6.0 EFFECTS ASSESSMENT AND MITIGATION

6.1 ASSESSMENT METHODOLOGY

6.1.1 Potential Effects and Valued Components

Treasury submitted a Project Description to the CEA Agency on November 26, 2012 and on January 18, 2013 received draft guidelines for the preparation of an EIS for an environmental assessment conducted pursuant to the CEAA, 2012. The EIS guidelines were issued as final on February 21, 2013. This effects assessment was conducted in accordance with the EIS guidelines.

The first stage of the effects assessment is the identification of potential Project effects on Valued Components (VCs). VCs are those aspects of the natural and socio-economic environment that are particularly notable or valued because of their ecological, scientific, resource, socio-economic, cultural, health, aesthetic, or spiritual importance, and which have a potential to be adversely affected by project development or have the potential to have an effect on the Project. A VC must both be important and have the potential to be affected by, or to affect, the Project. The potential to be affected means there has to be some interaction, either directly or indirectly, between the environmental component and some component or activity associated with the project during planning, construction, or operation. In this way, the assessment becomes focused on the identification and management of potential adverse effects.

A natural environment VC can be a particular habitat, an environmental feature, a particular assemblage (community) of plants or animals, a particular species of plant or animal, or an indicator of environmental health. Natural environment VCs were defined on the basis of their meeting one or more of the following criteria:

- Area of notable biological diversity;
- Significant habitat for locally important species;
- Significant habitat for uncommon, rare or unusual species;
- Important corridor or linkage for fish and/or wildlife movement;
- Sensitive receiving water environment;
- Species at risk;
- Notable species or species groups;
- Indicator of environmental health;
- Important component to the function of other ecosystem elements or functions;
- Component is of economic or cultural significance;
- Component is of educational, scientific, or aesthetic interest; and
- Component is of provincial, national or international significance.

6.1.2 Integration of Public and Aboriginal Considerations

The VCs assessed in the environmental effects analysis for this Project were defined by the multi-disciplinary project team undertaking the assessment based on:

- Identified regulatory requirements;
- Consultation with regulatory authorities;
- Information derived from published and unpublished data sources;
- Information and comment received during the engagement of local communities;

- Feedback through the Project community and public engagement program (Appendix EE); and
- Biophysical field surveys.

Consultation and engagement efforts by Treasury have not resulted in any formal Traditional Knowledge (TK) studies being conducted that are specific to the Project. Consequently, direct traditional Aboriginal knowledge gained through these studies has not been made available or used to derive VCs. A number of Aboriginal communities have alluded to traditional use of the general area of the Project but no specific information has been provided to Treasury on either the location or extent of traditional use. Similarly, Aboriginal communities have not proposed any measures that would quantify the concerns raised or that could reduce or mitigate those concerns. Having said that, aboriginal concerns have been made available to Treasury via letters to Treasury, letters to government agencies and direct and meetings with the company and government agencies. The issues and concerns raised have been incorporated into the development of Project VCs. Aboriginal concerns relating to the development of the Project are discussed in detail in the Aboriginal Consultation Report (Appendix DD).

In addition, concerns and questions brought to Treasury's attention through various interactions with the general public through community meetings, specific group meetings at the Project site and written correspondence have been considered in the identification of VCs by Treasury. The CEA Agency, in discussion with Aboriginal communities has also identified issues and concerns. These items have also been incorporated in the development of VC's. Examples of the raised concerns that were considered for VCs include, but are not limited to the following:

- Surface and groundwater quality – Eagle Lake First Nation, Wabauskang First Nation, Wabigoon Lake Ojibway Nation, local residents, camp owners and the general public;
- Country foods and traditional plant harvest - Eagle Lake First Nation, Naotkamegwanning First Nation, Wabauskang First Nation, Wabigoon Lake Ojibway Nation;
- Fish and fish habitat - Eagle Lake First Nation, Naotkamegwanning First Nation, Wabauskang First Nation, Wabigoon Lake First Nation, camp owners and the general public;
- Mammals and migratory birds - Eagle Lake First Nation, Naotkamegwanning First Nation, Wabauskang First Nation, Wabigoon Lake Ojibway Nation and the local population;
- Hunting, fishing, and trapping - Eagle Lake First Nation, Naotkamegwanning First Nation, Wabauskang First Nation, Wabigoon Lake Ojibway Nation; and Cultural heritage sites - Naotkamegwanning First Nation, Wabigoon Lake Ojibway Nation

Aside from an expressed desire to maintain Treaty and Aboriginal rights, the concerns raised by Aboriginal communities have been very similar to those concerns raised by the general public. The VCs considered and selected in the environmental assessment are detailed in Section 6.3.

6.1.3 Residual Effects Characterization

Environmental effects assessment for the Project is a stepwise process. The first step involved the identification of a potential interaction between the Project and a VC. The second step involved the development of avoidance, minimization and mitigation measures designed to reduce the potential effects (detailed in Section 6.4). The third step involved the characterization of any residual effect. Treasury characterized residual effects following existing guidance (e.g., Government of Canada 1994; BCEAO 2013):

- Magnitude – expected size or severity of the residual effect
    - Level I – No measurable residual effect.
    - Level II – Residual effect is measurable but within range of natural variation
    - Level III – Residual effect is outside range of natural variation
- Geographic Extent – the spatial scale of the residual effect

    - Level I – Residual effect restricted to Project footprint
    - Level II – Residual effect extends into LSA
    - Level III – Residual effect extends into RSA
- Duration – the temporal scale of the residual effect
    - Level I – Residual effect is temporary or not measurable beyond given Project phase (e.g., construction)
    - Level II – Residual effect could persist up to 10 years after Project initiation
    - Level III – Residual effect could persist beyond 10 years after Project initiation
- Frequency – how often the residual effect is expected to occur
    - Level I – Residual effect is expected to occur infrequently
    - Level II – Residual effect is expected to occur intermittently
    - Level III – Residual effects occurs frequently or continuously
- Reversibility – whether or not the residual effect can be reversed once the disturbance or activity has ended
    - Level I – Residual effect is readily reversible over a relative short time period
    - Level II – Residual effect is partially reversible (i.e., mitigation cannot guarantee a return to pre-disturbance conditions).
    - Level III – Residual effect is not reversible

VC specific-thresholds for each level are discussed in Section 6.4 and provided in Tables 6.4.1 to 6.4.8.

6.1.4 Residual Effects Significance Determination

A determination of the significance of any potential residual effects of the Project on VCs, after the application of all proposed mitigation measures, is a specific requirement of CEA Agency. The mitigation measures to be applied to this project have been integrated into the Project design; consequently, it is only the residual effects of the Project which require significance assessment.

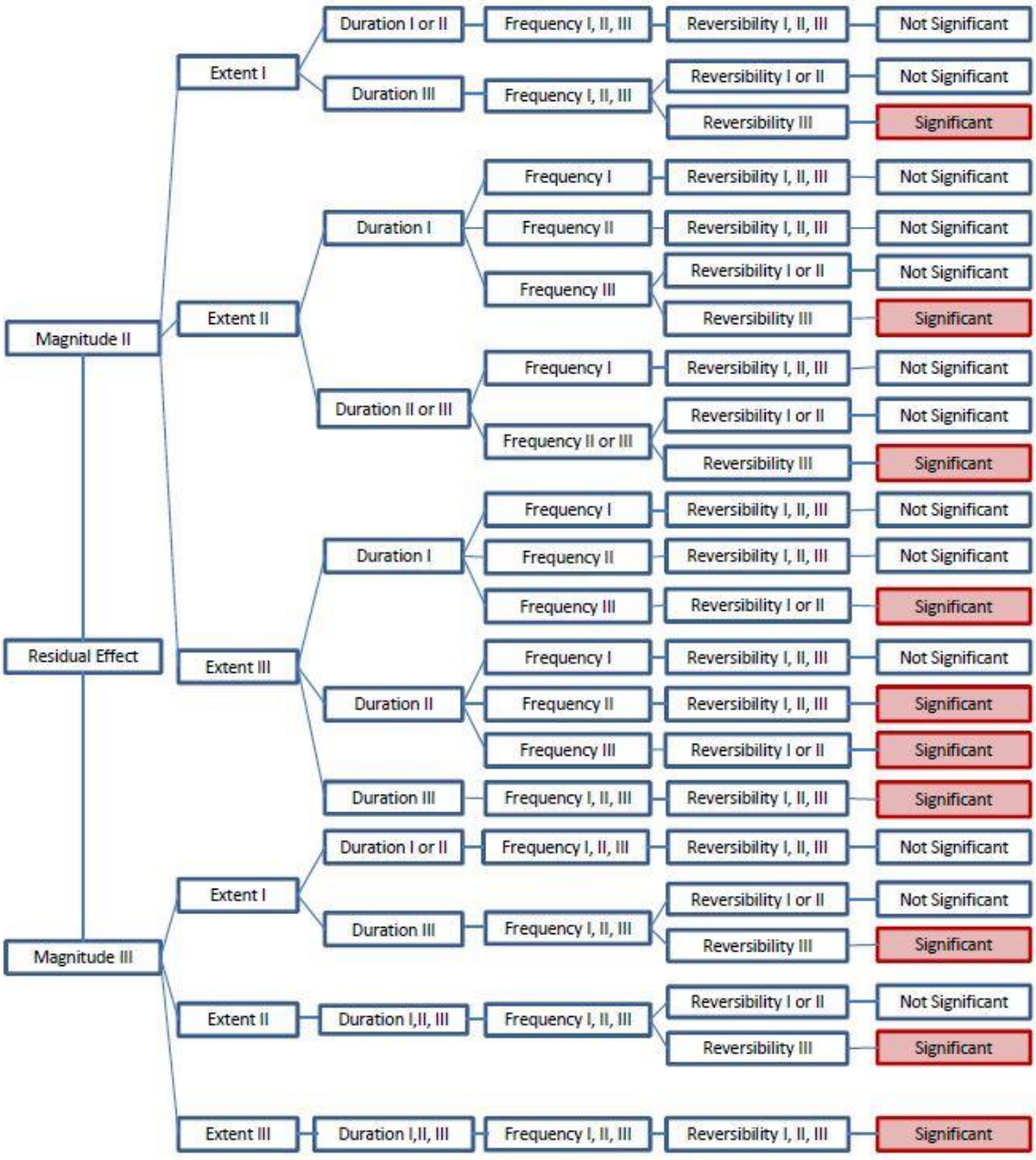
In keeping with existing guidance (e.g., Government of Canada 1994),Treasury evaluated the potential significance of residual effects by examining the level of each residual effect characteristic in the context of existing baseline data, relative literature, and consultation with experts. In general, the following logic was applied:

- If the magnitude of a potential residual effect is categorized as Level I, then the residual effect is considered not significant regardless of the levels assigned to other effect attributes.
- If the magnitude of a potential residual effect is categorized as Level II or III, a decision tree was used to evaluate significance (Figure 6.1.1).

Once the potential significance was assessed, Treasury assigned each residual effect a likelihood of occurrence:

- Level I – Residual effect is unlikely to occur
- Level II – Residual effect could reasonably be expected to occur
- Level III – Residual effect will occur

Figure 6.1.1 Decision Tree for the Determination of Significance for Residual Effects



6.2 POTENTIAL EFFECTS

6.2.1 Biophysical

6.2.1.1 Terrain and Soils

Potential effects to terrain and soils include:

- Addition of land masses in a relatively flat-lying landscape;
- Slope failure, subsidence or other collapse of altered land form;
- Erosion of soils as result of activities disturbing the stable overburden; and
- Chemical alteration of the soils.

The Project is located near public residences along Thunder Lake and Wabigoon in a relatively flat area within low relief surroundings with a 140 m vertical variability within 20 km of the site (Appendix G, Section 2.4.3 and Figure 1.1). Addition of surface features such as the WRSA, the TSF, the overburden storage area and the low-grade stockpile could contrast with the natural terrain viewscapes. Overburden stripping over the ore body and cut and fill in the vicinity of facilities requiring a leveled surface may result in susceptibility to wind and water erosion as a result of disturbing the stable state of the soils (removal of vegetation and alteration of consolidated state of the soils). The stored mine waste and low-grade stockpile could potentially affect soil chemistry.

6.2.1.2 Geology and Geochemistry

There are no direct potential effects from geology and geochemistry. The mine materials have intrinsic geochemical properties that are important factors considered for project design and planning, mitigation development, and water management and effluent quality. Potential effects can occur through secondary geochemical processes acting on exposed mine materials during construction, operation, and closure of the Project. Mine materials may potentially turn acid and in turn leach metals. Acid rock drainage (ARD) and metal leaching (ML) from mine materials in the WRSA, TSF, and low-grade ore stockpile could potentially affect surface water quality, groundwater quality, fish and fish habitat, and human health and ecological risk. The potential effects are described in Section 6.2.1.7 (surface water quality), Section 6.2.1.9 (groundwater quality), Section 6.2.1.12 (fish and fish habitat), and Appendix W (human health and ecological risk assessment).

6.2.1.3 Noise

Potential effects of the Project on the local acoustic environment will vary by Project phase and will likely be higher during construction and operations than during closure:

- Construction
    - Increased ambient noise associate with site clearing and preparation;
    - Increased traffic noise associated with construction vehicles moving to and from the Project;
- Operations
    - Increased traffic noise associated with operational vehicles moving to and from the Project;
    - Increased ambient noise levels associated with Project operations;
- Closure
    - Increased traffic noise associated with operational and maintenance vehicles moving to and from the Project.

6.2.1.4 Light

The primary potential effect of the Project on the local light environment is light trespass from the Project that interacts with the perception field of nearby property owners. A secondary potential effect will be attraction of wildlife (including night-migrating songbirds) to Project light sources.

6.2.1.5 Air Quality

Potential effects of the Project on the local Air Quality are expected to be limited to increases in the concentrations of products of combustion and fugitive particulate matter based contaminants of concern. Based on the criteria prescribed in the OAAQC, the primary adverse effects of these contaminants are expected to be:

- Impaired visibility (TSP, PM10, PM2.5)
- Soiling (Dust fall)
- Human Health (CO, PM10, PM2.5, NOx, SO_2)
- Damage to vegetation (from SO_2)

6.2.1.6 Climate

Climate change is a widely, often distantly, occurring effect resulting from numerous sources of greenhouse gases (GHG). Therefore, the potential effect of the Project on climate change is not something that can be quantified with any reasonable precision. The only reasonable method to determine significance is to compare Project emissions to national, provincial, and mining industry statistics. Project effects, in the form of GHG emissions, will occur during the construction and operation phases and result from the operation of mining and mine support equipment.

6.2.1.7 Surface Water Quality

During construction and closure, physical alteration of the surrounding landscape could result in increased sediment loading to receiving waters associated with the Project which could result in increased total suspended solids (TSS) in surface waters. Alteration of water quality could occur from accidental release of deleterious substances (e.g., chemical/fuel spills). During operation, release of tailings storage facility effluent is unlikely to result in exceedances of MMER, CCME and/or PWQO criteria due to anticipated mitigation measures. Runoff and seepage from WRSA, TSF, and LGOs could enter surface waters. Without mitigation, exposed waste rock and pit wall is expected to go acid within several decades potentially affecting water quality of runoff and pit lake.

6.2.1.8 Surface Water Quantity

During construction, operation, and closure physical alteration of the landscape will result in an increased runoff coefficient in the Blackwater creek watershed. This will result in higher peak flows but without changes to the minimum flows in the creek. During the development of the open pits, mine dewatering and raw water sourced from outside the Blackwater Creek watershed will add to the flow when the treated effluent is discharged into the creek. During the development of the underground mine in years 4 to 12 the treated effluent will be directed to the open pit. Total runoff in the Blackwater Creek will be reduced as surface runoff from the developed areas will be collected, treated, and discharged to the pit lake rather than to Blackwater Creek. Average flows, peak flows, and minimum flows in Blackwater Creek are likely to be reduced during the development of the underground operations. At closure the drainage patterns within the Blackwater Surface runoff from developed and disturbed areas result in higher peak flows in Blackwater Creek but without changes to the minimum flows.

6.2.1.9 Ground Water Quality

Potential effects to groundwater quality would relate primarily to the potential introduction of environmental contaminants of concern into the groundwater system through surficial releases during on-site construction, operations and/or closure. Potential contaminants of concern would include the following.

- Point source environmental contaminants of concern such as:
    - Petroleum hydrocarbon products (gasoline, diesel fuel, hydraulic oil, heating oil, oil & grease, solvents etc.) stored and used on site either as temporary facilities during facility construction and closure.
    - Petroleum hydrocarbon products storage and handling as part of site operations (truck shop, refueling station, etc.).
    - Explosives residue during open pit excavation.
    - Nutrients and metals from the wastewater treatment plant discharges during operations.
- Acid rock drainage and metals leaching from seepage of water through the WRSA, TSF, and LGO stockpile, both during operations and following closure.

Any surficial or near surface discharge of these contaminants could seep into the subsurface overburden or shallow bedrock water bearing units and then migrate outward from these areas, ultimately entering the nearby surface water creeks, wetlands, downstream lakes, or off-site private water well capture zones.

6.2.1.10 Ground Water Quantity

Potential effects to groundwater quantity relate primarily to the redirection of groundwater recharge or discharge through on-site activities, primarily as follows.

- Physical disturbance to the mine site itself during construction, operations and closure may result in the rerouting of surface runoff away from areas of more permeable soil cover which act as recharge areas, or disruption of shallow springs and seeps which may contribute to base flow in local creeks or wetlands.
- The proposed dewatering of the pit and underground working areas creating a drawdown zone which would gradually extend out over a significant area beyond the limits of the mine development.

A decrease in local groundwater elevations in either the overburden or bedrock aquifers may result in a decrease in groundwater discharge to local surface water environments including creek base flow or wetland area sustainability, as well as the pumping levels in private off-site water wells which draw groundwater from either the overburden or bedrock water bearing units.

6.2.1.11 Wildlife and Wildlife Habitat

Potential effects to wildlife and wildlife habitat include:

- Potential changes in population abundance and distribution due to habitat removal; and
- Direct mortality as a result of human activity (e.g., clearing, vehicle collisions, increased access leading to increased hunting and trapping pressure).

The primary potential effect to wildlife and wildlife habitat will result from the physical alteration or removal of existing habitat. Constructing access roads, mine infrastructure, tailing storage, pit excavation and waste rock storage areas will require disturbance or alteration of terrestrial and wetland/riparian habitats. In total, it is expected that 242 ha of wildlife habitat will be lost due to Project activities for the duration of the Project life. Habitats are expected to recover over time following Project closure.

A secondary potential effect to wildlife and wildlife habitat is direct mortality as a result of human activity. Direct mortality could occur during site clearing (e.g., removal of tree with active bird nest or bat roost), vehicle collisions,

human-wildlife interactions (e.g., nuisance bears on site), and increased hunting and trapping pressure that may result from increasing access to previously inaccessible.

6.2.1.12 Fish and Fish Habitat

Potential effects to fish and fish habitat include:

- Mortality of individuals due to physical disturbances;
- Mortality of individuals due to release of deleterious substances (e.g., sediment, chemicals, fuel, effluent);
- Noise and vibration disturbances to fish due to blasting and heavy equipment;
- Loss of habitat due to physical disturbances;
- Habitat quality degradation due to release of deleterious substances (e.g., sediment, chemicals, fuel, effluent);
- Changes to fish species abundance and distribution due to changes in habitat quality and/or availability;
- Changes to water quantity and subsequent habitat availability/quality due to Makeup Water Pipeline.

The primary effects to fish and fish habitat will result from the physical alteration of existing watercourses. Constructing access roads, mine infrastructure, tailing storage, pit excavation and WRSAs will require disturbance or alteration of local watercourses. In total, it is expected that approximately 6 ha of fish habitat will be lost due to Project activities.

The tailing pond dam is expected to cut off natural flow from a Blackwater Creek Tributary, which has only seasonal flow. Culverts across existing watercourses may be installed to manage surface water flow.

Liquid discharges from the Project, including treated tailing water and site runoff, are expected to meet all regulatory requirements before it is released to the natural environment. Water discharges are expected to be directed into the Blackwater Creek system, which ultimately flows into Wabigoon Lake.

Makeup water may be required for operation of the processing plant and may be obtained from groundwater wells or via pipeline from the old tree nursery irrigation ponds located on the Hoffstrom's Bay tributary on the Treasury offices site which has potential to reduce water quantity and, indirectly, habitat quality.

Both construction and operation activities will require blasting and heavy equipment use, which can cause noise and vibration impacts to fish.

6.2.1.13 Wetlands and Vegetation

Potential effects to wetlands and vegetation include:

- Reduction in the ability of wetlands to provide key ecological and hydrological services (e.g., floodwater attenuation, filtration);
- Alteration of water quality leading to loss of wetland function and indirect effects (e.g., potential storage of polluted runoff creating an attractive nuisance for waterfowl);
- Changes in the abundance and distributions of vegetation SAR (including Species of Special Concern and Provincially Rare Species); and

The primary effects to wetland and vegetation will result from the physical alteration of existing watercourses. Constructing access roads, mine infrastructure, tailing storage, pit excavation and WRSAs will require disturbance or alteration of local watercourses. In total, it is expected that 202.5 ha of vegetated habitat and 39.5 ha of wetland will be lost due to Project activities.

6.2.2 Socio-economic

6.2.2.1 Land Use

Potential effects to land use include:

- Direct impacts to land and resource use associated with the Project footprint;
- Indirect impacts associated with changes in the landscape and environment; and
- Impacts to transportation because of population change and logistics associated with Project development.

The primary effects to land use will result from noise and visual disturbance from mining operations that could affect recreation and tourism activities and the increased traffic levels as a result of the transportation of personnel, equipment and materials during all phases of the Project. Depending on the proximity of recreational and tourism activities, increased industrial activity and traffic related to the proposed Project could result in a degradation of land use enjoyment based on the potential for increased noise levels.

6.2.2.2 Social Factors

Potential effects to social factors include:

- Impact to the population demographic because of economic opportunities associated with Project development;
- Impacts on education because of changes in population and motivation to stay in or leave school;
- Impacts on infrastructure and services because of population change associated with Project development;
- Impacts on housing because of population change associated with Project development; and
- Impacts of the crime rate and type.

The primary effects to social factors will result from the modification and adaptation on regional demographics, which in turn strongly influences other social value components such as education; regional infrastructure; regional services; housing; and family and community wellbeing. Not all previously mentioned factors are relevant to the Project construction, operations, and decommissioning and closure stages.

6.2.2.3 Economic Factors

Potential effects to economic factors include:

- Impacts on employment opportunities because of availability of training and education and sourcing of workforce;
- Impacts on the regional and labour income; and
- Impact on provincial revenues and finances that will, in turn, affect economic development.

The primary effects to economic factors will result from the purchasing of labour, goods and services increasing employment rates, household incomes and federal, provincial and local tax revenues. Not all previously mentioned factors are relevant to the Project construction, operations, and decommissioning and closure stages. Indirect and induced Gross Domestic Product (GDP), employment and income effects of proposed Project expenditures are a normal consequence of direct project spending on labour, goods, and services working its way through the provincial economy.

6.2.2.4 Heritage Resources

Potential effects to heritage resources include:

- Impacts to undocumented sites through new construction; and
- Impacts to undocumented sites through removal of surficial sediments or burial of original surface.

The primary effects to heritage resources will result from land altering processes as part of the Project's development activities. Construction activities such as clearing and grading, maintenance of existing access roads, and construction of new mine site roads could potentially result in disturbance or loss of historic and cultural resources. Neither an archaeological assessment nor consultation efforts with Aboriginal Communities have identified any historic settlements or historic transportation routes, topological, surface water, or soil characteristics that would indicate any archaeological potential on or in proximity to the property.

6.2.2.5 Aboriginal Peoples

Potential effects to Aboriginal or treaty rights and traditional activities include:

- Limitations to the gathering of country foods (e.g., berries, wild rice, mushrooms);
- Negative effects on water and air quality (and attendant health effects) resulting from Project activity; and
- Limitations on the ability to hunt, fish and trap.

These potential effects were further evaluated using pre-existing reports and publically available information and the results of engagement with local communities (Appendix EE). People that harvest country foods from the study area may include:

- Local residents (e.g., residents of the local area, Wabigoon, Dryden), including both Aboriginal and non-Aboriginal peoples; and
- Residents from other communities that have travelled to the area to engage in hunting or fishing activities.

