WAASIGAN
TRANSMISSION LINE

FINAL ENVIRONMENTAL ASSESSMENT

Section 6.6 Fish and Fish Habitat

November 2023

Acknowledgements

We wish to acknowledge that the Waasigan Transmission Line Project is located within lands that represent the traditional territories and homelands of the Robinson-Superior Treaty (1850) First Nations and Treaty #3 (1873), and traverse the Red Sky Métis Independent Nation, Northwestern Ontario Métis Community and Northern Lake Superior Métis Community.

Hydro One also wishes to acknowledge Indigenous artist, Storm Angeconeb, for developing the covering page and wildlife designs throughout the Final Environmental Assessment. Storm is a highly recognized visual artist from Lac Seul First Nation in Treaty #3 and currently resides in Red Lake. Many of her works include animals and birds as representations of herself or those close to her. The artist's description of the covering page is presented below.

Hydro One Environmental Study Art:

What stands out in this art piece is the symbolic representation of solar rays as "Bringing Power"; we can see the environment represented through the wildlife and Ojibwe floral visuals. This artwork is an excellent representation of Hope, Life, and Opportunity, visually portrayed through the Black Bear and her two cubs. The colour theme of this artwork comes from the Waasigan Transmission Line Project brand identity.

Artist: Storm Angeconeb

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6.6 Fish and Fish Habitat

Giigoonyag Endanakiiwaad

This section describes and summarizes the fish and fish habitat baseline characterization program undertaken for the Waasigan Transmission Line (the Project) and presents an assessment of the potential effects of the Project on fish and fish habitat, as well as recommended mitigation and monitoring measures for the Project to reduce the likelihood of negative effects.

The assessment follows the general approach and concepts described in Section 5.0.

For the purposes of this document, waterbodies are defined as areas with defined bed and/or banks, whether or not water is continuously present (Ontario 2009, Stanfield 2017). A waterbody may be permanent, or non-permanent (i.e., intermittent, or ephemeral). Types of waterbodies include watercourses (i.e., depression in the ground with flowing water) (e.g., streams, rivers) and lakes and ponds (i.e., body of water with no discernable flow) (Ontario 2009). A water crossing is defined as a geographic location where the proposed right-of-way (ROW) or access roads are expected to cross a waterbody or drainage feature (i.e., a geographic low area that may convey water and has no defined bed or banks).

Fish are defined as, in the federal *Fisheries Act*, the parts of fish, and all life stages (i.e., eggs, sperm, spawn, larvae, spat and juvenile and adult) of fish, crustaceans, shellfish, and marine mammals (Canada 1985).

Fish habitat is defined as, in the federal *Fisheries Act*, water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas (Canada 1985).

For the purposes of this report, aquatic Species at Risk (SAR) are defined as the following:

- Any freshwater fish or mussel species listed under Schedule 1 of the *Species at Risk Act*, S.C. 2002, c. 29 (SARA) as Threatened, Endangered, or Extirpated; and/or
- Any freshwater fish or mussel species listed under the *Endangered Species Act*, 2007, S.O. 2007, c. 6 (ESA) as Threatened, Endangered, or Extirpated.
- Any aquatic SAR documented within 1 kilometre (km) of the preferred route that may be present in the waterbodies were included as criteria for the environmental assessment (EA).
- For the purposes of this report, aquatic Species of Conservation Concern (SOCC) are defined as:
    - Any freshwater fish or mussel species listed under Schedule 1 of SARA as Special Concern (SC);

- Any freshwater fish or mussel species designated Threatened, Endangered, or Extirpated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (unless otherwise listed as SAR under SARA or the ESA);
- Any freshwater fish or mussel species listed under the ESA as Special Concern (unless otherwise listed as SAR under SARA);
- Any freshwater fish or mussel species with a subnational rank (SRank) of S1 – S3 or SH as designated by the NHIC/NatureServe (2022); and/or
- Any freshwater fish or mussel species that have local significance (e.g., Coaster Brook Trout [*Salvelinus fontinalis*] (Bobrowicz 2014).

A criteria species is a species that is used as characteristic of a criterion that, if changed as a result of the Project, may demonstrate a physical, biological or socio-economic effect. Criteria species selected for the EA were identified due to their abundance within the Regional Study Area (RSA) and Local Study Area (LSA), as well as their ecological, Indigenous, and socio-economical importance and consisted of the following:

- Brook Trout (Salvelinus fontinalis);
- Lake Trout (Salvelinus namaycush);
- Northern Pike (*Esox lucius*); and
- Walleye (Sander vitreus).

A limited list of species of Indigenous community concerns were provided during engagement and included the following species: Whitefish [i.e., Lake Whitefish (*Coregonus clupeaformis*)], Walleye, Muskie [i.e., Muskellunge (*Esox masquinongy*)], Sturgeon [i.e., Lake Sturgeon [*Acipenser fulvescens*)], trout [i.e., Brook Trout, Rainbow Trout (*Oncoryhynchus mykiss*) and Lake Trout], Smallmouth Bass and small-bodied fish (i.e., fish less than 200 mm when they are adults). These species were included in the effects assessment and are discussed in detail in the sections below. Species of importance to Indigenous communities have also been assessed as part of the socio-economic assessment and, as such, are included in Sections 7.7 and 7.8.

Sensitive habitats were those that contained any of the following identified habitats:

- Habitats of aquatic SAR or SOCC species;
- Lake Trout and/or Brook Trout habitats; and
- Spawning and/or nursery habitats of other fish species.

6.6.1 Input from Engagement

Comments pertaining to fish and fish habitat that were provided by Indigenous communities, government officials and agencies, and interested persons and organizations during engagement and how they are addressed in the EA are listed in Table 6.2-1. Comments and responses are provided in Section 4.0 – Engagement Summary. In addition, the Draft EA Report was provided to Indigenous communities, government officials and agencies, and interested persons and organizations for review and comment on May 17, 2023. A high-level summary of the key themes from the comments on the Draft EA Report and related engagement meetings are included in Table 6.6-1. The detailed responses to these comments are included in Appendix 4.0-A.

Agencies and Indigenous communities noted during the ToR (Terms of Reference) process that additional field surveys should be completed on all alternative routes. The importance of water to Indigenous communities was recognized and factored into the decision to survey all alternative routes for baseline studies, which was not included as a commitment in the Amended TOR (Hydro One Inc. 2021).

The draft Aquatics Field Work Plan was provided to Agencies and Indigenous communities for review on March 22, 2022. Comments were received from Indigenous communities throughout the field season and addressed before releasing the final Aquatics Field Work Plan in September 2022.

Notices were provided to Indigenous communities ahead of planned field activities, which provided details on the proposed field surveys, methods, locations, and a request for Indigenous participants in the surveys. Maps were available for download and an online mapping platform was made available for Indigenous communities to review proposed field survey locations to identify any concerns. Hydro One also completed open house sessions with Indigenous communities where the field plans and maps were made available.

No concerns from Indigenous communities were received on the proposed aquatics field survey locations. There was one section of Alternative Route 3B that was identified by an Indigenous community as being culturally sensitive and field surveys were avoided in this area. Bi-weekly field summary reports were provided to Indigenous communities to provide regular updates on the field survey progress throughout the field season.

Table 6.6-1: Summary of Comment Themes Raised during Engagement Related to Fish and Fish Habitat

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Concerns expressed regarding herbicide use.	Through engagement during the Draft EA Report review process, Hydro One heard feedback from Indigenous communities and stakeholders regarding concerns with the use of herbicides to remove and manage vegetation on the Project. After extensive consideration of this feedback, herbicides will not be used during construction of the Project or for future maintenance of this transmission line. The Final EA has been updated to reflect this.	Gwayakocchigewin Limited Partnership Lac des Mille Lacs First Nation Mitaanjigamiing First Nation Northwestern Ontario Métis Community (NWOMC) and Region 2 Members of the public
Concerns regarding effects to water and watersheds.	Potential effects to water quality and quantity are assessed and the results of this assessment are considered in Section 6.2 – Surface Water and Section 6.6 - Fish and Fish Habitat of the Final EA. Recommended mitigation measures are identified in Sections 6.2 and 6.6.	Gwayakocchigewin Limited Partnership Migisi Sahgaigan (Eagle Lake First Nation) Lac des Mille Lacs First Nation Mitaanjigamiing First Nation NWOMC and Region 2 Members of the public
Importance of incorporating Indigenous knowledge, including species of importance provided by communities into the EA.	Fish species of importance to Indigenous communities were shared. Their Indigenous, common and cultural names (where provided) were listed in Section 6.6.3 as Criteria of Indigenous Significance. Additional input provided was used to characterize fish and fish habitat baseline in Section 6.6.5. A list of fish species documented within the Local Study Area through field studies are presented in Appendix 6.6-A. As well, information on fish and fish habitat that may affect the practice of Section 35 rights and interests or land uses by Indigenous communities are discussed in further detail in Section 7.7 (First Nations Rights, Interests and Use of Land and	Gwayakocchigewin Limited Partnership Migisi Sahgaigan Grand Council Treaty #3 Lac des Mille Lacs First Nation Mitaanjigamiing First Nation NWOMC and Region 2

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
	Resources) and Section 7.8 (Métis Rights, Interests and Use of Land and Resources).	
Interest in the rationale for the selection of the representative fish species as a focus for field programs. Recommendation to include fish species of importance to Indigenous communities (e.g., sauger, small-mouthed bass, yellow perch, rainbow trout, as well as all baitfish species).	Rationale for the choice of each criteria species is provided in Section 6.6.3 and throughout Section 6.6. The fish species and fish habitats identified as criteria are: 1) species that may experience a physical, biological or socio-economic effect and are of value based on input from engagement, and 2) are species with specific, restricted habitat requirements, species that are representative of the fish community or SOCC. Fish species identified as those of Indigenous importance (i.e., smallmouth bass, yellow perch, rainbow trout and baitfish) are species or groups that occupy similar habitats, ecological functions, compete for similar food and resources as the criteria species chosen. All fish species and their habitats were conservatively considered during the effects assessment process and applicable mitigation has been recommended to meet the *Fisheries Act* conditions and prevent death of fish and HADD of fish habitat. Species of Indigenous Concern are presented in Section 6.6.5.2.4.4 of the EA.	Gwayakocchigewin Limited Partnership
The importance of providing a visual representation of the mapped impacts resulting from the field studies.	Results of field studies, including mapping, are available in EA Section 6.6 for the fish and fish habitat component.	Grand Council Treaty #3
Request for sharing field data including the preliminary baseline environmental studies and desktop datasets.	A summary of the field survey results is presented in Appendix 6.6-A. The raw data from field surveys will be shared with Indigenous communities upon request.	Grand Council Treaty #3 Lac des Mille Lacs First Nation NWOMC and Region 2

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Concerns regarding the over-reliance of desk-top data sets provided by third parties which could be out-dated and not representative of Anishinaabe knowledge and processes.	Desktop data on provincial websites (e.g., NHIC) get updated monthly and the data sharing agreement that is in place means regular updates to the datasets were used for the assessment. Any records available were considered, although more recent records were considered more reliable resources. Field data collected during the 2022 field programs was then used to inform the baseline and effects assessment. Indigenous knowledge shared by communities has also been considered during the assessment and communicated with sensitivity in Project documentation as it has been received.	Grand Council Treaty #3
Question around whether benthic studies were included in field studies supporting the EA.	Benthic invertebrate community studies are not typically completed for transmission line projects. These studies are seen more often on projects where there is a project-related water discharge/effluent, such as mining projects, or where disturbance of benthic invertebrates and the benthic habitat will occur that may impact the fish food resources on such a scale that observable changes would be visible in the fish population (ECCC 2012). Project effects on fish and fish habitat from transmission line projects are more related to the construction stage (e.g., erosion and sediment and disturbing habitat) where potential construction impacts are limited to a relatively small site or segment on any single waterbody and would be anticipated to have a localized effect on an ecological unit. Benthic invertebrate communities are typically resilient to minor or short-term environmental disturbances (e.g., road crossings) (Volez et al. 2000). Benthic invertebrates are anticipated to rapidly recover (i.e., < 2 years) following disturbance of habitat if suitable habitat is available for recolonization (Volez et al. 2000). Measures to protect fish and fish habitats from construction-related effects will be recommended as part of the effects assessment process and are also protective of other freshwater biota such as benthic invertebrates (DFO 2022a and Chapman et al. 2017). As such, benthic invertebrate community studies are not required.	Grand Council Treaty #3

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Request for baseline information to be shared publicly or with other organizations to help with the advancement of science and interest in whether this impact First Nation Values.	Baseline information is presented in Appendix 6.6-A. Data collected under permit approvals for the preparation of the EA, such as fish collection records, were submitted to the MNRF as required by permit conditions, and will be available to others who are conducting research, sampling, or other activities. Protocols were followed such that sensitive data, such as the location of a SAR, were not shared publicly to prevent harm to the organisms. SAR records were provided to the NHIC, which in turn shares the data in compliance with its protocols. Discussion with Indigenous communities regarding their values and potential impacts to their values is an important part of the EA process. Input received from field monitors and community engagement has been considered during the assessment and communicated with sensitivity in our documentation.	Lac des Mille Lacs First Nation
The importance of traditional knowledge and local knowledge, including the observations of local hunters, fishers, and the indigenous population, in the northwest where available information on species at risk may be limited.	Local and Indigenous Knowledge has been considered as background information where available. Information collected during the field programs is intended to help fill data gaps and supplement available information.	Lac des Mille Lacs First Nation
Concern regarding timing of the placement or replacement of culverts relative to fish spawning season.	Section 6.6.7.1.2.2 reports mitigation measures for work below the highwater mark. Project work seeks to avoid effects the sensitive life history events for fish such as spawning, egg and larval development periods through the application of regulatory derived timing windows which prohibit near and in-water works during these periods that have the potential to affect fish or fish habitat (DFO 2013). Work may not be conducted during the proposed restricted activity timing window, or within a setback unless permits/approval is obtained from the appropriate regulatory agencies, where required. Applicable	Lac des Mille Lacs First Nation

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
	timing windows for each planned water crossing are available in Appendix Table 6.6 B-1, C-1, and C-2.	
Concern regarding water quality downstream of aggregate sites.	All aggregate pits and quarries will be located a minimum of 120 m away from the ordinary HWM of a waterbody, where possible and newly permitted sand and gravel pits will remain 1.5 m above the water table. The aggregate pits will follow the guidelines outlined in the Aggregates Permits on Crown Lands for Pits and Quarries above Water (MNRF 2014b) and the Forest Management Planning Manual (MNRF 2020a) and will meet the conditions set out in the *Aggregate Resources Act.* (Ontario 1990a) and Ontario Standards (MNRF 2020b).	Lac des Mille Lacs First Nation
Concerns regarding invasive species such as bass, rainbow smelt and baitfish species being introduced to the local environments that may negatively affect natural populations such as Walleye and Brook Trout.	Invasive species concerns regarding the presence and expansion of bass, rainbow trout and baitfish introductions are discussed within Section 6.6.5.2.6. Invasive species and disease prevention mitigation measures are provided within Section 6.6.7.	Lac des Mille Lacs First Nation
Concerns regarding water quality released by the former Steep Rock Mine.	The cumulative effects assessment in Section 7.7 of the Final EA has been updated, including to include further context on the perspective shared by Lac des Mille Lacs First Nation related to the Steep Rock Lake area. In-situ water quality and general fish health conditions were measured as part of the 2023 field baseline surveys. No fish health abnormalities or fish kills were observed during the field program. Some variability in water quality was observed but was not beyond the typical range of natural conditions documented for the region. Detailed water quality (EA Section 6.2) and fish capture information is available in Appendix 6.6A for the Project.	Lac des Mille Lacs First Nation

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Concerns regarding fish health, diseases, parasites and condition in Plateau Lake.	The two water crossings that are associated with Plateau Lake were not sampled during the 2023 field program (see Section 6.6.5.1 for site selection criteria). The health condition of fish should be documented during fish rescue efforts prior to project implementation. Fish rescue efforts will be conditional upon the MNRF Licence to Collect Fish for Scientific Purposes (LCFSP) and its conditions. Any fish with parasitic conditions or health abnormalities should not be returned to the waters; however, rescue activities will comply with LCFSP conditions. Invasive species and disease prevention mitigation measures are provided within Section 6.6.7. Fish sampling during the baseline program documented external health conditions and abnormalities; however, none were identified. Detailed fish capture information is available in Appendix 6.6A for the Project.	Lac des Mille Lacs First Nation
Concern related to climate change has affecting water levels within the RSA and the timing of fish spawning in some waterbodies within the traditional territories.	Climate change is addressed as a pathway of effects in Section 6.6.7.7. Winter access, water level, and spawning timing concerns have been incorporated into this section as potential effects and recommended mitigation measures have been identified.	Lac des Mille Lacs First Nation
Concerns with further changes to fishing pressure, overfishing or change in availability of wild foods including fish for numerous waterbodies within the traditional territories. Concern that Traditional travel routes may be affected by water crossings and	Concerns relating to fishing pressure/overfishing in relation to increased access by the public due to the expanded road network and ROW clearing, as well as traditional navigational routes are addressed as a pathway of effect in Section 6.6.7.6 and include recommended mitigation measures such as decommissioning access roads and associated infrastructure post construction. As well, information on fish and fish habitat that may affect the practice of Section 35 rights and interests or land uses by Indigenous communities are discussed in further detail in Section 7.7 (First Nations Rights, Interests and Use of Land and Resources) and Section 7.8 (Métis Rights, Interests and Use of Land and Resources).	Lac des Mille Lacs First Nation Migisi Sahgaigan (Eagle Lake First Nation)

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
have the potential to affect accessibility to fishing, trapping, gathering and other resources of the community.		
Concerns regarding the potential displacement of fish due to environmental disturbance, risk of chemical and physical contamination or removal of habitat.	Potential effects related to the displacement of fish during construction is presented in Section 6.6.7.1 and 6.6.7.3 and potential for deleterious substances and spills to be accidently released to water is presented in Section 6.6.7.4 and includes the recommended mitigation measures to reduce risks from these effects it is anticipated that displacement of fish will not occur during operation. Temporary water withdrawal and dewatering may occur to facilitate construction as discussed in Section 6.6.7.1; however, recommended mitigation measures will be implemented (e.g., use of fish screens to prevent impingement and entrainment of fish). A riparian area buffer has been applied across all project water crossings, in which clearing will be limited (see Section 6.6.7.1.1 for additional detail). The use of overhead cables for water crossings limits potential effects to fish within waterbodies (see Section 6.6.7.1.1.).	Mitaanjigamiing First Nation
Request to include turbidity mitigation measures in the EA/ Environmental Protection Plan.	Turbidity was recorded in the field and the results are presented in Appendix 6.6-A. Within the listed mitigation measures in this assessment, turbidity and total suspended solids will be monitored according to permit requirements.	NWOMC and Region 2 GLP
Concern regarding the scope of baseline field work focussed to fish bearing waterbodies crossed by the Project footprint rather than more broadly within the LSA.	The EA incorporates historical and recent background data for the Project footprint and LSA, in addition to field investigations, to provide both a focused level and regional level understanding of the study area, in this case, from a fish and fish habitat and surface water perspective.	NWOMC and Region 2

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Question whether effects to species at risk are considered.	SAR are included as a criterion in the effects assessment (see Section 6.3.3) . Some species that have similar habitat requirements, such as fish, have been considered within a similar grouping and other species that have very distinct habitat requirements through their lifecycle were assessed as individual species.	NWOMC and Region 2
Concern that only waterbodies impacted through direct crossings will be considered and request to consider waterbodies in proximity to the project footprint, particularly during construction as these areas may be susceptible to increased avoidance behaviors of Métis harvesters accessing these waterbodies in the exercise of their rights.	As appropriate or applicable to each site, potential impacts on harvesting behaviours, including increased avoidance, has been taken into account in the EA document, based on background data collection, including Indigenous Knowledge (IK) and Traditional Land and Resource Use (TLRU), and field investigations. See section 6.6.7.6, for the effects assessment on changes to public access to fish habitats.	NWOMC and Region 2
Question around how surface water survey locations were identified.	The field surveys targeted a subset of waterbodies that are crossed by the preliminary Project footprint for each alternative route (rather than the full list of crossing locations). The field surveys targeted approximately 25% of the total estimated number of mapped and unmapped (i.e., determined through air photo interpretation or field investigations) waterbody crossings along the preliminary Project footprint of each alternative route, which includes both the transmission line ROW and access roads. The site selection process for the subset of waterbody crossings relied primarily on the guidance and procedures under the *Crown Forest Sustainability Act* (Ontario 1994). Site selection also considered a scaled approach, with a plan to select a	Red Sky Métis Independent Nation

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
	representative number of waterbody crossings under three different categories of watershed size: small (areas of 1 km^2 to 50 km^2), medium (areas of 50 to 500 km^2), and large (areas greater than 500 km^2). The scaled approach to the site selection process offered the opportunity to extrapolate the field data from a particular watershed category to other waterbody crossing locations in the same category. Further detail can be found in Section 5.2.1 of the Draft Waasigan Transmission Line Field Work Plan – Aquatics (Hydro One Inc. 2022).	
Recommendation to clearly articulate the differences in design standards and approval requirements between a clear-span bridge and the use of a rig mat.	Several layers of legislation are applicable and documented within the EA. In this instance a rig mat is considered to bridge small watercourses and was considered to facilitate a span that would avoid interference with watercourse beds and banks as defined by DFO's code of Practice for Clear Span bridges. The revision requested has been applied throughout the EA to classify rig mats separately from clear span bridges. The preference of crossing structures is noted. The EA text was also updated to clarify that a rig mat crossing, though technically a clear span, is not a bridge as classified by the MNRF due to the definition in the Crown Land Bridge Management Guidelines. To clarify, rig mats will only be used for crossings where the span is no greater than three meters. Generally, bridges are preferred over rig mats as a crossing method; however, there are specific situations where rig mats are better suited and have a lower environmental impact. Such situations are for smaller creek crossings where clearances are not an issue and there is no need to excavate and install large abutments. Other situations might be short duration crossings in the fall where the rig mat will only be in place for a short period of time before being replaced by a snowfill.	Ministry of Natural Resources and Forestry (MNRF)

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Recommendation to use a slope-dependent buffer model when determining the width of a riparian areas and when planning water crossing.	Conservative values were used to establish riparian habitat while considering guidance provided by the province (MNR 2010a) and existing literature.	MNRF
Request for further detail on timing of planned restoration activities.	Restoration must be completed in consideration of time of year, weather/ground conditions, and access relative to when construction of facilities in a given area are completed. Final reclamation is to be completed outside of frozen conditions as soon as weather and soil conditions permit. Reclamation efforts within and near wetlands are to commence as soon as reasonably possible to reduce the potential impact and to take advantage of access. Timing of re-vegetation is to take advantage of favourable moisture and temperature conditions. Temporary watercourse crossing structures and all materials will be removed upon project completion in accordance with approvals from MNRF, DFO and Conservation Authorities as warranted. Snowfill and ice bridge removals will comply with DFO's Interim code of practice: temporary stream crossings. All permit requirements and applicable measures from DFO's Measures to Avoid Causing Harm to Fish and Fish Habitat including Aquatic Species at Risk will be followed. No construction activities are to be completed below the high-water mark to remove crossing structures or fill within the RAP timing windows. No logs or woody debris are to be left within the waterbody or on the banks or shoreline where they can wash into the waterbody.	MNRF
Request for further information regarding the vegetation buffer clearing up to 10 m and placement of	Section 6.6.7.1.2.3 Riparian and In-water Vegetation states that during construction, a riparian buffer of 30 m around waterbodies will be maintained for the ROW, unless required for access to install water crossing structures, in which case a 10 m wide area for equipment access will be cleared within the ROW.	MNRF

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
material relative to watercourses described in the Draft EA. Further clarification is requested to confirm if the EA will use a different method of removal within a potential riparian zone. Request for practices adjacent to watercourses to follow MNRF Environmental Guidelines for Access Roads and Water Crossings as indicated in the Draft E and provide a description of the riparian buffer, and the are that will remain vegetated.	Vegetation will be largely removed by mechanical means, except within 10 m of a watercourse or wetland. In these areas, vegetation will be removed manually, using chain saws and other hand-held equipment, while leaving the under growth and duff layer as undisturbed as possible to reduce the risk of erosion. Removal of riparian vegetation will be limited to the extent practicable (to the requirement of the access road and alignment clearing width only). After the construction time period, the 30 m riparian buffer is expected to be maintained through operations and compatible vegetation will be allowed to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the transmission line. Vegetation removal and reclamation of the riparian zone will follow MNRF and DFO protocol for the review and approval of forestry water crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), MNRF's Environmental Guidelines for Access Roads and Water Crossings (1990), applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNRF 2010a) and its associated Background Rationale document (MNRF 2010b). Wetland work areas will be restored to pre-construction drainage patterns and seeded/planted with native vegetation (wetland seed mix and shrub stock appropriate for the site conditions and surrounding vegetation community).	
Provide rationale for type of water crossing selected. Provide a definition of "log fill", elaborate on the considerations given for downstream	Prior to installation of a water crossing structure, a qualified professional will assess the stream characteristics to confirm the correct structure has been selected. The MNRF will be notified where any changes to proposed crossing structures are required. Log fills are characterized by a layer of logs covered with geotextile and fill material as required. Log fills	MNRF

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
effects during the freshet and explain how these will be decommissioned.	will only be prescribed in wet areas where there are no defined channels and are intended only to maintain natural drainage patterns. There will be no log fills installed in any waterbody with a defined channel, whether it is wet or dry. In effect, log fills will only be used where there is clearly no impact to fish or fish habitat. Upon decommissioning, the fill material will be pulled back and the geotextile removed and disposed. Logs will be removed and redistributed/disposed as appropriate to ensure natural drainage is maintained.	
Ground truthing of the proposed activities in the Access Plan is required to ensure no duplication of water crossing installations and that ice crossings are feasible at identified locations (e.g., Finlayson Lake) and to account for steep banks alongside waterbodies.	The existing crossing at Finlayson Lake is not suitable for construction traffic. Field assessments by the contractor have determined that an ice bridge is not feasible at this location. In the current access plan, structures on the north side of the waterbody will be accessed by roads coming from the north and similarly, the structure south of the waterbody will be accessed by roads coming in from the south. Field verification of the remaining waterbody crossings and along access routes is currently underway. The nature of the Limits of Approach and alternative access identified are intended to facilitate changes in the field to avoid obstacles.	MNRF
Further information of the type of risk to watercourses/ fish and fish habitat and how they will be mitigated is required to assess the potential impact of the helicopter pad locations.	Helicopter pad locations will apply a 30 m buffer around waterbodies and all recommended Erosion and Sediment Control (ESC) and spill prevention mitigation measures will be implemented.	MNRF
Recommends to avoid in water work during the restricted activity period for Lake	All sites with potential for Lake Sturgeon (i.e., desktop hydrological connections to Lake Sturgeon bearing waters or those that were identified in the desktop assessment and/or field to provide Lake Sturgeon habitat) had the Lake Sturgeon timing	Ministry of the Environment, Conservation and Parks

Comment Theme	How Addressed in the Environmental Assessment	Indigenous Community or Stakeholder
Sturgeon (April 1 – June 30). Should any in-water work in Lake Sturgeon habitat be required, then an authorization under the ESA may be required.	window applied. Added a statement regarding the need for an authorization under the ESA in Section *6.6.7.1.2.4 6.6.7.1.2.4 Reduce the Fish Mortality Risk Through Restricted Activity Timing Windows and Fish Rescues/Relocations*.	

LSA = Local study area; RSA =Regional study area; QA/QC = quality assurance/quality control; < = less than; km^2 = square kilometres; ToR = Terms of Reference.

6.6.2 Information Sources

As described in the Fish and Fish Habitat Baseline Report (Appendix 6.6-A), and in support of the effects assessments carried out, information was collected through review of the sources detailed in Table 6.6-2.

Table 6.6-2: Source Information used in the Baseline Characterization

Record Source	Records Reviewed
WSP Golder Aerial (helicopter) Reconnaissance (Golder 2021).	• Waterbody presence; • Approximate waterbody dimensions; • Approximate flow conditions and characteristics; • Visual permanency; and • Visual fish habitat availability.
MNRF Restricted Datasets requested and/ or accessed June 2022.	• Cultural heritage values; • Fish sanctuaries; • Fish nursery areas; and • Fish spawning areas.
Land Information Ontario (LIO) data requested and/ or accessed (MNRF 2022a, c).	• Active aggregate pits; • Areas of Natural and Scientific Interest (ANSIs); • Aquatic feeding areas; • Aquatic Resource Area water line/water polygon segment; • Crown Land Use Policy Atlas (CLUPA); • Conservation reserves (CLUPA, GapTool); • Forest Resource Inventory Ecosite and Wetland Layer (LIO); • Waterbodies/Watercourses; • Wetlands; • Woodlands; • National parks; • Provincial parks (CLUPA, GapTool); and • Recreation and tourism, such as canoe routes, trails, portages, and campsites.
Natural Heritage Information Centre (NHIC) data accessed June 2022 (NHIC 2022).	• Aquatic SAR; • Fish community occurrences; and • Provincially tracked species.
Species at Risk in Ontario List (SARO List), (Ontario 2022)	ESA Status of wildlife, fish, and plant species in Ontario.

Record Source	Records Reviewed
MNRF Fish ON-Line (MNRF 2022b).	• Fish species and angler reporting; and • Stocking information.
MNRF Atlas of Brook Trout Streams and Rivers in Ontario (MNRF 2003).	Brook Trout habitat and occurrence records.
MNRF Atlas of Walleye Streams and Rivers in Ontario (MNRF 2004).	Walleye habitat and occurrence records.
MNRF Inland Ontario Lakes designated for Lake Trout Management (MNRF 2015a).	Lake Trout habitat and occurrence records.
MNRF Historical Brook Trout Stocking Mapping Application (1905-2016) (MNRF 2018a).	Historical Brook Trout stocking area maps.
Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Mapping (DFO 2022b).	Aquatic SAR mapping.
Royal Ontario Museum (ROM) Global Biodiversity Information Facility IPT, Ichthyology Collection (ROM 2016).	Historical fish occurrence records.
ROM Freshwater Fishes of Ontario (Field Guide) (Holm et al. 2021).	Field Guide to Freshwater Fishes of Ontario including range maps, information on fisheries life history needs and identification keys.
COSEWIC Assessment Reports (Various 2013 to 2017).	COSEWIC assessment and status reports on various SAR.
Marten Falls First Nation Draft Baseline Report-Fish and Fish Habitat (Golder 2020).	Fish occurrence and habitat records.
Pygmy Whitefish (*Prosopium coulterii*), Great Lakes – Upper St. Lawrence populations (Canada 2021a).	Fish occurrence, distribution and life history.
Atlas of the Freshwater Fishes of Canada with a Taxonomic Key (Mandrak et al. in prep).	Canadian fish distribution by watershed.
Quetico Fishes (Crossman 1976).	Fish occurrence and life history.

Record Source	Records Reviewed
Freshwater Mussels of Ontario (Metcalfe-Smith et al. 2005).	Freshwater mussels distribution, life history, and identification.
Canadian Freshwater Mussel Guide (Toronto Zoo-DFO 2022).	Freshwater mussels distribution and identification.
Data provided by MNRF for the draft Waasigan Hydro One ToR, generated by Dillon (Dillon 2020).	Fish occurrence and habitat.
Ministry of the Environment, Conservation and Parks (MECP) Species at Risk Information.	SAR and SOCC documents pertaining to: • Northern Brook Lamprey (*Ichthyomyzon fossor*) (MECP 2014); • Shortjaw Cisco (*Coregonus zenithicus*) (MECP 2019a); • Pugnose Shiner (*Notropis anogenus*) (MECP 2019b); and • Upper Great Lakes Kiyi, (*Coregonus kiyi kiyi*) (MECP 2019c).
Ontario Parks (MECP).	GapTool dataset, including reports and shapefiles for underrepresented Landform/Vegetation associations for Ecodistricts, and critical Landform/Vegetation associations within protected areas, iNaturalist data, including for provincial parks and conservation reserves.
iNaturalist (iNaturalist. 2022).	Fish occurrence.
Canadian Aquatic Barriers Database (Canadian Wildlife Federation-DFO 2022).	Fish barrier and dam mapping.
Domtar Forest Management Plan for the Wabigoon Forest (Domtar 2018).	Forest management plan, fish spawning areas.
Dryden Forest Management Company, Forest Management Plan for the Dryden Forest (Dryden Forest Management Company 2016).	Forest management plan, fish spawning areas.
Greenmantle Forest Inc. Lakehead Forest Management Plan (Greenmantle 2020).	Forest management plan, fish spawning areas.
The Ecosystems of Ontario, Part I: Ecozones and Ecoregions (Crins et al. 2009 and Crins 2002).	• Ecozones; and • Ecoregions.

Record Source	Records Reviewed
Great Lakes Conservation Blueprint for Aquatic Biodiversity, Volume 2: Tertiary Watershed Summaries (Phair et al., 2005).	Watershed summaries.
Shared Indigenous Knowledge	• Lac des Mille Lacs First Nation. 2023. Traditional Land Use Studies / Geospatial Development / and Values and Rights Impact Assessment ("Studies") Interim Report. • Migisi Sahgaigan. 2022. Traditional Knowledge, Land and Resources Use Study for The Waasigan Transmission Line Project. • Mitaanjigamiing First Nation. 2022. Waasigan Transmission Line Summary Report 2022-Draft. Prepared by CE Strategies. • Northwestern Ontario Métis Community and MNO Region 2. 2023. Traditional Knowledge and Land Use Study for the Waasigan Transmission Line Project. Prepared by MNP. • Red Sky Métis Independent Nation. 2021. Red Sky Métis Independent Nation General Land Use Areas - Hunting and Fishing.

ToR = Terms of Reference

Aerial imagery for the Project was obtained from GeoEye (acquired 2021), World viewer (2020) and MNRF (acquired 2020 to 2022).

For the purposes of the effects assessment, sufficient information was deemed to be available from the references listed above to assess the potential effects of the Project on fish and fish habitat based on the conservative approach described below.

A waterbody had fish habitat potential if any of the following conditions were met:

- Background data indicated fish occurrences or fish habitat (e.g., spawning areas) records for the water crossing or for waterbodies hydrologically connected to the waterbody within 1 km of the water crossing;
- Background data with mapped watercourses or waterbodies as per the Ontario Hydro Network (OHN) layer (MNRF 2022c), that indicated defined bed and banks were present; or
- On the ground or helicopter field surveys identified fish or observed that waterbodies with defined beds/banks were present.

A conservative rating system was used to determine fish and fish habitat and if there was any potential for fish, including SAR and/or SOCC fish, to be present in a waterbody, the habitat potential ratings documented that potential, even if it was low quality habitat.

A similar approach was taken to determining flow regime; in the absence of historical and field collected data, any mapped waterbody was assumed to have a permanent flow regime.

6.6.3 Criteria and Indicators

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic, or ethical value (Section 5.2). Criteria were initially outlined in the Amended ToR. Note that this list was modified following feedback from Indigenous communities, government officials and agencies, and interested persons and organizations.

The following fish species and fish habitats were identified as criteria for fish and fish habitat, in part because 1) they are species that may demonstrate a physical, biological or socio-economic effect and are of value to communities, government agencies, and the public based on input from engagement, and 2) because they are species with specific, restricted habitat requirements, species that are representative of the fish community or SOCC. These consisted of:

- Species at Risk:
  - Lake Sturgeon.
- Species of Conservation Concern:
  - Northern Brook Lamprey *(Ichthyomyzon fossor);*
  - Coaster Brook Trout *(Salvelinus fontinalis)*; and
  - Deepwater Sculpin (*Myoxocephalus thompsonii).*
- Criteria Species:
  - Lake Trout*;*
  - Brook Trout*;*
  - Northern Pike*;* and
  - Walleye.

American Eel (*Anguilla rostrata*) and Silver Lamprey (*Ichthyomyzon unicuspis*) were initially identified as SAR / SOCC with the potential to occur in the study area but were not carried forward from the baseline into the effects assessment as the Project footprint avoided interactions with their habitats and areas of existing occurrence records.

All fish species and their habitat were conservatively considered during the effects assessment, although the species listed above represent a subset of common native fish and fish species of conservation concern that are limited within the study area as described in Section 6.6.4.2; therefore, including these species as criteria is consistent with DFO's legislation and policy (i.e., *Fisheries Act* [Canada 1985] and *Fish and Fish Habitat Protection Policy Statement* [DFO 2019]). Populations of some fish species differed between the watersheds within the RSA and were considered as separate organisms throughout the effects assessment. (Table 6.2-1).

Indicators are an aspect or characteristic of a criterion that, if changed as a result of the Project, may a physical, biological or socio-economic effect. Indicators may be characterized quantitatively or qualitatively. For example, potential effects from changes in the survival and reproduction of wildlife and fish criteria are often expressed through qualitative assessment of alterations in habitat availability and distribution. The indicators for the fish and fish habitat criteria are defined as follows:

- **Habitat quantity –** The amount of habitat available for various life history stages of fish. This was a quantitative assessment of potential changes to total area of habitat present, and calculated and presented as absolute (i.e., area) and relative (i.e., % change) as practicable. The calculation was based on the likely presence of each criteria species at each water crossing (determined using a desktop study), the width of the waterbody (measured using aerial imagery), and the area of disturbance within the Project footprint. Where the likelihood of a criterion species being present is unknown due to limited historical information or poor-quality aerial imagery, a precautionary approach was used, and it was assumed that the criteria species may be present.

- **Habitat quality –** The potential quality of habitat available for aquatic organisms and various life history stages of fish. This was a qualitative and quantitative assessment of changes to habitat quality using field data and species-specific habitat preferences.

- **Abundance –** A qualitative assessment of changes to abundance of fish in the population based on direct changes to the population (i.e., mortality of individuals resulting from physical activities or Project infrastructure); or indirect changes to the population (i.e., changes to habitat availability [quantity and quality] and distribution [connectivity] such that survival and reproduction are potentially affected). This qualitative assessment of changes to abundance via direct and indirect mortality of individuals was assessed through changes to habitat quality, habitat quantity, and distribution and connectivity that may have the potential to result in a measurable change in abundance.

- **Distribution –** The spatial configuration and connectivity of habitats for fish in the LSA and the spatial distribution and movement of fish. This was a qualitative assessment of changes to distribution via direct and indirect changes in aquatic habitat or fish abundance.

The criteria and indicators selected for the assessment of potential Project effects on fish and fish habitat, and the rationale for their selection, are provided in Table 6.6-3. All other fish species that may be present in the area are discussed in the description of the existing environment (Section 6.2.5.2) and were considered in the effects assessment including the application of the proposed restricted activity periods/in water work timing windows (Section 6.2.7).

A list of species of Indigenous concern were provided during engagement and through Indigenous knowledge studies and included the following fish [Geego] species: Whitefish (i.e., Lake Whitefish [Nimebin]), Walleye/Pickerel [Ogass](see Section 6.6.5.2.5.4), Sauger (*Sander canadensis*), Pike/Jackfish (i.e., Northern Pike) (see Section 6.6.5.2.3.1), Muskie (i.e., Muskellunge), Sturgeon (i.e., Lake Sturgeon) (see Section 6.6.5.2.3.1); Burbot (*Lota lota* [Massaii'i – Ling]) and Trout (i.e., Brook Trout, Rainbow Trout and Lake Trout) (see Sections 6.6.5.2.5.1 and 6.6.5.2.5.2), Smallmouth Bass (See section 6.6.5.2.6), Black Crappie (*Pomoxis nigromaculatus*), Yellow Perch (*Perca flavescens*), Suckers [e.g., White Sucker (*Catostomus commersonii* etc.)] and baitfish species (i.e., small-bodied fish species). These species were included in the effects assessment and are discussed in detail in the sections below.

In addition to species identified during engagement, a report provided by Migisi Sahgaigan First Nation noted there are fish of cultural significance near the area of the Project footprint (Migisi Sahgaigan 2022).

Migisi Sahgaigan First Nation also provided a memo indicating areas where the Project footprint may impact fish species, fish habitats and spawning areas (Migisi Sahgaigan 2023).

Table 6.6-3: Fish and Fish Habitat Criteria and Indicators

Criteria	Indicators	Rationale
Lake Sturgeon *(Acipenser fulvescens)*	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Lake Sturgeon in the Nelson River primary watershed are listed as "Endangered" under the federal COSEWIC (2017a) and as "Threatened" under the provincial *Endangered Species Act (ESA)* (Ontario 2007). • Lake Sturgeon in the Great Lakes – Upper St. Lawrence primary watershed are listed as "Threatened" under the federal COSEWIC (2017a) and the provincial *ESA, 2007* (Ontario 2007). • Rare in the LSA and provincially and globally rare. As a SAR, they are a concern from a regulatory perspective. • Primarily inhabit lakes and move into large watercourses in spring to spawn. • Long-lived sensitive fish species that are vulnerable to habitat loss and overharvest. • Species identified as being of Indigenous community concern by Lac des Mille Lacs First Nation, and by Grand Council Treaty #3.
Northern Brook Lamprey (*Ichthyomyzon fossor*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Northern Brook Lamprey are listed as Special Concern under COSEWIC (2007), SARA (Canada 2002) and the ESA (Ontario 2007) for the Great Lakes – Upper St. Lawrence populations and data deficient for the Nelson River population. • Rare in the LSA and provincially vulnerable (S3) . As a SOCC, their rarity and population sustainability are a concern from a conservation perspective and under the *Fisheries Act* but not from an ESA or SARA perspective. • Primarily inhabit cool water streams and migrate through connecting systems. • Sensitive benthic dwelling fish species that are vulnerable to habitat loss and overharvest.

