
**AMENDED EIS/EA REPORT
CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT
PLANNING
VERSION 3**



TABLES

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Table 8-1: Health and Safety Planning, Monitoring and Compliance

Aspect	Component	Considerations	Implementation, Management or Mitigation	Monitoring Objective and Plan	Regulating Authority / Compliance Requirements
Workplace Safety	General Health and Safety and Security	All workers must have a minimum understanding and acceptance of safe work procedures and policies for their area of employment.	<ul style="list-style-type: none"> ■ Training and Monitoring ■ Site Orientation Training ■ Establishment of a Joint Health and Safety Committee (JHSC) ■ WHMIS Training ■ Develop incident reporting and management system ■ Develop effective lines of communication ■ Develop and implement progressive discipline policy ■ Post a copy of the occupational health and safety policy in the workplace, where workers will be most likely to see it ■ Provide appropriate training for site supervisors 	<ul style="list-style-type: none"> ■ Safe working environment ■ Periodic Safety review meetings between management and workers ■ Regular JHSC meetings ■ Maintain and update training records ■ Regular review of incident reporting ■ Periodic review and update of health and safety policy 	Occupational Health and Safety Act (OSHA); Examples from OSHA: <ul style="list-style-type: none"> ■ instruct, inform and supervise workers to protect their health and safety [clause 25(2)(a)] ■ take every precaution reasonable in the circumstances for the protection of a worker [clause 25(2)(h)]
Workplace Safety	Harassment	All workers are entitled to work in a secure and harassment free environment.	<ul style="list-style-type: none"> ■ Develop programs supporting workplace harassment and workplace violence policies and include measures and procedures for workers to report incidents of workplace harassment and workplace violence, and set out how the employer will investigate and deal with incidents or complaints. 	<ul style="list-style-type: none"> ■ Verify through incident report tracking ■ Annual review of policies and update as required 	OSHA; <ul style="list-style-type: none"> ■ prepare policies with respect to workplace violence and workplace harassment and review them at least once a year [subsection 32.0.1(1)]
Workplace Safety	Worker (Job) Specific Training	Many various specialists, tradespeople all have skill sets that require training to be effective and safe, many of which require certificates or diplomas.	<ul style="list-style-type: none"> ■ Confirm credentials of trades people ■ Reference Checks ■ Specific training or training programs 	<ul style="list-style-type: none"> ■ Ongoing maintenance and annual update of training records 	OSHA; <ul style="list-style-type: none"> ■ inform a worker, or a person in authority over a worker, about any hazard in the work and train that worker in the handling, storage, use, disposal and transport of any equipment, substances, tools, material, etc. [clause 25(2)(d)]
Traffic Safety	Vehicular	Human Health and Wildlife	<ul style="list-style-type: none"> ■ Worker Education (site vehicle driver course) ■ Posting and Enforcing site speed limits 	<ul style="list-style-type: none"> ■ Require proof of valid driver's licence ■ Maintain records of completion of site specific training 	OSHA (Workplace Hazard)
Traffic Safety	Pedestrian	Human Health and Wildlife	<ul style="list-style-type: none"> ■ Worker Education (General orientation) ■ Posting and Enforcing site speed limits 	<ul style="list-style-type: none"> ■ Maintain and periodically review training records 	OSHA (Workplace Hazard)
Mine Safety	Worker Training	Specific mine training is required for safe mining operations.	Follow training requirements as legislated. Examples include: <ul style="list-style-type: none"> ■ Supervisor training. ■ Surface mining training ■ Mill operator training 	<ul style="list-style-type: none"> ■ Develop and maintain training database and confirm training records of employees ■ Comply with appropriate federal and provincial legislation 	Under OSHA: R.R.O. 1990, Reg. 854, s. 2 (1). O. Reg. 296/11, s. 1.

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Aspect	Component	Considerations	Implementation, Management or Mitigation	Monitoring Objective and Plan	Regulating Authority / Compliance Requirements
Mine Safety	Explosives Use	Improper use or storage of explosives could have safety and environmental concerns.	<ul style="list-style-type: none"> ■ Follow safe storage and handling procedures as legislated ■ Provide training on handling and use of explosives ■ Develop an explosives management plan to limit waste explosives ■ Use appropriately maintained and marked vehicles for explosives transport ■ Use appropriate warning signage and blast sirens prior to blasting, and ensure nearby waters are clear of boaters ■ Establish a minimum safe distance from blast zones ■ Develop a blast management plan 	<ul style="list-style-type: none"> ■ Maintain explosives inventory records ■ Maintain training records of employees charged with the use and storage of explosives ■ Routinely inspect explosive storage and preparation facilities ■ Comply with all federal and provincial legislation 	Reg 00/584 Part VI Under OSHA; Explosives Act (Canada) Reg. 272/97 Storage Standards for Industrial Explosives, May 2001 (Department of Natural Resources Canada)
Mine Safety	Fly Rock	Blast Management Plan.	<ul style="list-style-type: none"> ■ Develop a fly rock management plan and use appropriate mitigations to minimize fly rock 	<ul style="list-style-type: none"> ■ Record patterns and observations of fly rock and adjust mitigations if necessary 	OSHA (General worker safety)
Mine Safety	Slope Stability	Improper slope angles or other design considerations may endanger worker safety or mine viability.	<ul style="list-style-type: none"> ■ Follow appropriate mine design plan and blast plan 	<ul style="list-style-type: none"> ■ Map geological structures encountered during operations ■ Periodic review mine operations, design, and slopes by a qualified engineer ■ Reporting and investigation of unusual or unstable conditions or structures 	OSHA (General worker safety) MNDMF (Closure and Post Closure)
Mine Safety	Pit Inflow	<ul style="list-style-type: none"> ■ Rapid inflow of water may jeopardise mining operations. ■ At closure flooding of the pit may reduce slope stability. 	<ul style="list-style-type: none"> ■ Maintain buffer distance between Upper Marmion Reservoir and Mine as per Mine design 	<ul style="list-style-type: none"> ■ Periodic review of Mine inflow and pumping records ■ Groundwater Level Monitoring ■ Reporting and investigation unusual or excessive mine water inflows or mine structures leading to inflows 	OSHA (General worker safety) MNDMF (Closure and Post Closure)

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Table 8-2: Environmental Management Planning, Monitoring and Compliance – Physical Environment