6.2.3 Federal Considerations

6.2.3.1 Changes of Environmental Components within Federal Jurisdiction

Potential effects to environmental components under Federal Jurisdiction include:

- Potential changes in population abundance and distribution of SAR and migratory birds due to habitat removal (Section 6.2.1.11);
- Direct mortality of SAR and migratory birds as a result of human activity (e.g., clearing, vehicle collisions, increased access leading to increased hunting and trapping pressure) (Section 6.2.1.11).
- Mortality of fish due to physical disturbances (Section 6.2.1.12);
- Mortality of fish due to release of deleterious substances (e.g., sediment, chemicals, fuel, effluent) (Section 6.2.1.12);
- Noise and vibration disturbances to fish due to blasting and heavy equipment (Section 6.2.1.12);
- Loss of fish habitat due to physical disturbances (Section 6.2.1.12);
- Fish habitat quality degradation due to release of deleterious substances (e.g., sediment, chemicals, fuel, effluent) (Section 6.2.1.12);
- Changes to fish species abundance and distribution due to changes in habitat quality and/or availability (Section 6.2.1.12); and
- Changes to water quantity and subsequent fish habitat availability/quality due to Makeup Water Pipeline (Section 6.2.1.12).

The geographic locations of these potential effects are described in the individual effects sections.

6.2.3.2 Changes to Environment on Federal or Transboundary Lands

No Federal or Transboundary lands will be affected by the Project.

6.2.3.3 Changes to Environment Linked or Incidental to Federal Decisions

Potential effects on fish and fish habitat are regulated by the Federal *Fisheries Act* 2012. Section 35 of the *Fisheries Act 2012* includes prohibitions against causing serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Serious harm to fish is defined as “the death of fish or any permanent alteration to, or destruction of, fish habitat” and includes habitat loss/degradation, flow alteration and pollution, among other things. The Project will result in approximately 6 ha of fish habitat loss due to the unavoidable elimination of the tributary watercourse associated with the tailings storage facility, mostly in the vicinity of the pit excavation and tailing storage facilities (Section 6.2.1.12). Therefore, under Subsection 35(2) of the *Fisheries Act,* an Authorization from the Minister of Fisheries and Oceans Canada, which typically includes habitat compensation, is required for the Project. Section 27.1 of the MMER also requires habitat compensation to offset losses of fish habitat associated the deposit of a deleterious substances to a watercourse.

6.3 VALUED COMPONENT IDENTIFICATION

6.3.1 Biophysical

6.3.1.1 Terrain and Soils

Treasury considered three terrain and soils VCs for inclusion in the environmental assessment:

- Natural landscape (geomorphologic features such as hills, plains, and other notable landforms);
- Overburden;
- Bedrock.

The bedrock VC was not retained since it is mostly covered by overburden or relatively flat where exposed (eastern area of the proposed pit). Due to its inconspicuous or buried state, the bedrock in the Project area is not providing a significant habitat or a valued interest to society.

Accordingly, Treasury retained the following terrain and soils VCs:

- The natural landscape, mostly as a visual feature. Since the Project area is relatively flat lying, there is no need to alter protruding landforms. However, protruding features such as the TSF, WRSA, the overburden storage area and the LGO stockpile may be perceived as a visual contrast with the natural landscape to nearby residents and other individuals (e.g. residents and cottagers on Thunder Lake).
- The overburden acts as a medium to sustain plant growth, filters/retain precipitation and is part of the wildlife habitat. It will be stripped to access the proposed pits. In addition, the surficial soils will be disturbed through cut and fill process where facilities require a leveled surface.
- Soil chemistry - Once disturbed the soil may be eroded or chemically altered before reused in the reclamation process.

6.3.1.2 Geology and Geochemistry

No VCs have been selected for geology and geochemistry as these components cannot be described as endpoints. Instead, geology and geochemistry provided parameters, such as ARD and ML, which could

potentially affect VCs for other components such as surface water quality (Section 6.3.1.7), groundwater quality (Section 6.3.1.9), fish and fish habitat (Section 6.3.1.12), and human health and ecological risk (Appendix W).

6.3.1.3 Noise

Treasury considered the sound level limits provided by the Ministry of Environment and Climate Change "Stationary Source" guidelines set out in MOE Publication NPC-300 (Ontario MOE, 2013) for Class 3 areas (rural or recreational). These guidelines state that one-hour sound exposures (A-Weighted hourly L_{EQ} values) from stationary noise shall not exceed that of the background, where the background is defined as the sound level present in the environment produced by noise sources other than those associated with the project under assessment. The MOE Publication NPC-300 sound level limits at the façade (or plane of window) are outlined as follows:

- The higher of 45 dBA or background noise, during the daytime hours (0700-1900h);
- The higher of 40 dBA or background noise, during the evening hours (1900-2300h); and
- The higher of 40 dBA or background noise, during the night-time hours (2300-0700h).

The MOE Publication NPC-300 sound level limits at an outdoor point of reception (POR) are applicable during the daytime and evening hours only. These limits are summarized as follows:

- The higher of 45 dBA or background sound, during the daytime hours (0700-1900h); and
- The higher of 40 dBA or background sound, during the evening hours (1900-2300h).

High levels of environmental noise can affect people by impairing their enjoyment of using the land. High noise levels can also affect wildlife, causing changes in behaviour or avoidance of affected areas, for at least temporary periods of time.

In light of this information, two noise VCs were identified for inclusion in the environmental assessment:

- Ambient noise levels at key regional receptors (e.g., residential developments along Thunder Lake);
- Noise disturbance to locally occurring wildlife, including SAR.

6.3.1.4 Light

The development of the Project will required the use of exterior lighting for operations, safety and security. The results of the Project baseline light assessment (Appendix I) concludes that nearby occupied properties should not experience measureable increases in illuminance (i.e., the amount of ambient light). However, to be conservative and in response to the potential for light trespass to be a nuisance factor for Project neighbor, Treasury has included light trespass from the Project to nearby occupied properties as one of the Light VCs.

In addition, night-time lighting of structures (e.g., work lights) has been shown to act as an attractant to wildlife, thereby increasing the probability of Project-wildlife interactions. Accordingly, Treasury has include the potential for wildlife attraction to novel light sources as a second Light VC.

6.3.1.5 Air Quality

Air quality was identified as a VC during the environmental assessment. Seven (7) primary contaminants of concern and forty-one (41) metals (potential contaminants of concern present in particulate/dust fall) have been identified as air quality VCs:

- Total Suspended Particulate (TSP)
- Particulate Matter < 10 microns in diameter (PM10)
- Particulate Matter <2.5 microns in diameter (PM2.5)

- Dust fall – accumulated particulate deposition per surface area over time (i.e. g/m^2/month)
- Sulphur Dioxide (SO_2)
- Nitrogen Oxides (NO_2) – Primarily (>98%) NO_2
- Carbon Monoxide (CO)
- Metals (e.g. Lead, Manganese, Phosphorous; Table 5.2.1).

Ammonia emissions were excluded from the air quality assessment because the emissions are very minor. Although there is a fairly significant amount of ammonia generated from the breakdown of tailings solution, the resulting ammonia tends to stay in aqueous solution and is not released to air. Further ammonia has a very short life in the atmosphere and would not reach the fence line in significant quantities.

Air quality and the above retained indicators were selected because they are protected by Federal Standards (NAAQO 1999; CAAQS 2013) and Provincial Regulations (OAAQC's prescribed by O.Reg.419/05) and the project has the potential to cause significant impacts in the local study area (e.g., impairment of local air quality).

6.3.1.6 Climate

As large GHG emitters are required by Ontario Regulation 452/09 make annual reports of GHG emissions, Treasury included one climate CV in the environmental assessment: GHG emission compliance with CEAA and MOECC climate change guidelines.

6.3.1.7 Surface Water Quality

Treasury considered those water quality protections provided by the MOECC PWQOs. In particular, the PWQOs provide for the protection of aquatic life and recreation in freshwater from inorganics and dissolved and total metals in surface water (MOEE 1994). Although a firm objective for total phosphorus in surface water is not provided in the PWQOs, general guidelines are provided to avoid nuisance concentrations of algae in lakes, excessive plant growth, and general aesthetic deterioration. Additionally, there are MMER for deleterious substances (e.g., metals, TSS and radium) for the protection of water quality (and Canadian Environmental Quality Guidelines provided by CCME).

Water quality protections (including protection of potable surface water) provided by the PWQO, MMER, and CCME were selected as VCs because activities associated with Project construction, operation and closure have the potential to alter the surrounding landscape and could result in increased sediment loading (e.g., TSS) to receiving waters associated with of the Project. Alteration of water quality could also result from accidental release of deleterious substances from construction, operation, or closure of the Project.

6.3.1.8 Surface Water Quantity

Treasury included two surface water quantity VCs for inclusion in the environmental assessment:

- Alteration of flow rates Blackwater Creek throughout Project operations and closure; and
- Alteration of flow rates in the Hoffstrom's Bay tributary during operations.

Treasury selected these VCs for regulatory considerations. The *Fisheries Act* s.35(1) prohibits activities which result in serious harm to fish that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support these fisheries.

6.3.1.9 Groundwater Quality

Baseline groundwater quality sampling and analyses determined that groundwater in the basal sand and silt water bearing units are generally in compliance with the PWQO for the Protection of Aquatic Life, with the exceptions of some naturally occurring elevated metals (Aluminum, Arsenic, Chromium, Cobalt, Copper, Iron, Tungsten,

Vanadium and Zinc). Based on the use of groundwater from both the overburden and bedrock aquifers for domestic use in areas to the south and west, water quality in those areas is also expected to be generally compliant with Ontario Drinking Water Quality Standards, although some private in home water treatment equipment (e.g., filters, softeners, chlorinators) may be necessary.

Therefore, Treasury considered the protection of water quality for future discharge or private to be a VC to be considered through the construction, operation and closure processes in order to ensure there are no adverse impacts to the surface water environment, or current or future groundwater resource development in populated areas.

6.3.1.10 Groundwater Quantity

Groundwater quantity is a potential valued quantity relating to both discharge to surface water environments and as a source of domestic water for developed urban and rural areas to the south (Village of Wabigoon, Wabigoon Lake) and west (Thunder Lake).

Previous assessment of surface water hydrology in the watersheds surrounding the proposed mine development area have found that aquifer discharge provides for a negligible amount of creek base flow so depression of the groundwater surface would likely not impact the surface water regime to any significant extent.

There are records for about 140 private water wells in the general area, mostly to the south and west, the majority of which are assumed to be private drinking water wells. Approximately half of these wells are expected to be within the potential zone of influence on groundwater elevations caused by the proposed groundwater drawdown component of the Project.

Accordingly, Treasury considered the maintenance of (a) groundwater contributions to surface flow patterns and (b) groundwater elevations in private wells as VCs in the environmental assessment.

6.3.1.11 Wildlife and Wildlife Habitat

Treasury considered a wide range of potential wildlife and wildlife habitat VCs for inclusion in the environmental assessment including:

- Wildlife Species at Risk (especially bats);
- Migratory and non-migratory birds (and associated habitats);
- Ungulates (and associated habitats);
- Furbearers (and associated habitats);
- Reptiles and Amphibians (and associated habitats); and
- Small terrestrial mammals (and associated habitats).

After review of available baseline data and data from additional sources (e.g., Ontario Breeding Bird Atlas), Treasury selected five wildlife and wildlife habitat VCs were identified during the EA (Table 6.3.1).

Table 6.3.1 Wildlife and Wildlife Habitat Valued Components

Valued Component	Justification
Wildlife Species at Risk (especially bats)	• Species at Risk; • Important component to the function of other ecosystem elements or functions; • Component is of educational, scientific, or aesthetic interest; and • Component is of provincial, national or international significance.
Ungulates	• Significant habitat for locally important species; • Component is of economic or cultural significance;
Furbearers	• Significant habitat for locally important species; • Component is of economic or cultural significance;
Upland Birds	• Significant habitat for locally important species; • Significant habitat for uncommon, rare or unusual species; • Notable species or species groups; • Component is of provincial, national or international significance.
Wetland Birds	• Significant habitat for locally important species; • Significant habitat for uncommon, rare or unusual species; • Notable species or species groups; • Indicator of environmental health; • Component is of economic or cultural significance; • Component is of provincial, national or international significance.

Reptiles and amphibians were not selected as a VC for two reasons: the low probability of a reptile or amphibian SAR occurring in the Project area and the assumption that any mitigation planning for wetlands (which are a VC; Section 6.3.1.13) would benefit reptiles and amphibians as a matter of course.

Small terrestrial mammals were not selected as a VC for two reasons: the low probability of a small terrestrial mammal SAR occurring in the Project area and the assumption that any habitat-based mitigation for terrestrial habitats that would be undertaken for larger mammals and birds would benefit small mammals as a matter of course.

6.3.1.12 Fish and Fish Habitat

Treasury considered those fish species in the region that are subject to the Federal *Fisheries Act*. Two Fish and Fish Habitat VCs were identified during the environmental assessment:

- Fish (Northern Pike, Walleye, Yellow Perch and White Sucker; and coarse fish species that support Northern Pike, Walleye and Yellow Perch)
- Fish Habitat Conditions for all activities and fish life stages (spawning, incubating, rearing, feeding, respiration, migration, refuge, overwintering):

- Physical: cover features (e.g., large woody debris, pools, boulders, undercut banks), water quantity/flow, temperature, dissolved oxygen, riparian zone health, substrate composition, channel morphology
- Chemical: water quality (e.g., total and dissolved metals, nutrient balance)
- Biological: trophic structure (benthic invertebrates, periphyton, macrophytes, zooplankton, phytoplankton), predator/prey dynamics.

These were selected as VCs because they are protected by the Federal *Fisheries Act* 2012 and the Project has potential to cause significant effects (i.e., serious harm to fish – death of fish or any permanent alteration to, or destruction of, fish habitat).

The watercourse directly affected by the Project footprint is a headwater tributary network of Blackwater Creek that exhibits seasonal flows. The watershed of this tributary network is the location of the proposed tailings impoundment, which would eliminate this watercourse above the tailings dam. Watercourses in the RSA that have the potential to be affected by the Project include Blackwater Creek, Wabigoon Lake into which Blackwater Creek flows. Habitat quality in the tributary creeks affected by the Tailings impoundment may be considered of "medium value" (i.e., important migration corridor; presence of suitable spawning habitats (gravels, aquatic vegetation); habitat with moderate rearing potential for the species present). Most of the fish identified within the Project footprint were coarse fish species ("minnows"); however, Northern Pike, White Sucker and Yellow Perch were identified in the Blackwater Creek system. Although the fisheries value of the aquatic ecosystem (tributary to Blackwater Creek) within the Project footprint appears to be limited, the fish and fish habitat within the tributary support downstream fisheries and contributes to regional value warranting inclusion as VCs.

6.3.1.13 Wetlands and Vegetation

Treasury identified two wetland and wetland vegetation VCs during the environmental assessment, as described below. Although additional VCs that may be associated with wetlands were identified, they were more directly related to other resource topics such as water quality, fish and fish habitat, and wildlife and wildlife habitat, and are discussed in those sections:

- Wetlands are an integral component of the overall hydrologic system of a given watershed. Wetland functions including water storage and delay contribute to year-round flow of streams that are connected to them by either surface or sub-surface flow. These flows in turn support year-round habitat for aquatic species. Intact, functional wetlands help to ensure that downstream flow rates are moderated and the hydroperiod extends as long as possible into the dry season.
- Vegetation Species at Risk, Species of Special Concern and Provincially Rare Species – The only "listed" plant species detected within the LSA is the floating marsh marigold (provincially rare). This species is considered a VC as it is found only in wetlands, its presence serves as an indicator of wetland health, and it is a rare species, both regionally and in the ecosystem type in which it is found.

6.3.2 Socio-economic

Treasury considered a wide range of socio-economic VCs for inclusion in the environmental assessment based on feedback from regulators and the local populations.

6.3.2.1 Land Use

Two land use VCs were identified and retained during the socioeconomic assessment:

- Land and resource use; and
- Transportation

Both of these VCs have been evaluated in recent mining EAs and are key areas of interest for regulators and Aboriginal and local communities.

6.3.2.2 Social Factors

Five social factors VCs were identified and retained during the socioeconomic assessment:

- Population demographics;
- Education;
- Regional infrastructure and services;
- Housing; and
- Crime.

All of these VCs have been evaluated in recent mining EAs and are key areas of interest for regulators and Aboriginal and local communities. Health effects are addressed in Section 6.4.2.5.

6.3.2.3 Economic Factors

Three economic factors VCs were identified and retained during the socioeconomic assessment:

- Employment;
- Income; and
- Economic Development.

All three of these VCs have been evaluated in recent mining EAs and are key areas of interest for regulators and Aboriginal and local communities.

6.3.2.4 Heritage Resources

Two heritage resources VCs were identified during the archeological and heritage assessment:

- Archaeological sites; and
- Historic heritage sites.

Both of these VCs were selected based on their importance to local and Aboriginal communities and on their regulatory support (e.g., Ontario *Heritage Act*).

6.3.2.5 Aboriginal Peoples

Treasury evaluated three VCs with respect to Aboriginal peoples and their use of the Project area that have not already been addressed in other categories (e.g., effects on migratory birds or ungulates):

- Health effects related to potential air and water contamination;
- Gathering of country foods and traditional plant materials; and
- Hunting, trapping, and fishing conditions (e.g., access, perception of contamination).

6.4 EFFECTS ASSESSMENT

6.4.1 Biophysical

6.4.1.1 Terrain and Soils

The height of permanent terrain alterations such as the WRSA and TSF will be limited and contoured to blend in with other terrain features. The backfilling waste rock into the open pit will limit the amount of waste rock requiring above-grade storage. The WRSA may be observed during the early development of the pits (years 1 and 2) but progressive reclamation of the WRSA by covering it with soil and vegetation will soon assist in blending this visible feature with the surrounding landscape. Eventually the surrounding forest is expected to colonize the WRSA. The TSF will be more distant from the residences and lakes and will not extend above the surrounding terrain features. During construction and operations, the residual effects of terrain alterations have been characterized as Level I for Magnitude (minimal to no measurable residual), Level III for Geographic Extent (extends into RSA), Level II for Duration (effect will continue in the next Project phase), Level III for Frequency (frequent or continuous), and Level II for Reversibility (partially reversible). At closure, the TSF will be covered and vegetated and the surrounding forest is expected to colonize the surface. The residual effects at closure have been downgraded for most characteristics. No significant residual effects are anticipated for the terrain VC (Tables 6.4.1 to 6.4.3).

The overburden will be stripped to access the pit area. During this process, the soil will be susceptible to wind and water erosion as its protective vegetation is damaged and its consolidated state is disturbed. During the construction process, site drainage will be reestablished with grading, ditches and culverts to minimize runoff which would promote soils erosion. Industry best practices to minimize fine particles suspension will be followed such as loading the soils into trucks in a manner that minimizes drop height (Tables 6.4.1 to 6.4.3). Residual effects during construction have been characterized as Level I for Magnitude (minimal to no measurable residual), Level I for Geographic Extent (restricted to Project area), Level I for Duration (restricted to construction), Level II for Frequency (intermittent), and Level I for Reversibility (fully reversible). No significant residual effects are anticipated for this VC.

The WRSA and TSF are proposed for the long-term storage of mine waste. Left unattended the rock could be expected to go acid within several decades (Appendix K). Mitigation measures include collection of any seepage from the WRSA and TSF during operation, progressive reclamation of the WRSA with a water-shedding cap, storage of the remaining waste rock under water, and covering the TSF at closure with a water-shedding cap. The water-shedding caps and water cover will be in place well before the waste rock could be expected to go acid.

During operations, the residual effects have been characterized as Level I for Magnitude (minimal to no measurable residual), Level II for Geographic Extent (residual effect extends into LSA), Level I for Duration (restricted to operations), Level II for Frequency (intermittent), and Level I for Reversibility (fully reversible). During closure, one effect characteristic has been upgraded: Level II for Duration (effects will persist past closure). No significant residual effects to soil chemistry are anticipated (Tables 6.4.2 to 6.4.3).

6.4.1.2 Geology and Geochemistry

Geology and geochemistry do not provide endpoints for the effects assessment but rather provide parameters for the effects assessment of VCs for other components such as surface water quality (Section 6.4.1.7), groundwater quality (Section 6.4.1.9), fish and fish habitat (Section 6.4.1.12), and human health and ecological risk (Appendix W). Conservative estimates for geochemistry parameters such as ARD/ML, and onset to acid, were significant considerations in the project design, from construction through to post-closure, so as to prevent or mitigate potential effects to the VCs of other components.

Mine materials were characterized for ARD and ML potential (Section 5.4.3; Appendix K). Although characterization studies are ongoing, results to date indicate that the majority of waste rock, ore, and tailings samples tested are classified as PAG. From the same results, it was conservatively estimated that the time to acid onset for the PAG rock will range between a few tens of years to many tens of years (Appendix K, Section 4.2). The ARD and ML potential along with the onset of acid estimate were identified as significant parameters informing the development of mitigation strategies that were incorporated into the Project design, from construction through to post-closure. Although the mine materials are not expected to go acid until well after mine closure, a conservative approach to project design was used to ensure that all mine materials will be encapsulated, secured, or contained before the end of operations and well before the expected onset of acid. Project features incorporating this conservative approach include:

- Perimeter ditching to collect runoff and seepage from the WRSA, low-grade ore stockpile, and TSF during construction and operation;
- A water management system that includes containing and collecting seepage and runoff from Project components, recirculation of collected water to minimize mine water effluent, and a secondary treatment plant for any water to be released to the environment;
- Immediate encapsulation of WRSA with a water-shedding cover to minimize waste rock exposure and seepage;
- Backfilling pit with waste rock and accelerated flooding to minimize waste rock and pit wall exposure;
- Accelerated pit flooding with treated mine effluent to minimize discharges to the environment;
- Establishing a pit lake surface elevation above pit walls to ensure PAG pit walls are not exposed; and
- Encapsulation of TSF at closure with a water-shedding cover to minimize seepage.

A secondary effect of incorporating conservative geochemistry parameter estimates into the project design through the practice of containing and collecting runoff and seepage and installing a secondary treatment plant has been to reduce the raw water needs for the process plant through recirculation of treated water. This has reduced the raw water requirements from the environment from 600 m^3/d to 150 m^3/d which can be met using the existing storage ponds at the former tree nursery site rather than constructing an intake line to a larger waterbody (e.g. Thunder Lake or Wabigoon Lake). Similarly, the lower raw water requirements and recirculation from the secondary treatment plant have reduced the discharge to Blackwater Creek from 1,917 m^3/d to 1,467 m^3/d. During the accelerated pit refill, all treated mine effluent will be directed to the pit therefore there will be no discharge to the environment during the remaining years of the operations phase.

6.4.1.3 Noise

To mitigate potential noise-related effects, Treasury will utilize new, low-noise-engineered machinery, will time major activities (e.g., blasting) to minimize adverse effects, and will minimize night-time activities where practical. With the application of these appropriate mitigation and monitoring strategies, the potential Noise-related residual effects of the Project should not be significant (Tables 6.4.1 to 6.4.3).

During all phases, the potential residual effect of noise resulting from traffic and construction was rated as Level I for Magnitude (within applicable guidelines), Level II for Geographic Extent (residual effect extends into the LSA), Level I for Duration (residual effect confined to a particular phase), Level II for Frequency (intermittent), and Level I for Reversible (fully reversible).

During all phases, the potential residual effect of noise-related disturbances on wildlife was rated as Level I for Magnitude (within applicable guidelines), Level II for Geographic Extent (residual effect extends into the LSA), Level I for Duration (residual effect confined to a particular phase), Level II for Frequency (intermittent), and Level I for Reversible (fully reversible).

Periodic noise monitoring at key receptor locations throughout the life of the Project is recommended to respond to lingering public concern.

6.4.1.4 Light

To mitigate potential light-related effects, Treasury will limit Project lighting to areas required for safe operations, orient Project lighting towards the interior of the Project area and, where possible, use down-shaded lighting on Project buildings and infrastructure. With the application of appropriate mitigation and monitoring strategies, the potential light-related residual effects of the Project should not be significant (Tables 6.4.1 to 6.4.3).

