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# TABLES

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**Table ES-1: Hammond Reef Gold Project Valued Ecosystem Components/Valued Social Components**

VEC/VSC	Rationale for Selection	Indicators
<b>TERRESTRIAL ENVIRONMENT</b>		
<b>Habitat VECs</b>		
Wetlands	<ul style="list-style-type: none"> <li>■ Support's the ecological integrity of the boreal region</li> <li>■ Important as wildlife habitat</li> <li>■ Support migratory waterfowl breeding</li> <li>■ Supports critical habitats for beaver, moose, others</li> <li>■ Hydrological functions</li> <li>■ Supports traditional use plants (e.g., wild rice)</li> </ul>	<ul style="list-style-type: none"> <li>■ Extent of wetland habitat</li> <li>■ Composition/diversity of wetland plant communities</li> <li>■ Hydrological function</li> </ul>
Forest Cover	<ul style="list-style-type: none"> <li>■ Dominant forest plant community that supports the ecological integrity of the boreal region</li> <li>■ Important as wildlife habitat</li> <li>■ Supports populations of large carnivores such as black bear, wolves and lynx, as well as prey animals such as hare, marten and red squirrel</li> <li>■ Abundance of migratory birds utilize habitat for breeding</li> <li>■ Socio-economic importance</li> </ul>	<ul style="list-style-type: none"> <li>■ Extent of forested habitat</li> <li>■ Composition of forest plant community</li> <li>■ Suitability of habitat in supporting wildlife populations</li> </ul>

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VEC/VSC	Rationale for Selection	Indicators	
<b>TERRESTRIAL ENVIRONMENT (CONTINUED)</b>			
<b>Group VECs</b>			
Species at Risk	Bald Eagle	<ul style="list-style-type: none"> <li>■ Observed in the vicinity of the Project Site</li> <li>■ Cultural significance</li> <li>■ Provincially, bald eagles are designated as Special Concern under Ontario's <i>Endangered Species Act</i></li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat suitability and availability for bald eagle</li> </ul>
	Common Nighthawk	<ul style="list-style-type: none"> <li>■ Bird SAR observed on and in the vicinity of the Project Site</li> <li>■ Provincially, Common nighthawk is designated as Special Concern under Ontario's <i>Endangered Species Act</i></li> <li>■ Breeding habitat occurs on the Project Site</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat suitability and availability for common nighthawk</li> </ul>
	Canada Warbler	<ul style="list-style-type: none"> <li>■ Bird SAR observed on and in the vicinity of the Project Site</li> <li>■ Provincially, Canada warbler is designated as Special Concern under Ontario's <i>Endangered Species Act</i></li> <li>■ Breeding habitat occurs on the Project Site</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat suitability and availability for Canada warbler</li> </ul>
	Little Brown Myotis	<ul style="list-style-type: none"> <li>■ Observed in the vicinity of the Project Site</li> <li>■ Cultural significance</li> <li>■ Provincially, little brown myotis are designated as Special Concern under Ontario's <i>Endangered Species Act</i></li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat suitability and availability for little brown myotis</li> </ul>
	Northern Myotis	<ul style="list-style-type: none"> <li>■ Observed in the vicinity of the Project Site</li> <li>■ Cultural significance</li> <li>■ Provincially, northern myotis are designated as Special Concern under Ontario's <i>Endangered Species Act</i></li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat suitability and availability for northern myotis</li> </ul>
	Snapping Turtle	<ul style="list-style-type: none"> <li>■ Herpetofaunal SAR observed on and in the vicinity of the Project Site</li> <li>■ One of few reptile species in this northern ecosystem</li> <li>■ Indicator of wetland function</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat suitability and availability for snapping turtle</li> </ul>

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<b>TERRESTRIAL ENVIRONMENT (CONTINUED)</b>		
<b>Group VECs (continued)</b>		
Furbearers	<ul style="list-style-type: none"> <li>■ Marten</li> <li>■ Muskrat</li> </ul>	<ul style="list-style-type: none"> <li>■ Presence/persistence of furbearers</li> <li>■ Habitat suitability and availability for furbearers</li> </ul>
Upland Breeding Birds	<ul style="list-style-type: none"> <li>■ Small territory size and high bird density means large numbers of upland birds may be affected by habitat loss</li> <li>■ Migratory birds are susceptible to population declines as a result of changing environmental conditions on breeding and overwintering habitats</li> </ul>	<ul style="list-style-type: none"> <li>■ Relative abundance of breeding birds</li> <li>■ Habitat suitability and availability for upland breeding birds</li> </ul>
<b>Species VECs</b>		
Moose	<ul style="list-style-type: none"> <li>■ Observed on and in the vicinity of the Project Site</li> <li>■ Important subsistence and cultural species</li> <li>■ Large herbivorous mammal requiring a large home range</li> <li>■ Prey species for large carnivores</li> </ul>	<ul style="list-style-type: none"> <li>■ Presence/persistence of moose in the area</li> <li>■ Habitat suitability and availability for moose</li> </ul>
Wild rice	<ul style="list-style-type: none"> <li>■ Traditional use plant (culturally significant to Aboriginal communities)</li> <li>■ Sensitive to fluctuating water levels</li> </ul>	<ul style="list-style-type: none"> <li>■ Potential presence/persistence of wild rice in the area</li> <li>■ Habitat suitability and availability for wild rice</li> </ul>

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VEC/VSC	Rationale for Selection	Indicators
<b>AQUATIC ENVIRONMENT</b>		
Lower reaches (e.g., downstream) of small streams draining footprint including any mainstem ponds, and stream crossings	<ul style="list-style-type: none"> <li>■ Potentially affected (altered, diverted) by Project infrastructure</li> <li>■ Alteration may result in loss of fish and productivity (e.g., critical habitats, food resources for fish)</li> <li>■ Changes can be measured using a variety of standard indicators available (e.g., provincial and federal government criteria)</li> </ul>	<ul style="list-style-type: none"> <li>■ Benthic invertebrate community</li> <li>■ Fish habitat suitability</li> <li>■ Fish community (resident assemblages/species present)</li> </ul>
Upper Marmion Reservoir (receiver)	<ul style="list-style-type: none"> <li>■ Socio-economic importance (tourism, angling)</li> <li>■ Sensitive receiving water environment</li> <li>■ Receiving Bays (mouths of small streams) potentially affected (altered, diverted) by Project infrastructure</li> <li>■ Receiving Bays may represent significant habitat for locally important fish species. Alteration of habitats may result in loss of fish and productivity (e.g., critical habitats, food resources for fish)</li> <li>■ Changes can be measured using a variety of standard indicators available (e.g., provincial and federal government criteria)</li> </ul>	<ul style="list-style-type: none"> <li>■ Benthic invertebrate community</li> <li>■ Fish habitat suitability (receiving bays)</li> <li>■ Fish community (resident assemblages/species present in receiving bays)</li> <li>■ Concentrations in fish tissue.</li> </ul>
Lizard Lake (receiver)	<ul style="list-style-type: none"> <li>■ Socio-economic importance (tourism, angling)</li> <li>■ Sensitive receiving water environment</li> <li>■ Receiving Bays (mouths of small streams) potentially affected (altered, diverted) by Project infrastructure</li> <li>■ Receiving Bays may represent significant habitat for locally important fish species. Alteration of habitats may result in loss of fish and productivity (e.g., critical habitats, food resources for fish)</li> <li>■ Changes can be measured using a variety of standard indicators available (e.g., provincial and federal government criteria)</li> </ul>	<ul style="list-style-type: none"> <li>■ Benthic invertebrate community</li> <li>■ Fish habitat suitability (receiving bays)</li> <li>■ Fish community (resident assemblages/species present in receiving bays)</li> <li>■ Concentrations in fish tissue</li> </ul>

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VEC/VSC	Rationale for Selection	Indicators
<b>AQUATIC ENVIRONMENT (CONTINUED)</b>		
Walleye	<ul style="list-style-type: none"> <li>■ Socio-economic importance (angling)</li> <li>■ Traditional resource use (First Nation concern)</li> <li>■ Long lived, top predator species (piscivorous), will accumulate contaminants</li> <li>■ Human health; consumed by anglers, subsistence fishers</li> </ul>	<ul style="list-style-type: none"> <li>■ Walleye habitat</li> <li>■ Concentrations in walleye flesh</li> </ul>
Smallmouth Bass	<ul style="list-style-type: none"> <li>■ Socio-economic importance (angling, Bass Classic fishing derby)</li> </ul>	<ul style="list-style-type: none"> <li>■ Smallmouth Bass habitat</li> </ul>
Northern Pike	<ul style="list-style-type: none"> <li>■ Socio-economic importance (angling)</li> <li>■ Long lived, top predator species (piscivorous), will accumulate contaminants</li> <li>■ Human health; consumed by anglers, subsistence fishers</li> </ul>	<ul style="list-style-type: none"> <li>■ Northern Pike habitat</li> </ul>
Baitfish species	<ul style="list-style-type: none"> <li>■ Socio-economic importance (commercial baitfish fishery)</li> <li>■ Important food resource for large fish species (e.g., walleye)</li> </ul>	<ul style="list-style-type: none"> <li>■ Baitfish habitat</li> </ul>
<b>CULTURAL HERITAGE RESOURCES</b>		
Archaeological Sites	<ul style="list-style-type: none"> <li>■ Possible affect to archaeological sites</li> </ul>	<ul style="list-style-type: none"> <li>■ Project related changes to archaeological sites and artifacts</li> </ul>
Built Heritage	<ul style="list-style-type: none"> <li>■ Possible affect to late 19th and early 20th century mine sites</li> </ul>	<ul style="list-style-type: none"> <li>■ Project-related changes to 19<sup>th</sup> to mid-20<sup>th</sup> century mine sites</li> </ul>
Cultural Heritage Landscapes	<ul style="list-style-type: none"> <li>■ Possible affect to cultural heritage landscapes</li> </ul>	<ul style="list-style-type: none"> <li>■ Project-related changes to cultural heritage landscapes</li> </ul>

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**Table ES-1: Hammond Reef Gold Project Valued Ecosystem Components/Valued Social Components**

VEC/VSC	Rationale for Selection	Indicators
<b>ABORIGINAL INTERESTS</b>		
Aboriginal community characteristics	<ul style="list-style-type: none"> <li>■ Potential changes to economic base and educational attainment of Aboriginal communities</li> </ul>	<ul style="list-style-type: none"> <li>■ Project Aboriginal employment</li> <li>■ Project contracts awarded to Aboriginal businesses</li> <li>■ Education and training of Aboriginal people</li> </ul>
Aboriginal heritage resources	<ul style="list-style-type: none"> <li>■ Importance of Aboriginal heritage resources such as archaeological sites</li> <li>■ Importance of specific cultural or spiritual sites</li> </ul>	<ul style="list-style-type: none"> <li>■ Identified archaeological sites and artefacts</li> <li>■ Identification of Cultural or spiritual sites</li> </ul>
Traditional use of land and resources	<ul style="list-style-type: none"> <li>■ Aboriginal people have traditionally made use of lands and resources for their personal and community needs</li> <li>■ Importance of plants, animals and fish that have been traditionally harvested and consumed by Aboriginal people</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes or effects identified on the aquatic environment</li> <li>■ Changes or effects identified on the terrestrial environment</li> <li>■ Availability and quality of country foods</li> </ul>
<b>SOCIO-ECONOMIC ENVIRONMENT</b>		
Population and demographics	<ul style="list-style-type: none"> <li>■ Direct job opportunities will attract workers to area for short term (i.e. construction) and longer term (i.e. operations)</li> <li>■ Population change may result in changes in demand on social and physical services and infrastructure</li> <li>■ The influx of workers due to the Project could benefit long-term economic and community development, supporting community vibrancy and improved social infrastructure (e.g., housing, organized recreation, support for local business, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>■ Population change (historical and projections)</li> <li>■ Mobility</li> <li>■ Age and Gender</li> <li>■ Dependency ratios</li> </ul>

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VEC/VSC	Rationale for Selection	Indicators
<b>SOCIO-ECONOMIC ENVIRONMENT (CONTINUED)</b>		
<b>Economics</b>		
Labour market (employment and training)	<ul style="list-style-type: none"> <li>■ Sustainable employment and training opportunities can develop transferable skills, and long-term regional and local economic benefits</li> <li>■ Communities are interested in local recruitment, training and employment</li> <li>■ Timing and number of employment opportunities could offset layoffs in other sectors</li> <li>■ Loss of employment and income generation at closure may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Labour force by industry and occupation</li> <li>■ Employment and Unemployment rates</li> <li>■ Median Income</li> <li>■ High school/post-secondary completion rates</li> </ul>
Economic development	<ul style="list-style-type: none"> <li>■ The Project would contribute to diversification of the regional and local economies and either directly or indirectly encourage investment in other business activities, namely through:                             <ul style="list-style-type: none"> <li>■ Creation of opportunities for local contractors and suppliers</li> <li>■ Encouraging new investment in service capacity</li> <li>■ Encouraging business creation and expansion</li> <li>■ Creation of competitive local suppliers</li> </ul> </li> <li>■ Loss of business opportunities at closure (~2030) may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Regional and local economic base</li> <li>■ Regional and local supplier base</li> </ul>
Local government finances	<ul style="list-style-type: none"> <li>■ Governments will benefit through increased tax and fee for service revenues</li> <li>■ Governments may incur costs related to the provision of services</li> </ul>	<ul style="list-style-type: none"> <li>■ Local government revenues and expenditures</li> </ul>



