

**HARDROCK PROJECT  
Final Environmental Impact  
Statement / Environmental  
Assessment**

Chapter 24.0:  
Summary of Environmental Effects  
and Commitments

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## **NOTE TO READER**

Please note that additional and clarified information has been added to this chapter since its original submission in June 2017, in accordance with Condition 27 of the Provincial Environmental Assessment approval, dated March 12, 2019. Additionally, Appendix C11, F13, F14, F15 and G12 have been added to provide further supporting information.

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## **24.0 SUMMARY OF ENVIRONMENTAL EFFECTS AND COMMITMENTS**

This chapter provides a summary of potential environmental effects, mitigation and residual effects.

### **24.1 SUMMARY OF CHANGES TO THE ENVIRONMENT, POTENTIAL EFFECTS, MITIGATION AND RESIDUAL EFFECTS**

Chapters 7.0 through 19.0 provide an assessment of Project-related effects on valued components (VCs). The assessment included:

- a description of potential effects of the Project on the VC including pathways to other VCs
- the consideration of mitigation measures to reduce or eliminate the potential environmental effect
- the characterization of the residual adverse effect remaining after mitigation
- the significance of the residual environmental effect.

Table 24-1 presents a summary of potential environmental effects, mitigation measures, residual adverse effects and significance. Results are provided for each VC including pathways from and to other VCs and the phase of the Project during which the effect is predicted to occur. The Project will also result in beneficial effects; these are summarized in the table.

Furthermore, Table 24-1 provides information related to areas of federal jurisdiction. As stated in Part 1, Section 1 of the EIS Guidelines, "the EIS must include a full description of the changes the project will cause to the environment that may result in adverse effects on areas of federal jurisdiction (i.e., section 5 of CEAA 2012) including changes that are directly linked or necessarily incidental to any federal decisions that would permit the project to be carried out." Specific changes to the environment that are directly linked or necessarily incidental to any federal decisions are provided in Table 24-1.

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**Table 24-1: Summary of Potential Effects, Mitigation Measures, Residual Effects and Significance**

| Potential Effect<br>(and Measurable Parameters)   | Mitigation Measures   | Activity     |           |         | Residual Effect  |           |                   |            |                          |             |               |                                       |                 |
|---|---|--------------|-----------|---------|--|-----------|-------------------|------------|--------------------------|-------------|---------------|---------------------------------------|-----------------|
|   |   | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing     | Frequency                | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <b>VALUED COMPONENT: ATMOSPHERIC ENVIRONMENT</b>  |   |              |           |         |  |           |                   |            |                          |             |               |                                       |                 |
| Pathway to other VCs: surface water, vegetation communities, wildlife and wildlife habitat, land and resource use, traditional land and resource use, human and ecological health   |   |              |           |         |  |           |                   |            |                          |             |               |                                       |                 |
| Pathway from other VCs: N/A   |   |              |           |         |  |           |                   |            |                          |             |               |                                       |                 |
| Area of Federal Jurisdiction: CEAA, 2012 – changes to the physical environment (atmospheric environment), effects of the environment on Aboriginal people (health conditions).  |   |              |           |         |  |           |                   |            |                          |             |               |                                       |                 |
| <b>Change in ambient air quality</b><br>• Emissions and ambient concentrations of criteria air contaminants (CAC) and other parameters of potential concern (PoPCs), including metal substances in particulate matter, polycyclic aromatic hydrocarbons (PAH) and other volatile organic compounds, in units of kilograms per day (kg/d) or tonnes per year (t/yr) for emissions, and micrograms per cubic metre (µg/m <sup>3</sup> ) for ambient concentrations. | <b>Construction, Operation and Closure:</b> <ul style="list-style-type: none"> <li>Implementation of a best management plan (BMP) to control fugitive dust from the Project.</li> <li>Use of dust suppressants (e.g., water) during situations that have an increased potential to generate airborne dust.</li> <li>Limit vehicle speeds.</li> <li>Effective and timely equipment maintenance to maintain mining equipment in good working condition.</li> <li>Where possible, reduce haul routes to and within the PDA.</li> <li>Administrative controls, including a no idling policy to reduce mobile equipment and other-use vehicle emissions.</li> </ul> <b>Operation:</b> <ul style="list-style-type: none"> <li>Equipping primary crusher with a dust collection system (baghouse or equivalent) to control fugitive emission during ore crushing.</li> <li>Equipping secondary crusher with a dust collection system (baghouse or equivalent) and protective covers, to control potential dust emissions during secondary crushing and ore transferring.</li> <li>Enclosing mill feed ore storage area.</li> <li>Equipping high pressure grinding rolls (HPGR) with wet scrubbers (or equivalent) to control dust emissions from the grinding operations.</li> <li>Using a wet scrubber (or equivalent) on the induction furnace to control emissions.</li> <li>New mobile equipment onsite will meet applicable Transport Canada off-road vehicle emission requirements. Tier 4 emissions standards are anticipated to come into effect in 2018, coinciding with early Project construction. GGM will look to acquire equipment that meets the new standard where available and feasible.</li> <li>Manage fugitive dust generated during the transport of historical tailings.</li> </ul> | ✓            | -         | ✓       | Adverse  | High      | LAA               | Applicable | Multiple irregular event | Short-term  | Reversible    | Typical                               | Not significant |
|   |   | -            | ✓         | -       | Adverse  | High      | LAA               | Applicable | Continuous               | Medium-term | Reversible    | Typical                               | Not significant |
|   |   |              |           |         | <b>Increase in ambient levels of particulate, CACs and other PoPCs:</b> <ul style="list-style-type: none"> <li>With mitigation, Project related activities will result in an increase in outside modelled property boundary concentrations in the LAA; but all outside modelled property boundary residual concentrations were predicted to be below applicable air quality criteria for construction and active closure (with the exception of benzene and benzo(a)pyrene from vehicle tailpipe emissions whose background levels are above the applicable criteria).</li> </ul>  |           |                   |            |                          |             |               |                                       |                 |
|   |   |              |           |         | <b>Increase in ambient levels of particulate, CACs and other PoPCs:</b> <ul style="list-style-type: none"> <li>Results of the air dispersion modelling showed that the maximum predicted concentrations of all PoPCs were below applicable criteria during operation at all off assessed property modelling locations with the exception of infrequent 24-hour average PM<sub>10</sub> and PM<sub>2.5</sub> close to the modelled property boundary (e.g., no more than 6 days in 5-years, or 0.3% of the time). At inside modelled property boundary receptors, infrequent exceedances of PM<sub>10</sub> and manganese were predicted for Project Mill Phase 1. TSP, PM<sub>10</sub>, PM<sub>2.5</sub> and manganese were predicted to have infrequent exceedances at the Kenogamisis Golf Club during Mill Phase 2 of operation. Residual concentrations of benzene and benzo(a)pyrene from vehicle tailpipe emissions also exceeded applicable criteria at inside and outside modelled property boundary receptors as the baseline levels of both benzene and benzo(a)pyrene are above applicable air quality criteria.</li> </ul> |           |                   |            |                          |             |               |                                       |                 |

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| Potential Effect<br>(and Measurable Parameters)   | Mitigation Measures  | Activity   |           |         | Residual Effect |           |                   |        |                           |             |               |                                       |                 |
|---|--|--|-----------|---------|-----------------|-----------|-------------------|--------|---------------------------|-------------|---------------|---------------------------------------|-----------------|
|   |  | Construction   | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency                 | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
|   | <ul style="list-style-type: none"> <li>Fugitive dust emission control from roads, material handling and storage areas/stockpile may include, application of water sprays, use of surfactants (as a contingency), dust sweeping, gravel application, truck wheel washing stations, and enclosure of dust sources. The site roads will be maintained in good condition, with regular inspections and maintenance to limit the loose dust on the roads.</li> </ul>  |  |           |         |                 |           |                   |        |                           |             |               |                                       |                 |
| <b>Climate change (as measured by change in greenhouse gas emissions)</b> <ul style="list-style-type: none"> <li>Greenhouse gas emissions (primarily CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) in units of kilotonnes (kt) per year of greenhouse gasses (GHG), as CO<sub>2</sub> equivalents (CO<sub>2</sub>e).</li> </ul>   | <b>Construction, Operation and Closure:</b> <ul style="list-style-type: none"> <li>Many of the same mitigation procedures provided under "change in ambient air quality" above to mitigate levels of combustion gases would also aid in reducing GHG emissions.</li> </ul>   | ✓  | -         | ✓       | Adverse         | Low       | Global            | N/A    | Multiple irregular events | Short-term  | Irreversible  | N/A                                   | Not significant |
|   |  | <b>Increase in GHG Emissions:</b> <ul style="list-style-type: none"> <li>The incremental contribution of Project construction to total Ontario annual GHG emissions would be a maximum of 0.06% over the construction period (based on Ontario's 2014 GHG emission level). The incremental contribution of Project construction to total Canadian annual GHG emissions would be a maximum of 0.01% over the construction period. During construction, releases of GHGs from the Project are expected to be very small in comparison to provincial, national and global emissions.</li> </ul> |           |         |                 |           |                   |        |                           |             |               |                                       |                 |
|   |  | -  | ✓         | -       | Adverse         | Low       | Global            | N/A    | Continuous                | Medium-term | Irreversible  | N/A                                   | Not significant |
| <b>Increase in GHG Emissions:</b> <ul style="list-style-type: none"> <li>The incremental contribution from the operation of the Project to total Ontario annual GHG emissions would be 0.1% for the Mill Phase 1 operating scenario, and 0.2% for the Mill Phase 2 scenario. The incremental contribution of the Project to total Canadian annual GHG emissions would be 0.03% for the Mill Phase 1 scenario, and 0.04% for the Mill Phase 2 scenario occurring annually over the lifetime of the Project. During operation, releases of GHGs from the Project are expected to be very small in comparison to provincial, national and global emissions.</li> </ul> |  |  |           |         |                 |           |                   |        |                           |             |               |                                       |                 |
| <b>Change in lighting</b> <ul style="list-style-type: none"> <li>Light trespass at nearby receptors in units of lumens.</li> </ul>  | <b>Construction and Closure:</b> <ul style="list-style-type: none"> <li>Construction lighting will be specified to use only as much lighting as is necessary for safe and efficient construction activities, and to locate portable lighting equipment where, to the extent feasible, it is not visible at nearby receptors.</li> <li>Use of directional light fixtures to avoid the transmission of light outside of the PDA.</li> </ul> <b>Operation:</b> <ul style="list-style-type: none"> <li>Design exterior lighting systems for Project operation to include directional lighting to limit light trespass and to avoid glare.</li> </ul> | ✓  | -         | ✓       | Adverse         | Moderate  | LAA               | N/A    | Multiple Irregular Event  | Short-term  | Reversible    | Typical                               | Not significant |
|   |  | <b>Increase in ambient lighting levels:</b> <ul style="list-style-type: none"> <li>Project construction will result in an increase in light levels in the LAA; but outside modelled property boundary residual light trespass levels during construction would be comparable to baseline conditions (i.e., rural area characterized by low district brightness).</li> </ul>  |           |         |                 |           |                   |        |                           |             |               |                                       |                 |

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|--|---|--------------|-----------|---------|-----------------|-----------|-------------------|------------|------------------------|-------------|---------------|---------------------------------------|-----------------|
|  |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing     | Frequency              | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
|  | <ul style="list-style-type: none"> <li>Incorporate proper shielding via the use of full horizontal cutoff fixtures into the Project lighting plan (where practicable).</li> <li>Position portable lighting to limit visibility at surrounding residences.</li> <li>Most of the routes for haul trucks and service vehicles onsite will be shielded by topography and vegetation along their length. In the detailed roadway design, tree cover will be left in place where practicable to reduce the line-of-sight from receptors to the onsite roads.</li> <li>Lighting of the realigned Highway 11 will be implemented according to current MTO standards.</li> </ul> | -            | ✓         | -       | Adverse         | Moderate  | LAA               | N/A        | Continuous             | Medium-term | Reversible    | Typical                               | Not significant |
| <p><b>VALUED COMPONENT: ACOUSTIC ENVIRONMENT</b></p> <p><b>Pathway to other VCs:</b> fish and fish habitat, wildlife and wildlife habitat, land and resource use, traditional land and resource use<br/> <b>Pathway from other VCs:</b> N/A</p> <p><b>Area of Federal Jurisdiction:</b> CEAA, 2012 – changes to the physical environment (atmospheric environment), effects of the environment on Aboriginal people (health conditions).</p> |   |              |           |         |                 |           |                   |            |                        |             |               |                                       |                 |
| <p><b>Change in noise levels</b></p> <ul style="list-style-type: none"> <li>One Hour Energy Equivalent Sound Level, in dBA.</li> <li>Peak sound pressure level, in dB.</li> </ul>  | <p><b>Construction, Operation, and Closure:</b></p> <ul style="list-style-type: none"> <li>Noise mitigation measures (e.g., muffler systems) will be installed on construction and other mobile equipment and equipment will be properly maintained.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Select equipment and/or design acoustical enclosures to limit overall noise emissions.</li> <li>Limits on the overall noise emissions transferring through doors for building enclosures.</li> <li>Air inlet and discharge silencers for exhaust stacks associated with diesel or natural gas-fueled generators.</li> </ul>             |              | ✓         | ✓       | Adverse         | Low       | LAA               | Applicable | Continuous             | Medium-term | Reversible    | Typical                               | Not significant |
| <p><b>Increase in sound levels:</b></p> <ul style="list-style-type: none"> <li>Predicted Project noise emission levels at PoRs and Pols comply with applicable guideline criteria and thresholds selected for assessment.</li> </ul>   |   |              |           |         |                 |           |                   |            |                        |             |               |                                       |                 |
| <p><b>Change in vibration levels</b></p> <ul style="list-style-type: none"> <li>Peak particle velocity, in mm/s.</li> <li>Root Mean Square Particle Velocity (mm/s).</li> </ul>  | <p><b>Construction and Operation:</b></p> <ul style="list-style-type: none"> <li>Preliminary blast design meets the MOECC's criteria and all blasting will occur during the daytime as required by MOECC Guideline NPC 119.</li> <li>No source-specific mitigation measures were incorporated in the model predictions.</li> </ul>  | ✓            | ✓         | -       | Adverse         | Low       | LAA               | Applicable | Multiple Regular Event | Medium-term | Reversible    | Typical                               | Not significant |
| <p><b>Increase in vibration levels:</b></p> <ul style="list-style-type: none"> <li>Predicted Project vibration levels at PoRs and Pols comply with applicable guideline criteria and thresholds selected for assessment.</li> </ul>  |   |              |           |         |                 |           |                   |            |                        |             |               |                                       |                 |

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|---|---|--------------|-----------|--|-----------------|--|-------------------|-----------|--------------|------------|-----------------|---------------------------------------|-----------------|--|
|   |   | Construction | Operation | Closure  | Direction       | Magnitude  | Geographic Extent | Timing    | Frequency    | Duration   | Reversibility   | Ecological and Socio-Economic Context | Significance    |  |
| <b>VALUED COMPONENT: GROUNDWATER</b>  |   |              |           |  |                 |  |                   |           |              |            |                 |                                       |                 |  |
| Pathway to other VCs: surface water, vegetation communities, community services and infrastructure, human and ecological health   |   |              |           |  |                 |  |                   |           |              |            |                 |                                       |                 |  |
| Pathway from other VCs: surface water   |   |              |           |  |                 |  |                   |           |              |            |                 |                                       |                 |  |
| Area of Federal Jurisdiction: CEAA, 2012 – changes to the physical environment (groundwater), effects of changes to the environment on Aboriginal people (health conditions).   |   |              |           |  |                 |  |                   |           |              |            |                 |                                       |                 |  |
| <b>Change in groundwater levels and/or flow</b><br><ul style="list-style-type: none"> <li>Changes in shallow and deep groundwater levels as measured in monitoring wells (m) and baseflow to surface water bodies (L/s).</li> </ul> | <b>Construction, Operation and Closure:</b><br><ul style="list-style-type: none"> <li>Use standard management practices throughout the Project, including drainage control and excavation and open pit dewatering.</li> </ul> <b>Construction:</b><br><ul style="list-style-type: none"> <li>Limit construction footprint (i.e., PDA) to the extent possible to reduce the potential for reductions in groundwater recharge, and limit the number of watersheds overprinted by the PDA.</li> <li>Use standard construction methods, such as seepage cutoff collars, where trenches extend below the water table to mitigate preferential flow paths.</li> </ul> <b>Operation:</b><br><ul style="list-style-type: none"> <li>Use standard construction methods, such as seepage cutoff collars, where trenches extend below the water table to mitigate preferential flow paths.</li> <li>Return water generated from historical underground dewatering (with treatment at the ETP as required) to Kenogamisis Lake during operation to offset a reduction in groundwater discharge.</li> </ul> <b>Closure:</b><br><ul style="list-style-type: none"> <li>Consider accelerating open pit filling at closure to return groundwater levels to baseline conditions in a shorter timeframe.</li> </ul> | ✓            | -         | -  | Adverse         | Low  | PDA               | N/A       | Continuous   | Short-term | Reversible      | Typical                               | Not significant |  |
|   |   |              |           |  |                 | <b>Decrease in groundwater levels and change in flow direction due to a change in recharge and temporary dewatering for foundations and installation of infrastructure:</b><br><ul style="list-style-type: none"> <li>Changes in recharge and temporary dewatering during construction will result in a reduction of groundwater levels of less than 5 m based on typical foundation depths below ground surface and will be less than 1 m beyond the PDA.</li> </ul>  |                   |           |              |            |                 |                                       |                 |  |
|   |   | ✓            | ✓         | ✓  | Adverse         | Moderate   | LAA/RAA           | N/A       | Continuous   | Long-term  | Irreversible    | Typical                               | Not significant |  |
|   |   |              |           |  |                 | <b>Decrease in groundwater levels and change in flow direction in overburden and bedrock due to dewatering of historical underground workings and open pit, aggregate sources S1 and T2 and the Goldfield Creek diversion:</b><br><ul style="list-style-type: none"> <li>Changes in recharge, dewatering of the historical underground workings and open pit, and completion of the Goldfield Creek diversion will result in a reduction of groundwater levels of greater than 5 m within the PDA, reducing to less than 5 m within the LAA/RAA during operation. At closure, the reduction in groundwater levels is less than 1 m.</li> </ul> |                   |           |              |            |                 |                                       |                 |  |
| ✓   | ✓   | ✓            | Adverse   | Moderate   | LAA / RAA       | N/A  | Continuous        | Long-term | Irreversible | Typical    | Not significant |                                       |                 |  |
|   |   |              |           | <b>Change in groundwater levels and/or flow in overburden and bedrock due to construction of the TMF, aggregate source T2, and the Goldfield Creek diversion:</b><br><ul style="list-style-type: none"> <li>Changes in recharge and construction of the TMF will result in an increase in groundwater levels of greater than 5 m within the PDA, reducing to less than 1 m within the LAA. Construction of the Goldfield Creek diversion will reduce groundwater flows by less than 1 m within the LAA.</li> </ul> |                 |  |                   |           |              |            |                 |                                       |                 |  |