Criteria	Indicators	Rationale
Coaster Brook Trout (*Salvelinus fontinalis*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Coaster Brook Tout are ecotypes and not separate species from Brook Trout; therefore, they are not listed under COSEWIC and SARA (Canada 2002) and no designation is provided under the ESA (Ontario 2007). • Rare in the LSA and no separate provincial rank compared to Brook Trout. As a SOCC they are of local concern from a conservation perspective but not from an ESA or SARA perspective. • Larger than stream dwelling Brook Trout, sought after by recreational fish, vulnerable to habitat loss and overharvest. • Primarily inhabit Lake Superior and migrate to cold, clear, well oxygenated tributary streams to spawn.
Deepwater Sculpin (*Myoxocephalus thompsonii*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Stringent habitat requirement (deep cold lakes) and are a benthic dwelling species. • Deepwater Sculpin are listed as Special Concern under COSEWIC (2017b) and SARA (Canada 2002) but no designation is provided under the ESA (Ontario 2007). • Rare in the LSA and provincially. Apparently Secure (S4) compared to other species. As a SOCC, their rarity and population sustainability are a concern from a conservation perspective but not from an ESA or SARA perspective. • Found only in cold waters of very deep lakes, including Lake Superior.

Criteria	Indicators	Rationale
Brook Trout (*Salvelinus fontinalis*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Stringent habitat requirements (e.g., cold water) and are sensitive to disturbance. • Representative large-bodied predator and migratory species for coldwater fish and fish habitat. • Important recreational (catch and release and harvested) species. • Fall spawning species that primarily spawn in watercourse habitat with coarse rocky substrates. • Relatively common in waterbodies in the fish and fish habitat LSA. • Species identified as being of Indigenous community concern by Grand Council Treaty #3.
Lake Trout (*Salvelinus namaycush*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Stringent habitat requirements (e.g., cold water lakes) and are sensitive to disturbance with home ranges limited to the lakes they inhabit or connecting waterbodies. • Representative large bodied predatory species for fish and fish habitat in cold water lakes. This includes being representative of Lake Whitefish that were requested for inclusion by Grand Council Treaty #3. • Important recreational (catch and release and harvested) species. • Fall spawning species that primarily spawn in rocky shoal habitat in lakes. • Relatively common in waterbodies in the fish and fish habitat LSA. • Species identified as being of Indigenous community concern by Lac des Mille Lacs First Nation, NWOMC and Region 2 and Grand Council Treaty #3.

Criteria	Indicators	Rationale
Northern Pike (*Esox lucius*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Representative large bodied predatory and migratory species for fish and fish habitat in cool and warm water lakes, ponds, and watercourses of various sizes. This includes being representative of Muskellunge that were requested for inclusion by Grand Council Treaty #3. • Species identified as being of Indigenous community concern by Migisi Sahgaigan, Lac des Mille Lacs First Nation, NWOMC and Region 2. • Spring spawning species that spawn in shallow, well vegetated waters with a variety of substrates. Occupy a wide range of habitats. • Important recreational (catch and release and harvested) species. • Abundant in lakes and watercourses in the LSA.
Walleye (*Sander vitreus*)	• Habitat quantity; • Habitat quality; • Abundance; and • Distribution.	• Representative large bodied predatory and migratory species for fish and fish habitat in cool and warm water lakes and large waterbodies. • Spring spawning species that spawn in lakes or larger watercourses with coarse substrates. Occupy a wide range of habitats. • Important recreational (catch and release and harvested) species. • Common in lakes and watercourses in the LSA. • Species identified as being of Indigenous community concern by Migisi Sahgaigan, Lac des Mille Lacs First Nation, NWOMC and Region 2, Grand Council Treaty #3.

Source: Eakins 2022, Holm et al. 2021.

Note: Species of Indigenous Concern (see Section 6.6.5.2.4.4) and all other fish species that may be present in the LSA are discussed in the description of the existing environment (Section 6.2.5.2) and were considered in the effects assessment including the application of the proposed restricted activity periods/in-water work timing windows.

6.6.4 Assessment Boundaries

6.6.4.1 Temporal Boundaries

The Project is planned to occur during three stages:

- **Construction stage**: The period from the start of construction to the start of operation.
- **Operation and maintenance stage:** The period from the start of operation and maintenance activities through to the end of the Project life; and
- **Retirement stage**: The period from the start of retirement activities through to the end of final reclamation of the Project.

As described in Section 5.3.2, the Project will be operated for an indefinite period and the timing of retirement, or decommissioning, is not known at this time as it is anticipated that upgrades to reinforce or rebuild portions of the Project may occur over its lifetime to maintain its longevity. Further, potential effects and mitigation measures to be identified during the EA for the construction of the Project will likely equally apply to the potential removal of the Project at a future point in time, should it ever be required. Therefore, the construction scenario assessed as part of the EA is considered bounding and potential effects and mitigation measures for retirement are not identified separately in this EA.

The assessment of Project potential effects on fish and fish habitat considers effects that occur during the construction and operation and maintenance stages. This timeframe is intended to be sufficient to capture the potential effects of the Project since potential effects during retirement or decommissioning are typically the same as those with the potential to occur during construction.

6.6.4.2 Spatial Boundaries

Study areas were developed for the fish and fish habitat and surface water components to define the spatial extent of the baseline and effects assessments for the Project. These study areas are described in Table 6.6-4.

A Project footprint was developed for the Project and includes the components listed in Table 6.6-4. The Project includes the development of new access roads and the use of existing access roads. Existing access roads include roads that require no improvements and roads that will require improvements such as additional clearing, expansion of the graded area and new or upgraded water crossings (i.e., the crossing of a body of water by the ROW or access road/trails). The existing access roads that do not require improvements were not evaluated during the aquatics baseline surveys or assessed during the EA for potential surface water impacts as the potential for direct impacts resulting from expected Project-related activities (i.e., driving on the roads during construction) was considered nil, although indirect effects such as noise were considered for these locations when determining potential effects on fish and fish

habitat. Potential effects during the operation stage, where road improvements or culvert maintenance may be required were considered as potential for direct effects.

Table 6.6-4: Area of the Fish and Fish Habitat Spatial Boundaries

Spatial Boundary	Area (ha)	Description	Rationale
Project footprint	4,073	The Project footprint includes: • Typical 46 m wide transmission ROW; • Widened ROW for the separation of circuits F25A and D26A for 1 km; • Modification of the Lakehead Transformer Station (TS), Mackenzie TS, and Dryden TS; • Access roads (improved existing roads and new); and • Temporary supportive infrastructure associated with construction including fly yards, construction/stringing pads, laydown areas, construction camps, and helicopter pads; and • Aggregate pits.	Designed to capture the potential direct effects of the physical footprint of the Project on the aquatic environment.
Aquatics LSA	89,098	Includes the Project footprint and extends approximately 1 km from the ROW boundary and approximately 500 m from the boundaries of access roads (excluding the Trans-Canada Highway), storage yards, laydown yards, construction camps, and temporary construction easements, unless intersected by the shoreline of Lake Superior or a nearshore area of Lake Superior (in instances where Lake Superior is crossed by the study area).	Selected to capture all Project activities that could potentially influence conditions within the aquatic environment.

Spatial Boundary	Area (ha)	Description	Rationale
Regional study area	7,029,988	The North Lake Superior Shoreline, Kaministiquia River, Rainy Headwaters, Rainy Lake, Rainy Lake – Big Turtle River, Upper English, and Wabigoon River tertiary watersheds.	To provide a large enough area to assess the potential cumulative and regional effects on the fish and fish habitat criteria.

Notes: ha = hectare; km = kilometre; LSA = Local Study Area; m = metre; ROW = right-of-way.

6.6.5 Description of the Existing Environment

This section provides a summary of the existing environment for the fish and fish habitat criteria based on review of desktop information.

6.6.5.1 Baseline Characterization Data Collection Methods

As described in the Fish and Fish Habitat Baseline Report (Appendix 6.6-A), the fish and fish habitat baseline characterization program involved the creation of potential water crossing lists and the collection of background desktop information, including a review of aerial imagery. In addition, from June to September 2022, a subset of approximately 25% of waterbody crossings were surveyed in the field (Appendix 6.6-A); the results from the background review and field surveys were incorporated into the description of the existing environment. The water crossing lists were created and background desktop studies were completed for waterbodies potentially crossed by the ROW and new and existing access roads.

6.6.5.1.1 Development of the Water Crossing List

To facilitate completion of the fish and fish habitat baseline characterization program a waterbody crossing list was prepared to identify all the waterbodies that are expected to be crossed by the alternative routes (Appendix 6.6B, Table 6.6B-1). This crossing list was first generated based on the preliminary design of each of the alternative routes. The preliminary design of the preferred route was subsequently refined to account for the specific placement of transformer station (TS) modifications, temporary laydown areas, temporary construction camps, aggregate pits, and new and existing access roads (all of which were associated with the preliminary design of the preferred route).

The water crossing list was developed as a starting point to facilitate compilation of fish and fish habitat existing environment conditions at the local scale, initially for each potential waterbody that could be affected by the Project (i.e., within the Project footprint) and ultimately for each confirmed waterbody that has the potential to be affected by the Project. Steps associated with developing the water crossing included:

- Geographic Information Systems (GIS) were used to overlay the Project footprint with the Ontario Hydrographic Network (OHN) (MNRF 2022c);
- GIS analyst-identified hydrology features crossed by the Project footprint were identified and listed; and
- Potential waterbodies were confirmed, and additional waterbodies identified during the aerial imagery review, desktop study, aerial reconnaissance and field surveys were added to the water crossing list.

Each of the identified water crossings from the crossing list were assigned a unique site ID that consisted of a common, two-letter code (specifically "WC" that signifies Water Crossing) and a unique number (e.g., WC-1090.00). This unique number corresponded to the numerical sequence and geographic location of the crossing within the Project footprint (i.e., generally ascending from east to west) and the crossings were generally arranged/grouped by segments of the alignment, noting the following:

- Sites ending in "00" represented water crossings on mapped waterbodies (i.e., available on the OHN data layers [MNRF 2022c]); and
- Site IDs ending in "0.1, 0.2, 0.3…." and "0.11, 0.12, 0.13…" represented crossings at unmapped waterbodies that were inferred based on desktop review at the time of the initial assessment (2021), identified during field reconnaissance (2022) or additional desktop review, respectively.

Site IDs ranging from WC-1000 to WC-1999 corresponded to ROW crossings between Lakehead TS and Mackenzie TS, while site IDs ranging from WC-2000 to WC-2999 corresponded to ROW crossings between Mackenzie TS and Dryden TS. Access road crossings were assigned site IDs WC-3000 to 3999. Temporary laydown areas, temporary construction camps, helicopter pads, aggregate pits, etc. were assigned WC-4000 to 4999, followed by an abbreviation to indicate where the crossing is located.

Waterbodies identified within the area of the modified TSs, temporary laydown areas, and temporary construction camps were included in the crossing lists as well as additional waterbodies that were identified during the desktop study.

Unique fields were added to the crossing list to identify the location of the crossing (e.g., ROW, access road, etc.), type of crossing (e.g., clear span bridge, rig mat, culvert, etc.) and alternative crossings, as well as waterbodies that occurred within 30 m of temporary laydown areas, temporary construction camps, helicopter pads and within 120 m of aggregate pits.

6.6.5.1.2 Baseline Characterization Data Collection

The purpose of the baseline characterization data collection for the effects assessment was to collate information relating to fish and fish habitat at each potential water crossing. Information was collected from review of the sources outlined in Section 6.2.2 and combined with data from the field surveys. Details of the baseline characterization are presented in Appendix 6.6-A.

For each potential water crossing, habitat variables were documented as set out in Appendix 6.6-A. Primary characteristics recorded included :

- Water crossing ID (e.g., WC-1001);
- GPS location;
- Waterbody name;
- Waterbody type (i.e., watercourse, lake/pond, no defined channel);
- Tertiary watershed name and watershed ID (according to the OHN [MNRF 2022c]);
- Flow regime (permanent, non-permanent) (according to the OHN [MNRF 2022c] and field data);
- Thermal regime (cold water, cool water, warm water) (MNRF 2022a);
- Channel morphology (e.g., riffle, pool) and characteristics: pattern, confinement, basin shape, bankfull and wetted widths and depths, observed bank stability, channel substrates;
- Qualitative ranking of fish habitat potential for spawning, rearing/nursery/feeding, overwintering, and migration habitats, specialized habitat features (e.g., groundwater upwelling, etc.), overwintering areas, and fish impediments/barriers;
- Existing infrastructure and/or potential pollution point sources;
- In-situ water quality measurements (i.e., temperature, dissolved oxygen, pH, specific conductivity, turbidity), water colour and clarity were taken as a single point-in-time measurement, collected at the time of the field survey;
- Wetted areas (square metres [m^2], converted to hectares [ha] where practicable) were calculated for all waterbodies from aerial imagery using existing background information (MNRF 2022b) or, where field survey data were available, the estimated bankfull width at each potential crossing (where there was potential for a criteria species; as outlined above) was multiplied by a width of 46 m for ROW and 10 m for access roads; and

- Documented fish species occurrence records in each waterbody, in upstream and downstream connecting waterbodies, and in the tertiary watersheds from background review and field surveys (Appendix 6.6-A-2, Table 1 and Appendix 6.6-A-3, Table 1, in Appendix A).

The conservative approaches as outlined in Section 6.6.2 with respect to fish habitat ranking and flow regime were applied to the dataset.

To qualitatively assess fish distribution, a list of fish species, including the criteria species that are potentially present in the LSA waterbodies was generated. This was a conservative assessment and took into consideration waterbody type, fish distribution in the tertiary watershed, and known habitat preferences for each fish species. For example, Northern Pike and Leuciscidae species have been documented in all the tertiary watersheds in the RSA and are known to inhabit lakes/ponds and watercourses under a wide variety of conditions; therefore, they were considered present in all the lakes/ponds and watercourses in the Project footprint. Whereas some species such as Brook Trout and Deepwater Sculpin have specific habitat requirements that may limit the habitats they can occupy (i.e., cold water) or other species are limited because they are not documented in all the tertiary watersheds in the RSA. If there were any uncertainties about the ability of a waterbody to support a species of fish, a conservative approach was used, and it was assumed the species may be present in the waterbody.

To qualitatively assess abundance, historical data and known abundance characteristics for fish species in Ontario (Eakins 2022) were used to rate abundance for each fish species documented in the LSA. Values were adjusted based on professional judgment and first-hand knowledge of the fish species distribution of the LSA. Species abundance was ranked as Abundant (species that are regularly encountered, with widespread range and habitat conditions), Common (species frequently encountered, usually with a widespread range); Uncommon (species occasionally encountered, may have a somewhat restricted range) and; Rare (species that is very infrequently encountered).

Hydro One believes that the Project benefits greatly with the active engagement of Indigenous communities since they hold Indigenous Knowledge/Traditional Land and Resource Use (IK/TLRU) information for the area. Indigenous communities identified interested community members to participate in field work as equal members of the field team. Eleven community representatives participated in the aquatics field program. Their contribution to the success of the field program was acknowledged in Appendix 6.6-A: Fish and Fish Habitat Baseline Report, Section 2.2.1.

A number of Indigenous communities shared Indigenous Knowledge/Traditional Land and Resource Use studies or information (see Table 6.6-2). Much of the information provided is not be presented in order to protect culturally sensitive sites and information, and at direction of the communities; however, a high-level summary of the information received is presented below to

demonstrate that the Indigenous Knowledge/Traditional Land and Resource Use studies shared were considered integrated in the assessment.

Lac des Mille Lacs First Nation provided an Interim Traditional Land Use Study (Lac des Mille Lacs First Nation 2023) which included information on fish species and lake information, environmental concerns and fishing and fish spawning areas.

Migisi Sahgaigan provided a Traditional Knowledge, Land and Resources Use Study (Migisi Sahgaigan 2022) indicating fish of cultural significance. Migisi Sahgaigan also shared areas where the Project footprint may impact fish species, habitats and spawning areas.

The Northwestern Ontario Métis Community (NWOMC) and MNO Region 2 provided a Traditional Knowledge and Land Use Study (NWOMC and Region 2 2023). The study contained information regarding species of fish that are of interest to their community, lakes where species are fished, fishing seasons and concerns regarding disruptions to spawning areas. The study also indicates the importance of teaching fishing practices to future generations.

The Red Sky Métis Independent Nation provided generalized maps of traditional land use and a cover email indicating they reserve the right to fish within the Study Area (Red Sky Métis Independent Nation 2021).

Data Quality and Control

A QA/QC program was implemented for the Project to minimize the possibility of error during data collection, data entry, and data interpretation. Standardized data entry spreadsheets and methods were used as a means of consistency and to control the quality of data collected. Specific work instructions were written for this purpose and reviewed by all team members working on the background data collection. Data entry was evaluated for errors or omissions by qualified biologists/ water resources specialists to verify that the electronic database accurately reflected the aerial imagery review.

QA/QC for the water crossing lists and fish data lists involved the following tasks:

- Review by more than one person, including a senior fish biologist; and
- Review by a fish biologist and a water resource engineer to confirm completeness of the waterbody list included in the QA/QC process.

6.6.5.2 Baseline Characterization Conditions

6.6.5.2.1 Fish Habitat Quantity and Quality

This section presents existing information related to the quantity and quality of fish habitat for all fish species, including the criteria species with potential to be in the RSA and LSA, to provide context for the effects assessment.

The RSA is in the secondary watersheds of the English River, Winnipeg River, and Northwestern Lake Superior. The RSA includes the following tertiary watersheds (MNRF 2022c):

- North Lake Superior Shoreline (297,691 ha);
- Kaministiquia River (644,422 ha);
- Rainy Headwaters (1,638,233 ha);
- Rainy Lake (127,2591 ha);
- Big Turtle River – Rainy Lake (644,422 ha);
- Upper English River (1,413,676 ha); and
- Wabigoon River (874,500 ha).

The waterbodies in these watersheds are predominately considered cool water systems (MNRF 2022a); however, there are prominent coldwater lakes in the watersheds. Fish species information provided through Indigenous Knowledge (see Section 6.6.2) aligns with the information provided through background resources and field data, confirming and expanding upon the knowledge of the fish communities within the RSA and LSA.

The LSA contains many waterbodies that provide fish habitat and have potential to support many different fish species (MNRF 2022a, 2022b, Dillon 2020). The larger waterbodies in the LSA have potential to provide fish habitat year-round, including spawning, rearing, feeding, and overwintering habitat. The smaller waterbodies in the LSA may not have potential to provide overwintering habitat for larger fish, as oxygen levels in shallow lakes and wetlands can create conditions and they may freeze to bottom. Smaller waterbodies can provide suitable habitat for spawning, rearing, and feeding for larger fish for portions of the year, typically in early spring and immediately after the spring freshet and have the potential to support smaller fish year-round. Spring, fall, and winter spawning habitat is available in the LSA for a variety of species as observed through background review, aerial imagery review and field surveys. For example, the watercourses with fast moving water and coarse substrates (e.g., gravel or cobble etc.) would provide fall spawning habitat for Brook Trout. Some of the larger watercourses may provide spawning habitat for Lake Sturgeon. The smaller watercourses with slow moving water and instream vegetation would provide spring spawning habitat for Northern Pike or forage species (i.e., species from the Leuciscidae family). The lakes in the LSA may also provide spawning habitat for lake spawning species including spring spawning Walleye and fall spawning Lake Trout and Lake Whitefish.

A summary of the waterbody characteristics for the Project is provided in Table 6.6-5 to Table 6.6-9. A list of the water crossings for the preferred route is provided in Appendix 6.6B, Table 6.6B-1 and figures depicting the water crossings are in Appendix 6.6B, Figures 6.6B-1 to

6.6B-30. The habitat potential for each waterbody varied depending on location (e.g., habitat potential may be higher in lower reaches near the confluence with a major waterbody than in upper reaches in a watershed); the discussion below is presented for the habitat potential along the Project footprint. There are 830 waterbodies crossed by the ROW and access roads. Most water crossings along the Project footprint are watercourses (i.e., 161 within the ROW and 2455 along access roads) (Table 6.6-5). Most of the remaining crossings are lakes/ponds (i.e., 76 within the ROW and 40 along the access roads). Based on the field survey, 31 ROW crossings and 56 access road crossings did not have defined bed or banks (i.e., there was no channel present). No background or field data were available for the remainder of the crossings (i.e., 47 ROW and 174 access road crossings). Permanent flow regimes were identified at 214 ROW crossings and 237 along the access roads, whereas intermittent flow regimes were identified in 16 ROW crossings and 33 access road crossing (Table 6.6-6). Non-permanent flow regimes were determined for 27 ROW crossings and 49 of the access road crossings. Forty-nine ROW crossings and 175 access road crossings had no data available and, as such, were conservatively assessed to have permanent flow regimes.

Thermal regime data were available for 86 crossings along the ROW and 70 crossings along access roads and represent approximately <19% of the crossings, all of which were cold water and cool water habitats (Table 6.6-7). The bankfull widths range from 0.45 to 600 m and the majority (i.e., 43 in the ROW and 33 along the access roads) had bankfull widths >5 m and are considered larger sized waterbodies (Table 6.6-8). Numerous locations were found to be dry at the time of the assessment or did not contain defined beds and banks (i.e., no defined channels).

Fish habitat potential was determined for most of the crossings assessed (i.e., 248 within the ROW and 314 along access roads), fish habitat potential was unable to be determined at 182 waterbodies, as no existing background data or field data were available for these locations (these locations were conservatively assessed to contain fish habitat for the effects assessment) and, based on the field survey, 86 were determined to have nil fish habitat potential (Table 6.6-5).

Sixteen waterbodies are known to provide spawning habitat at or near the vicinity of the crossing for Walleye, Lake Trout, or undefined species (Dillon 2020, Dryden Forest Management Company 2016, Greenmantle Forest Inc. 2020, MNRF 2022a). Potential spawning habitat was observed at 128 crossings in October 2020 and from June to September 2022 (Appendix 6.6-A). No known nursery areas were identified in background data, although field surveys identified 111 potential nursey areas (Appendix 6.6-A). One fish sanctuary was determined to be crossed by the ROW (i.e., Crowrock Lake) and two other fish sanctuaries were located within the LSA (i.e., potential to be impacted by the Project footprint [Dillon 2020]). Lake Trout lakes designated for management that overlap the project footprint include: Balmoral Lake, Crowrock Lake, Elsie Lake, Forsberg Lake, Mabel Lake, and Nym Lake. Additional Lake Trout lakes designated for management are located within the LSA and RSA and are described

in Section 7.1.7.4.4 (Fishing Activities in the Study Area) of the EA. No SAR critical habitats were mapped by DFO within the LSA (DFO 2022b)

Crossings within the Campus Lake Conservation Reserve boundaries are WC-2065, WC-3699 and WC-3700. Three crossings are located within the boundaries of the Turtle River-White Otter Lake Provincial Park and are identified as WC-2077, WC-3746 and WC-3747. Additional permitting requirements will apply for work in these areas.

The project is in Fisheries Management Zones (FMZs) 4, 5 and 6. In general, lakes in FMZ 4 are characterized as having intermediate depth, medium mean surface area, stained water, and cool thermal regimes (MNRF 2020c). Waterbodies in FMZs 4 and 5 have an abundance and wide range of aquatic habitat that is typical of northwest Ontario (MNRF 2020c, MNRF 2018b). The lakes in FMZ 5 tend to have a greater depth, clearer water, and lower nutrient levels than other zones in northwestern Ontario and therefore tend to be less productive (MNRF 2018b). The lakes and rivers of FMZ 6 flow southerly toward Lake Superior or into Lake Nipigon. Most have cold and cool water thermal regimes (MNRF 2009).

Table 6.6-5: Summary of Waterbodies Crossed by the Project Footprint

Tertiary Watershed	Lake/Pond	Watercourse	No Defined Channel[a]	Unmapped[b]	Total
Transmission Line ROW					
North Lake Superior Shoreline	0	7	1	1	9
Kaministiquia River	15	45	5	18	83
Rainy Headwaters	35	20	5	6	66
Rainy Lake	8	19	4	6	37
Big Turtle River - Rainy Lake	12	18	6	6	42
Upper English River	1	3	2	2	8
Wabigoon River	5	49	8	8	70
Total	**76**	**161**	**31**	**47**	**315**
Access Roads[c]					
North Lake Superior Shoreline	2	8	4	4	18
Kaministiquia River	5	56	13	59	133
Rainy Headwaters	16	52	10	21	99
Rainy Lake	7	33	17	22	79
Big Turtle River - Rainy Lake	5	42	4	25	76
Upper English River	0	3	0	2	5
Wabigoon River	5	51	8	41	105
Total	**40**	**245**	**56**	**174**	**515**

a) Field survey locations that were found to be dry at the time of the assessment or did not have defined beds and banks (i.e., no defined channels).
b) No data designation in the variable column refers to lack of designation provided within the MNRF LIO ARA (MNRF 2022a) or OHN (MNRF 2022c) datasets.
c) Sites that are crossed by both the ROW and access roads are summarized under the access road heading.

Table 6.6-6: Summary of Flow Regime in Waterbodies Crossed by the Project Footprint

Tertiary Watershed	Permanent	Intermittent	Non-Permanent	Nil[a]	No Data[b]
Transmission Line ROW					
North Lake Superior Shoreline	7	0	0	1	1
Kaministiquia River	54	1	7	3	18
Rainy Headwaters	50	4	4	2	6
Rainy Lake	25	1	3	0	8
Big Turtle River - Rainy Lake	27	3	4	2	6
Upper English River	3	1	2	0	2
Wabigoon River	48	6	7	1	8
Total	214	**16**	**27**	**9**	**49**
Access Roads					
North Lake Superior Shoreline	7	0	6	0	5
Kaministiquia River	54	2	11	7	59
Rainy Headwaters	50	13	10	5	21

Tertiary Watershed	Permanent	Intermittent	Non-Permanent	Nil[a]	No Data[b]
Rainy Lake	39	0	14	4	22
Big Turtle River - Rainy Lake	40	6	4	1	25
Upper English River	1	2	0	0	2
Wabigoon River	46	10	4	4	41
Total	**237**	**33**	**49**	**21**	**175**

a) Refers to crossing locations that were determined through field surveys to be designated as no defined channel (i.e., lacking beds and banks)

b) No data designation in the variable column refers to lack of designation provided within the MNRF LIO ARA (MNRF 2022a) or OHN (MNRF 2022c) datasets and no field surveys were completed to determined status at these locations.

Table 6.6-7: Summary of Thermal Regime in Waterbodies Crossed by the Project Footprint

Tertiary Watershed	Cold	Cool	No Data[a]
Transmission Line ROW			
North Lake Superior Shoreline	3	0	6
Kaministiquia River	19	12	52
Rainy Headwaters	6	11	49
Rainy Lake	1	4	32
Big Turtle River - Rainy Lake	5	2	35
Upper English River	2	0	6
Wabigoon River	1	20	49
Total	**37**	**49**	**229**
Access Roads			
North Lake Superior Shoreline	2	0	16
Kaministiquia River	26	7	100
Rainy Headwaters	2	4	93
Rainy Lake	0	3	76
Big Turtle River - Rainy Lake	9	4	63
Upper English River	3	0	2
Wabigoon River	0	10	95
Total	**42**	**28**	**445**

a) No data designation in the variable column refers to lack of designation provided within the MNRF LIO ARA (MNRF 2022a) or OHN (MNRF 2022c) datasets and no field surveys were completed to determined status at these locations.

Table 6.6-8: Summary of Bankfull Widths in Waterbodies Crossed by the Project Footprint

Tertiary Watershed	≤2.0 m	2.1 to 5.0 m	>5.1m	Minimum	Maximum
Transmission Line ROW					
North Lake Superior Shoreline	-	1	-	2.73	2.73
Kaministiquia River	3	1	8	0.5	305
Rainy Headwaters	2	3	16	1	600
Rainy Lake	-	1	3	3.3	72.45
Big Turtle River - Rainy Lake	2	1	7	0.6	550
Upper English River	1	-	1	1	56.4
Wabigoon River	2	1	7	0.75	180
Total	**10**	**8**	**42**	**-**	**-**
Access Roads					
North Lake Superior Shoreline	-	1	2	4	44
Kaministiquia River	2	4	11	0.45	96
Rainy Headwaters	6	3	8	0.5	40
Rainy Lake	1	4	6	1	78
Big Turtle River - Rainy Lake	-	3	1	2.3	14
Upper English River	-	-	-	-	-
Wabigoon River	4	0	4	0.8	30
Total	**13**	**15**	**32**	**-**	**-**

Notes: < = less than; > = greater than; n/a = not applicable.

Table 6.6-9: Summary of Fish Habitat in Waterbodies Crossed by the Project Footprint

Tertiary Watershed	Fish Habitat	Unknown[(a)]	Nil
Transmission Line ROW			
North Lake Superior Shoreline	7	1	1
Kaministiquia River	64	14	5
Rainy Headwaters	56	5	5
Rainy Lake	28	5	4
Big Turtle River - Rainy Lake	33	3	6
Upper English River	4	2	2
Wabigoon River	56	7	7
Total	**248**	**37**	**30**
Access Roads			
North Lake Superior Shoreline	10	4	4
Kaministiquia River	65	55	13
Rainy Headwaters	70	19	10

Tertiary Watershed	Fish Habitat	Unknown[a]	Nil
Rainy Lake	46	16	17
Big Turtle River - Rainy Lake	58	14	4
Upper English River	3	2	0
Wabigoon River	62	35	8
Total	**314**	**145**	**56**

a) No data designation in the variable column refers to lack of designation provided within the MNRF LIO ARA (MNRF 2022a) or OHN (MNRF 2022c) datasets and no field surveys were completed to determined status at these locations.

The Project footprint is in close proximity to several communities and population centres in northwestern Ontario throughout the LSA, which may result in additional pressure to fish habitat and fish populations at water crossings in proximity to multiple communities. The number of water crossings within 100 km of the population centres within the LSA are presented in Table 6.6-10.

Table 6.6-10: Number of Water Crossings within 100 km of Population Centres in the LSA

Location Name	Size (# of Residents)	Number of Water Crossings within 100 km of a Population Centre
Thunder Bay	>100,000	327
Dryden	<10,000	320
Ignace	<3,000	676
Atikokan	<3,000	659
Wabigoon and Wabigoon Lake Ojibway Nation	<600	417

Source: Statistics Canada (Canada 2021b)

Considering proximity of the Project footprint to these communities, the listed potential effects have the capacity to alter overall abundance of fish at associated water crossings. Literature suggests that recreational fishers (in Ontario specifically) are willing to drive up to approximately 225 km to access fishing stocks (Hunt and Lester 2009, de Kerckhove et al. 2015). However, it has been demonstrated that sustainable levels of local recreational fishing are likely to occur in fishing locations further than 100 km from population centres of 100,000 people, where fishing locations tend to remain relatively unexploited (Post et al. 2002, 2008). Based on these fishing trends and considering the average distance between communities within the LSA is approximately 150 km, access to large areas of the Project footprint is likely, and the highest fishing pressure is expected within 100 km of Thunder Bay.

6.6.5.2.2 Fish Community Abundance and Distribution

This section presents existing aquatic environment descriptions to provide context for the assessment based on all fish species within the Project footprint, including the fish species selected as criteria for the fish and fish habitat assessment (Section 6.6.3). This subsection describes the existing fish abundance and distribution in the LSA.

Waterbodies in the LSA are known to support 53 fish species, including the criteria species (Brook Trout, Lake Trout, Northern Pike, Walleye). SAR (Lake Sturgeon) and SOCC species (Coaster Brook Trout, Deepwater Sculpin and Northern Brook Lamprey) were restricted to specific waterbodies within the LSA (Table 6.6-20). The LSA contains a diverse fish community consisting of many species of ecological, socio-economical and Indigenous importance. The species encountered are typical of cold and cool water thermal regimes in Ontario (MNRF 2009 and 2011). Spring, fall, and winter spawning species were recorded in the LSA (Table 6.6-20).

Documented fish presence was limited in the Project footprint and fish occurrence records were available for 199 crossings (24%) in the background data (within 1 km of hydrologically connected systems). An additional 65 crossings (<8%) were determined to contain fish during the field survey (Appendix 6.6B: Table 6.6B-1). Background knowledge of fish species and their distributions in northern Ontario and within the LSA is limited and is generally a mixture of historical records (i.e., >20 years old) and sporadic newer data, which are particularly restricted to developed areas that are more easily accessible, such as roadside sites associated with transportation, forestry and mining operations. Most of the background data available are for larger lakes and rivers in the region, whereas data are more limited for small to medium sized waterbodies (MNRF 2011).

Overall, the waterbodies in the Project footprint are likely to be relatively productive for the region from a fisheries perspective, given the documented fish presence and distribution of fish in the RSA, and there is a potential that most of the waterbodies (i.e., with defined beds and banks and wetted conditions) may have fish present even if there is no documented fish community. Most named waterbodies have documented fish presence (MNRF 2022a). The remainder of the waterbodies had fish presence documented within 1 km of waterbodies connected upstream and/or downstream of the surveyed reaches.

The most common fish species recorded by the MNRF (i.e., recorded in the most waterbodies, and in upstream and downstream waterbodies) in the LSA crossings were Burbot, Lake Trout, Lake Whitefish, Northern Pike, Smallmouth Bass, Walleye, White Sucker (*Catostomus commersonii*) and Yellow Perch. These species are distributed in lakes and watercourses across all FMZs (MNRF 2020c, MNRF 2018b). Northern Pike occur in approximately 90% of the lakes in FMZ 4 and FMZ 5 (Cano and Parker 2007 from MNRF 2020c, MNRF 2018b). Northern Pike also had the most abundant occurrence records along the Project footprint, where their presence was documented at 26% of the water crossings.

Native Brook Trout populations occur in FMZ 6 (MNRF 2009) and in the northeast corner of FMZ 4, but there are limited data on natural Brook Trout populations in the zone (MNRF 2020c). FMZ 5 has the highest number of Lake Trout lakes in northwestern Ontario and one of the highest densities of Lake Trout in the province (MNRF 2018b). Brook Trout and Rainbow Trout are both stocked in select lakes in all FMZs within the LSA (MNRF 2009, MNRF 2020c; MNRF 2018b). Within FMZ 4, most Brook Trout populations are a result of stocking (MNRF 2014a). Within FMZ 5, stocked Brook Trout are not known to have established self-sustaining populations (MNRF 2012b); however, the data are over 10 years old and may be outdated. Most of the data collected in FMZs 4 and 5 are from lakes, and it is possible that there are self-sustaining populations in watercourses in these zones as a result of the lack of data for watercourses as well as the age of the lake-related data.

Other fish such as Black Crappie, Largemouth Bass (*Micropterus salmoides)*, Sauger and several other Sunfish species are not widespread within the RSA but are found in FMZ 5 and FMZ 6 (MNRF 2009, MNRF 2018b). Channel Catfish (*Ictalurus punctatus*), Muskellunge and

Atlantic Salmon (*Salmo salar*) have all been documented in FMZ 6 but are uncommon (MNRF 2009).

For the Project, most water crossings were considered to have habitat that would support a wide variety of fish species. This is a conservative assumption as it is unlikely that each water crossing would support every fish species presented in Table 6.6-20. However, more site-specific data would be required to determine the detailed distribution of fish species within the Project footprint and is likely to be required for permitting.

Most fish species are likely to be widely distributed throughout the Project footprint and LSA (Table 6.6-20). For example, Northern Pike, Walleye, White Sucker, and Yellow Perch are distributed throughout the LSA, while native Brook Trout are distributed in the southeastern portion and stocked populations are distributed in the northwestern portion of the LSA (MNRF 2009, 2011 and 2022a and 2022b). It is likely that species in the Leuciscidae family (i.e., minnows) are abundant and widely distributed in the waterbodies in the LSA (MNRF 2011). Lake Sturgeon have a more restricted distribution in the LSA than the other criteria species due to their limited populations and habitat requirements for lakes or larger watercourses (COSEWIC 2006, COSEWIC 2017a, Dillon 2020, Golder 2011). Coaster Brook Trout populations within the LSA are restricted to Lake Superior and tributary watercourses (Bobrowicz 2014). Deepwater Sculpin within the LSA is limited to Middle Shebandowan Lake and within Lake Superior (COSEWIC 2017b, NHIC 2022, Dillon 2020). Northern Brook Lamprey distribution in the LSA is restricted to Gorham Creek, McIntyre Creek and an unnamed watercourse within the Kaministiquia River watershed near Thunder Bay (MNRF 2022a, COSEWIC 2007, Dillon 2020, NHIC 2022).

Overall, fish are likely to be abundant in waterbodies where there is habitat to support each species (Table 6.6-20) (MNRF 2011). The waterbodies in the Project footprint are likely to be productive from a fisheries perspective given the documented fish presence and distribution of fish in the RSA and fish are likely to be abundant in each waterbody (MNRF 2009). Larger waterbodies are expected to support more fish than smaller waterbodies. There are some species (e.g., Lake Sturgeon, Quillback [*Carpiodes cyprinus*], Northern Brook Lamprey, etc.) that are considered uncommon (i.e., limited in the number of waterbodies where they are located, and there are few of these fish) and some with limited distributions (i.e., Western Blacknose Dace [*Rhinichthys obtusus*] Note that recent updates to Holm et al. (2021) referenced a genetic study that indicated Ontario is an area of sympatry for Western and Eastern Blacknose Dace [*Rhinichthys atratulus]* and concluded Blacknose Dace occurring in Ontario cannot be reliably identified to species using morphological characteristics). (Table 6.6-20).

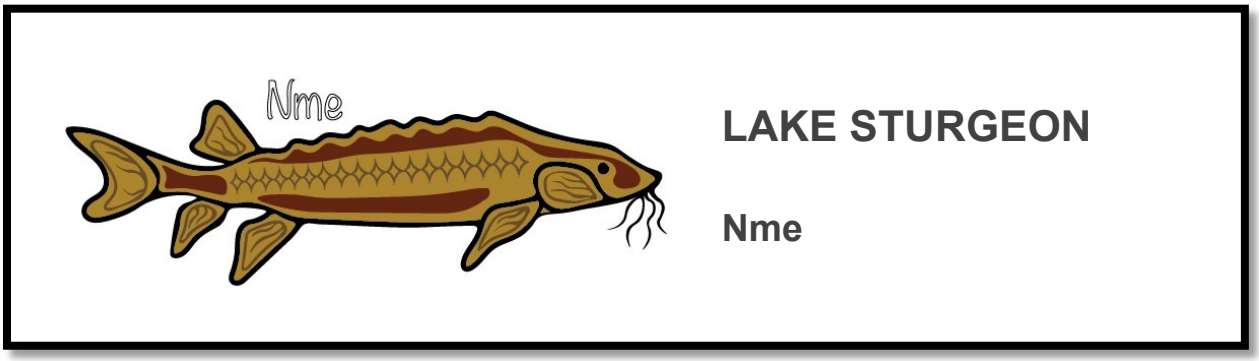
To provide an estimate of the overall potential presence, distribution and habitat quantity in the Project footprint (m^2) for each of the SAR and SOCC discussed below, the estimated wetted width at each crossing with documented potential for presence was multiplied by the width of the ROW as well as the associated access roads.

6.6.5.2.3 Species at Risk

Lake Sturgeon was the only SAR identified with potential to occur in the LSA (Table 6.6-20). Based on known habitat requirements (Scott and Crossman 1998, Golder 2011) and geographic distributions, Lake Sturgeon from the Southwest Hudson Bay and Nelson River populations have potential to occur in the LSA. It is highly unlikely that Lake Sturgeon from the Great Lakes – Upper St. Lawrence populations will occur in the LSA due to a lack of larger watercourses with habitat for their life history and the presence of large dams. Lake Sturgeon in the Nelson River tertiary watershed are listed as "Endangered" by the federal COSEWIC (2016; no SARA status) and as "Threatened" under the provincial *Endangered Species Act, 2007* (Government of Ontario 2007).

American Eel are listed as "Threatened" under COSEWIC (2012) and "Endangered" under the ESA (Ontario 2007). They are not listed under SARA (Canada 2002). They were determined to have potential presence in the RSA (Mandrak et al. nd, MNRF 2022a, NHIC 2022). However, based on the known distribution of the species, their life history characteristics and habitat preferences (Scott and Crossman 1998, Eakins 2022, Holm et al. 2021 and COSEWIC 2012) as well as the presence of multiple barriers (i.e., dams) from Lake Superior, it is unlikely that American Eel are in the waterbodies within the Project footprint and LSA. Therefore, they were not carried through the effects assessment as SAR, however all species were considered generally from a management, mitigation and monitoring perspective of the Fisheries Act. Abundance, distribution and life history information on American Eel is presented in Appendix 6.6-A.

6.6.5.2.3.1 Lake Sturgeon



Lake Sturgeon are Ontario's largest long-lived fish species, and their presence can be traced back over 200 million years (Golder 2011). The species has a rich history associated with Indigenous communities and was also commercially harvested between the late 1800s to mid-1900s throughout most of the species' range (Golder 2011; COSEWIC 2017a). Lake Sturgeon are migratory species that travel between several habitats to fulfill seasonal and life history stage requirements (Golder 2011). Habitat selection generally favours high quality shoal areas of large lakes and rivers at depths of 5 m to 10 m or more. Lake Sturgeon occupy rivers characterized by a wide range of turbidity, dissolved oxygen, and clarity levels, and can withstand temperatures between 0°C and 30°C (COSEWIC 2017a).

