ROAD IMPACT MATRICES

Table C.1: Permafrost Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Monitoring/ Management
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pit(s)	Loss of permafrost, cooling of remaining permafrost, and development of a new active layer	loss	local	infrequent	Short-term	all year	low	none	N/A	low	certain	none recommended
Ditches	A - Loss of permafrost, warming of remaining permafrost, and development of a new active layer in cut sections; B - where ditches are excavated through bogs, there is potential for deepening of the active layer, warming of permafrost, ground ice degradation and related thaw subsidence, slumping and sediment losses	loss	A – local B - footprint	infrequent	A – permanent B - permanent	A - all year B - summer	A - low B - high	B only: Where thaw sensitive polygons are crossed, avoid using cut sections for ditches, ensure positive drainage away from fill sections, avoid concentrating runoff waters, or use rock aprons to slow the rate of thaw penetration and stabilize the underlying soils	none	B only: Low	high	B only - Further assessment of susceptible locations along proposed ditch centrelines is required
Culverts	- see comments in operations matrix	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Access Road & Traffic	A - Loss of permafrost and development of a new active layer in cut sections; B - permafrost aggradation and formation of new active layer in fill sections - POSITIVE	negligible	local	infrequent	A – permanent B - medium-term	A - all year B - winter	low	none	N/A	low	certain	none recommended

Table C.2: Permafrost Impact Matrix – Operation

Project Component	Potential Effect	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Influence of Mitigation on Effects Assessment	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pit(s)	Loss of permafrost, cooling of remaining permafrost, and development of a new active layer where pits continue to be operated; stabilization of permafrost temperatures and active layer thickness soon after operations cease	loss	local	infrequent	permanent	all year	low	none	N/A	low	certain	none recommended
Ditches	Stabilization of permafrost temperatures and active layer thickness; stabilization of thaw subsidence and sediment loss in bog areas	negligible	local	infrequent	permanent	all year	medium	Silt fences as required to manage sediment loss; rock aprons as required to slow the rate of thaw penetration and stabilize the underlying soils	none	low	moderate	none recommended
Culverts	Loss of permafrost, warming of remaining permafrost, and deepening of the active layer where runoff is concentrated through culverts; possible subsidence, particularly in low lying bog areas	loss	local	infrequent	medium-term	summer	low	Maintenance, as required, to restore smooth grade where thaw settlement is a problem; avoid culverts in areas susceptible to thaw settlement	none	low	moderate	Maintenance, as required, to restore smooth grade where thaw settlement is a problem
Access Road & Traffic	Stabilization of permafrost temperatures and active layer thickness - POSITIVE	negligible	local	infrequent	medium term	all year	low	none	N/A	low	certain	none recommended

Table C.3: Permafrost Impact Matrix – Closure & Post-Closure

Project Component	Potential Effect	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Influence of Mitigation on Effects Assessment	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pit(s)	Stabilization of permafrost temperatures and active layer thickness - POSITIVE	negligible	local	infrequent	permanent	all year	low	none	N/A	low	certain	none recommended
Ditches	Stabilization of permafrost temperatures and active layer thickness - POSITIVE	negligible	local	infrequent	permanent	all year	low	none	N/A	low	certain	none recommended
Culverts	Stabilization of permafrost temperatures and active layer thickness - POSITIVE	loss	local	infrequent	permanent	all year	low	none	N/A	low	certain	none recommended
Access Road & Traffic	Stabilization of permafrost temperatures and active layer thickness - POSITIVE	negligible	local	infrequent	permanent	all year	low	none	N/A	low	certain	none recommended