Project/Environment Interaction	Potential Effects	Mitigation Measures	Monitoring Objectives	Regulating Authority / Compliance Requirements	Contingency / Non-Compliance Strategy
Air emissions	<ul style="list-style-type: none"> ■ Risk to human and ecological health ■ Increase in dust levels ■ Change to ambient air quality 	<ul style="list-style-type: none"> ■ In-design mitigation including: <ul style="list-style-type: none"> ▪ Dust management and a dust management plan ▪ Design to appropriate air quality standards ■ Develop and implement a greenhouse gas (GHG) emission plan to minimize releases of GHG. The plan will describe: <ul style="list-style-type: none"> ▪ Potential sources and factors that may influence releases of GHG; ▪ Measures to minimize releases of GHG; ▪ Monitoring and reporting programs for releases of GHG; ▪ Mechanisms to incorporate the results of monitoring programs into further improvements and updates to the plan 	<ul style="list-style-type: none"> ■ Confirmation of process emissions ■ Confirmation of predicted dust and indicator compound levels 	<ul style="list-style-type: none"> ■ MOE: Environmental Compliance Approvals ■ Ontario Regulation 419/05 under the Environmental Protection Act: <ul style="list-style-type: none"> ▪ Comply with air standards in Schedule 3 of the regulation ▪ Prepare and annually update an Emission Summary and Dispersion Modeling Report used to assess compliance ■ Environment Canada's Code of Practice for Metal Mines ■ National Pollutant Release Inventory (NPRI): Report monitoring data ■ Canada/US Air Quality Agreement: Notification if required under Article V 	<ul style="list-style-type: none"> ■ Register and investigate any air quality complaints ■ Review monitoring data and, if required, make appropriate adjustments/ modifications to planned mitigation measures such as: <ul style="list-style-type: none"> ▪ Adjusting fugitive dust management plan, preventative procedures and control measures ▪ Modifying in-design fugitive dust control devices (e.g., enclosures, baghouses) ▪ Reviewing non-road vehicle emissions and considering alternative vehicle or fuel types, fleet sizes and/or engineered controls (e.g., diesel particulate filters)
Noise emissions	<ul style="list-style-type: none"> ■ Noise levels may be annoying to nearby receptors. 	<ul style="list-style-type: none"> ■ Post signs at potential recreational activity sites to indicate potential for elevated noise levels ■ Provide contact information on signage 	<ul style="list-style-type: none"> ■ Confirmation that recreational users are not being affected by elevated noise levels 	<ul style="list-style-type: none"> ■ Ontario Environmental Protection Act ■ MOE publication NPC 300 "Environmental Noise Guideline – Stationary and Transportation Noise Sources – Approval and Planning" 	<ul style="list-style-type: none"> ■ Register and investigate any noise complaints ■ If received, noise complaints will be followed up on; appropriate stakeholders will be contacted and consulted ■ If required, potential noise reduction measures such as mufflers, rubber lining of haul truck boxes and physical barriers may be implemented
Vibration from blasting	<ul style="list-style-type: none"> ■ Blasting in the open pit will cause vibration in surrounding water bodies and may impact fish habitat. 	<ul style="list-style-type: none"> ■ Develop blast monitoring and mitigation plan. ■ Perform initial monitoring to provide site specific data for refinement of vibration attenuation models ■ Adjust blast intensities if required based on initial monitoring results to protect sensitive fish species during critical life stages and eggs during incubation 	<ul style="list-style-type: none"> ■ Confirmation that guideline limits are met and allow for adaptive management 	<ul style="list-style-type: none"> ■ DFO: Fisheries Act authorizations 	<ul style="list-style-type: none"> ■ Review monitoring data and, if vibration exceeds guideline limits, reduce the maximum explosive weight detonated per delay through any one or a combination of the following measures: <ul style="list-style-type: none"> ▪ Reducing the borehole diameter; ▪ Introducing decked charges; ▪ Reducing the borehole length.

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Water taking and discharge	<ul style="list-style-type: none"> Changes to water levels and flows Potential impact to navigable waters 	<ul style="list-style-type: none"> Recirculation of water in process plant to reduce withdrawal from Marmion Reservoir Management through discussion with other local water users and participation in the Seine River Watershed Management Plan Design of facility and flows will be optimized to handle hydrologic conditions and to allow for maintained existing uses of Marmion Reservoir Precipitation (weather station) records will be used for design and flow evaluation and adaptive management 	<ul style="list-style-type: none"> Confirmation of predictions to allow for adaptive management. Ongoing information sharing with other water users Periodic review of water levels and weather station data to allow for adaptive water management 	<ul style="list-style-type: none"> Seine River Watershed Management Plan MMER: requirements MOE: Environmental Compliance Approvals MNDMF: Closure Plan and amendments (post-closure) MISA (Industrial Sewage works Environmental Compliance Approval) applies to worker accommodation camp discharge and TMF operation Transport Canada (Navigable Waters Protection Act) 	<ul style="list-style-type: none"> Review monitoring data and, if it is clear that the direct project effects are greater than predicted, OHRG will work with the Seine River Management Authority and appropriate regulating authorities to determine appropriate action. If required, additional mitigation measures could include: <ul style="list-style-type: none"> Withdrawing water only during certain periods of the year and storing it on-site Providing additional fish habitat compensation if flow and/or water level changes in fish bearing waters are greater than predicted If future precipitation events cause flooding in excess of the design capacity of the water management facilities, appropriate structural modifications will be investigated and implemented if necessary
Pit dewatering	<ul style="list-style-type: none"> Changes to lake water levels Changes to water quality Impact to pit slope stability 	<ul style="list-style-type: none"> Maintenance of dewatering flows within site water management system and release through discharge locations Monitoring and/or treating to ensure appropriate water quality prior to discharge Continual evaluation pit design to ensure slope stability Install interception wells, if necessary 	<ul style="list-style-type: none"> Confirmation of predictions and design assumptions through monitoring of water levels around the Mine pits Adaptive management will be applied should monitoring results differ from predictions 	<ul style="list-style-type: none"> MMER: requirements MOE: Environmental Compliance Approvals MNDMF: Closure Plan and amendments (post-closure) 	<ul style="list-style-type: none"> If seepage inflows to the pit are larger than expected, additional pumping infrastructure will be provided and the impact to Marmion Reservoir will be re-assessed. If required, appropriate mitigation measures will be implemented Review monitored groundwater levels and, if required, implement adaptive modifications to the pit slope design or groundwater levels through pumping to ensure pit slope stability
Excavation and stockpiling	<ul style="list-style-type: none"> Potential for metal leaching and acid drainage from stockpiles 	<ul style="list-style-type: none"> Waste Rock and Tailings will be stored appropriately Runoff and seepage from WRMF and TMF will be captured and treated if necessary A geochemical management plan will be developed to periodically confirm the geochemical characteristics during operational placement of materials 	<ul style="list-style-type: none"> Confirmation of predictions Periodic evaluation for signs of oxidation or acid mine drainage influence Confirmation of material properties' to confirm mine design, allow for adaptive management, and for consideration in the Certified Closure Plan 	<ul style="list-style-type: none"> Mining Act of Ontario – Regulation 240/00 MMER 	<ul style="list-style-type: none"> If stockpile runoff is found to be acidic or contain unacceptable metals concentrations, additional evaluation of water quality will be completed and further mitigation strategies will be developed if necessary. Potential mitigation strategies may include: <ul style="list-style-type: none"> Enhanced water treatment Modification to runoff/seepage collection systems Modify the closure plan to ensure long-term protection of aquatic and terrestrial life if deemed necessary through geochemical testing and experience gained through mine operation