During all phases, the potential residual effect of light trespass was rated as Level I for Magnitude (within applicable guidelines), Level II for Geographic Extent (residual effect extends into the LSA), Level I for Duration (residual effect confined to a particular phase), Level III for Frequency (frequently or continuous), and Level I for Reversible (fully reversible).

During all phases, the potential residual effect of wildlife light attraction was rated as Level I for Magnitude (within applicable guidelines), Level II for Geographic Extent (residual effect extends into the LSA), Level I for Duration (residual effect confined to a particular phase), Level II for Frequency (intermittent), and Level I for Reversible (fully reversible).

Periodic light trespass monitoring at key receptor locations throughout the life of the Project is recommended to respond to lingering public concern. The implementation of the wildlife reporting system within the Project EMP will help quantify potential effects of light attraction on wildlife.

6.4.1.5 Air Quality

From construction through to closure there is expected to be limited to increases in the concentrations of products of combustion and fugitive particulate matter based contaminants of concern. Based on the criteria prescribed in the OAAQC, the potential effects of these contaminants are impaired visibility (TSP, PM10, PM2.5), soiling (dust fall), human health (CO, PM10, PM2.5, NOx, SO_2), and damage to vegetation (from SO_2). Ammonia was excluded from further consideration as emissions are expected to be very minor.

Mitigation measures that will minimize potential effects during construction, operation, and closure phases of the Project include:

- Surface drilling will be performed with drilling rigs equipped with dust suppression equipment, such as wet suppression or dry filtration systems.
- Blasting will be conducted in a phased manner that optimizes the amount of explosives needed for a given area to be blasted, and that minimizes the area being blasted.
- Material will be loaded into haul trucks in a manner that minimizes the drop height from the loader or excavator bucket to the bed of the truck (or equivalent bed height as material is loaded into the truck).
- Ensure that all internal combustion engines are properly maintained and all emission control systems (e.g., diesel particulate filters) are in good working order.
- Water and chemical suppressants will be used for dust control on the haul roads is used at the mine site, when temperatures are above freezing. The watering program requires dedicated watering equipment, and enough water must be available and applied to off-set evaporation and maintain a wetted road surface. This program would also be supplemented with applications of an approved dust suppressant as required to minimize fugitive dust emissions.
- The crusher will be located inside a structure that is equipped with a bag-house dust collector to minimize dust from processing.

- A best management practices plan for dust will be implemented on the site to provide specific directions for operators (Appendix J - *Best Management Practices Plan for Dust Management*).

Inventories of emission sources were prepared for each project phase based on the proposed project plan. Estimates of the expected emissions from these sources during each project phase were prepared based on published methodologies and emissions data from a number of sources as presented in detail in Section 3.3 of the EAQA (Appendix J). A detailed breakdown of the estimated emissions from the project during each project phase are presented in *Table 3 - Annual Emissions from Construction and Site Preparation Phase*, *Table 4 - Annual Emissions from the Mine Operational Phase* and *Table 8 - Annual Emissions from Closure, Decommissioning and Restoration Phase*, in the EAQA (Appendix J, sections 6.2, 7.2, and 8.2, respectively).

The emission rate estimates and relevant emission source data were employed, along with the appropriate local terrain and meteorological data, to complete an advanced air dispersion modelling assessment (Appendix J - *Emission Summary and Dispersion Modelling Report*). The O.Reg.419 approved, United States Environmental Protection Agency (U.S. EPA) AERMOD dispersion model was used to predict the local ground level concentrations of all contaminants of concern at the off-site receptor locations in the Project area.

The dispersion modelling assessment was prepared based on the worst case Operational Phase of the Project. The total estimated annual emission rates from all phases of the Project are within the same order of magnitude, with the Operational phase lasting significantly longer and therefore expected to have the longest term potential air quality impacts. Additionally, the expected increase in emissions from the haul road calculated for the Construction and Site Preparation Phase and the Closure, Decommissioning and Restoration Phase are due to truck traffic along the haul road from the waste rock pile to the open mine pit. As such the impact of these emissions is expected to be further from the receptors of interest those generated during the Operations Phase.

The results of the dispersion modelling assessment were then added to the existing baseline background concentrations for each air quality indicator to determine the cumulative impact (Table 6.4.4).

Based on the results of the dispersion modelling assessment, the project is expected to result in a residual impact on local air quality (Magnitude Level I), with potential (but occasional – Frequency, Duration, and Likelihood of Occurrence Level I) exceedances of the Provincial (OAAQC) standards for TSP and PM10 beyond the Project footprint (Geographic Extent Level I). However, the direct effects of the Project at the nearest, regulated receptors (i.e., human residences) are expected to be consistently below federal and provincial standards (Table 6.4.5; Magnitude and Likelihood of Occurrence Level I). Application of the appropriate avoidance, minimization, and mitigation measure (i.e., Appendix J - *Best Management Practices Plan for Dust*) will help to minimize the effect on local air quality. As all air quality indicators are expected to remain in compliance with the applicable criteria at the relevant regulatory receptors, any potential residual effects are not significant (Table 6.4.1 to 6.4.3). Based on these results, no follow-up monitoring will be conducted.

6.4.1.6 Climate

GHG emissions are anticipated to increase during the construction phase and peak during the development of the open pits (years 1 - 3) when surface activities are most extensive. GHG emissions are then anticipated to decline during the progressive reclamation of the surface works and development of the underground mine (years 4 – 12). Closure of surface developments such as the TSF will likely result in a short (one year) upswing in GHG emissions before GHG emissions cease all together. There are no compliance limits for GHG in Ontario; however, Project GHG emissions are expected to be less than projects of similar scale in isolated locations. This is because, unlike similar operations in isolated location, power for the Project will be provided by the existing power grid rather than diesel generation required at isolated locations. The residual effect of GHG emissions is projected to be not significant: Level I for magnitude (no measureable residual effect), Level III for Geographic Extent (residual effect extends into RSA), Level II for Duration in (residual effect will diminish at closure), Level III for Frequency (continuous during construction and operations), and Level I for Reversibility (reversible at closure)

(Tables 6.4.1 and 6.4.2). Therefore, the Project GHG emissions are low in comparison to similar projects, the Mining, Oil & Gas sector, and provincial and national overall reporting. Thus, the residual effect was determined to be not significant.

6.4.1.7 Surface Water Quality

During construction, sediment loading or accidental release of deleterious substances (e.g., spills) to receiving waters could result in exceedances of applicable federal and provincial regulations and guidelines (Table 6.4.1). These exceedances, however, are not expected to be measureable beyond the construction period and are expected to occur infrequently. Mitigation measures outlined in the EMP are designed to reduce the likelihood of occurrences of increased TSS or chemicals of concern in receiving waters. EEM studies will be conducted during construction to monitor potential changes in the water quality of receiving waters resulting from construction activities.

During operation, release of tailings storage facility effluent could result in exceedances of applicable federal and provincial regulations and guidelines; however, secondary water treatment (reverse osmosis) of effluent is expected to meet limits based on PWQOs. That is, the residual effects (magnitude, geographic extent, duration, frequency, reversibility, and likelihood of occurrence) are considered Level I and not expected to result in exceedances of federal or provincial regulations or guidelines beyond the mixing zone or beyond the construction period (3 years). Thus, the remaining potential effects to water quality during operation are considered not to be significant if appropriate mitigation measures are implemented (Table 6.4.2). Also during operation, handling and/or equipment malfunctions could result in the release of chemicals and petroleum products due to spills; however, equipment refueling will be conducted at a refueling station positioned over a spill collection system. Additionally, spill prevention kits will be stationed throughout the mine as well as on vehicles. This will allow staff to rapidly address spills from equipment failure. Lastly, any transfer of chemicals will be conducted in dedicated and contained transfer areas. The residual effects resulting from handling and/or equipment malfunctions are considered Level I and not expected to result in exceedances of federal or provincial regulations or guidelines beyond the mixing zone or beyond the construction period (3 years). Thus, the remaining potential effects to water quality during operation are considered not to be significant if appropriate mitigation measures are implemented (Table 6.4.2).

In the highly improbable event of a catastrophic failure of the TSF, the surface water quality of Blackwater Creek would be altered as the flood wave moves downstream. However, Wabigoon Lake would be affected for a very short period of time and the effect would be mostly localized to Kelpyn Bay. If the tailings solids dispersed on land and water bodies are not removed in a timely manner following a TSF dam breach, there could be a longer term risk of migration. Runoff could potentially mobilize tailings particles into Blackwater Creek and negatively affect its water quality (i.e., turbidity and chemical or mineral composition). It is less likely that remobilized particles would affect the quality of Wabigoon Lake since they would likely settle in low moving water such as beaver ponds along Blackwater Creek. However, high water levels and velocities, such as spring freshet, could remobilize the settled particles and affect the water quality of Wabigoon Lake (Section 4.3.2).

During closure sediment loading or accidental release of deleterious substances to receiving waters could result in exceedances of applicable federal and provincial regulations and guidelines (Table 6.4.3). These exceedances, however, are not expected to be measureable beyond the closure period and are expected to occur infrequently. Mitigation measures outlined in the EMP (e.g., well-maintained equipment, spill response plan and kits, soil stabilization measures) are designed to reduce the likelihood of occurrences in increased in TSS or chemicals of concern in receiving waters during Project closure.

A screening level risk assessment (SLRA) to evaluate the potential for human health and ecological risk has been completed for the Project (Appendix W). The human health component of the SLRA focused on two contaminants of concern (COC; mercury and lead) and two human exposure pathways to contamination: direct soil contact (ingestion, dermal contact, and dust inhalation) and surface water (ingestion, dermal contact). The results of the

human health component of the SLRA indicated that risk estimates did not exceed the acceptable threshold for both mercury and lead during the operations phase of the Project.

6.4.1.8 Surface Water Quantity

Blackwater Creek water quantity can be expected to be reduced during mine operations as portions of the watershed such as the WRSA, low-grade ore stockpile, process plant, and TSF will be isolated and runoff/seepage collected and directed to the TSF. Treated water will initially be discharged into Blackwater Creek during the development of the open pits (years 1 to 3) which when combined with excess treated process water will be slightly higher than natural flows. Once open pit mining has been completed, the treated water effluent will be directed to the pit to accelerate filling which will result in a reduction in Blackwater Creek flow from years 4 to 12. After closure, natural drainage patterns will be restored. Reclaimed developed areas are expected to have a higher runoff coefficient which in turn will result in higher peak flows but no changes to low flows (Appendix O). The residual effects of flow alterations in Blackwater Creek have been categorized as Level I for Magnitude (no measurable effects outside of natural variation), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond operations), Level III for Frequency (will occur throughout the operations period), and Level I for Reversibility (readily reversible) (Table 6.4.2). The residual effects on flow rates in Blackwater Creek are predicted to be not significant; this prediction should be verified with surface hydrology monitoring throughout operations and closure.

In the highly improbable event of a catastrophic failure of the TSF, the resulting flood wave would likely cause some erosion along Blackwater Creek until the flood wave velocity is attenuated as it reaches bends and beaver ponds along the creek. This highly unlikely scenario would be of a relative short duration (several hours to few days) until the flow would return to seasonal normal (Section 4.3.2).

The Hoffstrom's Bay tributary will provide 150 m^3/d of raw water to the process plant throughout the operational phase of the Project. Water will be drawn from the two impoundments which were constructed to provide irrigation water for the former tree nursery. Raw water requirements will be mitigated by the installation of a reverse osmosis secondary treatment plant. The secondary treatment plant will be able to recirculate 450 m^3/d of treated water back to the process plant reducing the raw water needs from 600 m^3/d to 150 m^3/d. It is anticipated that the impoundments on the Hoffstrom's Bay tributary will be able to provide the raw water needs for the process plant with limited effects to water quantity in the tributary (Appendix F). The residual effects of flow alterations in Blackwater Creek have been categorized as Level I for Magnitude (no measurable effects outside of natural variation), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond operations), Level III for Frequency (will occur throughout the operations period), and Level I for Reversibility (readily reversible) (Table 6.4.2). The residual effects on flow rates in Hoffman's Bay tributary are predicted to be not significant; this prediction should be verified with surface hydrology monitoring throughout operations and closure.

6.4.1.9 Groundwater Quality

The level of risk posed to the groundwater quality is considered to be variable throughout the life of the development, and is associated primarily with point sources and the leachate produced from waste rock and tailings. Increased risk of point source releases may be present during the construction phase where protective measures for the control and containment of any accidental releases may be limited. However, the severity of any release would also be limited and appropriate spill response and remediation procedures would be in place to address any potential impacts.

Over the course of the construction phase, the potential impact of these types of point source releases to the groundwater quality is not considered to be significant since, in accordance with environmental legislation and industry good practice, any releases would be subject to an environmental assessment and appropriate remediation at the time of occurrence. During operations, care and control measures are expected to be in place

for any contaminant storage and handling areas. In the unlikely event that any accidental release should occur on site, the potential for subsurface contaminant migration would be limited by the operation of the groundwater dewatering system which would limit any impacts to the immediate vicinity of the source. Appropriate spill response and remediation measures would also be implemented to address these concerns prior to the off-site migration of any contaminants.

During operation of the mine site, there is the potential for between 200 m^3/d and 500 m^3/d of seepage through the base of the TSF. The majority of any seepage from the TSF to groundwater is predicted to be shallow horizontal flow that will be intercepted by perimeter drainage ditches. The remaining 10% to 30%, or about 70 m^3/d to 90 m^3/d, is predicted to bypass the ditches, migrating underneath them, and eventually discharging either into the flooded open pit, nearby creeks (Hoffstrom's Bay Tributary, Thunder Lake Tributary #3 and Blackwater Creek) or Thunder Lake/Thunder Creek.

Seepage out of the WRSA is estimated to be within the range of 100 m^3/d to 200 m^3/d. Under the base case scenario, about 80% of seepage coming out of the WRSA is expected to end up in the flooded open pit, while the remaining 20% is expected to be captured by the nearby creeks and Thunder Lake.

Based on the initial chemical analysis of the anticipated waste rock, this is not expected to develop into an acid generating waste for a period of a few tens of years to many tens of years. This suggests that any seepage would therefore have limited adverse impacts on groundwater quality conditions, which would then be further attenuated through natural dispersion within the groundwater system over this time frame.

As part of the overall closure plan, capping of the WRSA will begin soon after waste rock has been diverted from this area in order to backfill the exhausted open pits. The cap for the WRSA will therefore be completed well before the waste rock is predicted to go acid. At mine closure, the TSF will also be capped. Once capped, the WRSA and TSF are not expected to have any effect on groundwater quality since the cap will minimize infiltration of water and therefore further reduce the seepage from these areas.

The residual impact of spill-related events during all phases (Tables 6.4.1 to 6.4.3) has been characterized as Level III for Magnitude (potential introduction of contaminants), Level I for Geographic Extent (restricted to release area), Level I for Duration (not measurable past phase of occurrence), Level I for Frequency (infrequent), and Level I for Reversibility (fully reversible).

The residual impact of WRSA/TSF seepage during operation (Table 6.4.2) has been characterized as Level I for Magnitude (not measureable), Level I for Geographic Extent (restricted to Project), Level I for Duration (not measurable past phase of occurrence), Level I for Frequency (infrequent), and Level I for Reversibility (fully reversible). During closure, Reversibility is upgraded to Level I (partially reversible based on natural processes).

Throughout the site operations, a groundwater monitoring program will be maintained to monitor changes to water quality in the area. Water quality changes may be indicative of seepage and the potential for adverse impacts, which may require implementation of additional mitigation measures. This monitoring program will be continued following capping of the WRSA and TSF to confirm the effectiveness of the caps in minimizing future seepage.

6.4.1.10 Groundwater Quantity

During this initial phase of site construction, disturbance to site topography soil cover and drainage patterns will result in modifications to possible local ground recharge and/or discharge areas which will persist through operation and closure. However, these surficial disruptions are not expected to have any significant impact to groundwater quantity since the area of disturbance would be relatively small (less than 0.1%) compared to the overall groundwater basin.

The excavation of the open pit operations and subsequent operation of underground workings will include the implementation of a perimeter groundwater table depressions system, which, over the life of the mine operations, is expected to result in the gradual drawdown of the water table at the mine site to approximately 160 m below

grade. This drawdown would extend out from the mine site in a radial manner with the drawdown impact decreasing with distance from the mine site.

In order to obtain an indication of the magnitude of this drawdown cone, a three-dimensional steady state numerical groundwater flow model of the proposed operations was created as reported in the report entitled Hydrogeological Pre-Feasibility/EA Support Study Goliath Project, AMEC Environment & Infrastructure, August, 2014. This model was initially calibrated against observed groundwater conditions and then used to estimate the zone of influence/ drawdown created by the mine dewatering. This model is based on the assumption that the aquifer system is a relatively homogeneous porous media, which in the case of fractured rock is applicable only on a large scale since groundwater movement in fractured rock can be highly variable.

Near the end of mine operations, the zone of influence within which the groundwater table is expected to be drawn down by more than 1 m below average annual static conditions is estimated to extend approximately 2.5 km to the west, 3.5 km to the south, 2 km to the north and 1.5 km to the east. The predicted extent of this drawdown cone is presented in Figure 6.4.1.

All the creeks close to the proposed open pit are runoff dominated creeks with watersheds that sit predominantly on clay. Blackwater Creek is predominantly on clay overburden and has limited base flow. The base flow loss for Blackwater Creek is expected to be negligible. Thunder Lake Tributary #2 and #3 and Hughes Creek are the water courses closest to the Project site with significant base flow from groundwater discharge, most of which would be from the outwash sand and gravel deposits along Thunder Lake. These creeks are predicted to have base flow reductions of around 5% and below 1% respectively. The residual effects on recharge patterns have been characterized as Level I for Magnitude (limited to no measurable effects), Level I for Geographic Extent (restricted to Project area), Level III for Duration (residual effect permanent), Level III for Frequency (residual effect permanent), and Level III for Reversibility (permanent) (Tables 6.4.1 to 6.4.3). The residual effect will not be significant.

The residual operations-phase effects on groundwater contributions to surface flows (Table 6.4.2) have been characterized as Level I for Magnitude (no measurable residual effect), Level III for Geographic Extent (extends into RSA), Level III for Duration (effects will persist past operations and closure), Level III for Frequency (continuous during operations) and Level I for Reversible (readily reversible). The residual effect will not be significant.

There are 77 wells located within the zone of influence (ZOI) as defined by the predicted 1 m drawdown contour. A preliminary qualitative risk assessment has been undertaken for these 77 wells:

- Twelve wells within the 5 m Base Case drawdown contour located on the Thunder Lake shore to the east of Thunder Lake have moderate to high risk of dewatering. These are relatively shallow wells (< 25 m deep) that likely source most of their water from the basal sand and shallow bedrock;
- Five wells within the 5 m Base Case drawdown contour also located on Thunder Lake shore have low risk of dewatering. These are deeper wells (> 30 m) that likely source the majority of their water from deeper bedrock;
- 55 wells outside of the 5 m Base Case drawdown contour are assessed to have low risk of dewatering due to their proximity and likely good hydraulic connection with a recharge boundary and/or recharge source;
- The five remaining wells within the 1 m ZOI are within the Project property boundaries.

The residual effect of the Project on private well performance during operations (Table 6.4.2) has been characterized Level III for Magnitude (residual effect exceeds natural variation), Level III for Geographic Extent (extends into RSA), Level III for Duration (residual effect will persist beyond closure), Level III for Frequency (continuous), and Level II for Reversibility (partially reversible). The residual effect of the Project on private well performance during closure (Table 6.4.3) has been characterized Level II for Magnitude (residual effect exceeds

natural variation but less so than during operations), Level II for Geographic Extent (extends into LSA), Level III for Duration (residual effect will persist beyond closure), Level II for Frequency (effect gradually decreasing over time), and Level I for Reversibility (reversible).

In order to address the potential for impact to private water wells, an ongoing hydrogeological monitoring program will be implemented as described in Section 13.6. This program will involve the regular monitoring of water level fluctuations in areas between the mine site and the private well developments to determine if the rate and extent of drawdown is progressing as anticipated. The numerical model will be regularly revised to incorporate additional geological and hydrogeological findings to better represent the effects to date and therefore the reliability of future predictions. In the event that this monitoring program does confirm the likelihood of adverse groundwater table drawdown impacts on local private wells, mitigations measures will be implemented. These mitigation measures may include deepening of existing wells, relocation of existing wells, or installation of an alternative water supply, as conditions may require. With the implementation of appropriate mitigation, the residual effects are predicted to be not significant.

At closure, when the mine is allowed to flood, the groundwater elevations are expected to gradually return to the pre-development elevations. The groundwater monitoring program will be continued through the early closure phase to confirm the rate of groundwater recovery. It is anticipated that the drawdown effects will be fully reversed in 20 to 30 years.

525750
528500
531250
5512500
5510000

LP
GO
OT
RN
GK

Thunder Lake
Thunder Lake Tributary 1
Thunder Lake Tributary 2
Thunder Lake Tributary 3
Hoffstrom's Bay Tributary
Hoffstrom's Bay
Wabigoon Lake
Little Creek
Thunder Creek
Blackwater Creek
Blackwater Tributary 1
Blackwater Tributary 3
Blackwater Tributary 4
Hughes Creek
Nugget Creek

100
70
50
30
20
10
5
2

HYDROGEOLOGICAL PRE-FEASIBILITY / EA SUPPORT STUDY

Goliath Project

Figure 6.4.1

Model Predicted Drawdown in Basal Sand/Shallow Bedrock for the Fully Developed and Dewatered Goliath Mine (Base Case)

Legend

- 2013 Monitoring Well
- 2014 Geotechnical Hole
- MOE Private Water Well
- Base Case Drawdown (m)
- Proposed Open Pit
- Waste Rock Storage Area
- Tailings Management Area
- Tailings Management Pond

Surficial Geology

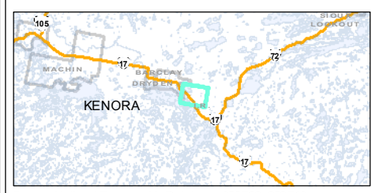
- Sand - Clay / Silt - Sand Boundary

Landform

- GK: Kame
- GO: Glaciofluvial Outwash
- LP: Glaciolacustrine Plain
- OT: Organics
- RN: Bedrock Knob

Bedrock Outcrop Mapping

- Beakhouse and Pigeon, 2003
- Treasury Metals



Source: National Topographic Database, 052F09, 052F10, 052F15, and 052F16, 1:10 000 nominal scale.
Source: Ontario Geological Survey, Ministry of Northern Development and Mines, and Northeast Science and Information Section, Ministry of Natural Resources 2005. Digital Northern Ontario Engineering Geology Terrain Study (NOEGTS); Ontario Geological Survey, Miscellaneous Release--Data 160. 1:100,000 scale

Conditions encountered in the field may be different from the interpreted information presented on this figure.

Project #: TB124004
Date: July, 2014
Client: Ontario Infrastructure & Lands

Drawn by: DF
Checked by: MS
Revision No.: 2

UTM NAD 83
Zone 15N
1:25,000

Meters
0 130 260 390 520 650

AMEC Environment & Infrastructure
a Division of AMEC Americas Limited
505 Woodward Ave.
Hamilton, ON L8H 6N6

6.4.1.11 Wildlife and Wildlife Habitat

Wildlife Species at Risk

Two terrestrial mammalian SAR were observed within the LSA during field survey efforts: Little Brown Myotis (2011 and 2012) and Northern Myotis (2012). Seven bird SAR were observed within the LSA during the field survey efforts: Bald Eagle, Peregrine Falcon, Black Tern, Common Nighthawk, Barn Swallow, Canada Warbler, Olive-sided Flycatcher. Based on range overlap and habitat availability, seven additional bird SAR are potentially present (at least in some years) but have not yet been reported from the LSA: American White Pelican, Bobolink, Eastern Whip-poor-will, Golden Eagle, Least Bittern, Short-eared Owl, and Yellow Rail.