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VEC/VSC	Rationale for Selection	Indicators
<b>SOCIO-ECONOMIC ENVIRONMENT (CONTINUED)</b>		
<b>Services and Infrastructure</b>		
Public services and infrastructure	<ul style="list-style-type: none"> <li>■ Population increase in the LSA may increase demand on services (health, emergency and protection, education, recreation) and water and waste infrastructure</li> <li>■ Project activities may increase demand for health, emergency services and waste/water infrastructure</li> </ul>	<p><b>Protection and Emergency:</b></p> <ul style="list-style-type: none"> <li>■ Police capacity</li> <li>■ Ambulance capacity</li> <li>■ Fire protection capacity</li> </ul> <p><b>Health Services:</b></p> <ul style="list-style-type: none"> <li>■ Number/type of facilities, services and programs</li> <li>■ Number of medical practitioners per population</li> <li>■ Capacity/capacity utilization</li> </ul> <p><b>Social Services:</b></p> <ul style="list-style-type: none"> <li>■ Capacity/capacity utilization</li> </ul> <p><b>Education:</b></p> <ul style="list-style-type: none"> <li>■ School enrolment</li> <li>■ Capacity utilization</li> </ul> <p><b>Recreation:</b></p> <ul style="list-style-type: none"> <li>■ Number/type of recreational facilities</li> <li>■ Capacity utilization</li> </ul> <p><b>Water, Wastewater and Waste Management:</b></p> <ul style="list-style-type: none"> <li>■ Capacity and capacity utilization of infrastructure</li> <li>■ Solid waste management sites and capacity utilization</li> </ul> <p><b>Utilities:</b></p> <ul style="list-style-type: none"> <li>■ Capacity and capacity utilization</li> </ul>
Housing and accommodation	<ul style="list-style-type: none"> <li>■ Influx of workers and families may lead to changes in demand for, availability and cost for temporary and permanent housing, and tourism accommodation</li> </ul>	<ul style="list-style-type: none"> <li>■ Permanent and temporary housing supply</li> <li>■ Occupancy rates</li> <li>■ Housing costs and availability</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>■ The Project may strain existing road and transportation network due to movement of Project workers, equipment, supplies and products</li> </ul>	<ul style="list-style-type: none"> <li>■ Traffic volumes (average annual daily traffic counts) and levels of service on relevant access roads and intersections (traffic study to be completed)</li> <li>■ Existing transportation network</li> </ul>

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VEC/VSC	Rationale for Selection	Indicators
<b>SOCIO-ECONOMIC ENVIRONMENT (CONTINUED)</b>		
<b>Land Use and Resources</b>		
Outdoor tourism and recreation	<ul style="list-style-type: none"> <li>■ The Project may affect tourism and recreation activities and opportunities</li> <li>■ Loss of employment and income generation by tourist operators may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Crown land and other tenures</li> <li>■ Tourism activities and specific-use areas</li> <li>■ Number and types of visitors to the study area</li> <li>■ Tourism revenue generation</li> </ul>
Hunting	<ul style="list-style-type: none"> <li>■ The Project may occupy or affect the land base which supports hunting</li> <li>■ Loss of employment and income generation by hunters may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Hunting areas</li> <li>■ Wildlife management (e.g., moose, deer, bear) management areas</li> <li>■ License sales</li> <li>■ Harvest volumes</li> </ul>
Trapping	<ul style="list-style-type: none"> <li>■ The Project may occupy or affect the land base which supports trapping</li> <li>■ Loss of employment and income generation by trappers may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Tenured trapline areas</li> <li>■ Harvest volumes</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>■ The Project may occupy land base which supports fishing activities</li> <li>■ Loss of fishing opportunity may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Recreational fishing participation (e.g., Atikokan Bass Classic)</li> <li>■ Recreational and commercial fishing areas, licence sales and harvest volumes</li> <li>■ Baitfish areas and harvest volumes</li> <li>■ Conduct a biannual fishing questionnaire of the project workforce to estimate the level of fishing pressure resulting from the Project</li> </ul>
Water use and access	<ul style="list-style-type: none"> <li>■ The Project has the potential to influence the use of and access to water bodies such as the Marmion Reservoir</li> <li>■ The Marmion Reservoir is an important resource for recreational fisheries and tourism, hydro-electric power and other commercial and industrial uses</li> </ul>	<ul style="list-style-type: none"> <li>■ Recreational fishing participation (e.g., Atikokan Bass Classic)</li> <li>■ Water use for hydro-electric power and other industrial and commercial uses</li> </ul>

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<b>SOCIO-ECONOMIC ENVIRONMENT (CONTINUED)</b>		
<b>Land Use and Resources (continued)</b>		
Mining	<ul style="list-style-type: none"> <li>■ The Project may affect current and future mining and aggregate resource activity</li> </ul>	<ul style="list-style-type: none"> <li>■ Exploration and development projects (current and potential resources)</li> <li>■ Mining land use, plans</li> </ul>
Forestry	<ul style="list-style-type: none"> <li>■ The Project occupies forested land</li> <li>■ Disrupting access to existing or future harvest land may require mitigation measures to avoid adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Timber harvesting land base (harvest area, tenure)</li> </ul>
<b>ATMOSPHERIC ENVIRONMENT</b>		
<b>Air Quality</b>		
Ambient air quality	<ul style="list-style-type: none"> <li>■ Air quality is selected as a VEC since it has been identified as an important aspect of the environment by both public and regulators. In addition, emissions from the Site activities have the potential to alter the existing air quality</li> </ul>	<p>The following compounds have been identified, which are expected to be emitted in measureable amounts from the Site, and for which air quality criteria against which the Site effects can be compared are available:</p> <ul style="list-style-type: none"> <li>■ Particulate matter, including suspended particulate matter (SPM), particles nominally smaller than 10 µm in aerodynamic diameter (PM10), and particles nominally smaller than 2.5 µm in aerodynamic diameter (PM2.5)</li> <li>■ Oxides of nitrogen (NOX) and the resulting nitrogen dioxide (NO2)</li> <li>■ Sulphur dioxide (SO2)</li> <li>■ Carbon monoxide (CO)</li> <li>■ Metals, including antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, tellurium, tin and vanadium</li> </ul>
<b>Noise</b>		
Ambient noise levels	<ul style="list-style-type: none"> <li>■ Noise levels are selected as a VEC since it has been identified as being important to regulators and stakeholders. In addition, Site activities have the potential to affect existing noise levels.</li> </ul>	<ul style="list-style-type: none"> <li>■ The effect of the on Site noise sources will be evaluated using the 1-hour equivalent noise level (Leq). The 1-hour Leq is the energy equivalent continuous sound level, which has the same energy as the time varying signal over a one hour period at the same location.</li> <li>■ Other noise indicators are available that are not appropriate for the evaluation of the Site noise levels, but are appropriate for evaluating the indirect effects of changes in noise levels on other VECs (e.g., ecological effects).</li> </ul>

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VEC/VSC	Rationale for Selection	Indicators
<b>ATMOSPHERIC ENVIRONMENT (CONTINUED)</b>		
<b>Vibration from Blasting</b>		
Vibration Levels	<ul style="list-style-type: none"> <li>■ Vibration levels are selected as a VEC since they have been identified as being important to regulators and stakeholders. In addition, Project Site activities have the potential to affect existing vibration levels.</li> </ul>	<ul style="list-style-type: none"> <li>■ The effect of blasting on air vibrations will be evaluated using Peak Air Pressure Level in dBL.</li> <li>■ The effect of blasting on ground vibrations will be evaluated us Peak Particle Velocity in mm/s</li> </ul>
<b>HYDROLOGY</b>		
Surface water quantity	<ul style="list-style-type: none"> <li>■ The Project may result in changes to surface water quantity within the MSA.</li> </ul>	<ul style="list-style-type: none"> <li>■ Seasonal stream flow in creeks</li> <li>■ Seasonal water levels in Marmion Reservoir and Lizard Lake</li> <li>■ Catchment areas</li> </ul>
Navigability	<ul style="list-style-type: none"> <li>■ The Project may result in the partial obstruction or change to navigable watercourses or waterbodies.</li> <li>■ Potential for changes in flow, width, depth or gradient of watercourses or waterbodies.</li> </ul>	<ul style="list-style-type: none"> <li>■ Presence of obstruction.</li> <li>■ Flow, width, depth or gradient of waterbody or watercourse.</li> </ul>
<b>HYDROGEOLOGY</b>		
Groundwater quantity	<ul style="list-style-type: none"> <li>■ Potential of groundwater flow change within the MSA.</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in groundwater levels.</li> </ul>
<b>WATER QUALITY</b>		
Surface Water Quality and Quantity	<ul style="list-style-type: none"> <li>■ Potential changes in surface water quality due to water intake and discharge and/or from alteration of runoff processes within the MSA.</li> </ul>	<ul style="list-style-type: none"> <li>■ Substrate metal content.</li> <li>■ Amount of organic material.</li> <li>■ Dissolved oxygen.</li> <li>■ pH.</li> <li>■ Temperature.</li> <li>■ Total phosphorous.</li> <li>■ Total and dissolved metal concentrations in water.</li> <li>■ Nutrient content in water.</li> <li>■ Total Dissolved Solids.</li> <li>■ TKN, TP.</li> <li>■ Anions, cations.</li> <li>■ Conductivity.</li> </ul>

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**Table ES-2: Summary of Preferred Alternative Means of Carrying out the Hammond Reef Gold Project**

<b>Project Component</b>	<b>Preferred Alternative</b>
Ore processing method	Processing using cyanide including a cyanide destruction circuit
Project transmission line	Transmission line along Hardtack/Sawbill Road and crossing Sawbill Bay
Sewage treatment facility location	Dedicated facilities for the worker accommodation camp and the Mine
Sewage treatment technology	Package sewage treatment plant
Water discharge location	Overland pipeline to the south with discharge to the south end of Sawbill Bay
Access road	Hardtack/Sawbill Road
Worker accommodation camp	On-site worker accommodation camp
Tailings Deposition	Thickened tailings

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**Table ES-3: Project Activities**

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
Management, Permitting and Employment	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Source and hire construction workforce.</li> <li>Source operational workforce.</li> <li>Source and obtain equipment and materials.</li> <li>Maintain construction permits/monitoring.</li> <li>Finalize operational permits/plans and monitoring.</li> <li>Restrict Project Site access.</li> </ul>	<ul style="list-style-type: none"> <li>Maintain operational workforce.</li> <li>Maintain and manage Project Site.</li> <li>Maintain operational permits and monitor.</li> <li>Implement and adjust plans as necessary.</li> <li>Restrict Project Site access.</li> </ul>	<ul style="list-style-type: none"> <li>Change workforce activities.</li> <li>Manage closure process.</li> <li>Implement closure.</li> <li>Implement monitoring programs.</li> <li>Restrict Project Site access.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor and maintain as necessary.</li> <li>Maintain post-closure workforce if necessary.</li> <li>Restrict Project Site access if necessary.</li> </ul>
Linear Infrastructure	<ul style="list-style-type: none"> <li>Access road (Hardtack/Sawbill).</li> <li>Project transmission line.</li> <li>Fibre optic line.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrading/construction of access road (Hardtack/Sawbill).</li> <li>Construction of project transmission line and electrical substations (tie-in and on-site substation).</li> <li>Construction of fibre optic line.</li> <li>Clearing and grubbing.</li> <li>Drill and blast.</li> </ul>	<ul style="list-style-type: none"> <li>Maintaining access road (Hardtack/Sawbill).</li> <li>Maintain project transmission line.</li> <li>Maintain fibre optic line.</li> </ul>	<ul style="list-style-type: none"> <li>Maintaining appropriate access.</li> <li>Decommission project transmission line when no longer necessary.</li> <li>Decommission fibre optic line when no longer necessary.</li> <li>Return applicable portions of access road (Hardtack/Sawbill) to MNR control.</li> </ul>	<ul style="list-style-type: none"> <li>Work with MNR to allow for appropriate road use and access.</li> </ul>
Aggregate	<ul style="list-style-type: none"> <li>Nearby aggregate sites.</li> </ul>	<ul style="list-style-type: none"> <li>Clearing, grubbing and installation of temporary sediment control measures.</li> <li>Stripping and stockpiling of topsoil and overburden as necessary.</li> <li>Operation of mobile crushing and screening plant.</li> <li>Excavation crushing and screening aggregate material.</li> <li>Hauling and transporting material as required.</li> </ul>	<ul style="list-style-type: none"> <li>Clearing, grubbing and installation of temporary sediment control measures.</li> <li>Stripping and stockpiling of topsoil and overburden as necessary.</li> <li>Operation of mobile crushing and screening plant.</li> <li>Excavation crushing and screening aggregate material.</li> <li>Hauling and transporting material as required.</li> <li>Decommission following appropriate guidelines once they are no longer required.</li> </ul>	<ul style="list-style-type: none"> <li>Closure and decommission following appropriate guidelines once they are no longer required.</li> </ul>	<ul style="list-style-type: none"> <li>None.</li> </ul>