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| Potential Effect<br>(and Measurable Parameters)   | Mitigation Measures  | Activity  |           |         | Residual Effect   |           |                   |        |            |            |               |                                       |                       |
|---|--|---|-----------|---------|---|-----------|-------------------|--------|------------|------------|---------------|---------------------------------------|-----------------------|
|   |  | Construction  | Operation | Closure | Direction   | Magnitude | Geographic Extent | Timing | Frequency  | Duration   | Reversibility | Ecological and Socio-Economic Context | Significance          |
| <b>Change in groundwater quality</b><br><ul style="list-style-type: none"> <li>Change in concentration of physical and chemical parameters in groundwater directly related to Project activities (mg/L or µg/L).</li> </ul> | <b>Construction, Operation, and Closure:</b> <ul style="list-style-type: none"> <li>Removal of contaminated soils from the historical process plant areas and manage them in accordance with the Soil Management Plan (SMP). A Conceptual SMP is provided in Appendix M9.</li> <li>Installation of a subsurface seepage collection system around the base of the historical MacLeod high tailings to collect seepage and groundwater recharge from the tailings. For the purposes of this effects assessment, and to maintain a conservative approach, the collection of groundwater within the subsurface seepage collection ditches around the historical MacLeod high tailings was not considered as a mitigation measure in the modelling and water quality predictions.</li> <li>Design of the WRSAs to increase the amount of runoff and reduce the amount of infiltration through the WRSAs, thereby reducing the recharge and loading to groundwater.</li> <li>Installation of contact water collection ditches around the overburden storage area, ore stockpile and WRSAs to collect toe seepage and groundwater recharge from these Project components. For the purposes of this effects assessment, and to maintain a conservative approach, the collection of groundwater within the contact water collection ditches around the overburden storage area, ore stockpile and WRSAs was not considered as a mitigation measure in the modelling and water quality predictions.</li> <li>Installation of seepage collection ditches around the TMF to collect seepage from the TMF dam and groundwater recharge originating from the TMF. A conservative design depth of 1.5 m bgs was used in the modelling to predict seepage collection and the assessment of water quality effects. Seepage collection is an integral component of the TMF design, and is therefore included in the effects assessment as mitigation.</li> </ul> <b>Construction:</b> <ul style="list-style-type: none"> <li>Limit construction footprint (i.e., PDA) to the extent possible to reduce the potential for reductions in groundwater recharge, and limit the number of watersheds overprinted by the PDA.</li> </ul> | ✓   | ✓         | ✓       | Positive  | Moderate  | LAA               | N/A    | Continuous | Long-term  | Irreversible  | Atypical                              | N/A (Positive Effect) |
|   |  | <b>Improvement in water quality due to removal of a portion of the historical tailings and management of contaminated soil:</b> <ul style="list-style-type: none"> <li>The removal of a portion of the historical tailings and contaminated soil will result in a decrease in mass loadings to Kenogamis Lake and in improvements to groundwater quality within the LAA/RAA relative to baseline conditions. This effect on groundwater quality is predicted to extend beyond the closure phase.</li> </ul> | -         | ✓       | ✓   | Positive  | Moderate          | LAA    | N/A        | Continuous | Long-term     | Irreversible                          | Atypical              |
|   |  |   |           |         | <b>Improvement in groundwater quality due to groundwater discharge from TMF, WRSAs, and/or historical tailings:</b> <ul style="list-style-type: none"> <li>The Project will result in improved groundwater quality in some areas of the PDA near the historical tailings, but a slight decrease in groundwater quality in areas near the WRSAs and TMF. For parameters predicted to increase in concentrations relative to baseline conditions they are expected to remain below the regulatory limits at the point of discharge. No existing or foreseeable groundwater users are located in the areas with groundwater quality that exceeds the ODWQS. The change in water quality will begin during operation and continue throughout and beyond closure.</li> </ul> |           |                   |        |            |            |               |                                       |                       |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Removal of approximately 22% of the historical MacLeod tailings and 77% of the historical Hardrock tailings and their placement within the new TMF. This will reduce the chemical loading from the historical tailings to groundwater and surface water and result in an improvement to groundwater quality.</li> <li>Installation of an enhanced cover over the remaining historical MacLeod high tailings to reduce infiltration and increase runoff, thereby further reducing loadings to groundwater and surface water.</li> <li>Implementation of progressive rehabilitation (placement of a vegetated soil cover) to reduce infiltration into the WRSAs and TMF, thereby reducing the amount of water and loading to groundwater and improvements to groundwater quality.</li> <li>Implementation of cyanide detoxification technology to reduce cyanide concentrations and precipitate metals in the process plant, resulting in an improvement in water quality within the TMF.</li> </ul> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Implementation of progressive rehabilitation (placement of a vegetated soil cover) to reduce infiltration into the WRSAs and TMF, thereby reducing the amount of water and loading to groundwater and improvements to groundwater quality.</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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| Potential Effect<br>(and Measurable Parameters)   | Mitigation Measures   | Activity     |           |         | Residual Effect      |           |                   |        |            |           |                             |                                       |                 |
|---|---|--------------|-----------|---------|----------------------|-----------|-------------------|--------|------------|-----------|-----------------------------|---------------------------------------|-----------------|
|   |   | Construction | Operation | Closure | Direction            | Magnitude | Geographic Extent | Timing | Frequency  | Duration  | Reversibility               | Ecological and Socio-Economic Context | Significance    |
| <b>VALUED COMPONENT: SURFACE WATER</b>  |   |              |           |         |                      |           |                   |        |            |           |                             |                                       |                 |
| <b>Pathway to other VCs:</b> groundwater, fish and fish habitat, vegetation communities, wildlife and wildlife habitat, land and resource use, traditional land and resource use, human and ecological health   |   |              |           |         |                      |           |                   |        |            |           |                             |                                       |                 |
| <b>Pathway from other VCs:</b> groundwater, atmospheric environment   |   |              |           |         |                      |           |                   |        |            |           |                             |                                       |                 |
| <b>Area of Federal Jurisdiction:</b> CEAA, 2012 – changes to the physical environment (surface water), effects of changes to the environment on Aboriginal people (health conditions). Federal decision – Metal Mining Effluent Regulations.  |   |              |           |         |                      |           |                   |        |            |           |                             |                                       |                 |
| <p><b>Change in surface water quantity</b></p> <ul style="list-style-type: none"> <li>Change in surface water levels (m) in waterbodies and flows (m<sup>3</sup>/s) in watercourses – percentage change from baseline.</li> <li>Change in drainage areas (km<sup>2</sup>) and drainage patterns.</li> </ul>   | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>Reduce Project effluent discharge by reusing contact water in Project processes.</li> <li>Maintain existing drainage patterns with the use of culverts.</li> <li>Maintain access roads by periodically regrading and ditching to improve water flow, reduce erosion and manage vegetation growth.</li> <li>Inspect culverts periodically. Remove accumulated material and debris upstream and downstream of the culverts to prevent erosion, flooding, habitat damage, property damage and mobilization of sediment.</li> <li>Attenuate peak discharges to the environment through use of Project water storage features (i.e., historical underground workings, and contact water collection ponds).</li> <li>Design and construction of the Goldfield Creek diversion channel extending easterly from the north end of the TMF into the Southwest Arm Tributary to convey the peak flow from the EDF (the more severe of a 100 year 24-hour rainfall event and a 100 year 30-day freshet). The diversion channel floodplain has been sized to accommodate the flows from the TMF spillway and Goldfield Creek in events greater than the 100 year storm, and has the capacity to pass flows up to and including the PMF event. The diversion dam will be constructed on Goldfield Creek south of Lake GFP4 and north of the ultimate TMF dam. The diversion channel design accounts for the post-closure condition when runoff from the TMF will be directed (through the closure spillway) in to the diversion channel (Greenstone Gold Mines Tailings Management Facility Design Hardrock Feasibility Study; Appendix K1.2).</li> <li>Habitat offsetting through natural channel design for changes in drainage alignment for the Goldfield Creek diversion and to accommodate increased flows in the Southwest Arm Tributary from</li> </ul> | ✓            | ✓         | ✓       | Positive/<br>Adverse | Low       | LAA               | N/A    | Continuous | Long-term | Reversible/<br>irreversible | Typical                               | Not significant |
| <p><b>Change in surface water quantity:</b></p> <ul style="list-style-type: none"> <li>It is predicted that the Project is likely to cause reduction in surface water quantity at the LAA boundary during construction, operation and closure due to sequestration of water to tailings pore spaces and open pit filling period, but increase after the pit lake begins to discharge to slightly above baseline conditions. Changes in surface water quantity at the LAA boundary for Kenogamisis Lake system is considered long-term, as there will be continuous discharge from the open pit lake to the Southwest Arm of Kenogamisis Lake extended beyond active closure, and effects on Goldfield Creek, Southwest Arm Tributary and first order watercourses overprinted by the Project components are expected to extend beyond active closure. Predicted changes in water quantity for Kenogamisis Lake system at the LAA boundary are considered as within the range of natural variability.</li> </ul> |   |              |           |         |                      |           |                   |        |            |           |                             |                                       |                 |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p>the Goldfield Creek diversion (Draft Fisheries Offset Plan; Appendix F10). The compensatory measures including:</p> <ul style="list-style-type: none"> <li>- development of approximately 7.5 ha of new pond habitat at the interface between the existing Goldfield Creek and the new diversion channel (referred to as the Goldfield Creek diversion pond)</li> <li>- construction of a new approximately 2.7 km Goldfield Creek (bankfull channel dimension) diversion channel between the Goldfield Creek diversion pond and the existing Southwest Arm Tributary watercourse (SWP1)</li> <li>- reconstruct the existing Southwest Arm Tributary channel between SWP2 and SWP3 to convey larger flows and facilitate the replacement of the existing Lahtis Road crossing</li> <li>- construct two valley wide grade control structures within the existing Southwest Arm Tributary to impound and attenuate flows, and reduce water velocities to mitigate erosion due to increased flows.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• Limit construction footprint (i.e., PDA) to the extent practicable.</li> <li>• Dewatering the historical Macleod-Mosher and Hardrock underground workings and maintaining approximately 25 m dewatered condition between the active open pit floor and the water level in the underground workings.</li> <li>• Drawing potable water from a connection to the Greenstone municipal water supply system.</li> <li>• Construction and use of perimeter runoff and contact water collection ditches to collect overland flow, seepage, and intercept shallow groundwater flow, and divert freshwater away from Project components.</li> <li>• Contact water collection ditches designed to convey the 1:100 year storm event.</li> <li>• Contact water collection ditches with positive gradients to limit standing water, maintain positive flow and act as interception ditches for groundwater.</li> <li>• Contact water collection ponds designed to provide onsite storage of local runoff with the size and residence times designed to provide</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|---|--|--------------|-----------|---------|-----------------|-----------|----------------------|--------|-----------|----------|---------------|---|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic<br>Extent | Timing | Frequency | Duration | Reversibility | Ecological and<br>Socio-Economic<br>Context |
|   | <p>sediment removal to meet the MMER effluent TSS criterion of 15 mg/L, with removal of particles down to the 5 micron (<math>\mu</math>) in size.</p> <ul style="list-style-type: none"> <li>• Contact water collection ponds designed to contain (without discharge) flows resulting from the 1:100 year, 24-hour storm event, including emergency spillways and maintaining minimum freeboard of 0.5 m. The emergency spillways will enable the collection ponds to attenuate and manage larger storms than the 1:100 year up to the Timmins regulatory storm event (which is a larger runoff event than the 1:500 year event).</li> <li>• Contact water collection ponds designed with active water storage that considers ice thickness during winter. Under an extreme storm event, such as Timmins storm, only the stormwater in excess of the available storage at that time will be discharged to the environment via the emergency spillway to protect the collection ponds.</li> <li>• Pond inlet and outlet structures configured to reduce inlet velocity and scour and meet sedimentation requirements.</li> <li>• Pond outlets designed with subsurface inlets to mitigate against chemical stratification in ponds, thermal heating of discharge and ice blockage of outlets.</li> <li>• Design and construction of the temporary ditch to divert runoff from Goldfield Creek watershed between the Goldfield Creek diversion dam and the TMF inner dam towards the upper drainage area of watercourse WC-O. The temporary diversion ditch is sized to convey the peak flow from the 1:100 year 24-hour storm and the Regional storm event (i.e. Timmins storm) without risk of substantial erosion. The temporary diversion ditch is also sized to convey the peak flow from the PMF without discharging flow through the low topographic saddle forming a part of the TMF containment system during early TMF operation. No additional hardening of WC-O is proposed to accommodate extreme flow bypass as flow velocities are estimated to be relatively low and the risk of extreme storm occurrence is low.</li> <li>• Potential mitigation for changes in groundwater discharge and flow in surface water features near the aggregate source areas can be</li> </ul> |              |           |         |                 |           |                      |        |           |          |               |   |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p>mitigated by directing dewatering water to the receiving environment to augment any changes in flows.</p> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Mitigation measures for the construction phase are also applicable to the operation phase except limiting the construction footprint.</li> <li>Implement progressive rehabilitation (e.g., placement of soil cover and vegetation) to reduce infiltration into the WRSA and TMF by increasing the evapotranspiration capacity</li> <li>Collection of runoff and groundwater seepage from the open pit, with water directed to the historical underground workings associated with the historical MacLeod-Mosher and Hardrock mines via drainage shafts bored through the active open pit floor.</li> <li>Excess water will be pumped to pond M1 and then to the Southwest Arm of Kenogamisis Lake following treatment as needed.</li> <li>Perimeter grading and access roads to divert runoff away from the open pit.</li> <li>Recycling of contact water for ore processing.</li> <li>Taking process water, in order of preference, from the TMF, pond M1, and excess water from the historical underground workings and open pit dewatering.</li> <li>Balancing the timing of recycling from sources, which will relieve storage pressures on contact water collection ponds, provide a more sustainable, seasonally attenuated mill demand system, and moderate the flows to the ETP.</li> <li>TMF designed with two cells to allow progressive development and rehabilitation of the TMF during operation to reduce water management requirements.</li> <li>TMF dam designed to maintain water storage to contain the Environmental Design Flood (EDF), a 100-year return hydrologic event (24-hour storm or freshet event) with no discharge through the spillway (Greenstone Gold Mines Tailings Management Facility Design Hardrock Feasibility Study; Appendix K1.2). To address extreme weather events, an emergency spillway will be maintained to safely pass the Inflow Design Flood while maintaining minimum freeboards requirements to protect the structural integrity of the dam. The Inflow Design Flood is taken as the PMF event generated by the theoretical maximum precipitation that could fall in the area which is 361 mm.</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|---|---|--------------|-----------|---------|---|-----------|-------------------|--------|------------|-----------|---------------|---------------------------------------|-----------------------|
|   |   | Construction | Operation | Closure | Direction   | Magnitude | Geographic Extent | Timing | Frequency  | Duration  | Reversibility | Ecological and Socio-Economic Context | Significance          |
|   | <p>The PMF runoff exceeds the Timmins Storm event (193 mm) by nearly two the total.</p> <ul style="list-style-type: none"> <li>Dam runoff and seepage captured in seepage collection ditches downstream of the dams and pumped back to the TMF via three seepage collection ponds (T1, T2 and T3, Figure 10 34). The normal operation levels in the seepage collection ponds are designed to be lower than those of the surrounding water table, creating a positive (reverse) hydraulic gradient such that minimal seepage will escape the collection system. The collection ponds have been sized to contain runoff from the EDF (a 1:100 year, 24-hour storm). The ponds and design pump capacity have been designed to store water for 14 days while water from the pond is pumped back to the TMF.</li> </ul> <p>Design and operate the TMF with no discharge to the environment during operation through reclaiming and recycling surplus water from the TMF to meet mill demand during operation.</p>                    |              |           |         |   |           |                   |        |            |           |               |                                       |                       |
| <p><b>Change in surface water quality</b></p> <ul style="list-style-type: none"> <li>Change in concentration of physical and chemical parameters in surface water directly related to Project activities (mg/L or µg/L).</li> </ul> | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>Implement progressive erosion and sediment control measures during construction.</li> <li>Implement progressive water management over the life of the mine including development of drainage controls for areas only prior to the development and expansion of these features.</li> <li>In addition to the WMMP, implementation of the Soil Management Plan, Waste Rock Management Plan, Waste Management Plan and Spill Prevention and Response Plan.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Limit construction footprint (i.e., PDA) to the extent possible.</li> <li>Third party sewage disposal contractor to provide portable washroom facilities with offsite disposal until the STP and sewage discharge line are set-up.</li> <li>Treat the dewatering water from the historical underground workings prior to the discharge to the Southwest Arm of Kenogamisis Lake using</li> </ul> | -            | ✓         | ✓       | Positive  | Low       | LAA               | N/A    | Continuous | Long-term | Irreversible  | Atypical                              | N/A (positive effect) |
|   |   |              |           |         | <p><b>Change in surface water quality due to treated effluent discharge, contact water, groundwater discharge, seepage and removal of a portion of historical tailings:</b></p> <ul style="list-style-type: none"> <li>All PoPCs above the PWQO/Interim PWQO in baseline are predicted to improve in water quality and all PoPCs meeting the PWQO/ Interim PWQO in baseline remain below the PWQO/Interim PWQO. At the Kenogamisis Lake outlet water quality effects are even further reduced and mitigated with Policy 1 PoPCs maintaining Policy 1 status and Policy 2 PoPCs (only arsenic) undergoing water quality improvement relative to baseline conditions, meeting the intent of the Policy 2 objective. For predicted water quality changes within the Kenogamisis Lake system at the LAA boundary, parameters with concentrations change within the range of natural variability.</li> </ul> |           |                   |        |            |           |               |                                       |                       |

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|--|---|--------------|-----------|---------|----------------------|-----------|-------------------|--------|------------|-----------|---------------|---------------------------------------|--------------------------|
|  |   | Construction | Operation | Closure | Direction            | Magnitude | Geographic Extent | Timing | Frequency  | Duration  | Reversibility | Ecological and Socio-Economic Context | Significance             |
|  | <p>the construction ETP during construction until the permanent ETP has been constructed and commissioned for use.</p> <ul style="list-style-type: none"> <li>• Treat effluent discharge to the receiving water environment where required to effluent criteria developed through the receiving water Assimilative Capacity TDR (Appendix F6).</li> <li>• Maintain access roads by periodically regrading and ditching to improve water flow, reduce erosion and manage vegetation growth.</li> <li>• Maintain culverts to avoid debris and sediment accumulation.</li> <li>• Implement dust suppression measures for exposed ground areas of the PDA.</li> <li>• The subsurface seepage system will address both short term seepage anticipated during construction and highway embankment pre-loading and long term seepage (operation and closure/post-closure) from the historical MacLeod high tailings. Seepage collected will drain by gravity to two collection ponds located west and east side of the tailings. The collection ponds will be lined with a 40 mil high density polyethylene geomembrane and designed to contain the 100-year 24 hour rainfall event and 7 days of seepage accumulation to account for possible power outage and prolonged maintenance.</li> <li>• The subsurface collection system for the historical MacLeod high tailings will separate seepage from surface water runoff that will be collected within the seepage collection ditches.</li> <li>• Water from the seepage collection ponds will be pumped to the construction ETP for treatment prior to discharge during construction and either to the process plant to meet reclaim demands or the permanent ETP during operation.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• The mitigation measures for the construction phase also apply to the operation phase (with the exception of the first two bullets).</li> <li>• Use perimeter berms to divert non-contact runoff from disturbed areas.</li> <li>• Removal of approximately 22% of the historical MacLeod tailings and 77% of the historical Hardrock tailings and their placement within the new TMF.</li> <li>• Promote the collection, storage and reuse of contact water (runoff and seepage), only discharging excess water after reuse and treatment as necessary.</li> </ul> | ✓            | ✓         | ✓       | Positive/<br>Adverse | Moderate  | LAA               | N/A    | Continuous | Long-term | Irreversible  | Atypical                              | N/A<br>(positive effect) |
| <p><b>Change in surface water quality due to effluent discharge from the open pit:</b></p> <ul style="list-style-type: none"> <li>• The direction of changes in surface water quality at the LAA boundary within the Kenogamisis Lake system are expected to be positive for parameters with concentrations predicted to reduce during closure; and adverse for parameters with concentrations predicted to increase during closure. For predicted water quality changes within the Kenogamisis Lake system at the LAA boundary, parameters with concentration changes within the range of natural variability are considered low; parameters with concentration changes exceeding the natural variability of baseline condition but is within the PWQO and CWQG-FAL limits. Duration of changes in water quality within the LAA related to pit lake discharge is considered long-term, extending throughout and beyond post-closure.</li> </ul> |   |              |           |         |                      |           |                   |        |            |           |               |                                       |                          |

