Table 10: Potential Effects and Mitigation Measures.

Component	Potential Interaction	Project Phase	Mitigation Measures	Residual
Environmental Components				
Topography	Rock and soil movement	Mining & Closure	Minimize area of disturbance by using existing roads and laydown areas to the greatest extent possible.	Minor
			Use stockpiles for pit rehabilitation to reduce amount of rock remaining in stockpiles.	
			Contour stockpiles and open pits at closure to match surrounding topography.	
Soil	Acid rock drainage and metal leaching	Mining	PAG waste rock will be used as backfill for pit rehabilitation as soon as practical to minimize the amount of time this material is at surface. If required, soil surrounding the location of Stockpile 3 will be remediated following PAG waste rock removal. A temporary drainage and water diversion measure (*e.g.,* ditch or berm) may be constructed to minimize the amount of water passing through the temporary PAG waste rock stockpile. PAG waste rock and ore will be stockpiled in a manner that minimizes the potential for wind and water erosion.	Negligible
			The ore stockpile will be located adjacent to the existing mill at the same location used by the former Puffy Lake Mine operations permitted under the existing *Environment Act* Licence No. 1207E.	
			Discharge from the existing TDA will continue to be monitored under the *MMER* and *Environment Act* Licence No.1207E.	
		Closure	As part of pit rehabilitation, PAG waste rock used as backfill will be covered with NAG and/or overburden for the pits being completely filled. The walls of the partially filled pits (including any sulphide containing wall rocks) will be covered with NAG and/or overburden. Partially filled pits will be allowed to flood to further minimize sulphide containing wall rock weathering.	Negligible
	Soil disturbance (soil erosion)	Mining	Areas will be cleared of vegetation only when absolutely necessary.	Minor to Negligible
			A buffer of undisturbed forest will be maintained around the development to mitigate soil erosion due to wind.	
			Erosion control devices, including the use of silt fences, silt curtains, riprap, etc. will be used as appropriate.	
			NAG waste rock will be placed on new roads as soon as possible to minimize extent and duration of exposed soils.	
			Discharge from pit dewatering will be discharged to a splash pad consisting of NAG waste rock to minimize the potential erosion of soils.	
			Dewatering activities will be limited to areas of active construction activities that cannot be completed appropriately if underwater (such as blasting) to minimize the amount of pit water discharged and the potential for erosion along the drainage path.	
			During berm construction in Fire Pond, erosion and sediment control measures, such as a turbidity curtain, will be installed to avoid sediment deposition within Fire Pond.	
			If necessary riprap, or suitable equivalent, will be placed, on the berm surfaces to reduce water and wind erosion once the berm is in place.	
		Closure	Disturbed areas will be contoured and re-vegetated as soon as possible to encourage natural tillage through root development.	Negligible
			Monitor the success of re-vegetation efforts until vegetation has re-established with additional re-vegetation activities to occur on an as needed basis.	
	Soil disturbance (soil compaction)	Mining	Existing roads and laydown areas will be used to the greatest extent possible to minimize the area of disturbance.	Negligible
			Areas will be cleared of vegetation only when absolutely necessary.	
		Closure	Roads will be stripped of materials and scarified as soon as possible.	Negligible
			Disturbed areas will be contoured and re-vegetated as soon as possible to encourage natural tillage through root development.	
			The success of re-vegetation efforts will be monitored until vegetation has re-established with additional re-vegetation activities to occur on an as needed basis.	
	Soil disturbance (soil horizons)	Mining	During mining, care will be taken to keep the topsoil and subsoil layers separate during stockpiling and placement, where practical.	Negligible
			The area of disturbance will be minimized to limit the potential for soil horizon mixing.	
		Closure	Topsoil will be placed on top of waste rock and subsoil before re-vegetation.	Negligible
			Re-vegetation will occur as soon as possible to encourage re-establishment of organic topsoil layer.	
			The success of re-vegetation efforts will be monitored until vegetation has re-established with additional re-vegetation activities to occur on an as needed basis.	
	Waste management	Mining & Closure	Wastes generated on-site will be disposed of in garbage collection bins maintained at specific locations throughout the Puffy Lake Mine site. These bins will be emptied on a regular basis for disposal at a licensed waste disposal facility or other permitted disposal site.	Negligible
			Waste oils, fuels and hazardous wastes (if any) will be handled in a manner that prevents potential spills. Staff will be required to transport, store, handle and dispose of all such substances as recommended by the suppliers and/or manufacturers and in compliance with all applicable federal, provincial and municipal regulations. Manitoba Conservation and Water Stewardship shall be notified immediately if a reportable spill occurs.	
	Remediation	Mining & Closure	Assessment of any contamination caused by the development, followed by any remediation that may be required to eliminate risk to human health, safety or the environment	Negligible

Table 10: Potential Effects and Mitigation Measures.