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**Table ES-3: Project Activities**

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
Support and Ancillary Infrastructure	<ul style="list-style-type: none"> <li>■ Mine site road and on-site roads.</li> <li>■ Worker accommodation camp.</li> <li>■ Office and support facilities.</li> <li>■ Warehouses, workshops and maintenance facilities.</li> <li>■ Chemicals, fuel and explosives manufacturing facilities.</li> <li>■ Fuel storage area.</li> <li>■ Explosive storage and preparation.</li> <li>■ On-site power distribution (grid).</li> <li>■ Off-site waste disposal.</li> <li>■ Other ancillary and support infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>■ General operation of support and ancillary structure and facilities.</li> <li>■ Operation, fuelling and maintenance of vehicles.</li> <li>■ Transportation of people and materials.</li> <li>■ Operation and maintenance of backup power generation facilities.</li> <li>■ Hazardous and non-hazardous waste management.</li> <li>■ Control of dust.</li> <li>■ Fuel and chemical transportation handling and storage.</li> <li>■ Clearing and grubbing of development areas.</li> <li>■ Stripping and stockpiling of topsoil.</li> <li>■ Preparation of construction facilities (offices, shops, dry, cafeteria and nursing station).</li> <li>■ Grading and granular surfacing of laydown areas, including drill and blast and site preparation.</li> <li>■ Grading of development areas.</li> <li>■ Operation of concrete batch plant.</li> <li>■ Construction of facilities.</li> <li>■ Construction of on-site roads.</li> <li>■ Construction of piping and electrical between buildings.</li> <li>■ Construction of diversion ditching and linking water management systems from various facilities.</li> <li>■ Construction of support and ancillary infrastructure (explosive storage area, fuel storage areas, natural gas farm, parking areas, sewage, worker accommodation camp, truck shop, warehouses, backup power generation, other facilities to be determined as part of detailed design).</li> <li>■ Haulage of waste from Project Site to disposal in appropriately licensed facilities when required.</li> </ul>	<ul style="list-style-type: none"> <li>■ General operation of support and ancillary structure and facilities.</li> <li>■ Operation, fuelling and maintenance of vehicles.</li> <li>■ Transportation of people and materials.</li> <li>■ Operation and maintenance of backup power generation facilities.</li> <li>■ Hazardous and non-hazardous waste management.</li> <li>■ Control of dust and erosion.</li> <li>■ Fuel and chemical transportation handling and storage.</li> <li>■ Explosive manufacturing, handling and storage.</li> <li>■ Haulage of waste from Project Site to disposal in appropriately licensed facilities when required.</li> </ul>	<ul style="list-style-type: none"> <li>■ Decommissioning of Project facilities.</li> <li>■ Operation of temporary offices during closure.</li> <li>■ Operation, fuelling and maintenance of vehicles during closure activities.</li> <li>■ Transportation of people and materials.</li> <li>■ Hazardous and non-hazardous waste management.</li> <li>■ Control of dust.</li> <li>■ Fuel transportation handling and storage.</li> <li>■ Removal of re-useable supplies and materials.</li> <li>■ Salvage of equipment and sale of scrap where economical.</li> <li>■ Remediation of hydrocarbon impacts as per applicable guidelines if necessary.</li> <li>■ Demolition of facilities and disposal in licenced landfills.</li> <li>■ Project Site reclamation.</li> <li>■ Close (scarify and vegetate) all non-essential site roads.</li> <li>■ Implement closure monitoring programs.</li> <li>■ Haulage of waste from Project Site to disposal in appropriately licensed facilities when required.</li> </ul>	<ul style="list-style-type: none"> <li>■ Periodic Project Site access only.</li> <li>■ No additional waste materials will be placed on-site.</li> <li>■ Haulage of waste from Project Site to disposal in appropriately licensed facilities when required.</li> </ul>
Ore Processing Facility	<ul style="list-style-type: none"> <li>■ Ore crushing.</li> <li>■ Crushed ore stockpile.</li> <li>■ Processing plant (including ore grinding and processing).</li> <li>■ Conveyor.</li> </ul>	<ul style="list-style-type: none"> <li>■ Site grading.</li> <li>■ Construction of foundation, superstructure and process components including delivery and assembly.</li> <li>■ Construction and surfacing of ore pad.</li> <li>■ Construction of ore crushers, grinding mills and conveyors.</li> <li>■ Ditching where necessary.</li> </ul>	<ul style="list-style-type: none"> <li>■ Crushing, grinding and concentration of ore.</li> <li>■ Leaching of concentrate.</li> <li>■ Electro-winning and smelting of gold.</li> <li>■ Operation of cyanide destruction plant and tailings thickener.</li> </ul>	<ul style="list-style-type: none"> <li>■ Decommissioning of processing plant as per general activities.</li> </ul>	<ul style="list-style-type: none"> <li>■ None.</li> </ul>
Mine	<ul style="list-style-type: none"> <li>■ East pit.</li> <li>■ West pit.</li> <li>■ Haul roads.</li> <li>■ Service roads.</li> <li>■ Ramps.</li> <li>■ Pumping stations.</li> </ul>	<ul style="list-style-type: none"> <li>■ Clearing and grubbing.</li> <li>■ Strip haul and stockpile topsoil and overburden.</li> <li>■ Construction of haul roads.</li> <li>■ Blasting and excavation of pre-strip material and haul to WRMF.</li> <li>■ Set up open pit dewatering system (including use of portable generators where necessary).</li> <li>■ Ditching where necessary.</li> </ul>	<ul style="list-style-type: none"> <li>■ Ongoing removal and stockpile of topsoil and overburden.</li> <li>■ Ongoing dewatering of open pits.</li> <li>■ Drilling, loading of explosives and blasting.</li> <li>■ Loading of ore, low-grade ore, and waste rock.</li> <li>■ Hauling of ore to the crusher.</li> <li>■ Hauling of waste rock to the WRMF.</li> </ul>	<ul style="list-style-type: none"> <li>■ Undertake appropriate studies to establish a "safe line" around open pits.</li> <li>■ Construct a fence or boulder wall around safe line to prevent inadvertent public access.</li> <li>■ Cease pumping and allow the open pits to flood back.</li> <li>■ Pump water from the TMF reclaim pond and seepage collection to the open pits.</li> <li>■ Excavate a trench (spillway) connecting the east pit, west pit, and Marmion Reservoir such that the flooded open pits will eventually overflow through a spillway to Marmion Reservoir.</li> </ul>	<ul style="list-style-type: none"> <li>■ Periodically maintain fence or boulder wall if necessary.</li> <li>■ Monitor open pits water quality.</li> <li>■ Allow the flooded open pits to discharge to Marmion Reservoir. Implement contingency plan for in-pit or passive treatment of water, if necessary.</li> </ul>

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**Table ES-3: Project Activities**

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
Stockpiles	<ul style="list-style-type: none"> <li>■ Overburden/topsoil stockpile.</li> <li>■ Low-grade ore stockpile.</li> </ul>	<ul style="list-style-type: none"> <li>■ Clearing and grubbing.</li> <li>■ Set up seepage collection ditches sumps and pump system.</li> <li>■ Trucking, dumping and dozing of overburden.</li> </ul>	<ul style="list-style-type: none"> <li>■ Trucking dumping and dozing of material.</li> <li>■ Excavation and trucking of marginal ore to the mill.</li> <li>■ Use part of overburden and topsoil for progressive reclamation.</li> </ul>	<ul style="list-style-type: none"> <li>■ Excavation and use of part of overburden and topsoil for reclamation.</li> <li>■ Allow surface to revegetate naturally.</li> <li>■ Provide erosion protection and drainage channels as necessary.</li> </ul>	<ul style="list-style-type: none"> <li>■ None</li> </ul>
Waste Rock Management Facility (WRMF)	<ul style="list-style-type: none"> <li>■ Waste Rock Area.</li> <li>■ Transfer Area.</li> </ul>	<ul style="list-style-type: none"> <li>■ Clearing and grubbing as necessary.</li> <li>■ Set up seepage collection ditches sumps and pump system.</li> <li>■ Trucking, dumping and dozing of waste rock.</li> </ul>	<ul style="list-style-type: none"> <li>■ Trucking dumping and dozing of material.</li> </ul>	<ul style="list-style-type: none"> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> <li>■ Construct erosion protection drainage channels as necessary.</li> </ul>	<ul style="list-style-type: none"> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> <li>■ Monitor for erosion and repair if necessary.</li> </ul>
Tailings Management Facility (TMF)	<ul style="list-style-type: none"> <li>■ Tailings containment.</li> <li>■ TMF service road and pipeline access roads.</li> <li>■ Pipelines (tailings and water reclaim).</li> </ul>	<ul style="list-style-type: none"> <li>■ Construction of TMF service road and pipeline access roads.</li> <li>■ Clearing, grubbing and installation of temporary sediment control measures.</li> <li>■ Construction of pipelines (tailings and water reclaim).</li> <li>■ Installation of pump stations and power to pump stations.</li> <li>■ Strip topsoil from dam foundations and truck to stockpile.</li> <li>■ Construct first stage perimeter containment (include construction of coffer dams, dewatering of foundation, and preparation of dam foundations).</li> <li>■ Construction of seepage collection system and pumping stations.</li> <li>■ Installation of tailings distribution system.</li> <li>■ Ditching where necessary.</li> </ul>	<ul style="list-style-type: none"> <li>■ Deposition of tailings from processing plant.</li> <li>■ Staged raising and extension of TMF dams.</li> <li>■ Pumping of water from the reclaim pond back to the processing plant.</li> <li>■ Operation of the seepage collection ponds and pump back to TMF.</li> </ul>	<ul style="list-style-type: none"> <li>■ Decommission.</li> <li>■ Decommissioning and removal of tailings pumping and pipeline system.</li> <li>■ Direct revegetation to stabilize the tailings surface in the TMF.</li> <li>■ Providing erosion protected drainage channels in TMF as necessary.</li> <li>■ Monitoring and maintaining the TMF dams.</li> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> <li>■ Decommissioning and removal of reclaim pumping and pipeline system.</li> </ul>	<ul style="list-style-type: none"> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> <li>■ Monitor for erosion and repair if necessary.</li> </ul>
Water Management System	<ul style="list-style-type: none"> <li>■ On-site water containment.</li> <li>■ Effluent treatment plant (ETP).</li> <li>■ Ditches and seepage collection ponds (TMF, WRMF, stormwater, stockpiles).</li> <li>■ Pumping stations from water containment ditches/sumps.</li> </ul>	<ul style="list-style-type: none"> <li>■ Dewatering of Mitta Lake including fish rescue and discharge of water to Marmion Reservoir.</li> <li>■ Construction of ditches, and ponds (processing plant collection pond, emergency spill pond, seepage collection ponds).</li> <li>■ Construction of treatment facilities including an ETP, if necessary, potable water treatment and sewage treatment facility.</li> <li>■ Construction of pumping stations (mine water, surface water, fire water, potable water).</li> <li>■ Construction of site discharge lines and diffuser (if required).</li> </ul>	<ul style="list-style-type: none"> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> <li>■ Operation of ETP, if necessary.</li> <li>■ Operation of potable water treatment and sewage treatment facility.</li> </ul>	<ul style="list-style-type: none"> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> </ul>	<ul style="list-style-type: none"> <li>■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge.</li> </ul>



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**Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Site Preparation (clearing and grubbing, site levelling, etc.)	Air quality	Dust and emissions from equipment	Emissions controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Confined to initial stages of construction phase	Continuous activity during construction	Immediately reversible upon cessation of activities	Low: Effects meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Confined to initial stages of construction phase	Continuous activity during construction	Immediately reversible upon cessation of activities	Low: Effects meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Soils	Removal and stockpiling	Soil stockpiles will be protected against erosion.	Soils will be re-used at closure to promote revegetation.	Confined to Mine Study Area	Confined to initial stages of construction phase	Intermittent as sites are developed.	Partly reversible at closure	Low: Soils will be re-used	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Construct ditching and erosion controls prior to commencing construction.	TSS will be managed through sediment and erosion controls that will be implemented prior to construction.	Can extend into Local Study Area	Confined to initial stages of construction phase	Could occur intermittently throughout construction	Immediately reversible upon cessation of activities	Low: TSS increase is not predicted in local watercourses and waterbodies	Low: no impacts predicted to surface water and aquatic life.
	Hydrology	Alteration of drainage	Habitat loss will be addressed through a fish compensation plan	Changes in drainage will affect aquatic life in some habitats.	Can extend into Local Study Area	Changes in drainage will be permanent.	Occurs once.	Changes to site drainage are not reversible	Low: Flow reductions and changes in lake levels are minor.	Low: small areas of aquatic habitat lost will be addressed through compensation.
	Groundwater	Change in recharge area	None required	Changes in groundwater contribution to surface waters will have a negligible effect on lake water levels and aquatic life.	Confined to Mine Study Area	Changes in drainage will be permanent	Occurs once	Change in infiltration areas will be permanent in most areas.	Low: Minor increases or decreases in groundwater levels are confined to small areas around infrastructure.	Low: no effects on terrestrial or aquatic life.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA. Extensive areas of similar habitat are available.	Confined to Mine Study Area	Vegetation removal will occur continuously during construction.	Continuous activity during construction.	Loss of vegetation will be reversible in most areas at closure.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of terrestrial habitat will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning. Compensation will be provided for lost bat habitat, if necessary.	Some species will be displaced but most will find alternate habitat in LSA and RSA. No effect in LSA or RSA.	Can extend into Local Study Area	Habitat loss will occur continuously during construction.	Loss of habitat will occur continuously as the site is developed.	Most habitat will be restored in closure.	Moderate: small mammals and nesting birds will be displaced	Low: loss of terrestrial habitat will displace some species. small areas of bat habitat lost in MSA will be addressed through compensation, if necessary.
	Aquatic Biota	Loss of habitat	Mitigation is not possible for most areas, and compensation will be provided for lost habitat.	Small waterbodies and watercourses will be affected in the MSA, some permanently. These comprise a small amount of the aquatic habitat within the LSA. No effects on fish populations within the LSA are expected	Can extend into Local Study Area	Loss of habitat in will occur continuously during construction.	Intermittent as sites are developed.	Some habitat will be restored in closure, but loss of habitat in other areas will be permanent.	Moderate: Some aquatic habitat in MSA will be lost permanently. Flow reductions may affect some habitats in adjacent areas of LSA.	Low: small areas of habitat lost in MSA will be addressed through compensation.

