Table B-07. Characteristics of the Infrastructure Constructed at the Marine Laydown Area

Potential Development Area	653 ha Footprint of facilities = 20 ha
Site Roads	All-weather roads (all are service roads, widths of 4.5 m or 8 m) will be constructed on the site. Construction materials are from locally developed, geochemically suitable rock quarries. Roads will be private and not for public use.
Quarry Sites and Borrow Area	Estimated aggregate extracted: 1.3 Mt Number of rock quarries: none, cut from MLA Fuel Storage area used as fill for remaining pads. Number of borrow areas: none
Water Management	Water supply source: Bathurst Inlet - Desalination unit No water management ponds
Fuel Storage	On land storage of 60 ML (four tanks at 15 ML) Fuel delivered by sealift during open water season. Seacans as required (camp/shop facility)
Power Generation	Combined heat and power plant consisting of three (N + 1), 500 kW diesel fired reciprocating engine generator sets.
Laydown and Storage Area	Ammonium nitrate storage area: up to 3,900 tonnes inert AN in seacans
Waste Management	Landfarm – for treatment of hydrocarbon contaminated soils or snow Incinerator – at camp for incineration of combustible waste including sewage Pacto waste Hazardous waste: lined hazardous waste storage area. Hazardous waste temporarily stored then shipped off-site for ultimate disposal during annual sealift season.
Airstrip	Airstrip capable of accepting aircraft constructed on ice during winter. Access by floatplanes during open water, if necessary.
Wastewater Treatment	Oily water treatment plant. Oil to be collected and either burned in an approved waste-heat generator, or drummed and removed from site as hazardous waste.
Sewage Treatment	Waste collected from Pacto systems will be incinerated.
Buildings	Laydown areas; Explosives magazines; Reagent storage; Warehousing facility; Emergency facilities (fire and ambulance station); General maintenance building (site services); Waste management building; 75-person camp and Administration complex (workforce with contingency) complete with kitchen, dry and recreational facilities; Administration complex; Modular desalination water treatment system; Diesel power plant; Power utility building.
In Water Construction	Floating terminal barge that will accept lightering barges. There are no permanent in-water works.

Table B-08. Dimensions of Open Pits at End of Operations

Open Pit	Footprint (ha)	Depth (m)	Volume (Mm^3)
Umwelt	16	135	7.8
Llama	13	135	5.6
Echo	33	45	0.4
Goose Main	24	150	10.8

Table B-09. Closure Objectives and Criteria – Open Pit Workings

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices for controlling fugitive and exhaust emissions during active reclamation will be implemented	Routine air quality monitoring
Land	Reduce the potential for inadvertent access by humans to slopes that are dangerous or unstable – mostly completed during Operations as progressive reclamation	Stabilize all slopes to the extent possible. It is noted that the partial backfilling with tailings (Umwelt TF and Goose Main TF) and flooding will both increase stability.	Physical inspection by a qualified engineer; construction of the safety berms during Operations as progressive reclamation to extent possible
		Define a setback line in accordance with rock mechanics studies conducted for pit stability	
		Berms will be constructed around the open pit outside of the setback lines where slopes will exist above final water levels	
	Meet appropriate design levels for engineered structures for closure	The pit overflow structures and pipeline to WTP (Goose Main TF and other pits if needed) will be designed and constructed according to the extreme precipitation event selected for its design	Design and construction of the overflow structures and pipeline
Water	Reduce and control contaminated drainage from the flooded pits	Integrate a water management plan to reduce and control contaminated drainage from the flooded pits	Routine monitoring and sampling; water treatment if required
		Implement a system to manage these waters, and to treat as necessary to meet site permit water quality objectives before release	
	Ensure outflow from the flooded open pits meets water licence criteria	Prior to overflow, the water quality will be profiled and the most appropriate treatment method will be determined if necessary (e.g., in-pit treatment or through the WTP)	Routine monitoring and sampling; in-pit or water treatment at the WTP if required

(continued)

Table B-09. Closure Objectives and Criteria – Open Pit Workings (complete)

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
	Control pit flooding	The bottom of Llama Pit will be partially filled with saline water to form meromictic conditions. Umwelt Pit and Goose Main OP will be partially filled with tailings. After that, all 4 pits will be passively flooded with natural runoff and precipitation such that they can become natural outflow systems.	Routine monitoring and sampling; in-pit water treatment or water treatment at the WTP as necessary prior to release of open pit water
Wildlife	Discourage access to open pit - – mostly completed during Operations as progressive reclamation	A plan will be developed to allow for reasonable exit should access occur	Physical inspection; construction of rock barricades during Operations as progressive reclamation
		All pit access ramps will be secured by rock berm barricades	
	Reduce the possibility that water in the flooded open pits will affect wildlife health	Prior to overflow, the water quality will be profiled and the most appropriate treatment method will be determined if necessary (e.g., in-pit treatment or through the WTP)	Routine monitoring and sampling; in-pit water treatment or water treatment at the WTP, if required
Health and Safety	Allow emergency access and exit from flooded pits – mostly completed during Operations as progressive reclamation	A plan will be developed to allow for reasonable exit should inadvertent access occur	Physical inspection
	Reduce the potential for inadvertent access by humans to slopes that are dangerous or unstable – mostly completed during Operations as progressive reclamation	Define a setback line in accordance with rock mechanics studies conducted for pit stability. Berms will be constructed around the open pit outside of the setback line where slopes will exist above the final water line	Physical inspection by a qualified engineer; construction of the berms during Operations as progressive reclamation to extent possible
	Reduce the possibility that water quality of downstream flows will affect human health	The effluent water quality will be monitored and the most appropriate treatment method will be determined if necessary	Routine monitoring and sampling downstream of the decommissioned pits; in-pit water treatment or water treatment at the WTP as necessary prior to release of open pit water
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

WTP = water treatment plant

Table B-010. Dimensions of Underground Workings at End of Operations

Deposit	Depth (mbgs) From	To	# Vent Raises	Volume* (Mm^3)
Umwelt	135	650	2	0.76
Llama	135	380	1	0.32
Echo	45	325	1	0.15
Goose Main	150	390	1	0.39

*Note: mbgs: meters below ground surface; * open volume after backfilling (required ground stability)*

Table B-011. Closure Objectives and Criteria – Underground Mine Workings

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	N/A	N/A	N/A
Land	Eliminate access to underground mine workings and surface openings	The portals will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection and monitoring
	Remove hazardous materials from the underground mine	Fuels, oils, chemicals, etc. will be removed for disposal offsite at a licensed facility prior to flooding	Physical inspection and monitoring
Water	Eliminate access to underground mine workings and surface openings	The portals will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection and monitoring
	Allow underground to flood.	The Llama U/G, Umwelt U/G and Goose Main U/G workings will be flooded with water from the Saline Water Pond. Echo U/G workings will be flooded with site contact water.	Initial physical monitoring to check flooding, but limited once ventilation is turned off.
Wildlife	Eliminate access to underground mine workings and surface openings	The portals will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection and monitoring
Health and Safety	Eliminate access to underground mine workings and surface openings	The portals will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection

(continued)

Table B-011. Closure Objectives and Criteria – Underground Mine Workings (complete)

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
	Ensure the stability of underground workings after closure	The underground will be designed and mined to be physically stable; it will be back-filled as needed during Operations	Meet appropriate design levels, physical inspection and crown pillar stability assessment by a qualified engineer and monitoring
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-012. Dimensions of Waste Rock Storage Areas at End of Operations

WRSA	Footprint (ha)	Height (m)	Tonnage (Mt)
Umwelt	39.5	34	20
Llama	37.5	30	16
Echo	3.3	15	1.2
TSF WRSA	119.1	14	27