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|---|---|--------------|-----------|---------|-----------------|-----------|----------------------|--------|-----------|----------|---------------|---|--------------|
|   |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic<br>Extent | Timing | Frequency | Duration | Reversibility | Ecological and<br>Socio-Economic<br>Context | Significance |
|   | <ul style="list-style-type: none"> <li>Use site-distributed contact water collection ponds and historical underground workings to store runoff and provide initial sedimentation.</li> <li>Provide storage capacity in contact water collection ponds to the 1:100 year return period event to reduce the potential for pond overflow from extreme events.</li> <li>Maintain effluent discharge rates to below the maximum rate used in the Assimilative Capacity TDR (Appendix F6).</li> <li>Implement progressive rehabilitation and closure plans, including progressive rehabilitation (placement of soil cover and vegetation) to reduce infiltration by increasing the evapotranspiration capacity and control runoff.</li> <li>A subsurface seepage collection system consisting of a French drain system incorporated into the stabilization berm along the toe of the historical MacLeod high tailings during the initial construction works.</li> <li>Design of the TMF with a system to collect dam seepage and runoff, with pumping back to the TMF (Appendix M1).</li> <li>Cyanide detoxification within the mill using the SO<sub>2</sub>/air oxidation process resulting in the degradation of cyanide and precipitation of metals, iron, arsenic and antimony in particular, to the extent practical (Appendix M1).</li> <li>Building and operating an ETP to collect and treat (as required) surplus contact water before discharge to the environment, with effluent to meet MMER/O.Reg. 560/94 effluent criteria and MOECC ECA effluent criteria requirements.</li> <li>Reduction in atmospheric deposition to surface water due to the implementation of air emission and dust controls.</li> <li>A sewage treatment and disposal system to serve the mine site.</li> <li>Effluent treated to meet regulatory requirement and co-discharged with the treated effluent to the Southwest Arm of Kenogamisis Lake</li> </ul> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Implement progressive rehabilitation and closure plans, including progressive rehabilitation (placement of soil cover and vegetation) to reduce infiltration by increasing the evapotranspiration capacity and control runoff.</li> </ul> |              |           |         |                 |           |                      |        |           |          |               |   |              |

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|---|---|--------------|-----------|---------|-----------------|-----------|-------------------|--------|------------|-------------|---------------|---------------------------------------|-----------------|
|   |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
|   | <ul style="list-style-type: none"> <li>Third party sewage disposal contractor to provide portable washroom facilities with offsite disposal until the STP and sewage discharge line are set up.</li> <li>Water from each of the surface water discharge points will be managed on site until water quality consistently meets effluent criteria.</li> </ul>   |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <b>VALUED COMPONENT: FISH AND FISH HABITAT</b>  |   |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <b>Pathway to other VCs:</b> land and resource use, traditional land and resource use, human and ecological health<br><b>Pathway from other VCs:</b> acoustic environment, surface water  |   |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <b>Area of Federal Jurisdiction:</b> CEAA, 2012 – effects on VCs (fish and fish habitat), effects of changes to the environment on Aboriginal people (health conditions). Federal decisions – Authorization for Works Affecting Fish Habitat, Metal Mining Effluent Regulations.  |   |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <b>Lethal and sub-lethal effects on fish</b> <ul style="list-style-type: none"> <li>Direct mortality of fish measured by species, numbers and age classes killed.</li> <li>Peak particle velocity (PPV).</li> <li>Instantaneous pressure.</li> <li>Chronic toxicological effects on fish and other biota as measured by PoPC (e.g., mercury and arsenic) in water (mg/L) or body tissue (µg/g) and by toxicity testing (% mortality, % inhibition, and lethal body concentrations in µg/g). EEM regulated end-points including Condition Factor (CF), Gonadal Somatic Index (GSI), and Liver Somatic Index (LSI).</li> </ul>  | <b>Construction, Operation and Closure:</b> <ul style="list-style-type: none"> <li>Limit duration of in-water work.</li> <li>Conduct instream work during periods of low flow (e.g., summer, fall, or winter) to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.</li> <li>Design and plan activities and works in waterbodies such that loss or disturbance to aquatic habitat is limited and sensitive habitats are avoided.</li> <li>Comply with spring timing window for in-water work. The timing window for Northwestern Ontario restricts in-water work from April 1 to June 20 for spring spawning species (e.g., Northern Pike and Walleye). This timing restriction would apply to work within and adjacent to water (i.e. within 30 m of water) for the entire PDA. Where a timing window exemption may be required, work with MNRF and DFO to seek an exemption and avoid adverse effects on fish.</li> <li>Comply with coldwater timing window for in-water work. The timing window for Northwestern Ontario restricts in-water work between September 1 and May 31 for fall spawning species present in the LAA (e.g., Cisco and Lake Whitefish). This timing restriction would apply to work within and adjacent to Kenogamisis Lake (i.e. within 30 m) and other work areas with the potential to affect Cisco and Lake Whitefish spawning activity. Work in Kenogamisis Lake would follow both the spring and fall avoidance periods, unless approved beforehand by the MNRF and DFO, resulting in an in-water construction window of June 21 to August 30. Where a timing window</li> </ul> | ✓            | ✓         | ✓       | Adverse         | Low       | LAA               | N/A    | Continuous | Medium-Term | Reversible    | Typical                               | Not significant |
| <b>Sub-lethal effects on fish due to PoPC inputs from treated effluent and non-point sources:</b> <ul style="list-style-type: none"> <li>Concentrations of PoPCs in the mixing zone will not be acutely lethal to fish. The magnitude of sub-lethal effects is considered low because, due to the geographic range of fish, long-term exposure is not anticipated, especially given the overall predictions of improved water quality on a lake-wide basis. Furthermore, baseline data from Barton Bay, where concentrations of arsenic are currently higher than those predicted for all other basins as a result of the Project, do not indicate adverse effects on fish or other aquatic species tested. Concentrations will be above applicable guidelines at some locations, but the sustainability and productivity of CRA fisheries will not be affected.</li> </ul> |   |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p>exemption may be required, work with MNRF and DFO to seek an exemption and avoid adverse effects on fish.</p> <ul style="list-style-type: none"> <li>Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.</li> <li>Follow the "Hardrock Project Conceptual Water Management and Monitoring Plan" (Conceptual WMMP; Appendix M1), which been developed to divert noncontact water around Project components and to collect and manage contact water.</li> <li>Implement a SPRP immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit will be kept onsite.</li> <li>Promptly stabilize shoreline or banks disturbed by activities associated with the Project to prevent erosion and/or sedimentation, preferably through revegetation with native species appropriate for the site.</li> <li>Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.</li> <li>Design the effluent treatment plant (ETP) to treat effluent to levels that will not be acutely toxic in the effluent, will not have chronic toxicity outside the mixing zone, and will meet applicable guidelines outside the mixing zone.</li> <li>Limit access to waterbodies and banks to protect riparian vegetation and limit bank erosion.</li> <li>Maintain equipment to be used in water in a clean condition, free of fluid leaks and aquatic invasive species.</li> <li>Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that limits disturbance to the banks and bed of the waterbody.</li> <li>Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.</li> <li>Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible banks and beds (e.g., dominated by organic materials and silts). For fording equipment without a temporary crossing structure, use stream bank and bed</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p>protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.</p> <ul style="list-style-type: none"> <li>Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent deleterious substances from entering the water.</li> <li>Implement an ESCP for the site to reduce risk of sedimentation of waterbodies during all phases of the Project. ESC measures will be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The ESCP will be based on standard specifications such as Ontario Provincial Standard Specifications (OPSS), in particular, OPSS 805 (Construction Specification for temporary ESC measures), OPPS, PROV 182 (General Specification for Environmental Protection for construction in Waterbodies and on Waterbody Banks) and OPSS 206 (Grading).</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Within the construction timing window, schedule in-water work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.</li> <li>Treat and handle building material used in water in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.</li> <li>Design and construct approaches to waterbodies such that they are perpendicular to the watercourse to reduce loss or disturbance to riparian vegetation.</li> <li>Undertake all in-water activities, or installation of associated in-water structures, such that interference with fish passage, reduction in channel width, or reduction in flows is limited.</li> <li>Retain a qualified environmental professional to confirm that applicable permits for relocating fish are obtained and to capture fish trapped within an isolated/enclosed area at the work site and relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the PDA.</li> <li>Avoid using explosives in or near water where possible. To mitigate potential blasting effects on fish, a blasting plan will be developed if and as required. DFO provides guidelines for the use of explosives on</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|   |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p>their website (<a href="http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html">http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html</a>).</p> <ul style="list-style-type: none"> <li>• Design water intake and treated effluent discharge location to prevent entrainment or impingement of fish and to prevent scour erosion. This includes temporary intakes for dewatering during construction. Water intake structures will be designed following the Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995). Designs will be based on site-specific parameters including anticipated fish use and resident fish species.</li> <li>• Follow the WRMP; a conceptual version is provided in Appendix M2.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• Keep clearing of riparian vegetation to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.</li> <li>• Limit the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.</li> <li>• Undertake all in-water activities, or installation of associated in-water structures, such that interference with fish passage, reduction in channel width, or reduction in flows is limited.</li> <li>• Design water intake and treated effluent discharge location to prevent entrainment or impingement of fish and to prevent scour erosion. This includes temporary intakes for dewatering during construction. Water intake structures will be designed following the Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995). Designs will be based on site-specific parameters including anticipated fish use and resident fish species.</li> <li>• Implement a Blasting Plan for the Project to reduce risk of lethal or sub-lethal effects on fish, changes in bank stability and composition and sedimentations within Kenogamisis Lake. Blasting Plan measures would be followed for the construction and operation phases of the Project.</li> </ul> <p><b>Closure:</b></p> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|--|---|--------------|-----------|---------|-----------------|-----------|-------------------|------------|------------|-------------|---------------|---------------------------------------|-----------------|
|  |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing     | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
|  | <ul style="list-style-type: none"> <li>• Within the construction timing window, schedule in-water work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.</li> <li>• Treat and handle building material used in water in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.</li> <li>• Design and construct approaches to waterbodies such that they are perpendicular to the watercourse to reduce loss or disturbance to riparian vegetation.</li> <li>• Undertake all in-water activities, or installation of associated in-water structures, such that interference with fish passage, reduction in channel width, or reduction in flows is limited.</li> <li>• Retain a qualified environmental professional to confirm that applicable permits for relocating fish are obtained and to capture fish trapped within an isolated/enclosed area at the work site and relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the PDA.</li> <li>• Avoid using explosives in or near water where possible. To mitigate potential blasting effects on fish, a blasting plan will be developed if and as required. DFO provides guidelines for the use of explosives on their website (<a href="http://www.dfo-mpo.gc.ca/pnw-ppe/measurements-mesures/index-eng.html">http://www.dfo-mpo.gc.ca/pnw-ppe/measurements-mesures/index-eng.html</a>).</li> </ul> |              |           |         |                 |           |                   |            |            |             |               |                                       |                 |
| <p><b>Permanent alteration of fish habitat</b></p> <ul style="list-style-type: none"> <li>• Fish habitat quality as prescribed in the Ontario Stream Assessment Protocol, including stream morphology (e.g., percent riffle, percent pool), substrate types (e.g., percent detritus, percent gravel), and percent cover.</li> <li>• Water quantity as measured by lake levels (m amsl) and stream discharge (m<sup>3</sup>/s).</li> <li>• Water quality parameters that influence fish habitat including</li> </ul>  | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>• Design and plan activities and works in waterbodies such that loss or disturbance to aquatic habitat is limited and sensitive habitats are avoided.</li> <li>• Undertake all in-water activities, or installation of associated in-water structures, such that interference with fish passage, reduction in channel width, or reduction in flows is limited.</li> <li>• Implement an ESCP for the site to reduce risk of sedimentation of waterbodies during all phases of the Project. ESC measures will be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The ESCP will be based on standard specifications such as Ontario Provincial Standard Specifications (OPSS), in particular, OPSS 805 (Construction Specification for temporary ESC measures), OPPS, PROV 182 (General</li> </ul>  | ✓            | ✓         | -       | Adverse         | Low       | LAA               | Applicable | Continuous | Medium-term | Reversible    | Typical                               | Not significant |
| <p><b>Permanent alteration of fish habitat due to nutrient inputs from treated effluent and non-point sources:</b></p> <ul style="list-style-type: none"> <li>• The alteration to fish habitat is predicted to be less than applicable guidelines, legislated requirements and/or federal and provincial management objectives. Predicted concentrations are lower than the Interim PWQO and the predicted 3% increase in total phosphorus for the Southwest Arm is smaller than that required to cause a change in trophic status, as defined in the <i>Lakeshore Capacity Assessment Handbook</i>. Effects on sustainability and productivity of CRA fish populations within the LAA are not anticipated.</li> </ul> |   |              |           |         |                 |           |                   |            |            |             |               |                                       |                 |

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|---|---|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|
|   |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context |
| <p>water temperature (°C), dissolved oxygen (DO) (mg/L), TSS (mg/L), pH (pH units), nutrients and chlorophyll a (mg/L).</p> <ul style="list-style-type: none"> <li>• Concentration of PoPC in sediment (typically µg/g)</li> <li>• Benthic invertebrate abundance (number of organisms per m<sup>2</sup>), species diversity (number of species per m<sup>2</sup>) and chlorophyll a concentrations in water (µg/L).</li> <li>• Changes in bank composition or stability as indicated by bank slope (% slope).</li> <li>• Presence (presence/absence) and abundance (catch per unit effort) of fish.</li> <li>• Estimate of lost productivity based on fish condition factor (length/ weight relationship), growth (age/length relationship), and reproductive condition (gonad weight and fecundity).</li> </ul> | <p>Specification for Environmental Protection for construction in Waterbodies and on Waterbody Banks) and OPSS 206 (Grading).</p> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• Keep clearing of riparian vegetation to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.</li> <li>• Limit the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.</li> <li>• Design and construct approaches to waterbodies such that they are perpendicular to the watercourse to reduce loss or disturbance to riparian vegetation.</li> <li>• Promptly stabilize shoreline or banks disturbed by activities associated with the Project to prevent erosion and/or sedimentation, preferably through revegetation with native species appropriate for the site.</li> <li>• Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage would be restored.</li> <li>• Where replacement rock reinforcement or armouring is required to stabilize eroding or exposed areas, use appropriately-sized, clean rock, and install rock at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.</li> <li>• Remove all construction materials from site upon Project completion.</li> <li>• Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.</li> <li>• Avoid using explosives in or near water where possible. To mitigate potential blasting effects on fish, a blasting plan will be developed if and as required. DFO provides guidelines for the use of explosives on their website (<a href="http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html">http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html</a>).</li> <li>• Design the effluent treatment plant (ETP) to treat effluent to levels that will not be acutely toxic in the effluent, will not have chronic toxicity</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context |
|   | <p>outside the mixing zone, and will meet applicable guidelines outside the mixing zone.</p> <ul style="list-style-type: none"> <li>• Detoxification of cyanide (used to process the ore and extract gold) in effluent prior to discharge to TMF (closed system during operation; cyanide destruction at closure).</li> <li>• Limit access to waterbodies and banks to protect riparian vegetation and limit bank erosion.</li> <li>• Maintain equipment to be used in water in a clean condition, free of fluid leaks and aquatic invasive species.</li> <li>• Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that limits disturbance to the banks and bed of the waterbody.</li> <li>• Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.</li> <li>• Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible banks and beds (e.g., dominated by organic materials and silts). For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.</li> <li>• Design and install culverts in a way that prevents the creation of barriers to fish movement, and maintains bank full channel functions and habitat functions including: <ul style="list-style-type: none"> <li>– embedment</li> <li>– re-instatement of low flow channel and native substrates</li> <li>– proper sizing</li> <li>– maintaining adequate channel slope.</li> </ul> </li> <li>• Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.</li> <li>• Habitat offsetting for the loss of fish habitat that cannot be avoided or mitigated will employ a natural channel design and incorporate</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <p>habitat attributes as provided in the Draft Fisheries Offset Plan (Appendix F10).</p> <ul style="list-style-type: none"> <li>Implement a Blasting Plan for the Project to reduce risk of lethal or sub-lethal effects on fish, changes in bank stability and composition and sedimentations within Kenogamisis Lake. Blasting Plan measures would be followed for the construction and operation phases of the Project.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Follow the "Hardrock Project Conceptual Water Management and Monitoring Plan" (Conceptual WMMP; Appendix M1), which been developed to divert noncontact water around Project components and to collect and manage contact water.</li> <li>Design the effluent treatment plant (ETP) to treat effluent to levels that will not be acutely toxic in the effluent, will not have chronic toxicity outside the mixing zone, and will meet applicable guidelines outside the mixing zone.</li> <li>Detoxification of cyanide (used to process the ore and extract gold) in effluent prior to discharge to TMF (closed system during operation; cyanide destruction at closure).</li> </ul> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Follow the "Hardrock Project Conceptual Water Management and Monitoring Plan" (Conceptual WMMP; Appendix M1), which been developed to divert noncontact water around Project components and to collect and manage contact water.</li> <li>Promptly stabilize shoreline or banks disturbed by activities associated with the Project to prevent erosion and/or sedimentation, preferably through revegetation with native species appropriate for the site.</li> <li>Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage would be restored.</li> <li>Where replacement rock reinforcement or armouring is required to stabilize eroding or exposed areas, use appropriately-sized, clean rock, and install rock at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.</li> <li>Remove all construction materials from site upon Project completion.</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|---|---|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|   |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
|   | <ul style="list-style-type: none"> <li>Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.</li> <li>Limit access to waterbodies and banks to protect riparian vegetation and limit bank erosion.</li> </ul>   |              |           |         |                 |           |                   |        |           |          |               |                                       |              |
| <b>Loss of fish habitat</b><br><ul style="list-style-type: none"> <li>Fish habitat type and quantity as measured by aerial extent of loss (m<sup>2</sup>).</li> </ul>   | <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Implement a SPRP immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit will be kept onsite.</li> <li>Design and install culverts in a way that prevents the creation of barriers to fish movement, and maintains bank full channel functions and habitat functions including: <ul style="list-style-type: none"> <li>embedment</li> <li>re-instatement of low flow channel and native substrates</li> <li>proper sizing</li> <li>maintaining adequate channel slope.</li> </ul> </li> <li>Habitat offsetting for the loss of fish habitat that cannot be avoided or mitigated will employ a natural channel design and incorporate habitat attributes as provided in the Draft Fisheries Offset Plan (Appendix F10).</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Follow the "Hardrock Project Conceptual Water Management and Monitoring Plan" (Conceptual WMMP; Appendix M1), which been developed to divert noncontact water around Project components and to collect and manage contact water.</li> </ul> <p>Implement a SPRP immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit will be kept onsite.</p> | -            | -         | -       | -               | -         | -                 | -      | -         | -        | -             | -                                     | N/A          |
| <p><b>VALUED COMPONENT: VEGETATION COMMUNITIES</b></p> <p><b>Pathway to other VCs:</b> wildlife and wildlife habitat, land resource use, traditional land and resource use, human and ecological health</p> <p><b>Pathway from other VCs:</b> atmospheric environment, groundwater, surface water</p> <p><b>Area of Federal Jurisdiction:</b> CEAA, 2012 – changes to the physical environment (terrestrial landscape), effects on VCs (species at risk), effects of changes to the environment on Aboriginal people (health conditions).</p> |   |              |           |         |                 |           |                   |        |           |          |               |                                       |              |