Construction - The primary potential Project effect on wildlife SAR during construction is the potential change in population abundance and distribution due to habitat removal. Project construction will eliminate approximately 202.5 ha of terrestrial habitat and 39.5 ha of wetland habitat that could and does serve as habitat for wildlife SAR. Treasury has minimized the amount of habitat clearing required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). In addition, Treasury's EMP (Section 12) will limit activity of Project personnel outside of Project boundaries. The residual effects of habitat removal have been categorized as Level II for Magnitude (has the potential to measurably affect population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level III for Frequency (will occur throughout the construction period), and Level II for Reversibility (partially reversible upon closure) (Table 6.4.1). However, habitats slated for removal are not limiting within the LSA (removed habitat constitutes approximately 7.5% of available habitat in the LSA) and, as a result, their removal should not have a significant effect on SAR abundance in the region (Table 6.4.1). No follow-up activities are required or planned.

Additional potential effects during construction include direct mortality as a result of human activity: mortality of roosting bats or nesting birds during habitat clearing activities, and vehicular collisions (Table 6.4.1). To minimize the potential for effects on roosting bats and nesting birds, Treasury will conduct all habitat clearing activity outside of bat and bird migration and breeding periods. To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Table 6.4.1). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Operations and Closure - Potential Project effects on wildlife SAR during operations and closure (Tables 6.4.2 and 6.4.3) will be limited to direct mortality as a result of human activity (e.g., vehicle collisions). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Table 6.4.2 and 6.4.3). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Ungulates

Construction – The primary potential Project effect on ungulates during construction is the potential change in population abundance and distribution due to habitat removal. Project construction will eliminate approximately 202.5 ha of terrestrial habitat and 39.5 ha of wetland habitat that could and does serve as habitat for ungulates. Treasury has minimized the amount of habitat clearing required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). In addition, Treasury's EMP (Section 12) will limit activity of Project personnel outside of Project boundaries. The residual effects of habitat removal have been categorized as Level II for Magnitude (has the potential to measurably affect population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level III for Frequency (will occur throughout the construction period), and Level II for Reversibility (partially reversible upon closure) (Table 6.4.1). However, habitats slated for removal are not limiting within the LSA (removed habitat constitutes approximately 7.5% of available habitat in the LSA) and, as a result, their removal should not have a significant effect on ungulate abundance in the region (Table 6.4.1). No follow-up activities are required or planned.

Additional potential effects during construction include direct mortality as a result of human activity (e.g., vehicular collisions; Table 6.4.1). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Table 6.4.1). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Operations and Closure - Potential Project effects on ungulates during operations and closure (Tables 6.4.2 and 6.4.3) will be limited to direct mortality as a result of human activity (e.g., vehicle collisions). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Tables 6.4.2 and 6.4.3). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Furbearers

Construction – The primary potential Project effect on furbearers during construction is the potential change in population abundance and distribution due to habitat removal. Project construction will eliminate approximately 202.5 ha of terrestrial habitat and 39.5 ha of wetland habitat that could and does serve as habitat for furbearers. Treasury has minimized the amount of habitat clearing required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). In addition, Treasury's EMP (Section 12) will limit activity of Project personnel outside of Project boundaries. The residual effects of habitat removal have been categorized as Level II for Magnitude (has the potential to measurably affect population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level III for Frequency (will occur throughout the construction period), and Level II for

Reversibility (partially reversible upon closure) (Table 6.4.1). However, habitats slated for removal are not limiting within the LSA (removed habitat constitutes approximately 7.5% of available habitat in the LSA) and, as a result, their removal should not have a significant effect on furbearer abundance in the region (Table 6.4.1). No follow-up activities are required or planned.

Additional potential effects during construction include direct mortality as a result of human activity (e.g., vehicular collisions; Table 6.4.1). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Table 6.4.1). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Operations and Closure - Potential Project effects on furbearers during operations and closure (Tables 6.4.2 and 6.4.3) will be limited to direct mortality as a result of human activity (e.g., vehicle collisions). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Tables 6.4.2 and 6.4.3). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Upland Birds

Construction – The primary potential Project effect on upland birds during construction is the potential change in population abundance and distribution due to habitat removal. Project construction will eliminate approximately 202.5 ha of terrestrial habitat that could and does serve as habitat for upland birds. Treasury has minimized the amount of upland habitat clearing required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). In addition, Treasury's EMP (Section 12) will limit activity of Project personnel outside of Project boundaries. The residual effects of habitat removal have been categorized as Level II for Magnitude (has the potential to measurably affect population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level III for Frequency (will occur throughout the construction period), and Level II for Reversibility (partially reversible upon closure) (Table 6.4.1). However, habitats slated for removal are not limiting within the LSA (removed habitat constitutes approximately 7.5% of available habitat in the LSA) and, as a result, their removal should not have a significant effect on upland bird abundance in the region (Table 6.4.1). No follow-up activities are required or planned.

Additional potential effects during construction include direct mortality as a result of human activity: mortality of nesting birds during habitat clearing activities, and vehicular collisions (Table 6.4.1). To minimize the potential for effects on nesting birds, Treasury will conduct all habitat clearing activity outside of bird migration and breeding periods. To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality

have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Table 6.4.1). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Operations and Closure - Potential Project effects on upland birds during operations and closure (Tables 6.4.2 and 6.4.3) will be limited to direct mortality as a result of human activity (e.g., vehicle collisions). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Tables 6.4.2 and 6.4.3). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

Wetland Birds

Construction – The primary potential Project effect on wetland birds during construction is the potential change in population abundance and distribution due to habitat removal. Project construction will eliminate approximately 39.5 ha of wetland habitat that could and does serve as habitat for wetland birds. Treasury has minimized the amount of habitat clearing required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). In addition, Treasury's EMP (Section 12) will limit activity of Project personnel outside of Project boundaries. The residual effects of habitat removal have been categorized as Level II for Magnitude (has the potential to measurably affect population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level III for Frequency (will occur throughout the construction period), and Level II for Reversibility (partially reversible upon closure) (Table 6.4.1). However, habitats slated for removal are not limiting within the LSA (removed habitat constitutes approximately 7.4% of available habitat in the LSA) and, as a result, their removal should not have a significant effect on wetland bird abundance in the region (Table 6.4.1). No follow-up activities are required or planned.

Additional potential effects during construction include direct mortality as a result of human activity: mortality of nesting birds during habitat clearing activities, and vehicular collisions (Table 6.4.1). To minimize the potential for effects on nesting birds, Treasury will conduct all habitat clearing activity outside of bird migration and breeding periods. To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Table 6.4.1). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

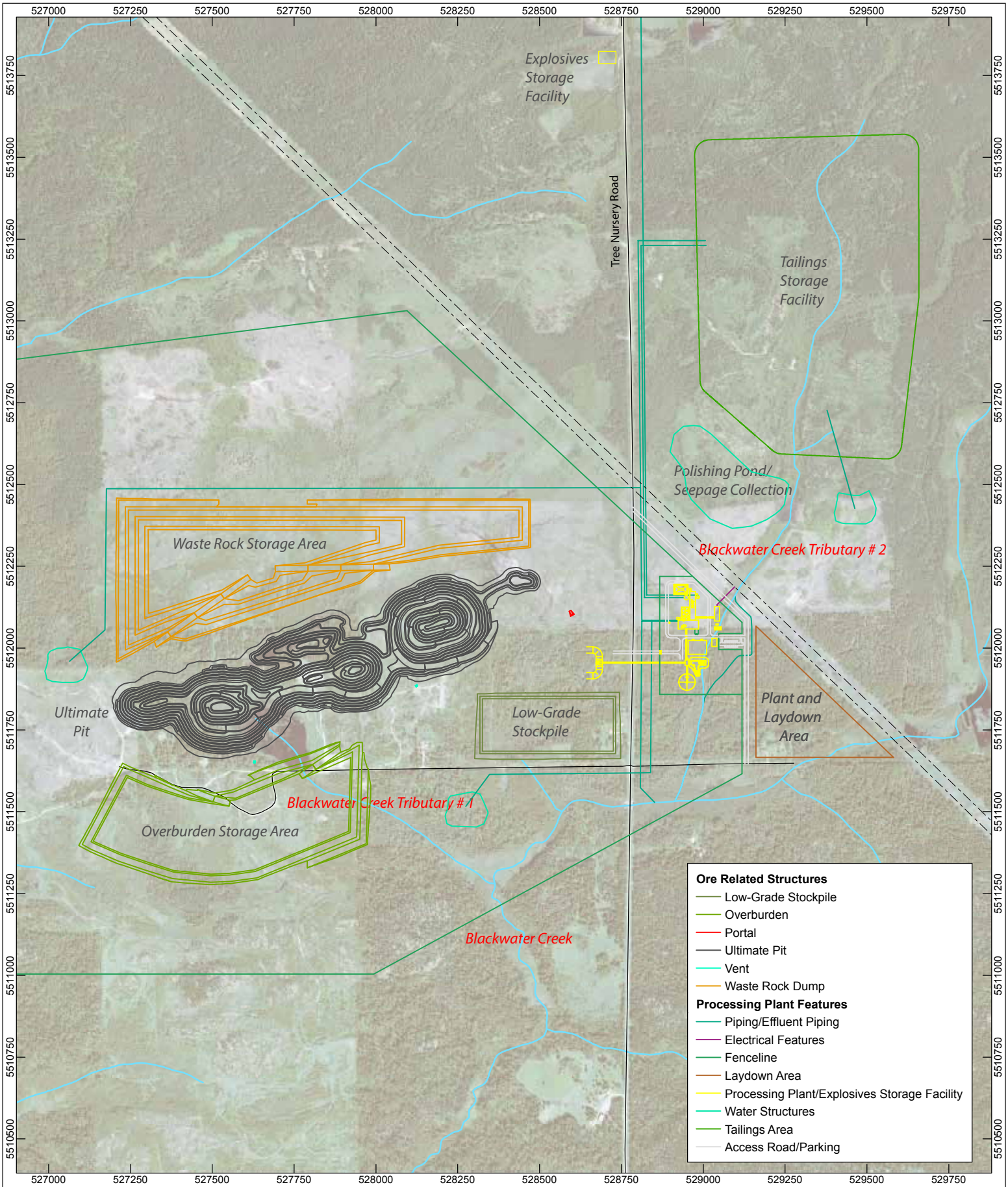
Operations and Closure - Potential Project effects on wetland birds during operations and closure (Tables 6.4.2 and 6.4.3) will be limited to direct mortality as a result of human activity (e.g., vehicle collisions). To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management). The residual effects of direct mortality have been categorized as Level I for Magnitude (no measurable effect on population size), Level II for Geographic Extent (extends into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (will occur infrequently), and Level III for Reversibility (not reversible) (Tables 6.4.2 and 6.4.3). The residual effect is predicted to be non-significant based on the predicted low frequency and low likelihood of a mortality event during construction and, therefore, the low total mortality over the construction phase. Treasury will implement a Wildlife Incident Response and Reporting System as part of its EMP to quantify interactions between Project personnel and wildlife.

6.4.1.12 Fish and Fish Habitat

There will be a direct effect and there exists the potential for both direct and indirect effects on fish and fish habitat associated with the Project (Figure 6.4.2). The single largest and unavoidable direct effect is due to the physical disturbance to a watercourse associated with the Project footprint, namely the loss of habitat within the tributary that will be sacrificed to accommodate the placement of the tailings impoundment (Table 6.4.1). Another potential direct effect is mortality of fish due to physical disturbances or the release of a deleterious substance (Tables 6.4.2 and 6.4.3). On-site water management has the potential to directly affect fish and fish habitat by altering flow in Blackwater Creek particularly during low-flow periods of the year. Indirect effects include the potential to change habitat beyond the Project footprint resulting from changes in water quality and/or water quantity and resultant effects on fish species population abundance and/or distribution due to changes in habitat quality or availability. With the exception of the unavoidable loss of habitat associated with the tailings facility, the application of appropriate avoidance, minimization, and mitigation measure should result in non-significant residual effects associated with the remaining identified potential effects.

Section 35 of the Federal *Fisheries Act 2012* includes prohibitions against causing serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Serious harm to fish is defined as “the death of fish or any permanent alteration to, or destruction of, fish habitat” and includes habitat loss/degradation, flow alteration and pollution, among other things. The Project will result in approximately 6 ha of fish habitat loss due to the unavoidable elimination of the tributary watercourse associated with the tailings storage facility, mostly in the vicinity of the pit excavation and tailing storage facilities. Therefore, under Subsection 35(2) of the *Fisheries Act,* an Authorization, which typically includes habitat compensation, will likely be required for the Project. Section 27.1 of the MMER also requires habitat compensation to offset losses of fish habitat associated the deposit of a deleterious substances to a watercourse. Waterbodies identified as potential candidate sites for the implementation of habitat compensation prescriptions are Thunder Lake, Wabigoon Lake and Thunder Creek.

The remaining potential effects to fish and fish habitat are considered not to be significant if appropriate mitigation measures are implemented (Rational provided below and in Tables 6.4.1 to 6.4.3).



GOLIATH GOLD PROJECT DRYDEN, ONTARIO, CANADA	SCALE: 15 000 *TREASURY METALS INC.*	Utility Line Roadway Waterbody Watercourse
PROJECT INFRASTRUCTURE AND FACILITIES	*DESIGN: MP 20 FEB. 2015* *GIS: AT 20 FEB. 2015* *CHECK: XX ADD DATE* *REVIEW: XX ADD DATE*	N 0 125 250 500 Meters ***REFERENCE*** *Data by Treasury Metals Inc.* *Projection: NAD83 UTM Zone 15N*
FIGURE 6.4.2 REV.00		

Fish

Construction – Four potential effects to fish, respective mitigation measures proposed by Treasury, and the significance of effects during the construction phase of the Project have been identified as follows:

- Fish mortality resulting from changes in water quality due to increased sediment from runoff and/or release of deleterious substances (e.g., chemical/fuel spills). Mitigation will involve implementation of an EMP, which will include measures to minimize potential for release of deleterious substances and a Spill Response plan. Equipment used will be well-maintained and will carry appropriately stocked spill kits. Operators will be trained in their use and have a spill response plan in place. Disturbed soils will be stabilized where possible to limit potential for erosion and sediment mobilization. Residual effects are characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level ll for Geographic Extent (extends into the LSA); Level l for Duration (not measurable beyond the construction period); Level l for Frequency (expected to occur infrequently); and, Level lll for Reversibility (not reversible). Although this effect could reasonably be expected to occur, the effect on fish mortality from changes in water quality is predicted to be not significant following the implementation of mitigation measures since the effect will be temporary (restricted to the construction period) and will occur infrequently. As such, mortalities, if they occur, will be limited spatially and temporally. Treasury will develop and implement a water quality monitoring program to comply with the *Fisheries Act* and the MMER.
- Direct mortality of individuals due to physical activities that occur within or adjacent to a watercourse (e.g., access roads, tailing area dam construction, pit excavation). Mitigation will involve minimizing work within watercourses, scheduling works to occur during reduced risk periods (i.e. outside of sensitive spawning, hatching, and nursery periods), and conducting fish salvage prior to construction where possible. Residual effects are characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level ll for Geographic Extent (extends into the LSA); Level l for Duration (not measurable beyond the construction period); Level l for Frequency (expected to occur infrequently); and Level lll for Reversibility (not reversible). Although this effect could reasonably be expected to occur, the effect on fish mortality due to physical activities is predicted to be not significant since the effect will have a relatively low magnitude, will be temporary (restricted to the construction period), and will occur infrequently due to the implementation of mitigation.
- Potential degradation of habitat availability and quality that result in changes to population abundance and distribution of fish species. Mitigation will involve minimization of site preparation activities in the vicinity of watercourses and implementation of comprehensive EMP measures (including erosion and sediment control measures) that minimize the potential for habitat disturbance. With these mitigation measures applied, it is predicted that the residual effects can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level ll for Geographic Extent (extends into the LSA); Level l for Duration (not measurable beyond the construction period); Level lll for frequency (occurs frequently or continuously); and Level ll for Reversibility (partially reversible). However, since the likelihood of occurrence is Level l (unlikely to occur), it is predicted that the effect on potential changes to fish population abundance and distribution will be not significant. Treasury will conduct monitoring during construction to detect ongoing or potential adverse effects to adaptively manage such issues and will implement follow up fish surveys to assess fish distribution and species composition.
- Habitat avoidance and disruption of fish spawning potential from noise and vibration disturbances resulting from heavy equipment operation. Specific mitigation measures will be detailed in the EMP, which will include measures to reduce potential impacts of noise and vibration, such as utilizing well-maintained equipment operated at optimum loads. Residual effects are characterized as Level l for Magnitude (no measurable residual effect to fish as fish will typically exhibit avoidance behavior); Level l

for Geographic Extent (restricted to the Project footprint); Level I for Duration (not measurable beyond the construction period); Level II for Frequency (expected to occur intermittently); and Level I for Reversibility (reversible). Although this effect will occur due to the unavoidability of noise and vibration from construction machinery, it is predicted to be not significant since it will be temporary, will have a low magnitude, and will occur intermittently.

Operations - It is expected that the four potential effects to fish during the construction phase will also occur during the operations phase of the Project:

- Direct mortality of individuals due to physical activities that occur within or adjacent to a watercourse (e.g., access roads, tailing area dam construction, pit excavation). Mitigation will involve minimizing work within watercourses, scheduling works to occur during reduced risk periods (i.e. outside of sensitive spawning, hatching, and nursery periods), and conducting fish salvage where possible. Residual effects are characterized as: Level II for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level I for Geographic Extent (restricted to the Project footprint); Level III for Duration (may extend beyond 10 years after operation initiation); Level I for Frequency (expected to occur infrequently); and Level III for Reversibility (not reversible). Although this effect could reasonably be expected to occur, the effect on fish mortality due to physical activities is predicted to be not significant since the effect will have a relatively low magnitude, will be geographically restricted, and will occur infrequently due to the implementation of mitigation.
- Fish mortality resulting from changes in water quality due to increased sediment from runoff and/or release of deleterious substances (e.g., chemical/fuel spills). Mitigation will involve implementation of an EMP, which will include measures to minimize potential for release of deleterious substances and a Spill Response plan. Equipment used will be well-maintained and will carry appropriately stocked spill kits. Operators will be trained in their use and have a spill response plan in place. Disturbed soils will be stabilized where possible to limit potential for erosion and sediment mobilization. Residual effects are characterized as: Level II for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level II for Geographic Extent (extends into the LSA); Level III for Duration (may extend beyond 10 years after operation initiation); Level I for Frequency (expected to occur infrequently); and Level III for Reversibility (not reversible). The residual effect on fish mortality from changes in water quality is predicted to be significant. As such, Treasury will develop and implement a water quality monitoring program to comply with the *Fisheries Act* and the MMER. In the highly improbable event of a catastrophic failure of the TSF, the resulting flood wave would increase the potential for fish mortality within Blackwater Creek as a result of its high kinetic energy until the flood wave velocity is attenuated as it reaches bends and beaver ponds along the creek. This highly unlikely scenario would be of a relative short duration (several hours to few days) until the flow would return to seasonal normal (Section 4.3.2).
- Potential degradation of habitat availability and quality that result in changes to population abundance and distribution of fish species. Mitigation will involve minimization of site preparation activities in the vicinity of watercourses and implementation of comprehensive EMP measures (including erosion and sediment control measures) that minimize the potential for habitat disturbance. With these mitigation measures applied, it is predicted that the residual effects can be characterized as: Level II for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level III for Geographic Extent (extends into the LSA); Level III for Duration may extend beyond 10 years after operation initiation); Level III for frequency (occurs frequently or continuously); and Level II for Reversibility (partially reversible). The residual effect on fish mortality from changes in habitat quality is predicted to be significant. Treasury will conduct monitoring during the operations phase to detect ongoing or potential adverse effects to adaptively manage such issues and will implement follow up fish surveys to assess fish distribution and species composition.

- Habitat avoidance and disruption of fish spawning potential from noise and vibration disturbances resulting from heavy equipment operation. Specific mitigation measures will be detailed in the EMP, which will include measures to reduce potential impacts of noise and vibration, such as utilizing well-maintained equipment operated at optimum loads. Residual effects are characterized as Level l for Magnitude (no measurable residual effect to fish as fish will typically exhibit avoidance behavior); Level l for Geographic Extent (restricted to the Project footprint); Level lll for Duration (may extend beyond 10 years after operation initiation); Level ll for Frequency (expected to occur intermittently); and Level l for Reversibility (reversible). Although this effect will occur due to the unavoidability of noise and vibration from construction machinery, it is predicted to be not significant since it will be temporary, will have a low magnitude, and will occur intermittently.

Closure - The closure phase of the Project is anticipated to result in effects on fish that are similar to those in the construction and operations phases:

- Direct mortality of individuals due to physical activities that occur within or adjacent to a watercourse (e.g., physical alteration of the landscape for reclamation, infrastructure removal). Mitigation will involve minimizing work within watercourses, scheduling works to occur during reduced risk periods (i.e. outside of sensitive spawning, hatching, and nursery periods), and conducting fish salvage where possible. Residual effects are characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level l for Geographic Extent (restricted to Project footprint); Level l for Duration (not measurable beyond the reclamation period); Level l for Frequency (expected to occur infrequently); and Level lll for Reversibility (not reversible). Although this effect could reasonably be expected to occur, the effect on fish mortality due to physical activities is predicted to be not significant following the implementation of mitigation since the effect will have a relatively low magnitude, will be temporary (restricted to the reclamation period), and will occur infrequently.
- Fish mortality resulting from changes in water quality due to increased sediment from runoff and/or release of deleterious substances (e.g., chemical/fuel spills). Mitigation will involve implementation of an EMP, which will include measures to minimize potential for release of deleterious substances and a Spill Response plan. Equipment used will be well-maintained and will carry appropriately stocked spill kits. Operators will be trained in their use and have a spill response plan in place. Disturbed soils will be stabilized where possible to limit potential for erosion and sediment mobilization. Residual effects are characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level ll for Geographic Extent (extends into the LSA); Level l for Duration (not measurable beyond the closure period); Level l for Frequency (expected to occur infrequently); and Level lll for Reversibility (not reversible). Based on these assessments, the effect on fish mortality from changes in water quality is unlikely to occur and will be not significant following the implementation of mitigation measures. However, Treasury will develop and implement a water quality monitoring program to ensure compliance with the *Fisheries Act* and the MMER.
- Potential degradation of habitat availability and quality that result in changes to population abundance and distribution of fish species. Mitigation will involve minimization of reclamation related disturbances in the vicinity of watercourses, implementation of comprehensive EMP measures (including erosion and sediment control measures) that minimize the potential for habitat disturbance, and the implementation of measures to return watercourses to pre-disturbance conditions as much as is possible. With these mitigation measures applied, it is predicted that the residual effects can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fisheries); Level lll for Geographic Extent (extends into the LSA); Level ll for Duration (may extend up to 10 years after project initiation); Level lll for frequency (occurs frequently or continuously); and Level ll for Reversibility (partially reversible). Although the likelihood of occurrence is Level l (unlikely to occur), it is predicted that the potential effect on changes to fish population abundance and distribution, if they were to occur, would be significant. Treasury will conduct monitoring during the closure period to detect ongoing or potential

adverse effects to adaptively manage such issues and will implement follow up fish surveys to assess fish distribution and species composition.

- Habitat avoidance and disruption of fish spawning potential from noise and vibration disturbances resulting from heavy equipment operation. Specific mitigation measures will be detailed in the Closure Plan, which will include measures to reduce potential impacts of noise and vibration, such as utilizing well-maintained equipment operated at optimum loads. Residual effects are characterized as Level I for Magnitude (no measurable residual effect to fish as fish will typically exhibit avoidance behavior); Level I for Geographic Extent (restricted to the Project footprint); Level I for Duration (not measurable beyond the closure period); Level II for Frequency (expected to occur intermittently); and Level I for Reversibility (reversible). Although this effect will occur due to the unavoidability of noise and vibration from construction machinery, it is predicted to be not significant since it will be temporary, will have a low magnitude, and will occur intermittently.