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**Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
TMF Construction	Air Quality	Dust and emissions from equipment	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction of the TMF	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction of the TMF	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates	Low: no impacts predicted for human health or ecological receptors.
	Soils	Removal and stockpiling	Stockpiles will be protected against erosion.	Removal is confined to the footprint of the containment berms.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during construction of the TMF	Reversible in closure as TMF is graded and soil amendment is added.	Low: Soils will be removed and stockpiled for re-use.	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Mitigation measures will be implemented prior to commencing construction.	Ditching and erosion control measures will limit TSS in adjacent surface waters.	Can extend into Local Study Area	Will occur only during construction phase.	Intermittent during construction.	Immediately reversible upon cessation of activities	Low: TSS levels predicted to be low and within guidelines.	Low: no impacts predicted to surface water and aquatic life
	Hydrology	Alteration of drainage	Compensation plan will be developed for effects on fish and fish habitat.	Loss of drainage affects fish habitat in on-site waterbodies and in watercourses downstream. Loss of drainage has negligible effect on lake levels in Lizard Lake and Upper Marmion Reservoir.	Can extend into Local Study Area	Changes in drainage persist throughout all project phases	Continuous	Not reversible.	Low: Loss of drainage area has minimal effect on lake levels.	Low: small areas of aquatic habitat lost will be addressed through compensation.
	Groundwater	Loss of recharge area	None possible	Changes in groundwater contribution to surface waters will have a negligible effect on lake water levels and aquatic life.	Confined to Mine Study Area	Changes in infiltration persist throughout all project phases	Continuous	Not reversible.	Low: Geology and lack of soil cover limit infiltration capacity	Low: no effects on terrestrial or aquatic life are predicted.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area	Throughout construction persisting through operations.	One time activity.	Some restoration is possible in closure.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of terrestrial habitat will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Throughout construction persisting through operations.	One time activity	Some restoration of habitat is possible in closure	Moderate: small mammals and nesting birds will be displaced	Low: loss of terrestrial habitat will displace some species.
	Aquatic Biota	Loss of habitat and effects on water quality and quantity	Effects of habitat loss cannot be mitigated. A compensation plan will be developed to address habitat loss.	<ul style="list-style-type: none"> <li>■ Some aquatic features are lost entirely. Others will experience changes to natural hydrographs that can limit available habitat.</li> <li>■ Negligible effect on lake water levels with no effect on lake dwelling aquatic species. No effects on fish populations within the LSA are expected</li> <li>■ Sediment and erosion controls will minimize impacts of TSS on aquatic life in downstream habitats.</li> </ul>	Loss of habitat confined to Mine Study Area. Water quality and quantity effects can extend into Local Study Area	Loss of habitat extends through all project phases. Water quality effects are confined to construction and operations phases.	One time activity for habitat loss. Intermittent for water quality depending on climatic conditions.	Habitat loss in some areas is not reversible. Water quality effects are reversible at closure	Moderate to High: Partial to complete loss of habitats in local waterbodies in MSA. Loss of drainage areas may affect some habitats in adjacent areas of LSA. No changes predicted in Upper Marmion Reservoir.	Low: compensation plan will address loss of small habitat areas affected. No effects on aquatic life due to water quality.

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**Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Infrastructure Construction	Air Quality	Dust and emissions from equipment	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	Removal and stockpiling	Soils will be stockpiled for later re-use. Stockpiled will be protected against erosion.	Removal is confined to the footprint of the infrastructure.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during construction of the infrastructure	Reversible in closure in some areas as site is decommissioned.	Low: Soils will be removed and stockpiled for re-use.	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Mitigation measures will be implemented prior to commencing construction.	Ditching and erosion control measures will limit TSS in adjacent surface waters.	Can extend into Local Study Area	Will occur only during construction phase.	Intermittent during construction.	Immediately reversible upon cessation of activities	Low: TSS levels predicted to be low.	Low: no impacts predicted to surface water and aquatic life
	Groundwater	Alteration of infiltration	None possible	Changes in groundwater contribution to surface waters will have a negligible effect on lake water levels and aquatic life.	Confined to Mine Study Area	Changes in infiltration persist throughout all project phases	Continuous	Not reversible in most areas. Decommissioning will restore natural infiltration in some areas.	Low: Geology and lack of soil cover limit infiltration capacity	Low: loss of infiltration will not affect terrestrial or aquatic life.
	Hydrology	Alteration of drainage	<ul style="list-style-type: none"> <li>■ Effects cannot be mitigated.</li> <li>■ To address habitat loss. A compensation plan will be developed</li> </ul>	Some habitats are lost entirely. Others will experience water levels reductions that can limit available habitat.	Can extend into Local Study Area	Changes in drainage persist until closure.	Occurs once only.	Decommissioning in closure will restore natural drainage in most areas.	Low: Drainage changes have minor effect on lake levels.	Low: small areas of aquatic habitat lost will be addressed through compensation.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within LSA and RSA.	Confined to Mine Study Area	Throughout construction persisting through operations.	One-time activity.	Some restoration is possible in closure.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of vegetation will displace some species.
	Terrestrial Biota	Loss of habitat	<ul style="list-style-type: none"> <li>■ Clearing will avoid sensitive periods, such as nesting and denning.</li> <li>■ Temporary bat habitat replacement.</li> </ul>	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Throughout construction persisting through operations.	One-time activity	Some restoration of habitat is possible in closure	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat will displace some species. small areas of bat habitat lost in MSA will be addressed through compensation, if necessary.
Aquatic Biota	Loss of habitat and effects on water quality and quantity. ; Blast Vibration.	<ul style="list-style-type: none"> <li>■ Effects of habitat loss cannot be mitigated. A compensation plan will be developed to address habitat loss.</li> <li>■ Sediment and erosion controls are included in Project design.</li> </ul>	<ul style="list-style-type: none"> <li>■ Some aquatic features are lost entirely. Others will experience changes to natural hydrographs that can limit available habitat.</li> <li>■ Negligible effect on lake water levels will not effect on lake dwelling aquatic species. No effects on fish populations within the LSA are expected</li> <li>■ Sediment and erosion controls will minimize impacts of TSS on aquatic life in downstream habitats. Distance from shoreline will limit effects of blasting.</li> </ul>	Can extend into Local Study Area	Loss of habitat extends through all project phases.	Throughout construction phase	Not reversible.	Moderate to High: Partial to complete loss of habitats in some MSA waterbodies. No predicted effects on aquatic habitats or aquatic life in LSA.	Low: compensation plan will address loss of small areas of habitat affected. No effects on aquatic life due to water quality. No predicted effects on habitat in the LSA.	

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**Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Site Access Roads	Air quality	Dust and emissions from equipment	Dust suppression as required	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors
	Noise	Noise from equipment	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	Removal and stockpiling	Soil stockpiles will be protected against erosion	Soils will be stockpiled for reclamation in closure. Stockpile will be protected against erosion to protect aquatic habitats.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during construction of roads.	Partly reversible in closure		Low: localized impacts on terrestrial habitat. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Road design will have ditching and sediment controls.	Sediment controls will be implemented to minimize TSS generated during construction. Short construction period minimizes potential impacts on aquatic life.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction of roads.	Immediately reversible upon cessation of activities	Low: short-term increase in TSS as crossing is constructed	Low: no impacts predicted to surface water or aquatic life.
	Hydrology	Alteration of drainage	Flow will be maintained during construction	Road will not alter drainage system since channels will not be altered or blocked.	Can extend into Local Study Area	Throughout construction and operations phases.	Continuous	Fully reversible	Low: Minor restriction of flow during construction.	Low: temporary construction works will have minimal effect on aquatic life.
	Groundwater	Loss of recharge area	None required	Road surface will divert runoff to margins where infiltration can occur.	Confined to Mine Study Area	Throughout construction and operations phases.	Continuous	Partly reversible in closure	Low: small areas affected.	Low: changes in groundwater levels will not affect terrestrial or aquatic habitats.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area	Throughout construction and operations phases.	Removal occurs once only as road is constructed.	Partly reversible in closure as some road are decommissioned	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of habitat in small areas may displace some species
	Terrestrial Biota	Loss of habitat and disturbance of wildlife	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Continuous through construction and operations.	Loss of habitat occurs once only. Disturbance of wildlife is continuous.	Partly reversible in closure	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat in small areas and disturbance will displace some species.
	Aquatic Biota	Disturbance during construction of stream crossings	Flows will be maintained during construction. Sedimentation will be minimized by constructing during low flow conditions.	Crossing construction will be timed to occur in low flow conditions and to avoid critical periods to minimize impacts on aquatic life.	Can extend into Local Study Area	Short-term disturbance, limited to a few days at each crossing.	Once only at each crossing.	Immediately reversible upon completion of construction.	Low: small areas and short-term disturbance.	Low: disturbance will be temporary and confined to non-critical periods for aquatic life.

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**Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Main Access Road	Air Quality	Dust and emissions from equipment	Dust suppression as required	No predicted effects on human health or terrestrial life.	Confined to Linear Infrastructure Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors.
	Noise	Noise from equipment	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Linear Infrastructure Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	Removal and stockpiling	Stockpiles will be protected against erosion.	Soils will be stockpiled for mine site reclamation in closure. Stockpile will be protected against erosion to protect aquatic habitats.	Confined to Linear Infrastructure Study Area	Will occur only in construction phase	Continuous during construction.	Partly reversible in closure	Low: soils will be re-used where practicable.	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Design includes ditching and sediment traps that will minimize runoff to local streams.	Sediment controls will be implemented to minimize TSS generated during construction. Short construction period minimizes potential impacts on aquatic life.	Confined to Linear Infrastructure Study Area	Will occur only during construction phase.	Continuous during construction of roads.	Immediately reversible upon cessation of activities	Low: short-term increase in TSS as crossing is constructed	Low: no impacts predicted to surface water or aquatic life.
	Hydrology	Alteration of drainage	Flow will be maintained during construction	Road will not alter drainage system since channels will not be altered or blocked.	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Continuous	Fully reversible	Low: Road will not alter drainage patterns.	Low: temporary construction works will have minimal effect on aquatic life.
	Groundwater	Loss of recharge area	None required	Road surface will divert runoff to margins where infiltration can occur.	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Continuous	Not reversible since road will not be decommissioned	Low: small areas affected.	Low: changes in groundwater level will not affect terrestrial or aquatic life.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Removal occurs once only as road is constructed.	Not reversible since road will not be decommissioned	Low: loss of habitat is restricted to margins of road	Low: loss of habitat in small areas will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA. No predicted effects in LSA or RSA	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Removal occurs once only as road is constructed.	Not reversible since road will not be decommissioned	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat may displace some species.
	Aquatic Biota	Disturbance and sedimentation during construction of stream crossings	Flows will be maintained during construction. Sedimentation will be minimized by constructing during low flow conditions.	Crossing construction will be timed to occur in low flow conditions and to avoid critical periods to minimize impacts on aquatic life. Fish passage will be maintained.	Confined to Linear Infrastructure Study Area	Short-term disturbance, limited to a few days at each crossing.	Once only at each crossing.	Immediately reversible upon completion of construction.	Low: small areas and short-term disturbance.	Low: disturbance will be temporary and confined to non-critical periods for aquatic life.