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Project/Environment Interaction	Potential Effects	Mitigation Measures	Monitoring Objectives	Regulating Authority / Compliance Requirements	Contingency / Non-Compliance Strategy
Water Discharge	<ul style="list-style-type: none"> Changes to water quality. Water discharges from the Project are predicted to meet baseline conditions, guideline values or site specific water quality objectives 	<ul style="list-style-type: none"> Capture of runoff and seepage in collection ditches and sumps to the extent practicable Recirculation of water in process plant to the extent practicable Capture water within the reclaim pond and PPCP to settle solids Implement management controls if necessary to reduce nutrient loading (ammonia, nitrate, and phosphorous) Include a treatment facility for suspended solids which would be operated if necessary Develop contingency plan that considers treatment of metals (Project Site discharge) or phosphorus (worker accommodation camp discharge) At closure and post-closure, re-establish direct drainage from Project Site areas to lakes and reservoirs only once applicable guidelines or site specific water quality objectives are met 	<ul style="list-style-type: none"> Confirmation of predictions for general parameters including nutrients, cyanide and metals Management of on-site water quality through monitoring of internal stations Ensure regulatory compliance at off-site stations included discharge points during operations and post-closure 	<ul style="list-style-type: none"> MOE: Environmental Compliance Approvals MOE: Permit to Take Water (<i>Ontario Water Resources Act</i>) DFO: Fisheries Act authorizations MMER regulatory requirements MNDMF: Closure Plan and amendments (post-closure) MISA (Industrial Sewage works Environmental Compliance Approval) applies to worker accommodation camp discharge and TMF operation 	<ul style="list-style-type: none"> Review monitoring data and, if required, develop and implement an appropriate mitigation or water management strategy to meet appropriate water quality objectives. Potential mitigation/ management strategies may include: <ul style="list-style-type: none"> Enhanced water treatment Enhanced settling through adjustment of pond sizes and/or flocculation Enhanced containment measures
Spills	<ul style="list-style-type: none"> Changes to water and soil quality 	<ul style="list-style-type: none"> Develop standard spill response procedures and protocols Develop and communicate roles and responsibilities for spill response including environment department and management teams Worker training on spill response protocols during general site orientation and for responders Maintenance of a spill and spill response database 	<ul style="list-style-type: none"> Timely reporting of spills to management teams and appropriate government agencies in accordance with all applicable laws and regulations Rapid and appropriate response to clean-up spills Continual improvement through maintenance of spill and spill response database 	<ul style="list-style-type: none"> MOE – Spills or unexpected releases will be reported to MOE following applicable guidelines and regulations 	<ul style="list-style-type: none"> Develop and implement a root cause and effect spill prevention approach which could involve implementation of a preventative maintenance plan Enhance containment measures for potentially harmful materials if required In the event of a catastrophic spill, contaminated soils may be excavated, disposed of in an approved disposal area and replaced with uncontaminated soil

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Earthworks	<ul style="list-style-type: none"> ■ Loss of soil and alteration of terrain may have implications with respect to wildlife use and the use of the area as a timber resource ■ Erosion may influence slope stability and water quality 	<ul style="list-style-type: none"> ■ Timber harvesting agreements will mitigate loss of timber resources ■ Soils will be stockpiled, protected against erosion and used in progressive restoration of habitat to the extent practicable ■ Maintenance of roadways and embankments will be undertaken to protect against erosion ■ Monitor embankment stability, pit slopes, and site erosion during construction, operation and into closure until long-term stability is demonstrated 	<ul style="list-style-type: none"> ■ Assurance of embankment stability, pit slopes, and site erosion through periodic review 	<ul style="list-style-type: none"> ■ Mining Act of Ontario ■ Canadian Dam Association Guidelines for slope stability ■ MOE requirements for protection of ecological habitat 	<ul style="list-style-type: none"> ■ On-going erosion and sediment control measures will be reviewed and revised as necessary if soil erosion is significantly undermining slope stability or water quality ■ If required, implement enhanced erosion and sediment control measures such as: <ul style="list-style-type: none"> ■ Placement of rock armouring on slopes ■ Use of silt curtains ■ Work with local communities to identify alternate resource and wildlife areas

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Table 8-3: Proposed Monitoring Program Considerations – Air Quality and Vibration

Potential Effect	Indicator / Parameter	Location(s)	Method	Frequency	Duration
Increased risk to human and ecological health	<ul style="list-style-type: none"> Concentrations of TSP/PM₁₀/PM_{2.5} and selected indicator compounds (NO_x, CO, SO₂, HCl, NH₃, NaOH) 	<ul style="list-style-type: none"> Stacks that discharge significant emissions of indicator compounds 	<ul style="list-style-type: none"> Source testing in accordance with applicable source testing codes 	<ul style="list-style-type: none"> One time (i.e., single occurrence) testing campaign for each significant emissions source 	<ul style="list-style-type: none"> Discrete testing during permitting phase
Increased dust levels	<ul style="list-style-type: none"> Silt loadings on roads 	<ul style="list-style-type: none"> Access and haul roads 	<ul style="list-style-type: none"> Periodic sampling road silt loadings to improve accuracy of emission estimations 	<ul style="list-style-type: none"> Annually during summer months 	<ul style="list-style-type: none"> Ongoing beginning at the start of operations until a consistent silt loading is established
Changes to ambient air quality	<ul style="list-style-type: none"> TSP 	<ul style="list-style-type: none"> Location to be selected based on locations of mine activities 	<ul style="list-style-type: none"> Installation of air quality monitoring station 	<ul style="list-style-type: none"> Samples to be collected on the 6-day National Air Pollutant Surveillance (NAPS) Cycle 	<ul style="list-style-type: none"> Construction phase until closure
Increased vibration levels	<ul style="list-style-type: none"> Ground and air vibration level monitoring from blasting operations 	<ul style="list-style-type: none"> Six sites during each blast; Set up at distances varying from about 300 m to 2000 m from the blast 	<ul style="list-style-type: none"> Establish a series of seismographs at varying distances from blasts and keep a detailed record of the loading parameters 	<ul style="list-style-type: none"> Minimum of 12 blasts 	<ul style="list-style-type: none"> To be determined based on data recorded during initial blasts and ECA requirements
	<ul style="list-style-type: none"> Blast ground vibrations 	<ul style="list-style-type: none"> Nearest active fish spawning bed 	<ul style="list-style-type: none"> Instrumentation to record ground vibration intensities. Data would be compared to known blast times to assess peak ground vibration intensities produced 	<ul style="list-style-type: none"> To be determined based on environmental compliance approval (ECA) requirements 	<ul style="list-style-type: none"> To be determined based on data recorded during initial blasts and ECA requirements
	<ul style="list-style-type: none"> Blast-induced water overpressure level 	<ul style="list-style-type: none"> Nearest fish habitat 	<ul style="list-style-type: none"> Instrumentation to record water overpressure intensities, including a hydrophone and data acquisition unit 	<ul style="list-style-type: none"> Periodic monitoring as the blasts approach the nearest fishery. Based on data recorded during initial blasts, a decision will be made on subsequent monitoring requirements 	<ul style="list-style-type: none"> To be determined based on data recorded during initial blasts and ECA requirements

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Table 8-4: Proposed Monitoring Program Considerations – Site Flows and Hydrology

