitat Development Area
High / Mid Grade Ore Stockpile
Surficial Soil Stockpile
L-20
IS-AL
Main Open Pit
IS-AM
IS-AN
East Dike
Effluent Discharge Pipeline
230 kV Transmission Line
Mine Access Road
IS-Z
L-05-OUT
L-5-OUT
IS-BG
L-5
IS-Y
IS-AO
West Dike
Springpole Lake (North Basin)
Air Strip
UNX03
IS-AP
Birch Lake
IS-W
IS-V
S-23
IS-BI
IS-S
S-19
L-18
IS-U
S-22
IS-X
IS-AS
S-18
IS-BH
IS-T
IS-R
L-17
IS-Q
North Cell
Co-Disposed Thickened Tailings and Mine Rock
IS-P
S-24
IS-O
IS-E
Co-Disposal Facility
L-3
IS-D
S-16
IS-AR
IS-M
IS-L
L-4
IS-F
IS-G
S-17
IS-BF
IS-H
IS-N
IS-I
IS-K
IS-J
South Cell
CDF Internal Pond over Slurry Tailings
L-6
IS-A
IS-C
L-6-OUT
IS-B
IS-BA
L-16
IS-BB
Springpole Lake (North Basin)

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LEGEND

- Watercourse
- Waterbody
- Major Contours (5 m interval)
- Minor Contours (1 m interval)
- Existing Flow Direction

Estimated Distances for Blasting to Meet the DFO Limits

- Non-spawning and Spawning Season Constraint 50 kPa
- Spawning Season Constraint 13 mm/s
- Anticipated Schedule 2 Listing (Labelled with Impact Segment ID)
- Anticipated Section 35 Authorization (Labelled with Impact Segment ID)
- Non Fish Bearing Waters
- Dewatered Area (Altered)
- Dewatered Area (Disrupted)

Proposed Mine Features

- Open Pit
- Ore Stockpile
- Surficial Soil Stockpile
- Co-Disposal Facility
- Co-Disposed Thickened Tailings and Mine Rock
- Process Plant Area
- Dike
- Pond
- Haul / Access Road
- Explosives Storage
- Air Strip
- Mine Access Road
- Seepage / Runoff Collection System
- 230 kV Transmission Line
- Fresh Water Intake Location
- Fresh Water Intake Pipeline
- Effluent Discharge Pipeline
- Tailings Pipeline Corridor
- Fish Habitat Development Area
- Potential Watercourse Crossing

0 0.5 1 2 3 4 5 Kilometres

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

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SPRINGPOLE GOLD PROJECT

Predicted Fish Habitat Impacts

PROJECT N°: ONS2104 | **FIGURE: 6.10-4**

SCALE: 1:19,000 | DATE: July 2024