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**Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Drainage of Mitta Lake	Air Quality	Emissions from pumping and excavating equipment	None required	No predicted effects on human health or terrestrial life. Emissions are considered within bounding estimates.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during draining operation.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no effects on human health or terrestrial receptors.
	Noise	Noise from equipment	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during draining operation.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no effects on human health or terrestrial receptors.
	Soils	No soils present			Not applicable					
	Water Quality	Changes in water quality in Upper Marmion Reservoir	Water from final stages of pumping will need to be held on-site prior to release to allow for settling of entrained sediment.	No impact predicted on aquatic life since water quality is similar to Upper Marmion Lake.	Can extend into Local Study Area	Confined to pumping period	One-time occurrence	Reversible upon cessation of pumping	Low: Water quality in Mitta Lake is similar to background levels in Upper Marmion Reservoir.	Low: no predicted effects on surface water and aquatic life.
	Groundwater	Alteration of groundwater flows	None possible	Alteration of groundwater flow to Upper Marmion Reservoir will have a negligible effect on aquatic habitats.	Can extend into Local Study Area	Extends throughout all project phases.	Occurs continuously once lake is pumped out	Not reversible	Low: groundwater flow to Mitta Lake is minor.	Low: no predicted effect on terrestrial or aquatic life.
	Hydrology	Alteration of drainage to Upper Marmion Reservoir	None possible	Mitta Lake contributes minor flow to Upper Marmion Reservoir. No effect predicted on aquatic habitats in Upper Marmion Lake.	Can extend into Local Study Area	Extends throughout all project phases.	One-time occurrence	Not reversible	Low: Loss of outflow to Upper Marmion Reservoir has minor effect on lake levels.	Low: negligible effect on aquatic habitats in Upper Marion Reservoir.
	Vegetation	Loss of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area	Extends throughout all project phases.	One-time occurrence	Not reversible	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of habitat will displace some species to LSA and RSA
	Terrestrial Biota	Loss of habitat in staging areas	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA. No predicted effects in LSA or RSA.	Confined to Mine Study Area	Confined to construction phase.	One-time occurrence	Not reversible	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat will displace some species to LSA and RSA.
Aquatic Biota	Loss of habitat	No mitigation possible. Loss will be compensated for in compensation plan.	Complete loss of lake habitat.	Confined to Mine Study Area	Extends throughout all project phases.	One-time occurrence	Not reversible	High: All habitat will be removed.	Low: compensation will be provided for loss of habitat.	

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**Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Development of Open Pits	Air Quality	Dust and emissions from blasting and equipment	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from blasting and equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	Soil removal and stockpiling	Soils will be stockpiled for later re-use. Stockpiled will be protected against erosion.	Removal is confined to the footprint of the pits.	Confined to Mine Study Area	Progressive soil removal will occur as pits are developed during operations phase.	Intermittent as pits are expanded	Not reversible.	Soils will be removed and stockpiled for re-use. Area of loss is relatively small within the RSA.	Low: loss of habitat will displace some species.
	Water Quality	Pumping of water from the pits.	Re-use of water and treatment of excess water prior to discharge will mitigate any adverse effects on aquatic life in receiving waterbodies.	Water will be re-used in processing plant or treated prior to discharge. No effects predicted on lake water quality or aquatic life.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations	Reversible at end of mine operations.	Any water discharged to surface waters will meet guidelines or background levels.	Low: no predicted effects on surface water and aquatic life.
	Hydrology	Alteration of drainage to Upper Marmion Reservoir	None possible	Loss of drainage areas has minor impact on lake water levels and aquatic life.	Can extend into Local Study Area	Occurs progressively as pits are developed during operations phase.	Intermittent as pits are expanded.	Mainly not reversible, but some drainage will be restored in post-closure when pits overflow.	Water course in pit footprints contribute minor flows to adjacent waterbodies.	Low: no predicted effect on lake levels and aquatic life.
	Groundwater	Effect on local groundwater levels from seepage into pit	None possible	Inflow to pits is not predicted to affect water levels in adjacent waterbodies or aquatic life.	Can extend into Local Study Area	Throughout all project phases	Continuous	Some reduction in inflow to pits in post-closure as pits fill	Groundwater flow to pits is predicted to be low.	Low: no predicted effect on terrestrial or aquatic habitats.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within LSA and RSA.	Confined to Mine Study Area.	Throughout operation and into post-closure	Progressively during closure as pits are expanded.	Not reversible	Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of habitat in pit areas will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Confined to Mine Study Area.	Throughout operation and into post-closure	Progressively during closure as pits are expanded.	Not reversible	Small mammals and nesting birds will be displaced	Low: loss of habitat will displace some species.
	Aquatic Biota	Vibrations from blasting.	Blast intensities may need to be modified at locations close to sensitive habitats in Upper Marmion Reservoir, depending on transmissivity and habitat studies.	Blasting will be monitored during initial stages of pit development to understand vibration transmissivity on a site-specific basis. Habitat assessment will be undertaken to assess sensitive habitats and critical use periods.	Can extend to Local Study Area	In later stages of pit development	Intermittent	Immediately reversible	To be determined through testing during initial stages of pit development.	Residual impacts will be managed to result in low impacts.

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Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect	
					Extent	Duration	Frequency	Reversibility	Magnitude		
Operation of Processing Plant	Air Quality	Dust and emissions	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.	
	Noise	Noise	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.	
	Soils	No additional impacts to soils.									
	Water Quality	Effects on surface water quality	None required. Re-use of water and treatment prior to release are inherent in the project design.	Water will be treated as required prior to discharge. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: discharged water will meet guidelines and/or background water quality.	Low: no predicted effects on surface water or aquatic life.	
	Hydrology	Effects on lake water levels from water taking	None required. Re-use of water is inherent in project design.	Water taking will be minimized by re-use of water. Lake levels predicted to change by less than 9 cm. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: minor effect on lake levels	Low: no predicted effects on aquatic habitats	
	Groundwater	Changes in groundwater quantity and quality	None required	Groundwater quality and quantity are not predicted to change.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: negligible change in groundwater levels predicted.	Low: no predicted effect.	
	Vegetation	Effects of emissions on vegetation	None required	No incremental increase in soil concentrations due to emissions. No predicted increase in uptake in vegetation or effects on vegetation.	Confined to Mine Study Area.	Throughout operations phase	Continuous during operations	Reversible at closure	Low: predicted soil concentrations are below guidelines and background levels.	Low: no predicted risk to vegetation.	
	Terrestrial Biota	Effects of emissions on wildlife	None required	On incremental increase in soil concentrations and no predicted increase in vegetation. No incremental increased risk to wildlife from soil or vegetation ingestion.	Confined to Mine Study Area.	Throughout operations phase	Continuous during operations	Reversible at closure	Low: predicted soil concentrations are below guidelines and background levels.	Low: no predicted risks to terrestrial biota.	
Aquatic Biota	Discharges to aquatic habitats	A treatment facility has been included in the project design.	No effects predicted on aquatic life from any discharges.	Can extend into Local Study Area	Throughout operations phase	Intermittent depending on need for re-use water	Reversible at closure	Low: discharge water will meet guidelines or background	Low: no predicted risks to aquatic life.		



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**Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Operation of TMF	Air Quality	No air emissions since tailings will be wet.								
	Noise	Noise	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted risks to human health or ecological receptors.
	Soils	Loss of soils	None feasible	Soils in TMF footprint will be covered over permanently. Soils will not be salvaged under the TMF.	Confined to Mine Study Area	Progressive covering of soils throughout operations.	Continuous during operations	Not reversible. Soils will be covered over permanently.	Low: area of loss is relatively small within the RSA.	Low:
	Water Quality	Effects on surface water quality	Design includes seepage collection and reclaim pipeline from TMF to PPCP to eliminate direct release of TMF water to the environment.	Collection of seepage and re-use of tailings water will eliminate discharge of water from the TMF to receiving environments. No effects predicted on aquatic or terrestrial life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in post-closure	Low: water quality guidelines/background levels in receiving water will not be exceeded	Low: no effects predicted on surface water or aquatic life.
	Groundwater	Effects on groundwater quality	None require. Low ARD potential in tailings minimizes metals leaching and mobility.	Water quality in TMF seepage is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Throughout operations and into post-closure	Continuous	Not reversible	Low: water quality in TMF seepage not predicted to affect groundwater quality	Low: no predicted effects on terrestrial or aquatic life.
	Hydrology	No additional effects on drainage over construction phase								
	Vegetation	Loss of vegetation	Merchantable timber will be harvested.	Moderate loss within LSA but insignificant loss of habitat within RSA.	Confined to Mine Study Area	Progressive loss of vegetation in operations phase as TMF is filled	Continuous during operations phase.	Not reversible. Terrestrial habitat in footprint will be permanently lost.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: habitat loss will displace some terrestrial wildlife species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA. Low effect in RSA.	Can extend into Local Study Area	Progressive loss of habitat in operations phase as TMF is filled.	Continuous during operations phase.	Not reversible. Habitat loss in footprint of TMF is permanent.	Moderate: small mammals and nesting birds will be displaced	Low: habitat loss will displace some species.
Aquatic Biota	Effects on surface water quality	Design includes seepage collection and reclaim pipeline from TMF to PPCP to eliminate direct release of TMF water to the environment.	Collection of seepage and re-use of tailings water will eliminate discharge of water from the TMF to receiving environments. No effects predicted on aquatic or terrestrial life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations.		Low: water quality guidelines/background levels will not be exceeded in receiving waters.	Low: no effects predicted on aquatic life.	

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Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Waste Rock and Ore Stockpiles	Air Quality	Dust	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	Loss of soils	None	Soils in waste rock stockpile will be covered over permanently. Soils will not be salvaged under either the waste rock or the ore stockpiles.	Confined to Mine Study Area.	Progressive covering of soils throughout operations.	Continuous during operations	Not reversible in waste rock disposal facility	Low: area of loss is relatively small within the RSA.	Low
	Water Quality	Effects on surface water quality	None required. Project design includes ditching and holding ponds for stormwater management. Water will be treated as required prior to discharge	Runoff and seepage will be collected by ditching and routed to the PPCP for re-use or treatment prior to discharge. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: water quality guidelines/background levels in receiving water will not be exceeded	Low: no predicted effects on aquatic life.
	Hydrology	Loss of drainage area	Drainage to Upper Marmion Reservoir will be restored in closure	The small drainage area affected will not affect water levels in adjacent waterbodies. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations and into closure.	Continuous during operations phase.	Not reversible	Low: small drainage area affected	Low: no predicted effects on aquatic life.
	Groundwater	Effects on recharge	None	Changes in infiltration are not predicted to result in changes in lake levels and effects on aquatic life. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area.	Throughout operations and into post-closure	Continuous.	Not reversible	Low: permeability of subsurface is low.	Low: no predicted effects on aquatic life.
	Vegetation	Loss of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area.	Progressive loss of vegetation throughout operations.	Continuous during operations.	Not reversible.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: some species will be displaced.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Progressive loss of habitat during operations.	Continuous during operations	Not reversible	Moderate: small mammals and nesting birds will be displaced	Low: some species will be displaced during operations.
	Aquatic Biota	Loss of habitat and water quality.	Mitigation for habitat loss is not possible. Loss will be addressed in compensation plan.	Small areas of aquatic habitat will be eliminated. Water will be directed to the PPCP and will be treated as required prior to discharge. No effects predicted on aquatic life.	Confined to Mine Study Area.	Progressive loss of habitat during operations.	Continuous during operations	Not reversible	Moderate: Some aquatic habitats will be eliminated.	Low: habitat loss will be compensated. No predicted effects from water quality.

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Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Operation of Site Water Management System	Air Quality	No predicted emissions from WTF								
	Noise		None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health.
	Soils	No additional effects on soils								
	Water Quality	Effects on surface water quality	None required. Treatment of discharge is inherent in the Project design.	Discharge will not affect aquatic life. No risks to wildlife from exposure to water in TMF reclaim pond.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in closure	Low: Discharges will meet guidelines and/or baseline conditions.	Low: no predicted effects on aquatic life.
	Hydrology	Water taking and discharge	None required. Project has been designed to minimize taking of freshwater from surface waters by re-use of water wherever possible.	Water taking will be modified by discharge. Net change will result in minor change in lake level. Change will not adversely affect aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in closure	Low: Minor decrease in lake levels	Low: no predicted effects on aquatic life.
	Groundwater	Effects on water quality	None required. Project design includes partial lining of the PPCP to limit infiltration and collect seepage from the TMF reclaim pond	<ul style="list-style-type: none"> <li>■ Part of PPCP will be lined to minimize seepage to groundwater and migration to surface waters. No impacts predicted on aquatic life</li> <li>■ Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters</li> </ul>	Mine Study Area	Throughout operation phase	Continuous during operations	Reversible at closure	Low: design minimizes seepage to groundwater	Low: no predicted effects on terrestrial or aquatic life.
	Vegetation	No additional effects on vegetation								
	Terrestrial Biota	Wildlife exposure to site water impoundments	None required. Measures may be required to keep wildlife away from PPCP if future monitoring shows wildlife are accessing the ponds.	Wildlife exposure to water in the TMF reclaim ponds do not result in predictions of risk. Wildlife exposure to water in the PPCP is not expected due to proximity to processing plant. Noise and activity will discourage wildlife in this area.	Mine Study Area	Throughout operations phase	Continuous	Reversible in closure	Low: concentrations in TMF reclaim pond are below effects levels.	Low: no predicted effects on terrestrial biota.
	Aquatic Biota	Effects on surface water quality and quantity	None required. Treatment of discharge is inherent in the Project design.	Small change in lake levels would not affect aquatic life. Discharge water will meet guidelines and/or baseline conditions in receiving waterbodies. No effects predicted on aquatic life. No increase in fish tissue residues predicted.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in closure	Low: Minor change in lake levels. Discharges will meet guidelines and/or baseline.	Low: no predicted effects on aquatic life.