Potential Effect	Indicator / Parameter	Location(s)	Method	Frequency	Duration
Changes to flows and lake water levels	Water withdrawal rates	Fresh water intakes	■ Install flow metering devices for measurement of all pumped water	■ Record data daily	Construction phase through the operations phase
	Effluent discharge rates	Treated sewage and mine wastewater effluent discharge outlets	■ Install flow metering devices for measurement of all pumped water	■ Record data daily	Construction phase through the operations phase
	Mine dewatering flows	Variable based on areas being dewatered	■ Install flow metering devices for measurement of all pumped water	■ Record data daily	Construction phase through the operations phase
	In-pit runoff and seepage collection volumes	Mine pit pumping station(s)	■ Install flow metering devices for measurement of all pumped water	■ Record data daily	Construction phase through the operations phase
	Project site out-of-pit runoff and seepage collection volumes	Site water collection pumping stations	■ Install flow metering devices for measurement of all pumped water	■ Record data daily	Construction phase through the operations phase
	TMF seepage collection volumes	TMF seepage collection pumping stations	■ Install flow metering devices for measurement of all pumped water	■ Record data weekly	Construction phase through the operations phase
	Recycle water use and TMF precipitation and runoff collection volumes	TMF reclaim pond pumping station	■ Install flow metering devices for measurement of all pumped water	■ Record data weekly	
	TMF reclaim pond water level	TMF reclaim pond	■ Install instrumentation for continuous water level recording; manual readings by staff gauge if continuous recording not possible	■ Continuous; Daily if continuous recording not possible	Construction phase through the operations phase
	Daily mean flow	Sawbill Creek above Sawbill Bay Lumby Creek above Lizard Lake Seine River above the Upper Marmion Reservoir	■ Install instrumentation for continuous flow recording	■ Continuous; Weekly if continuous recording not possible	Continued baseline monitoring through the construction and operations phases until closure or as required based on review of monitoring data
			■ Install instrumentation for continuous flow recording	■ Continuous; Weekly if continuous recording not possible	
			■ Install instrumentation for continuous flow recording	■ Continuous; Weekly if continuous recording not possible	
	Daily mean flow and daily mean lake water level	Lizard Lake West Tributary at Unnamed Lake 5	■ Install instrumentation for continuous flow and water level recording	■ Continuous; Weekly if continuous recording not possible	
		Lumby Creek below Lizard Lake	■ Install instrumentation for continuous flow and water level recording	■ Continuous; Weekly if continuous recording not possible	
	Instantaneous flows	Sawbill Bay East Tributary	■ Manual flow measurement	■ Periodic	
Lumby Creek Tributary at Lizard Lake		■ Manual flow measurement	■ Periodic		
Pit water level (post-closure)	Open pit(s)	■ Manual measurement of water level elevation	■ Annually	Post-closure until overflow or until pit infill rate is confirmed	

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Table 8-5: Proposed Monitoring Program Considerations – Hydrogeology

Potential Effect	Parameter	Location(s)	Method	Frequency	Duration
Changes to Groundwater Levels	Groundwater Level (Elevation)	In the vicinity of and at select locations downgradient from the Mine, Stockpiles, Waste Rock Management Facility (WRMF) and Water Management Systems	■ Manual depth to water measurements for at all locations and continuous monitoring using data logging pressure transducer at select locations	■ Quarterly for manual depth to water measurements. Continuous for locations with data logging pressure transducers	■ Construction phase through the operations phase until closure or as required based on review of monitoring data
		Select locations between the open pit(s) and Upper Marmion Reservoir	■ Manual depth to water measurements for at all locations and continuous monitoring using data logging pressure transducer at select locations	■ Quarterly for manual depth to water measurements. Continuous for locations with data logging pressure transducers	■ Construction phase through the operations phase until closure or as required based on review of monitoring data
		Select locations downgradient from the TMF near the shoreline of Lizard Lake and Upper Marmion Reservoir (Sawbill Bay)	■ Manual depth to water measurements	■ Bi-annual	■ Construction phase through the operations phase until closure or as required based on review of monitoring data
		Select locations downgradient from the worker accommodation camp's septic system near the shoreline of Upper Marmion Reservoir (Sawbill Bay)	■ Manual depth to water measurements	■ Bi-annual	■ Construction phase through the operations phase until closure or as required based on review of monitoring data
		Select locations near surface water (hydrology) monitoring stations	■ Manual depth to water measurements	■ Quarterly	■ Construction phase through the operations phase until closure or as required based on review of monitoring data
Changes to Groundwater Quality	Water Quality Parameters (as identified later in Section 8.2.2 or as required by applicable Acts, Regulations and/or permits)	In the vicinity of and at select locations downgradient from the Mine, Stockpiles, Waste Rock Management Facility (WRMF) and Water Management Systems	■ Discrete (grab) sampling and laboratory analysis	■ Bi-annual	■ Construction phase through the operations phase until closure
		Select location(s) between the open pit(s) and Upper Marmion Reservoir	■ Discrete (grab) sampling and laboratory analysis	■ Bi-annual	■ Construction phase through the operations phase until closure
		Select location(s) downgradient from the TMF near the shoreline of Lizard Lake and Upper Marmion Reservoir (Sawbill Bay)	■ Discrete (grab) sampling and laboratory analysis	■ Bi-annual	■ Construction phase through the operations phase until closure
		Select location(s) downgradient from the worker accommodation camp's septic system near the shoreline of Upper Marmion Reservoir (Sawbill Bay) and the chemical/fuel storage and maintenance facilities	■ Discrete (grab) sampling and laboratory analysis	■ Bi-annual	■ Construction phase through the operations phase until closure

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Table 8-6: Proposed Monitoring Program Considerations – Water Quality

Potential Effect	Parameter	Location(s)	Method	Frequency	Duration
Changes to Surface Water Quality	Water Quality Parameters (as identified in this Section or as required by applicable Acts, Regulations and/or permits)	Stream inlet at north end of Sawbill Bay; Upstream of worker accommodation camp discharge	■ Discrete (grab) sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Channel south east of Lynxhead Bay; Upstream of mine effluent discharge	■ Discrete (grab) sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Raft Lake Dam; Last monitoring station before discharge from Marmion Reservoir	■ Discrete (grab) sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Reference station in Unnamed Lake at northern most point of RSA (upstream of Site and TMF)	■ Discrete (grab) sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Sawbill Bay (mixing basin of worker accommodation camp discharge)	■ Water column profile sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Lizard Lake (potential mixing basin of deep groundwater flow from TMF area)	■ Water column profile sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Hawk Bay (upstream Upper Seine)	■ Water column profile sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		Turtle Bay			
		Lynxhead Bay	■ Water column profile sampling and laboratory analysis	■ Quarterly	■ Continued baseline monitoring and monitoring from construction phase through the operations phase until closure
		North Sawbill Bay; worker accommodation camp discharge location	■ Discrete (grab) sampling and laboratory analysis	■ Quarterly	■ Baseline monitoring beginning in 2013 and monitoring from construction phase through the operations phase until closure
		South Sawbill Bay; Mine effluent discharge site	■ Water column profile sampling and laboratory analysis	■ Quarterly	
		Open pit(s)	■ Discrete (grab) sampling and laboratory analysis	■ Annually prior to discharge and monthly after discharge	■ From first year of closure (as able based on safety considerations) until a stable chemical condition is reached and prior to discharge ■ After discharge until five years of acceptable results have been obtained