Table B2.1: Air Quality Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pit/	Generation of dust and gases from blasting, overburden stripping, excavation and other construction related activities resulting in poor air quality and contamination of aquatic and terrestrial habitats	Medium	Local	Contin	Long	All Year	No	Minimize quarry footprint; apply water spray during summer or use other dust suppressants; use fuel efficient machinery with emissions controls; avoid prolonged idling of service equipment vehicle engines; use specialized blasting techniques; see Air Quality and Noise Management Plan	Lower concentration of particulate and gaseous pollutants	No	Certain	Maintain vehicles in good operating condition; monitor dust fallout by static collectors (method ASTM D1739); see Air Quality and Noise Management Plan , Aquatic Environmental Management Plan, and Wildlife Management Plan.
Access Road and Traffic	Generation of dust and emissions from overburden stripping, excavation and other construction related activities resulting in poor air quality and contamination of aquatic and terrestrial habitats	Medium	Local	Contin	Perman	All Year	No	Minimize road length and width; apply water spray during summer or use other dust suppressants when necessary; use fuel efficient machinery with emissions controls; see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan	Lower concentration of particulate matter and gaseous pollutants	No	Certain	Maintain vehicles in good operating condition; see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan
	Generation of dust and emissions from frequent activity by service and vehicles accessing staging facility, and ongoing maintenance	Medium	Local	Contin	Perman	All Year	No	Minimize vehicle traffic and speeds; apply water spray during summer or use other dust suppressants when necessary; use fuel efficient machinery with emissions controls; see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan	Lower concentration of particulate matter and gaseous pollutants	No	Certain	Monitor scheduling to ensure number of trips are minimized; enforce speed limits; monitor dust fallout by static collectors (method ASTM D1739); see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan

Table B2.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Potential explosion or fire may release contaminants into the air	Low	Local	Infreqnt	Short	All Year	No	Follow Hazardous Materials Management Plan; follow Spill Contingency Guidelines	Unpredictable	No	Improbable	Regular maintenance checks; monitor fuel handling procedures in Hazardous Materials Management Plan

Table B2.2: Air Quality Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Monitoring/ Management
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Generation of dust and emissions from maintenance activities resulting in poor air quality and contamination of aquatic and terrestrial habitats	Low	Local	Contin	Long	All Year	No	Use dust suppressants as necessary; use fuel efficient machinery with emissions controls; see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan	Lower concentration of particulate matter and gaseous pollutants	No	Certain	Maintain vehicles in good operating condition; see Air Quality and Noise Management Plan, and Access and Air Traffic Management P Enforcement of traffic speeds; maintain equipment in good repair in order to reduce emissions;
	Generation of dust and emissions from frequent activity by service and vehicles accessing staging facility	Medium	Local	Contin	Long	All Year	No	Minimize vehicle traffic and speeds; use dust suppressants as necessary; use fuel efficient machinery with emissions controls; see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan		no	Certain	Monitor scheduling to ensure number of trips are minimized; enforce speed limits; monitor dust fallout by static collectors (method ASTM D1739); see Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan

Table B2.3: Air Quality Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pit/ Quarry	No effect											
Roads and Airstrip	Generation of dust during re-grading and recontour embarkment	Low	Local	Discontinue after abandonment	Short	Summer	No	**Apply dust suppressants; control vehicles movement**	Lower dust concentration; improved visibility	No	Moderate	**Supervise the operation**
Access Road	Generation of dust during re-grading and recontour embarkment	Low	Local	Discontinue after abandonment	Short	Summer	No	**Apply dust suppressants; control vehicles movement**	Lower dust concentration; improved visibility	No	Moderate	**Supervise the operation**

Table B3.1: Noise Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pits	High noise levels from blasting, excavation, and material handling will disturb wildlife and result in reduced habitat effectiveness	High	Local	Contin	Long	All Year	Yes	Use newer trucks, loaders and dozers equipped in efficient mufflers; use quietest machinery available; limit noisy operation to day time use; use specialized blasting techniques	Lower noise levels	no	Certain	Maintain vehicle mufflers and noisy components; monitor noise levels and behavioral responses of wildlife
Access Road and Traffic	Moderate noise levels associated with construction	Medium	Local	Frequent	Medium	All Year	No	Use newer trucks, loaders and dozers equipped in efficient mufflers; Use quietest machinery available	Lower noise levels	No	Certain	Maintain equipment in good repair
	Moderate noise associated with traffic and road maintenance activities, Noise associated with grading and snowplowing	Medium	Local	Contin	Long	All Year	No	Use newer trucks, loaders and dozers equipped in efficient mufflers; minimize vehicular traffic and speeds; convoy shipments whenever possible; limit random traffic; schedule transportation for daytime hours whenever possible	Lower noise levels	No	Certain	Enforcement of traffic speeds; maintain equipment in good repair in order to reduce tire noise