Component	Potential Interaction	Project Phase	Mitigation Measures	Residual
Air	Dust generation (vehicle and equipment)	Mining	Disturbed/exposed areas will be kept to a minimum. Existing roads and laydown areas will be utilized to the greatest extent possible.	Minor to Negligible
			A buffer of undisturbed forest will be maintained around the development to mitigate wind erosion.	
			New haulage roads will be cleared and developed only when necessary.	
			Haulage roads will be rehabilitated as soon as possible and travel will be limited to designated areas.	
			The number of trips required for ore or waste rock movement from the proposed open pits to the stockpiles will be minimized to the maximum extent possible.	
			Speed limits will be implemented as appropriate to minimize potential for dust generation as a result of traffic.	
			If required, dust suppression activities, such as the use of an approved dust control agent, will be undertaken for the main access road, on-site roads and haulage roads.	
			Pit dewatering discharge may be used to wet the waste rock within the pit to reduce the potential for dust generation during excavation, hauling and stockpiling.	
			Waste rock and ore truck loads will be covered to minimize dust coming off loads.	
		Closure	Disturbed areas will be re-vegetated as soon as practical and throughout the progressive pit rehabilitation	Minor
			Apply mitigation measures implemented for management of dust generation on air quality during mining [see *Dust generation (vehicle and equipment)* in *Air*].	
	Dust generation (use of explosives)	Mining	Blasting will not occur during high winds.	Minor to Negligible
			The pit contractor will design, use, and continually improve site-specific blasting plans (including blasting mats) to keep airborne particles to a minimum.	
			Maintain vegetated buffer around open pit.	
			Surface blasting to occur in only one open pit at a time.	
	Dust generation (ARD/ML)	Mining & Closure	Apply mitigation measures implemented for management of dust generation on air quality during mining and closure [see *Dust generation (vehicle and equipment or blasting)* in *Air*].	Minor to Negligible
			Apply all mitigation measures implemented for management of ARD/ML effects on soil quality during mining and closure [see *Acid rock drainage and metal leaching* in *Soil*].	
			Use pit dewatering discharge to wet the waste rock within the pit to reduce the potential for dust generation prior to excavation.	
	Emissions (vehicle and equipment)	Mining & Closure	Vehicles and equipment are to be well maintained and regularly inspected.	Minor to Negligible
			Trucks and vehicles used for the proposed Project will comply with the Federal *On-Road Vehicle and Engine Emission Regulations (SOR/2003-2)*, as required	
			Minimum number of vehicles and equipment required will be used to reduce traffic and emissions.	
			Vehicle idling will be kept to a minimum.	
			Vehicular travel will be limited to/from/around the site to designated areas.	
			Propane heaters will be equipped with low NOx burners if possible.	
	Waste management	Mining & Closure	Holding tanks will be properly sized and emptied with servicing on a regular basis by trained personnel and disposed of at an off-site approved facility.	Negligible
			Apply all mitigation measures implemented for waste management on soil quality during mining and closure [see *Waste management* in *Soil*].	
Noise & Vibration	Use of explosives	Mining	A buffer of undisturbed forest will be maintained around the development to further temper the noise generated during mining activities.	Minor
			The pit contractor will use several best management practices for blasting, including, but not limited to, design and use of (and continuous improvement to) specific blasting plans, blasting mats, correct charging procedures and blasting ratios, and micro-delayed detonations to minimize noise and virbation generation.	
			All workers will wear appropriate personal protective equipment (PPE) at all times, including hearing protection as required.	
			All project activities will be carried out in accordance with the Workplace Safety and Health Act to minimize health and safety effects.	
			To minimize the exposure to noise, blasting will be performed when the fewest receptors (*i.e.,* site workers) are on-site. Prior to blasting, a siren will sound to signal evacuation of the site and to deter wildlife from the area of active blasting.	
	Vehicle and equipment operation	Mining & Closure	In addition to the mitigation measures implemented for the use of explosives, minimize the ore/waste rock drop height.	Negligible
			Apply mitigation measures implemented for management of dust generation on air quality during mining and closure [see *Dust generation (vehicle and equipment)* in *Air*].	