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Table 8-7: Proposed Monitoring Program Considerations – Geochemistry

Potential Effect	Parameters	Location(s)	Method	Frequency	Duration
Change in water quality relative to predictions	<ul style="list-style-type: none"> ■ Solid phase and leachate ■ Sulphide minerals ■ Paste pH ■ Acid-base accounting results ■ Net acid generation test results ■ Visual change in site materials (colour, drainage) 	<ul style="list-style-type: none"> ■ TMF ■ WRMF ■ Site Materials ■ Pit Walls 	<ul style="list-style-type: none"> ■ Test materials mined to confirm the acid drainage and leachate potential used in the modelling assessment ■ Review site water quality monitoring data collected under water quality monitoring program 	<ul style="list-style-type: none"> ■ Annual site inspection and confirmation sampling ■ Annual monitoring data review 	<ul style="list-style-type: none"> ■ Discrete testing, and annual review over life of mine and closure, reducing in frequency in post closure (likely every five years)

Table 8-8: Environmental Management Planning, Monitoring and Compliance - Biological Environment

Potential Effect(s)	Potentially Affected VEC(s)	Mitigation Measures	Monitoring Objectives	Regulating Authority / Compliance Requirements	Contingency / Non-Compliance Strategy
<ul style="list-style-type: none"> ■ Loss/alteration of vegetation ■ Altered drainage patterns ■ Changes to upland forest and wetland habitat ■ Changes to wildlife and plant communities 	<ul style="list-style-type: none"> ■ Wetlands ■ Forest Cover 	<ul style="list-style-type: none"> ■ Vegetated riparian buffers will remain around watercourses at access road crossings to the extent possible ■ Where feasible, native plant species will be used for reclamation ■ An Invasive Plant Management Plan will be developed including: <ul style="list-style-type: none"> ▪ Establishment of demarked areas to minimize encroachment into natural ▪ Regular cleaning of construction equipment, particularly before moving into sensitive vegetation areas ▪ Isolation of areas undergoing natural regeneration until native vegetation is established 	<ul style="list-style-type: none"> ■ Ensure successful colonization of native plants in regenerating areas 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario 	<ul style="list-style-type: none"> ■ If invasive species are found to be preventing regeneration of native vegetation, adaptive measures such as plant removal may be implemented
Changes to water levels	<ul style="list-style-type: none"> ■ Wetlands ■ Species at Risk ■ Furbearers ■ Moose ■ Wild Rice 	<ul style="list-style-type: none"> ■ Recirculation of water in process plant to reduce withdrawal from Marmion Reservoir ■ Implement management controls 	<ul style="list-style-type: none"> ■ Ensure effectiveness of mitigation measures ■ Confirm predictions on effects to terrestrial VECs 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario 	<ul style="list-style-type: none"> ■ Enhance re-circulation through increased water storage ■ Temporarily interrupt operations if necessary ■ Re-evaluate effects on terrestrial VECs and, if required, investigate additional mitigation measures
<ul style="list-style-type: none"> ■ Increased risk to ecological health ■ Increased dust levels ■ Changes to ambient air quality 	<ul style="list-style-type: none"> ■ Species at Risk ■ Furbearers ■ Moose 	<ul style="list-style-type: none"> ■ In-design mitigation including: <ul style="list-style-type: none"> ▪ Dust management plans; and ▪ Design of facilities to appropriate air quality standards 	<ul style="list-style-type: none"> ■ Ensure effectiveness of mitigation measures ■ Confirm predictions on effects to terrestrial VECs 	<ul style="list-style-type: none"> ■ MOE: Environmental Compliance Approvals ■ Ontario Regulation 419/05 ■ Emission Summary and Dispersion Modeling Report ■ National Pollutant Release Inventory reporting 	<ul style="list-style-type: none"> ■ Enhance air treatment/dust suppression efforts ■ Temporarily interrupt operations if necessary ■ Re-evaluate effects on terrestrial VECs and, if required, investigate additional mitigation measures

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Table 8-8: Environmental Management Planning, Monitoring and Compliance - Biological Environment

Potential Effect(s)	Potentially Affected VEC(s)	Mitigation Measures	Monitoring Objectives	Regulating Authority / Compliance Requirements	Contingency / Non-Compliance Strategy
Displacement of wildlife due to loss of habitat and change in habitat suitability due to noise and human activity	<ul style="list-style-type: none"> ■ Species at Risk ■ Furbearers ■ Upland breeding birds ■ Moose 	<ul style="list-style-type: none"> ■ Avoid vegetation clearing within the breeding bird window (approximately May 15th-July 31st), where possible. If activities must occur within the window, pre-clearing surveys will be completed by a qualified ecologist to identify and demark active nests and set up appropriate buffer areas. ■ Develop an appropriate “hunting, harvesting, trapping or fishing” policies for workers while they are staying at the worker accommodation camp ■ Design transmission lines to minimize collisions and electrocution of birds to the extent practicable ■ Selectively clear transmission line pathway without grading or stripping of topsoil ■ Provide compensation for lost habitat if required (e.g., bats) 	<ul style="list-style-type: none"> ■ Minimize presence of large mammals (e.g., moose) in the danger zone or during blasting periods. ■ Identify and protect active nests present in areas targeted for clearing during the breeding bird. ■ Confirm effectiveness of habitat compensation measures if required (e.g., bats) 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario ■ Ontario Ministry of Natural Resources ■ Migratory Birds Conservation Act (MBCA) ■ Endangered Species Act 	<ul style="list-style-type: none"> ■ If monitoring data suggests displacement is greater than predicted or stakeholder concerns are raised, targeted studies may be initiated to assess the potential causes of displacement, the adequacy of the active monitoring program and to investigate and identify potential mitigation measures
Loss/injury of wildlife through nuisance interactions and/or accidents (i.e., vehicle collisions)	<ul style="list-style-type: none"> ■ Species at Risk ■ Furbearers ■ Upland breeding birds ■ Moose 	<ul style="list-style-type: none"> ■ Develop and implement an industrial and domestic waste management plan including: <ul style="list-style-type: none"> ▪ Appropriate management of food wastes ▪ Use of appropriate waste receptacles to limit attraction of wildlife ▪ Worker education on proper waste management techniques and the risks associated with feeding wildlife and careless disposal of food waste ■ Worker awareness training of hazards to wildlife, including species at risk ■ Speed limits will be posted and enforced on the access road and mine site road ■ Animals that become a nuisance will be trapped and moved to remote locations for release 	<ul style="list-style-type: none"> ■ Ongoing review of the waste management program and improvement through adaptive management ■ Evaluation of the effectiveness of the wildlife management strategy through recording of losses of wildlife individuals from vehicle collisions 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario ■ Ontario Ministry of Natural Resources ■ Migratory Birds Conservation Act (MBCA) 	<ul style="list-style-type: none"> ■ If required, revise the industrial and domestic waste management plan to include additional measures such as the installation of temporary wildlife barriers (fences), more frequent incineration of food wastes and strict enforcement of food waste policies ■ If required, appropriate signage may be posted to warn drivers of areas where frequent vehicle-wildlife interaction occur ■ If required, install snow fencing or hoarding to re-direct snapping turtles from roads or culverts
Loss water bodies and water courses within mine footprint.	<ul style="list-style-type: none"> ■ Baitfish ■ Northern Pike 	<ul style="list-style-type: none"> ■ Minimize the direct loss of fish by developing and implementing a fish relocation plan with input from stakeholders and Aboriginal communities ■ Develop and implement a No Net Loss / Habitat Offset Plan (NNLP) with MNR/DFO that provides habitat compensation under Section 35 of the <i>Fisheries Act</i> and the MMER Schedule 2 waterbody listing 	<ul style="list-style-type: none"> ■ Assess the effectiveness of habitat offset projects in replacing lost habitat 	<ul style="list-style-type: none"> ■ DFO: Fisheries Act ■ MMER 	<ul style="list-style-type: none"> ■ If habitat offset projects prove to be ineffective or do not meet the objectives of the NNLP, alternative offset projects will be considered and discussed with the appropriate regulatory authorities
Changes in receiving water levels due to loss of watershed area and water taking	<ul style="list-style-type: none"> ■ Lower Reaches ■ Lizard Lake ■ Upper Marmion Reservoir 	<ul style="list-style-type: none"> ■ Recirculation of water in process plant to reduce withdrawal from Marmion Reservoir ■ Management through discussion with other local water users and participation in the Seine River Watershed Management Plan 	<ul style="list-style-type: none"> ■ Assess aquatic health of water bodies impacted by water level changes ■ Confirm assumptions related to habitat loss 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario; MOE ■ Fisheries Act; DFO 	<ul style="list-style-type: none"> ■ If effects on water levels are greater than predicted, the effects on aquatic habitat will be re-evaluated and the need for additional habitat offset projects will be considered and discussed with the appropriate regulatory authorities