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|--|---|---|-----------|---------|-----------------|-----------|-------------------|------------|--------------|-------------|---------------|---------------------------------------|-----------------|--|
|  |   | Construction  | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing     | Frequency    | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |  |
| <b>Change in abundance of vegetation communities (upland and wetland communities)</b> <ul style="list-style-type: none"> <li>Abundance (count and areal extent [ha]) of: <ul style="list-style-type: none"> <li>upland vegetation communities</li> <li>wetland vegetation communities</li> </ul> </li> <li>rare vegetation communities</li> </ul>  | <b>Construction:</b> <ul style="list-style-type: none"> <li>Restrict vegetation clearing activities to the PDA.</li> <li>Mechanical vegetation removal practices when possible.</li> <li>Standard forestry practices to remove all merchantable timber inside the PDA.</li> </ul> <b>Operation and Closure:</b> <ul style="list-style-type: none"> <li>Progressive rehabilitation as outlined Conceptual Closure Plan (Appendix I).</li> </ul>  | ✓   | -         | -       | Adverse         | Low       | PDA               | N/A        | Single event | Long-term   | Irreversible  | Typical                               | Not significant |  |
|  |   | <b>Removal of approximately 1,133 ha of upland vegetation communities:</b> <ul style="list-style-type: none"> <li>Given the community types that will be removed are generally common and widespread in the RAA, the loss of the community types in the PDA is not predicted to jeopardize the long-term viability of the community types. At closure, vegetation communities removed are unlikely to return to baseline conditions.</li> </ul>                               |           |         |                 |           |                   |            |              |             |               |                                       |                 |  |
|  |   | ✓   | -         | -       | Adverse         | Low       | PDA               | N/A        | Single event | Long-term   | Irreversible  | Typical                               | Not significant |  |
|  |   | <b>Removal of approximately 810 ha of wetland vegetation communities:</b> <ul style="list-style-type: none"> <li>The Project will remove and infill wetland vegetation communities in the PDA. The vast majority of wetland communities are subject to changes that do not threaten long-term viability of that vegetation community type in the RAA.</li> </ul>  |           |         |                 |           |                   |            |              |             |               |                                       |                 |  |
| <b>Change in function, connectivity, and quality of vegetation communities</b> <ul style="list-style-type: none"> <li>Abundance (count or areal extent [ha]) of: <ul style="list-style-type: none"> <li>wetland communities altered/converted to other wetland or upland community types</li> <li>upland communities altered/converted to other upland or wetland community types</li> <li>wetlands may experience a loss of wetland function as a result of groundwater drawdown or change in surface water supply</li> </ul> </li> </ul> | <b>Construction:</b> <ul style="list-style-type: none"> <li>Restricting vegetation clearing activities to the PDA.</li> <li>Mechanical vegetation removal practices when possible.</li> <li>Using clean, coarse fill material for grading to reduce the potential for introducing or spreading non-native, or invasive plant species.</li> </ul> <b>Closure:</b> <ul style="list-style-type: none"> <li>Using clean, coarse fill material for grading to reduce the potential for introducing or spreading non-native, or invasive plant species.</li> <li>Reestablishment of drainage patterns, to the extent feasible.</li> </ul> <b>Construction, Operation and Closure:</b> <ul style="list-style-type: none"> <li>Mitigation for potential effects from dust in Chapter 7.0 (atmospheric environment).</li> <li>Mitigation for potential effects on groundwater in Chapter 9.0 (groundwater).</li> <li>Mitigation for potential effects on surface water in Chapter 10.0 (surface water).</li> </ul> | ✓   | ✓         | ✓       | Adverse         | Low       | LAA               | Applicable | Single event | Long-term   | Irreversible  | Typical                               | Not significant |  |
|  |   | <b>Wetland communities altered/ converted to other wetland or upland community types due to changes in surface water flow:</b> <ul style="list-style-type: none"> <li>Changes in surface water flow/drainage will increase the variability of the flow regime for retained wetlands and the area of wetlands in the PDA will decrease. Change in surface water flow is not expected to threaten the long-term viability of a vegetation community type in the RAA.</li> </ul> |           |         |                 |           |                   |            |              |             |               |                                       |                 |  |
|  |   | ✓   | ✓         | ✓       | Adverse         | Low       | LAA               | N/A        | Continuous   | Medium-term | Reversible    | Typical                               | Not significant |  |
|  |   | <b>Vegetation affected by dust deposition:</b> <ul style="list-style-type: none"> <li>Dust deposition is predicted to occur within 30 m of the PDA boundary. The change in abundance of vegetation communities is not expected to result in the loss of long-term viability of that vegetation community type in the RAA.</li> </ul>  |           |         |                 |           |                   |            |              |             |               |                                       |                 |  |
|  |   | ✓   | ✓         | ✓       | Adverse         | Low       | LAA               | N/A        | Continuous   | Medium-term | Irreversible  | Typical                               | Not significant |  |

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|--|---------------------|--|-----------|---------|---|-----------|-------------------|--------|--------------|-----------|---------------|---------------------------------------|-----------------|
|  |                     | Construction   | Operation | Closure | Direction   | Magnitude | Geographic Extent | Timing | Frequency    | Duration  | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <ul style="list-style-type: none"> <li>- vegetation communities may be affected by dust deposition</li> <li>- vegetation communities may be affected by invasive species</li> <li>• vegetation communities fragmented by changes in the landscape</li> </ul> |                     |  |           |         | <b>Vegetation affected by invasive species:</b> <ul style="list-style-type: none"> <li>• The Project may alter the quality of vegetation communities within 30 m of the PDA through the introduction of invasive species. The change in abundance of vegetation communities is not expected to result in the loss of long-term viability of that vegetation community type in the RAA.</li> </ul> |           |                   |        |              |           |               |                                       |                 |
|  |                     | ✓  | -         | -       | Adverse   | Low       | LAA               | N/A    | Single Event | Long-term | Irreversible  | Typical                               | Not significant |
|  |                     | <b>Vegetation affected by fragmentation:</b> <ul style="list-style-type: none"> <li>• The Project may alter the quality of vegetation communities along the edge of the PDA. The area of the communities affected by edge effects and fragmentation is relatively small in the large landscape context and is not predicted to result in the loss of long-term viability of a vegetation community type in the RAA.</li> </ul>   |           |         |   |           |                   |        |              |           |               |                                       |                 |
|  |                     | -  | ✓         | ✓       | Adverse   | Moderate  | LAA               | N/A    | Continuous   | Long-term | Reversible    | Typical                               | Not significant |
|  |                     | <b>Wetlands that may experience a loss of wetland function as a result of groundwater drawdown:</b> <ul style="list-style-type: none"> <li>• During operation, open pit dewatering is predicted to alter groundwater levels and wetland communities dependent on those groundwater levels. The reduction in groundwater levels will be small relative to other hydrologic components that support the wetland such as stream flow and lake levels. The area of wetland communities potentially affected is relatively small and is not predicted to result in the loss of long-term viability of the wetland vegetation community types in the RAA.</li> </ul> |           |         |   |           |                   |        |              |           |               |                                       |                 |
| Change in abundance of plant species of interest   | Construction:       | ✓  | -         | -       | Adverse   | Low       | PDA               | N/A    | Single event | Long-term | Irreversible  | Typical                               | Not significant |

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|--|---|--------------|-----------|---------|--|-----------|-------------------|------------|------------|-----------|---------------|---------------------------------------|-----------------|
|  |   | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing     | Frequency  | Duration  | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <ul style="list-style-type: none"> <li>Abundance (count or areal extent [ha]) of:                             <ul style="list-style-type: none"> <li>plant species of interest to Aboriginal communities or vegetation communities that support these species</li> <li>plant SAR/SOCC or plant SAR/SOCC habitat</li> </ul> </li> </ul>   | <ul style="list-style-type: none"> <li>Where there is interest, provide opportunities to local communities for harvesting of plants for traditional purposes prior to construction.</li> <li>Restricting vegetation clearing activities to the PDA.</li> <li>Mechanical vegetation removal practices when possible.</li> </ul> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Incorporating plant species of interest to local Aboriginal communities into the Closure Plan as feasible.</li> </ul>  |              |           |         | <p><b>Removal of plant species of interest to Aboriginal communities:</b></p> <ul style="list-style-type: none"> <li>The Project will remove vegetation communities that support plant species of interest to Aboriginal communities. The removal of portions of the vegetation communities that support plant species of interest is not expected to threaten the long-term viability of a species of interest in the RAA.</li> </ul> |           |                   |            |            |           |               |                                       |                 |
| <b>VALUED COMPONENT: WILDLIFE AND WILDLIFE HABITAT</b>   |   |              |           |         |  |           |                   |            |            |           |               |                                       |                 |
| <p><b>Pathway to other VCs:</b> land resource use, traditional land and resource use, human and ecological health<br/> <b>Pathway from other VCs:</b> atmospheric environment, acoustic environment, surface water, vegetation communities</p>   |   |              |           |         |  |           |                   |            |            |           |               |                                       |                 |
| <p><b>Area of Federal Jurisdiction:</b> CEAA, 2012 – changes to the physical environment (terrestrial landscape), effects on VCs (migratory birds and species at risk), effects of changes to the environment on Aboriginal people (health conditions).</p>  |   |              |           |         |  |           |                   |            |            |           |               |                                       |                 |
| <p><b>Change in Habitat</b></p> <p>Change in area (ha) of habitat for:</p> <ul style="list-style-type: none"> <li>Migratory birds, represented by:                             <ul style="list-style-type: none"> <li>Forest and treed wetland bird breeding habitat, specifically Canada warbler and eastern wood-pewee breeding habitat.</li> <li>Open habitat bird breeding habitat, specifically common nighthawk breeding habitat, and barn swallow breeding and foraging habitat.</li> <li>Non-treed wetland (fen, bog, marsh) bird breeding habitat</li> <li>Waterfowl nesting habitat</li> </ul> </li> </ul>   | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>Mitigation for potential effects from lighting in Chapter 7.0 (atmospheric environment)</li> <li>Mitigation for potential effects from noise and vibration described in Chapter 8.0 (acoustic environment).</li> <li>Mitigation measures related to vegetation described in Chapter 12.0 (vegetation communities)</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Obtain proper authorizations under the ESA, including Ontario Regulation 242/08 (as applicable) for damage or destruction of habitat protected under the ESA and implement measures required by the authorization.</li> <li>If an active bald eagle nest occurs within 800 m of Project construction or operation activities, develop protection measures.</li> <li>Prior to construction flag environmentally sensitive areas adjacent to work areas (e.g., key habitat features such as dens, roosts, stick nests, beaver dams, hibernacula) prior to clearing and construction, and evaluate the features for additional mitigation measures (e.g., timing windows and/or setbacks).</li> <li>Retain actual or potential wildlife trees (e.g., cavity trees or snags) in areas where it is safe to do so.</li> </ul> | ✓            | ✓         | ✓       | Adverse  | Moderate  | LAA               | Applicable | Continuous | Long-term | Irreversible  | Typical                               | Not significant |
| <p><b>The direct loss of SAR habitats, SOCC habitats, SWHs and habitats of importance to stakeholders as a result of site clearing during construction.</b></p> <p><b>Change in wildlife habitat as a result of indirect loss or alteration due to sensory disturbance (habitat avoidance or under-utilization of habitat due to human activity).</b></p> <ul style="list-style-type: none"> <li>It is predicted that vegetation clearing and sensory disturbance will result in habitat loss or alteration or a reduction in habitat patch size for the wildlife habitats assessed. For barn swallow breeding habitat and American white pelican stopover and foraging habitat there will be no net loss of habitat and common nighthawk breeding habitat is expected to increase upon closure. The loss of habitat is unlikely to affect the long-term persistence or viability of wildlife in the RAA. It is expected that effects on all wildlife habitats will be partially reversed following the cessation of operation when wildlife habitat considered lost as a result of avoidance due to sensory disturbance will be regained. Some wildlife habitat will also be restored through the implementation of the Closure Plan (a Conceptual Closure Plan is provided in Appendix I), however other wildlife habitats, particularly those that are associated with wetlands and forest habitats will have some irreversible loss of habitat.</li> </ul> <p><b>Project activities will result in the direct loss or alteration of migratory bird habitat through vegetation clearing.</b></p> <ul style="list-style-type: none"> <li>For barn swallow breeding habitat and American white pelican stopover and foraging habitat there will be no net loss of habitat and common nighthawk breeding habitat is expected to increase upon closure. Regionally these habitats are common and the percent loss of migratory bird habitat is low and is not expected to affect the long-term persistence or viability of migratory bird populations.</li> </ul> |   |              |           |         |  |           |                   |            |            |           |               |                                       |                 |

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|---|---|--------------|-----------|---------|-----------------|-----------|-------------------|------------|------------|-------------|---------------|---------------------------------------|---|---|
|   |   | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing     | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance  |   |
| <ul style="list-style-type: none"> <li>Waterbird stopover and staging habitat, specifically American white pelican stopover and foraging habitat.</li> <li>Raptor nesting habitat, specifically bald eagle nesting habitat.</li> <li>Mammals represented by Moose foraging habitat (including seeps), Moose late winter cover habitat, Woodland caribou habitat, Northern myotis and little brown myotis maternity roost habitat.</li> <li>Amphibians and reptiles, represented by Western painted turtle overwintering habitat, and amphibian breeding habitat.</li> <li>Insects, represented by Taiga alpine butterfly breeding habitat.</li> </ul> | <ul style="list-style-type: none"> <li>Incorporate MNRF Best Management Practices for Mineral Exploration and Development Activities and Woodland Caribou in Ontario (MNR 2013c) in the development of the Biodiversity Management and Monitoring Plan (BMMP) and apply specific mitigation measures developed in consultation with MNRF (a Conceptual BMMP is provided as Appendix M13).</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>If an active bald eagle nest occurs within 800 m of Project construction or operation activities, develop protection measures.</li> <li>Managing vegetation cover along the boundaries of high activity areas (e.g., access roads) where adjacent to wildlife habitat to reduce sensory (noise and visual) disturbance.</li> <li>Avoid use of herbicides where feasible or practical.</li> <li>Progressive rehabilitation of disturbed areas used during construction.</li> <li>Use of directional light fixtures to avoid the transmission of light outside of the PDA.</li> </ul> <p><b>Closure:</b></p> <p>Implement measures detailed in the Conceptual Closure Plan (see Appendix I) including the revegetation plan.</p> |              |           |         |                 |           |                   |            |            |             |               |                                       | <ul style="list-style-type: none"> <li>Sensory disturbance to migratory birds is expected to be minimal and is not expected to affect the long-term persistence or viability of migratory bird populations.</li> <li>Habitat conservatively considered lost as a result of sensory disturbance will be regained following the cessation of operations and the completion of active closure activities.</li> </ul> |   |
| <p><b>Change in Mortality Risk</b></p> <ul style="list-style-type: none"> <li>Risk (qualitative) of mortality due to vegetation clearing during construction and operation activities.</li> <li>Risk (qualitative) of collisions with Project vehicles.</li> <li>Risk (qualitative) of adverse human-wildlife interactions</li> </ul>   | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>Implementation of a BMMP (a Conceptual BMMP is provided in Appendix M13).</li> <li>Implement mitigation measures in the Conceptual Explosives and Blasting Management Plan, Conceptual Spill Prevention and Contingency Plan, and Conceptual Waste Management Plan.</li> <li>Report the discovery of active nests during all Project phases to the Project Environmental Department who will refer to the BMMP for direction on follow-up actions.</li> <li>Report the discovery of occupied habitat features (e.g., active dens, beaver dams) during all Project phases to the Project Environmental Department for direction on follow-up actions.</li> </ul>   | ✓            | ✓         | ✓       | Adverse         | Low       | LAA               | Applicable | Continuous | Medium-term | Reversible    | Typical                               | Not significant   | <p><b>Increase in mortality risk to wildlife (including migratory birds):</b></p> <ul style="list-style-type: none"> <li>Throughout construction, operation and active closure, an increased risk of mortality to wildlife within the LAA as a result of Project activities is anticipated. With the implementation of the mitigation measures, the residual adverse effect on wildlife mortality is predicted to be within the normal variability of baseline conditions and is not expected to affect the long-term persistence or viability of wildlife within the RAA. Mitigation measures are expected to limit the effects on migratory bird mortality.</li> <li>No measurable residual effect resulting in direct loss and harm to migratory birds, their eggs and nests is expected following the implementation of a Bird Nest Mitigation Plan.</li> <li>The Bird Nest Mitigation Plan includes appropriate preventive and mitigation measures to minimize the risk of incidental take and to help maintain sustainable populations of migratory birds.</li> </ul> |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context |
|   | <ul style="list-style-type: none"> <li>Maintain the Project site in a manner that reduces the risk that wildlife will encounter potential hazards, such as ropes, wires and holes.</li> <li>Avoid situations that can lead to the creation of problem wildlife. Although food wastes are the typical wildlife attractant implicated in the creation of problem wildlife, there are other attractants that may be a concern, specifically roadside wildlife carcasses and vegetation. Project personnel and contractors will be required to report roadside wildlife sightings or interactions to the Project Environmental Department for initiation of follow-up actions to address these concerns.</li> <li>Report wildlife-vehicle collisions, near misses or observations of a wildlife road mortality on Project roads to the Environmental Department. Implement adaptive management measures where high frequency locations of wildlife-vehicle interactions are identified.</li> <li>Require Project personnel and contractors to report wildlife incidents and encounters related to garbage or other attractants to the Environmental Department so that corrective action can be initiated.</li> <li>Require Project personnel and contractors working in active zones (e.g., mine site) to relay wildlife sightings to other workers as soon as possible (e.g., by radio).</li> <li>Implement road safety measures (e.g., speed limits and signage) and yield the right of way to wildlife on Project roads to reduce wildlife road mortality.</li> <li>Obtain a permit under the Fish and Wildlife Conservation Act for the removal of any raptor nests or beaver dams required for the Project. Removal to be conducted following timing restrictions and any other mitigation specified in the permit and as determined during consultation with MNRF.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Address incidental take of migratory birds. GGM recognizes that scheduling vegetation clearing and site preparation activities outside the breeding period for migratory birds is the best way to reduce the risk of incidental take. If activities that could result in incidental take cannot be avoided, GGM will prepare a Bird Nest Mitigation Plan that outlines how risk of incidental take will be managed in accordance with Environment and Climate Change Canada guidance.</li> </ul> |              |           |         |                 |           |                   |        |           |          |               |                                       |

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|---|---|--------------|-----------|---------|-----------------|------------|-------------------|-------------------|-------------------|------------------|-------------------|---------------------------------------|------------------------|
|   |   | Construction | Operation | Closure | Direction       | Magnitude  | Geographic Extent | Timing            | Frequency         | Duration         | Reversibility     | Ecological and Socio-Economic Context | Significance           |
|   | <ul style="list-style-type: none"> <li>To the extent feasible, recover and relocate turtles and amphibians encountered during fish salvage/rescues.</li> <li>Carry out the removal of structures supporting barn swallow nesting outside of the active nesting season (approximately May- August; O.Reg. 242/08, s.23.5).</li> <li>Carry out the removal of mature deciduous and mixed forest communities or buildings outside the core maternity roosting season for batsB, to the extent practical. Additional mitigation may be required for occupied features. This measure will also reduce the risk to other species that use trees for denning or shelter (e.g., marten).</li> <li>Clear area of wildlife before blasting.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Clear area of wildlife before blasting.</li> <li>Where project site roads occur through forest or treed wetland communities, a regular vegetation cutting regime will occur along the edges of project site roads both to increase driver visibility and to reduce the attractiveness of the area for moose to browse (Tanner and Leroux, 2015).</li> <li>To reduce use of the ponds by waterfowl for foraging or breeding, no vegetation will be planted on the embankments of the TMF or the water management collection ponds. Vegetation that naturally regenerates around seepage and water collection ponds and the TMF will be removed as required.</li> <li>Monitor wildlife use (primarily targeting waterfowl but also species such as moose and bear) and water quality of the TMF, open aquatic areas and other key Project locations and implement adaptive management measures (e.g., deterrents and/or exclusionary measures) as required.</li> </ul> |              |           |         |                 |            |                   |                   |                   |                  |                   |                                       |                        |
| <b>Change in Movement</b>                       | <b>Construction, Operation and Closure:</b>   | ✓            | ✓         | ✓       | <b>Adverse</b>  | <b>Low</b> | <b>RAA</b>        | <b>Applicable</b> | <b>Continuous</b> | <b>Long-term</b> | <b>Reversible</b> | <b>Typical</b>                        | <b>Not significant</b> |