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					Extent	Duration	Frequency	Reversibility	Magnitude	
Accommodations Camp	Air Quality	Emissions	None required	No predicted effects on human health or terrestrial life.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effect on human health or ecological receptors.
	Noise	Noise	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effect on human health or ecological receptors.
	Soils	No additional impacts on soils over those noted for construction phase.								
	Water Quality	Domestic wastewater	Treatment facility is inherent in the Project design	No effect on aquatic life is predicted	Can extend into Local Study Area	Throughout operations phase	Continuous	Reversible at closure	Low: discharges will meet regulations	Low: no predicted effects on surface water or aquatic life.
	Groundwater	No additional impacts on groundwater. Potable water will be sourced from surface water.								
	Hydrology	Water taking	None required	Minor change in lake levels not predicted to affect aquatic life	Can extend into Local Study Area	Throughout operations phase	Continuous	Reversible at closure	Low: effect on lake levels is included in bounding scenario.	Low: no predicted effects on aquatic life.
	Vegetation	No additional impacts on vegetation. Impacts on vegetation occurred during construction.								
	Terrestrial Biota	Disturbance and hunting pressure	Restrictions on hunting by camp personnel will be implemented	Hunting could affect local populations of some species, and affect Aboriginal use of these resources.	Regional Study Area	Throughout operations phase	Occasional	Fully reversible at closure	Moderate: could affect local populations of some species.	Low: effects on wildlife will be regulated.
Aquatic Biota	Fishing pressure	Restrictions on fishing by camp personnel will be implemented.	Fishing in local waterbodies could deplete stocks of some species, with potential socio-economic impacts as well.	Local Study Area	Throughout operations phase	Occasional	Fully reversible at closure	Moderate to High: could affect local populations of some species.	Low: effects on fish population will be regulated.	
Access Road (Hardtack-Sawbill)	Air Quality	Dust and emissions	Dust suppression as required	No predicted effects on human health or terrestrial life.	Confined to Linear Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors.
	Noise	Noise	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Linear Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	No additional impacts on soils. Soils removal will occur in construction phase.								
	Water Quality	Road runoff	Regular maintenance of sediment control measures along road.	Road maintenance will include maintenance of sediment and erosion controls (e.g., sedimentation ponds). TSS concentrations are not expected to affect aquatic life.	Confined to Linear Study Area.	Throughout operations phase	Intermittent depending on precipitation events	Not reversible since road will remain after closure	Low: TSS concentrations are predicted to be low.	Low: no predicted effect on aquatic life.
	Groundwater	No additional impact above those noted for construction phase.								
	Vegetation	Brush clearing along ROW	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Linear Study Area.	Throughout operations phase	Intermittent: removal will be seasonal	Not reversible since road will remain after closure	Low: Habitat loss is confined to margins of road.	Low: some species may be displaced.
	Terrestrial Biota	Brush clearing along ROW. Wildlife-vehicle collisions	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Confined to Linear Study Area.	Throughout operations phase	Intermittent: removal will be seasonal	Not reversible since road will remain after closure	Low: Habitat loss is confined to margins of road.	Low: some species may be displaced.
Aquatic Biota	Road drainage effects on water quality	Regular maintenance of sediment control measures along road.	Road maintenance will include maintenance of sediment and erosion controls (e.g., sedimentation ponds). TSS concentrations are not expected to affect aquatic life.	Confined to Linear Study Area.	Throughout operations phase	Intermittent depending on precipitation events	Not reversible since road will remain after closure	Low: TSS concentrations are predicted to be low.	Low: no predicted effects on water quality or aquatic life.	

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**Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Site Decommissioning	Air Quality	Dust and emissions from equipment	None required	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors
	Noise	Noise from equipment.	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	Restoration of disturbed areas	None	Some disturbed areas can be restored.	Confined to Mine Study Area	Confined to closure phase	Intermittent as areas are decommissioned	Reversibility is not desirable.	Low positive: restoration of some disturbed areas.	Low: habitat restoration will permit return of some species.
	Water Quality	Erosion and sedimentation.	None	Erosion and sediment controls will be in place during closure. In post-closure revegetation of site will minimize TSS in runoff.	Can extend into Local Study Area	Confined to closure phase	Intermittent depending on precipitation events.	Reversible upon cessation of events.	Low: TSS increase is expected to be low and within guidelines.	Low: no predicted effect on water quality or aquatic life.
	Hydrology	Alteration of drainage	None	Natural drainage in some disturbed areas can be restored during closure. Minimizes lake level changes in post-closure due to the project, minimizing impacts on aquatic life.	Can extend into Local Study Area	Confined to closure phase	One-time occurrence	Reversibility is not desirable	Low positive: natural drainage will be restored where feasible.	Low positive: minor changes in lake levels will be reversed as drainage is restored.
	Groundwater	Alteration of infiltration	None	<ul style="list-style-type: none"> <li>■ Restoration of groundwater infiltration will assist in restoring some habitats such as wetlands.</li> <li>■ Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters</li> </ul>	Confined to Mine Study Area	Confined to closure phase	One-time occurrence	Not reversible	Low: groundwater infiltration will be restored in some areas.	Low positive: localized effects on habitats will be reversed in some areas.
	Vegetation	Effects of site restoration on vegetation	None	Restoration of small areas of habitat lost during construction and operations will promote return of wildlife.	Confined to Mine Study Area	Confined to closure phase	Intermittent as areas are decommissioned and restored	Reversibility is not desirable	Low positive: Moderate gain in vegetated areas lost.	Low positive: wildlife habitat will be progressively restored.
	Terrestrial Biota	Effects of site restoration on habitat	None	Restoration of small areas of habitat lost during construction and operations will promote return of wildlife.	Can extend into Local Study Area	Confined to closure phase	Intermittent as areas are decommissioned and restored	Reversibility is not desirable	Low positive: Moderate gain in habitat lost.	Low positive: wildlife habitat will be progressively restored.
Aquatic Biota	Effects of site restoration on aquatic life	None	Sediment and erosion controls will be in place until end of closure. Re-vegetation will minimize sediment erosion in post-closure, minimizing effects on aquatic life.	Can extend into Local Study Area	Confined to closure phase	Intermittent depending on precipitation events.	Reversible at end of closure	Low: site runoff will be controlled to minimize TSS.	Low: no predicted effects on aquatic life.	

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**Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Closure of TMF	Air Quality	Dust and emissions from equipment	None	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors
	Noise	Noise from equipment	None	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	No additional impacts on soils								
	Water Quality	Effects on water quality	TMF will be sculpted to promote runoff and minimize infiltration. Soil amendment will promote vegetation growth minimizing TSS in runoff to local waterbodies. Excess water will be diverted to open pit until water quality is acceptable for aquatic life.	Seepage from TMF in post-closure is not predicted to affect aquatic life. Runoff will be released to local waterbodies when quality is acceptable for aquatic life.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Reversible at end of closure	Low: Discharges will meet guidelines/background levels.	Low: no predicted effects on surface waters or terrestrial or aquatic life.
	Hydrology	Alteration of drainage	Drainage will be routed to Sawbill Bay when water quality is acceptable.	Drainage from the TMF will be routed to surface waters, reducing effects of construction and operation on lake levels.	Can extend into Local Study Area	Extends into post-closure	Continuous	Not reversible	Low: drainage from TMF in post-closure will be routed to surface waters.	Low: restoration of drainage will restore lake levels minimizing effects on aquatic life.
	Groundwater	Effects on groundwater quality and quantity	None	Sculpting of TMF will reduce infiltration, reducing groundwater levels under the TMF. Reducing seepage of TMF water to local aquifer will minimize effects of TMF seepage on groundwater quality. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Throughout closure and post-closure	One-time occurrence	Not reversible	Low: reduced infiltration due to sculpting of TMF	Low: no predicted effects on surface waters or ecological receptors.
	Vegetation	Effects on vegetation	None	Addition of soil amendment to TMF will promote vegetation growth on TMF in post-closure, restoring some habitat lost during construction and operations.	Confined to Mine Study Area	During closure phase	Throughout closure and post-closure	Reversibility is not desirable	Low positive: Moderate increase in vegetated area.	Low positive: some habitat will be restored permitting return of some species.
	Terrestrial Biota	Effects on habitat	None	Addition of soil amendment to TMF will promote vegetation growth on TMF in post-closure, restoring some habitat lost during construction and operations and facilitating return of some wildlife.	Can extend into Local Study Area	During closure phase	Throughout closure and post-closure	Reversibility is not desirable	Low positive: Moderate increase in vegetated area.	Low positive: some habitat will be restored permitting return of some species.
Aquatic Biota	Effects on surface water quality and quantity	TMF will be sculpted to promote runoff and minimize infiltration. Soil amendment will promote vegetation growth minimizing TSS in runoff to local waterbodies. Excess water will be diverted to open pit until water quality is acceptable for aquatic life.	Seepage from TMF in post-closure is not predicted to affect aquatic life. Runoff will be released to local waterbodies when quality is acceptable for aquatic life.	Can extend into Local Study Area	During closure phase	Continuous during closure	Reversible at end of closure	Low: Discharges will meet guidelines and/or background levels.	Low: no predicted effects on aquatic life.	

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**Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect	
					Extent	Duration	Frequency	Reversibility	Magnitude		
Closure of Waste Rock Stockpile	Air Quality	Dust and emissions from equipment	None	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Confined to closure phase. No emissions in post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effect on human health or ecological receptors.	
	Noise	Noise from equipment	None	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Confined to closure phase. No sources of noise in post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effect on human health or ecological receptors.	
	Soils	No additional impacts									
	Water Quality	Effects on water quality	None	Water will be routed to open pits at closure until seepage water is of acceptable quality to discharge to local waterbodies. No predicted impact on aquatic life.	Can extend into Local Study Area	Closure phase into post-closure	Continuous during closure	Reversible in post-closure	Low: water discharged to local waterbodies will meet guidelines and/or background levels.	Low: no predicted effects on surface waters or aquatic life.	
	Hydrology	Effects on drainage	None	Small reduction in drainage area until water is of acceptable quality to release to surface waters.	Can extend into Local Study Area	Closure phase potentially into post-closure	Continuous during closure	Reversible in post-closure	Low: drainage area contribution to lake levels is small.	Low: effects on lake levels and aquatic habitat will be progressively reversed.	
	Groundwater	Effects on groundwater quality and quantity	None	Shallow groundwater will be intercepted by ditches minimizing impacts of seepage via groundwater to surface waters. Loss of groundwater contribution to surface waters will be restored in post-closure when drainage can be directed to surface waters. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Closure phase potentially into post-closure	Continuous during closure	Reversible in post-closure.	Low: ditches will intercept shallow groundwater.	Low: effects on lake levels and aquatic habitat will be progressively reversed.	
	Vegetation	Restoration of vegetation	None	The waste rock stockpile will be left to re-vegetate naturally. Vegetation may not revert fully to pre-development habitat.	Confined to Mine Study Area	Into post-closure	Continuous	Reversibility is not desirable	Low positive: Some species are expected to colonize the stockpile	Low positive: some habitat will be restored permitting return of some species.	
	Terrestrial Biota	Restoration of habitat	None	Wildlife will gradually move in as the stockpile re-vegetates. Habitat may not revert fully to pre-development habitat.	Can extend into Local Study Area	Into post-closure	Continuous	Reversibility is not desirable	Low positive: some habitat lost in construction will be restored.	Low positive: some habitat will be restored permitting return of some species.	
Aquatic Biota	Effects on surface water quality and quantity	None	At closure seepage and runoff water will be directed to the open pits until water is of acceptable quality to discharge directly to local waterbodies. No effects are predicted on aquatic life.	Can extend into Local Study Area	Into post-closure	Continuous until water quality is acceptable	Not reversible	Low: Water quality will be acceptable for aquatic life upon release to surface waters	Low: no predicted effects on aquatic life.		

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**Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases**

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect	
					Extent	Duration	Frequency	Reversibility	Magnitude		
Open Pits	Air Quality	Dust and emissions from equipment	None	No predicted effects on human health or terrestrial life.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effect on human health or ecological receptors.	
	Noise	Noise from equipment	None	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effect on human health or ecological receptors.	
	Soils	No effect on soils predicted since no soils will be in the open pit									
	Water Quality	Effects on water quality	Water quality will be monitored during post-closure to verify that overflow will not affect aquatic life	Pits will overflow after approximately 218 years and drain to Upper Marmion Reservoir. Pit water quality at overflow is predicted to be acceptable for aquatic life.	Can extend into Local Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: Pit water quality at overflow will be acceptable for aquatic life	Low: no predicted effect on human health or ecological receptors.	
	Hydrology	Effects on drainage	None	Pit overflow will restore some of the drainage to Upper Marmion Reservoir that was lost due to the project.	Can extend into Local Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low positive: Some restoration of original drainage	Low: effects on lake levels and aquatic habitat will be progressively reversed.	
	Groundwater	Effects on groundwater quality and quantity	None	Loss of groundwater contribution to adjacent surface waters is minor. Groundwater contribution to surface waterbodies will be restored when pits overflow. Groundwater quality is not predicted to be affected.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: groundwater flow to Marmion Reservoir will be restored in post-closure. Quality is not predicted to be affected.	Low: effects on lake levels and aquatic habitat will be progressively reversed.	
	Vegetation	No effects on vegetation predicted since pits will be aquatic habitat									
	Terrestrial Biota	Effects on habitat and wildlife	None	Pit water quality will be of acceptable quality for consumption by wildlife.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: Water quality in pits will be acceptable quality for wildlife consumption	Low: no predicted effects on ecological receptors.	
	Aquatic Biota	Effects on surface water quality and quantity	None	Water quality at overflow is predicted to meet background levels in Upper Marmion Reservoir and/or guidelines for protection of aquatic life. No impacts are predicted on aquatic life.	Can extend into Local Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: Overflow water quality will meet guidelines and/or background levels.	Low: no predicted effects on aquatic life.	