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Table 8-8: Environmental Management Planning, Monitoring and Compliance - Biological Environment

Potential Effect(s)	Potentially Affected VEC(s)	Mitigation Measures	Monitoring Objectives	Regulating Authority / Compliance Requirements	Contingency / Non-Compliance Strategy
<ul style="list-style-type: none"> ■ Change to water quality in Sawbill Bay due to discharge ■ Loss lake bottom habitat due to intake and discharge structures ■ Loss of fish due to high intake velocities 	<ul style="list-style-type: none"> ■ Baitfish ■ Northern Pike ■ Walleye ■ Smallmouth Bass ■ Upper Marmion Reservoir 	<ul style="list-style-type: none"> ■ Discharge and intake structures will be set at an appropriate height above the lake bottom to minimize impacts on aquatic life ■ Effluent diffusers will be constructed to enhance mixing and dilution at the discharge locations ■ An aquatic effects monitoring plan will be developed in consultation with aboriginal groups, the public and regulatory agencies during the permitting process ■ Intake structures will include fish screens and will be designed according to established velocity criteria to minimize entrainment of fish and other organisms 	<ul style="list-style-type: none"> ■ Confirm operation of intake structures within operational velocity criteria ■ Assess aquatic health of water bodies in areas near the discharge structures 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario; MOE ■ Fisheries Act; DFO 	<ul style="list-style-type: none"> ■ If intake velocities exceed guideline criteria, appropriate measures will be implemented to reduce velocities such as: <ul style="list-style-type: none"> ■ Modifying the intake to provide a larger intake screen area; or ■ Reducing the operational withdrawal rate through appropriate water management activities ■ If monitoring of effluent discharge shows trends that may eventually result in significant adverse effect on aquatic life, the mitigation strategy will be re-evaluated additional mitigation measures may be implemented.
Loss of aquatic habitat due to road construction	<ul style="list-style-type: none"> ■ Baitfish ■ Northern Pike ■ Smallmouth Bass 	<ul style="list-style-type: none"> ■ Road and culvert/bridge construction will avoid fish spawning windows and adhere to strict erosion and sediment control plans ■ Compensate for habitat lost at stream crossings 	<ul style="list-style-type: none"> ■ Minimize road impingement on habitat and sediment release during construction ■ Assess aquatic health of channel upstream and downstream of road crossings ■ Assess the effectiveness of habitat offset project in replacing lost habitat 	<ul style="list-style-type: none"> ■ Environmental Protection Act of Ontario; MOE ■ Fisheries Act; DFO ■ MNR: Environmental Guidelines for Access Roads and Water Crossings 	<ul style="list-style-type: none"> ■ Erosion and sediment control measures will be reviewed and revised as necessary during construction ■ If required, water conveyance structures (e.g., culverts) will be modified/repared to ensure proper flow conveyance and fish passage ■ If habitat offset projects prove to be ineffective or do not meet the objectives of the NNLP, alternative offset projects will be considered and discussed with the appropriate regulatory authorities
Impact to sensitive fish spawning and nursery habitat due to blasting operations	<ul style="list-style-type: none"> ■ Baitfish ■ Northern Pike ■ Walleye ■ Smallmouth Bass 	<ul style="list-style-type: none"> ■ Develop blast monitoring and mitigation plan ■ Adjust blast intensities if required based on initial monitoring results to protect sensitive fish species during critical life stages 	<ul style="list-style-type: none"> ■ Confirmation of predictions related to impacts on fish habitat and to allow for adaptive management 	<ul style="list-style-type: none"> ■ Fisheries Act (DFO) 	<ul style="list-style-type: none"> ■ Review monitoring data and, if vibration exceeds guideline limits, reduce the maximum explosive weight detonated per delay through any one or a combination of the following measures: <ul style="list-style-type: none"> ■ Reducing the borehole diameter ■ Introducing decked charges ■ Reducing the borehole length

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Table 8-9: Proposed Monitoring Program Considerations – Terrestrial Ecology

Potential Effect	Indicator / Parameter	Location(s)	Method(s)	Frequency	Duration
Loss and/or Alteration of Vegetation	Composition/diversity/health of plant communities in LSA	Disturbed areas within the mine site and access routes that are left to naturally regenerate	<ul style="list-style-type: none"> Visual assessment of areas undergoing natural regeneration by an ecologist 	<ul style="list-style-type: none"> Periodically at each site; approximately every 2-3 years 	<ul style="list-style-type: none"> Beginning 2-3 years after an area is left to re-vegetate and on-going until native vegetation communities become established and are considered to be thriving
<ul style="list-style-type: none"> Displacement of wildlife Change in habitat availability and suitability 	Presence/persistence of species in the LSA	Monitoring locations to be selected based on ongoing mine activity	<ul style="list-style-type: none"> Breeding bird point counts using same methods as outlined in the Terrestrial Ecology TSD 	<ul style="list-style-type: none"> Annually 	<ul style="list-style-type: none"> Construction phase, operations phase and closure or as required by relevant permits
		Location(s) of installed bat habitat compensation measures (if required)	<ul style="list-style-type: none"> Bat acoustic monitoring using stationary devices and visual assessments 		
		Areas adjacent to the mine site and within the LSA	<ul style="list-style-type: none"> Review of secondary source of data from MNR (hunting and trapping records) 	<ul style="list-style-type: none"> Review of records as available and as updated 	
			<ul style="list-style-type: none"> Recording visual observations of SAR and other wildlife in a Wildlife Log 	<ul style="list-style-type: none"> On-going 	
Risk of wildlife Injury/Mortality			<ul style="list-style-type: none"> Mandatory reporting of road mortality and other mortality by mine staff 		