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|--|--|--------------|-----------|---------|--|-----------|-------------------|--------|------------|-------------|---------------|---------------------------------------|--------------|
|  |  | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance |
| <ul style="list-style-type: none"> <li>Risk (qualitative) of the Project creating a barrier that prevents wildlife movement</li> </ul>   | <ul style="list-style-type: none"> <li>Implementation of mitigation measures to reduce potential effects on wildlife habitat, specifically, those measures that reduce the size of movement barriers (by limiting the size of clearing areas) and that limit behavioral disruptions (by reducing the intensity of sensory disturbance).</li> <li>Implementation of the progressive rehabilitation of the Project as per the Closure Plan and Fish Habitat Offset Plan. A Conceptual Closure Plan and Draft Fish Habitat Offset Plan are provided in Appendix I and F10, respectively.</li> <li>Provide low areas in the ploughed snow banks of access and haul roads if excessive snow buildup is encountered. These low areas will facilitate wildlife movements across and out of road corridors</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>When designing watercrossings include consideration of design features that promote wildlife (e.g. amphibian, turtle, furbearers) movement.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>When designing watercrossings include consideration of design features that promote wildlife (e.g. amphibian, turtle, furbearers) movement.</li> </ul> |              |           |         | <p><b>Disruption of existing wildlife movement patterns within and across the LAA:</b></p> <ul style="list-style-type: none"> <li>There will be an adverse effect on wildlife (e.g. amphibians, turtles, furbearers and large mammal) movement throughout construction, operation and active closure as the Project is expected to disrupt wildlife movement patterns. However, wildlife (particularly large mammals) are expected to shift their movement patterns during the life of the mine to areas of available habitat elsewhere within the RAA. Following active closure, new movement patterns may be established as sensory disturbance abates and revegetation of the PDA progresses, although for some species (e.g., species requiring more developed security cover [trees]) this may take decades. The predicted change in movement is not expected to affect the long-term persistence or viability of wildlife in the RAA.</li> </ul> |           |                   |        |            |             |               |                                       |              |
| <b>VALUED COMPONENT: LABOUR AND ECONOMY</b>  |  |              |           |         |  |           |                   |        |            |             |               |                                       |              |
| There are no pathways associated with labour and economy from or to other VCs.   |  |              |           |         |  |           |                   |        |            |             |               |                                       |              |
| <b>Area of Federal Jurisdiction:</b> CEAA, 2012 – effects of changes to the environment on Aboriginal people (socio-economic conditions).  |  |              |           |         |  |           |                   |        |            |             |               |                                       |              |
| <p><b>Change in Labour</b></p> <ul style="list-style-type: none"> <li>Project-generated employment.</li> <li>Local unemployment rate.</li> <li>Labour availability by trade or skill.</li> </ul> | <p><b>Construction and Operation:</b></p> <ul style="list-style-type: none"> <li>Posting job qualifications and identifying available training programs and providers so that local and Aboriginal residents can acquire the necessary skills and qualify for potential employment.</li> <li>Working with local and Aboriginal businesses to enhance the opportunity to participate in the supply of goods and services for construction and operation.</li> <li>Working with local communities to develop training programs oriented to operational needs.</li> <li>Implement the Project's labour and training framework, which includes partnerships with Aboriginal communities and education</li> </ul>   | ✓            | -         | -       | Positive   | Low       | LAA / RAA         | N/A    | Continuous | Short-term  | Reversible    | Moderate Diversity                    | N/A          |
|  |  | -            | ✓         | -       | Positive   | Moderate  | LAA / RAA         | N/A    | Continuous | Medium-term | Reversible    | Moderate Diversity                    | N/A          |

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|--|---|--------------|-----------|---------|---|-----------|-------------------|--------|---------------------------|-------------|---------------|---------------------------------------|-----------------------|
|  |   | Construction | Operation | Closure | Direction   | Magnitude | Geographic Extent | Timing | Frequency                 | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance          |
|  | <p>institutes, information sharing (e.g., skills databases) and employment preparation and training.</p> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Establish a skills inventory that should be retained for active closure.</li> <li>Support re-training to establish transferable skills.</li> <li>Provide opportunities for voluntary redundancies during ramp-down (e.g., early retirement).</li> <li>Provide redundancy payments.</li> <li>Provide job search assistance.</li> </ul>  |              |           |         | <p><b>Direct employment during operation:</b></p> <ul style="list-style-type: none"> <li>During the operation phase, the Project will directly employ, on average, 450 workers providing a net positive effect. The positive effect is anticipated to be high in magnitude in the LAA, where the Project would increase the size of the labour force by 10% (compared to 2011 levels) and reduce the unemployment rate by over six percentage points (compared to 2011).</li> </ul>   |           |                   |        |                           |             |               |                                       |                       |
|  |   | -            | -         | ✓       | Adverse   | Moderate  | LAA / RAA         | N/A    | Multiple Irregular events | Long-term   | Irreversible  | Moderate Diversity                    | Not significant       |
|  |   |              |           |         | <p><b>Loss of direct employment at the end of operation:</b></p> <ul style="list-style-type: none"> <li>The closure of the Project after its final year of operation will result in the loss of 450 direct full time positions (average mining operational labour).</li> </ul>  |           |                   |        |                           |             |               |                                       |                       |
|  |   | -            | -         | ✓       | Positive  | Low       | LAA / RAA         | N/A    | Continuous                | Short-term  | Reversible    | Unknown                               | N/A                   |
|  |   |              |           |         | <p><b>Direct employment from closure activities:</b></p> <ul style="list-style-type: none"> <li>Activities relating to the closure of the Project will result in approximately 40 PYs of employment per year over the planned 5-year active closure phase. Given the small labour force required for active closure activities in relation to the workforce in the LAA, the magnitude is expected to be low.</li> </ul>   |           |                   |        |                           |             |               |                                       |                       |
| <p><b>Change in Economy</b></p> <ul style="list-style-type: none"> <li>Project-generated income.</li> <li>Project-generated government revenue.</li> <li>Project-generated business.</li> <li>Revenue of businesses in other sectors.</li> </ul> | <p>The potential effects of the Project on the LAA and RAA economies because of purchases of labour, goods and services will be positive during construction and operation, therefore no mitigation will be required. However, GGM has and will continue to work with local and Aboriginal-owned businesses on Project contract opportunities regarding the supply of goods and services, particularly for the operation phase.</p> <p>With respect to potential adverse effects on forestry, GGM has consulted with the MNRF and the enhanced Forest Resource Licence holder to address, to the extent possible, access to the PDA and the Crown timber allocated within the FMP that will be removed as part of site preparation, and long-term changes in the forest land base. As per discussions held to date, GGM will continue discussions with Ne-Daa-Kii-Me-Naan Inc. to obtain an Overlapping Agreement and to harvest the trees under their pulp mill license.</p> | ✓            | -         | -       | Positive  | Low       | LAA / RAA         | N/A    | Continuous                | Short-term  | Reversible    | Moderate Diversity                    | N/A (positive effect) |
|  |   |              |           |         | <p><b>Local and regional businesses: Project expenditures:</b></p> <ul style="list-style-type: none"> <li>During construction, Project expenditure on goods and services in the RAA is estimated to be approximately \$355 million, of which \$110 million will be spent on goods and services in the LAA. Project spending is expected to have a positive effect on local and regional businesses by creating 810 PYs of employment for businesses in the LAA and another 1,330PYs for businesses elsewhere in the RAA.</li> </ul> |           |                   |        |                           |             |               |                                       |                       |
|  |   | -            | ✓         | -       | Positive  | Moderate  | LAA / RAA         | N/A    | Continuous                | Medium-term | Reversible    | Moderate Diversity                    | N/A (positive effect) |
|  |   |              |           |         | <p><b>Local and regional businesses: Project expenditures:</b></p> <ul style="list-style-type: none"> <li>During operation, Project expenditure on goods and services in the RAA will be approximately \$135 million per year, of which \$25 million will be spent in the LAA. An additional \$40 million in sustaining capital will be spent in the RAA</li> </ul>   |           |                   |        |                           |             |               |                                       |                       |

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|---|---------------------|--------------|-----------|---------|---|-----------|-------------------|------------|------------|------------|---------------|---------------------------------------|-----------------------|
|   |                     | Construction | Operation | Closure | Direction   | Magnitude | Geographic Extent | Timing     | Frequency  | Duration   | Reversibility | Ecological and Socio-Economic Context | Significance          |
|   |                     |              |           |         | (\$20 million in the LAA) during operation. In total, Project spending during operation (including sustaining capital) is expected to create 8,265 indirect and induced PYs of employment in the RAA, of which 7,033 will be in the LAA.  |           |                   |            |            |            |               |                                       |                       |
|   |                     | -            | -         | ✓       | Positive  | Low       | LAA / RAA         | N/A        | Continuous | Short-term | Reversible    | Unknown                               | N/A (positive effect) |
|   |                     |              |           |         | <b>Local and regional businesses: Project expenditures:</b> <ul style="list-style-type: none"> <li>During active closure, Project purchases and expenditures on goods and services within the RAA (\$35 million) are expected to generate 75 PYs of employment.</li> </ul>  |           |                   |            |            |            |               |                                       |                       |
|   |                     | -            | -         | ✓       | Adverse   | Low       | LAA / RAA         | N/A        | Continuous | Long-term  | Irreversible  | Unknown                               | Not significant       |
|   |                     |              |           |         | <b>Local and regional businesses: loss of Project expenditures:</b> <ul style="list-style-type: none"> <li>Loss of Project expenditures at local and regional businesses will result in an adverse residual environmental effect. When measured against the current labour force in non-basic industries, this effect will be low in magnitude the LAA.</li> </ul>  |           |                   |            |            |            |               |                                       |                       |
|   |                     | ✓            | -         | -       | Adverse   | Low       | LAA               | Applicable | Continuous | Short-term | Reversible    | Moderate Diversity                    | Not significant       |
|   |                     |              |           |         | <b>Loss of revenue and employment for the tourism industry:</b> <ul style="list-style-type: none"> <li>It is expected that site preparation activities during construction, particularly the removal of the MacLeod-Cockshutt Mining Headframe and Discover Geraldton Interpretive Centre, and effects on the Kenogamisis Golf Club, will result in a residual adverse effect on the tourism industry in terms of small losses of revenues and employment.</li> </ul> |           |                   |            |            |            |               |                                       |                       |
|   |                     | ✓            | -         | -       | Adverse   | Low       | LAA               | N/A        | Continuous | Long-term  | Irreversible  | Moderate Diversity                    | Not significant       |
|   |                     |              |           |         | <b>Reduction in economic activities associated with forestry:</b>   |           |                   |            |            |            |               |                                       |                       |

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|---|---------------------|--------------|-----------|---------|---|-----------|-------------------|--------|------------|------------|---------------|---------------------------------------|-----------------------|
|   |                     | Construction | Operation | Closure | Direction   | Magnitude | Geographic Extent | Timing | Frequency  | Duration   | Reversibility | Ecological and Socio-Economic Context | Significance          |
|   |                     |              |           |         | <ul style="list-style-type: none"> <li>Project construction will cause a reduction in the forested land base and loss of area associated with forest management activities in the Forest Management Unit (FMU), which has the potential to affect forest harvesting activities and employment.</li> </ul>   |           |                   |        |            |            |               |                                       |                       |
|   |                     | -            | ✓         | -       | Positive  | Moderate  | LAA               | N/A    | Continuous | Long-term  | Reversible    | Moderate Diversity                    | N/A (positive effect) |
|   |                     |              |           |         | <b>Increase in municipal government revenues:</b> <ul style="list-style-type: none"> <li>GGM will pay taxes to the Municipality of Greenstone while the Project is operating, although the exact amount of annual tax has not yet been negotiated. As a result, the Project is expected to have a positive effect on municipal government revenues during operation.</li> </ul> |           |                   |        |            |            |               |                                       |                       |
|   |                     | -            | -         | ✓       | Adverse   | Moderate  | LAA               | N/A    | Continuous | Long-term  | Irreversible  | Unknown                               | Not significant       |
|   |                     |              |           |         | <b>Decrease in municipal government revenues:</b> <ul style="list-style-type: none"> <li>The loss of tax revenues from the Project for the Municipality of Greenstone during closure will cause an adverse residual environmental effect.</li> </ul>  |           |                   |        |            |            |               |                                       |                       |
| <b>VALUED COMPONENT: COMMUNITY SERVICES AND INFRASTRUCTURE</b>  |                     |              |           |         |   |           |                   |        |            |            |               |                                       |                       |
| Pathway to other VCs: N/A   |                     |              |           |         |   |           |                   |        |            |            |               |                                       |                       |
| Pathway from other VCs: groundwater   |                     |              |           |         |   |           |                   |        |            |            |               |                                       |                       |
| Area of Federal Jurisdiction: CEAA, 2012 – effects of changes to the environment on Aboriginal people (socio-economic conditions) |                     |              |           |         |   |           |                   |        |            |            |               |                                       |                       |
| Change in Capacity of Housing and Accommodation   | Construction        | ✓            | -         | -       | Adverse   | Low       | LAA/RA A          | N/A    | Continuous | Short-term | Reversible    | Moderate Capacity                     | Not significant       |

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|---|--|--------------|-----------|---------|--|-----------|-------------------|--------|------------|-------------|---------------|---------------------------------------|-----------------|
|   |  | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <ul style="list-style-type: none"> <li>Housing and accommodation availability.</li> </ul>   | <ul style="list-style-type: none"> <li>A temporary camp will be in place for construction, and potentially early operation, when some construction activities may be ongoing. The temporary camp will have the capacity to house an anticipated average of 450 people to a maximum of 600 during peak construction, so non-local construction workers can be housed during their on-site rotation.</li> </ul> <p><b>Operation/Closure</b></p> <ul style="list-style-type: none"> <li>No additional mitigation is required for housing operation or closure workers due to the availability of vacant housing in the LAA/RAA.</li> </ul>  |              |           |         | <p><b>Additional demands on housing and accommodations:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause a decrease in capacity of housing and accommodations. The change in capacity of housing and accommodations will be at or near to baseline conditions. During construction, the average labour force will consist of 650 workers (with a peak at 975 workers). Workers will be housed at the temporary camp and will therefore not require housing accommodations elsewhere. The Municipality has an adequate number of temporary accommodations to absorb additional demand from workers that may live outside of the temporary camp.</li> </ul> |           |                   |        |            |             |               |                                       |                 |
|   |  | -            | ✓         | ✓       | Adverse  | Low       | LAA/RAA           | N/A    | Continuous | Medium-term | Reversible    | Moderate Capacity                     | Not significant |
| <p><b>Change in capacity of municipal and provincial services and infrastructure (police, fire, medical, recreation, education, water/sewer, power and waste).</b></p> <ul style="list-style-type: none"> <li>Health care facility and services capacity.</li> <li>Crime severity index.</li> <li>Criminal code violations per 100,000 population.</li> <li>Emergency Medical Services (EMS) response times.</li> <li>Recreational facility and services capacity.</li> <li>School capacity.</li> </ul> | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>GGM will maintain communication with relevant agencies and organizations, including municipal authorities, health agencies and school boards, to provide Project information, to identify and address potential Project-related implications for services and infrastructure, and to support responsible organizations in planning for, adapting to, or benefitting from changing demand as a result of the Project.</li> <li>GGM will offer its employees an Employee Assistance Program, and require pre-employment physicals. Workforce education to encourage healthy lifestyle choices, sensitivity training and strict enforcement of GGM's health and safety policies will also help mitigate adverse social effects. For example, sensitivity training will raise the level of awareness about the potential effects that workers can have on the community and their families through drug and alcohol use or other social concerns.</li> <li>Demands on emergency response services will be managed by having Project rescue vehicles and trained First Responders at the worksite.</li> <li>Safety orientations will be mandatory and provided for new employees, and select employees will be trained in fuel handling,</li> </ul> | ✓            | ✓         | ✓       | Adverse  | Low       | LAA/RAA           | N/A    | Continuous | Long-term   | Reversible    | Low Capacity                          | Not significant |
|   |  | ✓            | ✓         | ✓       | Adverse  | Low       | LAA/RAA           | N/A    | Continuous | Long-term   | Reversible    | Moderate Capacity                     | Not significant |
|   |  | ✓            | ✓         | ✓       | Adverse  | Low       | LAA/RAA           | N/A    | Continuous | Long-term   | Reversible    | Moderate Capacity                     | Not significant |