Table B3.2: Noise Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Borrow Pits	High noise levels from blasting, excavation, and material handling will disturb wildlife and result in reduced habitat effectiveness	High	Local	Contin	Long	All Year	Yes	Use newer trucks, loaders and dozers equipped in efficient mufflers; use quietest machinery available; limit noisy operation to day time use; use specialized blasting techniques	Lower level noise	no	Certain	Maintain vehicle mufflers and other noisy components; monitor noise levels and behavioral responses of wildlife
Access Road and Traffic												
	Moderate noise associated with traffic and road maintenance activities, Noise associated with grading and snowplowing; traffic noise	Medium	Local	Contin	Long	All Year	No	Use newer vehicles equipped in efficient mufflers; minimize vehicular traffic and speeds; convoy shipments whenever possible; limit random traffic; schedule transportation for daytime hours whenever possible	Lower level noise	No	Certain	Enforcement of traffic speeds; maintain equipment in good repair; maintain roads in order to reduce tire noise

Table B3.3: Noise Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Road removed	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table A1: Surface Water Quantity Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Mine Waste and Water Management Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Culverts	Culverts will reduce ability to discharge spring freshet resulting in increases in water levels	Medium	Local	Continuous	Medium-term	Summer	Yes	Culverts will be sized (ie., 2.5 m diameter) to handle 1:100 year flood events and increased discharge due to annual freshet; culverts will be installed in winter when the outlet is frozen to the bottom, ensuring no disruption of flow	With no constraints on water discharge, the potential magnitude of the impact would be low	No	High	Ongoing hydrological monitoring will be conducted.
Access Road & Traffic	Interference with local surface drainage patterns	Low	Local	Infrequent	Medium	Summer	No	Maintain roads in good condition and maintain adequate drainage pattern.	NA	No	Certain	Use sedimentation traps, selection of more durable materials for road surfacing.

Table A.2: Surface Water Quantity Impact Matrix – Operation

Project Components	Potential Effects	Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects	Proposed Mitigation	Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	Mine Waste and Water Management Plan
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Culverts	Culverts will reduce ability to discharge spring freshet resulting in increases in water levels	Medium	Local	Continuous	Medium-term	Summer	Yes	Culverts will be sized (ie., 2.5 m diameter) to handle 1:100 year flood events and increased discharge due to annual freshet	With no constraints on water discharge, the potential magnitude of the impact would be low	No	High	Ongoing hydrological monitoring wil be conducted; check culverts on regular basis for blockages and ensure free-flowing
Access Road & Traffic	Interference with local surface drainage patterns	Low	Local	Infrequent	Medium	Summer	No	Maintain roads in good condition and maintain adequate drainage pattern.	NA	No	Certain	Use sedimentation traps, selection of more durable materials for road surfacing.

Table A.3: Surface Water Quantity Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects					Significance of Unmitigated Effects	Proposed Mitigation	Assessment of Residual Effects			Mine Waste and Water Management Plan
		Spatial Boundaries			Temporal Boundaries				Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road & Traffic	Roads to be decommissioned and reclaimed to restore drainage patterns - POSITIVE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Culverts	Culverts removed to restore natural drainage patterns - POSITIVE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.1: Water Quality Impact Matrix – Construction