Fish Habitat

Construction - Four potential effects to fish during the construction phase of the Project have been identified:

- Decreased habitat quality due to changes in water quality from increased sediment loads (increased turbidity/suspended solids) and/or release of deleterious substances (chemical/fuel spills). An EMP for the Project will include mitigation measures to minimize the potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators will be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization. Habitat compensation, as per the Fisheries Act, will be provided. With these mitigation measures applied, it is predicted that the residual effects can be characterized as: Level II for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level II for Geographic Extent (extends into the LSA); Level II for Duration (may extend up to 10 years after project initiation); Level I for Frequency (expected to occur infrequently); Level II for Reversibility (partially reversible). Although this effect could reasonably be expected to occur, it is predicted to be not significant.
- Physical disturbance to or loss of aquatic habitat by equipment working in or adjacent to a waterbody. Construction of mine infrastructure (e.g., ponds, pits, WSRA, roads) will result in a direct impact to 5.991 ha of aquatic habitat, primarily within Blackwater Creek and several tributaries. Mitigation of these effects will involve minimizing work within watercourses; scheduling works to occur during reduced risk periods (i.e., outside of spawning, hatching etc.); conducting fish salvage where possible. Appropriately sizing and embedding culverts or constructing bridges where appropriate. Habitat compensation, as per the *Fisheries Act* will be provided. Based on these mitigation measures, it is predicted that the residual effects can be characterized as: Level II for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level I for Geographic Extent (restricted to the Project footprint); Level III for Duration (may persist beyond 10 years after project initiation); Level III for Frequency (expected to occur frequently of continuously); Level II for Reversibility (partially reversible). Although this effect is likely to occur, it is predicted to be not significant, particularly due to its moderate magnitude and restricted geographic extent. Treasury will develop and implement fish habitat compensation will be implemented, if necessary, as per *Fisheries Act* requirements.
- Potential decrease in habitat quality due to changes in water quality (i.e., increased turbidity/suspended solids, release of deleterious substances). The Project will include an EMP with mitigation measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used will be well-maintained and carry appropriately stocked spill kits. Operators will be trained in their use and will have a spill response plan in place. Disturbed soils will be stabilized where possible to limit potential for erosion and sediment mobilization. With these mitigation measures applied, it is predicted that the residual effects can be characterized as: Level II for Magnitude (has the potential to measurably

affect productive capacity of local fish habitat); Level ll for Geographic Extent (extends into the LSA); Level ll for Duration (may extend up to 10 years after project initiation); Level l for Frequency (expected to occur infrequently); Level ll for Reversibility (partially reversible). Although this effect could reasonably be expected to occur, it is predicted to be not significant. A Water Quality Monitoring program will be developed and implemented to comply with *Fisheries Act* and MMER.

Operations - Four potential effects to fish habitat during the operations phase of the Project have been identified:

- Physical disturbance to, or loss of, aquatic habitat by equipment working in or adjacent to a waterbody. Mine infrastructure (e.g., ponds, pits, WSRA, roads) will result in a loss of 5.991 ha of aquatic habitat. Most of the footprint will be cleared during construction but the total footprint will expand during operations. Mitigation will include: minimizing work within watercourses; scheduling works to occur during reduced risk periods (i.e., outside of spawning, hatching); and conducting fish salvage where possible. Habitat compensation, as per the *Fisheries Act* will be provided, as required. Based on implementation of these mitigation measures, the residual effects can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level l for Geographic Extent (restricted to the Project footprint); Level lll for Duration (may persist beyond 10 years after project initiation); Level lll for Frequency (expected to occur frequently of continuously; Level ll for Reversibility (partially reversible). Although this effect is likely to occur, it is predicted to be not significant, particularly since residual effects will be limited in geographic scale and will be partially reversible. Follow-up monitoring will include implementing fish habitat compensation as required by the *Fisheries Act.* (Appendix II). The focus on the habitat compensation plan will be to avoid, minimize, and mitigate any residual serious harm to fish or fish habitat.
- Changes to water quality due to release of deleterious substances into a watercourse (e.g., sediment runoff, chemical/fuel spills). This effect could be within and beyond the Project footprint. The Project will include an EMP with mitigation measures to minimize the potential for release of deleterious substances and include a Spill Response plan. Equipment used will be well-maintained and carry appropriately stocked spill kits. Operators are to be trained in their use and will have a spill response plan in place. Disturbed soils will be stabilized where possible to limit potential for erosion and sediment mobilization. Habitat compensation, as per the *Fisheries Act* will be provided. Based on implementation of these mitigation measures, the residual effects can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level ll for Geographic Extent (extends into the LSA); Level lll for Duration (may extend beyond 10 years after project initiation); Level l for Frequency (expected to occur infrequently); Level ll for Reversibility (partially reversible). Although this effect is reasonably likely to occur, it is predicted to be not significant, particularly since residual effects will be limited in geographic scale, will occur infrequently and will be partially reversible. Follow-up monitoring will include development and implementation of a Water Quality Monitoring program to comply with the *Fisheries Act* and MMER. In the highly improbable event of a catastrophic failure of the TSF, the surface water quality of Blackwater Creek would be altered as the flood wave moves downstream. However, Wabigoon Lake would be affected for a very short period of time and the effect would be mostly localized to Kelpyn Bay. The initial emergency response would focus on preventing further movements of tailings solids to Blackwater Creek and intercepting the particles in suspension (silt fences). Additional mitigative measures would concentrate on removing the tailings solids dispersed on land to prevent potential future migration to water bodies as runoff (Section 4.3.2).
- Changes to water quantity and subsequent habitat availability/quality downstream of the project footprint due to assumed altered surface water hydrology, particularly during natural low-flow periods. Mitigation will involve planning for on-site water management to maintain downstream water balance or to ensure the release of minimum flows to maintain a sufficient quality and quantity of fish habitat within affected channels. Following implementation of mitigation, the residual effects can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level ll for

Geographic Extent (extends into the LSA); Level lll for Duration (may extend beyond 10 years after project initiation); Level ll for Frequency (expected to occur intermittently); Level l for Reversibility (reversible). Although this effect is reasonably likely to occur, it is predicted to be no significant.

Closure - During the Closure Phase, two potential main effects on fish habitat are predicted:

- Physical disturbance to or loss of aquatic habitat by equipment working in or adjacent to a waterbody; reclamation works may include disturbance or alteration of aquatic features. Mitigation of these physical effects to habitat will involve development of a closure plan that provides measures to minimize disturbances to existing natural features and aims to restore watercourse and riparian areas to pre-mine conditions, where possible. The residual effect of physical disturbances following mitigation can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level l for Geographic Extent (restricted to the Project footprint); Level lll for Duration (may extend beyond 10 years after project initiation); Level l for Frequency (expected to occur infrequently); Level ll for Reversibility (partially reversible). It is expected that physical effects during closure will occur, but that they are predicted to be not significant. A closure plan will be approved by regulatory bodies. All follow-up and monitoring requirements will be met.
- Physical alteration of the landscape during reclamation could result in changes to water quality due to the release of deleterious substances into a watercourse (e.g., sediment runoff, chemical/fuel spills, and release of effluent). To mitigate effects on habitat due to deterioration in water quality, an EMP will be produced, which will contain measures to minimize the potential for the release of deleterious substances and which will include a Spill Response plan and an Erosion and Sediment Control Plan. Equipment used must be well-maintained and carry appropriately stocked spill kits. Operators will be trained in their use and have a spill response plan in place. Disturbed soils will be stabilized where possible to limit potential for erosion and sediment mobilization. Habitat compensation, as per the *Fisheries Act* will be provided, as required. The residual effect of physical disturbances following mitigation can be characterized as: Level ll for Magnitude (has the potential to measurably affect productive capacity of local fish habitat); Level ll for Geographic Extent (extends into the LSA); Level ll for Duration (may extend up to 10 years after project initiation); Level l for Frequency (expected to occur infrequently); Level ll for Reversibility (partially reversible). It is expected that physical effects during closure are reasonably likely to occur, but are predicted to be not significant. A closure plan will be approved by regulatory bodies and all follow-up and monitoring requirements will be met. In addition, Treasury will develop and implement a Water Quality Monitoring program to comply with the *Fisheries Act* and MMER.

6.4.1.13 Wetlands and Vegetation

Wetlands

Construction – Potential direct effects to wetlands during construction include loss of functions including filtration, water retention, and habitat for rare plants, reptiles/amphibians, furbearers, waterfowl, and ungulates such as moose that graze in wetland areas. Treasury has minimized the amount of wetland disturbance required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). The residual effect of loss of wetland functionality during construction have been categorized as Level I for Magnitude (localized loss of a non-limiting resource), Level I for Extent (restricted to Project footprint), Level III for Duration (effect is permanent), Level 1 for Frequency (infrequent occurrence), and Level III for Reversibility (permanent) (Table 6.4.1). Permanent loss of up to 39.5 ha of wetlands would occur as a result of Project development. However, as wetlands comprise a dominant land cover type in this region (removed habitat constitutes approximately 7.4% of available habitat in the LSA) and are not limiting in terms of water quality or habitat, these losses are not expected to be locally or regionally significant (Table 6.4.1). Furthermore, the wetlands are not located in an area that is bound to be highly developed for other projects, so these losses are not expected to contribute to a cumulatively significant loss.

Operations and Closure – As a result of being found in topographical depressions, wetlands may become the endpoint for contaminated runoff from mine operations. As waterfowl and wildlife (e.g., reptiles/amphibians) are attracted to wetlands for foraging and breeding, concentrations of contaminants could constitute an attractive nuisance to such species. This effect will be offset by diverting runoff to a tailings pool, with a fenced perimeter and possibly a screen over the top to prevent entry by migrating waterfowl. If contaminated runoff cannot be diverted to a tailings pool, wetlands receiving contaminated runoff would be monitored and isolated if contaminant levels exceed regional thresholds. The residual effect on wetlands during operations has been categorized as Level I for Magnitude (not expected to be measurable), Level I for Extent (restricted to Project footprint), Level II for Duration (may extend up to 10 years after initiation of operations), Level II for Frequency (could occur during rain or snowfall events), and Level I for Reversibility (readily reversible) (Table 6.4.2). The residual effect is expected to be not significant. Follow-up activities will include EEM monitoring.

The residual effect on wetland during closure has been categorized as Level II for Magnitude (has potential to affect hydrological function and wildlife/fish habitat), Level II for Extent (extends into the LSA), Level II for Duration (may extend up to 10 years after initiation of operations), Level I for Frequency (infrequent), and Level II for Reversibility (partially reversible) (Table 6.4.3). The residual effects is expected to be not significant. Follow-up activities will include EEM monitoring.

Vegetation Species at Risk, Species of Special Concern and Provincially Rare Species

Potential direct effects to floating marsh marigold include habitat loss due to habitat destruction (e.g., wetlands). Indirect effects include the potential change in the abundance and health of any populations that are downstream from the Project resulting from changes to outflow water quality. Mitigation measures outlined in the EMP are designed to reduce the likelihood of occurrences in increased in TSS or chemicals of concern in receiving waters. EEM studies will be conducted during construction to monitor potential changes in the water quality of receiving waters resulting from construction activities. During operation, release of tailings storage facility effluent could result in exceedances of applicable federal and provincial regulations and guidelines; however, secondary water treatment (reverse osmosis) of effluent is expected to meet limits based on PWQOs.

During construction and operations, the potential residual effects have been characterized as Level I for Magnitude (no measureable effect on populations), Level II for Extent (extends into LSA), Level II for Duration (may extend up to 10 years after initiation of operations), Level I for Frequency (infrequent), and Level II for Reversibility (partially reversible). During closure, the potential residual effects have been characterized as Level I for Magnitude (no measureable effect on populations), Level II for Extent (extends into LSA), Level II for Duration (not measurable beyond closure period), Level I for Frequency (infrequent), and Level II for Reversibility (partially reversible). Application of appropriate avoidance, minimization, and mitigation measures should result in non-significant residual effect (Tables 6.4.1 to 6.4.3). No follow-up activities are required.

6.4.2 Socio-economic

6.4.2.1 Land Use

Land and Resource Use

The primary potential Project residual effect on the land and resource use during all phases of the Project is the loss of land area to the mine footprint. Treasury has minimized the Project footprint by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). The residual effects of the obstruction and loss of land has been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level I for Geographic Extent (confined to the Project footprint), Level III for Duration (likely to persist beyond closure), Level III for Frequency (expected to occur regularly or continuously), and Level III for Reversibility (not reversible) (Tables 6.4.6 to 6.4.8). The loss and obstruction of area will be reversed following closure to the extent possible (directly related to the successful

reclamation); as a result, it should not have a significant residual effect. No follow-up activities are required or planned.

Additional potential residual effects during all phases of the project include change in local ambience due to noise, vibration and decreased aesthetics at the mine site, as well as increased traffic. To minimize the potential for effects in local ambience, Treasury will establish and implement Noise Management Plans, Emergency and Spill Response Plans and will ensure ongoing communication with local stakeholders to minimize the changes in the landscape and environment. The residual effects in local ambience have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level II for Geographic Extent (confined to the LSA), Level II for Duration (residual effect throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.6 to 6.4.8). The residual effect is predicted to be not significant with an expected decrease once closure commences. No follow-up activities are required or planned. Regarding increased project traffic and improved access, Treasury will establish and implement a Transportation and Access Management Plan. The residual effects associated with Project traffic and improved access have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to RSA), Level II for Duration (residual effect throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long term) (Tables 6.4.6 to 6.4.8). The residual effect is predicted to be not significant based on the improved access and reduced travelling time to and from the site. No follow-up activities are required or planned.

Transportation

Construction – The primary potential Project residual effect on transportation during construction is the increased traffic volume to delivery equipment and materials needed for the mine site development. Treasury will establish and enforce traffic safety protocols, regulatory and cautionary signage, road maintenance and emergency response plans on all Project roads to prevent collisions and accidents. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The increased traffic will be reflected in average daily increases during construction that with appropriate mitigation and monitoring strategies should not have a significant effect. No follow-up activities are required or planned.

Operations and Closure – Potential Project residual effects on the transportation will be observed as increased traffic volumes during operations and a decline over the closure phase (Tables 6.4.7 and 6.4.8). The additional wear and tear of road surfaces will be minimized with ongoing monitoring and enhanced maintenance (e.g., grading, dust suppression, snow removal). The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8). The residual effect is predicted to be not significant based on the implementation of management and mitigation measures identified. No follow-up activities are required or planned.

6.4.2.2 Social Factors

Population Demographics

Construction – Potential Project residual effects on population demographics during the construction phase is the immigration of job seekers and their dependents. The changes related to the characteristics of that population (e.g., ethnicity, age, gender) are directly dependent on the magnitude of the population change. Treasury will develop training programs for unemployed and under employed resident and non-resident workers. The residual

effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The residual effect is predicted to be not significant based on the direct and indirect employment positions filled by a combination of non-residents and existing residents. No follow-up activities are required or planned.

Operations – Potential Project residual effects on population demographics during the operations phase will continue to be the immigration of job seekers and their dependents. The long-term employment opportunities could promote the relocation of population closer to the Project. Although mitigation measures will look to employ the local population, it is recognized that skilled workers might need to be recruited from outside of the LSA/RSA. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Table 6.4.7). The residual effect is predicted to be not significant based on the direct and indirect employment positions filled by a combination of non-residents and existing residents. No follow-up activities are required or planned.

Closure – The primary potential Project residual effects on population demographics during the closure phase is the out-migration of job seekers and their dependents. As operations wind down, the workforce will start to decrease in the LSA/RSA. The changes in demographics will be dependent on the availability of other work opportunities available at the time in the region. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level III for Reversibility (not reversible) (Table 6.4.8). The residual effect is predicted to be not significant based on project labour demand and mitigation measures aimed at ensuring that an adequate workforce is available to meet proposed Project requirements without affecting the regional population. No follow-up activities are required or planned.

Education

Construction – The primary potential Project residual effect on education during construction is largely related to changes in population and, thus, in demands for local and regional education services. Although governments are responsible for planning and implementing social programs and delivering public services that address social effects, Treasury will continuously communicate the appropriate information (e.g., the timing and the communities in which new residents may locate) to the school district(s) to assist with their resource planning process. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The increase in student enrolment due to changes in in-and-out-migration should not have a significant effect. No follow-up activities are required or planned.

Operations and Closure – Potential Project residual effects on education will be represented by demand increase during operations and a decline on enrolment over the closure phase (Tables 6.4.7 and 6.4.8). Treasury will continue to communicate the appropriate information to the school district(s) to assist with their resource planning process and make clear the education requirements needed for employment on the site to discourage dropouts. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8). The residual effect is predicted to be not significant based on the offset of in-migration during the operations phase to any potential out-migration

after construction is completed, and the small decline during closure as the result of workforce relocation. No follow-up activities are required or planned.

Regional infrastructure and services

Construction – Potential residual effects on regional infrastructure and services during construction will be largely attributable to changes in population, and the demands for local and regional public services. In turn, demand for regional services is linked to the expected increases in population. Whether it is new home construction, rental activity, or securing temporary accommodations in hotels, motels or RV/camp sites, these new residents will require utilities, housing, communication services, and recreation facilities. Treasury will aim their mitigation measures at closely and frequently communicating with government agencies to ensure that the appropriate information (e.g. proposed transportation volumes, potential variation to the local population) are considered in the planning of future services and response capabilities. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The increase in traffic volumes, population and the reflection of these on the demand for services are not expected to have a significant effect based on the construction period and other VC mitigation efforts to utilize local workforce. No follow-up activities are required or planned.

Operations and Closure – Potential Project residual effects on the regional infrastructure and services will be observed in the demand changes during operations and closure phase (Tables 6.4.7 and 6.4.8). Treasury will continue to communicate with the various service providers to ensure that the appropriate information (e.g. transportation volumes and the variation to the local population during operation and closure) are considered and managed. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8). The residual effect is predicted to be not significant based on the low population increase during operations and slight reduction during closure. No follow-up activities are required or planned.

Housing

Construction – Potential residual effects on housing during construction will be largely attributable to changes in population due to non-residents who relocate. Treasury will work with local and regional governments to minimize the in-migration workforce where possible. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The increase of housing demand is not expected to have a significant effect based on residents working on the proposed Project assumed to already have housing. No follow-up activities are required or planned.

Operations and Closure – Potential Project residual effects on housing will reflect population changes during the operations and closure phase (Tables 6.4.7 and 6.4.8). Treasury will continue to work with local and regional government to minimize in-and-out-migration of the workforce where possible. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8). The residual effect is predicted to be not significant based on the expected slight incremental demand (over a long period of time) during the operations phase and the

return of demand to base conditions after Project closure. The expected fluctuation is expected to be normal, product of resource development trends. No follow-up activities are required or planned.

Crime

Construction – Potential Project residual effects on crime during construction is the increase in demand for public safety services due to traffic volumes. Treasury will work with public safety services to develop safety and work policy guidelines for mine workers. Mitigation measures at the mine site can include contracted security services, which would help ensure a secure and safe worksite environment; a policy of no alcohol or drugs on-site; policies and guidelines for ensuring a respectful workplace. These measures would assist in mitigating the requirement of local policing resources to enforce criminal code offences that may occur. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). With the application of appropriate mitigation and monitoring strategies, the crime (demand for public safety services) residual effects of the Project should not be significant. No follow-up activities are required or planned.

Additional potential residual effects during project construction include effects related to behavior of a non-local labour force and income/spending levels. To minimize the potential for effects, Treasury will work with local agencies to assist in monitoring community wellbeing and take corrective actions where appropriate. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The residual effect is predicted to be not significant and could have positive effects with the application of appropriate mitigation and monitoring strategies. No follow-up activities are required or planned.

Operations and Closure – Potential Project residual effects on crime during operations and closure would be reflected in the changes in demand for public safety services. Treasury will continue to work with public safety services to develop safety and work policy guidelines for mine workers during operations, and in the incorporation of employment and wages decrease variables in management initiatives. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8). With the application of appropriate mitigation and monitoring strategies residual effects of the Project should not be significant. No follow-up activities are required or planned.

To minimize the potential for residual effects related to behavior of a non-local labour force and income/spending levels during operations and closure, Treasury will work with local agencies to assist in monitoring community wellbeing and take corrective actions where appropriate as well as develop a mine closure plan that identifies strategies and actions to aid residents. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8). The residual effect is predicted to be not significant based on the overall economic and social wellbeing achieved during operations and the implementation of an effective closure plan. No follow-up activities are required or planned.

6.4.2.3 Economic Factors

Employment

Construction – Potential residual effects on employment during construction will be largely attributable to Project spending generating the need for services and workers. The Project will provide direct construction employment and will create employment for workers in industries that will supply goods and services needed for the mine construction. These direct employment opportunities are expected to occur in the local and regional context based on the existing workforce, and regional businesses goods and services with experience in the construction and mining industries. Treasury will develop and implement employment practices that give preference to local and regional labour where possible. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). The potential residual effects of Project employment would vary among the various communities in the study area. Generally, for construction, effects of the proposed Project on employment are characterized as significant in magnitude and positive and reasonably likely to occur. No follow-up activities are required or planned.

Operations and Closure – Potential Project residual effects on employment will be observed in the decrease of unemployed population during the operations phase and an increase during the closure phase (Tables 6.4.7 and 6.4.8). Treasury will look to hire and train the vast majority of its operational and maintenance workforce from the local population around Wabigoon, Dryden, and neighbouring First Nation communities. Training would be done through in-house programs and in conjunction with local and regional educational institutes. Closure mitigation measures will focus on working with the affected communities and government agencies to develop a mine closure plan that includes a strategy for buffering the effects of eventually losing direct mine-related jobs and assist in the placement of potentially affected employees. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the RSA), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Tables 6.4.7 and 6.4.8).

Income

Construction – Potential Project residual effects on income during the construction phase will be reflected in the generation of income for employees and supply industries due to project spending. However, there will be considerable variation in income depending on the type of job. The extent of the effects of the Project will be influenced by Treasury's approach to local and regional hiring and procurement. Generally, pay scales for jobs in the mining sector in Ontario are significantly higher than all other manufacturing jobs. The effects of the proposed Project will be positive and significant to local and regional areas as Treasury has stated local hiring and purchasing policies and a demonstrated track record in these areas. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level II for Geographic Extent (confined to the LSA), Level I for Duration (extends through the construction phase), Level III for Frequency (expected to occur regularly or continuously), and Level I for Reversibility (reversible over a relatively short period) (Table 6.4.6). No adverse effect is expected. No follow-up activities are required or planned.

Operations – Potential Project residual effects on income during the operations phase will continue to be the generation of income for employees and supply industries due to project spending with variations depending on the type of job and services required. The effects are positive so no mitigation is necessary. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level II for Geographic Extent (confined to the LSA), Level II for Duration (throughout operations

and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long-term) (Table 6.4.7). No follow-up activities are required or planned.

Closure – Potential Project residual effects on income during the closure phase is the lower direct, indirect and induced income products of the cessation of mining operations. Nearly all of the employment opportunities for residents of the LSA and RSA will cease during closure affecting income. Mitigation measures will focus on working with the affected communities and government agencies to develop a mine closure plan that will assist in buffering the effects of an eventual mine closure on income. The residual effects have been categorized as Level I for Magnitude (might or might not be detectable, but is within the normal range of variability), Level III for Geographic Extent (extends to the Province), Level II for Duration (throughout operations and closure), Level III for Frequency (expected to occur regularly or continuously), and Level II for Reversibility (reversible in the long term) (Table 6.4.8). The significance of potential residual effects of Project employment would vary among the various communities in the study area in terms of spatial extent, magnitude, and significance. With the application of appropriate mitigation and monitoring strategies, the residual effects of the Project should not be significant and reasonably expected to occur.

Economic Development

Construction – Potential residual effects on economic development during construction will be largely attributable to increases in the Gross Domestic Product, employment and government revenues. The proposed Project would involve directly purchasing labour, goods, and services and, in turn, tax revenues distributed between the federal, provincial and local (municipal and regional) governments. The overall effects of construction of the proposed Project are all positive and require no mitigation (Table 6.4.6). No follow-up activities are required or planned.

Operations and Closure – Potential residual effects on economic development during the site operation and closure will be largely attributable to changes in the Gross Domestic Product, employment and government revenues (Tables 6.4.7 and 6.4.8). The overall effects of operation of the proposed Project are all positive and require no mitigation although mine closure will result in the net loss of operating jobs and income. No follow-up activities are required or planned.

6.4.2.4 Heritage Resources

Archeological sites

Potential direct residual effects results from land altering activities impacting undocumented archaeological sites. The indirect Project residual effect results from increased activity in the LSA from the increase in people and related activities and their effect on undocumented archaeological sites. Construction would have the greatest direct impact; however, any land-altering activity during operations and closure phases could impact archaeological sites.