Lake Sturgeon in the Nelson River primary watershed are listed as “Endangered” under the federal COSEWIC (2016) and as “Threatened” under the provincial *Endangered Species Act, 2007* (Government of Ontario 2007) and the SARO list (Government of Ontario 2007; Government of Ontario 2016. However, it does not receive protection under the federal SARA (Canada 200) as it is currently awaiting Governor in Council approval to be included on Schedule 1.

Lake Sturgeon spawn in early May to late June in relatively shallow, fast flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom, or on shoals in large rivers with strong currents and at depths of 0.6 m to 4.5 m (Scott and Crossman 1973). Individuals generally begin migration from lakes not long after the ice melt, sometimes beginning their travel upriver under the ice, and continuing up to 400 km to reach spawning habitat (Scott and Crossman 1973). Smaller movements occur seasonally, where Lake Sturgeon move from warm, shallow waters to cooler, deeper waters in summer, returning to the shoal areas in the fall, and back to deeper waters for winter (Scott and Crossman 1998). Overwintering begins in early fall, where adults retreat to downstream portions of rivers or return to offshore habitats in lakes with moderate depths and soft substrates (i.e., mud or sand), remaining relatively immobile over the winter (Golder 2011; Rusak and Mosindy 1997).

Based on known habitat requirements (Scott and Crossman 1998, Golder 2011) and geographic distributions, Lake Sturgeon from the Nelson River populations have a reasonable potential to occur in the LSA. Documented water crossings where Lake Sturgeon are known to be present within the LSA and RSA are in the Rainy Headwaters watershed. Within the Project footprint, Lake Sturgeon are known to be present in <1% of the water crossings, and through review of habitat requirements and aerial imagery habitat potential has been identified in <3% of total water crossings intersected by the Project footprint. Of these, all areas have been avoided for work below the high-water mark (HWM) through project planning (i.e., routing to avoid) or the use of overhead wires or water crossing methods (e.g., clear span bridges, ice bridges). The Saskatchewan – Nelson River population of Lake Sturgeon has been identified as present in FMZ 5 within the LSA, where the public Lake Sturgeon fishery is closed all year except for existing quota held by Indigenous communities; however, harvest by those communities does not currently occur as self-imposed moratoriums have been imposed by the license holders (MNRF 2014a).

Considering species distribution maps and documented fish presence, Lake Sturgeon are unlikely to be present in the Big Turtle River – Rainy Lake, Kaministiquia River, North Lake Superior Shoreline, Rainy Lake, Upper English River and Wabigoon River tertiary watersheds within the Project footprint. The 11 historic occurrence records in the LSA were all derived from hydrological connections to Eva Lake and Little Eva Lake within 5 km (Dillon 2020). No Lake Sturgeon were captured during the 2022 field program. No critical habitat is mapped within the LSA (DFO 2022). Indigenous knowledge provided by Lac des Mille Lacs First Nation noted that Sturgeon are caught in the Kaministiquia River yearly downstream from Kakabeka Falls. The falls act as a barrier to fish passage to upstream habitats. Sturgeon have also been documented

by Lac des Mille Lacs First Nation as being caught in Quetico Park by community members. Both areas are located beyond the LSA, although Lake Sturgeon are present within the RSA.

In addition to known occurrence records, Lake Sturgeon were also considered to be potentially present in cold waters along the bottom of large lakes and watercourses crossed by the Project footprint for waterbodies not visited in the field. These water crossings are considered to provide suitable habitat for various life stage requirements (i.e., spawning, rearing, feeding, and overwintering). This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Lake Sturgeon. Lake Sturgeon are considered to have limited abundance within the LSA; however, there is a potential that all life stages (i.e., fry, juvenile, and adult) are present where suitable habitat exists. More site-specific data would be required to further determine the detailed distribution of Lake Sturgeon in the LSA. No critical habitat for Lake Sturgeon is mapped within the LSA (DFO 2022), and Lake Sturgeon are afforded general habitat protection under both the *Fisheries Act* and ESA.

Based on the approach presented in the introduction to Section 6.6.5.2.2, there are 225,250 m^2 of overall known and potential Lake Sturgeon habitat in the Project footprint (Table 6.6-11).

Table 6.6-11: Summary of Baseline Characterization Conditions for Lake Sturgeon

Indicator	Baseline Characterization

Habitat Quantity	• Lake Sturgeon habitat is considered limited within the LSA.
	• Based on the desktop review and field investigations, Lake Sturgeon habitat exists at:
	  ◦ Two known water crossings within the ROW and no known water crossings along associated access roads; and
	  ◦ 20 potential water crossings within the ROW and 3 potential water crossings along associated access roads.
	• Water crossings within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have not been identified as potential Lake Sturgeon habitat through background screening and field investigations.
	• 27,260 m^2 of known Lake Sturgeon habitat[(a)] and 191,120 m^2 of potential habitat have been identified in the ROW footprint through background screening and field investigations.
	• No known Lake Sturgeon habitat[(a)] and 6,870 m^2 of potential habitat has been identified in the access roads footprint through background screening and field investigations.

Habitat Quality	• Based on the fish habitat documented in the LSA and the life history characteristics of Lake Sturgeon, there is likely limited habitat present for this species. • Water crossings where there is potential for Lake Sturgeon to be present likely provide suitable feeding, spawning, rearing, migration and/ or overwintering habitat.

Indicator	Baseline Characterization
Abundance	• At waterbodies in the LSA with suitable habitat to support Lake Sturgeon, they are likely rare. • It is possible that all life stages (i.e., fry, juvenile, and adult) are present at waterbodies in the LSA with suitable habitat to support the species.
Distribution	• Distribution of Lake Sturgeon is limited to lakes and larger watercourses in the LSA.

a) Feeding, spawning, rearing, and/ or overwintering habitat may be present; m = metre; m^2 = square metre.

6.6.5.2.4 Species of Conservation Concern

Silver Lamprey (Special Concern [ESA 2007, COSEWIC 2011]) and American Brook Lamprey (*Lethenteron appendix*; not listed) were determined to have potential presence in the RSA. However, based on the known distribution of the species, their life history characteristics and habitat preferences (Scott and Crossman 1998, Eakins 2022, Holm et al. 2021 and COSEWIC 2012), as well as the presence of multiple barriers (i.e., dams) from Lake Superior, it is unlikely that they are in the waterbodies within the Project footprint and LSA. Therefore, they were not carried through the effects assessment as SOCC; however, all species were considered generally from the management, mitigation and monitoring perspective of the *Fisheries Act*. Abundance, distribution and life history information on Silver Lamprey and American Brook Lamprey are presented in Appendix 6.6-A.

Three SOCC species were documented within the RSA, consisting of Coaster Brook Trout, Northern Brook Lamprey, and Deepwater Sculpin. Based on known habitat requirements (e.g., Scott and Crossman 1998, Holm et al.2021) and geographic distributions (Mandrak et al. in prep), they have a reasonable potential to occur in the LSA, except for Coaster Brook Trout, which is documented in the LSA (Bobrowicz 2014).

6.6.5.2.4.1 Northern Brook Lamprey

Lamprey play ecological and culturally important roles (Close et al. 2003). Lamprey contribute to biodiversity of waterbodies and are prey for a variety of fish and terrestrial species. The

ammocoetes are filter feeders and detritivores that recycle the organic matter and can have an impact on the physical and geochemical conditions in a stream (DFO 2016a).

Northern Brook Lamprey is found within the Great Lakes, with two SAR designation units in Ontario: the Saskatchewan – Nelson River population is Endangered (COSEWIC 2020; no status on SARA Schedule 1), whereas the Great Lakes – Upper St. Lawrence population has a COSEWIC designation of Special Concern and is listed as Special Concern under SARA Schedule 1.

Northern Brook Lamprey inhabit sand and gravel streams, with larger coarse substrates and swift flowing water required for spawning. Adults spawn in the spring when water temperatures are between 13°C and 15°C (Holm et al. 2021) and die shortly afterwards. Juvenile habitats for Northern Brook Lamprey include cold water watercourses, where the ammocoetes burrow in soft substrates of silt and sand. They use larval drift to disperse and undertake migrations to upstream habitats for spawning upon maturity (DFO 2016a). A single juvenile lamprey was observed during the 2022 field surveys; however, it could not be identified to species level due to inherent complexities in distinguishing *Lethenteron* spp. and *Ichthyomyzon* spp. ammocoetes (Page and Burr 1991, Smith 1985, Mandrak et al. 2004).

Within the RSA, the North Lake Superior Shoreline watershed is known to support Northern Brook Lamprey in Black Sturgeon River, Nipigon River, Pearl River, Prairie River, Sibley Creek, Stokey Creek and several unnamed tributaries (DFO 2016a). Considering known habitat requirements (Scott and Crossman 1998, Holm et al. 2021) and geographic distributions, it was determined that Northern Brook Lamprey have reasonable potential to exist within the LSA. Documented water crossings where Northern Brook Lamprey are known to be present within the LSA are in the Kaministiquia River watershed. Within the Project footprint, Northern Brook Lamprey are known to be present in <1% of the water crossings and habitat potential has been identified in approximately 22% of water crossings intersected by the Project footprint. Northern Brook Lamprey are found in FMZ 6; however, a lack of information exists within the Fisheries Management Plan (MNRF 2009) for this species.

Based on species distribution maps and documented fish presence, Northern Brook Lamprey were considered unlikely to be present in the Big Turtle River – Rainy Lake, Rainy Lake, Rainy Headwaters, Upper English River, and Wabigoon River tertiary watersheds within the Project footprint. From the three historic Northern Brook Lamprey occurrence records within the LSA this species is known to be present (however not limited to) within Gorham Creek, McIntyre River, and an unnamed watercourse within 1 km of the McIntyre River (Dillon 2020). No Northern Brook Lamprey were captured during the 2022 field program.

In addition to known occurrence records, Northern Brook Lamprey were also considered to be potentially present in cold water watercourses crossed by the Project footprint in the North Lake Superior Shoreline and Kaministiquia River watersheds. These waterbodies are considered to provide suitable habitat for various life stage requirements (i.e., spawning, rearing, feeding, and overwintering). This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Northern Brook Lamprey. More site-specific data

would be required to further determine the detailed distribution of Northern Brook Lamprey in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2, there is 17,059 m^2 of overall known and potential Northern Brook Lamprey habitat in the Project footprint (Table 6.6-12).

Northern Brook Lamprey are considered rare in the cold water watercourses within the LSA; however, there is a potential that all life stages (i.e., fry, juvenile, and adult) are present where suitable habitat exists.

Table 6.6-12: Summary of Baseline Characterization Conditions for Northern Brook Lamprey

Indicator	Baseline Characterization

Habitat quantity	• Cold water watercourses in the LSA provide potential habitat for Northern Brook Lamprey.
	• Based on the desktop review, Northern Brook Lamprey habitat exists at:
	  ◦ Two known water crossings in the ROW and two known water crossing along associated access roads; and,
	  ◦ 62 potential water crossings in the ROW and 123 potential water crossings along associated access roads
	• No waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as known Northern Brook Lamprey habitat.
	• 324 m^2 of known Northern Brook Lamprey habitat[(a)] and 12,238 m^2 of potential habitat have been identified in the ROW footprint through background screening and field investigations.
	• 35 m^2 of known Northern Brook Lamprey habitat[(a)] and 4,462 m^2 of potential habitat has been identified in the access roads footprint through background screening and field investigations.

Habitat quality	• There is potential for suitable habitat in the LSA and it is likely to be moderately productive from a fisheries perspective, although background review has provided a limited known range. • Some of the identified watercourses within the LSA may provide suitable feeding, spawning, rearing, migration and/or overwintering habitat for Northern Brook Lamprey; however, extent is unknown in absence of field confirmation.
Abundance	• At watercourses in the LSA with suitable habitat to support Northern Brook Lamprey, they are likely rare. • It is possible that all life stages (i.e., egg, larvae, and adult) are present at watercourses in the LSA with suitable habitat to support the species.

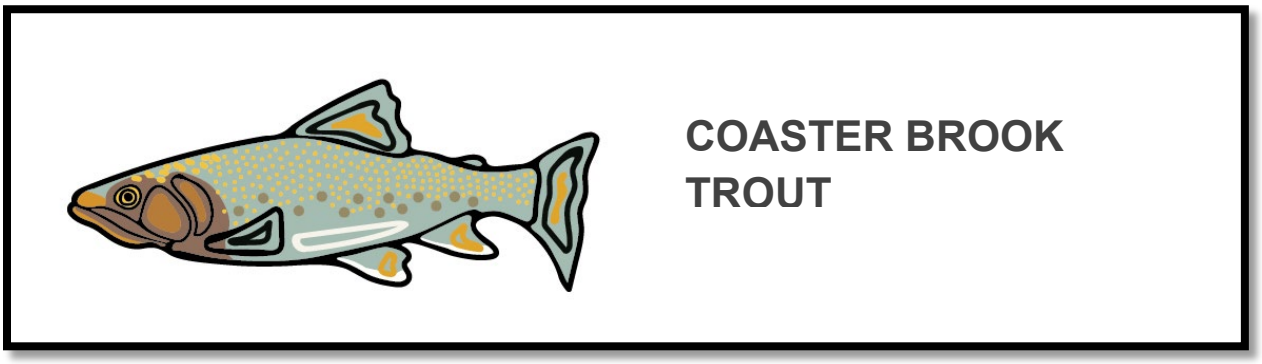
Indicator	Baseline Characterization
Distribution	• Distribution of Northern Brook Lamprey is limited to cool-cold water watercourses in the LSA.

a) Feeding, spawning, rearing, and/ or overwintering habitat may be present.

b) ROW and access road water crossings that were within the 120 m of aggregate pits and the 30 m of temporary laydown areas and construction camps were not included in the count of waterbodies within these areas.

LSA = local study area; RSA = regional study area; m = metre; m^2 = square metre.

6.6.5.2.4.2 Coaster Brook Trout



Coaster Brook Trout are a lake dwelling ecotype or life history variant of local Brook Trout (Wilson et al. 2008). Coaster Brook Trout play important roles in the Great Lakes fish community and were historically popular with anglers due to their large body size (Meek 2022). Coaster Brook Trout were identified as having local significance in the Thunder Bay area within the tributary watercourses of Lake Superior (Bobrowicz 2014).

This species is of local concern due to the unique ecotype and is of conservation concern resulting from overfishing, forestry, mining, and hydro-electric dam pressures that have reduced populations (Huckins et al. 2008, MNRF 2017). Coaster Brook Trout are not afforded protection under SARA, ESA or SARO. Populations of Coaster Brook Trout are limited to Lake Superior and occur both in Canada and the United States.

Knowledge on Coaster Brook Trout habitat selection and use is limited, although it is anticipated to be relatively consistent with typical Brook Trout preferences. Spawning is known to occur in October and November, when spawning beds are created in silt-free gravel and well-oxygenated tributary streams (National Park Services 2022). Coaster Brook Trout of Lake Superior migrate to tributary rivers to spawn and are larger than stream dwelling Brook Trout (National Park Services 2022).

Based on known habitat requirements (Holm et al. 2021, Horns et al. 2003) and geographic distributions, Coaster Brook Trout populations have a reasonable potential to occur in the RSA and LSA. Within the RSA, Coaster Brook Trout occurrence records are documented in more than 118 tributaries of Lake Superior. Coaster Brook Trout have been identified as present within FMZ 5; however, they are not specifically mentioned within the Fisheries Management

Plan as a designated species (MNRF 2014a). Within the LSA, Coaster Brook Trout are known to occur in Lake Superior and Wild Goose Creek (Golder 2020; Mucha and Mackereth 2008; Bobrowicz 2014). Within the Project footprint, Coaster Brook Trout are not known to be present in any of the water crossings; however, habitat potential has been identified in approximately 3% of water crossings intersected by the Project footprint.

Considering species distribution maps and documented fish presence, Coaster Brook Trout are unlikely to be present in the Big Turtle River – Rainy Lake, Kaministiquia River, North Lake Superior Shoreline, Rainy Headwaters, Upper English River, and Wabigoon River tertiary watersheds within the Project footprint. No Coaster Brook Trout were captured or observed during the field program.

Coaster Brook Trout were considered to be potentially present in cold water watercourses with appropriate connectivity to Lake Superior. These watercourses are considered to provide suitable habitat for spawning and migration of Coaster Brook Trout. This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Coaster Brook Trout. More site-specific data would be required to further determine the detailed distribution of Coaster Brook Trout in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2, there is 8,227 m^2 of overall potential Coaster Brook Trout habitat in the Project footprint (Table 6.6-13).

Coaster Brook Trout are considered to have limited abundance in cold water watercourses; however, it is possible that all life cycle stages (i.e., fry, juvenile, and adult) are present in the LSA under the correct conditions and timing.

Table 6.6-13: Summary of Baseline Characterization Conditions for Coaster Brook Trout

Indicator	Baseline Characterization

Habitat quantity	• Cold water waterbodies in the North Lake Superior watershed in LSA provide potential habitat for Coaster Brook Trout.
	• Based on the desktop review Coaster Brook Trout habitat exists at:
	  ◦ 8 potential water crossings within the ROW; and
	  ◦ 14 potential water crossings along associated access roads.
	• No waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as potential Coaster Brook Trout habitat.
	• No known Coaster Brook Trout habitat[(a)] is identified in the ROW footprint; however, 640 m^2 of potential habitat has been identified in the ROW footprint through field investigations and background screening.
	• No known Coaster Brook Trout habitat[(a)] is identified along associated access roads; however, 7,587 m^2 of potential habitat has been identified along associated access roads through field investigations and background screening.

Indicator	Baseline Characterization
Habitat quality	• Due to limited connectivity to large waterbodies where Coaster Brook Trout spend most of their life cycle, habitat quantity is considered limited within the LSA. • The identified watercourse crossings within the LSA may provide spawning and/ or rearing habitat for Coaster Brook Trout if suitable connectivity and substrates are present.
Abundance	• At watercourses in the LSA where suitable habitat to support Coaster Brook Trout is present, they are likely rare. • It is possible that all life stages (i.e., egg, larvae, and adult) are present at watercourses in the LSA with suitable habitat to support the species; however, adult use is likely limited to seasonal spawning activities.
Distribution	• Distribution of Coaster Brook Trout is limited to cold water watercourses in the LSA.

a) Feeding, spawning, rearing, and/ or overwintering habitat.

b) ROW and access road water crossings that were within the 120 m of aggregate pits and the 30 m of temporary laydown areas and construction camps were not included in the count of waterbodies within these areas.

6.6.5.2.4.3 Deepwater Sculpin

Deepwater Sculpin are an ecologically important benthic dwelling species in deep lake and coldwater ecosystems. They prey on invertebrates, crustaceans, and fish eggs, and are prey for Lake Trout and Burbot (Holm et al. 2021). Deepwater Sculpin are an important cold water species due to their habitat restrictions to deep/cold lakes, their rarity, and the limited geographic range they occupy.

Deepwater Sculpin occurs in the former glacial regions of Canada including the Great Lakes. Several other populations have been defined outside Ontario. In Ontario, the Great Lakes – Western St. Lawrence populations are ranked as Special Concern under SARA Schedule 1 but SARO has deemed them Not at Risk (COSSARO 2017). Therefore, they are not protected by the provincial ESA. However, they have a provincial rank of S3 (NHIC 2022, NatureServe 2022), which means they are rare to uncommon in Ontario, (i.e., <100 documented occurrences in the province).

These species are widespread in Canada; however, their distribution has been difficult to record because of the remote nature of most potential habitat locations as well as sampling complexities associated with their considerable depth requirements (COSEWIC 2017b). Most occurrence records are in the form of bycatch and not due to targeted sampling of the species. There is a high probability that Deepwater Sculpin also inhabit other deep remote lakes. They were recently found in Eagle and Teggau Lakes in Northwestern Ontario (west of Dryden) where they have not previously been recorded (COSEWIC 2017b). DFO Aquatic Species at Risk mapping also included records for Deepwater Sculpin in lakes south of the Shebandowan Lakes, near and within Lake Superior (DFO 2022b). According to the ROM Field Guide to Freshwater Fishes of Ontario (Holm et al. 2021), their northern Ontario range includes Lake Superior, Quetico Park, and a stretch from Kenora to north of Thunder Bay.

Deepwater Sculpin prefer deep (e.g., >50 m), cold, highly oxygenated freshwater glacial lakes, as they are bottom-dwelling species that only occur in lake environments (COSEWIC 2017b). Sculpin in Lake Superior were commonly captured at depths greater than 70 m and up to 407 m (Selgeby 1988). Sculpin were typically captured at depths greater than 50 m or the deepest 20% of lakes. Preferred water temperature is less than 7°C. Dissolved oxygen needs for Deepwater Sculpin fall within the CCME CWQG for typical cold water concentrations (i.e., >6.5 milligram per litre [mg/L]) with a preference for dissolved oxygen levels greater than 10 mg/L (COSEWIC 2017b). The spawning and larval development period for Deepwater Sculpin is unknown but spawning is expected to occur in Lake Superior from late November to mid-May, peaking in January (Selgeby 1988), with larval movements to the inshore areas of lakes in the spring and to deeper waters again by the fall.

Based on species distribution maps and documented fish presence, Deepwater Sculpin were considered unlikely to be present in the Big Turtle River – Rainy Lake, North Lake Superior Shoreline, Rainy Lake, Rainy Headwaters, Upper English River, and Wabigoon River tertiary watersheds within the Project footprint. At the eastern extent of the RSA, Deepwater Sculpin were identified within Lake Superior (DFO 2022b and ROM 2016) and are known to be present (however not limited to) Middle Shebandowan Lake and an unnamed waterbody that is hydrologically connected to the Shebandowan Lakes (Dillon 2020). No Deepwater Sculpin were captured during the 2022 field program, in part due to the nature of the sampling efforts (i.e., focused on wadable water crossings using backpack electrofishing and passive net sets).

Considering known habitat requirements (Scott and Crossman 1998, Holm et al. 2021) and geographic distributions, it was considered that Deepwater Sculpin have the potential to exist within the LSA. Documented water crossings where Deepwater Sculpin are known to be present within the LSA are in the Kaministiquia River watershed. Within the Project footprint, Deepwater Sculpin have known presence in < 1% of the waterbodies. Similarly, habitat potential has been identified in approximately 1% of water crossings intersected by the Project footprint, largely due to the previously described habitat requirements. Deepwater Sculpin are found in FMZ 6; however, no information exists within the Fisheries Management Plan (MNRF 2009).

In addition to known occurrence records, Deepwater Sculpin were also considered to be potentially present in cold water waterbodies crossed by the Project footprint. These waterbodies are considered to provide suitable habitat for various life stage requirements (i.e., spawning, rearing, feeding, and overwintering). This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Deepwater Sculpin. More site-specific data would be required to further determine the detailed distribution of Deepwater Sculpin in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2.2, there is an estimated 86,850 m^2 of overall known and potential Deepwater Sculpin habitat in the Project footprint (Table 6.6-14). Although spawning habitat cannot be quantified due to the extreme depths at which it occurs, it is expected to be similar to the overall area of waterbodies where this species occurs.

Deepwater Sculpin are considered to have limited potential abundance; however, there is a potential that all life stages (i.e., fry, juvenile, and adult) are present in the LSA where suitable habitat exists.

Table 6.6-14: Summary of Baseline Characterization Conditions for Deepwater Sculpin

Indicator	Baseline Characterization

Habitat quantity	• Deep, cold water waterbodies in the LSA provide potential habitat for Deepwater Sculpin.
	• Based on the desktop review, Deepwater Sculpin habitat exists at:
	  ◦ One known water crossing within the ROW.
	  ◦ Nine potential water crossings within the ROW.
	• No waterbodies associated with access roads were identified as potential Deepwater Sculpin habitat through the field program or desktop review.
	• No waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as potential Deepwater Sculpin habitat.
	• 9,980 m^2 of known Deepwater Sculpin habitat[(a)] and 76,870 m^2 of potential habitat have been identified in the ROW footprint through background screening and field investigations.

Habitat quality	• The fish habitat in the LSA is considered limited for Deepwater Sculpin due to lack of large, deep waterbodies where they reside. • Waterbodies identified within the LSA that may provide suitable habitat for Deepwater sculpin are likely to provide opportunity for feeding, spawning, rearing, and/or overwintering habitat.
Abundance	• Deepwater Sculpin are likely rare within the LSA; however, may be present in deep, cold lakes. • It is possible that all life stages (i.e., egg, larvae, and adult) are present at waterbodies identified in the LSA where suitable habitat to support the species exists.

Indicator	Baseline Characterization
Distribution	• Distribution of Deepwater Sculpin is limited to deep cold water lakes in the LSA.

a) Feeding, spawning, rearing, and/or overwintering habitat may be present.
b) ROW and access road water crossings that were within the 120 m of aggregate pits and the 30 m of temporary laydown areas and construction camps were not included in the count of waterbodies within these areas.

LSA = local study area; ROW = right-of-way; RSA = regional study area; m = metre; m^2 = square metre.

6.6.5.2.4.4 Species of Indigenous Concern

Fish species [Geego] of Indigenous concern were identified through engagement, feedback received on Project reporting and IK studies by the Gwayakocchigewin Limited Partnership (GLP) on behalf of their member communities, Migisi Sahgaigan (Eagle Lake First Nation) (2022), Lac des Mille Lacs First Nation (2023), NWOMC and Region 2 (2023), Mitaanjigamiing First Nation (2023), and Grand Council Treaty #3. These species were included in the effects assessment within the RSA and LSA and are discussed in detail in the sections below, as indicated:

- Whitefish (i.e., Lake Whitefish [Nimebin]);
- Walleye/Pickerel [Ogass]((see Section 6.6.5.2.5.4) and Sauger
- Sauger (*Sander canadensis*);
- Northern Pike/Pike/Jackfish (see Section 6.6.5.2.5.3)
- Muskie (i.e., Muskellunge);
- Sturgeon (i.e., Lake Sturgeon) (see Section 6.6.5.2.3.1);
- Burbot [Massaii'i – Ling];
- Salmonids (i.e., Brook Trout, Rainbow Trout, Lake Trout, Salmon) (see Sections 6.6.5.2.5.1 6.6.5.2.5.2);
- Smallmouth Bass (See section 6.6.5.2.6);
- Black Crappie;
- Yellow Perch; and
- Suckers (e.g., White Sucker etc.).

Baitfish species (i.e., small-bodied fish species). All fish and fish habitat were considered for the EA under the *Fisheries Act* (Canada 1985) definitions. SAR/SOCC and criteria fish species were chosen to be representative of the most sensitive fish communities, or to represent

common species that occupied a broad range of northern Ontario habitat types, with a focus on large-bodied predator species that are favoured by recreational users.

Lake Trout was chosen as a criteria species to represent large bodied predatory species of fish that occupy the pelagic area of cold water lakes. This category would also represent Lake Whitefish and Salmon which occupy similar habitats and trophic levels.

Brook Trout was chosen as a criteria species to represent large bodied predatory fish species that occupies cold water tributaries, watercourses and lake habitats. It represents substratum spawners with an affinity for high cover and groundwater inputs. This category would also represent Rainbow Trout and other stream spawning/migrating Salmonids, which occupy similar habitats and trophic levels.

Northern Pike was chosen as a criteria species to represent large bodied predatory and migratory species and used for harvest. This species occupies cool and warm water lakes, ponds and watercourses of various sizes. This category would also represent Muskellunge which occupy similar habitats and trophic levels as well as Black Crappie, Yellow Perch and Burbot which occupy similar habitats (i.e., well vegetated cool water lakes and streams).

Walleye was chosen as a criteria species to represent large bodies fish species that occupies a variety of cool water habitats of both lakes and watercourses, as a substratum spawning species with an affinity for vegetation. This species is used by Indigenous communities for harvest. This category also represents Sauger which occupy similar habitats and trophic levels. The habitat preferences of Suckers (i.e., cool water substratum spawning species), Black Crappie are represented by this category as both species are insectivores. Yellow Perch (i.e., well vegetated cool water lakes and streams) and Smallmouth Bass (i.e., well vegetated/high cover cool water lakes and streams with substratum for spawning) were considered similar to Walleye.

Small-bodied fish (i.e., bait fish) were considered during the EA to have the potential to be present in all waterbodies and particularly those occupied by predatory species.

There are more background data available for the criteria species carried through the assessment (e.g., Lake Trout than Lake Whitefish, Northern Pike than Muskellunge and Walleye than Sauger) among the available digital data, secondary source information and citizen science reporting platforms, than for small-bodied fish or other large-bodied species. Species of Indigenous concern were captured during the 2022 field surveys and included Yellow Perch and small-bodied fish along the preferred route.

As all fish species were considered during the effects assessment and are likely to occur in the LSA, their conservation ranking, proposed species restricted activity timing windows and their habitat preferences are presented in Table 6.6.-19 and 6.6-20, including those of Indigenous concern.

6.6.5.2.5 Criteria Species

Criteria species (i.e., Brook Trout, Lake Trout, Northern Pike, and Walleye) were used as representative species that are characteristic of a criterion that, if changed as a result of the Project, may demonstrate a physical, biological, or socio-economic effect. Criteria species were selected for the effects assessment based on their abundance within the RSA and LSA as well as their ecological, Indigenous, and socio-economical importance and are discussed in detail in the sections below.

6.6.5.2.5.1 Brook Trout

Brook Trout, also known as Speckled Trout, occur in clear, cold, well-oxygenated watercourses and lakes (Eakins 2017). Brook Trout are a provincially secure species (i.e., SRank 5) (NHIC 2022, NatureServe 2022) (Appendix 6.6-A, Appendix C, Table C-1). Habitat preferences include headwater spring ponds and small spring-fed streams that have cool, clear waters with sand and gravel bottoms and moderate amounts of vegetation (Minnesota Department of Natural Resources [MDNR] 2022). They are also known to congregate behind beaver dams. Juvenile Brook Trout have a high affinity for instream cover objects (i.e., rubble substrate rather than overhead cover (i.e., riparian plants) (Raleigh 1982). During the summer as water temperature increases, they may move to deep, colder waters.

Spawning occurs yearly in the fall at temperatures between 4.5°C and 10°C, in watercourses with gravel substrates (Raleigh 1982). However, Brook Trout spawning can also occur in lakes with a groundwater influence and moderate current. Movement upstream to spawning areas usually occurs just prior to spawning, with males arriving ahead of females. Eggs are deposited in redds created by the female (Scott and Crossman 1998). Spawning success is reduced by fine sediment and decreased oxygen concentrations. Overwintering generally occurs in lakes or in watercourses with suitable depth and dissolved oxygen levels below the ice. Brook Trout typically overwinter in deep water (i.e., >1 m) in areas with a low flow (i.e., <15 m^3/s), cover, and groundwater discharge (Chisholm et al. 1987; Cunjak and Power 1986). They prefer woody debris cover, followed by vegetation, and undercut banks (Cunjak 1996).

Based on known habitat requirements (Scott and Crossman 1998, Holm et al. 2021) and geographic distributions, Brook Trout have a high potential to occur in the LSA. Within the Project footprint, Brook Trout are known to be present in approximately 7% of water crossings

and habitat potential has been identified in approximately 78% of water crossings intersected by the Project footprint. Small populations of Brook Trout are found in FMZ 4, 5 and 6 within the water bodies of the LSA (MNRF 2017). Brook Trout are stocked in select lakes in FMZs 4 and 5 (MNRF 2014a; MNR 2010a; 2012a, b). Within FMZ 4, most Brook Trout populations are a result of stocking (MNRF 2014a). Within FMZ 5, stocked Brook Trout are not known to have established self-sustaining populations (MNR 2012b). The only known native Brook Trout population in FMZ 4 occurs in the northeast corner, but there are limited data on natural Brook Trout populations in the zone (MNRF 2014a). Brook Trout records in FMZ 6 were reduced to less than 37 Brook Trout Lakes from the previously reported 105 lakes in 1980 (MNRF 2017).

Brook Trout were documented in 60 water crossings associated with the Project footprint, found in all tertiary watersheds except for Rainy Headwaters and Upper English River watersheds within the LSA as well as the greater RSA. Brook Trout have been identified in four lakes and ponds (i.e., Amp Lake, Middle Shebandowan Lake, and two unnamed waterbodies), 46 watercourses (e.g., Kaministiquia River, Sunshine Creek, Strawberry Creek, etc.), 10 unmapped waterbodies, and have potential to be present in 651 additional waterbodies based on habitat types identified in the background data. No Brook Trout were captured at water crossings along the Project footprint during the 2022 field program.

In addition to known occurrence records, Brook Trout were potentially present in permanent, cold, well-oxygenated watercourses and lakes with overwintering potential as stated above (i.e., >1 m) crossed by the Project footprint. Specific suitable velocities were not considered for potential habitat, as this parameter was not available in sufficient detail during desktop screening and velocity measurements were limited during the field investigations due to water depth restrictions and site specific restrictions (e.g., target sites were chosen as those with no existing fisheries information). Water crossings where potential habitat for Brook Trout was considered present have been identified as possessing suitable habitat requirements for various life stages (i.e., spawning, rearing, feeding, and overwintering).

These watercourses were considered to provide primarily rearing or feeding habitat and the lakes and ponds were considered to provide primarily spawning and/or overwintering habitat. The waterbodies in the LSA are generally considered to have a cool water thermal regime. Brook Trout are considered cold water species and may not be present in the cool waterbodies in the LSA. This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Brook Trout. More site-specific data would be required to further determine the detailed distribution of Brook Trout in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2.2, there is 379,216 m^2 of overall known and potential Brook Trout habitat in the Project footprint (Table 6.6-15).

Brook Trout are considered common in the LSA (Crins 2009, MNRF 2009) (Table 6.6-15), and they are likely to be present in the small, cold water watercourses with gravel substrates. There is a potential that all life stages (i.e., fry, juvenile, and adult) are present in the LSA.

Table 6.6-15: Summary of Baseline Characterization Conditions for Brook Trout

Indicator	Baseline Characterization

Habitat quantity	• Brook Trout are documented in the southern and northern portion of the RSA.
	• Based on the desktop review, Brook Trout habitat exists at:
	  ◦ 27 known water crossings within the ROW and 33 known water crossings along associated access roads; and
	  ◦ 226 potential water crossings within the ROW and 425 potential water crossings along associated access roads.
	• Waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as potential Brook Trout habitat at one location.
	• 31,014 m^2 of known Brook Trout habitat[(a)] is estimated in the ROW footprint and 291,598 m^2 of potential habitat has been identified in the ROW footprint through background screening and field investigations.
	• 7,958 m^2 of known Brook Trout habitat[(a)] is estimated in the access road footprint and 39,646 m^2 of potential habitat has been identified in the access road footprint through background screening and field investigations.

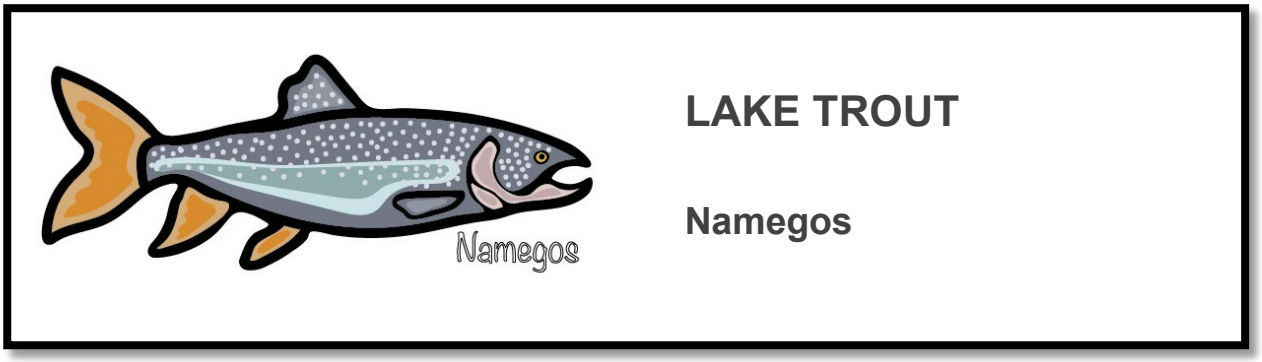
Habitat quality	• The fish habitat in the LSA is likely to be productive from a fisheries perspective. • Water crossings where Brook Trout habitat has been identified are considered as likely possessing suitable habitat requirements for various life stages (i.e., spawning, rearing, feeding, and overwintering)
Abundance	• Brook Trout are considered common within the LSA and may be abundant in small, cold water watercourses with gravel substrates where there is habitat to support this species. • There is a potential that all life stages (i.e., fry, juvenile, and adult) are present at waterbodies in the LSA with suitable habitat to support the species.
Distribution	• Brook Trout are restricted to cold water watercourses and lakes throughout the RSA and LSA.

a) Feeding, spawning, rearing, and/or overwintering habitat may be present.

b) ROW and access road water crossings that were within the 120 m of aggregate pits and the 30 m of temporary laydown areas and construction camps were not included in the count of waterbodies within these areas.

LSA = local study area; RSA = regional study area; m = metre; m^2 = square metre.

6.6.5.2.5.2 Lake Trout



Lake Trout are a native sport and commercial fish species with socio-economical importance and ecological importance since they are the only native sport fish species adapted to oligotrophic lakes (MNRF 2019). Lake Trout are considered a provincially secure species (i.e., Srank 5) despite rarity of Lake Trout lakes in Ontario (MNRF 2019) (Appendix 6.6-A, Appendix C, Table C-1). Lake Trout prefer oligotrophic lakes that have characteristically low nutrient levels, high dissolved oxygen levels, and typically deep areas with very cold water (10°C; Janoscik 2001). They move to deep, colder waters in summer months and shallow, warmer waters in the fall for spawning (Eakins 2017).

Lake Trout are fall spawning species that are reliant upon temperature and length of daylight as spawning cues. Spawning occurs at between 15 centimetres (cm) below the HWM and 55 m, over a variety of substrates but typically rubble/ cobble/ small boulder shoals (Marcus et al. 1984). Lake Trout are broadcast spawners and eggs incubate over the winter in the interstitial spaces of the large substrate. Adult overwintering usually occurs in deeper areas of deep lakes with suitable levels of dissolved oxygen (Scott and Crossman 1998), but also may occur in the centre of the lake in the top 3 m of the water column (Blanchfield et al. 2009).

Distribution of Lake Trout during winter is influenced by ambient light levels, snow depth, and daylight hours (Blanchfield et al. 2009). Lake Trout are highly mobile and make both horizonal and vertical movements in their range in response to various abiotic and biotic factors (Marcus et al. 1984). Although primarily a lake-dwelling fish, Lake Trout may move into larger, cold water tributary watercourses for feeding and rearing.

Based on known habitat requirements (Scott and Crossman 1998, Holm et al. 2021) and geographic distributions, Lake Trout have a moderate potential to occur in the LSA. Within the Project footprint, Lake Trout are known to be present in approximately 3% of water crossings and habitat potential has been identified in approximately 19% of water crossings intersected by the Project footprint.

Lake Trout were documented in 27 water crossings associated with the Project footprint and have been found in all tertiary watersheds in the RSA. Lake Trout have been identified in 15 lakes and ponds (e.g., Little Eva Lake, Amp Lake, Middle Shebandowan Lake, etc.), 12 associated watercourses (e.g., Crystal River, Kashabowie River, Wabigoon River, etc.), and

have potential to be present in 157 additional waterbodies based on habitat types present in the background data. No Lake Trout were captured during the 2022 field program.

In addition to known occurrence records, Lake Trout were potentially present in large waterbodies (i.e., bankfull width greater than 5 m) crossed by the Project footprint. The watercourses were considered to provide primarily rearing or feeding habitat and the lakes and ponds were considered to provide primarily spawning and/or overwintering habitat. The waterbodies in the LSA are generally considered to have a cool water thermal regime. Lake Trout are considered cold water species and may not be present in the cool waterbodies in the LSA. This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Lake Trout. More site-specific data would be required to further determine the detailed distribution of Lake Trout in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2.2, there is 336,478 m^2 of overall known and potential Lake Trout habitat in the Project footprint (Table 6.6-16).

Based on background data (presented and referenced in Appendix 6.6A, 6.6B and) field investigations (presented and referenced in Appendix 6.6A) and Indigenous knowledge studies (Lac des Mille Lacs First Nation 2023; NWOMC and Region 2 2023), Lake Trout are considered to be common throughout the LSA, present in the cold water lakes and large watercourses and there is a potential that all life stages (i.e., fry, juvenile, and adult) are present in the LSA where suitable habitat exists.

Table 6.6-16: Summary of Baseline Characterization Conditions for Lake Trout

Indicator	Baseline Characterization

Habitat quantity	• Lake Trout are documented in the lakes and larger watercourses throughout the RSA and LSA.
	• Based on the desktop review, Lake Trout habitat exists at:
	  ◦ 21 known water crossings within the ROW and six known water crossings along associated access roads; and
	  ◦ 91 potential water crossings within the ROW and 66 potential water crossings along associated access roads.
	• Waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as potential Lake Trout habitat at 12 locations.
	• 165,295 m^2 of known Lake Trout habitat[(a)] is estimated in the ROW footprint and 138,780 m^2 of potential habitat has been identified in the ROW footprint through background screening and field investigations.
	• 2,870 m^2 of known Lake Trout habitat[(a)] is estimated in the access road footprint and 29,533 m^2 of potential habitat has been identified in the access road footprint through background screening and field investigations.