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|---|--|--------------|--|---------|--|-----------|----------------------|-----------|--------------|-------------------|-----------------|---|-----------------|
|   |  | Construction | Operation  | Closure | Direction  | Magnitude | Geographic<br>Extent | Timing    | Frequency    | Duration          | Reversibility   | Ecological and<br>Socio-Economic<br>Context | Significance    |
|   | <p>equipment maintenance, and fire prevention and response measures. Fire prevention and suppression systems will be maintained onsite, including water supplies, sprinklers, fire extinguishers and other firefighting equipment. Flammable material (such as fuels and explosives) will be carefully controlled within the PDA.</p> <ul style="list-style-type: none"> <li>GGM will consult with local emergency providers so that roles and responsibilities are understood, and the necessary resources are in place.</li> <li>Project planning and management strategies, including in-design mitigation measures and environmental protection measures, will reduce the likelihood of accidents and potential fires to as low a level as is reasonably practical. Environmental Management and Monitoring Plans, such as a Spill Prevention and Response Plan, are provided in Appendix M.</li> <li>Demands on police services due to Project activities will be managed by controlling access to the mine site through the use of a security gate and guard house, and by employing onsite security staff. The use of a temporary camp, along with the work rotation, will limit interactions among local residents and non-local Project construction workers as some of the workforce will return to their home communities during their time off.</li> <li>Implementation of a Waste Management Plan, that sets out procedures for reducing Project-related waste and limiting demands on local landfills. A Conceptual Waste Management Plan is provided in Appendix M4 and includes conceptual strategies. A Conceptual Closure Plan is provided in Appendix I.</li> <li>GGM will provide Project information to the Municipality and local service providers to prepare for increased waste, water, or sewer infrastructure demand.</li> <li>GGM will maintain access and use of the front nine holes of the golf course and club house. In the event the contingency WRSA A/C is required during the Project life, GGM will discuss its requirements with the Municipality.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>GGM will develop cooperative protocols with responsible agencies to deal with temporary construction and closure worker access to</li> </ul> |              |  |         | <p><b>Additional demands on fire services:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on fire services. The change in capacity of fire services will be at or near to baseline conditions after proposed mitigation and management.</li> </ul>   |           |                      |           |              |                   |                 |   |                 |
|   |  | ✓            | ✓  | ✓       | Adverse  | Low       | LAA/RAA              | N/A       | Continuous   | Long-term         | Reversible      | Low Capacity                                | Not significant |
|   |  |              |  |         | <p><b>Additional demands on power and municipal servicing:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on power and municipal servicing including water and waste services and infrastructure. change in capacity of power and municipal servicing will be at or near to baseline conditions after proposed mitigation and management. The Municipality confirmed there is sufficient capacity to connect the temporary camp to the municipal sanitary sewer system. The Municipality also confirmed adequate capacity within the Geraldton municipal water system to provide potable water for the mine site and temporary camp. Other Project design plans, including the potential use of generators as a power source during construction, a sewage treatment plant at the mine site, and the use of a natural gas-fuelled power plant during operation will reduce effects on provincial and municipal services and infrastructure.</li> </ul> |           |                      |           |              |                   |                 |   |                 |
|   |  | ✓            | -  | -       | Adverse  | Low       | PDA                  | N/A       | Single event | Long-term         | Irreversible    | Low Capacity                                | Not significant |
|   |  |              |  |         | <p><b>Removal of recreation services and infrastructure:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, the Project will cause the removal of the Kenogamisis Golf Course (holes 10-18), MacLeod-Cockshutt Mining Headframe and the Discover Geraldton Interpretive Centre. The change in capacity of recreation services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. An Agreement has been signed between the Municipality and GGM to support the Municipality's future plans with respect to these facilities. With respect to the golf course, GGM has committed to avoid using the contingency WRSA A/C to preserve the golf clubhouse and the front nine holes unless needed.</li> </ul>  |           |                      |           |              |                   |                 |   |                 |
| ✓   | ✓  | ✓            | Adverse  | Low     | LAA/RAA  | N/A       | Continuous           | Long-term | Reversible   | Moderate Capacity | Not significant |   |                 |
|   |  |              | <p><b>Additional demand on recreation services and infrastructure:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on recreation services and infrastructure. The change in capacity of recreation services and infrastructure will be at or near to baseline conditions after proposed mitigation and management.</li> </ul> |         |  |           |                      |           |              |                   |                 |   |                 |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|------------|-----------|---------------|---------------------------------------|-----------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency  | Duration  | Reversibility | Ecological and Socio-Economic Context | Significance    |
|   | <p>emergency and other medical services. During construction most workers will continue to receive general health care in their home communities. Minor injuries or health problems will be addressed through the provision of first-aid at the worksite</p> <ul style="list-style-type: none"> <li>GGM will provide notice to the local school board regarding Project scheduling and human resources planning in order for the school board to prepare for the enrollment of additional students.</li> <li>The temporary camp provided by GGM will include dining services and a basic recreation area, which may include a pool table and/or ping pong table, television and exercise equipment.</li> <li>A third-party sewage disposal contractor will provide portable washroom facilities during early construction until the STP and sewage discharge line is set up and during active closure when facilities are decommissioned.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>GGM will provide notice to the local school board regarding Project scheduling and human resources planning in order for the school board to prepare for the enrollment of additional students.</li> <li>Heat and power for Project operation will be supplied by an onsite natural gas-fuelled power plant and power generation heat recovery distribution system.</li> <li>GGM will install a package modular STP for the mine site and there will be no direct interaction between the mine site and the municipal wastewater system.</li> </ul> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>A third-party sewage disposal contractor will provide portable washroom facilities during early construction until the STP and sewage discharge line is set up and during active closure when facilities are decommissioned.</li> </ul> | ✓            | ✓         | ✓       | Adverse         | Low       | LAA/RAA           | N/A    | Continuous | Long-term | Reversible    | Moderate Capacity                     | Not significant |
| <p><b>Additional demands on education services and infrastructure:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on education services and infrastructure. The change in capacity of provincial and municipal services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. Schools in the LAA/RAA have physical capacity to accommodate new students and GGM will provide Project information to school boards to help them prepare for potential increases in demand.</li> </ul> |  |              |           |         |                 |           |                   |        |            |           |               |                                       |                 |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|------------|-------------|---------------|---------------------------------------|-----------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <p><b>Change in capacity of transportation services and infrastructure</b></p> <ul style="list-style-type: none"> <li>Road and air transportation capacity.</li> </ul>  | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>Schedule arrivals/departures of employee traffic to occur earlier than the existing observed a.m. peak hour for local traffic and later than the existing observed p.m. peak hour.</li> <li>Schedule alternating work shifts so that all workers do not arrive in and leave the area at the same time to limit Project-related demands on both highway and air services and infrastructure.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Implement standard construction procedures and a Traffic Management Plan to reduce traffic delays during construction of realigned Highway 11. The Traffic Management Plan will be developed during ongoing planning and engineering design to address traffic staging in order to reduce delays.</li> <li>Provide bussing services between the temporary camp and mine site.</li> <li>GGM will encourage carpooling among local resident construction and operation workers.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>GGM will encourage carpooling among local resident construction and operation workers.</li> </ul> | ✓            | ✓         | ✓       | Adverse         | Low       | LAA/RAA           | N/A    | Continuous | Long-term   | Reversible    | Moderate Capacity                     | Not significant |
| <p><b>Additional demands on transportation infrastructure:</b></p> <ul style="list-style-type: none"> <li>Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on transportation infrastructure. The change in capacity of transportation services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. Since the Highway 11 realignment will be constructed prior to closure of the existing Highway 11 alignment, access to the area will be uninterrupted and existing infrastructure will be able to accommodate Project-related traffic increases.</li> </ul>         |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <p><b>VALUED COMPONENT: LAND AND RESOURCE USE</b></p>   |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <p><b>Pathways to other VCs:</b> human and ecological health</p> <p><b>Pathways from other VCs:</b> atmospheric environment, acoustic environment, surface water, fish and fish habitat, vegetation communities, wildlife and wildlife habitat</p>  |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <p><b>Area of Federal Jurisdiction:</b> CEAA, 2012 – effects of changes to the environment on Aboriginal people (socio-economic conditions), changes to the physical environment (terrestrial landscape), effects on VCs (navigation). Federal decision – Approval of Works in Navigable Waters.</p>  |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
|   |  | ✓            | ✓         | ✓       | Adverse         | Moderate  | LAA               | N/A    | Continuous | Medium-term | Reversible    | Typical                               | Not significant |
| <p><b>Decrease in the availability of hunting areas and wildlife:</b></p> <ul style="list-style-type: none"> <li>The removal of wildlife habitat and the imposition of access restrictions to the PDA at the start of construction will result in the loss of areas for hunting. Also, the Project may cause sensory disturbance, and disruption of wildlife movement corridors thereby reducing the availability of wildlife resources. The decrease in the availability of hunting areas or wildlife resources is predicted to reduce the ability to undertake hunting in the PDA (access restrictions) and within the LAA due to sensory disturbance (predicted not to extend beyond 200 m of the PDA).</li> </ul> |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |

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|---|--|---|-----------|----------|-----------------|-----------|-------------------|-----------|--------------|-------------|-----------------|---------------------------------------|-----------------|--|
|   |  | Construction  | Operation | Closure  | Direction       | Magnitude | Geographic Extent | Timing    | Frequency    | Duration    | Reversibility   | Ecological and Socio-Economic Context | Significance    |  |
| <p><b>Change in recreational land and resource use</b></p> <ul style="list-style-type: none"> <li>Change in areas of recreational use that would be restricted or lost (ha).</li> <li>Change in length of recreational trails that would be restricted or lost (km).</li> <li>Change in access to recreational land and resource use areas.</li> <li>Change in the availability of fish and wildlife resources.</li> <li>Sensory disturbance to users including changes to visual setting.</li> </ul> | <p><b>Construction, Operation, and Closure:</b></p> <ul style="list-style-type: none"> <li>Implementation of mitigation outlined for atmospheric environment (Chapter 7.0), acoustic environment (Chapter 8.0), fish and fish habitat (Chapter 11.0) and wildlife and wildlife habitat (Chapter 13.0).</li> <li>Initiate revegetation as soon as practical after Project components are no longer needed.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Provide in-kind support to assist Greenstone Snowmobile Club in improving the existing trail to Longlac.</li> <li>Where possible in accessible areas (e.g., along cleared rights-of-way), leave trees and other vegetation in place to buffer the view of Project components, reducing the change in viewshed and muffling nuisance noise.</li> <li>Site the majority of Project components so as to achieve a 120 m setback for the surface rights reservation area on claim to lease lands and a 30 m high water mark setback for patent lands; existing vegetation will remain in these areas.</li> <li>Implement progressive rehabilitation works, including stabilization and rehabilitation of aggregate source areas, the north cell of the TMF, plateaus and benches of WRSAs A, B, and C and the overburden storage areas.</li> <li>Remove construction-related buildings, access roads and laydown areas following construction.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Where possible in accessible areas (e.g., along cleared right-of-ways), leave trees and other vegetation in place to buffer the view of Project components, reducing the change in viewshed and muffling nuisance noise.</li> <li>Implement progressive rehabilitation works, including stabilization and rehabilitation of aggregate source areas, the north cell of the TMF, plateaus and benches of WRSAs A, B, and C and the overburden storage areas.</li> </ul> <p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Rehabilitation will be designed to meet desired end land uses, end land uses will be identified in the Closure Plan, in consultation with</li> </ul> | ✓   | ✓         | ✓        | Adverse         | Moderate  | LAA               | N/A       | Continuous   | Medium-term | Reversible      | Typical                               | Not significant |  |
|   |  | <p><b>Decrease in the availability of fishing areas or fishing resources:</b></p> <ul style="list-style-type: none"> <li>The removal of the public access points and closure of Lahtis Road may result in the loss of access to ice fishing areas in the Southwest Arm. Although there is potential for fishing to occur in the PDA, there are no documented fishing areas and fishing is not known to occur within the PDA. The loss of access to launches for ice fishing huts is predicted to reduce the ability to undertake fishing activities.</li> </ul>                                       |           |          |                 |           |                   |           |              |             |                 |                                       |                 |  |
|   |  | ✓   | ✓         | ✓        | Adverse         | Moderate  | LAA               | N/A       | Continuous   | Long-term   | Reversible      | Typical                               | Not significant |  |
|   |  | <p><b>Loss of recreation areas or change in access:</b></p> <ul style="list-style-type: none"> <li>The Project will result in the loss of access to the Southwest Arm of Kenogamisis Lake through the closure of Lahtis Road and the removal of roads within the Hardrock and MacLeod Townsites during construction and operation. Crown land recreational areas, including the campsite and two access points to Kenogamisis Lake will also be removed from the PDA. The closure of Lahtis Road located within the PDA may result in the reduced access to recreational areas in the LAA.</li> </ul> |           |          |                 |           |                   |           |              |             |                 |                                       |                 |  |
|   |  | ✓   | -         | -        | Adverse         | Low       | PDA               | N/A       | Single Event | Medium-term | Reversible      | Typical                               | Not significant |  |
| <p><b>Removal of 10.6 km of snowmobile trails and 1.4 km of hiking trails:</b></p> <ul style="list-style-type: none"> <li>The removal of trails within the PDA is predicted to reduce the ability to undertake hiking and snowmobiling in the PDA. The loss of trails is restricted to the PDA. Based on discussions with the Greenstone Snowmobile Club, removal the snowmobile trail within the PDA will not remove access to other trails within the LAA that are currently in use.</li> </ul>     |  |   |           |          |                 |           |                   |           |              |             |                 |                                       |                 |  |
| ✓   | ✓  | ✓   | Adverse   | Moderate | LAA             | N/A       | Continuous        | Long-term | Irreversible | Typical     | Not significant |                                       |                 |  |
| <p><b>Sensory disturbance to land and resource users:</b></p> <ul style="list-style-type: none"> <li>Recreational users in the LAA may be affected by sensory disturbance resulting from changes to the viewscape. The effect is characterized as moderate in magnitude because the residual effect is predicted to change the land user experience in proximity to the PDA. The visual landscape will be altered permanently.</li> </ul>   |  |   |           |          |                 |           |                   |           |              |             |                 |                                       |                 |  |



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| Potential Effect<br>(and Measurable Parameters)  | Mitigation Measures  | Activity     |           |         | Residual Effect   |            |                   |                   |                   |                  |                     |                                       |                        |            |
|--|--|--------------|-----------|---------|---|------------|-------------------|-------------------|-------------------|------------------|---------------------|---------------------------------------|------------------------|------------|
|  |  | Construction | Operation | Closure | Direction   | Magnitude  | Geographic Extent | Timing            | Frequency         | Duration         | Reversibility       | Ecological and Socio-Economic Context | Significance           |            |
|  | plateaus and benches of WRSAs A, B, and C and the overburden storage areas.<br><b>Closure:</b><br><ul style="list-style-type: none"> <li>Rehabilitation will be designed to meet desired end land uses, end land uses will be identified in the Closure Plan, in consultation with agencies, stakeholders and Aboriginal communities, as the Project progresses.</li> </ul>  |              |           |         |   |            |                   |                   |                   |                  |                     |                                       |                        |            |
| <b>Change in navigation</b><br><ul style="list-style-type: none"> <li>Change in navigation on watercourses affected by the Project.</li> </ul> | <b>Construction, Operation and Closure:</b><br><ul style="list-style-type: none"> <li>Use established watercourse crossings and avoid obstructions to navigation.</li> <li>Implementation of mitigation outlined for surface water (Chapter 10.0), specifically those related to surface water quantity.</li> </ul> <b>Construction:</b><br><ul style="list-style-type: none"> <li>Construction activities will be undertaken in a way to prevent debris from flowing into a navigable waterbody.</li> </ul> | ✓            | ✓         | ✓       | <b>Adverse</b>  | <b>Low</b> | <b>LAA</b>        | <b>Applicable</b> | <b>Continuous</b> | <b>Long-term</b> | <b>Irreversible</b> | <b>Atypical</b>                       | <b>Not significant</b> |            |
|  |  |              |           |         | <b>Change in navigation on watercourses affected by the Project:</b><br><ul style="list-style-type: none"> <li>Navigation has not been confirmed within the PDA through consultation input, TK and TLRU studies or observations made during fieldwork, however it is conservatively assumed that navigation is currently possible in the PDA on Goldfield Creek, the Southwest Arm Tributary, and SWP3. Although there has been no confirmed use of Goldfield Creek for navigation, the diversion will change the channel alignment but permit navigation by small vessels such as canoes or kayaks, with obstacles (e.g. beaver dams and vegetation obstructions), between Goldfield Lake and the Southwest Arm of Kenogamisis Lake following closure. In addition, the Project will create obstacles to navigation and access to waterways in the PDA will be restricted during construction and operation due to safety concerns.</li> </ul> |            |                   |                   |                   |                  |                     |                                       |                        |            |
| <b>VALUED COMPONENT: HERITAGE RESOURCES</b>  |  |              |           |         |   |            |                   |                   |                   |                  |                     |                                       |                        |            |
| There are no pathways associated with heritage resources from or to other VCs.   |  |              |           |         |   |            |                   |                   |                   |                  |                     |                                       |                        |            |
| <b>Area of Federal Jurisdiction:</b> CEAA, 2012 – effects of changes to the environment on Aboriginal people (physical and cultural heritage). |  |              |           |         |   |            |                   |                   |                   |                  |                     |                                       |                        |            |
| <b>Loss of archaeological resources (either Aboriginal or</b>  | <b>Construction and Operation:</b>   | ✓            | ✓         | -       | -   | -          | -                 | -                 | -                 | -                | -                   | -                                     | -                      | <b>N/A</b> |

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|--|--|--------------|-----------|---------|--|-----------|-------------------|--------|-----------|----------|---------------|---------------------------------------|--------------|
|  |  | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing | Frequency | Duration | Reversibility | Ecological and Socio-Economic Context | Significance |
| <p><b>European) determined to have cultural heritage value or interest</b></p> <ul style="list-style-type: none"> <li>Number of known archaeological resources.</li> </ul>   | <ul style="list-style-type: none"> <li>If an archaeological resource is discovered during the construction phase, all construction will cease within a 20 metre radius of where the archaeological resource has been found.</li> <li>In the event of a chance find, a licensed archaeologist will be retained by GGM and a Stage 2 Archaeological Assessment will be conducted with the participation of any interested Aboriginal groups.</li> <li>Follow-up Stage 3 or Stage 4 archaeological investigations will be conducted as required by the Ontario Heritage Act and the 2011 Standards and Guidelines for Consultant Archaeologists, as necessary.</li> <li>Key construction and operation staff will be trained in the recognition of basic archaeological artifacts such as Aboriginal material culture, and Euro-Canadian material culture and also on the potential and documented historic use and occupation of the PDA and LAA/RAA.</li> <li>If human remains are encountered, GGM will stop work immediately and contact the Registrar or Deputy Registrar of the Cemeteries Regulation Section of the Ontario Ministry of Government and Consumer Services, as well as the Archaeology Programs Unit.</li> </ul> |              |           |         | <p><b>No residual effect expected</b></p> <ul style="list-style-type: none"> <li>With the proposed mitigation measures, no residual effects on archaeological resources for all phases of the Project are anticipated.</li> </ul>                                |           |                   |        |           |          |               |                                       |              |
| <p><b>Loss of, change in access to, or change in cultural heritage value or interest of architectural or historical resources determined to have cultural heritage value or interest.</b></p> <ul style="list-style-type: none"> <li>Number of known architectural or historical resources.</li> </ul> | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>A buffer zone of 60 m will be implemented to isolate CHR 1 from Project activities including construction, operation, and closure. The 60 m construction buffers at CHR 1 will be noted on all construction plans and communicated to the construction team leads. Site plan controls, such as flagging, will be used to prevent Project activity from occurring within the 60 m buffer zone. If Project activities need to encroach upon the 60 m buffer zone, GGM will consult a qualified building condition specialist, specializing in structures built to 20th century or later Euro-Canadian constructions standards, prior to the commencement of Project activities.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Documentation and salvage will be undertaken where retention or relocation is not feasible, as is the case with Euro-Canadian architectural and/or historical resources. Documentation creates a public record of the structure or structures, which provides researchers</li> </ul>   | ✓            | ✓         | ✓       | -  | -         | -                 | -      | -         | -        | -             | -                                     | N/A          |
|  |  |              |           |         | <p><b>No residual effect expected</b></p> <ul style="list-style-type: none"> <li>With the proposed mitigation measures, no residual effects on Euro-Canadian architectural and/or historical resources for all phases of the Project are anticipated.</li> </ul> |           |                   |        |           |          |               |                                       |              |

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|---|--|--------------|-----------|---------|--|-----------|-------------------|--------|------------|------------------|---------------|---------------------------------------|-----------------|
|   |  | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing | Frequency  | Duration         | Reversibility | Ecological and Socio-Economic Context | Significance    |
|   | <p>and the general public with a land use history, construction details, and photographic record of the resource. Through the selective salvage of identified heritage attributes and other materials, some of the CHVI of each property will be retained.</p> <ul style="list-style-type: none"> <li>Commemoration will be undertaken in order to create a record of past occupation and past mining activity, involving the associated architectural and/or historical resources. Any previously conducted documentation and salvage mitigation will form the basis for commemoration for Euro-Canadian resources.</li> </ul>  |              |           |         |  |           |                   |        |            |                  |               |                                       |                 |
| <b>VALUED COMPONENT: TRADITIONAL LAND AND RESOURCE USE</b>  |  |              |           |         |  |           |                   |        |            |                  |               |                                       |                 |
| <p><b>Pathways from other VCs:</b> atmospheric environment, acoustic environment, surface water, fish and fish habitat, vegetation communities, wildlife and wildlife habitat, land and resource use, heritage resources</p> <p><b>Pathways to other VCs:</b> human and ecological health</p> |  |              |           |         |  |           |                   |        |            |                  |               |                                       |                 |
| <p><b>Area of Federal Jurisdiction:</b> CEAA, 2012 – changes to the physical environment (terrestrial landscape), effects of changes to the environment on Aboriginal people (current use of lands and resources for traditional purposes).</p>   |  |              |           |         |  |           |                   |        |            |                  |               |                                       |                 |
| <p><b>Change to availability of plant species and access to plant harvesting sites and activities.</b></p> <ul style="list-style-type: none"> <li>Availability of resources.</li> <li>Plant harvesting sites and associated access.</li> </ul>  | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>Mitigation for potential effects on groundwater in Chapter 9.0 (groundwater).</li> <li>Mitigation for potential effects on surface water in Chapter 10.0 (surface water).</li> <li>Mitigation measures related to vegetation described in Chapter 12.0 (vegetation communities).</li> <li>Mitigation measures related to land and resource use described in Chapter 16.0 (land and resource use).</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Mitigation for the potential effects from dust in Chapter 7.0 (atmospheric environment).</li> <li>Where there is interest, provide opportunities to local communities for harvesting of plants for traditional purposes prior to construction.</li> <li>Avoid the use of chemical herbicides.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>Avoid the use of chemical herbicides.</li> </ul> <p><b>Closure:</b></p> <p>Incorporate plant species of interest to Aboriginal communities into the Closure Plan as feasible.</p> | ✓            | ✓         | ✓       | Adverse  | Moderate  | LAA               | N/A    | Continuous | Medium/Long-term | Irreversible  | Typical                               | Not significant |
|   |  |              |           |         | <p><b>Change to availability of plant species and access to plant harvesting areas and activities:</b></p> <ul style="list-style-type: none"> <li>The clearing of vegetation within the PDA during construction will result in the removal of plant species of interest to Aboriginal communities and plant harvesting sites resulting in a decrease in the availability of plant harvesting areas relative to baseline conditions. The removal of vegetation communities is not predicted to threaten the long-term viability of a vegetation community type in the RAA, including the LAA. Patterns of access to harvesting areas in the LAA may be altered by access restrictions to the PDA, including the closure of Lahtis Road. Access changes may affect harvesting sites located southwest of the PDA (however this area may be accessed via Goldfield Road), and along the shoreline of the Southwest Arm of Kenogamis Lake. The removal of plant species of interest to Aboriginal communities and plant harvesting sites within the PDA, and changes in patterns of access to harvesting sites are predicted to alter plant harvesting activities in the LAA without threatening the long-term viability of vegetation communities.</li> </ul> |           |                   |        |            |                  |               |                                       |                 |