Table 10: Potential Effects and Mitigation Measures.

Component	Potential Interaction	Project Phase	Mitigation Measures	Residual
Climate	Greenhouse gas emissions	Mining & Closure	The number of vehicles and equipment in operation at the site will be minimized to the maximum extent practical.	Negligible
			Vehicles and equipment will be well maintained and inspected on a regular basis. Vehicle idling will be kept to a minimum.	
			The use of best management practices for blasting will optimize the blasting operation to maximize the localized rock breakage using the minimum amount of explosives.	
	Vegetation removal (loss of CO_2 uptake)	Mining	The extent of clearing will be minimized as much as practical.	Minor
	Re-vegetation	Closure	Disturbed areas will be re-graded and re-vegetated as soon as practical to minimize the duration of un-vegetated soils.	Negligible
Groundwater	Acid rock drainage and metal leaching	Mining	Apply all mitigation measures implemented for management of ARD/ML effects on soil quality during mining [see *Acid rock drainage and metal leaching* in *Soil*].	Negligible
		Closure	Apply all mitigation measures implemented for management of ARD/ML effects on soil quality during closure [see *Acid rock drainage and metal leaching* in *Soil*].	Negligible
			PAG waste rock used in the rehabilitation of the open pits will be placed at the bottom of the open pit, covered with NAG waste rock then overburden and topsoil.	
			Allow partially backfilled open pits to flood naturally, ensuring that PAG waste rock and ore rock wall faces are not exposed to air.	
	Soil disturbance	Mining & Closure	Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during mining and closure [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	Negligible
	Use of explosives	Mining	The use of best management practices for blasting, includes, but is not limited to, design and use of (and continuous improvement to) specific blasting plans, blasting mats, correct charging procedures and blasting ratios, micro-delayed detonations. Best management practices maximize the efficiency of the detonation with the minimum amount of explosives as practical, thus reducing the potential for blast residuals to be generated.	Negligible
			Emulsion type explosives will be used in wet areas to minimize the potential for ammonium nitrate to dissolve in pit water.	
		Closure	Apply all mitigation measures implemented for management of the use of explosives on noise and vibration [see *Use of explosives* in *Noise & Vibration*].	Negligible
	Pit dewatering	Mining	A temporary drainage and water diversion measure (*e.g.,* ditch or berm) may be constructed around the open pit to discourage excessive volumes of shallow groundwater from entering the pit.	Minor to Negligible
		Closure	Backfill open pits with waste rock to decrease the amount of water required for recovery of the groundwater table by reducing the available space within the pit. Direct pit discharge into exhausted pit to reduce time of recovery.	Negligible
	Waste management	Mining & Closure	Apply all mitigation measures implemented for waste management on soil quality during mining and closure [see *Waste management* in *Soil*].	Negligible
	Remediation	Mining & Closure	Assessment of any contamination caused by the development, followed by any remediation that may be required to eliminate risk to human health, safety or the environment	Negligible
Surface Water	Acid rock drainage and metal leaching	Mining	Apply all mitigation measures implemented for management of ARD/ML effects on soil quality during mining [see *Acid rock drainage and metal leaching* in *Soil*].	Negligible
			Discharge effluent from the TDA will be monitored as per the conditions in *Environment Act* Licence No. 1207E.	
		Closure	Apply all mitigation measures implemented for management of ARD/ML effects on soil quality during closure [see *Acid rock drainage and metal leaching* in *Soil*].	Negligible
	Pit dewatering	Mining	Apply all mitigation measures implemented for management of ARD/ML effects on soil quality during mining [see *Acid rock drainage and metal leaching* in *Soil*].	Negligible
			The extent and duration of exposed rock walls will be limited, where practical.	
			Apply all mitigation measures implemented for management of the use of explosives on noise and vibration to minimize quantity of explosives used during mining [see *Use of explosives* in *Noise & Vibration*].	
			Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during mining [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	
			Apply all mitigation measures implemented to minimize potential for pit dewatering to effect groundwater during mining [see *Pit dewatering* in *Groundwater*].	
	Rock and soil movement	Mining & Closure	Apply all mitigation measures implemented for management of rock and soil movement effects on topography during mining and closure [see *Rock and soil movement* in *Topography*].	Minor to Negligible

Table 10: Potential Effects and Mitigation Measures.