Project Component	Potential Effect	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Influence of Mitigation on Effects Assessment	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Culverts	(see comments in Operations Matrix)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Access Road, culverts & Traffic	Sedimentation, dusting, fuel and load spills from traffic affects quality in water bodies along transit route.	low to medium	footprint	Continuous/ Rare	Short-term	All Year	low to medium	Use of dust suppressants, watering, road preparation and/or other dust control procedures (see Air Quality and noise Management Plan). Use BMP for sediment control in ditches and control of runoff. Implement Spill Contingency Plan and other emergency responses, when required.	medium	low	medium	Spill Contingency Plan, Emergency Response Plan, and Accidents and Malfunctions Plan Monitor conditions. See Mine Waste and Water Management Plan, Aquatic Environmental Management Plan, Air Quality and Noise Management Plan

Table B.2: Water Quality Impact Matrix – Operation

Project Component	Potential Effect	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Influence of Mitigation on Effects Assessment	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Roads & Traffic	Diesel spills to local water bodies	Medium	Footprint to Local	Rare	Medium to Long term	Year Round	Medium to Low	Best Management Practices and Spill Contingency Plans	Medium	Low	High	Spill Contingency Plan, Emergency Response Plan, and Hazardous waste Management Plan ,Aquatic Environment Management Plan.
	Dust from traffic releases metals and nitrogen species to local water bodies	Low	Footprint/Local	Frequent	Medium-term	Year round	Low	Dust control water will be drawn from the Portage Attenuation Pond (Abandonment & Restoration Plan) within Portage catchment. Dust control water for haul roads outside the Portage catchment areas will be drawn from Phase Lake in an effort to keep contact water within the mining areas. (Abandonment & Restoration Plan)	Medium	Low	High	Air Quality and Noise Monitoring Plan
	Metals, acidity and nitrogen species in runoff and seepage from road bed are released to local water bodies	Low	Footprint to Local	Frequent	Medium to Long term	Summer	Low	Select rock with low ARD and metal leaching potential will be used for construction. Best Management Practices for sediment and erosion control)	Medium	Low	medium	Mine site monitoring, and settling pond cleanout
Culverts	Metals, acidity and nitrogen species in runoff and seepage from road bed	Medium	Footprint to Local	Rare	Medium to Long term	Year Round	Medium to Low	Select rock with low ARD and metal leaching potential will be used for construction. Best Management Practices for sediment and erosion control	Medium	Low	High	Mine site monitoring, and settling pond cleanout

Table B.3: Water Quality Impact Matrix – Closure & Post Closure

Project Component	Potential Effect	Assessment of Unmitigated Effects					Significance of Unmitigated Effects	Proposed Mitigation	Assessment of Residual Effects			Management and Monitoring
		Spatial Boundaries		Temporal Boundaries					Influence of Mitigation on Effects Assessment	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads	Continued leaching of metals and acidity from active layer rock	Medium	Footprint	Frequent	Long-term	Summer	Medium	Selection of appropriate construction rock. (see Water and Waste Management Plan). Contingency (where monitoring indicates unanticipated metal leaching or acidic drainage) capping with nominal 2 m layer of UM rock.	High	Low	moderate	
Culverts	N/A after removal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic	N/A after final closure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table B6.1: Vegetation Cover Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Culvert	NA since no terrestrial component	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Access Road, Borrow pits and Traffic	Vegetation loss and disturbance	Low	Local	Contin	Perman	All Year	No	Minimize number of borrow pits required and road dimensions	Permanent vegetation loss at local level	No	Certain	Incourage Revegetation along road edges
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Contin	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderat	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrqnt	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderat	Monitor plant species composition
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infreqnt	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderat	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B6.2: Vegetation Cover Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road,Borrow Pits and Traffic	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Contin	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderat	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrqnt	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderat	Monitor plant species composition
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infreqnt	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderat	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B6.3: Vegetation Cover Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Borrow Pits and Traffic	Vegetation loss and disturbance	Low	Local	Contin	Long	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent alteration of vegetation cover likely	No	High	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Contin	Long	Summer	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Low potential for ongoing impacts to roadside vegetation	No	Moderat	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Culvert	Possible disturbance to riparian vegetation during removal	Low	Local	Contin	Long	Summer	No	Minimize disturbance to nearshore vegetation during removal of culverts	Minor amount of vegetation loss	No	Moderat	As per Abandonment & Restoration Plan