Table B-013. Closure Objectives and Criteria – Waste Rock Storage Areas

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices for controlling fugitive and exhaust emissions will be implemented during active reclamation	Routine air quality monitoring
Land	Confirm the WRSA slopes and top are stable	The WRSAs will be designed for closure and will account for seismic and permafrost conditions	Physical inspection by a qualified engineer, and monitoring
		A thermal cover of NPAG rock will be placed on the WRSAs surface during progressive reclamation and closure to limit acid generating reactions	Thermistors to monitor verify that the piles are frozen throughout except for the predicted active layer
Water	Confirm runoff and seepage is collected	The runoff and seepage from the WRSAs will continue to be directed to the contact water storage ponds or the active TF and eventually pumped for treatment in the WTP, as per operational practices, until monitoring results demonstrate that water quality conditions from the WRSAs are acceptable for direct discharge	Physical inspection. Routine monitoring and sampling
	Confirm runoff and seepage from the WRSAs meet water licence criteria	As above	Routine monitoring and sampling
Wildlife	Ensure the WRSA surfaces are safe for wildlife	WRSAs at post-closure will not compromise wildlife safety	Physical inspection
	Reduce the possibility that water from the WRSAs will affect wildlife health	The runoff and seepage from the WRSAs will continue to be directed to the contact water storage ponds or the active TF and eventually pumped for treatment in the WTP, as per operational practices, until monitoring results demonstrate that water quality conditions from the WRSAs are acceptable for direct discharge	Routine monitoring and sampling
Health and Safety	Ensure the WRSAs are safe for monitoring and physical inspections	WRSAs at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

WRSA = waste rock storage area; WTP = water treatment plant

Table B-014. Dimensions of Tailings Storage Facilities at End of Operations

Tailings Facility	Footprint (ha)	Height (m)	Tonnage (Mt)	Volume (Mm^3)
Tailings Storage Facility (TSF)	119.1*	14	3.8**	3.1**
Umwelt Tailings Facility (TF)	within mined-out Umwelt Pit	5 (mbgs)	8.6	7.2
Goose Main Tailings Facility (TF)	within mined-out Goose Main Pit	31.3 (mbgs)	7.4	6.2

*Notes: * Includes capacity for storage of waste rock from Goose Main OP; ** TSF only*

Table B-015. Closure Objectives and Criteria – Buildings and Equipment

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices reclamation will be implemented for controlling fugitive and exhaust emissions during active	Routine air quality monitoring
	Control dust generation from demolition and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Maintain required site infrastructure during active reclamation	Reduce the use of facilities after closure to promote early decommissioning	Physical inspection
	Clean up and remove machinery, materials and equipment	Machinery, materials and equipment will be will be disposed of in an on-site landfill	Physical inspection
		Fluid hydrocarbons drained from equipment will be burned in generators or incinerated where approved. Other fluids will be removed from site for recycling or disposal at a licenced facility	Physical inspection
	Remove all hazardous wastes	Hazardous wastes will be shipped offsite for disposal at a licensed facility	Physical inspection
	Remove all fuels, chemicals and industrial wastes	During or prior to closure, a site inventory of all these products will be updated	Physical inspection
		Any unused petroleum products will be burned in generators or incinerated where approved. Other chemicals will be sold, returned to suppliers or shipped offsite for disposal at a licensed facility.	
	Remove surface infrastructure	Any above-ground infrastructure will be offered to third parties at closure for potential reuse elsewhere, otherwise it will be dismantled and buried in a landfill	Physical inspection

(continued)

Table B-015. Closure Objectives and Criteria – Buildings and Equipment (completed)

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
		Remaining concrete structures at grade will be perforated and covered or removed to a landfill. The area will be re-graded to promote natural drainage	
	Remove contaminated soils	An assessment will be carried out to identify areas where soils may be contaminated by hydrocarbons	Physical inspection
		A more detailed investigations will be carried out of the potential soil contaminated areas (i.e., Phase 1 and 2 ESA investigations) to determine the extent of the contamination	Environmental Site Assessment
		Selected hydrocarbon contaminated soils will be excavated and hauled to the landfarm area for remediation	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection and monitoring
Wildlife	Ensure the remaining surface areas are safe for wildlife use and access	Remaining areas will be scarified and remaining concrete structures at grade will be perforated and covered and rebar will be cut in pieces and buried or removed to a landfill	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-016. Closure Objectives and Criteria – Mine Infrastructure

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices will be implemented for controlling fugitive and exhaust emissions during active reclamation	Routine air quality monitoring
	Control dust generation from demolition and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Clean up and remove components or materials	All components and materials will be disposed of in an on-site landfill	Physical inspection
		Fluid hydrocarbons drained from components will be burned in generators or incinerated where approved. Other fluids will be removed from site for recycling or disposal at a licenced facility	Physical inspection
	Remove all reagent and hazardous wastes	Unused reagents will be returned to suppliers or shipped off-site by a licenced handler	Physical inspection
		Hazardous wastes will be removed for disposal at a licensed facility	
	Remove all fuels, chemicals and industrial wastes	During or prior to closure, a site inventory of all these products will be updated	Physical inspection
		Any unused petroleum products will be burned in generators or incinerated where approved. Other chemicals will be sold, returned to suppliers or removed for disposal at a licensed facility	
	Remove surface infrastructure	Any above-ground infrastructure will be offered to third parties at closure for potential reuse elsewhere; otherwise, it will be dismantled buried in an on-site landfill	Physical inspection
		Remaining concrete structures at grade will be perforated and covered or removed to a landfill. The area will be re-graded to promote natural drainage	
	Remove contaminated soils	An assessment will be carried out to identify areas where soils may be contaminated by hydrocarbons	Physical inspection
		A more detailed investigations will be carried out of the potential soil contaminated areas (i.e., Phase 1 and 2 ESA investigations) to determine the extent of the contamination	Environmental Site Assessment
		Selected hydrocarbon contaminated soils will be excavated and hauled to the landfarm area for remediation	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection and monitoring

(continued)

Table B-016. Closure Objectives and Criteria – Mine Infrastructure (completed)

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Wildlife	Ensure the remaining surface areas are safe for wildlife use and access	Remaining areas will be scarified and remaining concrete structures at grade will be perforated and covered or removed to a landfill	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-017. Closure Objectives and Criteria – Roads and Airstrips

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices will be implemented for controlling fugitive and exhaust emissions during active reclamation	Routine air quality monitoring
	Control dust generation from decommissioning and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Ensure preservation of permafrost	Culverts will be removed and the natural drainage restored. Roads and the airstrip will be scarified when they become redundant; they will otherwise remain intact for preservation of permafrost	Physical inspection
Water	Ensure drainage is restored	Culverts will be removed and the natural drainage restored	Physical inspection
Wildlife	Ensure the remaining surface areas are safe for wildlife use and access	The roads and airstrip will be designed to be safe for wildlife use and access for Operations - no additional work is expected at closure except for scarification and the removal of the culverts	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities and do not become a source of contamination	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-018. Closure Objectives and Criteria – Waste Management Facilities

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices will be implemented for controlling fugitive and exhaust emissions during active reclamation	Routine air quality monitoring
	Control dust generation from decommissioning and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Treat contaminated soils, ice and snow in the landfarm areas	As per operational practices contaminated soils, ice and snow will be treated in the landfarm areas during the active closure stage	Physical inspection
		Remediated soils will be hauled and disposed of in landfills or used for construction of the WRSAs cover	Physical inspection
	Clean up and remove waste management system components or materials	All components or materials will be cleaned up and disposed in the on-site landfill when they are no longer required	Physical inspection
		Metals will be separated and shipped off-site as scrap if economical to do so or disposed of in the on-site landfill	
	Remove all hazardous wastes	Hazardous wastes will be removed for disposal at a licensed facility Used oils and waste fuel could be burned in the on-site incinerators if required and approved	Physical inspection
	Remove surface infrastructure	Any above-ground infrastructure will be demolished/dismantled and the non-hazardous debris will be disposed in the on-site landfill or within the mined-out open pits	Physical inspection
		Remaining concrete structures at grade will be perforated and covered. Any rebar will be cut in pieces and buried or removed and the area re-graded to promote natural drainage	
	Landfills are encapsulated	The landfill areas will be covered with 5 m NPAG waste rock when they are no longer required	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection
Wildlife	Ensure the remaining areas are safe for wildlife use and access	Keep wildlife out of the landfills as per operational practices. Place the 5 m NPAG cover when they are no longer required The remaining areas will be re-graded to reduce hazards to wildlife	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-019. Site-Specific Water Quality Objectives for Arsenic and Copper