Indicator	Baseline Characterization
Habitat quality	• The fish habitat in the LSA is likely to be productive from a fisheries perspective due to abundance of preferred habitat. • Water crossings where there is potential for Lake Trout to be present likely provide suitable feeding, spawning, rearing, and/or overwintering habitat.
Abundance	• Lake Trout are likely to be present in the cold water lakes and large, cold water watercourses where there is habitat to support this species. • There is a potential that all life stages (i.e., fry, juvenile, and adult) are present at waterbodies in the LSA with suitable habitat to support the species.
Distribution	• Lake Trout are distributed in the cold lakes and larger watercourses throughout the RSA.

(a) Feeding, spawning, rearing, and/or overwintering habitat may be present.

RSA = regional study area; LSA= local study area; m = metre; m^2 = square metre.

6.6.5.2.5.3 Northern Pike

Northern Pike was chosen as a Project criteria species due to their predatory success, tolerance to a variety of environmental conditions, importance to Indigenous communities and wide distribution across the study area (Harvey 2009, MNRF 2009). Northern Pike provides a valuable contribution to the recreational fishery as well as occupying an important position in the food chain as an apex predator. Northern Pike is considered a provincially secure species (i.e., Srank 5) (NHIC 2022, NatureServe 2022). Northern Pike inhabit a wide range of waterbody types from headwater streams to nearshore waters (Holm et al. 2021). Northern Pike is primarily found in shallow, moderately productive, vegetated waters, at depths less than 4 m, with a preference to nearshore habitat, vegetated side channels, sloughs, and backwaters (Harvey 2009). Aquatic vegetation is key in all life stages of Northern Pike and is necessary to provide camouflage and cover for hunting and concealment. Adults are usually found in clear water with at least 30% aquatic vegetation cover (Casselman 1995). Northern Pike are ambush predators, and opportunistic feeders (Holm et al. 2021).

Spawning occurs in early spring under ice conditions or after ice melt when water temperatures reach 5°C (Holm et al. 2021). Spawning areas are often located within tributaries, typically

shallow, slow-moving waters with heavily vegetated floodplains of streams or lakes (Harvey 2009). Spawning migrations vary between individuals and populations in that some travel tens of kilometres while others travel hundreds of kilometres to ideal spawning locations; however, there is no evidence supporting homing to spawning grounds, only to relevant suitable habitat (Harvey 2009). Eggs are attached to vegetation and hatch in about two weeks. There is no parental care, and no nests are built nests (Holm et al. 2021). During the summer season, Northern Pike move to deeper, cooler water becoming more active and feeding nocturnally. In the winter, as the oxygen concentrations and water temperatures decrease, Northern Pike stay closer to the surface and increase their activity and feeding during the day. Northern Pike are less active below 6°C and stop feeding as oxygen drops below 2 mg/L (Casselman 1995).

Based on known habitat requirements (Scott and Crossman 1998, Holm et al. 2021), Indigenous knowledge studies (Lac de Mille Lacs First Nation 2023, NWOMC and Region 2 2023) and geographic distributions, Northern Pike have a high potential to occur in the LSA. Within the Project footprint, Northern Pike are known to be present in approximately 26% of water crossings and habitat potential has been identified in approximately 90% of water crossings intersected by the Project footprint.

Northern Pike are documented in all tertiary watersheds in the RSA; they have been documented in 216 water crossings associated with the Project footprint. Northern Pike have been identified in 34 waterbodies (e.g., Amp Lake, Middle Shebandowan Lake, Little Eva Lake, etc.), 159 watercourses (e.g., Little Pickerel River, Atikokan River, Current River etc.), 23 unmapped waterbodies, and have potential to be present at 743 additional waterbodies based on habitat types present in the background data. Northern Pike were captured at nine water crossings in the project footprint, 5 of which were within the ROW (i.e., 4% of crossings sampled) during the 2022 field program. It should be noted that crossings assessed during the 2022 field program were those with no historic fisheries data, often of negligible size or permanency, thus demonstrating the abundance of this species.

Lac des Mille Lacs First Nation community identified a pike spawning area within the LSA that is adjacent to an access road being used for the Project. This area is of importance to community members and special care will be taken at this crossing to avoid harming the fish during the spring spawn. The recommended in-water restricted activity timing window was applied to this location to protect the pike spawning period as well as egg and larval development periods.

In addition to known occurrence records, Northern Pike are potentially present in cool water of waterbodies and watercourses with instream vegetation that are crossed by the Project footprint. Water crossings where potential habitat for Northern Pike was considered present have been identified as suitable for various life stages (i.e., spawning, rearing, feeding, and/ or overwintering). Permanency was not an essential metric for screening potential habitat as riparian areas and intermittent or ephemeral flow is often considered suitable for some life processes (i.e., spawning). Similarly, areas of intermittent flow are not a limiting factor for this species; instead, floodplains that are dry except during spring, are often utilized for spawning. This is a conservative assumption as it is not known that all identified water crossings would

have suitable habitat for Northern Pike. More site-specific data would be required to further determine the detailed distribution of Northern Pike in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2.2, there is 576,859 m^2 of overall known and potential Northern Pike habitat in the Project footprint (Table 6.6-17).

Northern Pike are considered abundant in the LSA, and they are likely to be present with moderate abundance in most waterbodies and watercourses. There is a potential that all life stages (i.e., fry, juvenile, and adult) are present in the LSA.

Table 6.6-17: Summary of Baseline Characterization Conditions for Northern Pike

Indicator	Baseline Characterization

Habitat quantity	• Northern Pike are documented throughout the RSA and LSA.
	• Based on the desktop review, Northern Pike habitat exists at:
	  ◦ 86 known water crossings within the ROW and 130 known water crossings along associated access roads; and
	  ◦ 284 potential water crossings within the ROW and 459 potential water crossings along associated access roads.
	• Waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as potential Northern Pike habitat at 17 locations.
	• 308,795 m^2 of known Northern Pike habitat[(a)] is estimated in the ROW footprint and 202,192 m^2 of potential habitat has been identified in the ROW footprint through background screening and field investigations.
	• 15,697 m^2 of known Northern Pike habitat[(a)] is estimated in the access road footprint and 50,175 m^2 of potential habitat has been identified in the access road footprint through background screening and field investigations.

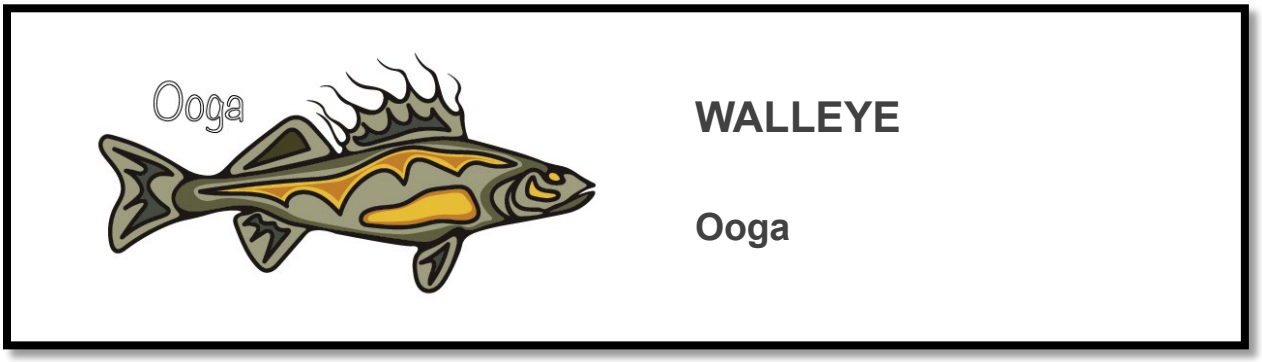
Habitat quality	• The fish habitat in the LSA is likely to be productive from a fisheries perspective. • Water crossings where Northern Pike habitat has been identified are considered as likely possessing suitable habitat requirements for various life stages (i.e., spawning, rearing, feeding, and overwintering).
Abundance	• Northern Pike are considered abundant within the LSA and may be abundant in lakes/ ponds and watercourses under a variety of habitat conditions that are known to support this species including the presence of aquatic vegetation. • There is a potential that all life stages (i.e., fry, juvenile, and adult) are present at waterbodies in the LSA with suitable habitat to support the species.

Indicator	Baseline Characterization
Distribution	• Northern Pike are documented throughout the RSA and LSA. • As an apex predator with a range of habitat usage, it is expected the Northern Pike is the most widely distributed criteria species throughout the RSA and LSA.

a) Feeding, spawning, rearing, and/or overwintering habitat may be present.
b) ROW and access road water crossings that were within the 120 m of aggregate pits and the 30 m of temporary laydown areas and construction camps were not included in the count of waterbodies within these areas.

LSA = local study area; RSA = regional study area; m = metre; m^2 = square metre.

6.6.5.2.5.4 Walleye



Walleye, also known as Yellow Pickerel or simply Pickerel, are a native freshwater fish that contribute a valuable socio-economic benefit by supporting substantial recreational and commercial fisheries and are a species of Indigenous importance. Walleye play significant roles in lake systems as a main predator that helps structure smaller fish and invertebrate communities (Pandit et al. 2013). They are present in all tertiary watersheds within the RSA and are considered a provincially secure species (i.e., SRank 5) (NHIC 2022, NatureServe 2022) Walleye are known to tolerate a large range of in water cover types, water depths and elevated turbidity (Scott and Crossman 1973 and Holm et al. 2021). Walleye are known to prefer moderate to large sized lakes (i.e., > 100 ha) and river systems with moderate amounts of nutrients (i.e., 40-60%) and extensive shorelines (McMahon et al. 1984).

Walleye spawn in late spring (May to June), primarily on gravel, boulder, or cobble along inshore areas of lakes or nearby tributaries in areas with fast flowing, white water downstream from falls and other potential barriers. In lakes they prefer to spawn in areas with wave action, shallow bays, and rocky shoals (Hartman 2009, Holm et al.2021). Walleye are broadcast spawners, with egg incubation occurring in the interstitial spaces of the large substrate. Rearing habitat includes the bottom of water bodies while the yolk sacs remain intact, as they age they move via drift/current to shallow and sheltered shoreline areas (Hartman 2009). Juvenile habitats are similar to adults once they leave the shallow areas (Hartman 2009). Overwintering occurs in similar habitat to rearing; however, strong currents are avoided (Scott and Crossman 1998). Ice may be used as cover during winter in shallow waters, while depth and turbid waters

may be used as cover in deeper waters (Scott and Crossman 1998). Overwintering habitat is sought once water temperatures decrease to approximately 5°C (Paragamian 1989).

Based on known habitat requirements (Scott and Crossman 1998, Holm et al. 2021), Indigenous knowledge studies (Lac de Mille Lacs First Nation 2023, NWOMC and Region 2 2023) and geographic distributions, Walleye have a high potential to occur in the LSA. Within the Project footprint, Walleye are known to be present in approximately 6% of water crossings and habitat potential has been identified in approximately 25% of water crossings intersected by the Project footprint.

Walleye are found in all tertiary watersheds of the RSA and have been identified in 47 water crossings (e.g., Amp Lake, Middle Shebandowan Lake, Nym Lake, Little Pickerel River, Kaministiquia River, Obadinaw River etc.), and potential habitat was identified in 211 additional water crossings based on the species habitat requirements. No Walleye were captured during the 2022 field program.

In addition to known occurrence records, Walleye were potentially present in cool water of waterbodies and watercourses crossed by the Project footprint. At water crossings where potential habitat for Walleye was identified, suitable habitat is present for various life stages (i.e., spawning, rearing, feeding, and/or overwintering). As mentioned above, Walleye require waterbodies and watercourses with substantial area and cool water, thus many wetland features are not considered suitable habitat for this species. This is a conservative assumption as it is not known that all identified water crossings would have suitable habitat for Walleye. More site-specific data would be required to further determine the detailed distribution of Walleye in the LSA.

Based on the approach presented in the introduction to Section 6.6.5.2.2, there is 529,549 m^2 of overall known and potential Walleye habitats in the Project footprint.

Walleye are considered common in the LSA (MNRF 2009) (Table 6.6-20) relative to other large-bodied predatory species and they are likely to be present with moderate abundance in significant cool water waterbodies and watercourses. There is a potential that all life stages (i.e., fry, juvenile, and adult) are present in the LSA, reinforced by information shared through Indigenous knowledge studies (Migisi Sahgaigan 2022, Lac de Mille Lacs First Nation 2023, NWOMC and Region 2 2023).

Table 6.6-18: Summary of Baseline Characterization Conditions for Walleye

Indicator	Baseline Characterization

Habitat quantity	• Walleye are documented throughout the RSA and LSA.
	• Based on the desktop review, Walleye habitat exists at:
	  ◦ 32 known water crossings within the ROW and 15 known water crossings along associated access roads; and
	  ◦ 132 potential water crossings within the ROW and 79 potential water crossings along associated access roads
	• Waterbodies[(b)] within 120 m of aggregate pits and 30 m of temporary laydown areas and construction camps have been identified as potential Walleye habitat at 11 locations.
	• 201,325 m^2 of known Walleye habitat[(a)] is estimated in the ROW footprint and 289,910 m^2 of potential habitat has been identified in the ROW footprint through background screening and field investigations.
	• 5,505 m^2 of known Walleye habitat[(a)] is estimated in the access road footprint and 32,808 m^2 of potential habitat has been identified in the access road footprint through background screening and field investigations.

Habitat quality	• The fish habitat in the LSA is likely to be productive from a fisheries perspective. • Water crossings with cool, clear water, and ample vegetation cover provide the highest quality of habitat for Walleye life stage requirements. • Rocky substrate and oxygenated waters (often of tributaries) provide the highest quality habitat for Walleye spawning activities.
Abundance	• Walleye are considered common within the LSA and may be abundant in moderately sized cool waterbodies (i.e., >100 ha) and their tributaries. • There is a potential that all life stages (i.e., fry, juvenile, and adult) are present in waterbodies in the LSA with suitable habitat to support the species.
Distribution	• Walleye are documented throughout the RSA and LSA, distributed throughout larger scale, cool water watercourses and waterbodies.

a) Feeding, spawning, rearing, and/or overwintering habitat may be present.

b) ROW and access road water crossings that were within the 120 m of aggregate pits and the 30 m of temporary laydown areas and construction camps were not included in the count of waterbodies within these areas.

LSA = local study area; RSA = regional study area; m = metre; m^2 = square metre.

6.6.5.2.6 Invasive and Introduced Species

Most of the fish species in the LSA are considered native or have been naturalized (Eakins 2022); however, several species may have been introduced, including invasive species. Aquatic invasive species records within the RSA are limited due to the lack of occurrence records, particularly around the MNRF Dryden-Fort Frances-Atikokan District, although 20 invasive species of fish, aquatic invertebrates, and aquatic plants were identified within the RSA

(EDDMaps 2022). Invasive species included, but were not limited to, Eurasian Ruffe (*Gymnocephalus cernuus*), Round Goby (*Neogobius melanostomus*) and Sea Lamprey (*Petromyzon marinus).* Invasive species records within the RSA are described in further detail in Appendix 6.6-A, Section 3.3.1.2. Precautions were taken during field investigations to avoid the transfer of invasive species between water crossings, which included the use of disinfection procedures. No invasive species were observed or captured during the 2022 field survey.

Several species may have been introduced (i.e., are non-native species that have become established in ecosystems outside their natural historic range as a result of human actions) and since naturalized (i.e., introduced species that has become established in the ecosystem) in the RSA. Native populations of Brook Trout are present in North Lake Superior Shoreline and Kaministiquia River watersheds, although some stocking also occurred (MNRF 2009). Brook Trout were introduced in Wabigoon and Upper English tertiary watersheds. Rainbow Trout are considered introduced throughout Ontario and may be present in the Wabigoon and southern portion of the Upper English tertiary watersheds. Brown Trout (*Salmo trutta*) were introduced to Arrow River in the 1980s, and some Brown Trout are occasionally caught in the tributaries of Lake Superior within FMZ 6 (MNRF 2009). Smallmouth Bass are considered native in Lake Superior, whereas lakes around the Thunder Bay area were stocked and have since become naturalized. Smallmouth Bass have been introduced and since become naturalized in the Wabigoon and Upper English tertiary watersheds. Lac des Mille Lacs First Nation noted depending on the ecology and conditions of the lake where bass have been introduced, in some cases they outcompete other species such as Walleye (Lac des Mille Lacs First Nation 2023). Walleye, Splake (a hybrid between Speckled Trout and Lake Trout) and Lake Trout are considered native in the LSA but may have been introduced as sport fish to waterbodies in the LSA. Rainbow Smelt (*Osmerus mordax)* are present in all the RSA watersheds. They are considered an invasive species and have been introduced into the Wabigoon and Upper English River watersheds and have since been considered naturalized (Appendix 6.6-A, Table A-4) (MNR 2012b). Largemouth Bass and Black Crappie are considered introduced within FMZ 5 (MNR 2012b). White Perch (*Morone americana*) invaded Lake Ontario in 1950 and subsequently the Great Lakes; it is now considered naturalized in the near shore tributaries of Lake Superior (Holm et al. 2021).

6.6.5.2.7 Fish and Fish Habitat in a Changing Climate

Climate change has the potential to cause effects that can alter the physiology, life history, phenology, survival, abundance and distribution of fishes and aquatic organisms, while also imparting indirect effects through complex interactions with numerous other ecological processes in habitat quality and quantity (Paukert et al. 2021, DFO 2019). Observed impacts of climate change as they relate to fish and fisheries include but are not limited to:

- Changes in water temperatures: changes in water temperatures can cause changes in the native fish reproduction, growth and mortality rates, disruption of spawning cues, distributional shifts of fish species or guilds, expansion of fish ranges and change in

habitat suitability for non-native fish, change in water quality from acidification and nutrient enrichment; and

- Changes in precipitation: changes in precipitation can cause loss of connectivity, habitat diversity, increased erosion potential/overland run off, increased sedimentation of waterbodies, variable water levels, disruption of natural hydrological regimes, change in water quality from nutrient loading, disruption of spawning cues, reduction of biodiversity and loss of native species.

The fish productivity within the RSA is limited based upon the climate and according to the length of the growing season, as well as availability of nutrients (MNRF 2009). Ice cover occurs for approximately 6 months of the year beginning in mid-November and thaw occurring in early May. Warmer temperatures resulting from climate change have the potential to increase the productivity of the lakes (MNRF 2009). DFO predicts increases in winter and fall flows, reduction in summer flows with lower and earlier spring freshets that are regionally variable and headwater dependent and snow depth dependent (DFO 2013a). Changes to lake temperatures and stratification, increased evaporation and longer water renewal times, declining oxygen levels and increases in primary production with community shifts (DFO 2013a) are also predicted. Long term climate change effects may result in changes to fish community composition, as the current populations are replaced by other species better adapted to the warmer conditions (e.g., bass populations) are expected to benefit from warmer temperatures, which may cause decreases in Walleye abundance (MNRF 2009) and may have substantial, negative consequences for the fish communities already inhabiting those watersheds, especially diverse Leuciscid communities (i.e., fish communities containing relatively tolerant fish species such as Fathead Minnows [*Pimephales promelas*] as well as species with narrower habitat requirements such as Pearl Dace (*Margariscus nachtriebi*) (Chu et al. 2005)). Chu et al. 2005, predicts that Brook Trout in northern Ontario may constrict their ranges and they will be limited to the areas around Lake Superior, whereas Walleye, and Smallmouth Bass etc. are predicted to expand their ranges. Northern Canada and Ontario are expected to see greater climate warming than in the southern regions of Canada (Flato and Boer 2001).

6.6.5.2.8 Summary of the Existing Environment

The existing environment described above for fish species and their habitats documented within the LSA including the criteria species provides context for the effects assessment presented in Section 6.6.7. Tables 6.6-19 and 6.6-20 present a summary of the information detailed above. These data will be considered through the assessment of potential Project-related effects and in the recommendation of preliminary avoidance mitigation measures (Table 6.6-23 and Table 6.6-24).

Table 6.6-19: Fish Species Likely to Occur in the Local Study Areas, Their Conservation Ranking, and Proposed Species Restricted Activity Timing Windows

Common Name[a]	Scientific Name	Family	COSEWIC[c]	SARA[d]	ESA[e]	S Rank[f]	Preferred Thermal Regime[g,i]	Recommended Species Restricted Activity Timing Window[h]
Black Bullhead	*Ameiurus melas*	Ictaluridae	-	-	-	S4	Warm	April 1 to June 15
Black Crappie	*Pomoxis nigromaculatus*	Centrarchidae	-	-	-	S4	Cool	April 1 to June 15
Blacknose Dace [j]	*Rhinichthys* sp.	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Blacknose Shiner	*Notropis heterolepis*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Bluntnose Minnow	*Pimephales notatus*	Leuciscidae	NAR	-	-	S5	Warm	April 1 to June 15
Brook Stickleback	*Culaea inconstans*	Gasterosteidae	-	-	-	S5	Cool	April 1 to June 15
Brook Trout[b]	*Salvelinus fontinalis*	Salmonidae	-	-	-	S5	Cold	September 1 to June 15
Brown Bullhead	*Ameiurus nebulosus*	Ictaluridae	-	-	-	S5	Warm	April 1 to June 15
Brown Trout	*Salmo trutta*	Salmonidae	-	-	-	SNA	Cold	September 1 to June 15
Burbot	*Lota lota*	Gadidae	-	-	-	S5	Cold	September 1 to June 15
Carps and Goldfish	*Cyprinidae* spp.	Cyprinidae	-	-	-	S5	Warm	April 1 to June 15
Central Mudminnow	*Umbra limi*	Umbridae	-	-	-	S5	Cool	April 1 to June 15
Chinook Salmon	*Oncorhynchus tshawytscha*	Salmonidae	-	-	-	SNA	Cold	September 1 to June 15
Cisco	*Coregonus artedi*	Salmonidae	-	-	-	S5	Cold	October 1 to May 31
Common Shiner	*Luxilus cornutus*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Creek Chub	*Semotilus atromaculatus*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Deepwater Sculpin (Great Lakes - Western St. Lawrence Populations)[b]	*Myoxocephalus thompsonii pop. 2*	Cottidae	SC	SC	-	S3?	Cold	September 1 to June 15
Emerald Shiner	*Notropis atherinoides*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Fathead Minnow	*Pimephales promelas*	Leuciscidae	-	-	-	S5	Warm	April 1 to June 15
Finescale Dace	*Chrosomus neogaeus*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Gasterosteidae sp.	*Gasterosteidae* spp.	Gasterosteidae	-	-	-	S5	n/a	April 1 to June 15
Golden Shiner	*Notemigonus crysoleucas*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Green Sunfish	*Lepomis cyanellus*	Centrarchidae	NAR	-	-	S4	Warm	April 1 to June 15
Iowa Darter	*Etheostoma exile*	Percidae	-	-	-	S5	Cool	April 1 to June 15
Johnny Darter	*Etheostoma nigrum*	Percidae	-	-	-	S5	Cool	April 1 to June 15
Lake Chub	*Couesius plumbeus*	Leuciscidae	-	-	-	S5	Cold	April 1 to June 15
Lake Sturgeon (Saskatchewan - Nelson River Populations)[b]	*Acipenser fulvescens*	Acipenseridae	END	-	THR	S2	Cold	April 1 to June 30
Lake Trout[b]	*Salvelinus namaycush*	Salmonidae	-	-	-	S5	Cold	September 1 to May 31
Lake Whitefish	*Coregonus clupeaformis*	Salmonidae	-	-	-	S5	Cold	September 15 to May 31
Least Darter	*Etheostoma microperca*	Percidae	NAR		-	S4	Cool	April 1 to June 15
Leuciscidae sp.	*Leuciscidae* spp.	Leuciscidae	-	-	-	S2 - S5	n/a	April 1 to June 15
Logperch	*Percina caprodes*	Percidae	-	-	-	S5	Cool	April 1 to June 15

Common Name[a]	Scientific Name	Family	COSEWIC[c]	SARA[d]	ESA[e]	S Rank[f]	Preferred Thermal Regime[g,i]	Recommended Species Restricted Activity Timing Window[h]
Longnose Dace	*Rhinichthys cataractae*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Mimic Shiner	*Notropis volucellus*	Leuciscidae	-	-	-	S5	Warm	April 1 to June 15
Mottled Sculpin	*Cottus bairdii*	Cottidae	-	-	-	S5	Cold	September 1 to June 15
Muskellunge	*Esox masquinongy*	Esocidae	-	-	-	S4	Warm	April 1 to July 15
Ninespine Stickleback	*Pungitius pungitius*	Gasterosteidae	-	-	-	S5	Cold	April 1 to June 15
Northern Brook Lamprey[b]	*Ichthyomyzon fossor*	Petromyzontidae	SC	SC	SC	S3	Cool	April 1 to June 15
Northern Pearl Dace	*Margariscus nachtriebi*	Leuciscidae	-	-	-	S5	Cold	April 1 to June 15
Northern Pike[b]	*Esox lucius*	Esocidae	-	-	-	S5	Cool	April 1 to June 15
Northern Redbelly Dace	*Chrosomus eos*	Leuciscidae	-	-	-	S5	Cool	April 1 to June 15
Percidae sp.	*Percidae* sp.	Percidae	-	-	-	S4 - S5	n/a	April 1 to June 15
Pumpkinseed	*Lepomis gibbosus*	Centrarchidae	-	-	-	S4	Warm	April 1 to June 15
Quillback	*Carpiodes cyprinus*	Catostomidae	-	-	-	S4	Cool	April 1 to June 15
Rainbow Smelt	*Osmerus mordax*	Osmeridae	-	-	-	S5	Cold	April 1 to June 15
Rainbow Trout	*Oncorhynchus mykiss*	Salmonidae	-	-	-	SNA	Cold	April 1 to June 15
Rock Bass	*Ambloplites rupestris*	Centrarchidae	-	-	-	S5	Cool	April 1 to June 15
Salmonidae sp.	*Salmonidae* spp.	Salmonidae	-	-	-	S5	Cold	September 1 to June 15
Sauger	*Sander canadensis*	Percidae	-	-	-	S4	Cool	April 1 to June 20
Shorthead Redhorse	*Moxostoma macrolepidotum*	Catostomidae	-	-	-	S5	Warm	April 1 to June 15
Slimy Sculpin	*Cottus cognatus*	Cottidae	-	-	-	S5	Cold	September 1 to June 15
Smallmouth Bass	*Micropterus dolomieu*	Centrarchidae	-	-	-	S5	Warm	May 15 to July 15
Spottail Shiner	*Notropis hudsonius*	Leuciscidae	-	-	-	S5	Cold/Cool	April 1 to June 15
Trout-perch	*Percopsis omiscomaycus*	Percopsidae	-	-	-	S5	Cold	April 1 to June 15
Walleye[b]	*Sander vitreus*	Percidae	-	-	-	S5	Cool	April 1 to June 20
White Perch	*Morone americana*	Moronidae	-	-	-	SNA	Warm	April 1 to June 15

Common Name[a]	Scientific Name	Family	COSEWIC[c]	SARA[d]	ESA[e]	S Rank[f]	Preferred Thermal Regime[g,i]	Recommended Species Restricted Activity Timing Window[h]
White Sucker	*Catostomus commersonii*	Catostomidae	-	-	-	S5	Cool	April 1 to June 15
Yellow Perch	*Perca flavescens*	Percidae	-	-	-	SNA	Cool	April 1 to June 15

a) The crossing list is a combination of collated data from various background resources and field data by georeferenced crossing location (see Appendix 6.6-A Fish and Fish Habitat Baseline Report for the details on sources used).
b) Criteria species.
c) Committee on the Status of Endangered Wildlife in Canada (COSEWIC) http://www.cosewic.gc.ca/; Extirpated (EX), Endangered (END), Threatened (THR), Special Concern (SC), Data Deficient (DD), NAR (Narrative).
d) *Species at Risk Act* (SARA), 2002. Schedule 1 (Last amended September 5, 2020); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern), DD (Data Deficient).
e) *Endangered Species Act* (ESA), 2007. General (O.Reg 242/08 last amended June, 29 2020 as O.Reg 328/20). SARO List (O.Reg 230/08 last amended Aug 1, 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC), Data Deficient (DD), NAR (Not At Risk).
f) Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the NHIC. These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly–Extirpated – Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SNA (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2019.
g) Eakins, R.J. 2022. Ontario Freshwater Fishes Life History Database. Version 5.14. Online database. (https://www.ontariofishes.ca), accessed April 21, 2023.
h) Department of Fisheries and Oceans Canada (DFO). 2013b. Government of Ontario 2013; Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat. Northwest Region.
i) Coker, G. A., Portt, C. B., and Minns, C. K. 2001. Morphological and Ecological Characteristics of Canadian Freshwater Fishes. Can. Tech. Rep. Fish. Aquat. Sci. 2554: iv+89p. Accessed April 21, 2023. Available at https://publications.gc.ca/collections/collection_2007/dfo-mpo/Fs97-4-2554E.pdf.
j) Recent updates to Holm et al. (2021) referenced a genetic study that concluded all of the Blacknose Dace (including Eastern Blacknose Dace) occurring in Ontario cannot be accurately identified using morphological characteristics. Previous occurrence data obtained for the Project referenced Eastern Blacknose Dace captures.

Table 6.6-20: Fish Species Likely to Occur in the Local Study Area, their Habitat Preferences and Number of Water Crossings with Potential to Provide Habitat

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Black Bullhead	*Ameiurus melas*	Ictaluridae	Bottom of warm, shallow, slow moving areas of lakes, streams and ponds with some cover availability, soft substrates and low gradients	• Spring spawner in waterbodies and watercourses • Creates nests in mud, sand or gravel bottom	• Rainy Lake • Big Turtle River	Lake/Ponds and Watercourses	69	134	Uncommon
Black Crappie	*Pomoxis nigromaculatus*	Centrarchidae	Warm waters of lakes and slow moving watercourses with instream vegetation, mud or sand substrates	• Spring spawner • Prepares a nest in shallow water with sand, gravel and mud, often some vegetation.	• North Lake Superior Shoreline • Kaministiquia River • Rainy Headwaters • Rainy Lake • Big Turtle River • Wabigoon River	Lakes/Ponds and Watercourses	158	127	Common
Blacknose Shiner	*Notropis heterolepis*	Leuciscidae	Clear, cool waters of shallow vegetated areas of lakes and slow moving watercourses with sand, gravel and silt substrates	• Unknown spawning timing - thought to be summer spawner • Deposits adhesive eggs over sand or aquatic vegetation in lakes or watercourses	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Bluntnose Minnow	*Pimephales notatus*	Leuciscidae	Shallow waters in lakes and watercourses with sand/gravel bottoms and clear water	• Spring spawner • Deposits eggs under flat surfaces of objects resting directly on bottom of shallow water (although prefers stones)	All Watersheds	Lakes/Ponds and watercourses	284	459	Abundant
Brook Stickleback	*Culaea inconstans*	Gasterosteidae	Cool watercourses, lakes and wetlands, often associated with vegetation	• Spring spawner • Constructs organic debris nest near bottom in shallow areas	All Watersheds	Lakes/Ponds and watercourses	284	459	Abundant
Brook Trout[b]	*Salvelinus fontinalis*	Salmonidae	Cold, clear, well-oxygenated lakes and watercourses where maximum water temperature does not exceed 22°C	• Fall spawner • Creates a redd in gravel substrates in riffles in watercourses or groundwater upwelling areas in near shorelines of lakes	All Watersheds	Lakes/Ponds and Watercourses	226	425	Common

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Brown Bullhead	*Ameiurus nebulosus*	Ictaluridae	Bottom of warm, shallow, slow moving areas of lakes, streams and ponds with some cover availability	• Late spring/early summer spawner • Shallow, saucer shaped nest in shallow water of lakes or stream banks. • May use anthropogenically sourced material (i.e., submerged tires)	• North Lake Superior Shoreline • Kaministiquia River • Rainy Headwaters • Rainy Lake • Big Turtle River	Lakes/Ponds and Watercourses	183	322	Common
Brown Trout	*Salmo trutta*	Salmonidae	Cool water of the Great Lakes and their tributaries, seldomly in small lakes	• Fall spawner • Coarse substrates of shallow streams and rocky shorelines of waterbodies	• North Lake Superior Shoreline • Kaministiquia River	Lakes/Ponds and Watercourses	86	134	Common
Burbot	*Lota lota*	Gadidae	Cold waters along the bottom of lakes and occasionally rivers	• Winter spawner • Sand or gravel substrate in shallow bays or shoals under ice cover • Periodically in shallow waters of rivers	All Watersheds	Lakes and Watercourses	207	383	Common
Carps and Goldfish	*n/a*	Cyprinidae	Warm, vegetated, slow moving waters of lakes and watercourses	• Spring Spawner • Shallow vegetated areas - no nest constructed	• North Lake Superior Shoreline • Kaministiquia River • Rainy Lake • Big Turtle River	Lakes/Ponds and Watercourses	155	268	Common
Central Mudminnow	*Umbra limi*	Umbridae	Quiet, vegetated waters of cool lakes and watercourses	• Spring spawner • Areas with instream vegetation in watercourses, lakes and ponds, and flooded areas	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Chinook Salmon	*Oncorhynchus tshawytscha*	Salmonidae	Spends most of life in deep, cold waters of large waterbodies, until returning to tributaries to spawn	• Fall spawner • Migrational spawner to areas of coarse substrate near riffles in watercourses	• North Lake Superior • Kaministiquia River	Lakes/Watercourses	17	8	Uncommon

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Cisco	*Coregonus artedi*	Salmonidae	Cold, deeper waters of lakes and occasionally large watercourses (bankfull width >25 m)	• Fall spawner • Gravel or coarser substrates in lakes in shallow or deep water and potentially larger watercourses (bankfull width >25 m)	All Watersheds	Lakes and large watercourses (bankfull width >25 m)	60	36	Uncommon
Common Shiner	*Luxilus cornutus*	Leuciscidae	Cool, shallow watercourses in oxygenated pools near riffles and nearshore areas of clear lakes	• Spring spawner • Constructs a nest by removing stones in shallow areas of lakes or watercourses. • May use the nests of other species	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Creek Chub	*Semotilus atromaculatus*	Leuciscidae	Cool water pools of clear creeks and small rivers, over sand, gravel and cobble substrates, rarer in large lakes and watercourses	• Spring spawner in watercourses • Gravel substrate above or below riffles in watercourses	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Deepwater Sculpin - Great Lakes - Western St. Lawrence Populations[b]	*Myoxocephalus thompsonii pop. 2*	Cottidae	Benthic inhabitants to the cold waters of deep lakes	• Summer/Fall Spawner • Largely unknown beyond deep water of lakes	• North Lake Superior Shoreline • Rainy Headwaters • Wabigoon River	Lakes	9	0	Rare
Emerald Shiner	*Notropis atherinoides*	Leuciscidae	Cool, open waters of lakes and pools/ runs in lower reaches of watercourses with sand and gravel substrates	• Late spring/early summer spawner • Gravel in lakes and watercourses	All Watersheds	Lakes/Ponds and watercourses	284	459	Abundant
Fathead Minnow	*Pimephales promelas*	Leuciscidae	Known to prefer lakes and watercourses with muddy substrates; however, may occupy many different habitat types	• Spring spawner • Under rocks or woody debris in lakes or watercourses, occasionally under lily pads	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Finescale Dace	*Chrosomus neogaeus*	Leuciscidae	Cool lakes and watercourses with instream vegetation and silt and detritus substrate; usually stained water	• Spring spawner • Woody debris in watercourses and lakes	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Golden Shiner	*Notemigonus crysoleucas*	Leuciscidae	Lakes and watercourses with instream vegetation and silty substrates	• Spring/summer spawner • Filamentous algae, rooted vegetation essential for egg deposition	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Green Sunfish	*Lepomis cyanellus*	Centrarchidae	Warm, shallow waters of lakes, ponds, impoundments and watercourses, frequently found in brush piles and dense vegetation.	• Spring/summer spawner • Colony nesting in very shallow water	• Rainy Headwaters • Rainy Lake • Big Turtle River	Lakes/Ponds and Watercourses	118	213	Common
Iowa Darter	*Etheostoma exile*	Percidae	Benthic inhabitant to the clear waters of lakes, and slow flowing pools of watercourses with organic - sand substrates and rooted aquatic vegetation	• Spring spawner • Shallow water with woody debris or roots, and soft substrates, and fibrous roots of undercut banks	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Johnny Darter	*Etheostoma nigrum*	Percidae	Benthic inhabitants most commonly found in waters with little - moderate current, sand, silt and gravel substrates preferred; however, also may be found in riffles and vegetated areas	• Spring spawner • Under rocks in watercourses and lakes	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Lake Chub	*Couesius plumbeus*	Leuciscidae	Open waters of lakes and pools or runs of creeks and rivers with gravel substrate. Migrates to watercourses seasonally, often found in cold pelagic strata of lakes in warmer seasons	• Spring spawner • Migrates to watercourses to spawn over sand, gravel, or rocks	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Lake Sturgeon (Saskatchewan - Nelson River population)[b]	*Acipenser fulvescens*	Acipenseridae	Cold waters along sand and silt bottoms of lakes and large watercourses	• Spring spawner • Migrates to fast flowing watercourses over rocky substrate or woody debris • Will spawn at the foot of migrational barriers (i.e., falls and hydro dams)	• Upper English River • Wabigoon River	Lakes and watercourses (i.e., bankfull width >50 m)	20	3	Rare

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Lake Trout[b]	*Salvelinus namaycush*	Salmonidae	Cold water lakes, below the thermocline in summer months, may migrate to large watercourses in the fall	• Fall spawner • Large boulder/ cobble substrates in various water depths (often <40 m, observed as shallow as 0.3 m); often associated with groundwater upwellings • Infrequently in large watercourses	All Watersheds	Lakes and rarely in large watercourses (i.e., bankfull width >5 m)	91	66	Common
Lake Whitefish	*Coregonus clupeaformis*	Salmonidae	Cold, deeper waters of lakes below the thermocline and occasionally large watercourses (bankfull width >5 m).	• Fall spawner • Often over hard rocky substrates, infrequently sand in shallow waters (<8 m)	All Watersheds	Lakes and large watercourses (bankfull width >5 m)	91	66	Common
Least Darter	*Etheostoma microperca*	Percidae	Vegetated areas of lakes and watercourses with soft sand, mud and/or organic substrates	• Spring spawner • Shallow areas near shore where eggs are adhered to vegetation	• Kaministiquia River	Lakes/Ponds and Watercourses	78	120	Uncommon
Logperch	*Percina caprodes*	Percidae	Sand, gravel or rocky beaches in waterbodies and over similar substrates in watercourses, often avoiding swift currents and highly silted areas	• Spring spawner • Congregational spawners over sand or gravel substrate in lakes and watercourses	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Longnose Dace	*Rhinichthys cataractae*	Leuciscidae	Cool, fast flowing waters of watercourses with rocky substrate or in shallow waters of lakes	• Spring spawner • Deposits eggs over substrate in riffles in watercourses	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Mimic Shiner	*Notropis volucellus*	Leuciscidae	Vegetated areas of lakes and slow-moving watercourses with sand and gravel substrates	• Spring/summer spawner • Broadcast adhesive eggs over aquatic vegetation	• Kaministiquia River • Rainy Headwaters • Rainy Lake • Big Turtle River • Upper English River • Wabigoon River	Lakes/Ponds and Watercourses	276	445	Abundant

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Mottled Sculpin	*Cottus bairdii*	Cottidae	Benthic inhabitants to the rocky shores of lakes and cobble/gravel riffles in cool watercourses	• Spring • Underside of rocks and ledges, preferred in areas of natural current	All Watersheds	Lakes and Watercourses	230	377	Common
Muskellunge	*Esox masquinongy*	Esocidae	Cool waters of lakes and large watercourses (bankfull width >5 m), usually near aquatic vegetation	• Spring spawner • Shallow vegetated floodplains of lakes and large watercourses	• Rainy Lake • Big Turtle River • Upper English River • Wabigoon River	Lakes/Ponds and large watercourses (bankfull width >5 m)	60	45	Uncommon
Ninespine Stickleback	*Pungitius pungitius*	Gasterosteidae	Shallow vegetated areas nearshore in lakes, ponds and wetlands or pools of watercourses; however, also documented in deep waters of the Great Lakes	• Summer spawner • Constructs tunnel shaped organic debris nest	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Northern Brook Lamprey[b]	*Ichthyomyzon fossor*	Petromyzontidae	Coolwater creeks and small rivers; appears to avoid large rivers and lakes/ponds. Adults are found in clear riffles and runs with gravel and sand substrates whereas ammocoetes are found in quieter waters with softer substrates (i.e., sand, silt and detritus)	• Spring spawner • Streams and small rivers over coarse substrates	• North Lake Superior Shoreline • Kaministiquia River	Watercourses	62	123	Rare
Northern Pearl Dace	*Margariscus nachtriebi*	Leuciscidae	Prefers pools in cool streams, ponds, small lakes and wetlands with silt, sand or gravel substrates; often associated near aquatic vegetation	• Spring spawner • Deposits eggs in sand or gravel, facing into a weak-moderate current	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Northern Pike[b]	*Esox lucius*	Esocidae	May occupy a variety of habitat types, often in shallow waters of weedy bays, slow meandering and heavily vegetated rivers during the spring, and adults often move to deeper, cooler waters in the summer months	• Spring spawner, right after ice out • Heavily vegetated floodplains of rivers, marshes and bays of larger lakes	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Northern Redbelly Dace	*Chrosomus eos*	Leuciscidae	Cool, vegetated areas of lakes/ponds and slow-moving watercourses with silt and detritus substrates	• Summer spawner • Fractional spawner, many times throughout the season in algal beds	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Pumpkinseed	*Lepomis gibbosus*	Centrarchidae	Cool to warm waters of lakes/ponds and slow-moving watercourses with aquatic vegetation and organic debris	• Spring/summer spawner • Nest in submerged aquatic vegetation in slow moving waterbodies and watercourses near shore • Nesting occurs over any substrate type an adult is able to clear as exposed roots are used for egg adhesion	• Kaministiquia River • Rainy Headwaters • Rainy Lake • Big Turtle River • Upper English River • Wabigoon River	Lakes/Ponds and Watercourses	276	445	Abundant
Quillback	*Carpiodes cyprinus*	Catostomidae	Prefers cool waters along bottoms with sand to silt substrates in backwaters and main channels of creeks, clear - turbid pools and large rivers or lakes	• Spring spawner • Migrational spawner to streams, bays of lakes, floodplains and bends in rivers where eggs are deposited over sand or mud substrates	• North Lake Superior Shoreline • Wabigoon River	Lakes and large watercourses (bankfull width >10 m)	4	10	Uncommon
Rainbow Smelt	*Osmerus mordax*	Osmeridae	Cold and clear pelagic areas of lakes where schooling occurs; do not occupy watercourses aside from spawning	• Spring spawner • Shorelines and shoals of lakes and streams with swift current where eggs are adhered to aquatic vegetation and gravel bottoms	All Watersheds	Lakes and watercourses	23	5	Uncommon
Rainbow Trout	*Oncorhynchus mykiss*	Salmonidae	Occupy a variety of habitats from mid-waters of lakes to cool watercourses with riffle-pool habitats, gravel substrates and moderate flow	• Spring spawner • Redds are created in fine gravel beds within riffles, often above a pool in flowing streams	• North Lake Superior Shoreline • Kaministiquia River • Rainy Headwaters • Rainy Lake • Big Turtle River	Lakes and Watercourses	33	35	Uncommon