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Table 8-10: Proposed Monitoring Program Considerations – Aquatic Environment

Potential Effect	Parameter	Location(s)	Method	Frequency	Duration
Changes to Water Levels	<ul style="list-style-type: none"> Water levels Distribution/success of aquatic vegetation; Instream/littoral cover features; Fish use (age composition, abundance, diversity) 	<ul style="list-style-type: none"> Upper Marmion Reservoir Lizard Lake API-8 	<ul style="list-style-type: none"> Water level recording data loggers; manual readings by staff gauge if continuous recording not possible Vegetation mapping, electrofishing/ seine netting 	<ul style="list-style-type: none"> Continuous (dataloggers); daily or weekly readings gauge if continuous recording not possible Bi-annual (biological assessments) 	<ul style="list-style-type: none"> Operations phase through to closure
Mortality of aquatic species	<ul style="list-style-type: none"> Intake velocity 	<ul style="list-style-type: none"> Intake locations 	<ul style="list-style-type: none"> Flow metering at intakes (also included in hydrology monitoring program considerations) 	<ul style="list-style-type: none"> Daily 	<ul style="list-style-type: none"> Operations phase through to closure
Changes to aquatic health due to discharge	<ul style="list-style-type: none"> Benthic community and fish health 	<ul style="list-style-type: none"> Discharge locations 	<ul style="list-style-type: none"> Benthic community assessment (various metrics), fish tissue sampling 	<ul style="list-style-type: none"> Bi-annual 	<ul style="list-style-type: none"> Operations phase through to closure
<ul style="list-style-type: none"> Loss of fish habitat Changes to habitat due to road construction 	<ul style="list-style-type: none"> Water levels Distribution/success of aquatic vegetation; Instream/littoral cover features; Fish use (age composition, abundance, diversity) Construction 	<ul style="list-style-type: none"> Habitat offset projects Stream crossings 	<ul style="list-style-type: none"> Water level recording data loggers; manual readings by staff gauge if continuous recording not possible Vegetation mapping, electrofishing/ seine netting at offset projects after construction Construction monitoring at stream crossings to ensure erosion and sediment control plans are adhered to and that habitat impingement is minimized 	<ul style="list-style-type: none"> Continuous (dataloggers) ; daily or weekly readings gauge if continuous recording not possible Bi-annual (biological assessments) On-going during construction 	<ul style="list-style-type: none"> Construction through operations to closure
Blasting effects on fish habitat	<ul style="list-style-type: none"> Blast-induced water overpressure level 	<ul style="list-style-type: none"> Nearest identified fish habitat or location 	<ul style="list-style-type: none"> Instrumentation to record water overpressure intensities, including a hydrophone and data acquisition unit 	<ul style="list-style-type: none"> Periodic monitoring as the blasts approach the nearest fishery. Based on data recorded during initial blasts, a decision will be made on subsequent monitoring requirements 	<ul style="list-style-type: none"> To be determined based data recorded during initial blasts

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Table 8-11: Environmental Management Planning, Monitoring and Compliance – Emergency Response and Contingency

Aspect	Component	Considerations	Implementation, Management or Mitigation	Monitoring Objective and Plan	Regulating Authority / Compliance Requirements
Emergency Response	Road Accident	<ul style="list-style-type: none"> ■ Potential for injury to personnel, loss of equipment, effect to the environment through direct contact with wildlife or spills ■ Potential for spill of fuel or hazardous materials 	<ul style="list-style-type: none"> ■ Posted speed limits, worker training ■ Implement a policy for delivery workers requiring employers to certify that their workers have appropriate training ■ Develop a spill response team and communication linkages ■ Conduct drills on emergency response for spills ■ Maintain a current emergency response contact list and plan ■ Road maintenance program 	<ul style="list-style-type: none"> ■ Maintain and periodically review driver training and driver credentials ■ Maintain and periodically review a list of approved suppliers and delivery personnel ■ Periodically retrain and monitor performance of emergency response team members 	<ul style="list-style-type: none"> ■ Ontario Provincial Police (OPP) ■ Ontario Ministry of the Environment (MOE) ■ Ministry of Transportation of Ontario (MTO) ■ Ontario Ministry of Labour (MOL)
Emergency Response	Fuel Tank Rupture or Hazardous Material Spill	<ul style="list-style-type: none"> ■ Potential for environmental contamination; ■ Loss of process and equipment ■ Worker injury 	<ul style="list-style-type: none"> ■ Worker training ■ Regular fuel tank inspection ■ Maintain current Material Safety Data Sheets (MSDS) of all materials transported, stored and used on-site ■ Develop a spill response team and communication linkages ■ Conduct drills on emergency response for spills ■ Maintain a current emergency response contact list and plan 	<ul style="list-style-type: none"> ■ Periodically retrain and monitor performance of emergency response team members 	<ul style="list-style-type: none"> ■ MOE; MOL; possibly OPP or others as necessary
Emergency Response	Tailings Pipeline Rupture	<ul style="list-style-type: none"> ■ Potential for environmental contamination ■ Loss of process and equipment 	<ul style="list-style-type: none"> ■ Worker training ■ Regular pipeline inspection ■ Perform appropriate maintenance checks on piping and pumping systems ■ Report and correct problems promptly ■ Develop a procedure for containment and cleanup of tailings ■ Periodically retrain staff on proper operation of the tailings systems 	<ul style="list-style-type: none"> ■ Periodically review maintenance, records, reporting, and response procedures ■ Maintain and review training records 	<ul style="list-style-type: none"> ■ MOE; MOL; others as necessary
Emergency Response	Spill of Tailings Water from TMF	<ul style="list-style-type: none"> ■ Potential for environmental contamination ■ Loss of process 	<ul style="list-style-type: none"> ■ Develop water management plan and standard operating procedures for TMF ■ Monitor and adapt to hydrologic conditions (See Section 8.2.2) ■ Perform appropriate maintenance checks on piping and pumping systems ■ Report and correct problems promptly ■ Periodically retrain staff on proper operation of the tailings systems ■ Develop and implement spill contingency and monitoring strategy 	<ul style="list-style-type: none"> ■ Maintain and review operational and maintenance logs ■ Monitor and review hydrologic information as detailed in the Monitoring Program ■ Monitor downstream water quality following any spill to ensure water quality objectives are met or clean-up is implemented 	<ul style="list-style-type: none"> ■ MOE; others as necessary