Parameter	MMER (mg/L)	CCME (mg/L)	Site-Specific Water Quality Objective (mg/L)
Total Arsenic	0.5	0.005	0.01
Total Copper	0.3	0.002	0.0042

Table B-020. Closure Objectives and Criteria – Water Management Facilities

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Control dust generation from active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Maintain surface water drainage control systems	Fresh water intakes and distribution system will be reclaimed after active closure	Physical inspection
		Maintain water management components until they are no longer required	Physical inspection
	Ensure berms and dams are stable	Berms and dams will be breached once water quality meets licence criteria for direct discharge. TSF dam will only be breached on left abutment (i.e., north of TSF WRSA pond) by excavating a spillway in the berm.	Physical inspection by qualified engineer
	Remove surface infrastructure (i.e., pipelines, culverts, pump systems, WTP)	All components or materials will be cleaned up and disposed in the on-site landfill when they are no longer required	Physical inspection
		Any above ground pipelines will be dismantled and associated distribution equipment will be disposed in the on-site landfill	Physical inspection
		Reclaimed areas will be re-graded	Physical inspection
		Any culverts and equipment will be removed and will be disposed in the on-site landfill	Physical inspection
		Any above-ground infrastructure will be demolished/dismantled and the non-hazardous debris will be disposed in the on-site landfill or within the mined-out open pits	Physical inspection
		Remaining concrete structures at grade will be perforated and covered. Any rebar will be cut in pieces and buried or removed and the area re-graded to promote natural drainage	Physical inspection

(continued)

Table B-020. Closure Objectives and Criteria – Water Management Facilities (completed)

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
	Remove all hazardous wastes	Hazardous wastes will be removed for disposal at a licensed facility	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection
	Ensure collected runoff and seepage meets water licence criteria	Runoff and seepage collected in the Goose Main TF will be treated through the WTP until water quality meets licence criteria for direct discharge	Routine monitoring and sampling
	Remove facilities when treatment is no longer required	When water quality from the mine components is deemed suitable for direct discharge to the environment the berms will be breached	Routine monitoring and sampling
Wildlife	Discourage wildlife from entering the facilities	Wildlife will be discouraged from entering the facilities until water quality is acceptable	Physical inspection
Health and Safety	Ensure the remaining areas are left in a healthy state that supports continuation of human land use activities	Human land use of the reclaimed areas at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-021. Water Management Structure Breach Schedule during Closure Period

Berm	Timing of Breach	Number of Breach Locations
Llama Non-Contact Water Diversion (Southwest, South)	Active Closure	1
SWP Contact Water Diversion	Active Closure	4
Ore Stockpile Pond Contact Water Diversion	Active Closure	2
Echo Non-Contact Water Diversion	Active Closure	2
Echo WRSA Contact Water Diversion	Active Closure	1
Echo WRSA Pond Contact Water Diversion	Active Closure	1
Llama Reservoir	Passive Closure	1
Llama WRSA Contact Water Diversion	Passive Closure	1
Umwelt TF	Passive Closure	1
Umwelt WRSA Contact Water Diversion	Passive Closure	1
Goose Main TF	Passive Closure	1
Goose Main TF Non-Contact Water Diversion	Passive Closure	1
TSF Contact Water Diversion	Passive Closure	3
TSF WRSA Pond Dam	Passive Closure	1

Table B-022. Closure Objectives and Criteria – Quarries and Granular Borrow Sites

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Control dust generation from active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Surfaces are stabilized	Quarries and granular borrow sites will be contoured to achieve gentle side slopes	Physical inspection
Water	Channel runoff through the watershed	Surfaces will be re-graded to promote natural drainage, new surface drainage patterns will be established if needed	Physical inspection
	Meet Water Licence criteria for runoff	A water management strategy will be implemented to control the transport of sediments out of borrow and quarry areas should it be encountered.	Physical inspection
Wildlife	Ensure surfaces are safe for wildlife use and access	Quarries and granular borrow sites will be re-contoured to reduce hazards to wildlife	Physical inspection
Health and Safety	Ensure surfaces are left in a healthy state that supports continuation of human land use activities	Land use of the areas at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-023. Proposed Closure and Post-Closure Main Activities Schedule

Component	Description	Operation Phase (Progressive Reclamation)									Closure Phase								Post-Closure Phase	
		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19+	Year 23
											Active Stage		Passive Stage							
Open Pits	- Flooding of Llama Pit			Flooding with water pumped from Saline Water Pond							Passive flooding with site runoff and precipitation [a]									
	- Filling and flooding of Umwelt Pit		Filling with tailings								Passive flooding with site runoff and precipitation [a]									
	- Filling and flooding of Goose Main Pit						Filling with tailings Active flooding with water pumped from TSF WRSA Pond				Active flooding with water pumped seasonally from TSF WRSA Pond; Passive flooding with site runoff and precipitation Treated in WTP and recirculated to Goose Main TF									
	- Flooding of Echo Pit										Passive flooding with site runoff and precipitation [a]									
	- Place warning signs around Open Pits perimeter and replace as needed, construct rock berm(s)	X (as needed)																		
Underground Mine Workings	- Active flooding of Llama U/G with water pumped from Saline Water Pond				X															
	- Active flooding of Umwelt U/G and Goose Main U/G with water pumped from Saline Water Pond									X										
	- Passive flooding of Echo U/G with site runoff									X										
	- Backfilling with waste rock (for ground support and additional PAG waste rock storage)		Ongoing during mining (mainly completed by Year 6)																	
	- Backfilling portal and capping vent raises				X (Llama U/G)					X (Echo U/G)	X (Umwelt & Goose U/G)									
WRSAs	- Cover placement with NPAG waste rock	Ongoing during mining																		
TSF WRSA	- Cover placement with NPAG waste rock	Ongoing during Operations (mainly completed by Year 6)																		
Machinery and Mobile Equipment	- Decommission machinery and equipment; drain of fluids and leave in OP or U/G. Leave equipment required for closure and post-closure activities in service.										X									
	- Drain fluids from equipment used for closure activities (e.g., trucks, backhoes, etc.) and dispose in landfill																		X	
	- Drain fluids from equipment used for long-term maintenance (e.g., excavators)[b] and dispose in landfill																			X
Mine Infrastructure	- Decommission facilities and re-grade areas as needed										X									

Component	Description	Operation Phase (Progressive Reclamation)									Closure Phase								Post-Closure Phase	
		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19+	Year 23
											Active Stage		Passive Stage							
Roads and Airstrip	- Decommission all-weather roads										X (partial)									X
	- Decommission all-weather airstrip																			X
Waste Management Facilities	- Decommission landfill(s)	Simultaneous with WRSAs if capacity reached																X		
	- Remediate contaminated soils in land farms		Ongoing (may continue into Closure and Post-Closure)																	
	- Decommission Sewage Treatment Plant at Goose Property (Pactos used in Closure and Post-Closure)										X									
Water Management Facilities	- Construct spillway on left abutment of TSF Embankment. Breach dams/berms and reclaim channel and pond areas										X			X	X			X		
	- Decommission WTP																		X	
MLA Facilities	- Decommission all infrastructure										X									
Long-term Care and Maintenance (assumed for 13 years)[b]																				
Monitoring							Monitor flooded open pits and contact water reporting from closed mine facilities (post-closure stage duration may be reduced or in-pit treatment may be required)													

[a] *Passive flooding may start earlier during Operations once each facility is no longer required.*
[b] *Assumed for 13 years after end of Operations; however, Closure schedule dependent on monitoring results. Activities will occur when contact water quality satisfies water licence criteria for direct discharge and/or access to the site is no longer required.*