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Rock Bass	*Ambloplites rupestris*	Centrarchidae	Prefers vegetated shallows of lakes/ponds and pools of moderate sized watercourses with large coarse substrates	• Spring spawner • May spawn in a diverse arrangement of habitats, from swamps to gravel shoals • Adults colonize in shallow waters with substrate types suitable for digging a shallow nest with fins	All Watersheds	Lakes/Ponds and Watercourses	249	421	Common
Sauger	*Sander canadensis*	Percidae	Cool waters in lakes and watercourses	• Spring spawner • Gravel substrate in lakes or watercourses	All Watersheds	Lakes and large watercourses (bankfull width >5 m)	132	82	Common
Shorthead Redhorse	*Moxostoma macrolepidotum*	Catostomidae	Benthic inhabitant of lake shallows and pools, runs or riffles in various sizes of watercourses with sand and gravel substrates with low levels of siltation	• Spring spawner • Migrates to smaller streams/rivers to gravel beds in riffle areas	All Watersheds	Lakes/Ponds and Watercourses	249	421	Common
Slimy Sculpin	*Cottus cognatus*	Cottidae	Benthic inhabitants to the rocky shores of lakes and cobble/gravel riffles in cool watercourses	• Spring • Underside of rocks and ledges, preferred in areas of natural current	All Watersheds	Lakes and Watercourses	230	377	Common
Smallmouth Bass	*Micropterus dolomieu*	Centrarchidae	Moderately shallow water (approximately 5 - 7 m) of lakes with sand substrate, talus slopes, shoals or submerged woody debris; however, may retreat to deeper waters in hot summer months. Also occupy clear runs and flowing pools of moderate to large watercourses with clear water	• Spring/summer spawner • Sand, gravel or rock substrate in lakes or watercourses near woody debris or dense aquatic vegetation	All Watersheds	Lakes/Ponds and Watercourses	141	98	Common

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
Spottail Shiner	*Notropis hudsonius*	Leuciscidae	Often associated with larger lakes/ponds and watercourses with slow to moderate current and sand, gravel, mud or silt substrates. May also be found in tributaries of larger waterbodies with cool water and appropriate substrates.	• Spring/summer spawner • Large schools congregate and eggs are deposited over sandy shoals or in lower reaches of associated tributaries	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Trout-perch	*Percopsis omiscomaycus*	Percopsidae	Often found in deeper waters of lakes (approximately 9 - 13 m), and deep, flowing pools of watercourses with sand and gravel substrates	• Spring/ summer fractional spawner • Rocky substrates in lakes and watercourses or gravel and sand substrates of lakes/ponds	All Watersheds	Lakes/Ponds and Watercourses	207	383	Common
Walleye[b]	*Sander vitreus*	Percidae	Prefer large, shallow, turbid lakes and large watercourses; however, may be found in clearer waters if appropriate depth and refuge is present (i.e., boulder shoals, sunken woody debris, thick aquatic vegetation)	• Spring spawner • Lake shoals with bolder to coarse gravel substrates • Rocky areas in white water below barriers (i.e., falls and dams) in watercourses	All Watersheds	Lakes and large watercourses (bankfull width >5 m)	132	79	Common
Blacknose Dace[g]	*Rhinichthys* sp.	Leuciscidae	Small, shallow, cool watercourses with instream and riparian cover, moderate to steep gradients and gravel substrates	• Spring spawner • Deposits eggs over substrate in riffles in watercourses	• North Lake Superior Shoreline • Kaministiquia River • Rainy Headwaters • Rainy Lake • Big Turtle River	Lakes/Ponds and Watercourses	284	459	Abundant

Common Name[a]	Scientific Name	Family	Preferred Habitat[c]	Spawning Season and Habitat[d]	Documented in Tertiary Watershed	Waterbody Types where Species was Considered Potentially Present in for the Project[e]	Estimated Number of Waterbody Crossings With Potential Habitat – ROW[a]	Estimated Number of Waterbody Crossings With Potential Habitat-Access Roads[a]	Abundance in LSA[f]
White Sucker	*Catostomus commersonii*	Catostomidae	Shallow bays and lakes/ponds with warm - cool water thermal regimes or pools and riffles of watercourses.	• Spring spawner • Most populations migrate to gravelly streams; however, spawning has also been observed in lake margins and slow-moving areas at the mouth of blocked streams. • May spawn in areas from gravelly substrates in streams to fast-flowing rapids	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant
Yellow Perch	*Perca flavescens*	Percidae	Found in a variety of warm to cool habitats, from large lakes/ponds to smaller watercourses; however, found to be most abundant in open waters of lakes with clear water, muck substrates and moderate amounts of aquatic vegetation	• Spring spawner • Over vegetation or wood debris in lakes and watercourses • May use sand or gravel substrates at times when other types are unavailable	All Watersheds	Lakes/Ponds and Watercourses	284	459	Abundant

a) The crossing list is combination of collated data from various background resources and field data by georeferenced crossing location (see Appendix 6.6-A Fish and Fish Habitat Baseline Report for the details on sources used).
b) Criteria species considered for the Project.
c) High level summary of preferred habitat based on Scott and Crossman (1998),Holm et al. (2021), and Eakins (2023).
d) Spawning habitat requirements based on Scott and Crossman (1998), Holm et al. (2021), and Eakins (2022).
e) Waterbody types where species were considered potentially present were determined using the preferred and spawning habitat characteristics.
f) Abundance was considered based on Eakins (2022) Ontario Freshwater Fishes Life History Database and professional judgement was used to revise rare and abundant categories based on potential community composition percentages within the LSA.
g) Recent updates to Holm et al. (2021) referenced a genetic study that indicated all of the Blacknose Dace (including Eastern Blacknose Dace) occurring in Ontario cannot be differentiated based on morphological characteristics.

6.6.6 Potential Project-Environment Interactions

Potential Project-environment interactions were identified through a review of the Project Description and the existing environmental conditions described within this report. The Project Description as defined in Section 3.3 includes:

- 230 kilovolt (kV) transmission line (approximately 360 km in length) within a typical 46 m wide transmission line ROW.
- Modifications to existing structures and facilities including the Lakehead TS, Mackenzie TS and Dryden TS, and separation of existing transmission lines out of the Mackenzie TS in Atikokan. No new TS are required for the Project at this time.
- Development of associated permanent infrastructure, such as self-supported and guyed structures with concrete bases (above the HWM), access roads and water crossings, to support the operation phase of the Project.
- Development of temporary supportive infrastructure associated with construction including, but not limited to, temporary wood poles, temporary access roads, temporary workspaces (including helicopter staging areas), construction camps, laydown areas, and water crossings. Temporary infrastructure (not including water crossings) will be developed >30 m from waterbodies.
- Development of aggregate pits to support the Project. Newly permitted sand and gravel pits which will remain 1.5 m above the water table and will meet the conditions set out in the *Aggregate Resources Act* (Ontario 1990a) and Ontario Standards (MNRF 2020b), including being developed >120 m from waterbodies.

The existing access roads that do not require improvements were not evaluated during the aquatics baseline surveys or assessed during the EA for fish and fish habitat as the potential for direct impacts resulting from construction were considered nil and the indirect effects from noise, vibration, dust, and climate change are considered in the assessment of site preparation and construction activities on all criteria.

The linkages between Project components and activities and potential effects to fish and fish habitat are identified in Table 6.6-21.

Table 6.6-21: Project-Environment Interactions for Fish and Fish Habitat including Aquatic SAR and SOCC Fish and Fish Habitat Criteria

Criteria[(a)]	Indicator	Project Stage: Construction	Project Stage: Operation and Maintenance	Project Stage: Retirement	Description of Potential Project-Environment Interaction
Fish and Fish Habitat including criteria species and their habitat	• Habitat quantity • Habitat quality	✓	✓	✓	Changes to fish habitat quantity and quality through: • Placement or removal of water crossing structures or materials; • Removal of riparian vegetation; and • Changes in downstream habitat quality from release of sediments during construction.
Fish and Fish Habitat including criteria species and their habitat	• Abundance • Distribution	✓	✓	✓	Injury or mortality of fish from construction and operation activities, such as: • Direct mortality from blasting during construction in vicinity of crossing or other project components; and • Direct mortality from construction equipment (e.g., excavators, pump intakes) during in-water construction and operation activities (i.e., fording access for maintenance).
Fish and Fish Habitat including criteria species and their habitat	• Abundance • Distribution	✓	✓	✓	Changes in fish access to habitat through the reduction in access to habitat, affecting fish abundance and distribution, from placement of water crossing structures and direct channel morphology alteration.
Fish and Fish Habitat including criteria species and their habitat	• Habitat quantity • Habitat quality	✓	✓	✓	Changes to water or sediment quality and quantity through: • Spills and deleterious substance exposure; and • Changes to hydrology or groundwater (may alter drainage patterns and increase or decrease groundwater and surface flow, water quantity and thermal regimes, which could affect fish habitat quantity and quality). Changes can affect fish habitat quality, leading to negative changes in fish reproduction and survival.

Criteria[a]	Indicator	Project Stage: Construction	Project Stage: Operation and Maintenance	Project Stage: Retirement	Description of Potential Project-Environment Interaction
Fish and Fish Habitat including criteria species and their habitat	• Habitat quantity • Habitat quality	✓	–	✓	Changes to air contaminants and fugitive dust emissions could lead to changes to constituent concentrations in water in the receiving environment, which could affect fish habitat quantity and quality.
Fish and Fish Habitat including criteria species and their habitat	• Habitat quality • Abundance • Distribution	✓	✓	✓	Changes to public access to fish habitat resulting in increased fishing pressure and subsequently a reduction in the population; avoidance of areas previously occupied due to increased noise and disturbance from increased access resulting in altered distribution.
Fish and Fish Habitat including criteria species and their habitat	• Habitat quantity • Habitat quality • Abundance • Distribution	✓	✓	✓	Changes to fish and fish habitat due to the interaction of the Project with climate change. Effects of the Project on Fish and Fish Habitat may be amplified under future climate conditions due to changes in temperature and precipitation patterns which will affect waterbody thermal regimes and flows. This includes reduction in localized riparian and aquatic vegetation reduction, loss in habitat quantity and quality, biodiversity loss, and changes in the distribution of species.

✓ = A potential Project-environment interaction could result in an environmental or socio-economic effect.

– = No plausible interaction was identified.

a) Criteria species for fish and fish habitat include Brook Trout (*Salvelinus fontinalis*), Lake Trout (*Salvelinus namaycush*), Northern Pike (*Esox lucius*), Walleye (*Sander vitreus*); Aquatic SAR: Lake Sturgeon (*Acipenser fulvescens*), Aquatic SOCC: Northern Brook Lamprey (*Ichthyomyzon fossor*), Coaster Brook Trout (*Salvelinus fontinalis*) and Deepwater Sculpin - Great Lakes - Western St. Lawrence Populations (*Myoxocephalus thompsonii* pop. 2).

6.6.7 Potential Effects, Mitigation Measures, and Net Effects

This section presents the potential effects, suggested mitigation measures, and predicted Project-related net effects for fish and fish habitat. Unless otherwise noted, the discussion of potential effects, mitigation measures and net effects apply to the ROW, all Project components and the access roads used. DFO's Pathway of Effects Diagrams (DFO 2018) were reviewed and used to determine potential impacts of the Project to fish and fish habitat. Applicable best management strategies, avoidance and mitigation measures will applied using the practices within the MNRF Environmental Guidelines for Access Roads and Water Crossings (MNR 1990), MNRF and DFO protocol for the review and approval of forestry water crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNR 2010a) and standard mitigation measures presented in the Ministry of Transportation/Fisheries and Oceans/Ministry of Natural Resources and Forestry (MTO/DFO/MNRF) Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings (MTO/DFO/MNRF 2020). A summary of the potential effects, suggested mitigation measures, and predicted net effects are presented in Table 6.6-23.

Note that no effects to Coaster Brook Trout and Deepwater Sculpin are predicted due to their habitat restrictions (i.e., are limited to specific waterbodies within the LSA and in the case of Deepwater Sculpin the requirement for very deep cold lakes). In addition, no water crossings are planned to interact with the habitats identified for these species. Therefore, these species are not discussed further in this report.

There are 315 water crossings along the ROW and 515 water crossings along access roads (Table 6.6-22).

Approximately 889.5 hectares (ha) and 446.6 km of new access roads are anticipated to be constructed for the Project. Access roads are expected to be approximately 10 m wide. Of the 515 water crossings along the access roads, approximately 30% of access roads outside of the ROW will remain in place to provide access for operation and maintenance activities.

The number, location, and characteristics of existing and proposed new access roads to be used for the Project will be refined through detailed planning work and through consultation with Indigenous communities, government officials and agencies, and interested persons and organizations. In sections where the Project crosses provincial parks and conservation reserves, access roads will be located along existing roads, within the proposed ROW or the adjacent existing transmission ROW to the extent reasonably possible.

The Project also includes temporary construction camps, turn-around areas, temporary laydown areas, and storage areas. The final size of the temporary construction camps and laydown areas will vary depending on site characteristics, environmental constraints, and contractor requirements. Storage areas will also be located in local towns (to be determined at procurement stage, Section 3.6.3).

In addition to waterbody crossings, approximately 546 ha of riparian area (measured as a 30 m buffer around all waterbodies ROW and access roads) will be crossed by the Project. It is estimated that approximately 3.7 ha (<1%) will be removed or altered for the project at helicopter pads, modified transformer stations, laydown areas, access/structure pads, and aggregate pits.

Although considerable efforts have been applied to identify all the water crossings in the Project footprint through a detailed review of the OHN mapping, aerial imagery, aerial reconnaissance and the field investigations, a small number of waterbodies may not have been identified. These waterbodies are likely small and potentially non-permanent; however, these waterbodies and tributaries may provide spring refuge habitat for fish, including Brook Trout. Pre-construction field surveys will be used to identify any waterbodies that were previously not included in the assessment, prior to permitting.

The type of equipment crossing structure used is a key mitigation measure to reduce or avoid potential effects to fish and fish habitat at a local scale; therefore, water crossing structures were identified for each waterbody (Appendix 6.6-A: Tables 6.2A-1A, 6.2A-2A, and 6.2A-3A). For each waterbody identified in the crossing list, the proposed water crossing structure was initially determined based on bankfull width and if the waterbody was on an existing access road.

If a water crossing is on an existing road or trail, the existing crossing structures will be used. Existing access roads will be used as much as possible and will be upgraded, if required, based on their capacity to support the heavy equipment to be transported. The number and locations of crossings that fall within existing access roads are presented in Table 6.6 22, Appendix 6.6-A: Tables 6.2A-1A, 6.2A-2A, and 6.2A-3A.

The probability and magnitude of effects from change in habitat quantity and quality are dependant upon the intensity, extent, resiliency, rarity, species dependence and sensitivity, as well as the types of habitats at the crossing site, the type of crossing structure used, and the timing of the construction. If work is required below the HWM (e.g., installation of fill or a culvert), work may temporarily or permanently impact the section of fish habitat where the work below the HWM is located. Additionally, fish communities can be negatively affected by in water work that occurs during certain periods in their life history or at certain life stages; for example, this can include migration movements to spawning areas, spawning and egg incubation, or eggs and newly hatched fry.

6.6.7.1 Changes to Fish Habitat Quantity and Quality

6.6.7.1.1 Potential Effects

6.6.7.1.1.1 Placement of Materials and Water Crossing Structures

The construction and operation of the transmission line has the potential for direct and indirect effects that could cause negative changes to fish and fish habitat quantity and quality through

physical alteration of waterbodies. To construct the transmission line, water crossing structures are required to provide vehicle access to the installation sites along the transmission line ROW. Water crossing structures will also be required along the access roads. These water crossings have the potential to directly affect fish habitat quantity and quality in each of the waterbodies where they are installed.

There are 315 water crossings along the ROW, and 515 water crossings along access roads. Depending on the crossing structure used to access each location, its installation may require in water work (Table 6.6-22 and Appendix 6.6B). The transmission line infrastructure and cable will be installed on land and overhead (i.e., they will not be installed below the HWM of the waterbodies); these types of crossings have potential for indirect effects to fish and fish habitats of the waterbody they span or where they are installed adjacent to waterbodies. Fifty-four water crossings within the transmission line ROW will be forded to provide vehicle access for structure installation. Along the access roads, there are 341 water crossings where work below the HWM (e.g., culvert installations/upgrades etc.) may occur and 324 crossings where fording is anticipated (Table 6.6-22 and Appendix 6.2A: Table 6.2A-2A and B). The proposed number and types of crossings for the Project are presented in Table 6.6-22 and Appendix B-1.

Nineteen waterbodies are located within 30 m of the boundary of the temporary laydown areas, construction camps, fly yards, pull sites, or helicopter pads (Appendix 6.6C-1). There are 30 waterbodies located within 120 m of the aggregate pits proposed to supply construction material for the Project (Appendix 6.6C-2).

It is not anticipated that pole structures will be placed below the HWM. If required in specific cases, it will be addressed through regulatory permitting. No structures are currently planned within 30 m of mapped waterbodies, with the exception of a single structure that is located approximately 22 m from a mapped waterbody.

Table 6.6-22: Proposed Number and Type of ROW and Access Road Water Crossings for the Project

Category	Transmission Line ROW	Access Roads[b,c]	Access Roads[b,c]
	Right-of-Way (ROW)	Preferred Road	Alternate Road
Number of Waterbody Crossings	315[a]	404	111
Area of Waterbody Crossings (m^2)	518,707	53,163	8,857
Number of Equipment Crossings	54	404	111
Area of Equipment Crossings (m^2)	8,273	53,163	8,857
Equipment Crossing Method[d]			
Clear-Span Bridge	-	30	23
Clear Span Causeway	-	1	-
Clear Span Existing	-	4	-

Category	Transmission Line ROW	Access Roads[b,c]	Access Roads[b,c]
	Right-of-Way (ROW)	Preferred Road	Alternate Road
Culvert Existing[f]	-	28	-
Culvert[f]	-	203	38
Culvert Causeway[f]	-	6	-
Ice Bridge	-	13	-
Ice Bridge/Snow Fill	-	1	3
Log Fill[f]	-	37	22
Log Fill/Snow Fill[f]	-	5	2
Rig Mat	-	-	1
Snow Fill	-	71	20
Total Crossings with Fording	54	250	74
Total New Access Road Crossings Identified	-	216	111
Total Existing Access Road Crossings Identified (Potential Improvements)	-	188	-
Total Crossings Requiring Work Below the HWM (area m^2)	54 (8273 m^2)	279 (27,750m^2)	62 (1,976 m^2)
Total Crossings Avoided by the Project[e]	261	0	0

Source: Valard 2023

a) The transmission line infrastructure and cable will be installed on land and overhead (i.e., they will not be installed below the HWM of the waterbodies).

b) Approximate number. Approximately 70% of the water crossings on the access roads will be temporary. This includes the existing and new equipment crossing structures proposed.

c) Approximate number. Approximately 30% of the water crossings on the access roads will be permanent. This includes the existing and new equipment crossing structures proposed.

d) The location and type of the permanent equipment crossing structures will be determined during detailed planning and design.

e) Work areas adjacent to water crossings will be accessed from either side of the crossing (i.e., a structure is not currently proposed to be installed). However, in the event that a crossing structure is required, a contingency method may be used.

f) Equipment crossing structure will require work below the HWM.

m^2 = square metres; n/a = not applicable; ROW = right-of-way.

Activities that may affect fish habitat quality and quantity directly through construction of water crossings include:

- Operation of heavy machinery in the waterbody;
- Installation of isolation structures during construction;
- Bank treatments and restoration/reclamation; and
- Placement of structures, fill, or other materials in the waterbody.

Potential direct effects to fish habitat with operation of heavy machinery in a waterbody could result from changes to bed and bank stability, changes to channel morphology, and changes to sediment transport rates.

Potential direct effects of isolation measure installation could result through physical alteration of bed and banks if measures are installed incorrectly.

Potential effects arising from bank treatments and restoration/reclamation could result if materials used are not consistent or compatible with those that are naturally occurring as well as if they are not implemented as designed.

Potential direct effects to fish habitat could result from changes in the waterbody:

- Change in the composition and size of bed material.
  - This may include a loss of coarse substrate spawning habitat for criteria species, such as Brook Trout or Lake Sturgeon, a loss of shoal spawning habitat for criteria species such as Walleye and Lake Trout.
- Change in the channel configuration (e.g., bed, banks, morphology, sinuosity etc.).
  - Alteration or loss of specific habitat features, such as pools, removal of beaver dams, aquatic vegetation and bed materials that ultimately lead to loss or impairment of habitat functions at the site and upstream or downstream of the site, such as overwintering, spawning, and rearing of criteria species.
  - Increased sediment inputs from erosion and bed and bank instabilities could alter the dynamic equilibrium in the channel's ability to transport water and sediment or cover areas used for sensitive life processes.
  - Installation of culverts could result in a constriction of the channel, which may affect flow volumes, velocities and directions that could in turn affect channel geomorphology (e.g., bankfull width and depth, bed material composition, ratio of pools to riffles, composition of riparian vegetation etc.) and overall channel stability (Sholtes et al 2017; BC and DFO 2012).

- Removal of beaver dams could result in disturbance to the waterbody bed and bank, release of sediments or deleterious substances, changes in flow regime and stranding of fish (DFO 2022).
- Placement of material in water can also increase water velocity, introduce vertical drops that obstruct fish movements (see Section 6.6.7.4), and remove or cover sensitive water features such as groundwater upwellings.

6.6.7.1.1.2 Removal of Riparian Vegetation

The total riparian areas with potential to be affected by the Project include the following:

- ROW and 30 m buffer: 239.35 ha (2,393,500 m^2);
- New/Improved Access Roads and 30 m buffer: 306.87 ha (3,068,700 m^2); and
- Project infrastructure: 3.7 ha (3,7000 m^2).

Vegetation removal within 30 m of waterbodies is estimated to include the following areas:

- Transformer stations: <0.1 ha (<1,000 m2);
- Mackenzie Circuit Separation: <0.1 ha (<1,000 m^2)
- Helicopter pads: 0.11 ha (1,100 m^2);
- Fly Yards: 1.41 ha (14,100 m^2);
- Pull sites: 0.37 ha (3,700 m^2);
- Aggregate sites: 1.28 ha (12,800 m^2);
- Camps and laydown areas: 0.26 ha (2,600 m^2);
- Access roads: 40.27 ha (402,700 m^2); and
- ROW: 73.11 ha (731,100 m^2).

Removal of riparian vegetation has the potential to affect fish habitat through the following:

- Changes in water temperature (from reduced shading) (Hotlby 1988, Macdonald et al. 2003, Steedman et al. 2001, Johnson and Jones 2000, MNRF 2010b, Collison and Gromack 2022);
- Changes in food supply (plants and organic debris that fall into the waterbody [allochthonous inputs] and terrestrial insects) (DFO 2018 MNRF 2010b, Collison and Gromack 2022);

- Changes in habitat structure and cover (change in channel stability, overhead cover, inputs of woody debris) (also see Section 6.6.7.1.1.1) (Jones et al. 1999);
- Change in sediment concentrations (from increased runoff and erosion) (also see Section 6.6.7.1.1.3 and 6.6.7.4);
- Injury or mortality of fish from instream and riparian construction activities (see Injury or Mortality of Fish from Instream Construction, Section 6.6.7.2);
- Changes in abundance and distribution (Jones et al. 1999); and
- Changes in groundwater recharge (MNRF 2009).

6.6.7.1.1.3 Release/ Mobilization of Sediments and other Deleterious Substances during Construction

Increases in the concentration of suspended sediment can result directly from disturbance and re-suspension of bed materials during construction of transmission line and water crossings or indirectly from site runoff. This could increase total suspended solids and turbidity in the downstream aquatic ecosystems and result in a negative effect on surface water quality. Exposure to suspended sediment can affect the health of fish with potential effects ranging from minor physiological stress to mortality. The magnitude of the effect depends on a combination of the suspended sediment concentration and the duration of exposure.

Fine sediment can also result in downstream sediment deposition that alters substrate composition or channel morphology and modifies the suitability of habitat for spawning, overwintering, foraging, and rearing. Deposited sediments can modify the availability and suitability of fish habitat through (CCME 1999):

- Changes in water clarity: reduced visibility due to turbid waters and available light penetration can create behavioural changes in local aquatic biota. Changes may be observed as alteration in movement patterns (i.e., migration) and foraging success, ultimately leading to reduction of habitat quality and/or quantity (Cavanagh et al. 2014; Wood and Armitage 1997).
- Potential effects on available forage species: increases in suspended and settled sediments may lead to a reduction of available dissolved oxygen to levels intolerable by some benthic invertebrates and forage species (e.g., Leuciscidae etc.), and may clog gills of zooplankton (Chapman et al. 2017). Coarse sediment transport may reduce the quantity of periphyton on substrates, and decreased light penetration may reduce phytoplankton, which has potential to cause trophic level changes in an ecosystem (Henley et al. 2000).
- Deposited sediments: suspended sediments mobilized by construction activities are ultimately deposited downstream from the point of release/mobilization. Deposition of such material can have direct effects on habitat quality and fish such as:

- Primary production of macrophytes may be reduced as a result of diminished light penetration or smothering, reducing food availability for herbivore species (mainly forage for fish), cover availability, and oxygen production (Ryan 1991; Henley et al. 2000);
- Reduced specialized habitat areas (i.e., decreased distinction between riffle-run-pool habitat complexes) which reduces habitat quality and species richness (Ryan 1991);
- Filling of interstitial spaces used by forage and benthic dwelling species (i.e., benthic invertebrates) (Lenat et al. 1981); and
- Decreased reproduction success by reduction of spawning areas, smothering of eggs and emergence of fish fry (Bilotta and Brazier 2008; Henley et al. 2000; Kjelland et al. 2015).

6.6.7.1.2 Mitigation Measures

The mitigation measures outlined in Section 6.6.7.2, 6.6.7.3 and 6.6.7.4 are also applicable to this potential effect and are discussed in detail within those sections. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNRF 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNRF 2010a and MTO/DFO/MNRF 2020) and environmental approval conditions (once available). Based on the Project-specific potential effects noted above, the additional mitigation measures described below are provided for protection of fish and fish habitat.

6.6.7.1.2.1 General Avoidance Measures and Project Planning

General avoidance and Project planning measures that will be implemented include the following:

- Applicable best management strategies, avoidance and mitigation measures were applied to protect fish and fish habitat from potential Project-related effects (MNRF 1990, MNRF and DFO 2021, DFO 2022a DFO 2022c, MNRF 2010a, and MTO/DFO/MNRF 2020).
- Potential effects to fish and fish habitat were avoided to the extent possible during the planning phase and through the alternate route evaluation and preferred route selection. The Project footprint will be minimized to the extent possible.
- Aquatic SAR listed in this document are afforded general habitat protection under both the *Fisheries Act* and ESA; therefore, it is not expected that additional mitigation (beyond the measures proposed below), monitoring and/or restoration is required. Project planning will avoid their habitats and apply the restricted activity timing window for in-water works for all aquatic SAR to the extent practicable, similarly to all other fish species within the potential waterbodies. If in-water work for construction or operation and maintenance activities cannot be avoided during the restricted activity timing

window for fish species for any specific crossing, Hydro One will engage with MECP, MNRF and/or DFO on behalf of ECCC to discuss permitting requirements and next steps and the appropriate Indigenous communities will be notified, where requested.

- The transmission line infrastructure and cable will be installed on land and overhead (i.e., they will not be installed below the HWM of the waterbodies) and is not anticipated there will be in water work or increases in sediment input.
- If the water crossing is on an existing road or trail, the existing road and crossing structures will be used as much as possible Existing access roads will be upgraded if required, based on the capacity to support the heavy equipment needed for construction.
- The number of temporary and permanent water crossings required for the Project will be minimized, where possible.
- Regulatory permits and approvals will be obtained from applicable agencies to install water crossings.
- Water crossings will be constructed or installed in a manner that maintains downstream flows and fish passage and follows conditions of permits or authorizations issued for the Project by regulatory agencies.
- Water crossings will be constructed in consideration of MNRF Environmental Guidelines for Access Roads and Water Crossings (MNRF 1990) MNRF and DFO protocol for the review and approval of forestry water crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNRF 2010a).
- To the extent practicable and while implementing all recommended measures, work will be completed below the HWM as quickly as possible to shorten the duration of disturbance.
- Channel realignments/infilling will be avoided through Project planning and design to the extent practicable. Channel realignments/infilling will only be undertaken in locations where specific conditions are met and/or where required for safety/security purposes. If required, then DFO/MNRF permitting and consultation will be undertaken to reduce the risk of negatively impacting the aquatic environment.
- Site-specific conditions and discharge rates (i.e., stream measurements and flow calculations completed in accordance with MNRF requirements) at the crossing will inform appropriate sizing and precise location for each water crossing structure.
- Before construction, it will be confirmed that all water crossings planned for installation are on the water crossing lists (Appendix 6.6B). If new waterbodies are identified, an

Aquatics Specialist will be engaged to determine the recommended crossing methods, proposed restricted activity timing window, and approvals or permits required. As part of this process, regulators, Indigenous communities, and relevant stakeholders will be informed of any new waterbodies.

- Where new water crossing structures are proposed, the primary preferred structures will avoid in water work (e.g., preferential use of clear span bridges, ice bridges/snow fills, etc.).
- All water crossing structures will be constructed, operated, removed, and decommissioned, and the waterbody reclaimed post decommissioning, if appropriate, following best management practices and environmental approval/permitting conditions (once available).
- Sensitive habitats will be avoided (e.g., SAR/SOCC habitats, spawning areas, groundwater upwellings, etc.) where permit conditions apply and through Project planning and design.
- Temporary construction camps, temporary laydown areas, fly yards will be located a minimum of 30 m back from the ordinary HWM of a waterbody through detailed planning, where possible. The distance of the setback in these areas will depend on the slope adjacent to the waterbody and will follow the guidelines outlined in the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNRF 2010a).
- Refueling, service, and maintenance of vehicles and equipment will generally be carried out in designated areas at temporary construction camps and temporary laydown areas located a minimum of 120 from waterbodies to the extent possible. These areas will be designed and constructed to collect and contain minor leaks and spills. If refueling within 120 of a waterbody cannot be avoided, enhanced spill containment measures will be used. In the event that refuelling, servicing and maintenance is required in the field, 120 m buffer will be respected to the extent possible. There may be locations where this is not possible due to the prevalence of wetlands; however, in these locations enhanced spill containment measures will be used.
- All aggregate pits or quarries will be located a minimum of 120 m away from the ordinary HWM of a waterbody, where possible and new permitted sand and gravel pits will remain 1.5 m above the water table. The aggregate pits will follow the guidelines outlined in the Aggregates Permits on crown lands for Pits and Quarries above Water (MNRF 2014b) and the Forest Management Planning Manual (MNRF 2017) and will meet the conditions set out in the *Aggregate Resources Act* (Ontario 1990a) and Ontario Standards (MNRF 2020b).
- Hydro One will use vegetation management practices to maintain vegetation within the transmission line ROW. For example, implementation of a “wire zone – border zone”

approach to vegetation management (Ballard et al. 2007) where appropriate in the ROW. This method manages vegetation in the two zones, where herb/grass/forb species are promoted in the wire zone, and shrub/short tree species are promoted in the border zone. This approach allows for the safe delivery of electricity while also fostering wildlife habitat and biodiversity, and simultaneously developing overall aesthetics and decreased long-term vegetation management costs.

The number of each type of equipment structure proposed to be installed is summarized in Table 6.6-22. The following was considered when choosing water crossing structures:

- Waterbodies where the bankfull width (measured from aerial imagery) is less than or equal to 2.0 m, a rig mat or ice bridge/snow fill was determined to be practicable;
- Waterbodies where the bankfull width (measured from aerial imagery) is between 2 and 20 m, a clear span bridge or ice bridge/snow fill was determined to be practicable;
- Waterbodies where the bankfull width is greater than 20 m, a crossing structure is not proposed; access around the waterbody will be from either side;
- The construction of new access infrastructure (i.e., water crossings), will be minimized to the extent practicable. For example, in areas where the ROW is parallel to the access road, only one water crossing structure will be installed. For the purposes of the EA, it was assumed that a water crossing structure will be installed on both the ROW and 10 m wide access road. Where conditions or timing windows do not allow for a one-time machine crossing for bridge installation and clearing equipment, work will be completed from either side of a waterbody to minimize in water works to the extent practicable; and
- Contingency water crossing structures include clear span bridges, rig mats, ice bridge/snow fills, and culverts.
    - Culverts are proposed as contingency crossing structures if a waterbody has a bankfull width less than 5 m. The use of culverts as a contingency at specific crossings would be determined during detailed planning considering site-specific conditions and permitting considerations. For permanent access roads, rig mats, log fills or ice bridges/snow fills are not proposed as crossing structures.
- The following measures and practices should be applied to avoid negatively impacting fish and fish habitat: DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), application of DFO's Codes of Practices (DFO 2022c), Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a) and guidance on project activities and criteria for DFO reviews (DFO 2022a).

The final design of the access road routes, including the final site locations and equipment crossing structures, will be developed as Project engineering progresses. Designs of water crossings as required for permitting applications will be submitted to both DFO and MNRF, particularly for those crossings where construction is required below the HWM that have

potential to cause death of fish and/or cause harmful alteration, disruption or destruction of fish habitat (Canada 1985) or where not all mitigation measures presented in DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) can be implemented effectively or where a Code of Practice is unable to be applied (DFO 2022c). The following was considered:

- Where new water crossing structures are proposed, the primary preferred structures to be used are clear span bridges, ice bridges/snow fills (for winter construction), and/or rig mats;
- Clear span bridges and rig mats will be placed above the HWM (i.e., no work will occur below the HWM during construction or operation and maintenance). A rig mat is a rigid portable platform used to support equipment in construction and other resource-based activities. It will function as a clear span bridge over small waterbodies (i.e., bankfull width less than 2 m). For clear span bridges and rig mats, it is expected that no new temporary or permanent fill would be placed below the HWM. The use of clear span bridges and rig mats will follow DFO's Code of Practice for Clear Span Bridges (DFO 2022d).
- Where rig mats are necessary for crossing unstable or unconfined waterbodies the following mitigation measures will be used as appropriate including: 1) Prioritize crossing during the frozen season to limit disturbance, 2) Where winter construction is not feasible, sediment and erosion control measures should be implemented (e.g., silt fencing, silt curtains, aqua dams, coffer dams etc.) to minimize disturbance to fish habitat, and 3) On-site monitoring will be completed during these crossings to monitor impacts to fish (i.e., distressed fish, stranded fish, mortalities) and be prepared for fish salvage, where required. Where practical, during winter construction, ice bridges/snow fills will be used as temporary crossing structures. For ice bridges/snow fills, any work below the HWM will involve the placement of clean snow fill only and will follow DFO's Code of Practice for Ice Bridges and Snow Fills (DFO 2022e);
- Fording will be avoided to the extent possible; in the event that fording is required, it will be a one-time crossing (over and back) with clearing and bridge installation equipment in flowing water conditions with stable beds and low sloping banks or approaches. Any fording will follow DFO's Code of Practice for Temporary Fords (DFO 2022f); and
- Log fill crossings will be used only in wet areas with no defined channel, areas that are dry at the time of crossing and in seepage areas where no fish habitat has been identified. They will be used only during the recommended timing widows, and under agency permitted conditions. Log fills will be characterized by a layer of logs covered with geotextile and fill material as required. Upon decommissioning, the fill material will be pulled back and the geotextile removed and disposed. Logs will be removed and redistributed/disposed as appropriate to ensure natural drainage is maintained.
- Snow fill crossings will apply adaptive management strategies and specific protocols will be outlined in the Environmental Protection Plan (EPP) to confirm ice thickness and

applicability of the crossing method (e.g., ice auger core samples, etc.) such that it reduces the likelihood of harm to fish and fish habitat as well as for health and safety purposes.

- Adaptive management strategies for alternative crossing locations will use similar crossing methods and mitigation measures as outlined within the EA and will be outlined in the EPP.

6.6.7.1.2.2 Mitigating Work Below the Highwater Mark

Measures to be implemented for work below the HWM include the following:

- Where culverts are used, culvert selection will consider site-specific conditions such as the width of the water crossing, fish habitat characteristics, substrate type, and hydrologic characteristics of the individual waterbody based on a desktop and field observed conditions. Culvert selection is primarily based on design flow calculations that consider several characteristics such as the expected rainfall in the geographic area, the catchment basin area, the slope and composition of the channel. Culvert design criteria dictate the function of the culvert including the minimum and maximum water levels in the culvert for fish passage, erosion control and the proper hydraulic function of the culvert. Each culvert is selected based on hydrological analysis and according to the Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings (2017). Culverts will be appropriately sized to handle peak flow, embedded by 10% to consider low flow conditions and aligned parallel to the waterbody channel on a straight section of uniform gradient (i.e., appropriately located). Culverts will be designed for fish passage at the lowest trophic levels of each system will be considered and will meet DFO's species-specific passage requirements (Di Rocco and Gervais 2022). This will aid in the ability to reduce the risk of the culvert installation introducing velocities which surpass swimming abilities of a waterbody's fishery (MNRF and DFO 2021), as they will be in operation for longer than a year. Open bottom culverts (i.e., arch structure culverts with no bottom that does not disturb the bed of a waterbody) may be considered for water crossings with fish habitat that has been determined to be sensitive in the EA assessment. Mitigation options will be implemented in permanent structures to minimize net habitat loss and optimize usage and passage by fish (e.g., baffles, gradient pools, keyed stone, etc.) (MTO 2017). Where permanent culverts are installed, substrates inside the culvert will mimic the existing substrates upstream of the crossing. At the Project engineering stage, site specific fish and fish habitat and surface water surveys will be completed at all water crossings where work below the HWM is proposed to support engineering and permitting. If site specific features, such as a bedrock bottom, prevent the installation of a culvert then a different crossing method will be chosen.

- Each waterbody crossing will be visited ahead of construction by qualified environmental personnel to confirm that the crossing location is conducive to a culvert install, such that any changes in site conditions can be addressed through adaptive management. All

water crossings will be confirmed to be on the water crossing lists before construction to correctly identify waterbodies, the recommended crossing structure and mitigation measures (Appendix 6.2A: Tables 6.2A-1A and B, 6.2A-2A and B, and 6.2A-3A and B). Site-specific fish and fish habitat and surface water surveys may be required at water crossings where work below the HWM is proposed to support engineering and permitting. If new waterbodies are identified, an Aquatics Specialist will be engaged to determine the appropriate crossing methods and proposed restricted activity timing window. The MNRF will be contacted regarding permits and DFO be contacted to provide the approvals required. Inform regulators, Indigenous communities and stakeholders of any new waterbodies.

- Culvert installations will follow regulatory requirements (i.e., will occur in dry conditions as appropriate; Interim Code of Practice: Temporary Coffer Dams and Diversion Channels [DFO 2023b], submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies [i.e., MNRF, DFO]).
- All water crossing structures will be constructed, operated, removed, and decommissioned, and the waterbody reclaimed post decommissioning, if appropriate, following best management practices and environmental approval/permitting conditions (once available).These activities will also consider best management practices and environmental approval conditions (once available), including MNRF guidelines for access roads (MNR 1990, MNR 2010a, MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and Codes of Practice (DFO 2022c).
- Environmental Monitor(s) will be available on site during construction to monitor the installation, use and removal of temporary water crossing structures, as appropriate. Erosion and sediment control (ESC) measures will be installed prior to commencing construction activities. Upon removal of the crossing materials, if necessary, the waterbody banks will be returned to a stable profile similar to/or improved stability from their original condition. Disturbed areas will be stabilized, as necessary, to reduce the risk of soil erosion.
- Where beaver dam removals will be required to facilitate the installation of water crossing structures, the activity will be completed in consideration of best management practices and environmental permit/approval conditions (once available), including MNRF guidelines for access roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), Code of Practice for Beaver Dam Removal (DFO 2022c) and MNRF permit will be required.
- At crossings where existing access roads and associated infrastructure are in place, no new work below the HWM is anticipated. Culvert maintenance activities include clearing of debris or accumulated sediments within the culverts and the immediate area, repairing roadway surfaces and the reinforcement of eroding inlets/outlets. Should culvert maintenance be required, the maintenance activities will be completed in consideration of best management practices and environmental permit/ approval

conditions (once available), including MNRF guidelines for access roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and Code of Practice for Culvert Maintenance (DFO 2022g).