Table B7.1: Ungulates Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Contin	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderat	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; rports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderat	Monitor contaminant levels in vegetation adjacent to roads
	Ungulates may use roads as travel corridors resulting in increased mortality from predators	Low	Local	Frequent	Long	All Year	No	Do not berm roads to reduce crossing barriers	Negligible residual effects anticipated	No	Moderat	drivers must report ungulate sightings; maintain wildlife log of all wildlife sightings
	Increased hunting pressure; mortality from vehicles	Low	Regional	Frequent	Long	All Year	Yes	Limit use of road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to ungulates and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderat	Report all ungulate/vehicle collisions; enforcement of no-hunting policy along road

Table B7.2: Ungulates Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Contin	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; ungulated have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderat	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; rports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderat	Monitor contaminant levels in vegetation adjacent to roads
	Ungulates may use roads as travel corridors resulting in increased mortality from predators	Low	Local	Frequent	Long	All Year	No	Do not berm roads to reduce crossing barriers	Negligible residual effects anticipated	No	Moderat	drivers must report ungulate sightings; maintain wildlife log of all wildlife sightings
	Increased hunting pressure; mortality from vehicles	Low	Regional	Frequent	Long	All Year	Yes	Limit use of road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to ungulates and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderat	Report all ungulate/vehicle collisions; enforcement of no-hunting policy along road

Table B7.3: Ungulates Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs; risks and disturbances to ungulates from traffic during closure and post-closure will decrease and ultimately become minimal	Low	Local	Contin	Long	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent habitat alteration likely	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction; reclamation activities as outlined in WMP and A&R
	Mortality due to vehicle/ungulate collisions	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderat	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity; reduced potential for effect as site is decommissioned	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; rports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderat	Monitor contaminant levels in vegetation adjacent to roads
	Ungulates may use roads as travel corridors resulting in increased mortality from predators; no effect once road is no longer used	Low	Local	Frequent	Long	Winter	No	Do not berm roads to reduce crossing barriers	Negligible residual effects anticipated	No	Moderat	drivers must report ungulate sightings; maintain wildlife log of all wildlife sightings

Table B7.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Increased hunting pressure; mortality from vehicles; reducing threat as need for road decreases	Low	Regional	Frequent	Long	Winter	Yes	Limit use of road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to ungulates and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderat	Report all ungulate/vehicle collisions; enforcement of no-hunting policy along road

Table B8.1: Predatory Mammals Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and avoidance of habitat and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Contin	Long	All Year	No	Minimize required roads and reduce road dimensions	Residual effect expected to be minor	No	Certain	Monitor predatory mammal movements; revegetate areas disturbed during construction
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderat	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderat	Monitor contaminant levels in vegetation and other indicators adjacent to roads
	Area of habitat alteration not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B8.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Increased hunting pressure; mortality from vehicles	Medium	Regional	Frequent	Long	All year	Yes	Limit use of road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to predatory mammals and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderat	Report all predatory mammal/vehicle collisions; enforcement of no-hunting policy along road

Table B8.2: Predatory Mammals Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	No additional habitat loss or disturbance anticipated during the operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderat	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Contin	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderat	Monitor contaminant levels in vegetation and other indicators adjacent to roads
	Area of habitat alteration not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Increased hunting pressure; mortality from vehicles	Medium	Regional	Frequent	Long	Winter	Yes	Limit use of road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to predatory mammals and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderat	Enforcement of no-hunting policy along road; follow up on all reports of illegal hunting