Appendix C. Glossary of Terms and Definitions

Glossary of Terms and Definitions

Term	Definition
Acid Base Accounting (ABA)	Acid base accounting; a static test that defines the amounts, and relative balance, of potentially acid-generating and acid-neutralizing (or base) minerals in a sample.
Active layer	The layer of ground above the permafrost which thaws and freezes annually.
Acid rock drainage (ARD)	Acidic pH rock drainage due to the oxidation of sulphide minerals that includes natural acidic drainage from rock not related to mining activity; an acidic pH is defined as a value less than 6.0.
Advanced mineral exploration	Any appurtenant undertaking in which the proponent requires a Type A or Type B water licence in order to carry out the proposed activities.
Quarries and Granular Borrow Sites	Site from where soils and aggregates are obtained for use in earthworks construction.
Care and maintenance	The status of a mine when it undergoes a temporary closure.
Closure goal	The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens when the proponent has satisfied all closure objectives. By its nature, the closure goal is a broad, high-level statement and not directly measurable.
Closure principles	The four core closure principles are 1) physical stability, 2) chemical stability, 3) no long-term active care requirements, and 4) future use (including aesthetics and values). The principles guide the selection of closure objectives.
Closure objectives	Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles. Closure objectives are typically specific to project components, are measurable and achievable, and allow for the development of closure criteria.
Closure options	A set of proposed alternatives for closing and reclaiming each mine component. The closure options are evaluated to determine the selected closure activity, which must be approved by the NWB.
Closure criteria	Standards that measure the success of selected closure activities in meeting closure objectives. Closure criteria may have a temporal component (e.g., a standard may need to be met for a pre-defined number of years). Closure criteria can be site-specific or adopted from territorial/federal or other standards and can be narrative statements or numerical values.
Contaminant	1) any physical, chemical, biological or radiological substance in the air, soil, or water that has an adverse effect; and 2) any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.
Effluent	Water flows being discharged to the environment.
Engagement	The communication and outreach activities a proponent undertakes with affected communities and Aboriginal organizations/governments prior to and during the operation of a project, including closure and reclamation phases.
Environmental Site Assessment (ESA)	Phase I ESA: A review of available information to determine the likelihood of actual or potential environmental impacts. Phase II ESA: An intrusive investigation involving sampling and testing to better define the nature and scope of any environmental impacts.
Explosives	Gunpowder, blasting powder, nitroglycerine, gun-cotton, dynamite, blasting gelatine, gelignite, fulminates of mercury or of other metals and every other substance made, manufactured or used with a view to producing a violent effect by explosion.
Humidify cell test (HCT)	A type of kinetic test in which a small sample (about 1 kg) is placed in an enclosed chamber in a laboratory, alternating cycles of moist and dry air is constantly pumped through the chamber, and once a week the sample is rinsed with water; chemical analysis of rinse water yields concentrations of elements and other parameters used to calculate reaction rates.

Term	Definition
Kinetic test	A geochemical procedure for characterizing the chemical status of a sample through time during continued exposure to a known set of environmental conditions, such as a humidity cell.
Landfarm	Infrastructure that uses biological and physical processes to treat (remove contaminants) contaminated soil.
Land owner	The responsible authority with administrative control and ownership of a type of land classified as crown land, commissioners land or Inuit Owned Land. Crown land is land belonging to Her Majesty or in respect of which Government has the power of disposition. In Nunavut, this power rests with Indigenous and Northern Affairs Canada (INAC). Commissions land is land belonging to the Commissioner for the Government of Nunavut; which typically is land within an established municipality administered by a Municipal Corporation and/or the Department of Community Government and Services (CGS) Inuit Owned Land (IOL) are those lands vested in the Designated Inuit Organization (DIO) pursuant the Nunavut Agreement. For this Project the DIO is the Kitikmeot Inuit Association.
Land use permit	For Crown land a Class A Permit or Class B Permit as required by the Territorial Land Use Regulations SOR/82-217, s.1; SOR/88-169, s.2 administered by INAC Lands Department. For IOLs- Land Use Licence I, II or III or Commercial Lease I, II, III as defined by the DIO. For Commissioners land - a permit or lease as required by the Municipal Land Administration Policy.
Leachate	Water or other liquid that has washed (leached) from a solid material, such as a layer of soil or water; leachate may contain contaminants.
Long-term active care	A post-closure mine site is in long-term active care when sustained monitoring and maintenance of active facilities is required (e.g., for more than 25 years). This should be avoided whenever possible.
Metal leaching (ML)	The release of a metal from its solid-phase mineral into mine site drainage; described by concentrations in static tests and by metal release rates obtained from kinetic tests.
Long-term passive care	Occasional monitoring, coupled with infrequent maintenance or repairs that takes place following reclamation in the post closure phase of the mine site. Many mine sites require ongoing passive care, which can be an acceptable practice.
Ore	Rock that is considered economic according to the parameters used in the ore reserve estimate. Ore will be processed at the mineral processing plant after it is mined from the Project underground mine and open pits.
Overburden	A general term referring to soil and broken rock, lying above ore and mine rock, that can usually be removed without blasting; at mines in soft sedimentary rock like coal, overburden can be synonymous with mine rock.
Potentially acid generating (PAG)	Rock with an NP/AP ratio less than 2 as determined by static tests, as defined by MEND (2009). PAG rock can also be operationally defined based on the results of static testing such as ABA and NAG testing.
Passive treatment	Treatment technologies that can function with little or no maintenance over long periods of time (e.g., use of wetlands).
Permafrost	Bedrock or soil that maintains a temperature at or below 0º C for a continuous period of two years or more.
Progressive reclamation	Selected closure activities that can be taken at advanced mineral exploration and mine sites before permanent closure. Progressive reclamation takes advantage of cost and operating efficiencies by using the resources available from an operation to reduce the overall reclamation costs incurred. It enhances environmental protection and shortens the timeframe for achieving the closure objectives.
Proponent	Applicant for, or a holder of, a water licence and/or land use permit.

Term	Definition
Reclamation	The process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
Reclamation research	Literature reviews, laboratory or pilot-scale tests, engineering studies, and other methods of resolving uncertainties. Proponents conduct reclamation research to answer questions pertaining to environmental risks; the design of reclamation research plans aims to provide data and information which will reduce uncertainties for closure options, selected closure activities, and/or closure criteria.
Remediation	The removal, reduction, or neutralization of substances, wastes, or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.
Risk assessment	Analysis of potential threats and options for mitigation for a given site, component, or condition. Risk assessments consider factors such as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.
Salvageable Materials	Decommissioned materials which can be sold or reused elsewhere.
Security deposit	Funds held by the Crown (Aboriginal Affairs and Northern Development Canada) or land owner that can be used in the case of abandonment of an undertaking to reclaim the site or carry out any ongoing measures that may remain to be taken after the abandonment of the undertaking.
Selected closure activity	The closure and reclamation activity chosen from the closure options for each Project component.
Stakeholders	Industry, federal agencies, the territorial government, Aboriginal organizations/governments, land owners, affected communities, proponent, and other parties with an interest in the Project.
Tailings	Material rejected from a mill after the recoverable valuable minerals have been extracted.
Talik	Unfrozen ground surrounded by permafrost.
Traditional Knowledge	Accumulative, collective body of knowledge, experience, and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual, and political change.
Type A Water Licence	A Type A Water Licence is required if the use is of a type set out in column 2 of Schedule 2 and satisfies a criterion set out in column 5 in respect of an undertaking set out in column 1 of the Nunavut Water Regulations SOR/2013-69 *(Note: despite definition of Type B water licence item a), a Type A licence is the appropriate licence for a use of waters if a Type A licence is required for another use of waters, or a deposit of waste, in respect of the same undertaking.)*
Type B Water Licence	A Type B water licence is required if the use is of a type set out in column 2 of Schedule 2 and satisfies a criterion set out in column 4 in respect of an undertaking set out in column 1 of the Nunavut Water Regulations SOR/2013-69, or The use satisfies the criterion set out in paragraph 4(1)(a) but does not satisfy one or more criterion set out in paragraphs 4(1)(b) to (d)
Waste rock	All unprocessed rock materials that a mining operation produces.