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|---|--|--------------|-----------|---------|-----------------|-----------|-------------------|--------|------------|-------------|---------------|---------------------------------------|-----------------|
|   |  | Construction | Operation | Closure | Direction       | Magnitude | Geographic Extent | Timing | Frequency  | Duration    | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <p><b>Change to availability of fish species and access to fishing areas and activities.</b></p> <ul style="list-style-type: none"> <li>• Availability of resources.</li> <li>• Access to fishing sites.</li> </ul>   | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>• Mitigation for potential effects on fish and fish habitat in Chapter 11.0 (Fish and Fish Habitat) including the Offsetting Plan (Appendix F10).</li> <li>• Mitigation measures related to land and resource use described in Chapter 16.0 (land and resource use).</li> </ul>  | ✓            | ✓         | ✓       | Adverse         | Low       | LAA               | N/A    | Continuous | Medium-term | Reversible    | Typical                               | Not significant |
| <p><b>Change to availability of fish species and access to fishing areas and activities:</b></p> <ul style="list-style-type: none"> <li>• Access restrictions and infilling of watercourses containing fish will result in the loss of availability of potential areas for fishing within the PDA resulting in a decrease in the availability of potential fishing areas relative to baseline conditions (although fishing potential within the PDA is limited and habitat that is altered or lost is limited and will be offset by creating new habitat within the Goldfield Creek realignment). Patterns of access to fishing areas in the LAA may be altered by the closure of Lahtis Road and restrictions to watercourses potentially used to access the PDA. These changes are predicted to result in a decrease in access to areas for fishing located southwest of the PDA (although this area may be accessed via Goldfield Road), in the Southwest Arm Tributary, and along the shoreline of the Southwest Arm of Kenogamisis Lake. The removal of areas for fishing potential within the PDA and reduced access to areas for fishing beyond the PDA is not predicted to reduce the ability to fish since overall, there will be no net loss of areas for fishing as a result of the Project, and more than half of the fish habitat that will be altered or lost is comprised of golf course pond and poor quality habitat such as roadside ditches and ephemeral drainage areas.</li> </ul> |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <p><b>Change to availability of hunted and trapped species and access to hunting and trapping areas and activities.</b></p> <ul style="list-style-type: none"> <li>• Availability of resources.</li> <li>• Access to hunting and trapping areas.</li> </ul>   | <p><b>Construction, Operation and Closure:</b></p> <ul style="list-style-type: none"> <li>• Mitigation for potential effects on change in habitat, mortality risk, and movement of wildlife in Chapter 13.0 (wildlife and wildlife habitat).</li> <li>• Mitigation measures related to land and resource use described in Chapter 16.0 (land and resource use).</li> <li>• Implementation of EMMPs (Appendix M) and Conceptual Closure Plan (Appendix I).</li> </ul> | ✓            | ✓         | ✓       | Adverse         | Moderate  | LAA               | N/A    | Continuous | Medium-term | Irreversible  | Typical                               | Not significant |
| <p><b>Change to availability of hunted and trapped species and access to hunting and trapping areas and activities:</b></p> <ul style="list-style-type: none"> <li>• During construction, clearing of the PDA is anticipated to result in a loss of wildlife habitat, including hunting and trapping areas identified by Aboriginal communities that will reduce but not eliminate opportunities for hunting and trapping relative to baseline conditions. Patterns of access to hunting and trapping in the LAA may be altered by access restrictions to the PDA, including the closure of Lahtis Road. Access changes may affect hunting and trapping areas located southwest of the PDA (however this area may be accessed via Goldfield Road), and along the shoreline of the Southwest Arm of Kenogamisis Lake. The removal of wildlife habitat, including hunting and trapping areas identified by Aboriginal communities within the PDA and alteration of patterns of access is predicted to reduce but not eliminate opportunities for hunting and trapping relative to baseline conditions. The loss of habitat is not predicted to affect the long-term persistence or viability of wildlife in the RAA, including the LAA.</li> </ul>  |  |              |           |         |                 |           |                   |        |            |             |               |                                       |                 |
| <p><b>Change to cultural or spiritual practices, sites or areas.</b></p>  | <p><b>Construction, Operation and Closure:</b></p>   | ✓            | ✓         | ✓       | Adverse         | Moderate  | LAA               | N/A    | Continuous | Medium-term | Reversible    | Atypical                              | Not significant |

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|---|--|--------------|-----------|---------|--|-----------|-------------------|--------|--------------|-----------|---------------|---------------------------------------|
|   |  | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing | Frequency    | Duration  | Reversibility | Ecological and Socio-Economic Context |
| <ul style="list-style-type: none"> <li>Integrity (disturbance, alteration, or removal) of cultural or spiritual sites or areas.</li> <li>Access to cultural or spiritual sites or areas.</li> </ul> | <ul style="list-style-type: none"> <li>Detailed recording and mapping of spiritual or cultural sites in partnership with Aboriginal community representatives, a decision is then made about the relative importance of the site and, if warranted, how to maintain and control access.</li> </ul> <p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>Where there is interest, provide opportunities to local communities for harvesting of plants for traditional purposes prior to construction.</li> <li>Through Project design the length and location of roads have been considered in order to reduce potential access restrictions.</li> <li>A Pipe Ceremony will be held prior to commencement of construction under the direction of local Aboriginal communities.</li> </ul> |              |           |         | <p><b>Change in availability of or access to cultural or spiritual practices, sites or areas:</b></p> <ul style="list-style-type: none"> <li>Development in the PDA and access restrictions during construction, operation and active closure will result in a decrease in areas for cultural practices relative to baseline conditions. Patterns of access to cultural or spiritual sites, or areas in the LAA may be altered by access restrictions to the PDA, including the closure of Lahtis Road. These changes are predicted to result in changes in access to areas located southwest of the PDA (however this area may be accessed via Goldfield Road), and along the shoreline of the Southwest Arm of Kenogamisis Lake. Continued use of the LAA for cultural and spiritual practices, sites and areas will still be possible, but due to changes to access conditions to sites in the LAA located southwest of the PDA (although this area may be accessed via Goldfield Road), and along the shoreline of the Southwest Arm of Kenogamisis Lake, continued use of these areas may entail a greater level of effort. The residual environmental effect will alter but not eliminate the ability to use the LAA for cultural and spiritual practices, sites and areas.</li> </ul> |           |                   |        |              |           |               |                                       |
|   |  | ✓            | -         | -       | Adverse  | High      | PDA               | N/A    | Single event | Long-term | Irreversible  | Atypical                              |
|   |  |              |           |         | <p><b>Removal of cultural or spiritual sites or areas:</b></p> <ul style="list-style-type: none"> <li>Relative to baseline conditions, there would be a removal of cultural sites and areas in the PDA. LLFN confirmed there are a total of four "land use" sites within the PDA. GGM and LLFN have agreed upon a path forward for these sites. MNO reported a tent or temporary structure near the south shore of Mosher Lake and a route connecting Highway 11 with Mosher Lake, both conservatively assumed to be located within the PDA. Based on the layout of the PDA, Mosher Lake will remain accessible during all phases of the Project. The residual environmental effect will eliminate TLRU at sites located within the PDA (LLFN "land use" sites and MNO land route and tent or temporary structure).</li> </ul>   |           |                   |        |              |           |               |                                       |

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|---|--|--------------|-----------|---------|--|-----------|-------------------|--------|------------|-----------|---------------|---------------------------------------|-----------------|
|   |  | Construction | Operation | Closure | Direction  | Magnitude | Geographic Extent | Timing | Frequency  | Duration  | Reversibility | Ecological and Socio-Economic Context | Significance    |
| <b>VALUED COMPONENT: HUMAN AND ECOLOGICAL HEALTH</b>  |  |              |           |         |  |           |                   |        |            |           |               |                                       |                 |
| <b>Pathway to other VCs:</b> N/A  |  |              |           |         |  |           |                   |        |            |           |               |                                       |                 |
| <b>Pathway from other VCs:</b> atmospheric environment, groundwater, surface water, fish and fish habitat, vegetation communities, wildlife and wildlife habitat, land and resources use, traditional land and resource use                                   |  |              |           |         |  |           |                   |        |            |           |               |                                       |                 |
| <b>Area of Federal Jurisdiction:</b> CEAA, 2012 – effects of changes to the environment on Aboriginal people (health conditions).   |  |              |           |         |  |           |                   |        |            |           |               |                                       |                 |
| <b>Change in human health.</b> <ul style="list-style-type: none"> <li>Concentration Ratio (CR)</li> <li>dimensionless</li> <li>Hazard Quotient (HQ)</li> <li>dimensionless</li> <li>Incremental Lifetime Cancer Risk (ILCR)</li> <li>dimensionless</li> </ul> | <b>Construction, Operation, and Closure:</b> <ul style="list-style-type: none"> <li>A number of mitigation measures have already been incorporated in the Project to eliminate or reduce environmental effects of the Project which also serve to address human health effects.</li> <li>These mitigation measures include, but are not limited to, the use of dust suppressants, dust collectors and protective covers, a Water Management and Monitoring Plan (Appendix M1), Soil Management Plan and progressive rehabilitation. <ul style="list-style-type: none"> <li>The mitigation measures to reduce air emissions and dust deposition are described in detail under the atmospheric environment VC (Chapter 7.0).</li> </ul> </li> <li>Mitigation measures to control discharges into both surface water and groundwater are described in detail under the surface water VC (Chapter 10.0) and groundwater VC (Chapter 9.0), respectively.</li> </ul> | ✓            | ✓         | ✓       | Adverse  | Low       | LAA               | N/A    | Continuous | Long-Term | Irreversible  | Atypical                              | Not significant |
|   |  |              |           |         | <b>Change in human health risk:</b> <ul style="list-style-type: none"> <li>Taking into account proposed air quality and water quality mitigation and management measures, it is predicted that the Project is likely to cause a negligible increase in human health risk.</li> </ul>           |           |                   |        |            |           |               |                                       |                 |
| <b>Change in ecological health.</b> <ul style="list-style-type: none"> <li>Risk Quotient (RQ) and Screening Ratio (SR)</li> <li>dimensionless</li> </ul>  | <b>Construction, Operation, and Closure:</b> <ul style="list-style-type: none"> <li>A number of mitigation measures have already been incorporated in the Project to eliminate or reduce environmental effects of the Project which also serve to address human health effects.</li> <li>These mitigation measures include, but are not limited to, the use of dust suppressants, dust collectors and protective covers, a Water Management and Monitoring Plan (Appendix M1), Soil Management Plan and progressive rehabilitation. <ul style="list-style-type: none"> <li>The mitigation measures to reduce air emissions and dust deposition are described in detail under the atmospheric environment VC (Chapter 7.0).</li> </ul> </li> <li>Mitigation measures to control discharges into both surface water and groundwater are described in detail under the surface water VC (Chapter 10.0) and groundwater VC (Chapter 9.0), respectively.</li> </ul> | ✓            | ✓         | ✓       | Adverse  | Low       | LAA               | N/A    | Continuous | Long-Term | Irreversible  | Atypical                              | Not significant |
|   |  |              |           |         | <b>Change in ecological health risk:</b> <ul style="list-style-type: none"> <li>Taking into account proposed air quality and water quality mitigation and management measures, it is predicted that the Project is likely to cause a negligible increase in ecological health risk.</li> </ul> |           |                   |        |            |           |               |                                       |                 |

NOTES:

✓ Residual effect anticipated.

– No residual effect anticipated.

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**24.2 COMMITMENTS**

Throughout the EA process, GGM has worked closely with stakeholders, government agencies and Aboriginal communities to identify, understand and address their input. The majority of comments raised during the preparation of the EIS/EA have been addressed through Project documentation, in the form of refinements to the assessment methods and results, and the description of the Project. In some cases, this has included the identification of commitments for future work, further consultation, or the implementation of measures or programs to manage potential effects.

GGM will undertake the Project in accordance with the Final EIS/EA, including meeting the key commitments identified during consultation on the EIS/EA and summarized in Table 24-2, as the Project is implemented. A complete list of commitments is provided in Table 24-3. GGM will continue to work with stakeholders, government agencies and local Aboriginal communities as the Project advances, to meet these commitments and continue to address input through subsequent Project phases.

**Table 24-2: Summary of Key Commitments**

| Key Commitment   | Description  |
|--|--|
| Effluent treatment plant for contact water treatment during construction and operation | <p>During construction, the location of the construction effluent treatment plant may change based on the location of construction activities to reduce pumping requirements. The construction ETP will be connected via temporary piping to the construction treated effluent discharge location along the shoreline of the Southwest Arm of Kenogamisis Lake and will meet effluent discharge criteria.</p> <p>During operation, water coming into contact with Project components will be collected and directed through the permanent ETP prior to discharge to the environment. The ETP will treat for metals removal and reduction of total suspended solids prior to discharge and will meet effluent discharge criteria.</p> |
| Independent TMF Review Board   | GGM is committed to staffing a senior geotechnical engineering position dedicated to TMF safety and to fund an Independent TMF Review Board (ITRB) for the Project composed of three external experts. The purpose of the ITRB is to review and advise on the design, construction, operation, performance, and closure planning for the TMF, with the objective of long-term safety and environmental protection. The ITRB will be in place prior to construction and provide review and advice through to closure. ITRB reports and actions undertaken by GGM to address ITRB feedback will be made available to interested stakeholders.  |
| Evaluate opportunity to transition to thickened tailings in year 3 to 5                | The thickened disposal option could potentially optimize TMF storage efficiency and is best evaluated once the mill successfully ramps up to the design throughput of 30,000 tonnes per day.   |

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**Table 24-2: Summary of Key Commitments**

| Key Commitment   | Description   |
|--|---|
| Revegetation pilot study   | During operation, GGM will carry out test plotting studies to optimize the revegetation approach. The results of these studies will be used to update and inform the revegetation approach within the Biodiversity Management and Monitoring Plan related to topsoil/overburden/nutrient mixture, seed mixture, planting species and natural succession.  |
| Constructed wetland pilot study  | During closure, in the event that actual water quality is different to that predicted, water quality can be addressed by implementing a constructed wetland. Model predictions will be verified through monitoring of water quality and used to refine closure planning through operation.<br><br>Wetlands can be used effectively as treatment of contact water at mine sites in Canada and other cold climate regions. During operation and with the need informed by ongoing geochemical testing, GGM will carry out a wetland pilot study to inform the design criteria for this contingency closure measure.   |
| Participation in regional moose country food study                       | GGM recognizes that Aboriginal communities are interested in participating in a moose health (i.e., tissue sampling) monitoring study in the region. Given the large ranges of these animals and mandate of the Ministry of Natural Resources and Forestry (MNRF), GGM will participate in an MNRF-led study with local Aboriginal communities during Project operation.  |
| Access through the PDA for the Southwest Arm of Kenogamisis Lake         | Lahtis Road will be closed during construction and operation due to safety reasons. At closure, Lahtis Road is anticipated to be re-opened to the Goldfield Creek diversion. GGM is committed to maintaining alternate access to the Southwest Arm of Kenogamisis Lake during construction, operation and closure.  |
| Rehabilitation approach for the historical MacLeod and Hardrock tailings | As part of Project activities, a portion of the historical tailings will be removed, including approximately 22% of the historical MacLeod tailings and approximately 77% of the historical Hardrock tailings. These historical tailings will be excavated and moved to the TMF in a controlled manner at designated locations to avoid effects to water quality, reducing the loadings to Kenogamisis Lake and improvements to water quality compared to baseline conditions.<br><br>Stabilization measures (buttresses and berms) have been developed to provide long term stability of the of the remaining MacLeod high tailings. A seepage collection system will be incorporated into the stabilization berm along the toe of the MacLeod high tailings during the initial construction works.<br><br>The placement of material over the historical MacLeod high tailings in overburden storage area #1 will include a drainage layer of coarse rock to help improve stability and act as a capillary break for drainage control. Overburden will then be placed in a controlled manner and runoff will be promoted through grading practices. Placement of |

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| Key Commitment   | Description   |
|--|---|
|  | overburden as described will provide an enhanced cover to reduce infiltration through the historical MacLeod tailings.  |
| Maintain the existing water monitoring station outside of the MacLeod Provincial Park lagoon | The MacLeod Provincial Park water supply well is classified as a groundwater under the direct influence of surface water (GUDI) supply, the potential effect of changes in surface water quality as a result of the Project were evaluated in Chapter 10.0, Section 10.4.3 (Surface Water) and demonstrate the Project will not negatively impact MacLeod Provincial Park water quality. The water quality predictions include conservative assumptions and will be confirmed through follow-up monitoring, which includes maintaining an existing surface water monitoring station in the Central Basin outside of the lagoon.   |
| Develop a specific blast plan for the eastern extension to address DFO guidelines            | A modified blast pattern will be developed for the eastern extension of the open pit to address DFO guidelines for blasting activities in proximity to fish bearing waterbodies.  |
| Further develop and implement key EMMPs  | The EMMPs guide environmental management for the Project and will be progressively developed as the Project moves through the EIS/EA, permitting, and construction, and updated based on continual improvement during operation through adaptive management.  |
| On-going consultation with local Aboriginal communities                                      | Consultation has been ongoing prior to and throughout the EIS/EA process, and will continue with local Aboriginal communities, through the life of the Project.   |
| Optimize noise reduction methods during detailed design of WRSA A considering MPP            | The inclusion of air and noise/vibration monitoring for the Geraldton area and MacLeod Provincial Park has been considered in Appendix M7 (Conceptual Air Quality Management Plan) and Appendix M10 (Conceptual Noise and Vibration Management and Monitoring Plan) to validate Final EIS/EA predictions. Adaptive management (contingency) measures such as the use of specialized back-up alarms and bed liners on the trucks operating at WRSA A are provided in the Management Plans. The development plan for WRSA A will take into account strategies to limit potential noise disturbance on MacLeod Provincial Park and other nearby residents. This may include reducing night-time work during the camping season on the east portion of the WRSA and/or the establishment of rock berms. |
| Document and salvage program for heritage resources  | <p>Documentation and salvage will be undertaken where retention or relocation of heritage resources is not feasible, as is the case with Euro-Canadian architectural and/or historical resources. Documentation creates a public record of the structure or structures, which provides researchers and the general public with a land use history, construction details, and photographic record of the resource.</p> <p>Documentation activities will be performed by a heritage professional with experience in historical documentation and familiar with Euro-Canadian historical background and material culture. This person will preferably be a member of the Canadian Association of Heritage Professionals.</p>   |

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| Key Commitment     | Description  |
|--------------------|--|
| Cyanide Management | GGM intends to become a signatory to the International Cyanide Management Code and will abide by code criteria for the safe and responsible use, transport and management of cyanide products. |