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Table 8-11: Environmental Management Planning, Monitoring and Compliance – Emergency Response and Contingency

Aspect	Component	Considerations	Implementation, Management or Mitigation	Monitoring Objective and Plan	Regulating Authority / Compliance Requirements
Emergency Response	Tailings Dam Failure	<ul style="list-style-type: none"> ■ Potential for environmental contamination ■ Loss of process and equipment ■ Loss of property ■ Worker injury ■ Loss of wildlife and habitat 	<ul style="list-style-type: none"> ■ Perform appropriate dam inspections ■ Repair issues promptly ■ Develop a tailings management system that includes appropriate response measures 	<ul style="list-style-type: none"> ■ Maintain records of all dam inspections ■ Monitor dam performance where repairs were completed 	<ul style="list-style-type: none"> ■ MNM; MOE; MOL; others as necessary
Emergency Response / Contingency Planning	Medical Emergency	<ul style="list-style-type: none"> ■ Potential for injury to personnel 	<ul style="list-style-type: none"> ■ Maintain first aid room ■ Develop a medical team and communication linkages. ■ Worker awareness of medical emergency resources ■ Emergency helipad landing 	<ul style="list-style-type: none"> ■ Record medical emergencies in Incident Reports ■ Periodically retrain and monitor performance of emergency response team members ■ Review and reflect previous incident records to improve response times and treatment effectiveness 	<ul style="list-style-type: none"> ■ MOL; others as necessary
Emergency Response / Contingency Planning	Pit Slope Failure (see also Section 8.24)	<ul style="list-style-type: none"> ■ Loss of process and equipment ■ Loss of property ■ Worker injury or death 	<ul style="list-style-type: none"> ■ Perform appropriate and routine geotechnical inspections ■ Identify issues and adjust mine planning appropriately if necessary ■ Develop a procedure for pit evacuation 	<ul style="list-style-type: none"> ■ Monitor groundwater levels in the vicinity of the pit ■ Maintain records of all Project pit slope inspections 	<ul style="list-style-type: none"> ■ MNM; MOL; others as necessary
Contingency Planning	Fires (on site)	<ul style="list-style-type: none"> ■ Loss of process and equipment ■ Loss of property (i.e., worker accommodation camp, administrative office, etc.) ■ Worker injury 	<ul style="list-style-type: none"> ■ Develop a fire prevention plan and fire response plan ■ Develop site evacuation plan ■ Provide appropriate firefighting equipment on-site ■ Worker training and awareness of firefighting resources, procedures and techniques ■ Maintain adequate supply of water on-site at all times 	<ul style="list-style-type: none"> ■ Perform routine checks on fire safety equipment ■ Regularly update building floor plans identifying emergency exits and firefighting equipment ■ Document and analyze fire incidents to improve prevention measures 	<ul style="list-style-type: none"> ■ MOE; MOL; MNR
Contingency Planning	Forest Fire	<ul style="list-style-type: none"> ■ Loss of process and equipment ■ Loss of property ■ Worker injury ■ Loss of wildlife and habitat 	<ul style="list-style-type: none"> ■ Develop an emergency evacuation plan ■ Ensure communication linkages are adequate for fast and reliable reporting to worker accommodation camp ■ Review daily weather conditions ■ Post forest fire hazard ratings in a visible location and ensure workers are aware of fire hazards 	<ul style="list-style-type: none"> ■ Periodically review and update emergency evacuation plan ■ Periodically retrain and monitor performance of emergency response team members 	<ul style="list-style-type: none"> ■ MOE; MOL; MNR

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Table 8-11: Environmental Management Planning, Monitoring and Compliance – Emergency Response and Contingency

Aspect	Component	Considerations	Implementation, Management or Mitigation	Monitoring Objective and Plan	Regulating Authority / Compliance Requirements
Contingency Planning	Drought or Flood	<ul style="list-style-type: none"> ■ Loss of process and equipment ■ Loss of property (i.e., worker accommodation camp, administrative office, etc.) ■ Worker injury 	<ul style="list-style-type: none"> ■ Develop a storm water management system ■ Include emergency features in design (i.e., spillways) ■ Implement flood control measures (sand bags, dykes) and evacuation procedures ■ Monitor water levels as per Section 8.2.2 and develop a response plan for dealing with excessively high or low water levels ■ Use the TMF as a storage reservoir if necessary (taking into consideration dam and TMF design) 	<ul style="list-style-type: none"> ■ Periodically review and update water management plan to account for emergency conditions ■ Periodically retrain and monitor performance of emergency response team members 	<ul style="list-style-type: none"> ■ MOE; MOL; MNR
Contingency Planning	Excessive or Rapid Pit Inflow	<ul style="list-style-type: none"> ■ Loss of process and equipment ■ Worker injury or death 	<ul style="list-style-type: none"> ■ Identify issues and adjust mine planning appropriately if necessary ■ Develop an emergency pit evacuation plan ■ Develop a procedure for grouting, pumping or stopping excessive pit inflow 	<ul style="list-style-type: none"> ■ Monitor groundwater levels in the vicinity of the pit ■ Maintain records of water levels and routinely compare against expected levels ■ Maintain records of pumping rates from the pit and monitor for unexpected changes 	<ul style="list-style-type: none"> ■ MNDM; MOL; others as necessary
Contingency Planning	Loss of Communication	<ul style="list-style-type: none"> ■ Potential to reduce efficiency of emergency response procedures 	<ul style="list-style-type: none"> ■ Ensure multiple lines of communication are available and accessible to workers (including: radio, telephone, sat-phone, email) 	<ul style="list-style-type: none"> ■ Perform routine maintenance checks on communication devices. 	
Contingency Planning	Explosion (explosives, fuel or chemicals)	<ul style="list-style-type: none"> ■ Loss of process and equipment ■ Loss of property (i.e., mine, worker accommodation camp, administrative office) ■ Worker injury 	<ul style="list-style-type: none"> ■ Partner with the explosives contractors to develop emergency procedures. ■ Identify and communicate with workers locations of explosives, or hazardous materials and chemicals ■ Ensure workers have appropriate WHMIS training and are appropriately trained for their job ■ Post proper signage ■ Develop communication procedures to notify workers when explosives will be detonated ■ Strictly enforce handling of explosives by certified contractor personnel only ■ Ensure contractor employees are trained and familiar with all relevant OHRG health and safety procedures 	<ul style="list-style-type: none"> ■ Maintain and review explosives training records ■ Maintain, review and periodically update WHMIS and job specific training 	<ul style="list-style-type: none"> ■ MOL; MOE; OPP; others as necessary

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Table 8-12: OHRG Wildfire Prevention Guidelines

Level of Fire Hazard	OHRG Response		
Extreme	Enhanced Prevention Measures	Implement Short Shift	Review feasibility of operations and make appropriate adjustments as necessary to maintain a safe working environment
High		Enhanced Prevention Measures	Implement Short Shift
Moderate	Normal Prevention Measures		
Low	Normal Prevention Measures	Normal Prevention Measures	Normal Prevention Measures
	Low Risk Operations	Moderate Risk Operations	High Risk Operations