Appendix D. List of Acronyms, Abbreviations, Units, and Symbols

List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AANDC	Aboriginal Affairs and Northern Development Canada (formerly known as Indian and Northern Affairs Canada, now known as Indigenous and Northern Affairs Canada)
ABA	Acid-Base Accounting
AEMP	Aquatic Effects Monitoring Plan
ARD	Acid Rock Drainage
ANFO	Ammonium Nitrate/Fuel Oil
AWAR	All-weather Access Road
BIF	Banded Iron Formation
CCME	Canadian Council for Ministers of the Environment
CLARC	Community Lands and Resources Committee
CLEY	Culture, Language, Elders and Youth
CGS	Community and Government Services
CP	Collection Pond
ICRP	Interim Closure and Reclamation Plan
DFO	Fisheries and Oceans Canada
FCRP	Final Closure and Reclamation Plan
FEIS	Final Environmental Impact Statement
Golder	Golder Associates Ltd.
GN	Government of Nunavut
HADD	Harmful Alteration Disruption or Destruction
HTO	Hunters and Trappers Organizations
INAC	Indigenous and Northern Affairs Canada
ISQG	Interim Sediment Quality Guidelines
KIA	Kitikmeot Inuit Association
LSA	Local Study Area
ML	Metal Leaching
MMER	Metal Mining Effluent Regulations
MVLWB	Mackenzie Valley Land and Water Board
NIRB	Nunavut Impact Review Board
NPAG	non-Potentially Acid Generating
NRC	Natural Resources Canada
NWB	Nunavut Water Board
PAG	Potentially Acid-Generating
Project	Back River Project
PEL	Probable Effect Level
RSA	Regional Study Area
SFE	Shake Flask Extraction
TDS	Total Dissolved Solids
TF	Tailings Facility

TSF	Tailings Storage Facility
TSS	Total Suspended Solids
WRSA	Waste Rock Storage Area
WTP	Water Treatment Plant

List of Units and Symbols

Units/Symbols	Definition
%	percent
°	degrees
°C	degrees Celsius
bgs	below ground surface
dBA	Decibels (A-weighted)
g	gram
H:V	horizontal to vertical
ha	hectares
km	kilometre
km/h	kilometres per hour
km^2	square kilometres
m	metres
m^2	square metres
m^3	cubic metres
m^3/day	cubic metres per day
masl	metres above sea level
mm	millimetres
mm/year	millimetres per year
mg/L	milligrams per litre
mg/kg	milligrams per kilogram
m^3	cubic metres
Mm^3	million cubic metres
Mt	million tonnes
t	tonnes
tpd	tonnes per day

Appendix E. Lessons Learned from Other Projects

Development	Activity Which Led to Lesson	Lesson Learned	Adaptive Management Result
Ekati, Diavik, and Snap Lake mine sites	Open pit mining	Wildlife injury or mortality may occur by entering the open pit	A rock berm(s) will be constructed around the open pits
Ekati, Diavik, and Snap Lake mine sites	Mine site infrastructure	Wildlife injury or mortality may occur by entering mine site facilities	Disturbed areas will be re-contoured at closure reducing hazards to wildlife
Meadowbank mine site	Landfill located within WRSA	Birds or wildlife injury or mortality by entering the landfill	Landfill will be located within the WRSAs and covered at closure reducing hazards to birds and wildlife

Appendix F. Ongoing Reclamation Studies

To address the uncertainties in the closure and remediation activities, the below ongoing reclamation studies will be considered. These studies will be reviewed on an ongoing bases and considered during Operations to allow potential modifications to be incorporated during progressive and final reclamation. The Table 1 below presents an update to the proposed reclamation studies presented in the Feasibility Study.

Table 1. Updated Proposed Reclamation Studies

Study No.	Description
1	Additional geochemical characterization to characterize the ARD/ML potential of the pit walls that will be above the final pit lake elevations.
2	Confirm cover designs are appropriate through further modelling and monitoring of temperatures, completion of energy balance on model inputs during freeze-back period, permafrost aggregation, active layer thaw in waste rock storage areas, etc.
3	Acquire an estimate of creep parameters for WRSA foundations and perform long-term deformation modelling for physical stability closure objective.
4	Develop an improved estimate of the runoff coefficient from the WRSAs. This will have an impact operationally on pump and pond sizing, and during closure on treatment volume and environmental loading estimates.
5	Collect additional water quality data during the winter to permit less conservative water quality modelling assumptions during the under-ice period.
6	Identify opportunities to locate the saline reservoir outside of Umwelt Lake in order to avoid an MMER Schedule II application for Umwelt Lake. Possible opportunities include building a ring dike containment structure or transporting the connate water to Bathurst Inlet and discharging via a diffuser.
7	Revegetation research focused on large footprint areas which will significantly improve long-term stability and usability of the site follow Closure.

Appendix G. Interim Closure Cost Estimate

SUMMARY OF COSTS

CAPITAL COSTS	COMPONENT NAME	COST	TOTAL LIABILITY
OPEN PIT	Umwelt	$35,187	$35,187
	Llama	$18,846	$18,846
	Echo	$18,625	$18,625
	Goose Main	$53,390	$53,390
QUARRY (under OPEN PIT TAB estimate)	Airstrip Quarry	$3,800	$3,800
UNDERGROUND MINE	Umwelt	$310,467	$310,467
	Llama	$89,886	$89,886
	Goose Main	$157,010	$157,010
	Echo	$96,206	$96,206
TAILINGS FACILITIES	TSF	$186,719	$186,719
ROCK PILE	Umwelt, Llama, Echo and TSF	$14,400,000	$14,400,000
BUILDINGS AND EQUIPMENT		$1,939,431	$1,939,431
CHEMICALS AND CONTAMINATED SOIL MANAGEMENT		$1,385,630	$1,385,630
SURFACE AND GROUNDWATER MANAGEMENT		$158,608	$158,608
INTERIM CARE AND MAINTENANCE		$592,201	$592,201
	SUBTOTAL: Capital Costs	**$19,446,004**	**$19,446,004**
	PERCENT OF SUBTOTAL		**100%**

INDIRECT COSTS		COST	TOTAL LIABILITY
MOBILIZATION/DEMOBILIZATION		$4,165,738	$4,165,738
POST-CLOSURE MONITORING AND MAINTENANCE		$5,565,651	$5,565,651
ENGINEERING	5%	$972,300	$972,300
PROJECT MANAGEMENT	5%	$972,300	$972,300
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	1%	$194,460	$194,460
BONDING/INSURANCE	1%	$194,460	$194,460
CONTINGENCY	20%	$3,889,201	$3,889,201
MARKET PRICE FACTOR ADJUSTMENT	0%	$0	$0
	SUBTOTAL: Indirect Costs	**$15,954,111**	**$15,954,111**

TOTAL COSTS	**$35,400,115**	**$35,400,115**

5 **Open Pit Name:** **Umwelt** **Pit #** **1** **1**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	Total Cost
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs	Assumed	each	4	Sabina	$75.00	$300	$300
Berm at crest	Estimated for continous berm with 1m diameter boulders, no spacing between boulders - 0.52 m3/m - assumed 50 % done during Operations	m3	426	RB1H	$17.05	$7,263	$7,263
Block roads	Temporary gate installation to allow water monitoring. It includes decommissioning of gate when no longer required. Exposed area after gate has been decommissioned will be blocked with boulders (exposed area along with block of roads with boulders included in berm cost above)	allow	1	Sabina	$5,000.00	$5,000	$5,000
Other				#N/A	$0.00	$0	$0
STABILITY STUDY							
Conduct stability and setback study		allow	1	Sabina	$10,000.00	$10,000	$10,000
STABILIZE SLOPES							
Off-load crest, soil A		m3		#N/A	$0.00	$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0	$0
Buttress slope		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
COVER/CONTOUR SLOPES							
Place fill, soil A		m3		#N/A	$0.00	$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Vegetate slopes		ha		#N/A	$0.00	$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
CONSTRUCT DIVERSION DITCHES							
Excavate ditches -soil		m3		#N/A	$0.00	$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0	$0
CONSTRUCT SPILLWAY							
Excavate channel	200 m long, 6 m wide and 1 m deep	m3	1,200	SB1L	$4.30	$5,160	$5,160
Concrete		m3		#N/A	$0.00	$0	$0
Rip rap		m3	400	RR1L	$13.50	$5,400	$5,400
Other	Geotextile	m2	600	GSTL	$3.44	$2,064	$2,064
RECLAIM QUARRIES							
Contour slopes		m3		#N/A	$0.00	$0	$0
Place overburden		m3		#N/A	$0.00	$0	$0
Vegetate		m3		#N/A	$0.00	$0	$0
FLOOD PIT-Capital							
Remove stationary equipment (sump pumps) and Pipeline	Umwelt TF will be used to store tailings in Years 2 to 6 and it will then passively flood with site runoff and direct precipitation through the remainder of Operations and into the Closure Phase. Pipelines/pumps will be relocated for use in the other active pits (Llama Pit and Goose Main Pit) and removed to closure landfill once they are no longer needed. Dispose of fuel in diesel day tank and oil from pump and landfill cleaned pump. Remove of pumps and pipelines will occur during Operations.	m		#N/A	$0.00	$0	$0
Remove dewatering pipeline		m		#N/A	$0.00	$0	$0
Remove power lines		each		#N/A	$0.00	$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0	$0
Supply/install pump station		each		#N/A	$0.00	$0	$0
Supply/install piping system		m		#N/A	$0.00	$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0	$0
FLOOD PIT-Annual Cost							
Operate pumps (power)		m3		#N/A	$0.00	$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
					Annual pumping costs	$0	
Number of years of pump flooding	passive pit flooding	years	0				
					Total pumping costs	$0	$0
					Total	$35,187	$35,187
					% of Total		100%