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**Table ES-7: Summary of Overall Socio-economic Effects Assessment Results**

<b>Valued Ecosystem Component</b>	<b>Overall Residual Effect</b>	<b>Description</b>
Population and Demographics	Positive	The population increase associated with the Project will first stem the decline and then augment the population of the Town. This will have an overall beneficial effect on the community.
Labour Market	Positive	The increase in employment and training and corresponding decrease in unemployment will bring additional income into the LSA, which will contribute to the overall economic wellbeing of the community.
Government Finance	Positive	Beyond additional revenue to the federal and provincial governments, new construction in the LSA will generate additional property assessment for the Town of Atikokan resulting in revenues that can be applied to the provision of services.
Public Services and Infrastructure	Neutral	There is sufficient capacity for existing infrastructure and service delivery to absorb the increases in demand associated with the Project.
Housing and Accommodation	Positive	The vacancy rate in the Town of Atikokan will be reduced by the influx of workers and their families, and new housing will be constructed. This will help stabilize the local housing market.
Transportation	Low-level adverse effect	The local transportation network currently operates well below capacity levels; hence the increase created by the Project can readily be absorbed.
Outdoor Tourism and Recreation	Low-level adverse effect	Upon the application of mitigation measures required for air quality and/or noise compliance, residual adverse effects on tourism and recreation are unlikely. The overall attractiveness of Atikokan and environs is not likely to be affected by the Project; however, a low-level effect through loss of visual aesthetics is anticipated. Of note is that given the mining history in the vicinity of Atikokan, many people coming to Atikokan understand that mining activities take place in this area.
Hunting	Low-level adverse effect	No effect is anticipated on the number of hunting licences issued or on general hunting activity in the area. A relatively small amount of land will no longer be available for hunting, which will have a low-level effect on hunting in the LSA.
Trapping	Neutral	Upon the application of mitigation for the loss of some portions of tenured trapline areas, no residual adverse effect on trapping is anticipated.
Fishing	Neutral	Overall fishing activity in the study areas is not likely to be affected.
Mining	Positive	Beyond the positive effects of the Project described in this TSD, the Project would likely have net beneficial effects on local or regional exploration and development in this sector.
Forestry	Neutral	Upon the application of mitigation, no residual adverse effect on forestry is likely.
Water Use and Access	Neutral	Ongoing discussions with the downstream hydro-electric facilities to further understand the potential financial implications of the predicted changes to outflows from the Raft Lake Dam. Upon the application of mitigation, no residual adverse effect other commercial or industrial water users is likely.

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**Table ES-8: Employment Opportunities for the Construction and Operations Phases of the Project**

Phase	Provincial Direct	National Direct	Provincial Direct & Indirect	National Direct, Indirect & Induced
<b>Construction Phase</b>				
Project workforce (FTE over 30 months)	780	1,040		
Supplier/service industry employment	2,335	4,004		
<b>Total Employment (Years 1-3)</b>	<b>3,115</b>	<b>5,044</b>	<b>4,287</b>	<b>9,557</b>
<b>Operations Phase</b>				
Average annual Project workforce (FTE per year)	440	550		
Average annual supplier/service industry employment	428	642		
<b>Annual Total Employment</b>	<b>868</b>	<b>1,192</b>	<b>1,182</b>	<b>2,289</b>
<b>Total Employment over 11 years</b>	<b>9,548</b>	<b>13,112</b>	<b>13,002</b>	<b>25,179</b>

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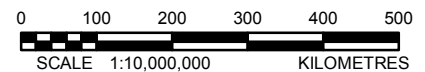


# FIGURES

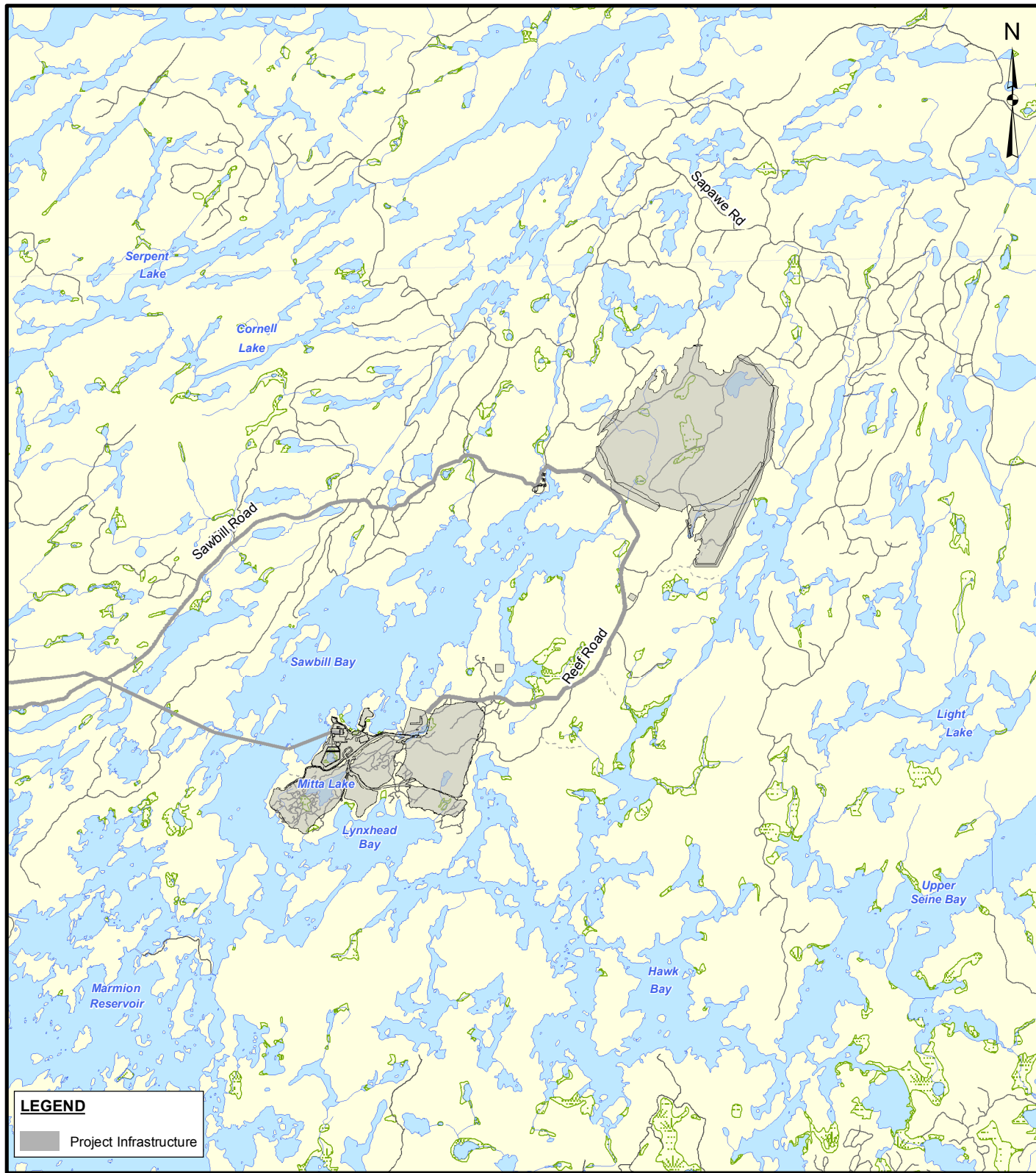


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 Base Data - MNR NRVIS, obtained 2004. Produced by Golder Associates Ltd  
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 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

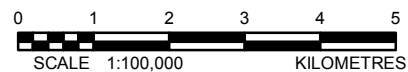


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			REVIEW	THW	



**REFERENCE**

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.;  
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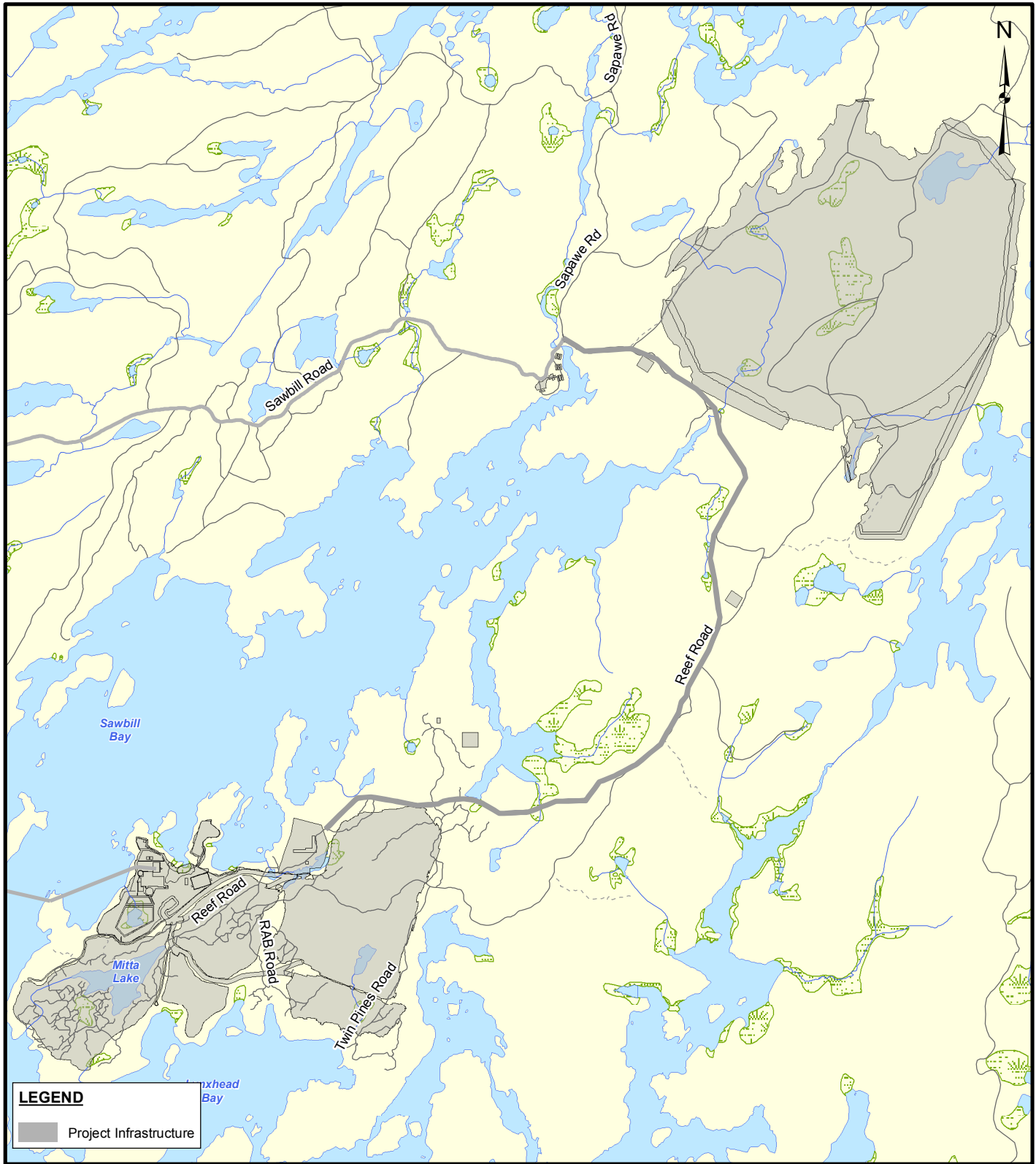
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PROJECT No. 13-1118-0010