Table B8.3 Continued

Table B8.3: Predatory Mammals Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Access Road and Traffic	Mortality due to vehicle/predatory mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infreqnt	Short	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent habitat alteration likely	No	Moderat	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction; reclamation activities as outlined in WMP and A&R
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of predatory mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of predatory mammals will likely be low; potential exposure is seasonal for most predatory mammal species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators

Table B9.1: Small Mammals Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat; disruption of movement and dispersal	Low	Local	Contin	Perman	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	Monitor small mammal populations; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/small mammal collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderat	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B9.2: Small Mammals Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/small mammal collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderat	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B9.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infreqnt	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Culverts	***POSITIVE*** – Some improved wildlife movement opportunities across in summer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B9.3: Small Mammals Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Dewatering												
Access Road and Traffic	Mortality due to vehicle/small mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infreqnt	Short	Summer	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent habitat alteration likely	No	Moderat	Monitor movements and aggregations; revegetate areas disturbed during construction; reclamation activities as outlined in WMP and A&R
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None specific to small mammals recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species; the potential for this effect will reduce substantially after mine closure; some potential contamination if small mammals utilize reclaimed road surfaces (see below)	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B9.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	POSITIVE – Small mammals may be attracted to reclaimed road bed areas for living and foraging once vegetation has become reestablished; reclaim activities will involve scarifying roads, restoring drainage, suppressing dust, and considering rehabilitation of roads as esker-like habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Culverts	***POSITIVE*** – Culverts will be removed and the land recontoured, drainage patterns restored, and animal movement patterns reduced but restored to original configurations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B10.1: Raptors Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Contin	Perman	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	None specific to raptors recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators

Table B10.2: Raptors Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators

Table B10.3: Raptors Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Prey species (e.g., passerines and ptarmigan) may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B11.1: Waterfowl Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Contin	Perman	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators

Table B11.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infreqnt	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and waterfowl have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting waterfowl
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in forage species	Low	Local	Contin	Perman	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats	No	Moderat	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip
Culverts	Disruption of movement opportunities for waterfowl	Low	Local	Contin	Medium	Summer	No	None recommended	Residual effects are considered to be low due to low waterfowl densities and ability for waterfowl to fly around obstructions	No	Certain	None recommended

Table B11.2: Waterfowl Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Contin	Perman	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
Culverts	Disruption of movement opportunities for waterfowl	Low	Local	Contin	Medium	Summer	No	None recommended	Residual effects are considered to be low due to low waterfowl densities and ability for waterfowl to fly around obstructions	No	Certain	None recommended

Table B11.3: Waterfowl Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species; the potential for this effect will reduce substantially after mine closure	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated forage species within diet of locally resident waterfowl is likely low; potential exposure is very seasonal for most waterfowl species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE – Waterfowl may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B12.1: Other Breeding Birds Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries					Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects					
Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Contin	Perman	All Year	No	Minimize required roads and reduce road dimensions; avoid construction of roads during breeding bird season; identify active nests	Minor alteration and loss of foraging habitat	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contaminatio n is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators

Table B12.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infreqnt	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contaminatio n is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B12.2: Other Breeding Birds Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contaminatio n is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators

Table B12.3: Other Breeding Birds Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Access Road and Traffic	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infreqnt	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderat	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Contin	Perman	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Contin	Perman	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderat	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Passerines and ptarmigan may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B13.1: Fish Impact Matrix – Construction