An archaeological assessment of the project site has not identified any sights of archaeological significance or interest. Nor has consultation with aboriginal communities resulted in any sites of interest or importance being identified. Consequently, no documented archaeological sites would be affected by the proposed Project. With the application of appropriate mitigation and monitoring strategies, the residual effects of the Project should not be significant (Tables 6.4.6 to 6.4.8). Treasury will develop and implement the appropriate management and mitigation measures (i.e., Archaeological and Cultural Heritage Resource Management Plan).

Historic heritage sites

The direct Project effect results from land altering activities impacting historic heritage sites. The indirect Project effect results from increased activity from the increase in people and related activities and their effect on historic heritage sites. Construction would have the greatest direct impact; however, any land-altering activity during operations and closure phases could impact historic heritage sites.

No historic heritage sites are identified within the proposed Project. No documented historic heritage sites would be affected by the proposed Project. With the application of appropriate mitigation and monitoring strategies, the residual effects of the Project should not be significant (Tables 6.4.6 to 6.4.8). Treasury will develop and implement the appropriate management and mitigation measures (i.e., Archaeological and Cultural Heritage Resource Management Plan).

6.4.2.5 Aboriginal Peoples

Health Effects

Aboriginal communities have identified the potential impacts of the Project on water as a concern. This concern is applicable to both drinking water sources as well as the potential impacts that alteration to water quality could have on fish and fish habitat. The possibility of mercury contamination of waterways downstream from the Project area was raised as a particular concern.

During construction, sediment loading or accidental release of deleterious substances (e.g., spills) to receiving waters could result in exceedances of applicable federal and provincial regulations and guidelines. These exceedances, however, are not expected to be measureable beyond the construction period and are expected to occur infrequently. Mitigation measures outlined in the EMP are designed to reduce the likelihood of occurrences in increased in TSS or chemicals of concern in receiving waters. EEM studies will be conducted during construction to monitor potential changes in the water quality of receiving waters resulting from construction activities. The potential residual effect has been characterized (Table 6.4.6) as Level II for Magnitude (residual effect in receiving waters could exceed regulations), Level II for Extent (could extend into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (infrequent), and Level I for Reversibility (readily reversible). The residual effect is predicted to be not significant.

During operation, release of TSF effluent could result in exceedances of applicable federal and provincial regulations and guidelines; however, secondary water treatment (reverse osmosis) of effluent is expected to meet limits based on PWQOs. The potential residual effects have been characterized as Level I for Magnitude (no exceedances), Level I for Extent (limited to Project footprint), Level I for Duration (not measurable beyond construction), Level I for Frequency (infrequent), and Level I for Reversibility (readily reversible). Thus, the remaining potential effects to water quality during operation are considered not to be significant if appropriate mitigation measures are implemented (Table 6.4.7).

Similar to construction, during closure sediment loading or accidental release of deleterious substances to receiving waters could result in exceedances of applicable federal and provincial regulations and guidelines (Table 6.4.8). These exceedances, however, are not expected to be measureable beyond the construction period and are expected to occur infrequently. Mitigation measures outlined in the EMP are designed to reduce the likelihood of occurrences in increased in TSS or chemicals of concern in receiving waters during Project closure. The potential residual effect has been characterized as Level II for Magnitude (residual effect in receiving waters could exceed regulations), Level II for Extent (could extend into the LSA), Level I for Duration (not measurable beyond construction), Level I for Frequency (infrequent), and Level I for Reversibility (readily reversible). The residual effect is predicted to be not significant.

A screening level risk assessment (SLRA) to evaluate the potential for human health and ecological risk has been completed for the Project (Appendix W). The human health component of the SLRA focused on two contaminants of concern (COC; mercury and lead) and two human exposure pathways to contamination: direct soil contact (ingestion, dermal contact, and dust inhalation) and surface water (ingestion, dermal contact). As detailed within the Screening Level Risk Assessment, exposure pathways were defined for wildlife that is seen as valued components (moose, deer, hare, and ruffed grouse). These exposure pathways included direct soil/tailings contact, ingestion of soil/tailings (while foraging), ingestion of surface water, and the ingestion of food (i.e., plants, soil invertebrates). Hazard quotients (HQ) were calculated for the selected wildlife receptors based on the ratio of

the estimated exposure to the toxicity reference value (TRV) to evaluate potential risk from exposure to mine-related containments of concerns (Appendix W).

Based on the calculated HQs, estimated risks for wildlife were below risk thresholds (1.0) for hare, moose, and deer exposed to mercury and lead for the Operational Phase. For grouse, the HQ for mercury was below risk thresholds for the Operational Phase. However, the HQ for lead was just above the risk threshold (HQ = 1.2) for grouse exposed to lead from the ingestion of tailings and food (plants and soil invertebrates) from the tailings during the Operational Phase. The HQ falls below the risk threshold when the assumption is made that grouse obtain one third rather than one half of their food from plants and soil invertebrates living on the tailings. These HQ were derived using a very small set of COC concentrations in tailings, and modelled surface water concentrations. In summary, the results of the human health component of the SLRA indicated that risk estimates did not exceed the acceptable threshold for both mercury and lead during the operations phase of the Project.

Gathering of Country Foods and Traditional Plant Materials

Aboriginal communities have expressed concern that the Project could adversely impact their ability to gather plants and berries. Specific types or plants and berries that are of interest have not been specified, nor have any specific locations from which plants and berries been traditionally gathered been identified.

Blueberry patches within the RSA that are known to Treasury have been identified (Figure 5.11.1 and 5.11.2). As locations have not been identified within the Project site, Treasury has identified additional areas of the property that provide the natural conditions for blueberry occurrence. This has been determined via Forest Resource Inventory (FRI) compiled by the OMNRF, and quantifying area via suitable ecosite area as defined by the OMNRF. In addition to this, Treasury has identified known sources of blueberries within the RSA. These sites has been documented though observations on site, and communications with public stakeholders. Potential effects to blueberry sites are minimal within the context of the RSA. FRI inventory data indicates a large amount of land that supports potential blueberry habitat and that Project construction will only result in the loss of 0.8% of potential blueberry habitat (Appendix EE). In addition to this the Dryden Forest Management Plan has harvested a number of sites in proximity to the Project site within 2012 to 2013. It is expected that blueberries will continue to be available on these harvested areas for the next few years, until crown closure of the regenerating forest occurs. Future logging in this area will result in ongoing picking opportunity.

Existing chanterelle picking areas will not be directly affected though Project development, although they will not be available to the public due to safety concerns. Upon closure of the Project this site will be available to the public and First Nation communities. Known sites within RSA and LSA have been documented though observations on site and communications with public stakeholders.

Some of the documented wild rice locations fall within the discharge area of the Project. However, the Project has been designed to discharge all effluent at PWQO guidelines. These guidelines are designed to protect aquatic life at all exposure levels. Therefore, it will not adversely impact the gathering of wild rice within the local and regional area.

The residual effects on the gathering of country foods has been characterized (Tables 6.4.6 to 6.4.8) as Level 1 for Magnitude (no measurable effect on country food abundance and distribution), Level I for Extent (restricted to Project footprint), Level III for Duration (could extend beyond closure period), Level III for Frequency (regular or continuous), and Level II for Reversibility (partially reversible). The residual effect is predicted to be not significant. No follow-up activities are required.

Hunting, Trapping, and Fishing

Potential impacts to hunting, trapping and fishing that could result from the Project have been identified by Aboriginal communities as a concern.

The Project is located within the Hartman and Zealand Townships in the Kenora Mining Division. The property has a total area of 4,976 ha and is comprised of 137 unpatented mining claims on 4,064 hectares and 20 patented mining claims on 912 ha. Crown land accounts for 43.4 ha, or 1.11% of the total mine site area. Crown land to the east of the Project accessed via Dump Road or the Trans-Canada highway will not be disturbed by the Project will remain available for hunting. The immediate mine site area will be closed to the public due to safety concerns.

The residual effects on hunting and trapping have been characterized (Tables 6.4.6 to 6.4.8) as Level I for Magnitude (no measurable effect on hunting and trapping opportunities), Level I for Extent (restricted to Project footprint), Level III for Duration (could extend beyond closure period), Level III for Frequency (regular or continuous), and Level II for Reversibility (partially reversible). Therefore, based on the private land holdings and the SLRA it has been determined that the Project will have no significant effect to hunting and trapping activities within the LSA. Regionally hunting and trapping can continue as per the limits imposed by the OMNRF. No follow-up activities are required.

The Project has been designed to discharge all effluent at PWQO guidelines. PWQO's are set at a level of water quality which is protective of all forms of aquatic life and all aspects of the aquatic life cycles during indefinite exposure. In addition to discharging all effluent at the appropriate standards, Treasury will initiate EEM as per the MMER. The EEM studies will consist of:

- Effluent and water quality monitoring studies comprising effluent characterization, sub-lethal toxicity testing and water quality monitoring (MMER, Schedule 5, Part 1); and
- Biological monitoring studies in the aquatic receiving environment to determine if mine effluent is having an effect on fish, fish habitat or the use of fisheries resources (MMER, Schedule 5, Part 2)

The level of Wabigoon Lake is controlled by a dam located at the Domtar pulp mill site in Dryden and operated by Domtar. Similarly, the level of Thunder Lake is controlled by a dam located within the boundary of Aaron Provincial Park and operated by the OMNRF. Based on anticipated discharge levels as detailed with the Water Management Plant completed by Lycopodium, it is anticipated that the Project will not impact the lake level of Wabigoon Lake or Thunder Lake.

The residual effects on fishing have been characterized (Tables 6.4.6 to 6.4.8) as Level I for Magnitude (no measurable effect on fishing opportunities), Level I for Extent (restricted to Project footprint), Level III for Duration (could extend beyond closure period), Level III for Frequency (regular or continuous), and Level II for Reversibility (partially reversible). Thus, the Project will not cause any significant effects to the valued aquatic components identified by Aboriginal stakeholders.

6.4.3 Federal Considerations

6.4.3.1 Changes of Environmental Components within Federal Jurisdiction

The primary potential Project effect on wildlife SAR and migratory birds during construction is the potential change in population abundance and distribution due to habitat removal. Project construction will eliminate approximately 202.5 ha of terrestrial habitat and 39.5 ha of wetland habitat that could and does serve as habitat for wildlife SAR and migratory birds (Section 6.4.1.11). Treasury has minimized the amount of habitat clearing required for the Project by optimizing pit design and siting Project infrastructure in previously disturbed areas (e.g., use of existing access roads). In addition, Treasury's EMP (Section 12) will limit activity of Project personnel outside of Project boundaries. Additional potential effects during construction, operations and closure include direct mortality as a result of human activity: mortality of roosting bats or nesting birds during habitat clearing activities, and vehicular collisions. To minimize the potential for effects on roosting bats and nesting birds, Treasury will conduct all habitat clearing activity outside of bat and bird migration and breeding periods. To limit the potential for vehicular collision and negative human-wildlife interaction, Treasury will establish and enforce speed limits on all Project roads and

will implement a comprehensive EMP that includes measure to minimize the attraction of wildlife to the Project (e.g., waste management).

The Project is anticipated to result in direct and indirect effects on fish and fish habitat (Figure 6.4.2). A large and unavoidable direct effect will occur to habitat within a watercourse that will be lost to accommodate the placement of the tailings impoundment. Another potential direct effect is mortality of fish due to physical disturbances or the release of deleterious substances. On-site water management and water withdrawals from Thunder Lake have the potential to directly affect fish and fish habitat by altering flow in Blackwater Creek particularly during low-flow periods of the year and by affecting water levels in Thunder Lake. Indirect effects include the potential to change habitat beyond the Project footprint as a result of changes in water quality and/or water quantity. These changes have the potential to affect fish species population abundance and/or distribution. With the exception of the unavoidable loss of habitat associated with the tailings facility, the application of appropriate avoidance, minimization, and mitigation measure should result in non-significant residual effects associated with the remaining identified potential effects.

Section 35 of the Federal *Fisheries Act 2012* includes prohibitions against causing serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Serious harm to fish is defined as “the death of fish or any permanent alteration to, or destruction of, fish habitat” and includes habitat loss/degradation, flow alteration and pollution, among other things. The Project will result in approximately 6 ha of fish habitat loss due to the unavoidable elimination of the tributary watercourse associated with the tailings storage facility, mostly in the vicinity of the pit excavation and tailing storage facilities. Therefore, under Subsection 35(2) of the *Fisheries Act,* an Authorization, which typically includes a requirement for habitat compensation (Appendix II), will likely be required by DFO for the Project. Section 27.1 of the MMER also requires habitat compensation to offset losses of fish habitat associated with the deposit of a deleterious substances to a watercourse. Waterbodies identified as potential candidate sites for the implementation of habitat compensation prescriptions are Thunder Lake, Wabigoon Lake and Thunder Creek.

6.4.3.2 Changes to Environment on Federal or Transboundary Lands

No Federal or Transboundary lands will be affected by the Project.

6.4.3.3 Changes to Environment Linked or Incidental to Federal Decisions

The *Fisheries Act* and CEAA are stand-alone legislations that serve to protect fisheries and environmental resources and values, respectively. CEAA provides comprehensive direction to federal agencies regarding the review and assessment of designated projects within federal jurisdiction, and directs federal agencies to ensure that appropriate environmental review is conducted for non-designated projects conducted under their authority. The *Fisheries Act* is not restricted to categories of projects, but rather, prohibits any activities that result, or have the potential to result in serious harm to fish that are of commercial, recreational, or Aboriginal importance to Canadians, unless specifically authorized by the Minister or a prescribed person. The definition of ‘serious harm’ is fairly broad and includes the death of fish or any permanent alteration to, or destruction of, fish habitat. As such, projects reviewed under CEAA necessarily include consideration of effects to fish and fish habitat, as defined in the *Fisheries Act*.

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Terrain and Soils	Natural viewscapes from nearby residences and lakes interrupted by WRSA, TSF, overburden storage area and low-grade stockpile.	Contouring of WRSA and TSF during construction and closure to blend with surrounding terrain; progressive reclamation to cap and vegetate WRSA during operations. Overburden storage area to be used as cover material during reclamation.	Level I - There is no measurable residual effect.	Level III - Residual effect extends into the RSA	Level II - Residual effect will extend beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of vegetation cover.
	Overburden stripping over the ore body and cut and fill in the vicinity of facilities requiring a leveled surface may result in susceptibility to wind and water erosion.	Regrade disturbed areas and construct surface drainage system (e.g. ditches, culverts) to minimize loss of soil through erosion	Level I - There is no measurable residual effect.	Level I - No anticipated adverse environment effects beyond Project footprint	Level I - Residual effect is not expected to be measurable beyond the construction period.	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of erosion at site and downgradient areas.
Noise	Increase in traffic noise due to movements of construction vehicles.	Use new, low-noise mobile equipment; time construction activities to minimize effects.	Level I - Noise levels anticipated within applicable federal and provincial regulations and guidelines	Level II - Residual effect extends into LSA	Level I - Residual effect is not expected to be measurable beyond the construction period.	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of noise levels at site and receptor areas.
	Disturbance effects on local wildlife.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure. Utilize proper waste management strategies to minimize wildlife attraction	Level 1 - There is no measurable residual effect to population abundance and distribution.	Level II - Residual effect extends into LSA	Level I - Residual effect is not expected to be measurable beyond the construction period.	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible following closure.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Light	Light trespass to nearby occupied properties.	Limit Project lighting to areas required for safe operations; orient Project lighting towards the interior of the Project area; where possible, use down-shaded lighting on Project buildings and infrastructure.	Level I - Light levels anticipated within applicable federal and provincial regulations and guidelines.	Level II - Residual effect extends into LSA	Level II - Residual effect will extend beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible following closure.	Not significant	Level III - Will occur.	Follow-up monitoring at key receptor locations.
	Wildlife attraction to novel light sources.	Limit Project lighting to areas required for safe operations; orient Project lighting towards the interior of the Project area; where possible, use down-shaded lighting on Project buildings and infrastructure.	Level 1 - There is no measurable residual effect to population abundance and distribution.	Level II - Residual effect extends into LSA	Level II - Residual effect will extend beyond construction period.	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible following closure.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Air Quality	Potential increase in the ambient concentrations of airborne contaminants (i.e., TSP, PM10, PM2.5, NOx, SOx, CO)	Implement industry best practices to minimize emissions (e.g. Blasting to be conducted in a phased manner that optimizes the amount of explosives, and that minimizes the area being blasted; Material will be loaded into haul trucks in a manner that minimizes the drop height; Ensure that all engines are properly maintained and all emission control systems are in good working order; Water and chemical suppressants will be used for dust control).	Level I - Emissions above background but within applicable federal and provincial regulations and guidelines; or if guidelines exceeded, effects limited to the project footprint	Level I - Emissions above background but within applicable federal and provincial regulations and guidelines; or if guidelines exceeded, effects limited to the project footprint.	Level I - Residual effect is not expected to be measurable beyond the construction period.	Level I - Residual effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - Unlikely to occur	None required
Climate	Climate change effects resulting from Project GHG emissions.	Project power provided by existing capacity within the power grid rather than onsite generation.	Level 1 - There is no measurable residual effect	Level III - Residual effect extends into the RSA	Level II - Residual effect will extend beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible following closure.	Not significant	Level III - Will occur.	None required.

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Surface Water Quality	Physical alteration of the surrounding landscape could result in increased sediment loading to receiving waters associated with the Project which could result in increased total suspended solids (TSS) in surface waters. Alteration of water quality could occur from accidental release of deleterious substances (e.g., chemical/fuel spills).	Implement an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to effect water quality in receiving waters that could exceed applicable federal and provincial regulations and guidelines	Level II - Potential to adversely affect drinking water uses, aquatic life, and/or wildlife in the LSA	Level I - Residual effect is not measurable beyond construction period.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur; however, mitigation measures outlined in an EMP are designed to reduce likelihood of occurrence.	Apply science-based performance measurements to conduct EEM studies during construction
Groundwater Quality	Groundwater quality impacted by accidental point source releases of environmental contaminants of concern.	Temporary containment of all potential contaminants of concern and implementation of spill response procedures and equipment.	Level III - Introduction of non-native contaminant	Level I - Residual effect is expected to be limited to release area.	Level I - Residual effect is not measurable beyond construction period assuming site remediation measures are implemented.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period when remediation measures are implemented.	Not significant	Level II - Could reasonably be expected to occur; however, spill prevention measures and response plan will minimize likelihood.	Contaminated site assessment and monitoring program, or remediation action plan implementation.
Groundwater Quantity	Groundwater quantity impacted by disturbance of recharge and/or discharge areas.	Minimize project footprint.	Level I - No measurable residual effect due to limited scale of development within groundwater basin.	Level I - Residual effects limited to the project footprint.	Level III - Change in groundwater recharge within project footprint will be permanent.	Level III - Residual effect within project footprint is permanent.	Level III - Residual effect is not reversible.	Not significant	Level III - Will occur.	None required.
Wildlife Species at Risk	Potential change in bat population abundance and distribution due to habitat removal. Construction will result in 242 ha of habitat removal.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure	Level II - Activity has the potential to affect population abundance and distribution	Level II - Residual effect extends into LSA	Level I - Residual effect is not measurable beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	None required

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Direct mortality to roosting bats or nesting birds during habitat clearing activities	No tree clearing activities conducted during bat migration or breeding periods.	Level 1 - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond construction period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	None required
	Direct mortality from vehicular collision or other human activity	Minimize construction of new roads. Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training.	Level 1 - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level I - Residual effect is not measurable beyond construction period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Ungulates	Potential change in ungulate population abundance and distribution due to habitat removal. Construction will result in 242 ha of habitat removal.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure. Utilize proper waste management strategies to minimize wildlife attraction	Level II - Activity has the potential to affect population abundance and distribution	Level III - Residual effect extends into the RSA	Level I - Residual effect is not measurable beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	None required
	Direct mortality from vehicular collision or other human activity	Minimize construction of new roads. Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training.	Level I - There is no measurable residual effect to population abundance and distribution.	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond construction period.	Level II - Residual effect expected to occur intermittently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Furbearers	Potential change in furbearer population abundance and distribution due to habitat removal. Construction will result in 242 ha of habitat removal.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure. Utilize proper waste management strategies to minimize wildlife attraction	Level II - Activity has the potential to affect population abundance and distribution	Level III - Residual effect extends into the RSA	Level I - Residual effect is not measurable beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	None required
	Direct mortality from vehicular collision or other human activity	Minimize construction of new roads. Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level 1 - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond construction period.	Level II - Residual effect expected to occur intermittently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Upland Birds	Potential change in upland bird population abundance and distribution due to habitat removal. Construction will result in 202.5 ha of habitat removal.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure	Level II - Activity has the potential to affect population abundance and distribution	Level II - Residual effect extends into LSA	Level I - Residual effect is not measurable beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	None required
	Direct mortality from vehicular collision or other human activity	Minimize construction of new roads. Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond construction period.	Level II - Residual effect expected to occur intermittently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
	Direct effects on active nests	All habitat clearing activities conducted during the non-breeding season. If detected, active nests avoided with species-appropriate disturbance buffers.	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond construction period.	Level II - Residual effect expected to occur intermittently	Level III - Residual effect is not reversible.	Not significant	Level I - Unlikely to occur	Conduct pre-clearance nest surveys prior to any habitat modification activities conducted during the migratory bird breeding season.
Wetland Birds	Potential change in wetland bird population abundance and distribution due to habitat removal. Construction will result in 39.5 ha of habitat removal.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure	Level II - Activity has the potential to affect population abundance and distribution	Level II - Residual effect extends into LSA	Level I - Residual effect is not measurable beyond construction period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	None required
	Direct mortality from vehicular collision or other human activity	Minimize construction of new roads. Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level 1 - Residual effect is not measurable beyond construction period.	Level II - Residual effect expected to occur intermittently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Direct effects on active nests	All habitat clearing activities conducted during the non-breeding season. If detected, active nests avoided with species-appropriate disturbance buffers.	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond construction period.	Level II - Residual effect expected to occur intermittently	Level III - Residual effect is not reversible.	Not significant	Level I - Unlikely to occur	Conduct pre-clearance nest surveys prior to any habitat modification activities conducted during the migratory bird breeding season.
Fish	Mortality of individuals due to changes in water quality from increased sediment loads from runoff and/or release of deleterious substances (e.g., chemical/fuel spills)	Implement an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond construction period (3 years).	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur; however, mitigation measures outlined in an EMP are designed to reduce likelihood of occurrence.	Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act* and MMER.
	Mortality of individuals because of physical activities that occur within or adjacent to a watercourse (e.g., access roads, tailing area dam construction, pit excavation).	Minimize work within watercourses. Schedule works to occur during reduced risk periods (i.e., outside of spawning, hatching). Conduct fish salvage where possible.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond construction period (3 years).	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	None required
	Potential changes to population abundance and distribution of fish species due to changes in habitat quality and/or availability.	Minimize site prep activities in vicinity of watercourses. Implement EMP measures to minimize potential for habitat disturbance.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond construction period (3 years).	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	Conduct monitoring during the closure period. Conduct follow up fish surveys to assess fish distribution and species composition.

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Noise and vibration disturbances to fish from heavy equipment operation.	EMP should include measures to reduce potential impacts of noise and vibration (e.g., utilizing well-maintained equipment operated at optimum loads).	Level I - There is no measurable residual effect to fishery as fish will typically exhibit avoidance behaviour.	Level 1 - Residual effect is restricted to Project footprint	Level 1 - Residual effect is not measurable beyond construction period (3 years).	Level II - Residual effect expected to occur intermittently	Level I - Residual effect is reversible.	Not significant	Level III - Will occur.	None required
Fish Habitat	Decreased habitat quality due to changes in water quality from increased sediment loads (increased turbidity/suspended solids) and/or release of deleterious substances (chemical/fuel spills).	Project should include an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization. Habitat compensation, as per the *Fisheries Act,* will be provided.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years after project initiation.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act* and MMER.