Component	Potential Interaction	Project Phase	Mitigation Measures	Residual
Surface Water	Soil disturbance	Mining	Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during mining [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	Minor to Negligible
			Erosion and sediment control methods will be implemented, where necessary.	
			Work conducted near waterbodies, such as replacing culverts or installing and maintaining roads and installation of the berm in Fire Pond, will be conducted in accordance with standard erosion protection measures and/or applicable Fisheries and Oceans (DFO) Operational Statements.	
			Disturbance to riparian vegetation will be limited where practical.	
			During installation of the berm in Fire Pond, turbidity curtains may be installed to minimize the likelihood of sediment transport within and downstream of Fire Pond.	
			The berm in Fire Pond will be armoured with NAG waste rock to protect the berm from wind and water erosion once in place.	
		Closure	Apply all mitigation measures implemented for management of rock and soil movement effects on topography during closure [see *Rock and soil movement* in *Topography*].	Negligible
			Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during closure [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	
	Waste management	Mining & Closure	Apply all mitigation measures implemented for waste management on soil quality during mining and closure [see *Waste management* in *Soil*].	Negligible
	Remediation	Mining & Closure	Assessment of any contamination caused by the development, followed by any remediation that may be required to eliminate risk to human health, safety or the environment	Negligible
Protected and Other Aquatic Resources	Residual surface water effects	Mining & Closure	Apply mitigation measures implemented to minimize the potential residual effects on surface water quality during mining and closure [see *Surface Water*].	Negligible
Protected and Other Flora Species	Acid rock drainage and metal leaching	Mining & Closure	Apply all mitigation measures implemented for management of ARD/ML effects on soil quality [see *Acid rock drainage and metal leaching*].	Negligible
	Dust deposition	Mining & Closure	Apply mitigation measures implemented for management of dust generation on air quality during mining and closure [see *Dust generation* in *Air*].	Negligible
	Vegetation removal	Mining	Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during closure [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	Minor
		Closure	Re-vegetation will occur as soon as practical to encourage re-establishment of organic topsoil layer.	Minor
			The success of re-vegetation efforts will be monitored until vegetation has re-established with additional re-vegetation activities to occur on an as needed basis.	
Protected and Other Fauna Species	Protected species	Mining & Closure	Protection of Boreal Woodland Caribou through mitigation measures implemented to minimize effects to fauna and flora [see *Protected and Other Fauna Species* and *Protected and Other Flora Species*].	Minor
	Habitat loss	Mining	Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during mining [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	Minor
		Closure	Apply all mitigation measures implemented for management of soil disturbance effects on soil quality during closure [see *Soil disturbance (soil erosion, soil compaction, and soil horizons)* in *Soil*].	Negligible
	Noise disturbance	Mining	Apply all mitigation measures implemented to minimize generation of noise and vibration during mining [see *Noise & Vibration*].	Moderate to Minor
		Closure	Apply all mitigation measures implemented to minimize generation of noise and vibration during mining [see *Noise & Vibration*].	Negligible
	Light pollution	Mining & Closure	The number and placement of lights will be limited and directed only to the site(s) of active mining, hauling, and stockpiling, to prevent potential light pollution effects.	Negligible
	Collisions	Mining & Closure	To prevent vehicle/wildlife collisions, road speed limits will be implemented.	Minor to Negligible
Social Components				
Resource Use	Effects on fauna, flora and aquatic resources	Mining & Closure	Implement mitigation measures to minimize effects on flora and fauna [see *Protected and Other Aquatic Resources*, *Protected and Other Fauna Species* and *Protected and Other Flora Species*].	Minor to Negligible
			Work with local trappers and interested stakeholders to ensure access to trap lines and other resource harvesting is not impacted by the proposed Project.	
Heritage Resources	Disturbance or destruction of heritage resources	Mining & Closure	If artefacts, historical features or skeletal remains are encountered during construction, work activities will stop immediately around the affected area with the find reported to the site supervisor. A qualified archaeologist may investigate and assess the find prior to the continuation of work. If skeletal remains are encountered during construction activities, the find will be immediately reported to the site supervisor and the RCMP.	Negligible
Aesthetics	Site aesthetics	Mining & Closure	Waste management techniques, as described in Section 5.3.3 will be implemented to maintain a site free of domestic waste.	Negligible
			Noise and light pollution will be mitigated as described in Section 5.5 and Section 5.10.4, respectively.	
			Effects on topography during the mining of the open pits will be mitigated as described in **Section 5.2.1**.	
			Implement mitigation measures to minimize effects on aesthetics during mining (Section 5.12.3).	
			Vegetation growth will be monitored and if necessary, areas may have to undergo repeated efforts of re-vegetation until vegetation has been re-established.	