Open Pit Name:		Llama			Pit #	2	2
ACTIVITY/MATERIAL	**Notes**	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**Total Cost**
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs	Assumed	each	4	Sabina	$75.00	$300	$300
Berm at crest	Estimated for berm with 1m diameter boulders, no spacing between boulders - 0.52 m3/m; berm needed only where pit edge will not abute the final flooded lake footprint.	m3	208	RB1H	$17.05	$3,546	$3,546
Block roads	Temporary gate installation to allow water monitoring. It includes decommissioning of gate when no longer required. Exposed area after gate has been decommissioned will be blocked with boulders (exposed area along with block of roads with boulders included in berm cost above)	allow	1	Sabina	$5,000.00	$5,000	$5,000
Other				#N/A	$0.00	$0	$0
STABILITY STUDY							
Conduct stability and setback study		allow	1	Sabina	$10,000.00	$10,000	$10,000
STABILIZE SLOPES							
Off-load crest, soil A		m3		#N/A	$0.00	$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0	$0
Buttress slope		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
COVER/CONTOUR SLOPES							
Place fill, soil A		m3		#N/A	$0.00	$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Vegetate slopes		ha		#N/A	$0.00	$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
CONSTRUCT DIVERSION DITCHES							
Excavate ditches -soil		m3		#N/A	$0.00	$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0	$0
CONSTRUCT SPILLWAY							
Excavate channel	Spillway not required; will follow natural drainage to Umwelt Lake.	m3		#N/A	$0.00	$0	$0
Concrete		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
RECLAIM QUARRIES							
Contour slopes		m3		#N/A	$0.00	$0	$0
Place overburden		m3		#N/A	$0.00	$0	$0
Vegetate		m3		#N/A	$0.00	$0	$0
FLOOD PIT-Captital							
Remove stationary equipment (sump pumps) and Pipeline	In Year 6, the exhausted Llama Pit will be converted to a water reservoir. Water from the Saline Water Pond will be pumped into Llama Reservoir between Year 4 and Year 9. The Llama Reservoir will continue to passively flood with site runoff and direct precipitation through the remainder of Operations and into the Closure Phase. Pipelines/pumps will be relocated for use in the other active pits (Goose Main Pit and Echo Pit) and removed to closure landfill once they are no longer needed. Dispose of fuel in diesel day tank and oil from pump and landfill cleaned pump. Remove of pumps and pipelines will occur during Operations.	m		#N/A	$0.00	$0	$0
Remove dewatering pipeline		m		#N/A	$0.00	$0	$0
Remove power lines		each		#N/A	$0.00	$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0	$0
Supply/install pump station		each		#N/A	$0.00	$0	$0
Supply/install piping system		m		#N/A	$0.00	$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0	$0
FLOOD PIT-Annual Cost							
Operate pumps (power)		m3		#N/A	$0.00	$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
					Annual pumping costs	$0	
Number of years of pump flooding	passive pit flooding	years	0				
					Total pumping costs	$0	$0
					Total	$18,846	$18,846
					% of Total		100%

Open Pit Name:	Echo				Pit #	3	3
ACTIVITY/MATERIAL	**Notes**	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**Total Cost**
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs	Assumed	each	4	Sabina	$75.00	$300	$300
Berm at crest	Estimated for continous berm with 1m diameter boulders, no spacing between boulders - 0.52 m3/m - assumed 50 % done during Operations	m3	195	RB1H	$17.05	$3,325	$3,325
Block roads	Temporary gate installation to allow water monitoring. It includes decommissioning of gate when no longer required. Exposed area after gate has been decommissioned will be blocked with boulders (exposed area along with block of roads with boulders included in berm cost above)	allow	1	Sabina	$5,000.00	$5,000	$5,000
Other				#N/A	$0.00	$0	$0
STABILITY STUDY							
Conduct stability and setback study		allow	1	Sabina	$10,000.00	$10,000	$10,000
STABILIZE SLOPES							
Off-load crest, soil A		m3		#N/A	$0.00	$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0	$0
Buttress slope		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
COVER/CONTOUR SLOPES							
Place fill, soil A		m3		#N/A	$0.00	$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Vegetate slopes		ha		#N/A	$0.00	$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
CONSTRUCT DIVERSION DITCHES							
Excavate ditches -soil		m3		#N/A	$0.00	$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0	$0
CONSTRUCT SPILLWAY							
Excavate channel	Spillway not required; will follow natural drainage to Goose Lake.	m3		#N/A	$0.00	$0	$0
Concrete		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
RECLAIM QUARRIES							
Contour slopes		m3		#N/A	$0.00	$0	$0
Place overburden		m3		#N/A	$0.00	$0	$0
Vegetate		m3		#N/A	$0.00	$0	$0
FLOOD PIT-Captital							
Remove stationary equipment (sump pumps) and Pipeline	Once mining of the Echo Pit concludes in Year 5, dewatering will continue until Year 9 (i.e., the end of Echo U/G mining) as the two mines will be connected. Starting in Year 10, Echo Pit will passively flood with site runoff and direct precipitation through the remainder of Operations and into the Closure Phase. Pipelines/pumps will be removed to closure landfill. Dispose of fuel in diesel day tank and oil from pump and landfill cleaned pump. Remove of pumps and pipeline will occur during Operations.	m		#N/A	$0.00	$0	$0
Remove dewatering pipeline		m		#N/A	$0.00	$0	$0
Remove power lines		each		#N/A	$0.00	$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0	$0
Supply/install pump station		each		#N/A	$0.00	$0	$0
Supply/install piping system		m		#N/A	$0.00	$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0	$0
FLOOD PIT-Annual Cost							
Operate pumps (power)		m3		#N/A	$0.00	$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
					Annual pumping costs	$0	
Number of years of pump flooding	passive pit flooding	years	0				
					Total pumping costs	$0	$0
					Total	$18,625	$18,625
					% of Total		100%