Project Component	Potential Physical and Ecological Effect	Assessment of Unmitigated Effects					Proposed Mitigation	Assessment of Residual Effects			Aquatic Environment Management Program (AEMP) Description
		Spatial Boundaries		Temporal Boundaries		Significance of Unmitigated Effects		Residual Effect / Influence of Mitigation	Significance of Residual Effects	Certainty of Prediction	
		Magnitude	Spatial Extent	Duration	Frequency & Timing						
Access Road and Traffic	Terrain disturbance, introduction of particulates to lakes during rain events, aerial dispersion of particulates, local habitat disturbance, road dust. Smothering of fish eggs, impaired feeding efficiency by fish; toxicity due to metals introduction.	L	L	S	F	NO	Construction activities in and around waterways will be avoided. No direct contact of vehicles in lakes. Dust suppressants applied to roads. Other dust control measures for aerial emissions.	Mitigation will eliminate exposure pathways and result in negligible ecological effects.Negligible ecological effects on fish. Mitigation will reduce magnitude, extent, and frequency of effects.	NO	High	Targeted monitoring during road construction will be implemented if necessary. Water quality monitoring adjacent to mine site will be conducted routinely at a variety of locations. Targeted monitoring during construction will be implemented when necessary. See AEMP
Culverts	Culverts installation could disturb fish movement	L	L	S	R	NO	Construct during winter. Place coarse grain substrate in bottom of culverts to replace habitat loss. Culverts will be designed with maximum discharge velocity of 0.6 m/s to ensure fish passage. See Aquatic Environmental Management Plan and No Net Loss Report (2004).	Culverts will mitigate crossing impact. Crossing will be constructed in winter when there are no fish movements therefore resulting in neglible ecological effects.	NO	High	Routine monitoring to confirm that movements of fish is not impaired. (see AEMP).

Table B13.2: Fish Impact Matrix – Operation

Project Component	Potential Physical and Ecological Effect	Assessment of Unmitigated Effects					Proposed Mitigation	Assessment of Residual Effects			Aquatic Environment Management Program (AEMP) Description
		Spatial Boundaries		Temporal Boundaries		Significance of Unmitigated Effects		Residual Effect / Influence of Mitigation	Significance of Residual Effects	Certainty of Prediction	
		Magnitude	Spatial Extent	Duration	Frequency and Timing						
Borrow Pit/Quarry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Access Road and Traffic	Terrain disturbance, introduction of particulates to lakes during rain events, aerial dispersion of particulates, local habitat disturbance, introduction of dust from runoff from roads. Potential adverse physiological effects to fish (leading to stress) and potential for increased egg mortality.	L	L	M	F	NO	Avoid operating heavy equipment in and around waterways. No direct contact of vehicles in lakes. Dust suppresants applied to roads. Other dust control measures for aerial emissions. Perimiter ditches to direct contact runoff with roads, waste piles, airstrip, etc. to tailings facility (see Golder 2004?).	Negligible ecological effects on fish. Mitigation will eliminate pathways of contamination, reducing magnitude, extent and duration of impacts.	NO	High	Routine, annual monitoring of the road to determine if any adverse effects can be observed and corrected (see AEMP). Implement emergency spills response in event of an accidental spill.
Culverts	Potential for impaired fish passage because of high water velocity during spring freshet; visual barrier to fish movement because of long culvert length.	L	L	M	I	NO	Install rip rap along shorelines and approaches to road crossing and within dike to encourage movement by fish. Install culvert to maintain discharge velocity <0.6 m/s to ensure fish passage.	Possible reduced movement by fish Adequate culvert sizing will ensure that fish passage is not compromised.	NO	High	See AEMP Targeted study.

Table B13.3: Fish Impact Matrix – Closure & Post-Closure

Project Component	Potential Physical and Ecological Effect	Assessment of Unmitigated Effects				Assessment of Residual Effects		
		Spatial Boundaries		Temporal Boundaries				
		Magnitude	Spatial Extent	Duration	Frequency and Timing	Influence of Activity/ Residual Effect	Significance of Residual Effects	Certainty of Prediction
Roads and Traffic	Roads will be decommissioned; land will be restored.	NA	NA	NA	NA	NA	NA	NA
Airstrip and Air Traffic	Airstrip will be decommissioned; land will be restored.	NA	NA	NA	NA	NA	NA	NA
Culverts	Removal in winter when natural stream channel is frozen. Minor disturbance to localized fish during closure; no residual effects following restoration.	NA	NA	NA	NA	NA	NA	NA