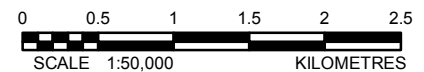
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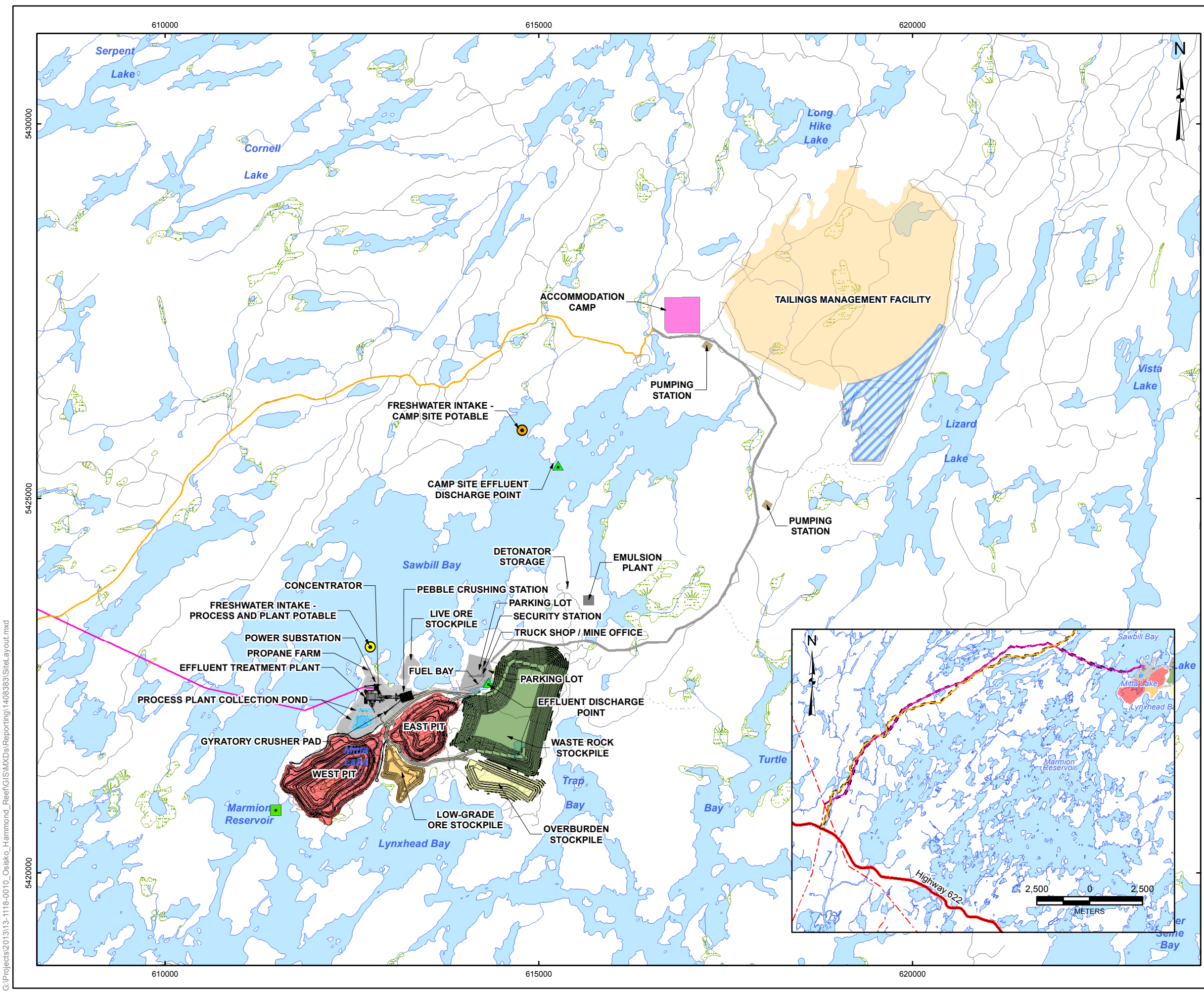
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PROJECT No. 13-1118-0010

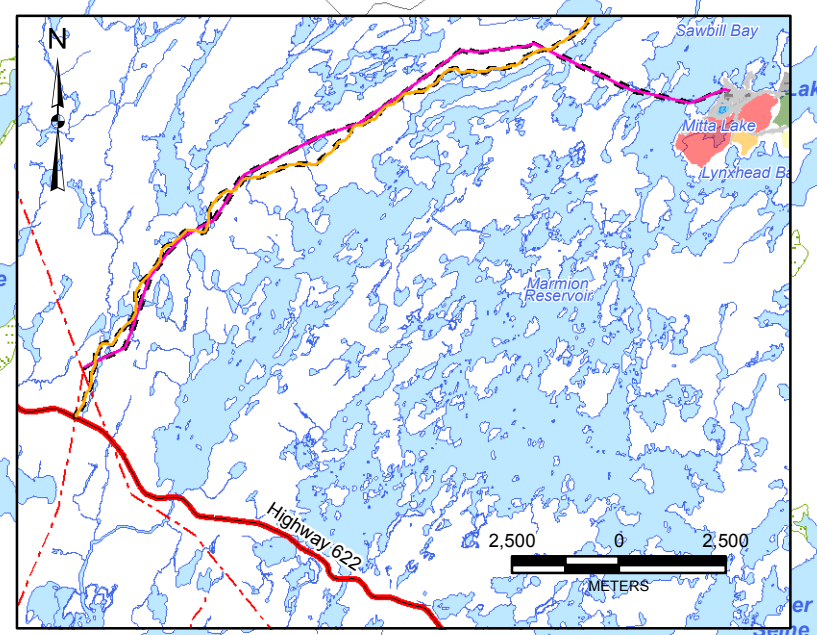
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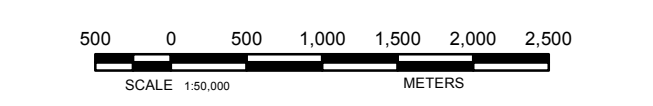
**LEGEND**

- Freshwater Intake - Camp Site Potable
- Freshwater Intake - Process and Plant Potable
- Mine Effluent Discharge
- Camp Effluent Discharge
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Accommodation Camp
- Laydown Area
- Office and Truck Shop, Explosives Storage and Processing Plant
- Open Pits
- Low-Grade Ore Stockpile
- Overburden Stockpile
- Process Plant Collection Pond
- Pumping Station
- Tailings Management Facility
- Tailings Management Facility Reclaim Pond
- Waste Rock Stockpile



**REFERENCE**

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.  
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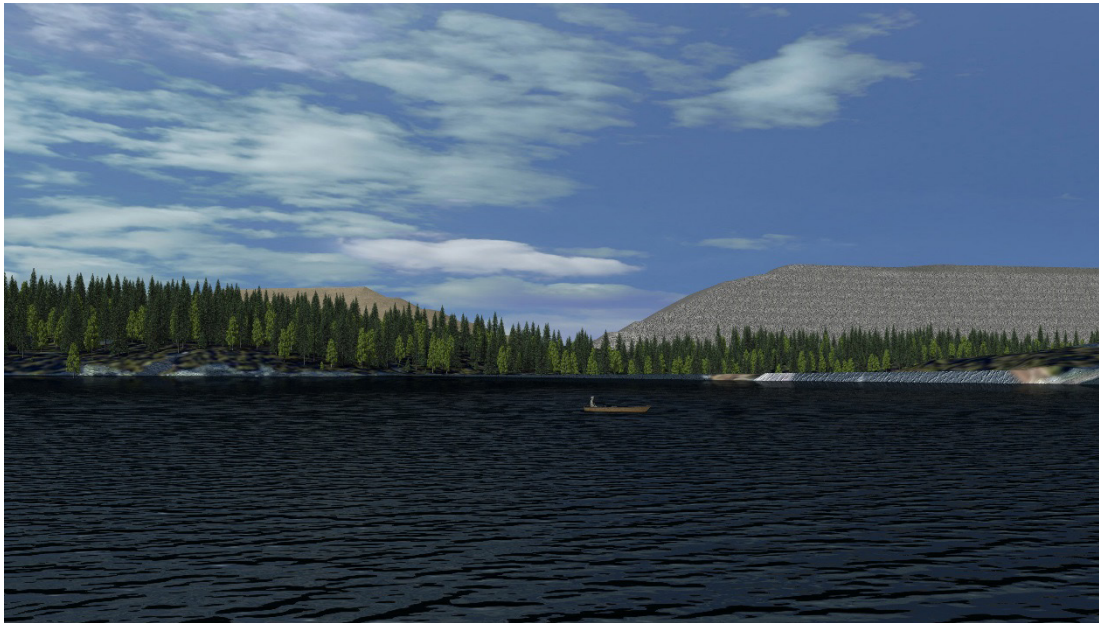
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Source: Genivar 2013.

*Figure ES-5: View 1 Visual Simulation – View of Overburden and waste Rock Stock Piles from Trap Bay of Upper Marmion*



Source: Genivar 2013.

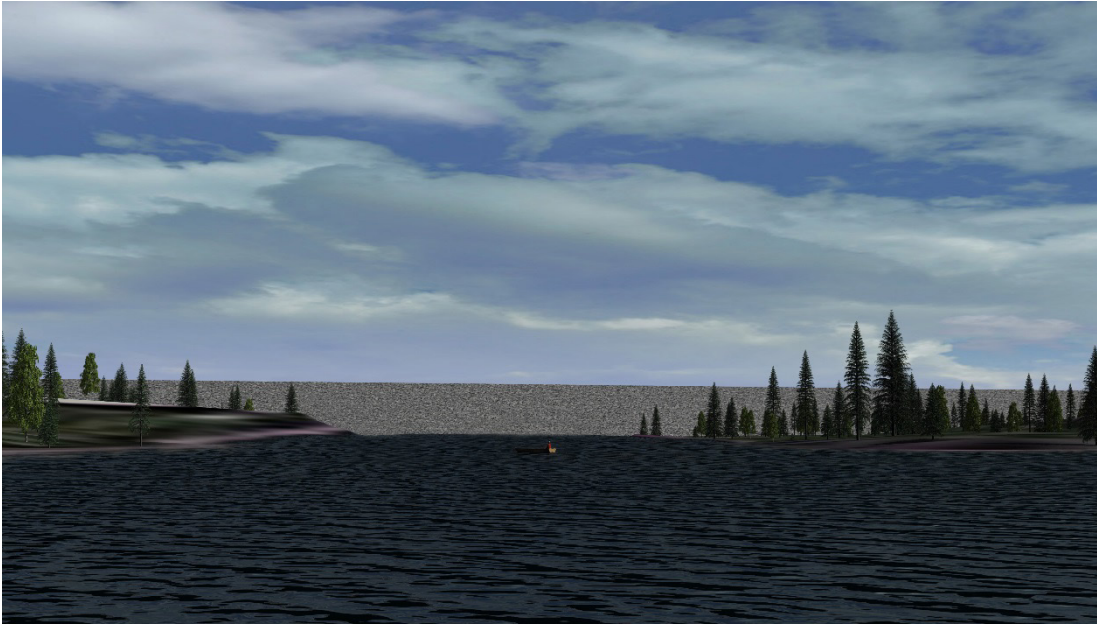
*Figure ES-6 View 3 Visual Simulation – View of Process Plant from Sawbill Bay*



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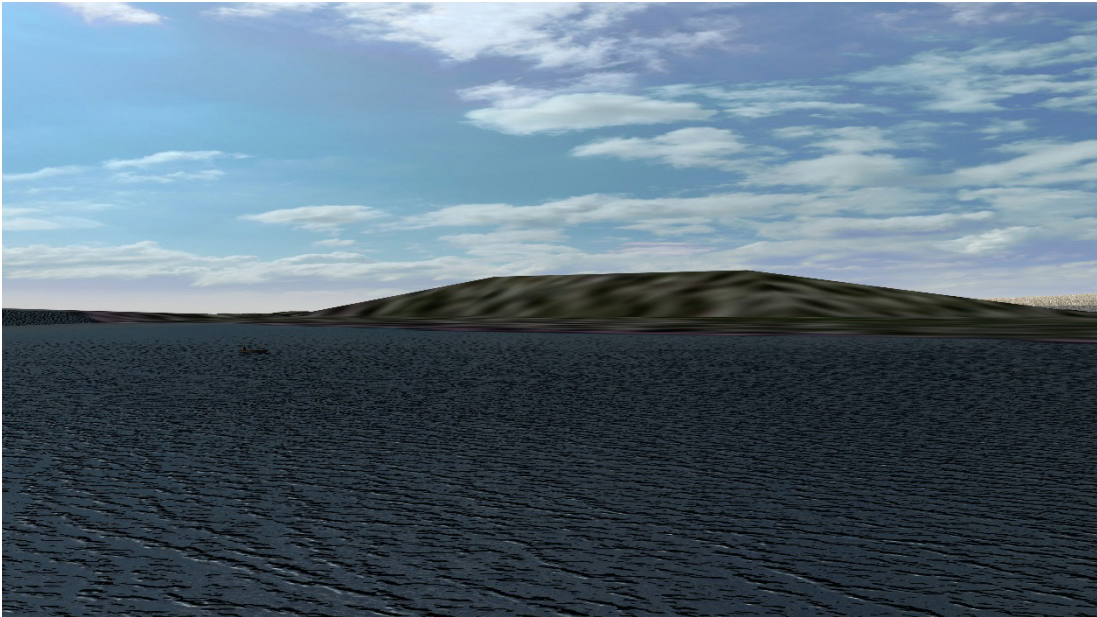
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Source: Genivar 2013.

*Figure ES-7: View 8 Visual Simulation – View of Tailings Management Facility from Trapper Cabin*



Source: Genivar 2013.

*Figure ES-8 View 6 Visual Simulation – View of Tailings Management Facility from Trapper Cabin*