Open Pit Name:	Goose Main				Pit #	4	4
ACTIVITY/MATERIAL	**Notes**	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**Total Cost**
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs	Assumed	each	4	Sabina	$75.00	$300	$300
Berm at crest	Estimated for continous berm with 1m diameter boulders, no spacing between boulders - 0.52 m3/m - assumed 50 % done during Operations	m3	494	RB1H	$17.05	$8,423	$8,423
Block roads	Temporary gate installation to allow water monitoring. It includes decommissioning of gate when no longer required. Exposed area after gate has been decommissioned will be blocked with boulders (exposed area along with block of roads with boulders included in berm cost above)	allow	1	Sabina	$5,000.00	$5,000	$5,000
Other				#N/A	$0.00	$0	$0
STABILITY STUDY							
Conduct stability and setback study		allow	1	Sabina	$10,000.00	$10,000	$10,000
STABILIZE SLOPES							
Off-load crest, soil A		m3		#N/A	$0.00	$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0	$0
Buttress slope		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
COVER/CONTOUR SLOPES							
Place fill, soil A		m3		#N/A	$0.00	$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Vegetate slopes		ha		#N/A	$0.00	$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
CONSTRUCT DIVERSION DITCHES							
Excavate ditches -soil		m3		#N/A	$0.00	$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0	$0
CONSTRUCT SPILLWAY							
Excavate channel	100 m long, 6 m wide and 1 m deep	m3	600	SB1L	$4.30	$2,580	$2,580
Concrete		m3		#N/A	$0.00	$0	$0
Rip rap		m3	200	RR1L	$13.50	$2,700	$2,700
Other	Geotextile	m2	300	GSTL	$3.44	$1,032	$1,032
RECLAIM QUARRIES							
Contour slopes		m3		#N/A	$0.00	$0	$0
Place overburden		m3		#N/A	$0.00	$0	$0
Vegetate		m3		#N/A	$0.00	$0	$0
FLOOD PIT-Captital							
Remove stationary equipment (sump pumps) and Pipeline	At closure, pump will be at top of TF and pipeline leads to WTP. Remove pipeline to closure landfill; dispose of fuel in diesel day tank and oil from pump and landfill cleaned pump.	m	4,325	Sabina	$5.40	$23,355	$23,355
Remove dewatering pipeline		m		#N/A	$0.00	$0	$0
Remove power lines		each		#N/A	$0.00	$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0	$0
Supply/install pump station		each		#N/A	$0.00	$0	$0
Supply/install piping system		m		#N/A	$0.00	$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0	$0
FLOOD PIT-Annual Cost							
Operate pumps (power)		m3		#N/A	$0.00	$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
					Annual pumping costs	$0	
Number of years of pump flooding	passive pit flooding	years	0				
					Total pumping costs	$0	$0
					Total	$53,390	$53,390
					% of Total		100%

Quarry Name:	Airstrip Quarry				Quarry #	1	1
ACTIVITY/MATERIAL	**Notes**	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**Total Cost**
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs		each		#N/A	$0.00	$0	$0
Berm at crest		m3		RB1H	$17.05	$0	$0
Block roads		allow		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
STABILITY STUDY							
Conduct stability and setback study	Not required for quarry	allow		#N/A	$0.00	$0	$0
STABILIZE SLOPES							
Off-load crest, soil A		m3		#N/A	$0.00	$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0	$0
Buttress slope		m3		#N/A	$0.00	$0	$0
Other	Backhoe to pull down loose rock on bedrock backslope - assumed	hrs	20	exc-sL	$190.00	$3,800	$3,800
COVER/CONTOUR SLOPES							
Place fill, soil A		m3		#N/A	$0.00	$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0	$0
Rip rap		m3		#N/A	$0.00	$0	$0
Vegetate slopes	Allow to revegetate naturally	ha		#N/A	$0.00	$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
CONSTRUCT DIVERSION DITCHES							
Excavate ditches -soil		m3		#N/A	$0.00	$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0	$0
CONSTRUCT SPILLWAY							
Excavate channel	Not required. Quarry base will be graded for sheet drainage.	m3		SB1L	$4.30	$0	$0
Concrete		m3		#N/A	$0.00	$0	$0
Rip rap		m3		RR1L	$13.50	$0	$0
Other		m2		GSTL	$3.44	$0	$0
RECLAIM QUARRIES							
Contour slopes	Quarry will not be flooded - development will occur below water level and the areas will be contoured to drain positively	m3		#N/A	$0.00	$0	$0
Place overburden		m3		#N/A	$0.00	$0	$0
Vegetate		m3		#N/A	$0.00	$0	$0
FLOOD PIT-Capital							
Remove stationary equipment (sump pumps) and Pipeline		m		#N/A	$0.00	$0	$0
Remove dewatering pipeline		m		#N/A	$0.00	$0	$0
Remove power lines		each		#N/A	$0.00	$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0	$0
Supply/install pump station		each		#N/A	$0.00	$0	$0
Supply/install piping system		m		#N/A	$0.00	$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0	$0
FLOOD PIT-Annual Cost							
Operate pumps (power)		m3		#N/A	$0.00	$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
					Annual pumping costs	$0	
Number of years of pump flooding	No flooding	years	0				
					Total pumping costs	$0	$0
					Total	$3,800	$3,800
					% of Total		100%

4 **Underground Mine Name Umwelt** **UG Mine # 1** **1**

ACTIVITY/MATERIAL	Notes	Unit	Qty	Cost Code	Unit Cost	Cost	Total Cost
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs		each		#N/A	$0.00	$0	$0
Block roads		m3		#N/A	$0.00	$0	$0
Berm		m3		#N/A	$0.00	$0	$0
Backfill Portal (NPAG waste rock plug)	At least 5 m deep into 5x4.5m portal and slope at least 2:1 outside of portal	m3	150	PORL	$18.80	$2,820	$2,820
Backfill portal #2		m3		#N/A	$0.00	$0	$0
Cap raise # 1	Concrete plug over 4m-dia. vent raise	m3	28	SRH	$2,132.00	$60,336	$60,336
Cap raise #2	Concrete plug over 4m-dia. vent raise	m3	28	SRH	$2,132.00	$60,336	$60,336
Cap shaft #1	Concrete plug over 4m-dia. fresh air vent	m3	28	SRH	$2,132.00	$60,336	$60,336
Cap shaft #2		m3		#N/A	$0.00	$0	$0
Backfill adits		m3		#N/A	$0.00	$0	$0
Backfill open stope		m3		#N/A	$0.00	$0	$0
Concrete cap over open stope		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
REMOVE HAZARDOUS MATERIALS							
Remove hazardous materials, U/G labor	Two shifts with loader, incl. operator and fuel	manhour	20	load-s	$175.00	$3,500	$3,500
Remove/decontam. stationary & elect. equip		mandays		#N/A	$0.00	$0	$0
Remove/decontam. mobile equipment		each		#N/A	$0.00	$0	$0
Remove misc. haz. mat & explosives	Dispose of up to 1 week's inventory of explosives	kg	100	Sabina	$50.00	$5,000	$5,000
Decommission Pipeline	Clean Umwelt UG to SWP pipeline, decommission and landfill	m	1,200	Sabina	$4.90	$5,880	$5,880
INSTALL BULKHEADS							
Bulkheads to control water flow		each		#N/A	$0.00	$0	$0
Grout bulkhead		m3		#N/A	$0.00	$0	$0
FLOOD MINE							
Supply/install pump	UG mine is expected to be flooded in Year 10 and active flooding will take about a year, relocation of pipelines and flooding will occur as part of operations but cost is provided as a conservative approach	each		#N/A	$0.00	$0	$0
Relocate Pipeline	Move SWP-Llama UG pipeline discharge to Umwelt UG	m	800	Sabina	$4.73	$3,780	$3,780
Operate pumps to flood workings		m3	763,134	Sabina	$0.13	$98,480	$98,480
Decommission of pipeline				#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM							
Excavate/install sumps		m2		#N/A	$0.00	$0	$0
Install pumping wells		m3		#N/A	$0.00	$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0	$0
SPECIALIZED ITEMS							
Install water quality monitoring pipes		each		#N/A	$0.00	$0	$0
Install permanent pumping system		each		#N/A	$0.00	$0	$0
Assess underground stability	Rock mechanics inspection before closure	each	1	Sabina	$10,000.00	$10,000	$10,000
					Total	$310,467	$310,467
					% of Total		100%