- If culverts are installed, installation and removal practices will follow MNRF and DFO's advice on ESC to reduce the likelihood of harm to fish and fish habitat.
- Installation of new culverts will consider site-specific conditions, be designed to handle peak flows and low flow conditions, will be embedded by 10% and will allow for water flow and fish passage requirements.
- Any infrastructure installed will also regularly be monitored and maintained over the lifespan according to Hydro One's maintenance schedule.
- To minimize potential downstream sediment effects, isolation methods will be used for the installation and removal of culverts, as required by MNRF and DFO regulatory and permitting requirements. For isolation, temporary diversions may be used (i.e., isolation construction techniques such as flumes, instream diversions, or bypass pumps) to divert the water flow around the isolated workspace. Where diversions are used, bypass pumping will be monitored and adjusted as necessary to maintain downstream flow.
- Any portion of waterbody beds, banks and/ or slopes and natural areas that were disturbed during construction will be reinstated and re-stabilized to preconstruction conditions or better (see Section 6.6.7.4).

6.6.7.1.2.3 Riparian and In-Water Vegetation

Measures to be implemented for riparian and in-water vegetation include the following:

- Implement the vegetation mitigation measures presented in Section 6.1, consisting of:
  - Allow compatible vegetation to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the transmission line;
- Develop and Implement a Vegetation Management Plan that includes details on vegetation reclamation and riparian area stabilization following construction to re-seed vegetation with native riparian/wetland seed mixes and stabilize soils/banks to pre-construction condition or better. This should include:
  - Stabilize and reinstatement of native soils in all areas where disturbance or exposure occurred during construction;
  - Restore and stabilize disturbed banks of waterbodies to a compatible pre-construction condition and configuration (or better) (i.e., use of vegetation, rock stone materials);

  - Where instream and riparian vegetation are removed, a vegetation reclamation plan will be developed to replant following construction to pre-construction conditions or better (see Section 6.4); and
  - Soil/seedbank salvage techniques will be used, along with transplanting and live staking, under site specific circumstances; and
  - Use of only approved seed mix species and species of importance to Indigenous communities for restoration/reclamation.
  - Enhanced vegetation recovery methods (e.g., seeding, planting seedlings) will be implemented where these enhanced methods are appropriate. For example, Hydro One will plant seedlings along new off-ROW access roads in conservation reserves and provincial parks. Further, waterbody crossing locations that have been removed after construction in conservation reserves and provincial parks, and areas that are subject to erosion will be seeded with an approved seed mix.

- Avoid encroachment into and the alteration of bed and bank profiles, where erosion and stabilization issues have been identified (DFO 2019, MNRF 2010). Use clean materials only (free from particulates) and integrate fish cover features where feasible. Limit access to waterbodies, wetlands and banks to protect riparian vegetation and minimize bank erosion. Use swamp mats where necessary on banks and approaches.
- At water crossings:
  - Removal of riparian vegetation will be limited to the extent practicable, and to the requirement of the access road width only; and
  - Clearing at water crossings along the ROW will generally be limited to a 10 m wide swath for equipment access to waterbody crossing structures (e.g., temporary bridges, etc.).
- Maintain buffer zones of 30 m around waterbodies, and limit removal of riparian vegetation to the extent practicable and to the requirements of the access road and alignment clearing width only.
- At laydown areas, access/structure pads, and facilities:
  - The laydown areas will be cleared of vegetation, grubbed and levelled, as required, and vegetation will generally be cleared using mechanical harvesters to remove the merchantable timber and bulldozers to remove the remaining woody vegetation; and
  - Calcium chloride may be used along municipal roads near residences to reduce dust and improve safety where there is increased Project traffic interface with public road users. Application of calcium chloride by Hydro One will be completed in consultation with road authorities and will not occur within 120 m of a waterbody or wetland.

- An Erosion and Sediment Control Plan will be developed and implemented to contain, manage site drainage and run off (see Section 6.6.7.4)

During construction, riparian vegetation may be cleared along the ROW and 10 m for access roads. To minimize impacts to waterbodies, a riparian buffer of 30 m around waterbodies will be maintained for the ROW, unless required for access to install water crossing structures, in which case a 10 m wide ROW for equipment access will be cleared within the ROW. The access roads will be cleared and will be 10 m wide within the riparian area.

Vegetation clearing will consist of cutting tree trunks within 15 cm of the root collar, as well as the removal of all shrubs, debris, and other such materials. Grubbing may be required along some parts of the ROW. Vegetation will be largely removed by mechanical means, except within 10 m of a watercourse or wetland. In these areas, vegetation will be removed manually, using chain saws and other hand-held equipment, while leaving the under growth and duff layer as undisturbed as possible to reduce the risk of erosion.

Removal of riparian vegetation will be limited to the extent practicable (to the requirement of the access road and alignment clearing width only) and will follow the Vegetation Management as planned in Section 3.4.2. Compatible vegetation will be allowed to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the transmission lineVegetation height restrictions in the ROW will adhere to best management practices for transmission lines and comply with North American Electricity Reliability Corporation (NERC) standards (NERC 2009). Allowing compatible species to regrow in the ROW will reduce the risk of contact between vegetation and transmission lines while maintaining a visual break, retaining tree patches, and discouraging predator use along the ROW. All of which will reduce the risk of negative environmental effects. The minimum clearance between vegetation and the transmission line considers the point of maximum sag of the power line and considers location within the province and local conditions (i.e., temperature and load of the line).

The temporary disturbance within the riparian area up to 10 m from a waterbody will have potential for effects to fish and fish habitat during the construction time period (e.g., potential for increased erosion and sedimentation related effects etc.). After the construction time period, the 30 m riparian buffer is expected to be maintained through operations and compatible vegetation will be allowed to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the transmission line.

Unless prompt revegetation is required for erosion control, most areas will be left to naturally revegetate following grading and stabilizing activities. However, reclamation will also include site-specific measures to promote the natural revegetation of disturbed areas, as practicable. Erosion control during construction will be maintained until the disturbed ground has been adequately stabilized with vegetation.

Hydro One, with their contractor, will prepare and implement a post-construction monitoring plan, which will include activities such as examining and documenting the success of revegetation and reclamation measures.

Portions of the access road or trail system may be left to revegetate until the road or trail requires re-clearing for maintenance. The magnitude of effects on riparian ecosystems from the changes in riparian habitat availability, distribution and composition along the Project footprint are predicted to be small (Section 6.4). Potential effects to treed riparian areas where vegetation height is restricted due to Hydro One safety protocols will be permanent because changes to the structure and composition of vegetation is expected to alter the function of these riparian areas for the wildlife species they support, but their hydrologic and water quality functions should be maintained. In addition, vegetation disturbance will be limited within the buffer, potential effects to instream habitat structure and function will be reduced, and it is anticipated that the channel bed and banks will be maintained.

The Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNRF 2010a recommends a riparian buffer of at least 30 m from waterbodies. This is measured from the edge of the vegetation communities capable of providing an effective barrier to the movement of sediment (MNR 2010a). For linear corridors, such as a transmission lines, the 30 m riparian buffer combined with the effective implementation of the erosion mitigation measures outlined in Table 6.2-19 is considered to be adequate to protect waterbodies from sediment input potentially resulting from clearing activities along the ROW. Riparian buffers of 30 m are proposed for SAR species or criteria species that are sensitive to riparian disturbances (e.g., Brook Trout) and were a commonly recommended fixed-width riparian buffer size in a review of fisheries studies from Canada and the United States (Collison and Gromack 2022). During detailed planning, the riparian buffer and vegetation height may be increased on a site-specific basis if site characteristics suggest an increased risk of erosion.

Vegetation clearing is limited to 10 m wide portions of the ROW and access roads. To be consistent with Hydro One's safety protocols, compatible vegetation species regrowth will be permitted where clearing to the water's edge is required for temporary water crossings and a riparian buffer will be maintained in areas where Project components are adjacent to waterbodies. Vegetation removal and reclamation of the riparian zone will follow MNRF and DFO protocol for the review and approval of forestry water crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), MNRF's Environmental Guidelines for Access Roads and Water Crossings (1990), applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNRF 2010a) and its associated Background Rationale document (MNRF 2010b).

6.6.7.1.2.4 *Reduce the Fish Mortality Risk Through Restricted Activity Timing Windows and Fish Rescues/Relocations*

Timing in-water work to avoid sensitive life stages is typically considered an effective means of reducing the risk of negative effects. The restricted activity timing windows provided in MNRF and DFO guidance documents (DFO 2013b; Government of Ontario 2013) are applied to each waterbody to protect fish from potential adverse effects of works or undertakings in and around water during spawning migrations and other critical life stages (i.e., spawning, egg incubation, and fry emergence) based on region (i.e., Northwest Region), species presence (single or multiple with differing windows), and seasonal spawning preference. All timing windows are to be confirmed with MNRF during the permitting phase and shared with DFO for approvals. Should the Project be unable to avoid the restricted activity periods (RAPs), this may result in one or more of the following: changes to significance determination in the effects assessment, requirement for additional studies, additional mitigations and monitoring, and increased consultation and engagement, which may result in permitting implications.

The typical periods when in water work should be avoided (i.e., RAPs) were identified for each waterbody (Appendix 6.2-A: Tables 6.2A 1B, 6.2A 2B, and 6.2A 3B and Table 6.6.7-2), together with the potential for each waterbody type (i.e., watercourse and/or lake/pond) documented within the LSA to provide spawning habitat for each species based on known life history characteristics Table 6.2-15. (Scott and Crossman 1998, Holm et al. 2021).

At a minimum, since each waterbody was considered to have potential to provide habitat for spring spawning species such as Northern Pike and members of the Leuciscidae family, a RAP of April 1 to June 15 was applied to each waterbody. This RAP covers the numerous other spring spawning species that are documented throughout the Project footprint (e.g., members of the Catostomidae and Percidae families). If only a predator species (e.g., Lake Trout) was listed, it was assumed that small-bodied prey fish species that fall under the category of “other spring spawning species” were also present as they make up the diet of the predatory fish and, as such, the relevant combination of timing windows was applied.

The addition of a fall RAP will also cover waterbodies with potential Burbot spawning habitat and other late winter/early spring spawners (e.g., Cottidae family) documented throughout the Project footprint. Where cold water thermal regime data were available, and no fish occurrence records were available, a conservative RAP of September 1 to June 15 was applied.

In summary, the following proposed RAPs are applicable to the Project:

- April 1 to June 15 (includes spring spawning species);
- April 1 to June 20 (includes spring spawning species, as well as considers Walleye);
- April 1 to June 30 (includes spring spawning species, as well as considers Lake Sturgeon);

- April 1 to July 15 (includes spring spawning species, as well as considers Bass and Muskellunge);
- September 1 to June 15 (includes all other fall spawning species, as well as considers Lake Trout and Brook Trout and overwinter/early spring spawning species);
- September 15 to May 31 (for Lake Whitefish); and
- October 1 to May 31 (for Cisco).

For the water crossing structures, the proposed RAPs will be applicable if:

- Any work is completed below the HWM (e.g., installation or removal of fill or culverts, bridge supports below the HWM);
- The waterbody is frozen and an ice bridge/snow fill is constructed;
- Beaver dam removals are required; and
- Fording is used.

For the water crossing structures, the proposed RAPs will not be applicable:

- If all work is completed above the HWM (e.g., installation of the transmission line, installation or removal of a clear span bridge or rig mat with no fill or supports below the HWM); and
- When using the existing and installed water crossing structures, where no modifications are required.

Fish within the isolated workspaces will be rescued (i.e., salvaged and relocated) by qualified professionals prior to construction under the conditions of a MNRF Licence to Collect Fish for Scientific Purposes (LCFSP) and DFO Interim Standard for In-water Site Isolation (DFO 2023a). Construction will be completed taking into consideration DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a). Should any in-water work be required within Lake Sturgeon habitat or other aquatic SAR habitat, then an authorization under the ESA may be required.

For diversions during isolations, appropriately screened pumps will be used to reduce the risk of entrainment or impingement of fish following the guidance within the interim DFO Code of Practice for end-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020).

6.6.7.1.2.5 *Erosion and Sediment Control and Spill Management Measures*

Erosion and sediment control and spill management measures that will be implemented include the following:

- An Erosion and Sediment Control Plan and Spill Prevention and Emergency Response Plan will be developed for the Project.
- The construction timing and preferred crossing methods will also reduce the risk of sediment entrainment and deposition. Where possible, access road construction in areas of potential spawning habitat will be avoided and will take place outside the proposed RAPs. Installation and removal of the water crossing structures where work is completed below the HWM (i.e., installation or removal of a culvert with fill or supports below the HWM) will occur outside of the proposed RAPs, unless permits/approval from regulatory authorities is obtained to work within the proposed RAPs. If excessive flows or flood conditions are present that occur outside of already identified in water works timing restrictions, instream construction will be postponed until water levels have subsided.
- ESC measures as set out in the Erosion and Sediment Control Plan (and approved by Hydro One, relevant regulators and Indigenous communities) will be installed prior to commencing work.
- Work will be scheduled to avoid wet and rainy periods to the extent practicable and in-water works will be conducted in the dry season or under ice-on conditions. Weather events will be monitored to prevent working in flooded and extreme precipitation conditions. Where works are required to take place outside the dry season/ice-on season and in flowing water, work will be conducted in an isolated area (e.g., coffer dam). Culvert installations will occur in dry conditions where risk to negatively impact fish or fish habitat has been identified within the crossing list. If conditions do not allow for dry installations, installations will following regulatory requirements (i.e., Interim Code of Practice: Temporary Coffer Dams and Diversion Channels (DFO 2023b), submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies (i.e., MNRF, DFO).
- Erosion resistant fill material will be used below the high-water level within the floodplain of a waterbody.
- Temporary erosion control measures must be:
  - Installed according to the plan;
  - Installed before or immediately after initial disturbance; and
  - Monitored and effectively maintained (e.g., repaired, replaced or supplemented with functional materials) throughout construction until permanent erosion control is established, or reclamation is complete.

- Construct or install water crossings in a manner that protects the banks from erosion, maintains downstream flows in the waterbody and follows permits or authorizations issued for the Project from the regulatory agencies.
- ESC measures will be installed, monitored, and managed as appropriate to reduce the risk of sediment reaching a waterbody prior to and during construction.
- Complete instream construction in isolation of flowing water (i.e., use isolation methods where surface water exists at the time of construction). Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a).
- For isolations/diversions, maintain 100% downstream flow and have contingency pumps on site. Pump intakes and outlets (if applicable) should be installed such that they do not disturb the bed and have flow dissipation measures at their outlets. For isolation, temporary diversions may be used (i.e., isolation construction techniques such as flumes, instream diversions, or bypass pumps) to divert the water flow around the isolated workspace.
- Upon removal of the crossing materials, the waterbody banks will be returned to their original profile or as per approved design drawings, and disturbed areas will be stabilized, as necessary, to reduce the risk of soil erosion.
- Disturbed areas will be re-contoured to restore drainage patterns and the approximate preconstruction profile.
- Environmental Monitor(s) will be on-site during construction to monitor the installation, use and removal of temporary water crossing structures.
- Turbidity and total suspended solids monitoring may be required at a subset of crossings or at particularly sensitive crossings to meet regulatory requirements. Turbidity and total suspended solids will be monitored according to permit requirements.
- ESC measures will be implemented at Project facilities (e.g., laydown areas, helipads, construction camps, aggregate pits and quarries, etc.), as required where waterbodies have been identified on the crossing list or any new waterbodies discovered (inform regulators, Indigenous communities and stakeholders of any new waterbodies), to reduce the risk of erosion and associated sedimentation of nearby waterbodies. The temporary construction camps and laydown areas will be decommissioned and reclaimed throughout and after completion of the construction stage.

6.6.7.1.2.6 Summary and Next Steps

Where reasonably possible, the installation of the water crossing structures (e.g., culverts, bridges, log fill, rig mats etc.) will be scheduled for the driest time of the year (i.e., July and August) (MNR 1990) or under frozen conditions (i.e., November to March)(e.g., snow fill and ice bridges) where the timing windows allow. However, due to the length of the construction stage

(i.e., approximately 18 to 24 months) and the number of water crossings, there may be water crossings installed outside of the in-water work preferred windows. If permits/approvals from MNRF and DFO are obtained and the potential for negative effects can be reduced or avoided, work below the HWM may be completed during the restricted activity timing window. To determine if this is possible, an assessment can be done on a site-specific level during the permitting process and will be based on the type of habitat potentially affected and its use by fish.

Hydro One (or their designated agent) will acquire all necessary permits and approvals prior to crossing construction, with adherence to all terms and conditions. The *Fisheries Act* approval and MNRF processes will be followed including implementation of DFO's measures to protect fish and fish habitat (DFO 2022a) and Codes of Practice (DFO 2022c) where applicable. A Road Management Strategy will be prepared and implemented for the Project within the EPP that describes decommissioning of Roads and water crossings will be decommissioned in a manner that protects fish habitat.

6.6.7.1.3 Net Effects

It is expected that the above mitigation measures will reduce the risk of overall net effects related to changes to fish habitat quality and quantity.

The crossing structures listed above were assessed to not negatively impact fish and fish habitat when all mitigation measures are correctly applied. Mitigation measures are based on DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a), application of DFO's Codes of Practices (DFO 2022c), isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a) and guidance on project activities and criteria for DFO reviews (DFO 2022a).

Potential effects to water temperatures or allochthonous inputs are expected to be nil for larger waterbodies and low for smaller waterbodies (i.e., bankfull width less than 5 m), since the majority of the waterbodies' riparian area will remain intact and unaffected by the Project.

The changes to fish habitat quantity and quality effect pathway will result in a net effect as it is recognized that with the best planning and implementation of mitigation measures, the potential exists for accidents and malfunctions. As such, measurable changes (i.e., net effects) to fish and fish habitat in the form of increases to the concentrations of chemical constituents in receiving waterbodies, poor revegetation growth, improper placement of materials and/or death of fish could occur. As such, this interaction was carried forward to the net effects characterization.

6.6.7.2 Injury or Mortality of Fish

6.6.7.2.1 Potential Effects

6.6.7.2.1.1 Injury or Mortality of Fish from Instream Construction

During instream construction of the water crossings within the ROW and access roads, there is the potential for physical injury or mortality of fish to occur. This can occur from the operation of heavy machinery in the water or the placement of fill or other materials in the waterbody where fish are present (e.g., placement of a fill below the HWM of a channel).

The use of intakes or pumps can also cause entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

6.6.7.2.1.2 Injury or Mortality of Fish through Blasting

Blasting (i.e., use of explosives) in or near water for transmission structures, for foundation excavations, and access road installation has the ability to cause potential effects to fish and fish habitats. Potential effects that may be caused by the project when blasting is used includes:

- Blast residues can cause changes in nutrient concentrations and contaminant concentrations in the watercourse;
- Blasting near water through high particle velocity and/ or pressure changes can cause lethal or sublethal effects on fish; and
- Blasting near water can cause changes in the bank composition, increase erosion potential and cause changes in sediment concentrations.

Blasting in or near water produces post-detonation compressive shock waves characterized by a rapid rise to a high peak pressure followed by a rapid decay to below ambient hydrostatic pressure. Pressure changes and vibrations caused by blasting during Project construction have potential to cause injury or mortality of fish in nearby waterbodies. Post-detonation compression shock waves caused by detonations of explosives in or near water can cause internal damage to the swim bladder and other soft organs of fish, and cause changes to fish behaviour (Wright 1982, Wright and Hopky 1998, and Godard et al. 2008). The severity of effects is related to the type of explosive, method of detonation, distance away from fish, water depth, and the weight and pattern of the charge(s). The species, size, and life stage of fish also plays a role in the severity of effects of blasting. Fish eggs incubating in spawning beds near blasting zones can also be damaged by movement of the substrate in which eggs are embedded, causing mortality or disrupting development (Wright 1982; Faulkner et al. 2008). Peak particle velocities (i.e., vibrations) can increase mortality of incubating eggs close to blasting zones (Wright 1982). Fly rock also has the potential to alter, disrupt or destroy fish habitat.

6.6.7.2.2 Mitigation Measures

The mitigation measures as outlined in Section 6.6.7.1 are also applicable to this potential effect and are discussed in detail within those sections. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020) and environmental permits/approvals conditions (once available). Based on the Project-specific potential effects noted above, the additional mitigation measures listed below are provided for protection of fish and fish habitat:

- Follow the mitigation measures in Section 6.6.7.1 for general avoidance measures and project planning, as well as to reduce the risk of fish mortality through RAPs and fish rescues/relocations.
- A Blasting and Communication Management Plan will be prepared and implemented by Hydro One with their contractor(s) for the Project that describes specific measures that would be implemented if blasting is required.
- All blasting will be done following the protective best management practices as outlined in Wright and Hopky 1995 and will be in compliance with Section 32 of the *Fisheries Act*. Consultation will be undertaken with DFO on the blasting plan. The DFO guidelines for the use of explosives in or near fish-bearing waters (Wright and Hopky 1998, Godard et al. 2008) include:
  - Maximum allowable limit for overpressure at 50 kilopascals (kPa) based on recent information disseminated by DFO (Godard et al. 2008). Previous advice (Wright and Hopky 1998) limited overpressure to 100 kPa;
  - Peak particle velocity (13 millimetres per second [mm/s]) to avoid death or damage to fish, their eggs or larvae;
  - Suggested setback distances from waterbodies to avoid effects to fish and effects to incubating eggs;
  - The use of explosives will be limited to Project construction activities and to specific geological conditions that do not allow for an alternative method of removing material;
  - Blasting will occur on land and will follow the recommended setback distances to fish-bearing waterbodies;
  - Blasts will be designed to minimize ground vibrations that can cause slope instability and impact to fish and fish habitats;
  - No ammonium nitrate-fuel oil mixtures will be used, due to the production of toxic by-products (i.e., ammonia);
  - Blast mats will be used to reduce the risk of fly rock from entering the waterbodies;

- Vibrations and peak particle velocity will be monitored throughout construction and blasting;
- Waterbodies closest to the blasting area will be isolated (e.g., silt curtain or cofferdam or alternate) to keep fish from entering the area during the blasting periods. A fish rescue/relocation will be completed to remove fish form the isolated areas. Fish rescues will be completed by fisheries biologists/environmental technicians, according to the conditions within an obtained MNRF LCFSP; and
- All applicable DFO-recommended measures to protect fish and fish habitat from the use of explosives will be considered for the Project (DFO 2022a), including respecting the Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO 2013b).

6.6.7.2.3 Net Effects

No measurable changes to fish abundance or distribution in waterbodies crossed by the Project are expected from construction activities with the effective implementation of mitigation measures described above and in Section 6.6.7.2.2. Therefore, the injury or mortality of fish due to instream construction is anticipated to have no net effect and this interaction was not carried forward to the net effects characterization.

Blasting is expected to result in no net effect to fish habitat quantity and quality or fish abundance and distribution in waterbodies crossed by the Project, with the effective application of all mitigation measures and following permitted conditions. Therefore, this interaction is not carried forward to the net effects characterization.

6.6.7.3 Changes in Fish Access to Habitats

6.6.7.3.1 Potential Effects

Placement of water crossing structures in waterbodies can potentially cause changes in fish accessibility to habitat through the introduction of obstructions. Obstructions are identified by the *Fisheries Act* (1989) as an introduced impediment to the “free passage of fish”. Reduction of accessibility or elimination of fish passage can have adverse implications throughout the ecosystem, particularly where there is more than one crossing in the waterbody, or if there are multiple crossings in a small watershed. The following are potential effects identified as plausible to changes in fish access to habitat by the placement of water crossing structures that may impact fish abundance or distribution:

- Habitat Fragmentation – Habitat fragmentation can occur through a number of pathways with detrimental effects to local populations. Isolation of habitat significant to specific life processes (i.e., movements/migration to spawning, rearing, overwintering, or foraging habitats) can disrupt processes required for the stability of self-sustaining populations (e.g., barrier between rearing and spawning habitat) (DFO 2007, 2010). This can result in obstruction of usable habitat at the crossing location.

- Placement of Materials – The placement of materials at water crossings can alter channel morphology and/ or flow, as well as change localized habitat features immediately adjacent to water crossing structures (e.g., culverts, bridges, etc.) (DFO 2010). See Section 6.6.7.1 for additional potential effects of placement of waterbody materials.
- Changes in Flow – Alteration of flow velocity and/ or depth introduces potential for erosion and/ or scouring of substrates and bank materials at and adjacent to crossing locations (DFO 2010, MTO 2009). Erosional deposition can cause fluctuating areas of water depth, introducing opportunity for displacement or stranding of fish, and improper sizing of crossing structures may alter water velocities, creating obstructions (Peake 2008, Katopodis and Gervais 2016). Further discussion on potential effects caused by changes in flow can be found in Section 6.6.7.7.
- Alteration of Grade – Changes in grade introduced by a crossing structure may result in obstructions by the same pathways as discussed by Changes in Flow. Furthermore, bank gradients can be associated with the reduced ability of riparian areas to filter runoff and control erosion. Unsuitable banks (e.g., lacking stability, inappropriate slope etc.) may reduce conveyance conditions for local species and introduce obstructions by altering flow and/ or water levels MTO 2009.

The above-listed potential effects can alter the use and composition of localized habitat and speciation in associated water crossings. Permanent residual effects caused by the alteration to the free passage of fish has potential to decrease biodiversity. It is expected that any net effects can by mitigated through the effective implementation and application of mitigation measures during the construction stage.

6.6.7.3.2 Mitigation Measures

The mitigation measures as outlined in Sections 6.6.7.1, 6.6.7.4, 6.6.7.5, and 6.6.7.7 are also applicable to this potential effect and are discussed in detail within those sections. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). Based on the Project-specific potential effects noted above, the additional mitigation measures listed below are provided for protection of fish and fish habitat:

- Follow the mitigation measures in Section 6.6.7.1 for general avoidance measures and project planning, as well as to reduce the risk of fish mortality through timing windows and fish rescues/relocations.
- Construct or install water crossings in a manner that maintains downstream flows and fish passage, that also follows permits or authorizations issued for the Project from the appropriate regulatory agencies.

- Where the construction of new access infrastructure for the Project will involve water crossings, the risk of potential changes in fish accessibility to habitat will be reduced by use of clear span bridges or rig mats.
- If culverts are used, the culvert will be designed and installed in fish bearing waterbodies to allow for fish movement by:
  - Culvert installations will occur in dry conditions where risk to negatively impact fish or fish habitat has been identified within the crossing list. If conditions do not allow for dry installations, installations will following regulatory requirements (i.e., Interim Code of Practice: Temporary Coffer Dams and Diversion Channels (DFO 2023b), submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies (i.e., MNRF, DFO)
  - Considering the habitat requirements for target species at the lowest trophic levels of each system, using resources such as Swim Performance Online Tools (SPOT) (Di Rocco and Gervais. 2022) to reduce the risk of the culvert installation introducing velocities which surpass swimming abilities of a waterbody's fishery (MNRF and DFO 2021);
  - Implementing mitigation options in permanent structures to minimize net habitat loss and optimize usage and passage by fish (e.g., baffles, gradient pools, keyed stone, etc.) (MTO 2017);
  - For permanent culverts, substrates inside the culvert will mimic the existing substrates upstream of the crossing; and
  - Mitigation measures as outlined in Section 6.6.7.7 are also applicable to this potential effect.
- Implement effective installation to reduce the risk of undermining of structures by embedding below the grade of the water crossing to allow free flow of water, passage of fish, and allow settlement of natural substrates (minimum or 10% recommended) (MNR 1990).
- Regularly monitor and maintain culverts to reduce the risk of blockages from forming and causing ponding or backwater effects. Where culverts are installed at fish-bearing waterbodies, debris removal activities will follow DFO's Code of Practice on Culvert Maintenance (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and fish stranding can be avoided) (DFO 2022g).
- Reclaim temporary access roads, construction camps, turn-around areas, water crossings and laydown areas at the end of construction.

- Re-instate and re-stabilize any portion of a waterbody beds, banks and slopes and natural areas that were disturbed during construction to pre-construction conditions or better, so that previous accessible habitat does not become degraded or fragmented (MNR 1990).

Where installed, culverts will be regularly monitored and maintained during construction, operation, and maintenance to allow for fish passage. Debris removal activities will follow DFO's guidance (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and avoidance of fish stranding). Culvert sizing will be considered during detailed planning to accommodate for local conditions (i.e., low flow and flooding events). Roadside culverts can provide optimal locations for beavers to construct dams. Blockage of culverts as a direct result of beaver activity may cause an impediment, and in some cases barriers to fish movement (MNR 1990). Culverts will be monitored during construction for beaver blockages and be maintained as appropriate to avoid potential loss of access to habitat because of dammed culvert openings.

If determined present, it is recommended that monitoring for fish passage, SAR and/or SOCC (e.g., Lake Sturgeon, Northern Brook Lamprey, etc.) occurs before, during and after construction activities to confirm integrity and accessibility of potential habitat has been maintained.

6.6.7.3.3 Net Effects

It is expected that the above mitigation measures will reduce overall net effects of access to habitat and abundance/distribution of local species imposed by placement of water crossing structures.

Changes in fish access to habitats, affecting fish abundance and distribution, from placement of water crossing structures will result in a net effect, and this interaction is carried forward to the net effects characterization.

6.6.7.4 Changes to Water and Sediment Quality and Quantity

6.6.7.4.1 Potential Effects

6.6.7.4.1.1 Spills and Deleterious Substance Exposure

Spills during construction, operation and maintenance that occur in high enough concentrations could negatively affect water quality and cause direct acute/chronic toxicity to fish, affect reproduction survival, cause ecosystem changes and, as a result, changes in abundance, richness, diversity and recruitment. Spills are generally local in nature; however, literature has demonstrated that the introduction of deleterious materials into a waterbody can have acute and chronic impacts on an ecosystem (Austin 1999, Bucke 1997, Crossman et al. 1974, Fitzsimons 1995). Considering the nature of work associated with the Project, the most plausible types of spills have been identified as hydrocarbons (i.e., fuel and/or oil) from machinery or other

chemical applications. Releases of cementitious materials have the potential to increase water pH (i.e., render it extremely alkaline or 'basic'), that has the potential to cause fish mortality or longer-term health issues in fish. Spills of fuel or other materials could alter quality of surface water, groundwater and sediments and, in turn, cause a potential net negative effect on fish reproduction, survival and abundance.

6.6.7.4.1.2 Changes to Hydrology or Groundwater

Potential changes in surface water drainage patterns and increases or decreases in flows and surface water levels in waterbodies are reported in detail in Sections 6.2 and 6.3. Changes beyond the natural range of variation could lead to changes in fish habitat quantity and quality. Changes in waterbody flow can affect spawning, rearing, feeding, migration, and overwintering habitat of fish-bearing waterbodies, and can affect the waterbody productivity and food availability for fish (e.g., benthic invertebrates). Changes in water quantity, quality and flow can also alter the presence of macrophytes, which provide cover, spawning material or food for fish.

Groundwater baseflow inputs are seasonally important to local waterbodies and natural environment features (e.g., vegetation, fish and fish habitat, and wetlands). Construction activities have the potential to locally influence the contribution of groundwater discharge to the baseflow of waterbodies. Specifically, Project construction may lead to changes in the local hydrogeological environment by increasing, decreasing or redirecting groundwater flows. These changes in local groundwater flow can result in local groundwater table lowering or raising and alteration of flow pathways. These potential changes in groundwater flow pathways are potentially linked to surface water quantity (i.e., water levels) and subsequently fish habitat quantity and quality.

6.6.7.4.2 Mitigation Measures

The mitigation measures as outlined in Section 6.6.7.1 are also applicable to this potential effect and are discussed in detail within that section. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). Based on the Project-specific potential effects noted above, the additional mitigation measures listed below are provided for protection of fish and fish habitat:

- Implement the surface water mitigation measures presented in Section 6.2.
- Implement the groundwater mitigation measures presented in Section 6.3.
- Follow the mitigation measures in Section 6.6.7.1 for general avoidance measures and project planning, as well as to reduce the risk of fish mortality through timing windows and fish rescues/relocations.

- Design drainage and infrastructure to avoid diversion and otherwise minimize change in drainage to or from a waterbody.
- Develop and maintain surface water management and ESC infrastructure to minimize potential for net changes to infiltration rates.
- Postpone instream construction if elevated flows (i.e., typically those resulting from precipitation events of 5 mm or more) excessive flows or flood conditions are present or anticipated outside of already identified in water works timing restrictions. Resume activities when water levels have subsided or equipment/techniques suitable for conditions are deployed.
- Complete instream activity in the shortest timeframe practical to minimize the duration and reduce the risk of severe disturbance.
- Manage temporary flows, withdrawal, and discharge, including all water from dewatering operations to reduce the risk of erosion and/or release of sediments to a waterbody.
- Reclaim temporary access roads, construction camps, turn-around areas, water crossings, aggregate areas, and laydown areas at the end of construction.
- Construct water crossings in consideration of MNRF Environmental Guidelines for Access Roads and Water Crossings (MNR 1990), MNRF and DFO protocol for the review and approval of forestry water crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNR 2010a).
- Locate temporary construction camps and storage and laydown areas a minimum of 30 m back from the ordinary HWM of a waterbody and aggregate pits and quarries will be located a minimum of 120 m from the ordinary HWM, where reasonably possible or otherwise permitted by regulators.
- Monitor turbidity and total suspended solids according to permit requirements.
- To reduce the potential impact in the event of a spill or leak, prepare and implement a Spill Prevention and Emergency Response Plan (Section 9.3.1.13) that describes specific measures that would be implemented if a spill occurred.
- Refueling, service, and maintenance of vehicles and equipment will generally be carried out in designated areas at temporary construction camps and temporary laydown areas located a minimum of 120 from waterbodies to the extent possible. These areas will be designed and constructed to collect and contain minor leaks and spills. If refueling within 120 of a waterbody cannot be avoided, enhanced spill containment measures will be used. In the event that refuelling, servicing and maintenance is required in the field, 120 m buffer will be respected to the extent possible. There may be locations where this

is not possible due to the prevalence of wetlands; however, in these locations enhanced spill containment measures will be used. The following practices and procedures will be employed to reduce the risk of spills and leaks:

- Machinery and equipment will arrive on-site in a clean condition and will be inspected and maintained routinely to avoid fluid leaks.
- Non-mobile equipment will be refuelled in a controlled manner to reduce the risk of spillage, and drip pans will be present under parked equipment at all times;
- Fuel and hazardous materials will be transported in approved containers in licensed vehicles, and stored in such a way to reduce the risk of any deleterious substances from entering a waterbody;
- Storage, operation, and maintenance (e.g., refuelling, lubrication, etc.) of any equipment or associated materials will occur in a manner that reduces the risk of deleterious materials from entry to waterbodies (MTO 2009).
- Fording will be avoided to the extent possible. If fording is required it will be a one-time crossing with clearing and bridge installation equipment (over and back) in flowing water conditions with stable beds and low sloping banks or approaches. Any fording will follow DFO's Code of Practice for Temporary Fords (DFO 2022f).
- Any portion of equipment to be used within a waterbody or operating within the bank shall be free of and monitored for fluid leaks, and externally cleaned/degreased prior to works (MTO 2009).
- Individuals working on-site and handling hazardous materials will be trained in best practices related to the transportation and handling of dangerous goods.
- The transportation, storage and handling of fuels will meet the *Ontario Technical Standards and Safety Act, 2000* (Ontario 2010) and Canada's *Transportation of Dangerous Goods Act* (Ontario 1990b).
- Following the construction phase, all temporary wash-out sites will be capped with local backfill and re-graded or rehabilitated according to approval conditions, prior to construction crews departing the site.

- Register above ground storage tanks under, and in compliance with, applicable federal and provincial legislation.
- Use only clean material free of particulate matter or deleterious substances.
- Temporarily store, handle, and dispose of materials used or generated (e.g., organics, soils, woody debris, temporary stockpiles, construction debris, etc.) during site preparation, construction, clean-up a minimum 30 m from waterbodies, to reduce the risk of that sediment or deleterious substances enter a waterbody.

- An emergency spill kit will be kept on-site. In the event of a spill/leak, the following precautions will be implemented:
  - The spill/leak will be contained and either disposed of through site waste handling systems or removed for disposal in approved facilities;
  - Reportable spills (as defined under O.Reg. 675/98) of potentially deleterious materials will be reported to the MECP Spills Action Centre (MTO 2009); and
  - If the spill is in fish bearing water or where potential for harm to fish or fish habitat is likely, the MNRF and DFO will also be contacted (MTO 2009).
- No herbicides will be used during construction of the Project or for future maintenance of this transmission line.

All aggregate pits or quarries will be located a minimum of 120 m away from the ordinary HWM of a waterbody, where possible and new permitted sand and gravel pits will remain 1.5 m above the water table. The aggregate pits and quarries and will follow the guidelines outlined in the Aggregates Permits on crown lands for Pits and Quarries above Water (MNRF 2014b) and the Forest Management Planning Manual (MNRF 2020a) and will meet the conditions set out in the *Aggregate Resources Act (*Ontario 1990a) and Ontario Standards (MNRF 2020b).

6.6.7.4.3 Net Effects

As described in Section 6.2.7.5, it is recognized that, even with the best planning and the implementation of mitigation measures, the potential exists for accidents and malfunctions. As such, measurable changes (i.e., net effects) to surface water quality in the form of increases to the concentrations of chemical constituents in receiving waterbodies could occur in the event of the wash-off from accidental spills or leaks to nearby waterbodies. Based on the above, this Project-environment interaction is carried forward to the net effects characterization due to potential changes in habitat quality and quantity.

Changes to hydrology or groundwater may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality through:

- Changes beyond the natural range of variation could lead to changes in fish habitat quantity and quality;
- Changes in waterbody flow can affect morphology, spawning, rearing, feeding, migration, and overwintering habitat of fish-bearing waterbodies, and can also affect the waterbody productivity and food availability for fish (e.g., benthic invertebrates); and
- Changes in waterbody quantity, quality and flow can also alter the presence of macrophytes, which provide cover, spawning material or food for fish.

These changes will result in a net effect and this interaction is carried forward to the net effects characterization.

6.6.7.5 *Changes to Air Contaminants and Fugitive Dust Emissions*

6.6.7.5.1 Potential Effects

Changes to air contaminants and fugitive dust emissions resulting from the Project could lead to net changes to constituent concentrations in water in the receiving environment, which could affect fish habitat quantity and quality. Construction of the Project is expected to generate air contaminants and fugitive dust emissions (see Section 6.7), with the main sources of emissions being:

- Exhaust from vehicles, construction equipment, and generators;
- Land clearing activities and slash pile burning;
- Material handling and hauling activities including extraction, dozing, and grading;
- Reclamation of temporary access roads and staging areas; and
- Travel along access roads.

Fish are vulnerable to harm from air pollution and their responses to air pollution may differ depending on exposure and vulnerability. Air pollution can harm fish through impacting the quality of the habitats in which they live and the availability and quality of their food supplies (ECCC 2012).

Effects from air pollutants may result in widespread disruption of the structure and function of ecosystems in developed areas (USFWS 1982). Air contaminants and dust emissions and subsequent deposition can change water quality, which can influence fish habitat availability and distribution, microbial activity and nutrient cycles, food webs and ecosystem interactions (USFWS 1982). Rates of dust deposition and accumulation are dependent on the rate of supply from the source, wind speed, precipitation events, topography, and vegetation cover.

6.6.7.5.2 Mitigation Measures

The air quality mitigation measures presented in Section 6.7 will be implemented and will include the development and implementation of a Dust Control/Air Quality Plan prior to construction. Section 6.7 describes the specific measures that will be implemented, where required. In addition, the following additional mitigation measures will be applied:

- Limit vehicle emissions;
- Vehicles and equipment will be regularly serviced, maintained and inspected for leaks;
- Obey all speed limits to limit fugitive dust;

- Slash pile burning will be subject to permits and approvals by appropriate regulatory agencies and in compliance with O. Reg. 207/96;
- Dust control practices (e.g., wetting with water, calcium chloride as a dust control solution) will be implemented at work sites and on access roads near residential areas or other areas as practicable. Application of calcium chloride by Hydro One will be completed in consultation with road authorities and will not occur within 120 m of a waterbody or wetland.;
- Minimize dust-generating activities, as practicable and where required, during periods of high wind to limit dust emissions and spread;
- Minimize vehicular traffic to exposed soils and stabilize high traffic areas with suitable cover material;
- Restore disturbed areas as soon as reasonably possible to minimize duration of soil exposure; and
- Multi-passenger vehicles will be used to transport personnel, where practicable.

In addition, the mitigation measures as outlined in Section 6.6.7.1 and 6.6.7.4 are also applicable to this potential effect and are discussed in detail within those sections. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). Additional detail on dust suppression activities will be included in the EPP.