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Physical disturbance to or loss of aquatic habitat by equipment working in or adjacent to a waterbody. Construction of mine infrastructure (e.g., ponds, pits, WSRA, roads) will result in a direct impact to 5.991 ha of aquatic habitat, *primarily within Blackwater Creek and several tributaries*.	Minimize work within watercourses. Schedule works to occur during reduced risk periods (i.e., outside of spawning, hatching). Conduct fish salvage where possible. Habitat compensation, as per the Fisheries Act will be provided. Appropriately size and embed culverts or construct bridges where appropriate.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level III - Will occur.	Implement Fish Habitat Compensation as per *Fisheries Act* requirements.
	Potential decrease in habitat quality due to changes in water quality (i.e., increased turbidity/suspended solids, release of deleterious substances).	Project should include an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years after project initiation.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act* and MMER.
Wetlands	Reduced water quality benefits associated with filtering effects of wetland vegetation; impact streams by reducing floodwater attenuation and long-term storage by wetland plants and soils; and diminish groundwater infiltration.	Avoid wetland habitats to the extent possible. Identify locations for restoration of wetland functions and values.	Level I - Wetlands are common in this area and localized loss of some functions and values is less than significant.	Level I - The extent of impacts to wetlands is confined to the project area.	Level III - Short of active mitigation, effect is permanent.	Level I - Effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level III - Will occur.	Monitor wetland soils and vegetation for presence of heavy metals and organic compounds.

Table 6.4.1 Environmental Effects Assessment for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Vegetation Species at Risk. Species of Special Concern and Provincially Rare Species	Potential change in abundance and distribution of floating marsh marigold	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure; Maintain outflow water quality standards to maintain wetland health.	Level I - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years post-construction	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	None required
Country Foods	Potential change in abundance and health of wild rice downstream of Project	Minimize project footprint to avoid known areas of wild rice; Maintain outflow water quality standards to maintain wetland health	Level I - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years post-construction	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Monitor health of wild rice populations periodically during first years of operation

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Terrain and Soils	Natural viewscapes from nearby residences and lakes interrupted by WRSA, TSF, overburden storage area and low-grade stockpile.	Contouring of WRSA and TSF during construction and closure to blend with surrounding terrain; progressive reclamation to cap and vegetate WRSA during operations. Overburden storage area to be used as cover material during reclamation.	Level I - There is no measurable residual effect.	Level III - Residual effect extends into the RSA	Level II - Residual effect will extend beyond operation period.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of vegetation cover.
	Soil chemistry changes resulting from WRSA runoff and TSF seepage.	Surface runoff and seepage collected and returned to TSF for secondary treatment.	Level I - There is no measurable residual effect.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond operation period (12 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of collection systems.
	Areas free of vegetation may be susceptible to wind and water erosion.	Installation of surface drainage system (e.g. ditches, culverts) to minimize loss of soil through erosion	Level I - There is no measurable residual effect.	Level I - No anticipated adverse environment effects beyond Project footprint	Level I - Residual effect is not measurable beyond operation period (12 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of erosion at site and downgradient areas.
Noise	Noise from operations including ventilation fans, blasting, crusher, and mobile equipment.	Use new, low-noise mobile equipment and crusher, conduct day time blasts.	Level I - Noise levels anticipated within applicable federal and provincial regulations and guidelines	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond operation period (12 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of noise levels at site and receptor areas.
	Disturbance effects on local wildlife.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure. Utilize proper waste management strategies to minimize wildlife attraction	Level 1 - There is no measurable residual effect to population abundance and distribution.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond operation period (12 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible following closure.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Light	Light trespass to nearby occupied properties.	Limit Project lighting to areas required for safe operations; orient Project lighting towards the interior of the Project area; where possible, use down-shaded lighting on Project buildings and infrastructure.	Level I - Light levels anticipated within applicable federal and provincial regulations and guidelines	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond operation period (12 years).	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible following closure.	Not significant	Level III - Will occur.	Follow-up monitoring at key receptor locations.
	Wildlife attraction to novel light sources.	Limit Project lighting to areas required for safe operations; orient Project lighting towards the interior of the Project area; where possible, use down-shaded lighting on Project buildings and infrastructure.	Level 1 - There is no measurable residual effect to population abundance and distribution.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond operation period (12 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible following closure.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Air Quality	Potential increase in the ambient concentrations of airborne contaminants (i.e. TSP, PM10, PM2.5, NOx, SOx, CO)	Implement industry best practices to minimize emissions (e.g. Surface drilling to be performed by rigs equipped with dust suppression equipment; Blasting to be conducted in a phased manner that optimizes the amount of explosives, and that minimizes the area being blasted; Material will be loaded into haul trucks in a manner that minimizes the drop height; Ensure that all engines are properly maintained and all emission control systems are in good working order; Water and chemical suppressants will be used for dust control, the crusher will be located indoors and be equipped with control equipment).	Level II - Emissions have the potential to exceed federal or provincial guidelines for areas beyond project footprint, resulting in potential for meaningful adverse environmental effects to resources (land, water, biota) or residents outside the project footprint.	Level II - Emissions have the potential to exceed federal or provincial guidelines for areas beyond project footprint, resulting in potential for meaningful adverse environmental effects to resources (land, water, biota) or residents outside the project footprint.	Level I - Residual effect is not expected to be measurable beyond the operations period.	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	None required

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Climate	Climate change effects resulting from Project GHG emissions.	Project power provided by existing capacity within the power grid rather than onsite generation.	Level 1 - There is no measurable residual effect	Level III - Residual effect extends into the RSA	Level II - Residual effect will extend beyond operation period.	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible following closure.	Not significant	Level III - Will occur.	None required.
Surface Water Quality	Release of tailings storage facility effluent could result in exceedances of MMER, CCME and/or PWQO criteria.	Secondary treatment (reverse osmosis) to achieve water quality criteria for chemicals of concern in the effluent.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond any defined mixing zones	Level 1 - Residual effect is not measurable beyond early operation period (3 years).	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - Unlikely to occur	Apply science-based performance measurements to conduct EEM studies
	Release of chemicals and petroleum products due to spills during handling and/or equipment malfunctions.	Equipment refueling conducted at a refueling station over a spill collection system. Spill kits stationed throughout the mine and on vehicles to rapidly address spills from equipment failure. Chemical transfer conducted in dedicated, contained transfer areas.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond any defined mixing zones	Level 1 - Residual effect is not measurable beyond early operation period.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Apply science-based performance measurements to conduct EEM studies
Surface Water Quantity	Increased flows in Blackwater Creek in years 1 -3 due to increases in the runoff coefficient of developed areas and discharge from the secondary treatment plant, including mine dewatering and process water	Developed areas with increased runoff coefficients will be contained and directed to tailings management area for secondary treatment and release to Blackwater Creek and later the pit lake.	Level I - No surface water quantity effects in receiving waters anticipated as flow changes are within natural variation and channel capacity	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond early operation period (3 years).	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level III - Will occur.	Surface water hydrology monitoring of Blackwater Creek.

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Decreased flows in Blackwater Creek in years 4 -12 due to redirection of runoff from developed areas and discharge from the secondary treatment plant to facilitate pit filling	None	Level I - No surface water quality effects in receiving waters anticipated as flow changes are within long-term natural variation	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond early operation period (4 - 12 years).	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level III - Will occur.	Surface water hydrology monitoring of Blackwater Creek.
	Decreased flows in Hoffstrom's Bay tributary in due to raw water needs for process plant	Installation and operation of secondary treatment plant to recirculate treated mine water to process plant and reduce raw water needs.	Level I - No surface water quality effects in receiving waters anticipated as flow changes are within long-term natural variation and historic use of tributary as a water source	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond early operation period.	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level III - Will occur.	Surface water hydrology monitoring of Hoffstrom's Bay tributary.
Groundwater Quality	Groundwater quality impacted by accidental point source release of environmental contaminants of concern.	Contaminant storage areas and handling practices in accordance's with current industry practices, spill response and remediation measures implemented, and groundwater table depression system controls potential subsurface migration.	Level III - Introduction of non-native contaminant	Level I - Residual effect is expected to be limited to release area.	Level I - Residual effect is not measurable beyond site operations assuming site remediation measures are implemented.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period when remediation measures are implemented.	Not significant	Level II - Could reasonably be expected to occur; however, spill prevention measures and response plan will minimize likelihood.	Contaminated site assessment and monitoring program, or remediation action plan implementation.

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Groundwater quality impacted by seepage from WRSA, TSF and low grade ore stockpile.	Seepage collection ditches will be installed around the WRSA, TSF, and low-grade ore stock pile and any water collected will be returned to the tailings storage facility for treatment prior to release.	Level I - No ground water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond the collection ditches	Level 1 - Residual effect is not measurable beyond operation period (12 years).	Level I - Residual effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Ground water quality monitoring program around containment areas to assess potential leakage.
Groundwater Quantity	Groundwater quantity impacted by disturbance of recharge and/or discharge areas.	Minimize project footprint.	Level I - No measurable residual effect due to limited scale of development within groundwater basin.	Level I - Residual effects limited to the project footprint.	Level III - Change in groundwater recharge within project footprint will be permanent.	Level III - Residual effect within project footprint is permanent.	Level III - Residual effect is not reversible.	Not significant	Level III - Will occur.	None required.
	Groundwater discharge to creeks and wetlands impacted by operation of groundwater dewatering system	Minimize project footprint.	Level I - No measurable residual effect.	Level III - Residual effect extends into the RSA	Level III - Residual effect is expected to persist, but decrease in intensity for 20 years following suspension of groundwater dewatering efforts.	Level III - Residual effect will be continuous, decreasing in intensity over a period of 20 years.	Level I - Effect is readily reversible over time.	Not significant	Level II - Could reasonably be expected to occur	Hydrogeological monitoring of study area to assess groundwater level fluctuations and extent of impact to surface water base flow (if any).
	Expansion of groundwater drawdown cone could potentially lead to reduced or loss of production in private wells surrounding the mine site.	Ground water monitoring wells between mine site and private wells will provide early warning if ground water quantity dropping off. Mitigation includes installation of deeper wells for private users or installation of alternative domestic water supply as necessary.	Level III - Residual effect is outside of range of natural variation.	Level III - Residual effect extends into the RSA	Level III - Residual effect is expected to persist, but decrease in intensity for 20 years following suspension of groundwater dewatering efforts.	Level III - Residual effect will be continuous, decreasing in intensity over a period of 20 years.	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Active groundwater elevation monitoring network to assess extent of drawdown cone growth and revisions to predictive modeling to assess potential impact to off-site receptors.

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Wildlife Species at Risk	Direct mortality from vehicular collision or other human activity.	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond operations period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Ungulates	Direct mortality from vehicular collision or other human activity (e.g., increased hunting pressure resulting from increased access).	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond operations period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Furbearers	Direct mortality from vehicular collision or other human activity (e.g., increased trapping pressure resulting from increased access).	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond operations period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Upland Birds	Direct mortality from vehicular collision or other human activity.	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond operations period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Wetland Birds	Direct mortality from vehicular collision or other human activity	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond operations period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Direct and indirect effects of attraction to waterbodies within Project footprint (e.g., tailings ponds).	Develop bird deterrent systems for all open water within footprint	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond operations period.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	Develop a Wildlife Incident Response and Reporting System
Fish	Mortality of individuals because of physical activities that occur within or adjacent to a watercourse (e.g., access roads, tailing area dam construction, pit excavation).	Minimize work within watercourses. Schedule works to occur during reduced risk periods (i.e., outside of spawning, hatching). Conduct fish salvage where possible.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect may extend beyond 10 years after operation initiation	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	None required
	Mortality of individuals due to changes in water quality from increased sediment loads from runoff and/or release of deleterious substances (e.g., chemical/fuel spills)	Project should include an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level II - Residual effect extends into LSA	Level III - Residual effect may extend beyond 10 years after operation initiation	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Significant	Level II - Could reasonably be expected to occur	Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act* and MMER.
	Potential changes to population abundance and distribution of fish species due to changes in habitat quality and/or availability within and beyond the project footprint.	Minimize operation activities and project footprint in vicinity of watercourses. Implement EMP measures to minimize potential for habitat disturbance.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level III - Residual effect extends into the RSA	Level III - Residual effect may extend beyond 10 years after operation initiation	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Significant	Level I - Unlikely to occur	Conduct follow up fish surveys to assess fish distribution and species composition

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Noise and vibration disturbances to fish from heavy equipment operation.	EMP should include measures to reduce potential impacts of noise and vibration (e.g., utilizing well-maintained equipment operated at optimum loads).	Level I - There is no measurable residual effect to fishery.	Level 1 - Residual effect is restricted to Project footprint	Level 1 - Residual effect is not measurable beyond construction period (3 years).	Level II - Residual effect expected to occur intermittently	Level I - Residual effect is reversible.	Not significant	Level III - Will occur.	None required
Fish Habitat	Physical disturbance to or loss of aquatic habitat by equipment working in or adjacent to a waterbody. Mine infrastructure (e.g., ponds, pits, WSRA, roads) will result in loss of 5.991 ha of aquatic habitat. *Most of the footprint will be cleared during construction but total footprint will expand during operations.*	Minimize work within watercourses. Schedule works to occur during reduced risk periods (i.e., outside of spawning, hatching). Conduct fish salvage where possible. Habitat compensation, as per the *Fisheries Act* will be provided.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Not significant	Level III - Will occur.	Implement Fish Habitat Compensation as per *Fisheries Act* requirements.
	Changes to water quality due to release of deleterious substances into a watercourse (e.g., sediment runoff, chemical/fuel spills). Effect could be within and beyond project footprint.	Project should include an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization. Habitat compensation, as per the *Fisheries Act,* will be provided.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level II - Residual effect extends into LSA	Level III - Residual effect could persist beyond 10 years of project initiation.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act* and MMER.
	Changes to water quantity and subsequent habitat availability/quality downstream of the project footprint due to assumed altered surface water hydrology particularly during natural low-flow periods	On site water management should be planned in order to maintain downstream water balance or to ensure minimum flows to support fish habitat within affect channels	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level II - Residual effect extends into LSA	Level III - Residual effect could persist beyond 10 years of project initiation.	Level II - Residual effect expected to occur intermittently	Level I - Residual effect is reversible.	Not significant	Level III - Will occur.	Hydrology (flow) and fish habitat monitoring within Blackwater Creek during critical low flow periods (summer/autumn)

Table 6.4.2 Environmental Effects Assessment for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Wetlands	May store polluted runoff and create attractive nuisance.	Divert runoff from operations area to isolated tailings pond.	Level I - Effect is not anticipated to be measurable	Level I - Effect should be confined to a localized area	Level II - Residual effect may extend up to 10 years after operation initiation	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Monitor wetland soils and vegetation for presence of heavy metals and organic compounds.
Vegetation Species at Risk. Species of Special Concern and Provincially Rare Species	Potential change in abundance and distribution of floating marsh marigold	Maintain outflow water quality standards to maintain wetland health.	Level I - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years after operation initiation	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	None required
Country Foods	Potential change in abundance and health of wild rice downstream of Project	Maintain outflow water quality standards to maintain wetland health	Level I - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years after operation initiation	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Monitor health of wild rice populations periodically during first years of operation

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Terrain and Soils	Natural viewscapes from nearby residences and lakes interrupted by TSF.	Contouring of TSF during closure to blend with surrounding terrain, cap, and vegetate TSF.	Level I - There is no measurable residual effect.	Level I - No anticipated adverse environment effects beyond TSF	Level I - Residual effect is not measurable beyond closure period (3 years).	Level II - Residual effect expected to occur intermittently and decline as vegetation cover is established.	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of vegetation cover.
	Natural viewscapes from nearby residences and lakes interrupted by WRSA, overburden storage area and low-grade stockpile.	Overburden storage area will be removed as the soils are progressively used as cover material during reclamation. The low-grade stockpile will be processed during the mining operation. Residual ore will be removed and placed in the TSF. Material from WRSA will be used to fill the pits during closure	Level I - No measurable residual effect.	Level I - No anticipated adverse environment effects beyond Project footprint	Level I - Residual effect is not measurable beyond closure period (3 years).	Level II - Residual effect expected to occur intermittently and decline as closure progresses.	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of vegetation cover.
	Soil chemistry changes resulting from WRSA runoff and TSF seepage.	WRSA and TSF covered with water-shedding caps tied into surrounding clay layers to prevent runoff and limit water infiltration and seepage.	Level I - Seepage anticipated within applicable federal and provincial regulations and guidelines	Level II - Residual effect extends into LSA	Level II - Residual effect will extend beyond closure monitoring period.	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of collection systems.
	Dust particulates may become airborne during closure and reclamation operations affecting the TSF, WRSA, low-grade stockpile and overburden as a result of disturbing the various materials.	Implement industry best practices to minimize fine particles suspension (e.g. material will be loaded into haul trucks in a manner that minimizes the drop height)	Level I - Dust emissions above background but within applicable federal and provincial regulations and guidelines; or if guidelines exceeded, effects limited to the project footprint	Level I - No anticipated adverse environment effects beyond Project Footprint	Level I - Residual effect is not measurable beyond closure period (3 years).	Level II - Residual effect expected to occur intermittently and decline as vegetation cover is established.	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of surroundings for presence of dust.

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Noise	Noise from closure including ventilation fans, blasting, crusher, and mobile equipment.	Use new, low-noise mobile equipment and crusher; limit night-time activities.	Level I - Noise levels anticipated within applicable federal and provincial regulations and guidelines	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond closure period (3 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Periodic monitoring of noise levels at site and receptor areas.
	Disturbance effects on local wildlife.	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure. Utilize proper waste management strategies to minimize wildlife attraction.	Level 1 - There is no measurable residual effect to population abundance and distribution.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond closure period (3 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible following closure.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Light	Light trespass to nearby occupied properties.	Limit Project lighting to areas required for safe operations; orient Project lighting towards the interior of the Project area; where possible, use down-shaded lighting on Project buildings and infrastructure.	Level I - Light levels anticipated within applicable federal and provincial regulations and guidelines	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond closure period (3 years).	Level III - Residual effect occurs frequently or continuously	Level I - Effect is readily reversible following closure.	Not significant	Level III - Will occur.	Follow-up monitoring at key receptor locations.
	Wildlife attraction to novel light sources.	Limit Project lighting to areas required for safe operations; orient Project lighting towards the interior of the Project area; where possible, use down-shaded lighting on Project buildings and infrastructure.	Level 1 - There is no measurable residual effect to population abundance and distribution.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond closure period (3 years).	Level II - Residual effect expected to occur intermittently	Level I - Effect is readily reversible following closure.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Air Quality	Potential increase in the ambient concentrations of airborne contaminants (i.e. TSP, PM10, PM2.5, NOx, SOx, CO)	Implement industry best practices to minimize emissions (e.g. Blasting to be conducted in a phased manner that optimizes the amount of explosives, and that minimizes the area being blasted; Material will be loaded into haul trucks in a manner that minimizes the drop height; Ensure that all engines are properly maintained and all emission control systems are in good working order; Water and chemical suppressants will be used for dust control).	Level I - Emissions above background but within applicable federal and provincial regulations and guidelines; or if guidelines exceeded, effects limited to the project footprint	Level I - Emissions above background but within applicable federal and provincial regulations and guidelines; or if guidelines exceeded, effects limited to the project footprint	Level I - Residual effect is not expected to be measurable beyond the construction period.	Level I - Residual effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - Unlikely to occur	None required
Surface Water Quality	Physical alteration of the surrounding landscape could result in increased sediment loading to receiving waters associated with the Project which could result in increased total suspended solids (TSS) in surface waters. Alteration of water quality could occur from accidental release of deleterious substances (e.g., chemical/fuel spills).	Implement an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to effect water quality in receiving waters that could exceed applicable federal and provincial regulations and guidelines	Level II - Potential to adversely affect drinking water uses, aquatic life, and/or wildlife, beyond any defined mixing zones	Level I - Residual effect is not measurable beyond construction period.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur however mitigation measures outlined in an EMP are designed to reduce likelihood of occurrence.	Ground water monitoring wells installed around facilities and between the Project and private wells; implement MMER monitoring program
	Exposed mine rock in pit could go acid and result in metal leaching and could result in exceedances of MMER, CCME and/or PWQO criteria.	Accelerated pit filling to ensure stored waste rock and pit walls under water prior to going acid.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond any defined mixing zones	Level 1 - Residual effect is not measurable beyond early closure period (3 years).	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - Unlikely to occur	Monitor pit lake and receiving waters following closure

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Runoff from tailings storage facility, low-grade ore stock pile and waste rock storage area could result in exceedances of MMER, CCME, DWSOG and/or PWQO criteria.	Above grade waste rock and tailings stored under water-shedding caps to prevent infiltration and runoff to surface waters. Low-grade ore stockpile fully reclaimed with any residual ore deposited in tailings management facility prior to capping.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond Blackwater Creek	Level 1 - Residual effect is not measurable beyond early closure period (3 years).	Level I - Residual effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - Unlikely to occur	Monitor receiving waters following closure
	Increased peak flows in Blackwater Creek due to increases in the runoff coefficient of reclaimed areas	Convert seepage ditches and collection ponds to wetland areas to retain runoff and reduce runoff coefficient. Pit lake will function as reservoir further reducing peak flows. Encourage recolonization of disturbed areas by surrounding forest.	Level I - No surface water quantity effects in receiving waters anticipated as flow changes are within natural variation and channel capacity	Level I - No anticipated adverse environment effects beyond Blackwater Creek	Level 1 - Residual effect is not measurable beyond early closure period (3 years).	Level I - Residual effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Surface water hydrology monitoring of Blackwater Creek.
Groundwater Quality	Groundwater quality impacted by accidental release of environmental contaminants of concern.	Contaminant storage areas and handling practices in accordance's with current industry practices, spill response and remediation measures implemented, and groundwater table depression system controls potential subsurface migration.	Level III - Introduction of non-native contaminant	Level I - Residual effect is expected to be limited to release area.	Level I - Residual effect is not measurable beyond site operations assuming site remediation measures are implemented.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period when remediation measures are implemented.	Not significant	Level II - Could reasonably be expected to occur; however, spill prevention measures and response plan will minimize likelihood.	Contaminated site assessment and monitoring program, or remediation action plan implementation.

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Groundwater quality impacted by seepage from WRSA, TSF and low grade ore stockpile.	WRSA and TSF to be decommissioned with water-shedding caps to minimize infiltration and seepage of water. Waste rock in pits stored under water. Low-grade ore stockpile fully reclaimed with any residual ore deposited in tailings management facility prior to capping.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond Project Footprint.	Level 1 - Residual effect is not measurable beyond early closure period (3 years).	Level I - Residual effect expected to occur infrequently	Level II - Residual effect of leachate seepage into groundwater is expected to be mitigated by natural dispersion.	Not significant	Level II - Could reasonably be expected to occur	Groundwater monitoring well network to be monitored during early closure period.
Groundwater Quantity	Groundwater quantity impacted by disturbance of recharge and/or discharge areas.	None.	Level I - No measurable residual effect due to limited scale of development within groundwater basin.	Level I - Residual effects limited to the project footprint.	Level III - Change in groundwater recharge within project footprint will be permanent.	Level III - Residual effect within project footprint is permanent.	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Groundwater monitoring to assess natural restoration of aquifer system recharge and discharge.
	Slow recovery of groundwater drawdown cone could limit development of private wells surrounding the mine site.	Mitigation measures implemented during operations will be maintained until dewatering cone reversed.	Level II - Residual impacts would be less than during period of dewatering system operation.	Level II - Residual impacts would extend throughout the LSA.	Level III - Recovery of groundwater elevations in drawdown cone is expected to be up to 20 years.	Level II - Residual effect is expected to decrease over time.	Level I - Effect gradually reverse once mine dewatering ceases	Not significant	Level II - Could reasonably be expected to initially occur but will fully reverse over time.	Active groundwater elevation monitoring network to assess extent of drawdown cone recovery and revisions to predictive modeling to confirm rate of recovery.