Table B14.1: Fish Habitat Impact Matrix – Construction

Project Component	Potential Physical and Ecological Effect	Assessment of Unmitigated Effects				Significance of Unmitigated Effects	Assessment of Residual Effects				Aquatic Environment Management Program (AEMP) Description
		Magnitude	Spatial Extent	Duration	Frequency and Timing		Proposed Mitigation	Residual Effect / Influence of Mitigation	Significance of Residual Effect	Certainty of Prediction	
Borrow Pit/Quarry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Terrain disturbance, introduction of particulates to lakes during rain events, aerial dispersion of particulates, local habitat disturbance, road dust. Smothering of benthos and fish spawning habitat, impaired feeding efficiency by fish; toxicity due to metals introductions.	L	L	S	F	NO	Construction activities in and around waterways will be avoided. No direct contact of vehicles in lakes. Dust suppresants applied to roads. Other dust control measures for aerial emissions..	Negligible residual effect. Mitigation will reduce the frequency and duration of effects and eliminate the exposure pathway and ecological effects.	NO	High	Targeted monitoring during road construction will be implemented if necessary. See AEMP (2004) Routine, annual monitoring of the road will be conducted to determine if any adverse effects to fish habitat at key crossing areas can be detected and corrected, if necessary (see AEMP).
Culvert	Culverts will be installed in the dry season during winter when natural stream channel is frozen. Elimination of fish habitat beneath culvert footprint	L	L	S	R	NO	Construct during winter. Place coarse grain substrate in bottom of culverts to replace habitat loss. see Aquatic Environmental Management Plan and No Net Loss Report (2004).	Negligible residual effect.	NO	High	Annual monitoring to confirm that rep rap habitat at entry and exit points to culvert is stable and functioning as designed (see AEMP).

Table B14.2: Fish Habitat Impact Matrix – Operation

Project Component	Potential Physical and Ecological Effect	Assessment of Unmitigated Effects				Significance of Unmitigated Effects	Assessment of Residual Effects				Aquatic Environment Management Plan (AEMP) Description
		Magnitude	Spatial Extent	Duration	Frequency and Timing		Proposed Mitigation	Residual Effect /Influence of Mitigation	Significance of Residual Effect	Certainty of Prediction	
Borrow Pit/Quarry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Terrain disturbance, introduction of particulates to lakes during rain events, aerial dispersion of particulates, local habitat disturbance, road dust. Potential for reduction in primary and especially secondary productivity.	L	L	L	F	NO	Operation activities in and around waterways will be avoided. No direct contact of vehicles in lakes. Dust suppresants applied to roads. Other dust control measures for aerial emissions.	Negligible ecological effect on fish. Mitigation will eliminate pathways of contamination, reducing magnitude, extent and duration of impacts.	NO	High	Water quality monitoring will be conducted routinely at a variety of locations. Targeted monitoring during construction will be implemented when necessary. See AEMP.
Culverts	Reduced productivity because of shading by road crossing. Loss of benthic habitat.	L	L	L	F	NO	Install rip rap along shorelines and approaches to road crossing to replace low value, soft sediment habitat with higher value habitat.	Negligible residual impact. Mitigation will protect habitat and lessen effects.	NO	High	Annual monitoring of shoreline stability at Turn Lake crossing (see AEMP).

Table B14.3: Fish Habitat Impact Matrix – Closure & Post-Closure

Project Component	Activity/ Ecological Effect	Assessment of Unmitigated Effects				Assessment of Residual Effects		
		Spatial Boundaries		Temporal Boundaries				
		Magnitude	Spatial Extent	Duration	Frequency and Timing	Influence of Activity/ Residual Effect	Significance of Residual Effects	Certainty of Prediction
Borrow Pit/Quarry	Decommissioned.	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Roads will be decommissioned; land will be restored.	NA	NA	NA	NA	NA	NA	NA
Culverts	Removal in winter when natural stream channel is frozen. Minor disturbance to localized benthos and periphyton during closure; no residual effects following restoration.	NA	NA	NA	NA	NA	NA	NA