6.6.7.5.3 Net Effects

Under baseline conditions, concentrations of suspended particulate matter (SPM), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO) and particulate matter (PM) were observed to be below the relevant criteria (i.e., the lowest applicable criteria) within approximately 100 m of the ROW. Predicted concentrations from Project activities in combination with background air quality are below the relevant criteria within approximately 100 m of the ROW after effective implementation of standard mitigation measures (Section 6.7.7.1)

The surface water quality assessment (Section 6.2) used the results from the air quality assessment (Section 6.7) to predict effects from air contaminants and fugitive dust emissions to surface water quality criteria; no net effect on surface water quality is anticipated.

Air contaminants and fugitive dust emissions and subsequent deposition are expected to result in no net effect on water quality and as a result fish habitat quantity and quality; therefore, this interaction is not carried forward to the net effects characterization.

6.6.7.6 Changes to Public Access to Fish Habitats

6.6.7.6.1 Potential Effects

The improvement of existing access roads and development of new access roads for the Project could result in a negative effect on the abundance of fish species, through increased access to waterbodies where populations are present. Access to previously undisturbed areas introduces opportunity for recreational fishing and baitfish harvest in populations that have not previously experienced such pressure. The introduction of the ROW and additional access roads will increase net land quantity and access within the outdoor tourism and recreational land use of the LSA. This will open new areas to outdoor recreation and tourism users both on, and adjacent to, the ROW and new or improved access roads. Potential effects identified by increased public access to recreational fishing areas are as follows:

- Pressure on historically inaccessible waterbodies – An increase in angling pressure at water crossings where novel access is established or improved has potential for detrimental effects on natural populations from excessive exploitation (Gunn and Sein 2000; Schindler 1998; Kaufman et al. 2009). Small lakes are especially susceptible to overharvesting, for example, oligotrophic lakes <50 ha often support a population of <300 Lake Trout (Schindler 1998) (see Section 6.6.5.2 and Table 6.6-16).
- Novel pressure on baitfish harvest – 'Donor ecosystems' (Litvak and Mandrak 1993) that have not experienced pressure of baitfish removal for recreational angling may not be able to support harvest.
- Disturbance by recreational vehicles (e.g., boats, ATVs, etc.) – Improved and new access to water crossings within the LSA create opportunity for recreational use and introduction of motorized recreational vehicles (Hunt and Dyck 2011). Disturbances introduced by recreational vehicles (e.g., noise and vibration, destruction of vegetation by propellors, contamination from fuels and spills, habitat destruction from off-road vehicle fording etc.) may impact overall habitat quality and quantity (Hunt et al. 2019; Stan 2017).
- Increase in risk of poaching (including increased access to fish sanctuaries) – Increased pressure on enforcement, the increase of access to remote water crossings within the Project footprint may contribute to elevated poaching. Fishing limits and restrictions exist to preserve natural stocks and recruitment, thus illegal harvest can have cascading impacts throughout an ecosystem (Gigliotti and Taylor 1990).
- Introduction or spread of invasive species and pathogens – Lack of control in fish transport and release (Litvak and Mandrak 1993; Drake and Mandrak 2014) provides opportunity for the release of non-native and/or invasive species into waterbodies. Non-native and invasive species may compete with local native fauna, and transport of boats and fish across waterbodies has the potential to introduce pathogens and diseases (Anderson et al. 2014; Killian et al. 2012).

- Increase in commercial outfitters – As harvest pressure may increase from local recreational fishers, guided outfitters who operate commercially and have benefited from limited public access to certain areas (i.e., creating visitor experiences based on values of remoteness and wilderness), are likely to see the expansion of access to have a negative effect on their activities.
- Increase in Conservation Area and Provincial Park Access – Increased access to areas, notably those that are protected such as provincial parks and conservation areas, has the potential to degrade these protected areas.
- Increased potential use by off-road vehicles – Increased access to areas through the placement of temporary and/or permanent water crossings and the cleared transmission line corridor can increase off-road vehicle access, although access is unauthorized within the transmission line corridor. Off-road vehicles have the potential to disturb/alter/destroy fish habitats through: removing vegetation, eroding soils, reducing pool depth and volume, increasing sedimentation and embeddedness, causing deep rutting in soils, deforming banks and increasing sediment loads in water as well increasing potential for spills and debris within natural settings (Carrot Valley Watershed Association nd, Guildin 2004, DFO nd).
- Travel Routes – The placement of materials (i.e., installation of culverts and low bridges) at water crossings can alter accessibility of Indigenous travel routes to access fishing and other resources used by Indigenous peoples and may reduce the ability to freely navigate to the fishing and harvest areas, subsequently potentially impacting their livelihoods.

It is expected the above potential effects can be mitigated if the proposed mitigation measures are effectively implemented.

6.6.7.6.2 Mitigation Measures

The mitigation measures as outlined in Section 6.6.7.1 are also applicable to this potential effect and are discussed in detail within that section. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). Based on the Project-specific potential effects noted above, the additional mitigation measures listed below are provided for protection of fish and fish habitat:

- Follow the mitigation measures in Section 6.6.7.1 for general avoidance measures and project planning, as well as to reduce the risk of fish mortality through timing windows and fish rescues/relocations.

- Use of existing roads to the extent possible for construction and maintenance of the Project to limit disturbance resulting from construction of new access roads and increases in public access.
- Temporary access roads, construction camps, turn-around areas, water crossings, helicopter pads, and laydown areas will be reclaimed and revegetated at the end of construction.
- Minimize disturbance to and access restrictions on trapping and hunting areas where possible during the construction stage and during periods when operation and maintenance activities are being completed for safety reasons.
- Most construction workers will be accommodated in temporary construction camps, and Hydro One or their contractor will develop a worker awareness guide that identifies local fishing licence authorities and where to obtain fishing licences, reviews the regulations within the FMZ and best management practices to reduce the spread of invasive species/diseases.
- Increased and novel access may require changes in fisheries management considerations, to ensure current targets and objectives remain sustainable for populations that may be sensitive to additional fishing pressure. This may include increased consideration of the following:
  - Developing and/or redefining biological objectives and invasive species management strategies;
  - Continued existing and redefined fisheries management goals through the Ontario Fishery Regulations (2007);
  - Broader and continued application of the current non-regulatory management instruments (i.e., access controls through the implementation of road use strategies, restrictions on where non-residents can camp on Crown Land, and restrictions on the size and location of commercial outpost camps (MNRF 2020c, Northwest Region Boat Cache and the Border Waters Area programs) will also support the avoidance of overharvest in previously inaccessible waterbodies;
  - For Lake Trout lakes overlapping the Project footprint, consideration of the Inland Ontario Lakes Designated for Lake Trout Management (2006) and the Amendment to Area specific Crown Land Use Policy #2007-025 (2009) (Update to Area-specific Land Use Policy to Reflect Updated Crown Land Disposition Policy for Designated Lake Trout Lakes [MNRF 2023]). Consideration of the recommended Area of Concern and application of a 120 m buffer as practicable. No timber harvesting will take place within this buffer except for access road routes and as practicable for the transmission line. Reclamation will be completed post-construction and may include seeding the disturbed areas as appropriate. Further mitigation for potential impacts to Lake Trout is presented throughout this EA Section;

- Mitigation measures presented in the Fish Management Plans (MNRF 2009). (MNRF 2020c, MNRF 2018) are reflective of the time of publication and may not be exhaustive in considering recent changes/development within the zone; and
- Off-road vehicle use by Hydro One or its contractors within the ROW will be limited during construction and operation and will follow DFO's Code of Practice for Fording (DFO 2022f) and DFO's All Terrain Vehicle Guidance (DFO nd). Guidance includes: vehicles will be cleaned before and after a ride to reduce the risk of spreading invasive species, vehicles will be inspected for fuel leaks or equipment damage, riders will avoid sensitive features and water crossings to the extent practicable, riders will not harm, kill or collect flora or fauna, and garbage and debris will be properly disposed of.

6.6.7.6.3 Net Effects

The management objectives outlined in the FMZ 4 (MNRF 2020c), FMZ 5 (MNRF 2018) and FMZ 6 (MNRF 2009) as determined by the MNRF were considered when assessing potential effects from increased access. It should also be noted that it is unknown at this time if effects introduced from increased access from fishing will be compensatory or additive to natural mortality rates and sustainability of remote waterbodies. Potential changes in angler pressure and fish harvest will continue to be managed by MNRF and DFO, the government agencies mandated to manage fisheries resources (i.e., fish management zones, fish restricted access timing windows and fish catch limits). Furthermore, fishing is managed as a public resource through provincial licensing requirements, and by establishing rules in terms of season length, catch limits, and catch-and-release rules for waterbodies near the Project.

Increase in harvest pressure on waterbodies is anticipated where access has been improved or created as a result of the Project, but most is expected to be on larger waterbodies with known productive fisheries. Smaller waterbodies may experience periodic fishing activity and may be vulnerable to overharvesting, but locations with higher value fisheries (e.g., criteria species) offer more appeal to recreational fishers (Hunt and Lester 2009). As an increase to public access to fish is anticipated and, in turn, increased exploitation and potential for invasive species and disease transfer (MNRF 2020c), this interaction is carried forward to the net effects characterization.

Further consideration of potential effects that may affect the practice of Section 35 rights and interests or land uses by Indigenous communities are discussed in further detail in Section 7.7 (First Nations Rights, Interests and Use of Land and Resources) and Section 7.8 (Métis Rights, Interests and Use of Land and Resources).

6.6.7.7 *Changes to Fish and Fish Habitat due to Project Related Effects Contributing to Climate Change*

6.6.7.7.1 Potential Effects

Climate change has the potential to impact the way that the Project interacts with fish and fish habitat. Effects of the Project on fish and fish habitat may be amplified under future climate conditions due to changes in temperature and precipitation patterns which will affect waterbody thermal regimes and flows. This includes:

- Reduction in water levels (i.e., drought conditions), localized riparian and aquatic vegetation reduction, loss in habitat quantity and quality, biodiversity loss, and changes in the distribution of species.
- Increased flood conditions, saturation of existing riparian areas, sedimentation and erosion of the waterbodies, change in habitat quantity and quality, change in fish abundance and distribution.
- Change in temperatures that may alter spawning and migration cues, reduce biodiversity and abundance, reduce or expand fish distributions, reduce fish habitat quality of cold and cool water habitats, and change ice on/ice off timing and ice quality.
- Increase in periodicity (i.e., occurring more often) of high flow (i.e., those with channel forming flows). For example, a flow event that currently occurs once every two years is expected to occur much more often than once in two years.

Climate change can also pose a risk to infrastructure. It is anticipated there will be an increased demand to provide emergency response to infrastructure damage due to flooding, eroding banks and higher rate of winds and storms in the future (DFO 2013a). Construction will face increased open water seasons and potential expansion or changes to the restricted activity periods/in-water work timing windows due to shifts in thermal cues for spawning fish and will need to be less reliant upon ice bridges and snow fill crossings in the future.

6.6.7.7.2 Mitigation Measures

The mitigation measures as outlined in Sections 6.6.7.1, 6.6.7.3, 6.6.7.4, and 6.6.7.7 are also applicable to this potential effect and are discussed in detail within those sections. Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). Based on the Project-specific potential effects noted above, the additional mitigation measures listed below are provided for protection of fish and fish habitat:

- Potential changes due to climate change will be mitigated to the extent possible by using avoidance techniques (i.e., limiting construction of new access roads, avoiding extreme weather events) and maintaining a 30 m vegetated buffer around waterbodies to help maintain shading and riparian vegetation to reduce the risk of erosion and provide flood protection (see Sections 6.6.7.2, 6.6.7.4, 6.6.7.5, and 6.6.7.7 for the full list of mitigation measures applicable).
- Project design will use best management practices to capture a wide spectrum of environmental conditions, such that suitably sized infrastructure is used at water crossings to accommodate flood and low flow conditions.
- Temporary access roads, construction camps, turn-around areas, water crossings, and laydown areas will be reclaimed and revegetated at the end of construction.

Most construction workers will be accommodated in temporary construction camps, and Hydro One or their contractor will develop a worker awareness guide that identifies local fishing licence authorities and where to obtain fishing licences, reviews the regulations within the FMZ and best management practices to reduce the spread of invasive species/diseases.

In the event of a climate change emergency that has impacts on fish and fish habitat, Hydro One will apply for a DFO *Emergency Fisheries Act* Authorization to allow for a timely response.

6.6.7.7.3 Net Effects

The management objectives outlined in the FMZ Plans (MNRF 2014a, MNRF 2009) as determined by the MNRF were considered when assessing potential effects from climate change. However, potential changes due to climate change will largely continue to be managed and monitored by MNRF and DFO, the government agencies mandated to manage fisheries resources.

Changes in fish abundance and distribution, as well as habitat quantity and quality from climate change, is anticipated to result in a net effect and this interaction was carried forward to the net effects characterization.

6.6.7.8 Summary of Potential Effects, Mitigation Measures, and Net Effects

Table 6.6-23 provides a consolidation of the potential effects, mitigation measures, and predicted net effects in tabular format, which is based on the previous assessment discussion and the effective implementation and application of the mitigation measures.

Table 6.6-23: Potential Effects, Mitigation Measures, and Predicted Net Effects for Fish and Fish Habitat

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
Project activities during the construction stage: • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, and temporary construction camps etc.); • Surface water management and erosion control; • Reclamation of decommissioned access roads, temporary laydown areas, staging areas and temporary construction camps. **Project activities during the operation and maintenance stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.	Changes to fish habitat quantity and quality.	**Construction stage:** • Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020), and environmental approval conditions (once available). • Work in and near water work and sensitive habitat features (e.g., SAR/SOCC habitats, spawning areas, groundwater upwellings, etc.) will be avoided as practicable through planning and design. • The Project footprint will be limited to the extent feasible. • Regulatory permits/approvals will be obtained from applicable regulatory agencies to install water crossings. • During construction and operation and maintenance, existing access roads will be used as much as possible to limit disturbance resulting from construction of new access roads. • The number of temporary and permanent water crossings required for the Project will be minimized, where possible. • Where new water crossing structures are proposed, the primary preferred structures will avoid in water work (e.g., preferential use of clear span bridges, ice bridges/snow fills, etc.). • Water crossings will be constructed or installed in a manner that maintains downstream flows and fish passage for the lowest trophic levels of each system according to DFO's species-specific passage requirements (Di Rocco and Gervais 2022). Constructed water crossings will follow permits or approvals issued for the Project from the appropriate regulatory agencies, including being designed to handle peak and low flow conditions, culvert embedment by 10% and will follow the natural slope of the watercourse. Mitigation options will be implemented in permanent structures to minimize net habitat loss and optimize usage and passage by fish (e.g., baffles, gradient pools, keyed stone, etc.) (MTO 2017). Where permanent culverts are installed, substrates inside the culvert will mimic the existing substrates upstream of the crossing. • Water crossings will be constructed in consideration of MNRF Environmental Guidelines for Access Roads and Water Crossings (MNR 1990), MNRF and DFO protocol for the review and approval of forestry water crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNR 2010a). • To the extent practicable and while implementing all recommended mitigation measures, work will be completed below the HWM as quickly as possible to shorten the duration of disturbance. • Channel realignments/infilling will be avoided through Project planning and design to the extent practicable. Channel realignments/infilling will only be undertaken in locations where specific conditions are met and/or where required for safety/security purposes. If required, then DFO/MNRF permitting, and consultation will be undertaken. • Only the appropriately sized crossing structure will be implemented, that is determined by site specific conditions and flow at the crossings. Approved crossing structures will be placed in the appropriate locations. • Site-specific conditions and discharge rates (i.e., stream measurements and flow calculations completed in accordance with MNRF requirements) at the crossing will inform appropriate sizing and precise location for each water crossing structure. • Each waterbody crossing will be visited ahead of construction by qualified environmental personnel to confirm that the crossing location is conducive to a culvert install, such that any changes in site conditions can be addressed through adaptive management. • Before construction, all water crossings will be checked to make sure they are on the water crossing lists (Appendix 6.6-B and 6.6C). If new waterbodies are identified, an Aquatics Specialist will be consulted to	Net changes to fish habitat quantity and quality.

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		determine the practicable crossing methods, proposed restricted activity timing window, approvals or permits required, and inform regulators, Indigenous communities and stakeholders of any new waterbodies. • Culvert installations will follow regulatory requirements (i.e., Interim Code of Practice: Temporary Coffer Dams and Diversion Channels (DFO 2023b), submission of appropriate notification and acquisition of necessary permits/approvals from regulatory agencies (i.e., MNRF, DFO). • Water crossing structures (e.g., bridges, ice bridges/snow fills, rig mats) will be installed, maintained, removed, and decommissioned and the waterbody will be reclaimed post decommissioning using best management practices and following environmental permit/approval conditions (once available), permits, or authorizations issued for the Project from the appropriate regulatory agencies. If culverts are installed, they will be installed as per the previous measures. • Where rig mats are necessary for crossing unstable or unconfined waterbodies the following mitigation measures will be used as appropriate and additional details will be included in the EPP: 1) Prioritize crossing during the frozen season to limit disturbance, 2) Where winter construction is not feasible, sediment and erosion control measures should be implemented (i.e., silt fencing, silt curtains, aqua dams, coffer dams etc.) to minimize disturbance to fish habitat, and 3) On site monitoring will be completed during these crossings to monitor impacts to fish (i.e., distressed fish, stranded fish, mortalities) and be prepared for fish salvage, where required. • Fording will be avoided to the extent possible, if fording is required it will be a one-time crossing with clearing and bridge installation equipment (over and back) in flowing water conditions with stable beds and low sloping banks or approaches. Any fording will follow DFO's Code of Practice for Temporary Fords (DFO 2022f). • Log fill crossings (i.e., a piece of corduroy road) will be used only in areas with no defined channel, areas that are dry at the time of crossing and in seepage areas where no fish habitat has been identified. They will be used only during the recommended timing widows, and under agency permitted conditions. • Snow fill crossings will apply adaptive management strategies and specific protocols which will be outlined in the EPP to test the applicability of the crossing method and reduce the likelihood of harm to fish and fish habitat as well as for health and safety purposes. • Environmental Monitor(s) will be on-site during construction to monitor the installation, use and removal of temporary water crossing structures, as appropriate. ESC measures will be installed prior to commencing construction activities. Upon removal of the crossing materials, if necessary, the waterbody banks will be returned to their original profile and disturbed areas will be stabilized, as necessary, to reduce the risk of soil erosion. • Where beaver dam removals are required to facilitate the installation of water crossing structures, the activity will be completed in consideration of best management practices and environmental permit/approval conditions (once available), including MNRF guidelines for access roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and Code of Practice for Beaver Dam Removal (DFO 2022h) as well as permitting through the MNRF. • Culvert maintenance will be completed in consideration of best management practices and environmental permit/approval conditions (once available), including MNRF Guidelines for Access Roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and Code of Practice for Culvert Maintenance (DFO 2022g). • To minimize downstream sediment effects, isolation methods will be used for the installation and removal of culverts, as required by MNRF and DFO regulatory and permitting requirements. Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a). For isolation, temporary diversions may be used (i.e., isolation construction techniques such as flumes, instream diversions, or bypass pumps) to divert the water flow around the isolated workspace. Where diversions are used, bypass pumping will be monitored and adjusted as necessary to maintain downstream flow. • Re-instate and re-stabilize any portion of a waterbody beds, banks and slopes and natural areas that was disturbed during construction to compatible pre-construction conditions or better (see Section 6.6.7.4).	

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect

		• Vegetation mitigation measures presented in Section 6.4 will be implemented, including:
		  ◦ Compatible vegetation will be allowed to grow back within the ROW, including riparian areas, to heights compatible with safe operation of the transmission line;
		  ◦ The Vegetation Management Plan will be followed (Section 6.4) to allow for revegetation following construction;
		  ◦ Native soils will be stabilized and reinstated and topsoil/planting mediums will be used in all areas where disturbance or exposure occurred during construction;
		  ◦ Disturbed banks of waterbodies will be reinstated and stabilized to pre-construction conditions and configurations (or better) using proper design and stabilization techniques (i.e., use of vegetation, rock stone materials).
		• Where instream and riparian vegetation removed, a vegetation rehabilitation reclamation plan will be developed to replant following construction to pre-construction conditions or better (see Section 6.4).
		• Soil/seedbank salvage techniques will be used, along with transplanting and live staking, under site specific circumstances.
		• Only approved seed mix species and species of importance to Indigenous communities for restoration/reclamation will be used; Encroachment into and the alteration of bed and bank profiles will be avoided. Only clean materials(free from particulates) will be used and fish cover features will be integrated where feasible.
		• Enhanced vegetation recovery methods (e.g., seeding, planting seedlings etc.) will be implemented where these enhanced methods are appropriate. For example, Hydro One will plant seedlings along new off-ROW access roads in conservation reserves and provincial parks. Further, waterbody crossing locations that have been removed after construction in conservation reserves and provincial parks, and areas that are subject to erosion will be seeded with an approved seed mix.
		• Access to waterbodies, wetlands, and banks will be limited to protect riparian vegetation and minimize bank erosion. Swamp mats will be used where necessary on banks and approaches.
		• The removal of riparian vegetation and in water vegetation will be limited to the extent practicable, and to the requirement of the access road width only.
		• Clearing of vegetation, grubbing and levelling for facility areas and temporary laydowns will be limited to only the areas and extents required.
		• Buffer zones of 30 m will be maintained around waterbodies, and removal of riparian vegetation will be limited to the extent practical and to the requirement of the access road and alignment clearing width only. Clearing at water crossings along the ROW will generally be limited to a 10 m wide ROW for equipment access to water crossing structures (e.g., temporary bridges).
		• The laydown areas will be cleared of vegetation, grubbed and levelled, as required, and vegetation will generally be cleared using mechanical harvesters to remove the merchantable timber and bulldozers to remove the remaining woody vegetation.
		• The temporary construction camps, temporary laydown areas will be located a minimum of 30 m back from the ordinary HWM of a waterbody through detailed planning, where reasonably possible or otherwise permitted by regulators. The distance of the setback in these areas will depend on the slope adjacent to the waterbody and will follow the guidelines outlined in the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNR 2010a).
		• Refueling, service, and maintenance of vehicles and equipment will generally be carried out in designated areas at temporary construction camps and temporary laydown areas located a minimum of 120 from waterbodies to the extent possible. These areas will be designed and constructed to collect and contain minor leaks and spills. If refueling within 120 of a waterbody cannot be avoided, enhanced spill containment measures will be used. In the event that refuelling, servicing and maintenance is required in the field, 120 m buffer will be respected to the extent possible. There may be locations where this is not possible due to the prevalence of wetlands; however, in these locations enhanced spill containment measures will be used.	

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect

		• All aggregate pits and quarries will be located a minimum of 120 m away from the ordinary HWM of a waterbody, where possible and newly permitted sand and gravel pits will remain 1.5 m above the water table. The aggregate pits will follow the guidelines outlined in the Aggregates Permits on Crown Lands for Pits and Quarries above Water (MNRF 2014b) and the Forest Management Planning Manual (MNRF 2020a) and will meet the conditions set out in the *Aggregate Resources Act.* (Ontario 1990a) and Ontario Standards (MNRF 2020b).
		• Use of vegetation management practices to maintain vegetation within the transmission line ROW. For example, implementation of a “wire zone – border zone” approach to vegetation management (Ballard et al. 2007) where appropriate in the ROW. This method manages vegetation in the two zones, where herb/grass/forb species are promoted in the wire zone, and shrub/short tree species are promoted in the border zone. This approach allows for the safe delivery of electricity while also fostering wildlife habitat and biodiversity, and simultaneously developing overall aesthetics and decreased long-term vegetation management costs. Application of calcium chloride by Hydro One will be completed in consultation with road authorities and will not occur within 120 m of a waterbody or wetland.
		• Construction near and in-water during the fish and fish habitat proposed restricted activity timing windows will be avoided. Proposed restricted activity timing windows were assigned to avoid work during sensitive life history periods or life stages for all fish that may be present in each waterbody, including movements to spawning areas, spawning and egg incubation, or eggs and newly hatched fry. Work may not be conducted during the proposed restricted activity timing window, or within a setback unless permits/approval is obtained from the appropriate regulatory agencies (i.e., MNRF and DFO), where required.
		• The proposed restricted activity timing windows are applicable if any work is completed below the HWM (e.g., installation or removal of fill or culverts or bridge supports below the HWM, ice bridges and snow fill construction, beaver dam removals, fording.
		• The proposed restricted activity timing windows are not applicable if all work is completed above the HWM (e.g., installation of the transmission line, installation or removal of a clear span bridge or rig mat with no fill or supports below the HWM, or when using the existing and installed water crossing structures, where no modifications are required).
		• Fish within the isolated workspaces will be rescued (i.e., salvaged and relocated) by qualified professionals prior to construction in the isolated workspace under the conditions of a MNRF LCFSP. Should any in-water work be required within Lake Sturgeon habitat or other aquatic SAR habitat, then an authorization under the ESA may be required.
		• Project planning will avoid their habitats and apply the restricted activity timing window for in-water works for all aquatic SAR to the extent practicable, similarly to all other fish species within the potential waterbodies. If in-water work for construction or operation and maintenance activities cannot be avoided during the restricted activity timing window for fish species for any specific crossing, Hydro One will engage with MECP, MNRF and/or DFO on behalf of ECCC to discuss permitting requirements and next steps and the appropriate Indigenous communities will be notified, where requested.
		• For diversions during isolations, screened pumps will be used to reduce the risk of entrainment or impingement of fish following the guidance within the DFO Code of Practice for End-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020).
		• An Erosion and Sediment Control Plan and Spill Prevention and Emergency Response Plan will be developed for the Project.
		• Near water and instream construction will be postponed if excessive flows or flood conditions are present or anticipated that occur outside of those already identified in water works timing restrictions. Activities will resume when water levels have subsided or equipment/techniques suitable for conditions are deployed.
		• Temporary ESC measures must be:
		  ◦ Effectively installed;
		  ◦ Installed before or immediately after initial disturbance; and	

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		• Monitored and effectively maintained (e.g., repaired, replaced or supplemented with functional materials) throughout construction until permanent erosion control is established or reclamation is complete. • Install, monitor, and manage ESC measures to reduce the risk of sediment reaching a waterbody prior to and during construction. • Use erosion resistant fill material below the high-water level within the floodplain of a waterbody. • Complete instream construction in isolation of flowing water (i.e., use isolation methods where surface water exists at the time of construction) as appropriate. Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a). • For isolations/diversions, 100% downstream flow will be maintained. Pump intakes and outlets (if applicable) should not disturb the bed. • Upon removal of the temporary crossing materials, the waterbody banks will be returned to their original profile, if needed, and disturbed areas will be stabilized, as necessary, to reduce the risk of soil erosion. The number of water crossings required for the Project will be minimized. • Downstream sediment effects will be minimized by using isolation methods for the installation and removal of culverts, as required by MNRF and DFO regulatory and permitting requirements. For isolation, temporary diversions may be used (i.e., isolation construction techniques such as flumes, instream diversions, or bypass pumps) to divert the water flow around the isolated workspace. Where diversions are used, bypass pumping will be monitored and adjusted as necessary to maintain downstream flow. Isolation measures will follow the DFO Interim Standard for In-water Site Isolation (DFO 2023a) • Turbidity and total suspended solids will be monitored according to permit requirements; and • Disturbed areas will be re-contoured to restore drainage patterns and the approximate pre-construction profile. **Operation and maintenance stage:** • The proposed restricted activity timing windows are not applicable when using the water crossing structures, unless in or near water work will occur. • Fording will be avoided to the extent possible; if fording is required it will be a one-time crossing with clearing and bridge installation equipment (over and back) in flowing water conditions with stable beds and low sloping banks or approaches. Any fording will follow DFO's Code of Practice for Temporary Fords (DFO 2022f). • ESC measures will be installed, monitored, and managed to minimize or avoid sediment mobilization to drainages or waterbodies. Adequate and appropriate ESC materials shall be on-site and available prior to commencement of maintenance activity that could result in sedimentation to the waterbody. • Culvert maintenance will be completed in consideration of best management practices and environmental permits/approval conditions (once available), including MNRF Guidelines for Access Roads (MNR 1990, 2010a,b), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and Code of Practice for Culvert Maintenance (DFO 2022g). • Follow the Vegetation Management Plan (EA Section 6.4). • Operate and maintain water crossings in consideration of MNRF Environmental Guidelines for Access Roads and Water Crossings (MNR 1990), MNRF and DFO Protocol for the Review and Approval of Forestry Water Crossings (MNRF and DFO 2021), DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and applicable Codes of Practice (DFO 2022c), Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNR 2010a). • Maintain buffer zones of 30 m around waterbodies, and limit removal of riparian vegetation to the extent practical and to the requirement of the access road and alignment clearing width only. Clearing at water crossings along the ROW will generally be limited to a 10 m wide ROW for equipment access to water crossing structures (e.g., culverts).	

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		• Culverts will be regularly monitored and maintained to reduce the risk of blockages from forming and causing ponding or backwater effects. Where culverts are installed at fish bearing waterbodies, debris removal activities will follow DFO's Code of Practice on Culvert Maintenance (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and fish stranding can be avoided) (DFO 2022g); and • Any infrastructure installed will also be regularly monitored and maintained over the lifespan according to Hydro One's maintenance schedule.	

Project activities during the construction stage:
• Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, and temporary construction camps, etc.);
• Surface water management and erosion control;
• Reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps; and
• Use of explosives and blasting to create level areas for transmission structures, roads and for foundation excavations.
 	
Project activities during the operation and maintenance stage:
• Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.
	Injury or mortality of fish from construction.	**Construction stage:**
		• Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020), and environmental permit/approval conditions (once available).
		• Implement the mitigation measures within Section 6.6.7.1 and listed above, as they are also applicable to this potential effect.
		• Regulatory permits/approval will be obtained from the appropriate regulator, as applicable, and qualified professionals will rescue and relocate fish within the isolated workspace prior to construction in the isolated workspace.
		• Construction near and in-water will be avoided during a fish and fish habitat restricted activity timing window. Work may not be conducted during the proposed restricted activity timing window, or within a setback unless permits/approval is obtained from the appropriate regulatory agencies, where required.
		• Hydro One with their contractor(s) will prepare and implement a Blasting and Communication Management Plan (Section 6.6.7.8) that describes specific measures that would be implemented if blasting is required.
		• Blasting activities will be permitted through DFO and MNRF.
		• Blasting operations will follow DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a) and Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters (Wright and Hopky 1998, Godard et al. 2008) including:
		  ◦ Maximum allowable limit for overpressure at 50 kilopascals (kPa) based on recent information disseminated by DFO (Godard et al. 2008). Previous advice (Wright and Hopky 1998) limited overpressure to 100 kPa;
		  ◦ Peak particle velocity (13 millimetres per second [mm/s]) to avoid death or damage to fish, their eggs or larvae;
		  ◦ The use of explosives will be limited to Project construction activities and to specific geological conditions that do not allow for an alternative method of removing material;
		  ◦ Blasting will occur on land and recommended setback distances from waterbodies will be applied to avoid effects to fish and effects to incubating eggs;
		  ◦ Blasts will be designed to minimize ground vibrations that can cause slope instability and impact to fish and fish habitats;
		  ◦ No ammonium nitrate-fuel oil mixtures will be used, due to the production of toxic by-products (i.e., ammonia);
		  ◦ Blast mats will be used to reduce the risk of fly rock from entering the waterbodies;
		  ◦ Vibrations and peak particle velocity will be monitored throughout construction and blasting;
		  ◦ Waterbodies closest to the blasting area will be isolated (e.g., silt curtain or cofferdam or alternate) to keep fish from entering the area during the blasting periods. A fish rescue/relocation will be completed to remove fish form the isolated areas. Fish rescues will be completed by fisheries biologists/environmental technicians, according to the conditions within an obtained MNRF LCFSP; and
		  ◦ All applicable DFO-recommended measures to protect fish and fish habitat from the use of explosives will be considered for the Project (DFO 2022a), including respecting the Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO 2013b).
			No net effect

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		Operation and maintenance stage: • The mitigation measures as outlined in Section 6.6.7.1 and listed above, as they are also applicable to this potential effect; and • Vegetation Management Plan (Section 9.3.2.2) will be followed.	
Project activities during the construction stage: • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, aggregate pits and temporary construction camps, etc.); • Mining of aggregate pits; • Surface water management and erosion control; and • Reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps. **Project activities during the operation and maintenance stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.	Changes in fish access to habitats, affecting fish abundance and distribution.	• Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). **Construction stage:** • The mitigation measures as outlined in Section 6.6.7.1 and 6.6.7.4, and listed above, as they are also applicable to this potential effect; and • Reclaim temporary access roads, construction camps, turn-around areas, water crossings, and laydown areas at the end of construction. **Operation and maintenance stage:** • The mitigation measures as outlined in Section 6.6.7.1 and 6.6.7.4, and listed above, as they are also applicable to this potential effect.	Net changes in fish access to habitats, affecting fish abundance and distribution.
Project activities during the construction stage: • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, aggregate pits and temporary construction camps, etc.); • Mining of aggregate pits; • Surface water management and erosion control; • Discharges of wastewater from construction, vehicle and equipment wash, and domestic activities; • Refuelling, service, and maintenance of vehicles and construction equipment; • Hazardous materials, solid and liquid waste handling; and • Reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps.	Changes to water or sediment quality and quantity which could affect fish abundance, distribution, habitat quality and quantity.	• Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). **Construction stage:** • Implement the surface water mitigation measures presented in Section 6.2. • Implement the groundwater mitigation measures presented in Section 6.3. • Implement the mitigation measures within Section 6.6.7.1, 6.6.7.3 and listed above, which are also applicable to this potential effect. • Develop and maintain surface water management and ESC infrastructure to minimize potential for net changes to infiltration rates. • Manage temporary flows, withdrawal and discharge, including all water from dewatering operations to reduce the risk of erosion and/ or release of sediments to a waterbody. • Use only clean material free of particulate matter or deleterious substances. • Materials used or generated (e.g., organics, soils, woody debris, temporary stockpiles, construction debris, etc.) during site preparation, construction and clean-up will be temporarily stored a minimum 30 m from waterbodies, to reduce the risk of entry of sediment or deleterious substances from entering a waterbody. • Prepare and implement a Spill Prevention and Emergency Response Plan (Section 9.3.1.13) that describes specific measures that would be implemented if a spill occurred. • Equipment for containing spills will be on-site. Spill response kits will be provided in fuel and hazardous materials storage and handling facilities at temporary construction camps and laydown areas, in on-site	No net effect.

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
Project activities during the operation and maintenance stage: • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.		work areas and/ or in vehicles and equipment, and personnel will be trained in spill response practices and procedures. Spills and leaks will be contained and cleaned up as soon as possible following incidents. • Reportable spills (as defined in O.Reg. 675/98) of potentially deleterious materials will be reported to the Ministry of the Environment Spills Action Centre (SAC) (MTO 2009); and if the spill is in fish-bearing water, or where potential for harm of fish or fish habitat is likely, the MNRF and DFO must also be contacted (MTO 2009). • Wash, refuel, store and service machinery, fuels and other materials in such a way to reduce the risk of any deleterious substances from entering a waterbody (i.e., >30 m away) (DFO 2022a). • Register aboveground storage tanks under, and in compliance with, applicable federal and provincial legislation. • The transportation, storage and handling of fuels will meet the *Ontario Technical Standards and Safety Act, 2000* (Ontario 2010) and Canada's *Transportation of Dangerous Goods Act* (Ontario 1990b). • Refueling, service, and maintenance of vehicles and equipment will generally be carried out in designated areas at temporary construction camps and temporary laydown areas located a minimum of 120 from waterbodies to the extent possible. These areas will be designed and constructed to collect and contain minor leaks and spills. If refueling within 120 of a waterbody cannot be avoided, enhanced spill containment measures will be used. In the event that refuelling, servicing and maintenance is required in the field, 120 m buffer will be respected to the extent possible. There may be locations where this is not possible due to the prevalence of wetlands; however, in these locations enhanced spill containment measures will be used. Machinery and equipment will arrive on-site in a clean condition and will be inspected and maintained routinely to minimize potential for fluid leaks. • Any portion of equipment to be used within a waterbody or operating within the bank will be free of and monitored for fluid leaks, and externally cleaned/degreased prior to works (MTO 2009). • Herbicides will not be used during construction of the Project. Mechanical removal methods will be used for initial vegetation removal; • Individuals working on-site and handling hazardous materials will be trained in best practices related to the transportation of dangerous goods to avoid negatively affecting fish and fish habitat by introducing hazardous materials into the environment; and • Following the construction phase, all temporary wash-out sites will be capped with local backfill and re-graded or rehabilitated according to approvals conditions, prior to construction crews departing the site. **Operation and maintenance stage:** • Implement the surface water mitigation measures presented in Section 6.2. • Implement the groundwater mitigation measures presented in Section 6.3. • Implement the mitigation measures within Section 6.6.7.1 and listed above, as they are also applicable to this potential effect. • ESC measures will be installed, monitored, and managed to minimize or avoid sediment mobilization to drainages, or waterbodies. Adequate and appropriate ESC materials shall be on-site and available prior to commencement of maintenance activity that could result in sedimentation to the waterbody. • A Spill Prevention and Emergency Response Plan will be prepared and implemented that describes specific measures that would be implemented if a spill occurred. • Equipment for containing spills will be on-site. Spill response kits will be provided in fuel and hazardous materials storage and handling facilities at temporary construction camps and laydown areas, in on-site work areas and/ or in vehicles and equipment, and personnel will be trained in spill response practices and procedures. Spills and leaks will be contained and cleaned up as soon as possible following incidents. • Spills of potentially deleterious materials are to be reported to the Ministry of the Environment Spills Action Centre (SAC) (MTO 2009); and if the spill is in fish bearing water, where potential for harm of fish or fish habitat is likely, the MNRF and DFO must also be contacted (MTO 2009); wash, refuel, store and service	

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		machinery, fuels, and other materials in such a way to reduce the risk of any deleterious substances from entering a waterbody (i.e., > 30 m away) (DFO 2022a). • Machinery and equipment will arrive on-site in a clean condition and will be inspected and maintained routinely to minimize potential for fluid leaks. • Any portion of equipment to be used within a waterbody or operating within the bank will be free of and monitored for fluid leaks, and externally cleaned/degreased prior to works (MTO 2009); • Herbicides will not be used during maintenance of the Project. • Individuals working on-site and handling hazardous materials will be trained in best practices related to the transportation of dangerous goods to avoid negatively affecting fish and fish habitat by introducing hazardous materials into the environment (Section 9.3.1.11).	

Project activities during the construction stage:
• Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, and temporary construction camps);
• Operation of vehicles, construction equipment, and diesel generators;
• Reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps; and
• Concrete mixing on-site or in batch plants.
	Changes to air contaminants and fugitive dust emissions resulting from the Project could lead to changes to constituent concentrations in Water in the receiving environment, which could affect fish habitat quantity and quality.	**Construction stage and operation and maintenance stage:**
		• Implement the mitigation measures within Section 6.6.7.1 and Section 6.7 Aire Quality, and listed above, as they are also applicable to this potential effect.
		• Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020).
		• Develop and implement a Dust Control/Air Quality Plan prior to construction.
		• Implement the air quality mitigation measures presented in Section 6.6.7.5 including:
		  ◦ Limit vehicle emissions;
		  ◦ Vehicles and equipment will be regularly serviced, maintained, and inspected for leaks;
		  ◦ Obey all speed limits to limit fugitive dust;
		  ◦ Slash pile burning will be subject to permits and approvals by appropriate regulatory agencies and in compliance with O. Reg. 207/96;
		  ◦ Dust control practices (e.g., wetting with water, calcium chloride dust control solution) will be implemented at work sites and on access roads near residential areas or other areas as practicable. Application of calcium chloride by Hydro One will be completed in consultation with road authorities and will not occur within 120 m of a waterbody or wetland;
		  ◦ Minimize dust-generating activities, as practicable and where required, during periods of high wind to limit dust emissions and spread;
		  ◦ Minimize vehicular traffic to exposed soils and stabilize high traffic areas with suitable cover material;
		  ◦ Restore disturbed areas as soon as reasonably possible to minimize duration of soil exposure; and
		  ◦ Multi-passenger vehicles will be used to transport personnel, where practicable.
			No net effect.

Project activities during the construction stage: • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, and temporary construction camps). **Project activities during the operation and maintenance stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.	Changes to public access to recreational fishing areas could affect fish abundance.	**Construction stage and operation and maintenance stage:** • Implement the mitigation measures within Section 6.6.7.1, and listed above, as they are also applicable to this potential effect. • Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). • Disturbance to and access restrictions on trapping and hunting areas will be minimized where possible during the construction stage and during the infrequent periods for operation and maintenance activities for safety reasons; and • Temporary access roads, construction camps, turn-around areas, water crossings and temporary laydown areas, and facility areas not longer in use will be reclaimed and revegetated at the end of construction. • Most construction workers will be accommodated in temporary construction camps, and Hydro One or their contractor will develop a worker awareness guide that identifies local fishing licence authorities and where to obtain fishing licences, reviews the regulations within the FMZ and best management practices to reduce the spread of invasive species/diseases.	Net changes to public access to recreational fishing areas could affect fish abundance.

Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		• For Lake Trout lakes overlapping the Project footprint, consideration of the Inland Ontario Lakes Designated for Lake Trout Management (2006) and the Amendment to Area specific Crown Land Use Policy #2007-025 (2009) (Update to Area-specific Land Use Policy to Reflect Updated Crown Land Disposition Policy for Designated Lake Trout Lakes [MNRF 2023]). Consideration of the recommended Area of Concern and application of a 120 m buffer as practicable. No timber harvesting will take place within this buffer except for access road routes and as practicable for the transmission line. Further mitigation for potential impacts to Lake Trout is presented throughout this EA Section; • Off-road vehicle use by Hydro One or its contractors within the ROW will be limited during construction and operation and will follow DFO's Code of Practice for Fording (DFO 2022f) and DFO's All Terrain Vehicle Guidance (DFO nd). Guidance includes: vehicles will be cleaned before and after a ride to reduce the risk of spreading invasive species, vehicles will be inspected for fuel leaks or equipment damage, riders will avoid sensitive features and water crossings to the extent practicable, riders will not harm, kill or collect flora or fauna, and garbage and debris will be properly disposed of.	
Project activities during the construction stage: • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, turn-around areas, temporary laydown areas, and temporary construction camps). **Project activities during the operation and maintenance stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.	Changes to Fish and Fish Habitat due to Project Related Effects Contributing to Climate Change could affect fish abundance, distribution, habitat quality and quantity.	**Construction stage and operation and maintenance stage:** • Implement the mitigation measures within Section 6.6.7.1, 6.6.7.3, 6.6.7.4, and 6.6.7.7 and listed above, as they are also applicable to this potential effect. • Applicable best management strategies, avoidance and mitigation measures will be applied using the practices detailed within various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020). • Potential changes due to climate change will be mitigated to the extent possible by using avoidance techniques (i.e., limiting construction of new access roads) and maintaining a 30 m vegetated buffer around waterbodies to help maintain shading and riparian vegetation to reduce the risk of erosion and provide flood protection (see Sections 6.6.7.2, 6.6.7.4, 6.6.7.5, and 6.6.7.7 for the full list of mitigation measures applicable); • Project design will use best management practices to capture a wide spectrum of environmental conditions, such that suitably sized infrastructure is used at water crossings to accommodate flood and low flow conditions; and • Temporary access roads, construction camps, turn-around areas, water crossings, and laydown areas will be reclaimed and revegetated at the end of construction. • Most construction workers will be accommodated in temporary construction camps, and Hydro One or their contractor will develop a worker awareness guide that identifies local fishing licence authorities and where to obtain fishing licences, reviews the regulations within the FMZ and best management practices to reduce the spread of invasive species/diseases. • In the event of a climate change emergency that impacts fish and fish habitat, Hydro One will apply for a DFO *Emergency Fisheries Act* Authorization to allow for a timely response.	Net changes to fish and fish habitat due to project related effects contributing to climate change could affect fish abundance, distribution, habitat quality and quantity.

DFO = Fisheries and Oceans Canada; HWM = highwater mark; m = metre; MNRF = Ministry of Natural Resources and Forestry; ROW = right-of-way.

6.6.8 Net Effects Characterization

A summary of the characterization of net effects of the Project on fish and fish habitat is provided in Table 6.6-24. Net effects are described after the implementation of effective mitigation measures, and summarized according to direction, magnitude, geographic extent, duration/reversibility, frequency, and probability of the effect occurring following the methods described in Section 6.6.7. Effective implementation of the mitigation measures summarized in Table 6.6-19, Section 6.6.7, and the EA Monitoring and Commitments Section 10.0, are expected to reduce the magnitude and duration of net effects on fish and fish habitat.

6.6.8.1 Net Effects Characterization Approach

The net effects characterization approach followed the general process described in Section 5.6.4 (EA Approach Section). Predicted net effects, where identified, are described in terms of the following significance factors (MNRF 2002, MNRF 2005):

- Direct/indirect;
- Direction;
- Magnitude;
- Geographic extent;
- Duration/reversibility;
- Frequency;
- Likelihood of occurrence; and
- Context (where applicable).

Potential effects with no predicted net effect after implementation of mitigation measures identified in Table 6.6-23 are not carried forward to the net effects assessment.

Net effects are described using the significance factors identified in Table 6.6-19. Effects levels are defined for the magnitude of effects characteristics for fish and fish habitat in Table 6.6-24.

Table 6.6-24: Magnitude Effect Levels for Fish and Fish Habitat

Indicator / Net Effect	Magnitude Level Definition Negligible	Magnitude Level Definition Low	Magnitude Level Definition Moderate	Magnitude Level Definition High
• Habitat quantity • Habitat quality • Abundance • Distribution	A small change to an indicator that is expected to be not measurable, and within the range of baseline, or natural variability and not expected to result in a measurable residual effect to the population of the criteria species.	A measurable change (discernable) to an indicator that is expected to be at or slightly exceed the limits of baseline, that would be expected to result in a minor measurable residual effect to the population of the criteria species.	A defined change to an indicator that is potentially detrimental, but manageable, and expected to result in a clearly defined change to the population of the criteria species, but well within the resilience limits and adaptive capacity.	A discernable change to an indicator that is detrimental and may pose a harmful level of risk and not be manageable. The amount of change to the population of the criteria species is near or exceeding the predicted resilience limits and adaptive capacity.

Magnitude is used as a function to define the quantitative and qualitative changes in fish habitats, the indicators and the associated influence on the abundance and distribution of the population. Physical (e.g., habitat quantity, quality, fragmentation) and biological (e.g., survival, reproduction, movement, behaviour) changes can result in effects on the abundance and distribution of populations. The magnitude of net effects considers the criteria species sensitivity, dependence on habitat, rarity of the species or habitats available, and resiliency of the habitats to recover from changes in environmental conditions. For example, native, common, self-sustaining fish populations that are healthy and robust are more likely capable of withstanding environmental change and accommodating random population processes. The evaluation and classification of magnitude considers the adaptive capacity and resilience of criteria to absorb potential effects from the Project and other disturbances and continue as self-sustaining and ecologically effective populations.

Significance for fish and fish habitat (including SAR) was defined in Table 5.6-2 in Section 5.6.5 (EA Approach Section); a predicted net effect would be considered significant if it is assessed as:

- High magnitude;
- Long-term or permanent in duration;

- Occurring at any geographic extent; and
- Representing a management concern.

Significant effects to fish and fish habitat are those that would cause permanent adverse changes to survival or reproduction at a population level such that self-sustaining and ecologically effective populations of criterion species cannot be maintained.

6.6.8.2 Net Changes to Fish Habitat Quantity and Quality

Changes to fish habitat quantity and quality through the physical alteration of waterbodies from the installation of water crossings, changes to riparian vegetation and changes in downstream habitat quality from the release of sediments are expected to be negative in direction, with low magnitude, restricted to the Project footprint, and infrequent.

Temporary water crossings will be decommissioned and rehabilitated during and after completion of the construction stage, which is expected to last 18 to 24 months (i.e., medium term). Although clearing for temporary crossings and the ROW is anticipated within the 30 m buffer up to 10 m from a waterbody, much of the disturbance to fish habitat is anticipated to be reversible within two years following construction (for non-tree vegetation species); therefore, the duration is expected to be medium-term to permanent for temporary crossings. However, changes to fish habitat quantity and quality through physical alteration of waterbodies and vegetation from the installation of permanent water crossings will be permanent.

The likelihood of occurrence of a net change where proposed work is above the HWM (e.g., clear span bridges, rig mats) is unlikely. However, where proposed work is below the HWM (e.g., installation of a culvert), the likelihood of occurrence is probable.

However, with the effective implementation of the mitigation measures (detailed in Section 6.6.7 and Table 6.6-23) and the use of best management practices, it is anticipated that effects will be reduced or moderated, as well as regulated through permitting. Key mitigation measures include:

- Selecting water crossing structures that are not expected to negatively affect the waterbody below the HWM (e.g., clear span bridges, ice bridges/snow fills, rig mats);
- Maintaining the 30 m riparian buffer around each waterbody during maintenance and operation phases and rehabilitating the temporary equipment water crossings;
- Avoiding work in or near water during the Ontario Restricted Activity Timing Windows for the protection of fish and fish habitat and during periods of increased flow or precipitation; and
- Developing and implementing post-construction maintenance and monitoring programs that will limit potential for changes to morphology.

- No herbicides will be used during construction of the Project or for future maintenance of this transmission line.

6.6.8.3 Net Changes due to Fish Access to Habitats

Changes to fish abundance and distribution from changes in fish access to habitats from placement of water crossing structures is expected to be negative in direction, with negligible magnitude, local to regional in scale.

Temporary water crossings will be installed and will be decommissioned and reclaimed during and after completion of the construction, stage which is expected to last 18 to 24 months (i.e., medium term).

For permanent water crossings, the likelihood of occurrence where proposed work is above the HWM (e.g., clear span bridges, rig mats) is unlikely. However, where proposed work is below the HWM (e.g., culvert), the likelihood of occurrence is possible. For any structures installed below the HWM, design and mitigation measures will limit potential for changes in fish access to habitat. Post-construction, water quality and water crossing monitoring programs will confirm this conclusion.

6.6.8.4 Net Changes to Water and Sediment Quality and Quantity

Changes to fish habitat quantity and quality through the alteration of water and sediment quality and quantity is expected to be negative in direction, with low magnitude, restricted to a local to regional scale, short-term, infrequent, and unlikely to possible for likelihood of occurrence.

For any work that may affect water and sediment quality and quantity, proposed design and mitigation measures are expected to limit potential for changes to fish habitat quality and quantity. Post-construction, water quality and water crossing monitoring programs will confirm this conclusion.

6.6.8.5 Net Changes due to Public Access to Fish Habitats

Changes in fish abundance due to changes to public access to fishing areas is expected to be negative in direction, with low to moderate magnitude, restricted to a local to regional scale. For temporary equipment crossings the duration is estimated to be of medium-term, and possible for allowing access to fish habitats, since new access roads will be opened and fishing from temporary bridges will be possible. For permanent equipment crossings, it is probable that increased fishing and access to fish habitats will occur, and it is expected to continuously allow for access opportunities to occur after construction.

Key mitigation will include the development of a worker awareness guide that portrays local licence authorities and where to obtain fishing licences, reviews the regulations within the FMZ and best management practices to reduce the spread of invasive species/diseases; and re-naturalization through natural recovery of temporary access trails and riparian areas,

camp/laydown areas, etc. and removal of temporary crossings to limit accessibility by the public, post construction.

All FMZ Fish Management Plans within the Project LSA express growing concern for access of the public to fisheries due to development. The management objectives outlined in the FMZ Plans (MNRF 2009. (MNRF 2020c, MNRF 2018) as determined by the MNRF were considered when assessing potential effects from increased access. However, potential changes due to increased access and fishing pressure will largely continue to be managed and monitored by MNRF and DFO, the government agencies mandated to manage fisheries resources. Assuming management objectives and plans as well as fishing regulations are adhered to, it is anticipated that it will result in no net effect.

6.6.8.6 *Net Changes to Fish and Fish Habitat due to Project Related Effects Contributing to Climate Change*

Changes to fish abundance, distribution, habitat quantity and quality due to Project in combination with climate change are expected to be negative in direction, with low magnitude initially but magnitude may be variable and is predicted to increase under future conditions, within a local to regional spatial scale. The duration is estimated to be short term to permanent, with increasing frequency, and the likelihood of occurrence is probable. For permanent equipment crossings, it is probable that increased effects from climate related events, such as increased frequency and intensity of precipitation events, will be frequent in the future and may pose a risk to infrastructure and the environment.

Key mitigation measures include:

- Applying avoidance techniques at the design phase to leave as much naturalized area as possible and avoiding sensitive habitats;
- Maintaining a 30 m vegetated buffer around waterbodies to aid in shading by riparian vegetation, minimizing erosion and providing flood protection;
- Using project design to capture a wide variety of flood and drought scenarios for the waterbodies;
- Providing education on the spread of invasive species and disease management; and
- Engagement with regulatory agencies and Indigenous communities in a timely manner to allow for timely response to climate-related emergencies.

Government agencies that manage fisheries have noted increasing concern related to the effects of climate change on fisheries. The management objectives outlined in the FMZ Plans (MNRF 2014a, MNRF 2009) as determined by the MNRF and by DFO in their risk assessment of impacts to fisheries from climate change (DFO 2013a) were considered when assessing potential effects from climate change. However, potential changes due to climate change will largely continue to be managed and monitored by MNRF and DFO.

Table 6.6-25: Characterization of Predicted Net Effects for Fish and Fish Habitat

Criteria	Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence	Significance
• Species at Risk (Lake Sturgeon) • Species of Conservation Concern (Northern Brook Lamprey, Coaster Brook Trout, and Deepwater Sculpin) • Criteria Species (Lake Trout, Brook Trout, Northern Pike, and Walleye)	• Habitat quantity • Habitat quality	Net changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in-water vegetation, channel morphology.	Direct	Negative	Low	Project footprint	• Medium-term for temporary water crossings • Long-term to permanent for permanent water crossings	Infrequent	• Unlikely where proposed work is above the highwater mark (e.g., installation of clear span bridge) • Probable where proposed work is below the highwater mark (e.g., installation of a culvert)	Not significant
• Species at Risk (Lake Sturgeon) • Species of Conservation Concern (Northern Brook Lamprey, Coaster Brook Trout, and Deepwater Sculpin) • Criteria Species (Lake Trout, Brook Trout, Northern Pike, and Walleye)	• Abundance • Distribution	Net changes in fish access to habitats, affecting fish abundance and distribution, from placement of water crossing structures.	Direct	Negative	Negligible	Local to Regional	• Medium-term for temporary water crossings • Permanent for permanent water crossings	• Frequent where proposed work is above the highwater mark (e.g., installation of clear span bridge) • Continuous where proposed work is below the highwater mark (e.g., installation of a culvert)	• Unlikely where proposed work is above the highwater mark (e.g., installation of clear span bridge) • Probable where proposed work is below the highwater mark (e.g., installation of a culvert)	Not significant

Criteria	Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence	Significance
• Species at Risk (Lake Sturgeon) • Species of Conservation Concern (Northern Brook Lamprey, Coaster Brook Trout, and Deepwater Sculpin) • Criteria Species (Lake Trout, Brook Trout, Northern Pike, and Walleye)	• Habitat quantity • Habitat quality	Net changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.).	Indirect	Negative	Low	Local to Regional	Short-term	Infrequent	• Possible where proposed work is below the high-water mark (e.g., installation of a culvert) and/or where spills occur <30 m away from the high-watermark	Not significant
• Species at Risk (Lake Sturgeon) • Species of Conservation Concern (Northern Brook Lamprey, Coaster Brook Trout, and Deepwater Sculpin) • Criteria Species (Lake Trout, Brook Trout, Northern Pike, and Walleye)	• Abundance	Net changes to public access to recreational fishing areas could affect fish abundance.	Indirect	Negative	Low to Moderate	Local to Regional	Permanent	Frequent	• Possible where proposed work is above the highwater mark (e.g., installation of clear span bridge) • Probable where proposed work is below the highwater mark (e.g., installation of a culvert)	Not significant

Criteria	Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration/ Irreversibility	Frequency	Likelihood of Occurrence	Significance
• Species at Risk (Lake Sturgeon) • Species of Conservation Concern (Northern Brook Lamprey, Coaster Brook Trout, and Deepwater Sculpin) • Criteria Species (Lake Trout, Brook Trout, Northern Pike, and Walleye)	• Abundance • Distribution • Habitat Quantity • Habitat Quality	Changes to Abundance, Distribution Habitat Quantity and Habitat Quality due to the interaction of the Project with climate change	Direct and Indirect	Negative	Low (variable and predicted to increase with time)	Local to Regional	Short-term to Permanent	Increasingly frequent	• Probable	Not significant

6.6.9 Assessment of Significance

The assessment of significance of net effects of the Project is informed by the interaction between the significance factors, with magnitude, duration, and geographic extent being the most important factors. Consideration is also given to concerns of Indigenous communities, interested agencies, groups and individuals raised during consultation and engagement and through review comments on the EA reports. Implementation of proven mitigation measures is expected to aid in the avoidance or reduction of the duration and magnitude of net effects on fish and fish habitat. The magnitude of the predicted net effects on fish and fish habitat are of low to moderate magnitude (representing measurable change to an indicator that is expected to be at or slightly exceed the limits of baseline, that would be expected to result in a minor measurable residual effect to the population of the criteria species and/or potentially detrimental, but manageable, and expected to result in a clearly defined change to the population of the criteria species, but well within the resilience limits and adaptive capacity), mostly direct, and ranging from local (confined to the Project footprint or extending into the LSA) to regional in scale. Changes to fish and fish habitat occurring at permanent Project components (i.e., permanent water crossings) are predicted to be permanent; however, for temporary Project components, most of the predicted net effects are anticipated to be reversible over the medium term.

Net effects to a criterion are considered significant if the majority of the net effects are assessed as high magnitude, long-term or permanent duration, at any geographic extent and represent a management concern. The predicted net effects on fish and fish habitat are not high magnitude, long-term or permanent in duration or represent a management concern, with the exception of a limited number of permanent crossing structures and potential for management concerns through an increased public access pathway. They are also not anticipated to result in a change to the criteria that will alter the sustainability of each criterion beyond a manageable level and the net effects do not result in changes that are not in accordance with provincial and federal guidelines. Therefore, the predicted net effects on fish and fish habitat are assessed as not significant.

6.6.10 Cumulative Effects Assessment

As identified in Table 6.6-25 Characterization of Predicted Net Effects for Fish and Fish Habitat, the magnitudes of the net effects are predicted to be negligible; therefore, they are not carried forward to a cumulative effects assessment.

In addition to assessing the net environmental effects of the Project, which considered past and present developments, this assessment also evaluates and assesses the significance of net effects from the Project that overlap temporally and spatially with effects from other reasonably foreseeable future developments (RFD) and activities (i.e., cumulative effects).

For a criterion that has identified net effects, it is necessary to determine if the effects from the Project interact both temporally and spatially with the effects from one or more past, present, or

RFD or activities, since the combined effects may differ in nature or extent from the effects of individual Project activities. Where information is available, the cumulative effects assessment estimates or predicts the contribution of effects from the Project and other developments on the criteria, in the context of natural changes in the environment.

For this assessment, the net effects characterized in Table 6.6-25 are carried forward to a cumulative effects assessment if they have a likelihood of occurrence of 'probable' or 'certain' and a non-negligible magnitude. Net effects with this characterization are most likely to interact with other RFD.

Based on this assessment, the following net effects to fish and fish habitat listed Table 6.6-25 are carried forward to the cumulative effects assessment:

- Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in-water vegetation, channel morphology;
- Changes to water and sediment quality and quantity may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality;
- Changes to public access to recreational fishing areas could affect fish abundance; and
- Changes to abundance, distribution, habitat quantity and habitat quality due to the interaction of the Project with climate change

A list of the RFDs that were considered for this EA are presented in Section 9.0, Table 9.0-1. Of these projects, the RFDs listed in Table 6.6-26 were identified as being probable to occur within the LSA and, therefore, have potential to have net effects within the LSA. Rationale for the inclusion or exclusion of each project is presented in the table, as well as the text following the table.

Table 6.6-26: Reasonably Foreseeable Developments that Overlap and Interact with the Regional Study Area and Summary of Cumulative Effects Interactions

ID	Project	Project Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis	Potential Cumulative Effect	Quantified in the Cumulative Effects	Criteria that Quantified the Development in the Cumulative Effects
2	Couchiching First Nation Industrial Lands Remediation Project	The Contaminated Site (FCSI # 5152001) is located in Couchiching First Nation, along the shore of Rainy Lake. The project consists of the remediation of contaminated land and removal of debris upland, along the shoreline and in the water lot. The project will be completed over a period of 5 to 6 years.	Yes	Yes	No	No cumulative effect anticipated	N/A	N/A
6	McIntyre Creek Culvert Rehabilitation	The project includes the culvert rehabilitation at McIntyre Creek, 1 km west of Hwy 102, Thunder Bay, and Wild Goose Creek Culvert, 6 km east of Hwy 527, Shuniah.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
7	Paved shoulders, Resurfacing Highway 11	The project includes adding paved shoulders and resurfacing 35.3 km of Highway 11, 6.0 km east of Hwy 102.	Yes	Yes	No	No cumulative effect anticipated.	N/A	N/A
8	Blind Creek Culvert Rehabilitation	The project includes the Blind Creek Culvert rehabilitation located 7 km east of Hwy 527, Shuniah.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.

ID	Project	Project Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis	Potential Cumulative Effect	Quantified in the Cumulative Effects	Criteria that Quantified the Development in the Cumulative Effects
9	McVicars and Corbett Creek Culverts Rehabilitation	The project includes the rehabilitation of McVicars and Corbett Creek Culverts, 6 km west of Hodder Ave. and 5 km west of Hwy 130, Thunder Bay, Oliver Paipoonge.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
10	John St. Culvert Replacement	The project includes the replacement of the John St. Culvert, west of Hwy 11/17, Thunder Bay.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
11	Highway 61, South of Hwy 130 northerly to Kaministiquia River Bridge, Reconstruction	The project includes the reconstruction of Highway 61, south of Hwy 130 northerly to Kaministiquia River Bridge, Oliver Paipoonge, Thunder Bay.	Yes	Yes	No	No cumulative effect anticipated.	N/A	N/A
12	Hwy 17 Resurfacing	The project includes resurfacing of Highway 17 West of Hwy 72 at Dinorwic westerly, Dryden.	Yes	Yes	No	No cumulative effect anticipated.	N/A	N/A
13	Osaquan and Melgund Creek Culverts, Rehabilitation	The project includes the rehabilitation of Osaquan and Melgund Creek Culverts, 8 and 56 km west of Ignace and Shoshowae Creek Culvert, 10 km west of Dryden	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.

ID	Project	Project Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis	Potential Cumulative Effect	Quantified in the Cumulative Effects	Criteria that Quantified the Development in the Cumulative Effects
14	Highway 17 East of Hwy 105 Construction	The project includes reconstruction of Highway 17, East of Hwy 105 at Vermilion Bay easterly, Machin.	Yes	Yes	No	No cumulative effect anticipated	N/A	N/A
17	Highway 11, 11B Resurfacing, Paved Shoulders	The project includes resurfacing and adding paved shoulders to the west of Hwy 11B easterly and Hwy 11B, Atikokan.	Yes	Yes	No	No cumulative effect anticipated	N/A	N/A
18	Highway 11 Resurfacing, Paved Shoulders	The project includes resurfacing and adding paved shoulders of Highway 11 from Oliver Rd., Kakabeka to Hwy 11, Shabaqua, Oliver Paipoonge, Conmee, west of Conmee.	Yes	Yes	No	No cumulative effect anticipated	N/A	N/A
19	Highway 102, Resurfacing	The project includes resurfacing highway 102 west of Hwy 589 westerly to Hwy 11/17, Thunder Bay, Oliver Paipoonge, north of Conmee.	Yes	Yes	No	No cumulative effect anticipated	N/A	N/A
20	CPR Kaministiquia and CNR Overheads, Bridge Rehabilitation and Bridge Removal	The project includes the rehabilitation and removal of CPR overhead bridge Kaministiquia and CNR overhead bridge, 4 km east of Hwy 17 at Sistonen's Corners, west of Oliver-Paipoonge.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
21	Seine River Bridge, Rehabilitation	The project includes the rehabilitation of the Seine River Bridge, 21 km north of Hwy 11B, north of Atikokan.	Yes	Yes	No	No cumulative effect anticipated.	N/A	N/A
22	Turtle and Little Turtle River Bridges, Rehabilitation	The project includes the rehabilitation of Turtle and Little Turtle River Bridges, 44 and 79 km south of Hwy 17, north of Atikokan.	Yes	Yes	No	No cumulative effect anticipated.	N/A	N/A
23	Revell River No. 3 Bridge, Rehabilitation	The project includes the rehabilitation of the Revell River No. 3 Bridge, 1 km east of Hwy 622, west of Ignace.	Yes	Yes	No	No cumulative effect anticipated.	N/A	N/A

ID	Project	Project Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis	Potential Cumulative Effect	Quantified in the Cumulative Effects	Criteria that Quantified the Development in the Cumulative Effects
24	Treasury Metals Inc. Goliath Gold Project.	The project includes one open pit with underground development, a tailings storage facility, waste rock storage, overburden storage, low-grade stockpile and a 115 kV transmission line with on-site electrical substation. 1,124,000 ounces of gold were measured and indicated, and 74,800 ounces gold inferred in 2022. The site is 20 km east of Dryden. Operation is anticipated to be 12 years.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
25	Rehabilitation of Steep Rock Mine	MNRF plans to stabilize and remediate the former Steep Rock Mine including a plan for enhanced natural recovery that will increase the size of Steep Rock Lake in the coming decades.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
28	Couchiching First Nation Stormwater Management Infrastructure Upgrades	The project will improve stormwater management in the Couchiching First Nation in Ontario. The work includes: Regrading approximately 10 km of road for water diversion; clearing and expanding ditches, clearing or upsizing 150 culverts; and treating and improving the quality of stormwater effluent by introducing wetland plants and swales.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.

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29	Nuclear Waste Management Organization (NWMO) Potential Deep Geological Repository site - Ignace	Preliminary assessments by NWMO are underway in Ignace and area to identify if this location is suitable for a deep geological repository site for nuclear waste. Currently a decision between this location and South Bruce is being made for the location.	Yes	Yes	No	No cumulative effect anticipated	N/A	N/A
30	Agnico Eagle Hammond Reef Gold Mine	Agnico Eagle Mines Limited has proposed the construction, operation, decommissioning and abandonment of a new open-pit gold mine. Mining would occur for 11 years, with an ore production capacity of 60,000 tonnes per day.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
31	Commercial Forestry	Planned forestry roads derived from Forest Management Plans.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
32	Capella Minerals Savant Lake Gold Project	The Property, which has not been considerably explored since the early 1980s, hosts seven known gold occurrences that have yielded high grade gold values up to 138.87 g/t from surface prospecting. New Dimension was attracted to the Savant Lake Property for its gold in iron formation characteristics	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and	Yes	All fish and fish habitat criteria.

ID	Project	Project Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis	Potential Cumulative Effect	Quantified in the Cumulative Effects	Criteria that Quantified the Development in the Cumulative Effects
		that it believes are analogous to Goldcorp's neighbouring Musselwhite gold mine and Agnico Eagle's newly discovered Amaruq deposit in Nunavut.				• Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.		
33	Treasury Metals Goldlund Gold Project	Mineral exploration project of a previous underground and open pit mine that was active between 1982 and 1985. The project is 60 km from the town of Dryden. The current resource estimate includes 19.1 million tonnes of measured mineral resource and an additional 25.8 million tonnes of inferred mineral resource. Currently, 27,000 m of drilling is scheduled to be carried out with the intent to upgrade the current mineral resource estimate. The Company further intends to use the new resource estimate for the preparation of a Preliminary Economic Assessment.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.	Yes	All fish and fish habitat criteria.
34	Treasury Metals Miller Gold Project	The Miller Mine Project is a proposed open pit mine with no associated processing infrastructure. Treasury Metals will soon start collecting baseline environmental data at the Miller Mine Project to support all future approvals and permits required to construct and operate the mine.	Yes	Yes	Yes	• Changes to fish habitat quantity and quality through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; • Changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); • Changes to public access to recreational fishing areas could affect fish abundance; and • Changes to abundance, distribution habitat quantity and habitat quality due to the interaction of the Project with climate change.		All fish and fish habitat criteria.

Although the following RFDs are located within the RSA (i.e., tertiary watersheds), they are anticipated to not result in impacts to fish and fish habitat as they do not interact with the aquatic environment, or they are spatially situated such that the project will not interact with flows or fish passage within the LSA. These consist of RFD IDs 1, 3, 5, 16, 26, and 27.

The RFD IDs 12, 17, 18, 19, 21, 22, 23 involve the rehabilitation and resurfacing of existing highway and bridge infrastructure and are unlikely to involve excavations and dewatering activities, blasting, or in water construction. Therefore, there are no overlapping net effects between these RFD and the Project that could result in cumulative effects and these RFD are not further assessed.

Culvert and bridge rehabilitation and replacement Projects (i.e., RFD IDs 6, 8, 9, 10, 13, and 20) where work is anticipated to occur below the HWM has the ability to change the fish habitat through physical alteration of waterbodies, changes in riparian and in water vegetation, and channel morphology; cause changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality, etc.); and contribute cumulatively to similar Project-related effects that ultimately contribute to Climate Change. Mining Projects located within the RSA (i.e., IDs 24, 25, 28, 30, 32, 33, and 34) involve the construction, operation and decommissioning of various mine sites. Expected activities and features related to these mining projects that may impact fish and fish habitat include pit and mine excavations, blasting, mine dewatering, access roads and mine water supply. These activities could cause cumulative effects to fish and fish habitat when combined with similar potential net effects from the Project.

Forestry projects located within the RSA (i.e., ID 31) involve the removal of forests, riparian and wetland habitats, as well as the development of access roads, camps and storage facilities. These activities could cause cumulative effects to fish and fish habitat when combined with similar potential net effects from the Project.

The Couchiching First Nation stormwater management infrastructure upgrades project includes:

- Regrading approximately 10 km of road for water diversion;
- Clearing and expanding ditches, clearing or upsizing 150 culverts; and
- Treating and improving the quality of stormwater effluent by introducing wetland plants and swales.

These activities have the potential to affect fish and fish habitat through physical alteration of waterbodies, changes in riparian and in water vegetation, channel morphology; cause changes to water and sediment quality and quantity (e.g., may alter drainage patterns and increase or decrease drainage flows and surface water levels, which could affect fish habitat quantity and quality etc.); and contribute to Project related effects contributing to Climate Change and increase public access to fish habitats. These activities could cause cumulative effects to fish and fish habitat when combined with similar potential net effects from the Project.

6.6.10.1 Cumulative Effects Characterization

Cumulative effects may occur where the Project and other RFD both cause similar net effects within Project boundaries. As discussed in the previous section, net effects to fish and fish habitat may occur due to Project and RFD activities that overlap spatially and temporally.

The cumulative effects are characterized based on the incremental effects that result from the combination of the standalone net effects of the Project and the RFD.

The summary of cumulative effects on fish and fish habitat in the RSA is presented in Table 6.6-27.

Table 6.6-27: Characterization of Cumulative Effects for Fish and Fish Habitat

Indicators	Cumulative Net Effect	Significance Factors Direction	Significance Factors Magnitude	Significance Factors Geographic Extent	Significance Factors Duration/ Irreversibility	Significance Factors Frequency	Significance Factors Likelihood of Occurrence	Significance
• Abundance • Distribution • Habitat Quantity • Habitat Quality	Changes to fish habitat quantity and quality	Negative	Low	Local	Short-term to Permanent	Infrequent	Unlikely where proposed work is above the high-water mark (e.g., installation of clear span bridge). Probable where proposed work is below the high-water mark (e.g., installation of a culvert).	Not significant.
• Abundance • Distribution • Habitat Quantity • Habitat Quality	Changes to water and sediment quality and quantity	Negative	Low	Local to Regional	Short-term to Long-term	Infrequent	Unlikely where proposed work is above the high-water mark (e.g., installation of clear span bridge). Probable where proposed work is below the high-water mark or ground water table (e.g., installation of a culvert).	Not significant.
• Abundance • Distribution • Habitat Quantity • Habitat Quality	Changes due to public access to recreational fishing areas	Negative	Low to Moderate	Local to Regional	Permanent	Frequent	Possible where proposed work is above the high-water mark (e.g., installation of clear span bridge). Probable where proposed work is below the high-water mark (e.g., installation of a culvert).	Not significant.
• Abundance • Distribution • Habitat Quantity • Habitat Quality	Changes to Habitat Quantity and Quality due to the interaction of the Project with climate change	Negative	Low (may be variable and predicted to increase over time)	Local to Regional	Short-term to Permanent	Increasingly frequent	Probable	Not significant.

LSA = Local Study Area

6.6.10.2 Assessment of Significance

The contribution of the Project and other RFD to cumulative effects on fish and fish habitat in the RSA is not anticipated to have a cumulative effect on the overall functionality of fish and fish habitat as they currently exist based on the predicted characterization of the cumulative effects. Consequently, the cumulative effects on fish and fish habitat are predicted to be not significant Table 6.6-27).

6.6.11 Prediction Confidence in the Assessment

There is a high degree of certainty that Project construction activities are expected to result in no significant net effects, as the Project will use proven risk management approaches for guidance. Most of the effects were predicted to be localized to within the Project footprint for changes to fish and fish habitat. Decommissioning and reclamation of temporary Project components is anticipated to occur during construction and into the operation and maintenance stage.

The confidence in the effects assessment for fish and fish habitat is high, considering that the mitigation measures described in Table 6.6-23 are based on accepted and proven best management practices that are well understood and have been applied to infrastructure and transmission line projects throughout North America. A desktop review was conducted to review existing information. It is recognized that there are limitations with respect to detailed site-specific baseline data, and there are potential changes that may occur in Project locations and/or methods (e.g., water crossing structure) during the design stage. However, uncertainty in the assessment was reduced by making conservative assumptions, planning implementation of known effective mitigation measures and monitoring measures, including guidelines developed by the MNRF and DFO for fisheries management and various standard guidance documents (MNR 1990, MNRF and DFO 2021, DFO 2022a, DFO 2022c, MNR 2010a and MTO/DFO/MNRF 2020), and using available adaptive management measures to address unforeseen circumstances should they arise.

To confirm the validity of the desktop approach (Section 6.2.5.1) and the accuracy of the data collated during the desktop and field assessment, a statistical comparison was completed (Appendix 6.2C). The results of the field survey generally confirmed the results of the desktop assessment; minor discrepancies were attributed to the conservative approach used in the desktop assessment, and variations in locations that were assessed after design updates. Due to the remote nature of the Project and the absence of background information at many of the crossings, the confidence in the historical data being applicable to the proposed crossings where no background data were available was low. High confidence was placed on data from mapped, named waterbodies with historical or field-collected fish and fish habitat data that generally were located near populated areas and roadways. However, the mitigation measures including the proposed restricted activity timing windows and crossing structures proposed were still determined conservatively. Based on the results of the field survey, the approach for the desktop assessment was considered valid for the purposes of the EA, as the desktop approach

was confirmed to be conservative for determining fish presence and assigning proposed restricted activity timing windows, such that potential effects of the Project were not underestimated.

The Project will undergo a regulatory review and permitting process with agencies, including MNRF and DFO. During this process, additional site-specific information may be collected at applicable crossings to support permit applications, as required. A key component of the confidence in the assessment, is that construction and operation and maintenance of the Project will follow both proven, industry-accepted standards, as well as regulatory requirements with respect to fish and fish habitat.

6.6.12 Monitoring

This section identifies recommended monitoring to verify the prediction of the effects assessment and to verify the effectiveness of the mitigation measures and compliance monitoring to evaluate whether the Project has been constructed, implemented, and operated in accordance with the commitments made in the EA Report. The following monitoring programs will be required following the assessment of, and implementation of mitigation measures for fish and fish habitat in the LSA, and will be completed for all in-water activities (i.e., installations and removals), across all waterbodies:

Erosion and Sediment Control Monitoring

The following monitoring program is intended to verify effectiveness and implementation of erosion and sediment control measures to reduce the risk of sediment mobilization from disturbed areas to waterbodies:

- Monitoring of all erosion and sediment management measures, bank stabilization features and coffer dam installations (including pump around) during construction.

Construction Procedures Effectiveness Monitoring

The following monitoring program is intended to characterize the effectiveness of the construction procedures and mitigation measures to minimize potential effects to fish and fish habitat:

- Monitoring will be conducted during instream construction (e.g., installation and removal of culverts) or active water taking and discharge by a qualified Environmental Monitor to observe implementation and report on the effectiveness of the construction procedures and mitigation measures for minimizing potential effects to fish and fish habitat. Monitoring will occur during installation works and be ongoing for the duration of the project until the culvert is removed as part of reclamation activities. The program will include:

- Monitoring of turbidity and/or Total Suspended Solids (TSS) and/or turbidity (instrumented measurements and/or visual observations), as well as visual inspections to confirm the presence or absence of oil or sheen, will be coupled with monitoring of streamflow rates and/or water levels, as required to meet regulatory or permitting requirements. Monitoring should occur at all waterbody crossings targeted for instream works or active water taking and discharge during construction to verify effectiveness of construction procedures and mitigation measures including dam and pump/diversion activities associated with the removal and/or installation of temporary or permanent crossing structures.

- The environmental monitor will monitor blasting operations for adherence to the Blasting and Communication Management Plan.

Water Crossing Monitoring Program:

The following monitoring program is intended to characterize the effectiveness of design features and mitigation measures related to waterbody crossings:

- Monitoring will be conducted at new, permanent, and temporary waterbody crossings to verify that erosion and sediment control measures have been successful (e.g., bank restoration, re-vegetation etc.). For temporary waterbody crossings, the post-construction monitoring will occur in the spring following installation and will continue annually in the spring until the structure is removed and the area has been restored, but timing may be extended if needed (as recommended or documented in monitoring reports or mandated by regulators). The integrity of the permanent crossing structures will be monitored annually in the spring during construction and operations until it has been determined that there are no significant, negative effects observed or anticipated based on field surveys completed by an aquatic ecologist or surface water specialist. At temporary and permanent culverts, monitoring will be conducted to identify and remove blockages (e.g., ice, woody debris etc.), as needed, that could otherwise lead to scouring and effects to channel morphology and fish habitat, and potentially interfere with fish passage.

- Any instances of channel instability that could be attributed to the past construction and/or initial restoration activities will be identified and addressed, as needed through adaptive management. Adaptive management will be site-specific and may include additional erosion and sediment control measures (e.g., additional seeding/re-vegetation or the implementation of other channel stabilization measures). If adaptive management is required, engagement with MNRF, DFO, Indigenous communities and stakeholders will occur prior to any instream construction activities, where appropriate (e.g., placement of additional fill, re-grading, stabilization of bed or banks etc.).

- Monitoring of TSS and/or turbidity (instrumented measurements and/or visual observations), coupled with monitoring of streamflow rates and/or water levels, at waterbodies that include greater sensitivity or implication to change from the standpoint of fish habitat, species at risk, channel stability, drainage pattern, or other environmental considerations. The specific monitoring locations will be determined during the permitting and design phases of the Project; however, it is expected that waterbodies of varying size (small, medium, large) would be captured, recognizing that this would allow the effectiveness of mitigation measures to be evaluated at a range of scales. Monitoring will occur on a twice annual basis (i.e., biannually) at new and permanent waterbody crossings during the early stages of the operation and maintenance stage until pre-existing conditions are reached (to verify the effectiveness of reclamation measures).

Post-Construction Monitoring Program:

The following monitoring program is intended to characterize and document the success of the effectiveness of the design features, mitigation, and reclamation activities:

- Post-construction monitoring will be conducted at equipment waterbody crossings to verify that erosion and sediment control measures have been successful (e.g., bank restoration and re vegetation) and that the stability of each waterbody crossing is maintained (i.e., the channel has not washed-out). For temporary waterbody crossings, the post-construction monitoring will occur in the spring following installation and will continue annually in the spring until the structure is removed and the areas has been restored, but timing may be extended if needed (as recommended or documented in monitoring reports or mandated by regulators). The integrity of the permanent crossing structures will be monitored annually during construction and operations in the spring until it has been determined that the culvert is functioning as intended (i.e., no channel instability or erosion is observed) for the life of the Project. At culverts, monitoring will be conducted for the life of the Project to identify and remove blockages (e.g., ice, woody debris), as needed, that could otherwise lead to scouring and effects to channel morphology and fish habitat, and potentially interfere with fish passage.

- Any instances of channel instability that could be attributed to Project-related construction and/or initial restoration activities will be identified and addressed as needed through an adaptive management plan. Adaptive management will be site specific and may include adding erosion and sediment control measures or other stabilization works. If adaptive management is required, engagement with MNRF and DFO, Indigenous communities and stakeholders will occur prior to any construction activities, where appropriate (e.g., placement of additional fill, re-grading, stabilization of bed or banks etc.). Monitoring will occur in the spring following installation and will continue annually in the spring until the structure is removed and the areas has been restored, but timing may be extended if needed as determined through monitoring observations and recommendations or as mandated by regulators.

- If determined present, it is recommended that monitoring for fish passage, SAR and/or SOCC (e.g., Lake Sturgeon, Northern Brook Lamprey, etc.) occurs before, during and after construction activities to monitor for maintained integrity and accessibility of potential habitat.

Using monitoring and adaptive management, mitigation measures may be modified, or additional mitigation measures may be implemented to reduce unexpected effects to fish and fish habitat.

Hydro One commits to developing an Indigenous Monitoring Plan in collaboration with affected Indigenous communities and providing opportunities for inclusion in monitoring programs.

Additional details on many of the proposed monitoring programs are presented in Section 6.2 Surface Water.

6.6.13 Information Passed on to Other Components

Results of the fish and fish habitat assessment were reviewed and incorporated into the following components of the EA:

- Surface water quality (Section 6.2);
- Vegetation and wetlands (Section 6.4);
- Wildlife and wildlife habitat (Section 6.5);
- Air quality (Section 6.7); and
- Land and resource use (Section 7.1).

6.6.14 Criteria Summary

Table 6.6-28 presents a summary of the assessment results for fish and fish habitat by criteria species for the Project.

Table 6.6-28: Fish and Fish Habitat Assessment Summary

Criteria Species	Assessment Summary
• Lake Sturgeon • Coaster Brook Trout • Northern Brook Lamprey • Deepwater Sculpin • Brook Trout • Lake Trout • Northern Pike • Walleye	• Net effects were assessed to be not significant with the effective implementation of the mitigation measures and monitoring proposed. • The Project is predicted to contribute to cumulative effects for some net changes to abundance, distribution habitat quantity and habitat quality for all criteria fish species. No effects are anticipated to Coaster Brook Trout and/or Deepwater Sculpin populations due to their habitat restrictions.

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