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Wildlife Species at Risk	Direct mortality from vehicular collision or other human activity	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Ungulates	Direct mortality from vehicular collision or other human activity (e.g., increased hunting pressure resulting from increased access)	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Furbearers	Direct mortality from vehicular collision or other human activity (e.g., increased trapping pressure resulting from increased access)	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Upland Birds	Direct mortality from vehicular collision or other human activity	Enforce speed limits on Project roads. No hunting/trapping by Project personnel. Awareness training	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	Develop a Wildlife Incident Response and Reporting System
Wetland Birds	Direct and indirect effects of attraction to waterbodies within Project footprint (e.g., tailings ponds)	Develop bird deterrent systems for all open water within footprint	Level I - There is no measurable residual effect to population abundance and distribution	Level I - Residual effect is restricted to Project footprint	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level I - Unlikely to occur	Develop a Wildlife Incident Response and Reporting System

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Fish	Mortality of individuals because of physical activities that occur within or adjacent to a watercourse (i.e., physical alteration of landscape for reclamation, infrastructure removal).	Minimize work within watercourses. Schedule works to occur during reduced risk periods (i.e., outside of spawning, hatching). Conduct fish salvage where possible.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level 1 - Residual effect is restricted to Project footprint	Level 1 - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	None required
	Mortality of individuals due to changes in water quality from increased sediment loads from runoff and/or release of deleterious substances (e.g., chemical/fuel spills)	Project should include an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level II - Residual effect extends into LSA	Level 1 - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level III - Residual effect is not reversible.	Not significant	Level I - Unlikely to occur	Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act* and MMER.
	Potential changes to population abundance and distribution of fish species due to changes in habitat quality and/or availability.	Minimize reclamation disturbances in vicinity of watercourses if possible. Implementation of comprehensive EMP measures (including erosion and sediment control measures) that minimize the potential for habitat disturbance. Reclamation activities should be conducted to return watercourses as close to pre-disturbance as possible.	Level II - Activity has the potential to measurably affect productive capacity of local fishery.	Level III - Residual effect extends into the RSA	Level II - Residual effect may extend up to 10 years after project initiation.	Level III - Residual effect occurs frequently or continuously	Level II - Residual effect is partially reversible	Significant	Level I - Unlikely to occur	Conduct follow up fish surveys to assess fish distribution and species composition
	Noise and vibration disturbances to fish from heavy equipment operation.	Closure Plan should include measures to reduce potential impacts of noise and vibration (e.g., utilizing well-maintained equipment operated at optimum loads).	Level I - There is no measurable residual effect to fishery.	Level 1 - Residual effect is restricted to Project footprint	Level 1 - Residual effect is not measurable beyond closure period.	Level II - Residual effect expected to occur intermittently	Level I - Residual effect is reversible.	Not significant	Level III - Will occur.	None required

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Fish Habitat	Physical disturbance to or loss of aquatic habitat by equipment working in or adjacent to a waterbody. Reclamation works may include disturbance or alteration of aquatic features.	Develop a closure plan that minimizes disturbance to existing natural features and aims to restore pre-mine conditions.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level III - Will occur.	Closure plan will be approved by regulatory bodies. All follow-up and monitoring requirements will be met.
	Physical alteration of landscape during reclamation could result in changes to water quality due to release of deleterious substances into a watercourse (e.g., sediment runoff, chemical/fuel spills, release of effluent).	Project should include an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan and an Erosion and Sediment Control Plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization. Habitat compensation, as per the *Fisheries Act* will be provided.	Level II - Activity has the potential to measurably affect productive capacity of local fish habitat.	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years after project initiation.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Closure plan will be approved by regulatory bodies. All follow-up and monitoring requirements will be met. Develop and implement a Water Quality Monitoring program to comply with *Fisheries Act and MMER.*
Wetlands	Losses of wetlands incurred during construction, and residual contamination that may have occurred during operations, may remain for the long term.	Prior to project, perform assessment to determine wetland functions and values. Using the functional assessment as a baseline, develop plan to restore wetland functional values after closure.	Level II - Activity has the potential to measurably affect fish and wildlife habitat, and hydrologic functions.	Level II - Residual effect extends into LSA	Level II - Residual effect may extend up to 10 years after project initiation.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	Closure plan will include measures to restore wetland functions and values.

Table 6.4.3 Environmental Effects Assessment for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Vegetation Species at Risk. Species of Special Concern and Provincially Rare Species	Potential change in abundance and distribution of floating marsh marigold	Maintain outflow water quality standards to maintain wetland health.	Level I - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	None required
Country Foods	Potential change in abundance and health of wild rice downstream of Project	Maintain outflow water quality standards to maintain wetland health	Level I - There is no measurable residual effect to population abundance and distribution	Level II - Residual effect extends into LSA	Level I - Residual effect is not measurable beyond closure period.	Level I - Residual effect expected to occur infrequently	Level II - Residual effect is partially reversible	Not significant	Level II - Could reasonably be expected to occur	None required

Table 6.4.4 Effects Assessment for Air Quality

Air Quality Indicator	Averaging Period	Maximum Modeled Concentration (ug/m³)	Background Concentration (ug/m³)	Cumulative Concentration (ug/m³)	Threshold (ug/m³)	% of Threshold
TSP	24 hr	351	33	384	120	320%
	Annual	57.4	14	71.4	60	119%
PM10	24 hr	96.5	15	111.5	50	223%
PM2.5	24 hr	10.9	10	20.9	27	77%
	Annual	2.76	4.28	7.04	8.8	80%
Dustfall [1]	30 day	5.5	N/A	5.5	7	79%
	Annual	4.45	N/A	4.45	4.6	97%
CO	1 hr	199	1248	1447	36,200	4%
	8 hr	111	1248	1359	15,700	9%
NO2	1 hr	186	3.3	189.3	400	47%
	24 hr	108	3.3	111.3	200	56%
	Annual	21	3.3	24	60	40%
SO2	1 hr	8.02	4	12.02	690	2%
	24 hr	3.09	4	7.09	275	3%
	Annual	0.68	1	1.68	55	3%
Aluminum	24 hr	Neg.	N/A	Neg.	N/A	N/A
Antimony	24 hr	Neg.	N/A	Neg.	N/A	N/A
Arsenic	24 hr	0.0217	N/A	0.0217	0.3	7%
Barium	24 hr	0.25	N/A	0.25	10	3%
Beryllium	24 hr	0.00127	N/A	0.00127	0.1	1%
Bismuth	24 hr	0.00559	N/A	0.00559	N/A	N/A
Cadmium	24 hr	0.00232	N/A	0.00232	0.025	9%
Calcium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Chromium	24 hr	0.0774	N/A	0.0774	1	8%
Cobalt	24 hr	0.00607	N/A	0.00607	0.1	6%
Copper	24 hr	Neg.	N/A	Neg.	N/A	N/A
Gallium	24 hr	0.0105	N/A	0.0105	N/A	N/A
Gold	24 hr	0.00263	N/A	0.00263	N/A	N/A
Iron	24 hr	Neg.	N/A	Neg.	N/A	N/A
Lanthanum	24 hr	0.00877	N/A	0.00877	N/A	N/A
Lead	24 hr	0.166	N/A	0.166	0.5	33%
Lithium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Magnesium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Manganese	24 hr	0.286	N/A	0.286	0.4	72%
Molybdenum	24 hr	Neg.	N/A	Neg.	N/A	N/A
Nickel	24 hr	0.00257	N/A	0.00257	0.04	6%
Palladium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Phosphorous	24 hr	0.263	N/A	0.263	0.35	75%

Table 6.4.4 Effects Assessment for Air Quality

Air Quality Indicator	Averaging Period	Maximum Modeled Concentration (ug/m³)	Background Concentration (ug/m³)	Cumulative Concentration (ug/m³)	Threshold (ug/m³)	% of Threshold
Platinum	24 hr	0.01	N/A	0.01	0.2	5%
Potassium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Rhodium	24 hr	0.00327	N/A	0.00327	0.4	1%
Scandium	24 hr	0.00294	N/A	0.00294	N/A	N/A
Selenium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Silver	24 hr	Neg.	N/A	Neg.	N/A	N/A
Sodium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Strontium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Sulphur	24 hr	Neg.	N/A	Neg.	N/A	N/A
Thallium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Thorium	24 hr	0.0107	N/A	0.0107	N/A	N/A
Tin	24 hr	Neg.	N/A	Neg.	N/A	N/A
Titanium	24 hr	0.918	N/A	0.918	120	1%
Tungsten	24 hr	Neg.	N/A	Neg.	N/A	N/A
Uranium	24 hr	0.000673	N/A	0.000673	0.03	2%
Vanadium	24 hr	0.0242	N/A	0.0242	2	1%
Yttrium	24 hr	Neg.	N/A	Neg.	N/A	N/A
Zinc	24 hr	Neg.	N/A	Neg.	N/A	N/A

Table 6.4.5 Estimated TSP and PM_{10} at Nearest Receptors

Air Quality Indicator	Averaging Period	Maximum Modeled Concentration (ug/m^3)	Background Concentration (ug/m^3)	Cumulative Concentration (ug/m^3)	Threshold (ug/m^3)	% of Threshold
TSP	24 hr	66.6	33	99.6	120	83%
	Annual	13.4	14	27.4	60	46%
PM10	24 hr	25.8	15	40.8	50	82%

Table 6.4.6 Socio Economic Effects Matrix for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Land and Resource Use	Potential obstruction, loss and/or usage of trapping areas associated with the mine footprint	Limit mine footprint; Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholders	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level I - Residual effect is confined to the Project footprint.	Level III - Residual effect likely to persist beyond closure	Level III - Residual effect expected to occur regularly or continuously	Level III - Residual effect is not reversible	Not significant	Level II - Could reasonably be expected to occur	None required
	Change in local ambience due to noise, vibration and decreased aesthetics at mine site	Noise Management Plans, Emergency and Spill Response Plans ensure ongoing communication with local stakeholders	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level II - Residual effect is confined to the LSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
	Direct effects associated with Project traffic and improved access	Transportation and Access Management Plan.	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Transportation	Increased traffic effects on road conditions, dust, and risk of collisions with other vehicles, animals and load spills	Traffic safety protocols, regulatory and cautionary signage, road maintenance, emergency response plan implementation	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - unlikely to occur	None required
Population Demographics	In-migration of job seekers and their dependents	Training programs for unemployed and underemployed, local and in-migrant workforce	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - unlikely to occur	None required

Table 6.4.6 Socio Economic Effects Matrix for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Education	Change in in- and out-migration creates increase in student enrolment	Work with school districts regarding planning and resourcing. Make educational attainment or the equivalent competencies a hiring requirement for the mine workers.	Level I - Effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level I - unlikely to occur	None required
Regional Infrastructure and Services	Traffic volume, construction operations, and change from in- and outmigration create demand for regional services	Work with the various service providers to incorporate increased traffic, construction operations and population demands into their planning and resourcing processes	Level I - Effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level I - unlikely to occur	None required
Housing	Changes in in- and out-migration affect housing demand and change the housing market	Work with Government to minimize in-migration	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	None required
Crime	Traffic volume, construction operations create demand for public safety services	Work with the various service providers and develop safety and work policy guidelines for mine workers	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level I - unlikely to occur	None required
	Effects related to immigrant behaviour and income/spending levels	Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level I - unlikely to occur	None required

Table 6.4.6 Socio Economic Effects Matrix for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Employment	Proposed Project spending would generate employment	Preferred hiring for local and regional labour	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	None required
Income	Project spending would generate income for employees and supply industries	Effects are positive so no mitigation necessary	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level II - Residual effect is confined to the LSA.	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	None required
Economic Development	Increases in Gross Domestic Product, employment, and government revenues due to capital expenditures	Not mitigated at a provincial level	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the Province	Level I - Residual effect extends throughout the construction phase	Level III - Residual effect expected to occur regularly or continuously	Level I - Residual effect is readily reversible over a relatively short period	Not significant	Level III - Will occur, or is likely to occur	None required
Archeological Sites	Land-altering activities impacting sites	Archaeological identification, recording, consultation, avoidance and /or systematic data recovery	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level I - Residual effects on geographically small resources such as an isolated artefact	Level III - Residual effects to archaeological site are permanent	Level I - Impacts to archaeological sites are one-time events	Level III - Residual effect is not reversible	Not significant	Level I - unlikely to occur as no sites were identified during baseline studies	None required
Historic Heritage Sites	Land-altering activities impacting sites	Historic heritage resource identification, recording, consultation, avoidance and/or systematic data recovery	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level I - Residual effects on geographically small resources such as an isolated artefact	Level III - Residual effects to historic heritage site are permanent	Level I - Impacts to historic heritage sites are one-time events (once destroyed the impacts are permanent)	Level III - Residual effect is not reversible	Not significant	Level I - unlikely to occur as no sites were identified during baseline studies	None required

Table 6.4.6 Socio Economic Effects Matrix for the Construction Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Aboriginal Peoples	Health Effects - release of deleterious materials to air or water	Implement an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to effect water quality in receiving waters that could exceed applicable federal and provincial regulations and guidelines	Level II - Potential to adversely affect drinking water uses, aquatic life, and/or wildlife, in the LSA	Level I - Residual effect is not measurable beyond construction period.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur; however, mitigation measures outlined in an EMP are designed to reduce likelihood of occurrence.	Apply science-based performance measurements to conduct EEM studies during construction
	Gathering of Country Foods	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure; Maintain outflow water quality standards to maintain wetland health.	Level 1 - There is no measurable residual effect to abundance and distribution of country foods.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
	Hunting and Trapping	None	Level 1 - There is no measurable residual effect on hunting and trapping opportunities.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
	Fishing	Measures proposed for water quality.	Level 1 - There is no measurable residual effect on fishing opportunities.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required

Table 6.4.7 Socio-Economic Effects Matrix for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Land and Resource Use	Potential obstruction, loss and/or usage of trapping areas associated with the mine footprint	Limit mine footprint; Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholders	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level I - Residual effect is confined to the Project footprint.	Level III - Residual effect likely to persist beyond closure.	Level III - Residual effect expected to occur regularly or continuously.	Level III - Reversible effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	None required
	Change in local ambience due to noise, vibration and decreased aesthetics at mine site	Noise Management Plans, Emergency and Spill Response Plans ensure ongoing communication with local stakeholders	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level II - Residual effect extends to the LSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
	Direct effects associated with Project traffic and improved access	Transportation and Access Management Plan.	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Transportation	Increased traffic effects on road conditions, dust, and risk of collisions with other vehicles, animals and load spills	Traffic safety protocols, regulatory and cautionary signage, road maintenance, emergency response plan implementation	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required

Table 6.4.7 Socio-Economic Effects Matrix for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Population Demographics	In-migration of job seekers and their dependents	Training programs for unemployed and underemployed, local and in-migrant workforce	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
Education	In-migration creates demand on educational services	Work with school districts regarding planning and resourcing. Make educational attainment or the equivalent competencies a hiring requirement for the mine workers.	Level I - Effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Effect expected to occur regularly or continuously	Level II - Effect is reversible at a substantial cost, and/or over a long period	Not significant	Level I - unlikely to occur	
Regional Infrastructure and Services	Traffic volume, construction operations, and change from in- and outmigration create demand for regional services	Work with the various service providers to incorporate increased traffic, construction operations and population demands into their planning and resourcing processes	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
Housing	In-migration creates housing demand and changes the housing market	Work with Government to minimize in-migration	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Crime	Traffic volume, construction operations create demand for public safety services	Work with the various service providers and develop safety and work policy guidelines for mine workers	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required

Table 6.4.7 Socio-Economic Effects Matrix for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Effects related to immigrant behaviour and income/spending levels	Work with local agencies to assist in monitoring community wellbeing and to take corrective actions where appropriate.	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
Employment	Proposed Project spending would generate employment	Preferred hiring for local and regional labour	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Income	Project spending would generate income for employees and supply industries	Effects are positive so no mitigation necessary	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability	Level II - Residual effect extends to the LSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Economic Development	Increases in Gross Domestic Product, employment, and government revenues due to operational expenditures	Not mitigated at a provincial level	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Effect extends to the Province.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Effect expected to occur regularly or continuously	Level II - Residual effect is reversible in the long-term.	Not significant	Level III - Will occur, or is likely to occur	None required

Table 6.4.7 Socio-Economic Effects Matrix for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Archeological Sites	Land-altering activities impacting sites	Archaeological identification, recording, consultation, avoidance and /or systematic data recovery	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability	Level I - Effects on geographically small resources such as an isolated artefact.	Level III - Effects to archaeological site are permanent	Level I - Impacts to archaeological sites are one-time events	Level III - Negative effects to archaeological sites are not reversible	Not significant	Level I - unlikely to occur as no sites were identified during baseline studies	None required
Historic Heritage Sites	Land-altering activities impacting sites	Historic heritage resource identification, recording, consultation, avoidance and/or systematic data recovery	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability	Level I - Effects on geographically small resources such as an isolated artefact.	Level III - Effects to historic heritage site are permanent	Level I - Impacts to historic heritage sites are one-time events (once destroyed the impacts are permanent)	Level III - Negative effects to historic heritage sites are not reversible	Not significant	Level I - unlikely to occur as no sites were identified during baseline studies	None required
Aboriginal Peoples	Human Health - Release of tailings storage facility effluent could result in exceedances of MMER, CCME and/or PWQO criteria.	Secondary treatment (reverse osmosis) to achieve water quality criteria for chemicals of concern in the effluent.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond any defined mixing zones	Level 1 - Residual effect is not measurable beyond early operation period (3 years).	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level I - Unlikely to occur	Apply science-based performance measurements to conduct EEM studies
	Human Health - Release of chemicals and petroleum products due to spills during handling and/or equipment malfunctions.	Equipment refueling conducted at a refueling station over a spill collection system. Spill kits stationed throughout the mine and on vehicles to rapidly address spills from equipment failure. Chemical transfer conducted in dedicated, contained transfer areas.	Level I - No water quality effects in receiving waters anticipated within applicable federal and provincial regulations and guidelines	Level I - No anticipated adverse environment effects beyond any defined mixing zones	Level 1 - Residual effect is not measurable beyond early operation period.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur	Apply science-based performance measurements to conduct EEM studies

Table 6.4.7 Socio-Economic Effects Matrix for the Operational Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
	Gathering of Country Foods	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure; Maintain outflow water quality standards to maintain wetland health.	Level 1 - There is no measurable residual effect to abundance and distribution of country foods.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
	Hunting and Trapping	None	Level 1 - There is no measurable residual effect on hunting and trapping opportunities.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
	Fishing	Measures proposed for water quality.	Level 1 - There is no measurable residual effect on fishing opportunities.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required

Table 6.4.8 Socio-Economic Effects Matrix for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Land and Resource Use	Potential obstruction, loss and/or usage of trapping areas associated with the mine footprint	Limit mine footprint; Reclamation and Closure Plan implementation; ensure ongoing communication with local stakeholders	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level I - Residual effect is confined to the Project footprint.	Level III - Residual effect likely to persist beyond closure.	Level III - Residual effect expected to occur regularly or continuously.	Level III - Reversible effect is not reversible.	Not significant	Level II - Could reasonably be expected to occur	None required
	Change in local ambience due to noise, vibration and decreased aesthetics at mine site	Noise Management Plans, Emergency and Spill Response Plans ensure ongoing communication with local stakeholders	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level II - Residual effect extends to the LSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
	Direct effects associated with Project traffic and improved access	Transportation and Access Management Plan.	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Transportation	Decreased traffic would reduce the risk to motor vehicle safety for road users, collisions with animals or load spills	n/a	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required

Table 6.4.8 Socio-Economic Effects Matrix for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Population Demographics	Out-migration of job seekers and their dependents	None	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level III - Reversible effect is not reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
Education	Out-migration reduces school enrolment	Work with school districts regarding planning and resourcing.	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
Regional Infrastructure and Services	Termination oftraffic volume and construction operations, and out-migration of population decrease demand for regional services	Work with the various service providers to incorporate decline in population in planning	Level I - Effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
Housing	Out-migration deceases housing demand and changes the housing market	Work with Government to minimize in-migration	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required

Table 6.4.8 Socio-Economic Effects Matrix for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Crime	Termination of traffic volume, construction operations create demand for public safety services	Work with the various service providers to incorporate employment and wages decrease variables in management initiatives	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Effect expected to occur regularly or continuously	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
	Crime increase due to job losses	Develop a mine closure plan that identifies strategies and actions to help minimize the potential adverse effects of closing the mine; and ensure ongoing training opportunities to help residents to increase their competitiveness and chances to get employment elsewhere.	Level I - Effect that occurs might or might not be detectable, but is within the normal range of variability	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level I - unlikely to occur	None required
Employment	Cessation of mining operations would lead to reduction in project-related employment	Adverse effects of mine closure can be partially mitigated by developing and implementing a mine closure plan	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Residual effect extends to the RSA.	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required
Income	Cessation of mining operations would lead to lower direct, indirect and induced income	Adverse effects of mine closure can be partially mitigated by developing and implementing a mine closure plan	Level II - Effect is unlikely to pose a serious risk or benefit to the VC or to represent a management challenge	Level II - Residual effect extends to the LSA.	Level II - Medium-term, effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level II - Could reasonably be expected to occur	None required

Table 6.4.8 Socio-Economic Effects Matrix for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Economic Development	Changes in Gross Domestic Product, employment, and government revenues due to closure expenditures	None	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level III - Effect extends to the Province	Level II - Medium-term, residual effect throughout operations and closure.	Level III - Residual effect expected to occur regularly or continuously.	Level II - Residual effect is reversible in the long-term.	Not significant	Level III - Will occur, or is likely to occur	None required
Archeological Sites	Land-altering activities impacting sites	Archaeological identification, recording, consultation, avoidance and /or systematic data recovery	Level I - Residual effect that occurs might or might not be detectable, but is within the normal range of variability.	Level I - Effects on geographically small resources such as an isolated artefact	Level III - Effects to archaeological site are permanent	Level I - Impacts to archaeological sites are one-time events	Level III - Negative effects to archaeological sites are not reversible	Not significant	Level I - unlikely to occur as no sites were identified during baseline studies	None required
Historic Heritage Sites	Land-altering activities impacting sites	Historic heritage resource identification, recording, consultation, avoidance and/or systematic data recovery	Level I - A small portion of the site is lost	Level I - Effects on geographically small resources such as an isolated artefact	Level III - Effects to historic heritage site are permanent	Level I - Impacts to historic heritage sites are one-time events (once destroyed the impacts are permanent)	Level III - Negative effects to historic heritage sites are not reversible	Not significant	Level I - unlikely to occur as no sites were identified during baseline studies	None required

Table 6.4.8 Socio-Economic Effects Matrix for the Closure Phase

VC	Potential Effect	Proposed Mitigation	Residual Effects Characterization					Significance (assuming implementation of mitigation)	Likelihood of Occurrence	Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility			
Aboriginal Peoples	Human Health - Physical alteration of the surrounding landscape could result in increased sediment loading to receiving waters associated with the Project which could result in increased total suspended solids (TSS) in surface waters. Alteration of water quality could occur from accidental release of deleterious substances (e.g., chemical/fuel spills).	Implement an EMP with measures to minimize potential for release of deleterious substances and include a Spill Response plan. Equipment used should be well-maintained and carry appropriately stocked spill kits. Operators should be trained in their use and have a spill response plan in place. Disturbed soils should be stabilized where possible to limit potential for erosion and sediment mobilization.	Level II - Activity has the potential to effect water quality in receiving waters that could exceed applicable federal and provincial regulations and guidelines	Level II - Potential to adversely affect drinking water uses, aquatic life, and/or wildlife, beyond any defined mixing zones	Level I - Residual effect is not measurable beyond construction period.	Level I - Effect expected to occur infrequently	Level I - Effect is readily reversible over a relatively short period	Not significant	Level II - Could reasonably be expected to occur however mitigation measures outlined in an EMP are designed to reduce likelihood of occurrence.	Ground water monitoring wells installed around facilities and between the Project and private wells; implement MMER monitoring program
	Gathering of Country Foods	Minimize project footprint; Minimize activity of project personnel outside of Project areas and infrastructure; Maintain outflow water quality standards to maintain wetland health.	Level 1 - There is no measurable residual effect to abundance and distribution of country foods.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
	Hunting and Trapping	None	Level 1 - There is no measurable residual effect on hunting and trapping opportunities.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required
	Fishing	Measures proposed for water quality.	Level 1 - There is no measurable residual effect on fishing opportunities.	Level 1 - Residual effect is restricted to Project footprint	Level III - Residual effect could persist beyond 10 years of project initiation.	Level III - Residual effect expected to occur regularly or continuously	Level II - Residual effect is partially reversible.	Not significant	Level III - Will occur, or is likely to occur	None required