**Table 24-3: Complete List of Commitments**

| Valued Component/ Topic | Commitment   |
|-------------------------|--|
| Atmospheric Environment | During the permitting phase of the Project, the emissions estimates will be refined using detailed design data and ECA application submitted to the MOECC for the Project will be required to demonstrate compliance with relevant MOECC air quality standards.  |
| Atmospheric Environment | Construction phase BMP (for air quality) is to be submitted to MOECC during permitting.  |
| Atmospheric Environment | GGM will share information with and obtain input from Ontario Parks during development of the details of Air Quality Management and Monitoring Plan in relation to MacLeod Provincial Park.  |
| Atmospheric Environment | The 2016 ambient monitoring report will be incorporated into the ECA permit application.   |
| Atmospheric Environment | Baghouse maintenance will be discussed in the air quality management plan.   |
| Atmospheric Environment | The form and frequency of reporting of the ambient air quality monitoring results will be determined as the Project progresses through permitting and further consideration can be made for real-time monitoring as details are advanced with engineering; however, at minimum, it is anticipated that relevant elements will be assembled into a formal report and made available to interested parties including Aboriginal communities, on an annual basis during construction and operation and during closure in years when monitoring is carried out.  |
| Atmospheric Environment | The AQMMP for the Project will include sampling to analyze the silt content of the unpaved roads to confirm EA assumptions. The sampling will be included in the appendix of the BMP complete with a technical memo outlining the sampling procedure and locations. Results of silt content analysis completed for the Construction Phase BMP will be included in the updated Operational Phase BMP. Consideration will be given to more frequent sampling of unpaved roads in closer proximity to off-property receptors. The silt sampling requirements will be refined through adaptive management determined based on the roads in proximity to off-property receptors, results of air quality monitoring, and effectiveness of mitigation measures. |

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| Valued Component/ Topic | Commitment  |
|-------------------------|---|
| Acoustic Environment    | GGM will share information with and obtain input from Ontario Parks during development of the details of the Noise and Vibration Management Plan in relation to MacLeod Provincial Park.  |
| Groundwater             | The design of Pond M1 will be confirmed during detailed design with additional geotechnical testing in the area being completed along with refining operating requirements and water levels for the pond. Based on actual site conditions, the need for a liner to maintain pond volumes and to address potential seepage if required will be confirmed. During detailed design, the configuration of Pond M1 will also be optimized to increase the setback from the Southwest Arm Tributary where feasible. |
| Groundwater             | The HELP input and output parameters will be documented in a memorandum and provided to support the permitting process.   |
| Groundwater             | Performance of the WRSA and TMF cover design will be evaluated during operations as part of progressive rehabilitation.   |
| Surface Water           | Update water quality modelling to further evaluate future pit lake water quality during closure and at the time of discharge as data is developed to validate actual site water quality during operations. This modelling will be used to refine the pit lake water quality at time of discharge, and the need for subsequent treatment or effluent polishing and to support required regulatory approvals.   |
| Surface Water           | The precise Safety Pond siting is planned to be optimized during detailed engineering to consider the final engineering plans for the haul road, tailings and water reclaim lines, and DFO Offsetting plan.   |
| Surface Water           | It is anticipated that the sludge will be stored in geotextile bags and transferred to the TMF when operational. The temporary sludge storage location will include seepage collection to contain and collect any contact water which will be directed to the ETP.  |
| Surface Water           | The design of Pond M1 will be confirmed during detailed design with additional geotechnical testing in the area being completed along with refining operating requirements and water levels for the pond. Based on actual site conditions, the need for a liner to maintain pond volumes and to address potential seepage if required will be confirmed. During detailed design, the configuration of Pond M1 will also be optimized to increase the setback from the Southwest Arm Tributary where feasible. |
| Surface Water           | Acceptable discharge criteria for closure will be established through consultation with staff from MNM to fulfill the requirements of O. Reg. 240/00.   |
| Surface Water           | If the tailings safety pond for emergency draining of the tailings line remains within the flood plain of the Southwest Arm Tributary, the facility will be engineered to prevent water over-topping the containment berm during a flood event.   |
| Surface Water           | A detailed design brief and engineering drawings of the proposed wastewater treatment system will be prepared during permitting stage   |

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|-------------------------|---|
|                         | and submitted to MOECC as part of the Industrial Sewage Works ECA application.  |
| Surface Water           | Results of the CORMIX model will be used for determining near field-mixing zone dimensions, and results of the RMA4 model will be used for determining far-field lake-wide water quality predictions  |
| Surface Water           | Monitoring of the temporary storage areas will consist of daily visual monitoring to verify the integrity of the temporary storage facilities and water management infrastructure. Contact water collected from the temporary storage facilities will be pumped to the effluent treatment plan and effluent discharge will be monitored as required by applicable permitting.   |
| Surface Water           | GGM will continue monitoring water quality in a location just outside the lagoon where the GUDI well is located and provide potable water for the MacLeod Provincial Park should an unforeseen event occur where Project activities affect water quality at this well.  |
| Surface Water           | Monitoring of cyanide, copper, lead, nickel and zinc in effluent are required as per O.Reg. 560/94 and MMER including the reporting of effluent concentrations relative to the regulation limits. However, as none of these parameters were predicted to exceed the PWQO in Pond M1, they were not proposed as specific effluent criteria. Regardless they will be monitored and reported as part of the comprehensive monitoring approach for the Project. |
| Surface Water           | Details on the monitoring locations, parameters, frequencies, triggers, methods, and reporting procedures will be confirmed through the permitting phase, will be documented in the Industrial Sewage Works ECA and PTTW, and will necessarily meet the requirements of O.Reg.560/94, O.Reg. 240/00 and MMER.   |
| Fish and Fish Habitat   | In accordance with MMER monitoring requirements, fish tissue collections will be planned for every third year. Sampling methylmercury and other metals in fish from Kenogamisis Lake will also occur at this time. Sampling frequency would be adjusted based on the results of water quality monitoring and previous fish tissue studies.  |
| Fish and Fish Habitat   | The final offsetting plan will provide linkages between lost habitat with spawning potential and amount of new habitat created to address spawning habitat loss.  |
| Fish and Fish Habitat   | Further details on the methods proposed for carrying out the EEM studies under the MMER will be provided in the Study Design for the EEM program that will be submitted to ECCC once the mine becomes subject to MMER EEM requirements. Agreement on the detailed methods and target species can be obtained at that time.  |
| Fish and Fish Habitat   | Details of the riparian zone (along the approximately 2 km long new channel alignment (between the GFDP and SWP1) will be provided during the permitting process associated with the MNRF LRIA and DFO Authorizations.  |

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|-------------------------------|--|
| Fish and Fish Habitat         | Further details to determine the effects on grade control structures (and fish habitat features) in the event of a release from the TMF emergency spillway(s) will be provided during permitting.  |
| Fish and Fish Habitat         | The details regarding frequency of monitoring will be further considered as part of the final Offsetting plan development and will consider input from local Aboriginal communities and ultimately will be determined by DFO.  |
| Vegetation Communities        | GGM will consider incorporating aspects of the Clean Vehicle Protocol for the next iteration of the Biodiversity Management Plan prior to construction.  |
| Vegetation Communities        | <p>The Biodiversity Management and Monitoring Plan will consider an approach to categorize land areas within the PDA in terms of the nature and degree of disturbance that will be caused by the development and operation of the mine and define appropriate revegetation strategies and practices for each category. The plan will take into consideration:</p> <ul style="list-style-type: none"> <li>• identify areas where vegetative cover will be removed</li> <li>• maintaining or restoring forested areas where appropriate</li> <li>• revegetation strategies for specific vegetation communities (wetlands, upland forest, lowland forest, floodplains)</li> <li>• minimizing the establishment of non-native or invasive plant species</li> <li>• practices for the control of vegetation where necessary for the safe operation of the mine</li> <li>• monitoring</li> <li>• communications and complaint protocols.</li> </ul> <p>GGM will consult with the MNRF to further develop the plan.</p> |
| Wildlife and Wildlife Habitat | Prior to any activities required for Pond D1 and WRSA D the activity of Bald Eagle nest 271 will be assessed, and a protection plan developed if the nest is active.   |
| Wildlife and Wildlife Habitat | GGM will work with the MNRF on advancing the details of the Biodiversity Management and Monitoring Plan with respect to the use of wildlife deterrent measures, selective fencing measures if required, response procedures and monitoring practices.  |
| Wildlife and Wildlife Habitat | <p>Wildlife use of the TMF, including the TMF reclaim pond, will be monitored during mine operation as follows:</p> <ul style="list-style-type: none"> <li>• Twice a week, starting at spring break-up and continuing until the start of freeze up (approximately April to October), environment staff will survey the TMF reclaim pond and the adjacent tailings beach for waterfowl. The surveyor will use binoculars, and if waterfowl are present, will document their species, age class, behaviour (e.g., resting, feeding, flying over), abundance, and specific location (to be marked on a large-scale site map). The survey will be completed from a single survey station that will be selected based on accessibility, safety, repeatability, and a suitable field of view of the pond surface. Observations of other wildlife will also be recorded.</li> </ul>   |

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|                         | <ul style="list-style-type: none"> <li>Project personnel and contractors will be instructed to report sightings of wildlife near or within the TMF boundaries directly to the Environment Manager, by radio or in person. These sightings will be recorded in the wildlife observation log maintained by GGM.</li> </ul> <p>Measures to deter wildlife from the TMF will be directed by the Environment Manager as needed. Specific adaptive management triggers will need to be refined prior to TMF operation but may include consistent observations of waterfowl use over a one-month period.</p> |
| Soil Management         | TP22, TP23, TP25 and TP33 (test pit locations) were located within the Macleod tailings. The reddish purple/burgundy coloured soils are consistent with descriptions of burgundy tailings in previous studies of the MacLeod tailings. These areas will be remediated as part of the mine development.  |
| Soil Management         | With respect to the PCB exceedance at TP26, it is possible that PCB-containing equipment, such as transformers, was historically present in the MacLeod plant site. These areas will be remediated as part of the mine development.   |
| Soil Management         | GGM is committed to the responsible long-term management of historical tailings within the PDA and will be carrying out additional laboratory work to simulate storage conditions in the new TMF to confirm geochemical behaviour to inform detailed design of the deposition plan. This will involve investigating layering design approaches, and the detailed engineering plan including any engineering updates to the segregation strategy will be reviewed by the ITRB.   |
| Soil Management         | As part of an agreement with Hydro One, GGM will be committed to perform a Phase 1 and Phase 2 Environmental Site Assessment at the designated new location for the Longlac Transformer Station.  |
| Soil Management         | As part of an agreement with Hydro One, GGM will be committed to perform a Phase 1 and Phase 2 Environmental Site Assessment at the designated new location for the GOC.  |
| Soil Management         | For properties currently owned by others, the soil management requirements will be site-specific and planned to be addressed separately from the mine's Soil Management Plan because these site-specific plans can only be completed once property ownership is transfer to GGM pending advancement of the Project.   |
| Soil Management         | Further delineation of soil quality will be completed in preparation for construction activities and will be used to refine the Final Soil Management Plan.   |
| Soil Management         | In the Final Soil Management Plan, soils are planned to be delineated into four categories: soils suitable for closure revegetation use, soil suitable for placement in the WRSAs (to fill void space or to cover the inert landfill cells, use as grading material over historical tailings prior to placement of enhanced cover), soil with higher metals content that are to be placed in the TMF along with the relocated historical tailings, and soils to be hauled off site (e.g. hydrocarbon impacted soils). Further   |

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|-------------------------|--|
|                         | discussion of the environmental criteria to be used for each of these categories will be held with the MOECC during the permitting phase of the Project. Additional soil sampling is planned to refine estimates and corresponding management options prior to construction.   |
| Soil Management         | The Final Soil Management Plan will include measures to ensure that all solid and liquid is contained during transportation.   |
| Soil Management         | Further refinement of the soil chemistry will be carried out to inform the next iteration of the soil management plan prior to construction, and will consider topsoil and subsoils separately.  |
| Soil Management         | GGM commits to taking all sediment from the water management treatment system to the TMF. Sediment that may collect in the ditches will either be from the excavated ditches themselves or runoff from the waste rock and operational pads.  |
| Soil Management         | Areas of known historical contamination will be flagged prior to disturbance, and run-off collected and treated prior to discharge as needed.  |
| Consultation            | GGM will support training of Aboriginal people through agreements with communities, seeking joint funding of programming, preparedness training, and providing on-the-job training.  |
| Consultation            | GGM will provide opportunities to affected Aboriginal communities to review and comment on permits, the Closure Plan, Environmental Management Plans, and monitoring.  |
| Consultation            | GGM will meet regularly (or at least annually) with affected Aboriginal communities to share information about the Project.  |
| Consultation            | GGM has supported, and will continue to support, the use of Aboriginal environmental monitors and/or technicians.  |
| Consultation            | GGM commits to supporting Aboriginal cultural practices through community driven initiatives.  |
| Consultation            | GGM is committed to monitoring and information sharing. It is anticipated that those elements relevant to the environmental monitoring and management plans will be assembled into a report and provided to interested parties on an annual basis during construction and operation, and during closure in years when monitoring is carried out. |
| Consultation            | A preliminary agreement was previously signed with Hydro One to begin to discuss and studies for the project. Going forward, two agreements are planned to be signed between Hydro One and GGM. These agreements will cover the responsibility of each party concerning the relocation of Hydro One's infrastructure.                            |
| Consultation            | GGM will continue to share project information with RSMIN to address its areas of interest through the implementation of appropriate mitigation measures that have been identified for the Project.  |

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| Consultation            | GGM will support RSMIN values through hiring as many regional employees as possible and working with local conservation groups to promote the high standard of environmental awareness and concern that now exists within the area.  |
| Consultation            | The information on fish species that are important to RSMIN, and the fish consumption methods used by RSMIN community members, will be considered in refining future monitoring programs.  |
| Consultation            | Water quality and fish tissue monitoring results will be shared with Aboriginal communities upon request.  |
| Consultation            | GGM commits to establish and fund the AZA, AFN, GFN Environment Advisory Committee (EAC) and to fund the training of the First Nation Community Consultation and Environmental Monitor (1 position for each First Nation). Activities to be undertaken by the EAC include assisting in the development and implementation of management and monitoring plans including Adaptive Management Planning, Environmental Assessment Compliance Monitoring Program, Socio-economic Monitoring Plan, Wild Foods Monitoring Program, review of regulatory permits, plans, monitoring reports and other aspects related to the environmental management and performance of the Project (e.g. Goldfield Creek diversion), and other topics reasonably brought forward by the EAC. |
| Consultation            | GGM commits to work with AZA, AFN and GFN to develop a Consultation and Implementation Plan to communicate Project developments. An Implementation Coordinator will be funded by GGM for each First Nation (AZA, AFN, GFN) to oversee the implementation of Project related commitments and liaise with GGM for the first three years of the agreement. At the end of the funding period this role will be assumed by the Community Consultation and Environmental Monitor.  |
| Consultation            | GGM commits to supporting reasonable community-based engagement and cultural activities including youth engagement in traditional teachings for fishing, hunting, harvesting and other land/water uses; participation in plant, fish and wildlife species salvage prior to construction and participation in revegetation efforts in the PDA and LAA.  |
| Consultation            | GGM is committed to ongoing consultation with the MNO as the project advances, including information sharing and opportunities related to the advancement of the Closure Plan, fish habitat offsetting, Environmental Management and Monitoring Plans, and reasonable support for cultural practices through community driven initiatives. GGM is also providing an opportunity for the MNO to have an Environmental Monitor (otherwise referred to as a Metis Liaison) and an Environmental Committee comprised of representatives of GGM and MNO to provide input on adaptive management for the Project.  |

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| Consultation            | Where MNRF has a permitting authority for the Project, the corresponding EMMP with linkage to the permit will be discussed with MNRF.   |
| Consultation            | Additional detail on the crossing to access aggregate site T2, (such as plans, profiles, cross sections) requires detailed engineering and will be available for review and discussion with MNO as the Project advances to permitting detail.   |
| Consultation            | GGM will continue to engage MNRF throughout the permitting phase regarding MNRF authorizations. Additional details will be provided during the permitting phase, including development of a road use strategy (RUS) for each of the roads and associated infrastructure.  |
| Consultation            | GGM acknowledges that each aggregate permit application must be a stand-alone document including details of the natural environment, hydrogeology, etc. as required by the ARA. Pre-consultation with the MNRF will ensure that necessary information is included in the applications.  |
| TMF Design              | Design approaches in addition to the use of the highest design criteria and standards combine to mitigate the probability of an accidental dam failure. Constant dam monitoring, surveillance and maintenance by GGM as well as anticipated regulatory requirements to conduct third party dam inspections and safety reviews in compliance with the Canadian Dam Association guidelines and condition of other regulatory approvals, will further mitigate against the potential for accidental dam failure. |
| TMF Design              | The detailed design of the toe stabilization berms will be advanced when the results of cone penetration tests (CPTs) are available. The highway will not be commissioned until such a time as adequate geotechnical stability has been demonstrated.   |
| TMF Design              | Site investigations carried out to date have characterized the dam foundation conditions and the design and dam instrumentation programs have been developed considering this information. Additional work will be carried out for detailed engineering.  |
| TMF Design              | A Failure Modes and Effects Analysis will be completed and informed by detailed engineering and has been acknowledged by the ITRB.  |
| Highway 11 Realignment  | GGM is committed to provide all required detailed engineering information to MTO as well as fulfill all legal requirements to conclude a legal agreement with MTO before commencing construction of the new segment of Highway 11.  |
| Highway 11 Realignment  | Prior to moving the utilities associated with the Highway relocation, GGM will submit the Utility Relocation Plan to MTO for review and approval.   |
| Emergency Response      | GGM will consider the provisions of the United Nations Environment Programme (UNEP) Awareness and Preparedness for Emergencies on a   |

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|--|--|
|  | Local Level (APEL) protocol in the next iteration of the Emergency Response Plan.  |
| Goldfield Creek Diversion                            | Details of the riparian zone (along the approximately 2 km long new channel alignment (between the GFDP and SWP1) development will be provided during the permitting process associated with the <i>Lakes and Rivers Improvement Act</i> and DFO Authorizations.   |
| Goldfield Creek Diversion                            | A hydraulic assessment memo is planned to be included in the permit applications for the channel realignment.  |
| EMMPs  | The EMMPs will be progressively developed as the Project moves through permitting, and construction, and updated based on continual improvement during operation through adaptive management. As the Project progresses towards construction and operations, the level of detail of the EMMPs is expanded upon as more Project details are advanced through detailed engineering work. Details on the monitoring locations, parameters, frequencies, triggers, methods, and reporting procedures will be developed through the permitting phase. |
| Waste Rock Management Plan                           | As the project proceeds and operational planning advances, the conceptual waste rock management plan will be updated including additional details on the testing program. GGM anticipates that the geochemical monitoring plan will form part of the Closure Plan for the Project.   |
| Exploration Agreement                                | GGM agrees to negotiate an exploration agreement for future exploration activities at Brookbank, in a reasonable time prior to undertaking or resuming exploration activities.   |
| Closure Plan   | More detailed geological descriptions will be included in Section 5 of the Closure Plan.   |
| Closure Plan   | Specific mitigation measures will be included in Sections 10, 11 and 12 of the Closure Plan.   |
| Closure Plan   | Requirements for rehabilitation measures during temporary suspension and state of inactivity will be included in the Closure Plan, in accordance with O.Reg. 240/00. These measures will include water management considerations.  |
| Closure Plan   | A description of the performance monitoring for the WRSA and TMF covers will be included in the Closure Plan.  |
| Closure Plan   | The certified Closure Plan will include reclamation cost estimate and sequencing.  |
| Waste Management Plan                                | Typical waste report requirements will be included in the annual reports. Specific reporting details will be confirmed during the development of the final Waste Management Plan   |
| Operating, Maintenance and Surveillance (OMS) Manual | Operation of the TMF and water management facilities will be carried out according to guidance that will be provided in an OMS Manual. The OMS sets out the management framework and responsibilities, states the design basis for the dams and ancillary hydraulic structure,   |

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|                         | provides an overview of the operating conditions, and highlights monitoring and surveillance procedures. |