Underground Mine Name **Llama** **UG Mine # 2** **2**

ACTIVITY/MATERIAL	Notes	Unit	Qty	Cost Code	Unit Cost	Cost	Total Cost
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs		each		#N/A	$0.00	$0	$0
Block roads		m3		#N/A	$0.00	$0	$0
Berm		m3		#N/A	$0.00	$0	$0
Backfill Portal (NPAG waste rock plug)	At least 5 m deep into 5x4.5m portal and slope at least 2:1 outside of portal	m3	150	PORL	$18.80	$2,820	$2,820
Backfill portal #2		m3		#N/A	$0.00	$0	$0
Cap raise # 1	Concrete plug over 4m-dia. vent raise	LS	28	SRH	$2,132.00	$60,336	$60,336
Cap raise #2		m3		#N/A	$0.00	$0	$0
Cap shaft #1		m3		#N/A	$0.00	$0	$0
Cap shaft #2		m3		#N/A	$0.00	$0	$0
Backfill adits		m3		#N/A	$0.00	$0	$0
Backfill open stope		m3		#N/A	$0.00	$0	$0
Concrete cap over open stope		m3		#N/A	$0.00	$0	$0
Other							
REMOVE HAZARDOUS MATERIALS							
Remove hazardous materials, U/G labor	Two shifts with loader, incl. operator and fuel	manhour	20	load-s	$175.00	$3,500	$3,500
Remove/decontam. stationary & elect. equip		mandays		#N/A	$0.00	$0	$0
Remove/decontam. mobile equipment		each		#N/A	$0.00	$0	$0
Remove misc. haz. mat & explosives	Mining will cease before closure	kg		#N/A	$0.00	$0	$0
Decommission Pipeline	Clean Llama UG to SWP pipeline, decommission and landfill	m	2700	Sabina	$4.90	$13,230	$13,230
INSTALL BULKHEADS							
Bulkheads to control water flow		each		#N/A	$0.00	$0	$0
Grout bulkhead		m3		#N/A	$0.00	$0	$0
FLOOD MINE							
Supply/install pump	UG mine is expected to be flooded in Year 5 and active flooding will take about a year, relocation of pipelines and flooding will occur as part of operations	each		#N/A	$0.00	$0	$0
Supply/install piping system		m		#N/A	$0.00	$0	$0
Operate pumps to flood workings		m3		#N/A	$0.00	$0	$0
Decommission of pipelines				#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM							
Excavate/install sumps		m2		#N/A	$0.00	$0	$0
Install pumping wells		m3		#N/A	$0.00	$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0	$0
SPECIALIZED ITEMS							
Install water quality monitoring pipes		each		#N/A	$0.00	$0	$0
Install permanent pumping system		each		#N/A	$0.00	$0	$0
Assess underground stability	Rock mechanics inspection before closure	each	1	Sabina	$10,000.00	$10,000	$10,000
					Total	$89,886	$89,886
					% of Total		100%

Underground Mine Name	Goose Main	UG Mine # 3	3

ACTIVITY/MATERIAL	Notes	Unit	Qty	Cost Code	Unit Cost	Cost	Total Cost
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs		each		#N/A	$0.00	$0	$0
Block roads		m3		#N/A	$0.00	$0	$0
Berm		m3		#N/A	$0.00	$0	$0
Backfill Portal (NPAG waste rock plug)	At least 5 m deep into 5x4.5m portal and slope at least 2:1 outside of portal	m3	150	PORL	$18.80	$2,820	$2,820
Backfill portal #2		m3		#N/A	$0.00	$0	$0
Cap raise # 1	Concrete plug over 4m-dia. vent raise	LS	28	SRH	$2,132.00	$60,336	$60,336
Cap raise #2		m3		#N/A	$0.00	$0	$0
Cap shaft #1		m3		#N/A	$0.00	$0	$0
Cap shaft #2		m3		#N/A	$0.00	$0	$0
Backfill adits		m3		#N/A	$0.00	$0	$0
Backfill open stope		m3		#N/A	$0.00	$0	$0
Concrete cap over open stope		m3		#N/A	$0.00	$0	$0
Other							
REMOVE HAZARDOUS MATERIALS							
Remove hazardous materials, U/G labor	Two shifts with loader, incl. operator and fuel	manhour	20	load-s	$175.00	$3,500	$3,500
Remove/decontam. stationary & elect. equip		mandays		#N/A	$0.00	$0	$0
Remove/decontam. mobile equipment		each		#N/A	$0.00	$0	$0
Remove misc. haz. mat & explosives	Mining will cease before closure	kg		#N/A	$0.00	$0	$0
Decommission WTP - Goose Lake Pipeline	In Water Management tab	m		#N/A	$0.00	$0	$0
INSTALL BULKHEADS							
Bulkheads to control water flow		each		#N/A	$0.00	$0	$0
Grout bulkhead		m3		#N/A	$0.00	$0	$0
FLOOD MINE							
Supply/install pump	UG mine is expected to be flooded in Year 10 and active flooding will take about a year, relocation of pipelines and flooding will occur as progressive reclamation but cost is provided as a conservative approach	each		#N/A	$0.00	$0	$0
Supply/install piping system	Adjust pipe line to route to Goose UG in Year 10	m	4,500	Sabina	$3.91	$17,575	$17,575
Operate pumps to flood workings		m3	391,630	Sabina	$0.13	$52,259	$52,259
Decommission SWP to Goose UG pipeline		m	10,800	#N/A	$1.90	$20,520	$20,520
Other				#N/A	$0.00	$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM							
Excavate/install sumps		m2		#N/A	$0.00	$0	$0
Install pumping wells		m3		#N/A	$0.00	$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0	$0
SPECIALIZED ITEMS							
Install water quality monitoring pipes		each		#N/A	$0.00	$0	$0
Install permanent pumping system		each		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
					Total	$157,010	$157,010
					% of Total		100%

Underground Mine Name	Echo	UG Mine # 4	4

ACTIVITY/MATERIAL	Notes	Unit	Qty	Cost Code	Unit Cost	Cost	Total Cost
CONTROL ACCESS							
Fence		m		#N/A	$0.00	$0	$0
Signs		each		#N/A	$0.00	$0	$0
Block roads		m3		#N/A	$0.00	$0	$0
Berm		m3		#N/A	$0.00	$0	$0
Backfill Portal (NPAG waste rock plug)	At least 5 m deep into 5x4.5m portal and slope at least 2:1 outside of portal	m3	150	PORL	$18.80	$2,820	$2,820
Backfill portal #2		m3		#N/A	$0.00	$0	$0
Cap raise # 1	Concrete plug over 4m-dia. vent raise	LS	28	SRH	$2,132.00	$60,336	$60,336
Cap raise #2		m3		#N/A	$0.00	$0	$0
Cap shaft #1		m3		#N/A	$0.00	$0	$0
Cap shaft #2		m3		#N/A	$0.00	$0	$0
Backfill adits		m3		#N/A	$0.00	$0	$0
Backfill open stope		m3	3,550	Sabina	$6.00	$21,300	$21,300
Concrete cap over open stope		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
REMOVE HAZARDOUS MATERIALS							
Remove hazardous materials, U/G labor	One shift with loader, incl. operator and fuel	manhour	10	load-s	$175.00	$1,750	$1,750
Remove/decontam. stationary & elect. equip		mandays		#N/A	$0.00	$0	$0
Remove/decontam. mobile equipment		each		#N/A	$0.00	$0	$0
Remove misc. haz. mat & explosives	Mining will cease before closure	kg		#N/A	$0.00	$0	$0
Decommission Pipeline		m		#N/A	$0.00	$0	$0
INSTALL BULKHEADS							
Bulkheads to control water flow		each		#N/A	$0.00	$0	$0
Grout bulkhead		m3		#N/A	$0.00	$0	$0
FLOOD MINE							
Supply/install pump	Passive flooding of Echo UG in Year 10, complete flooding is expected to occur within a few months.	each		#N/A	$0.00	$0	$0
Supply/install piping system		each		#N/A	$0.00	$0	$0
Operate pumps to flood workings		m3		#N/A	$0.00	$0	$0
Decommission				#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM							
Excavate/install sumps		m2		#N/A	$0.00	$0	$0
Install pumping wells		m3		#N/A	$0.00	$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0	$0
SPECIALIZED ITEMS							
Install water quality monitoring pipes		each		#N/A	$0.00	$0	$0
Install permanent pumping system		each		#N/A	$0.00	$0	$0
Assess underground stability	Rock mechanics inspection before closure	each	1	Sabina	$10,000.00	$10,000	$10,000
					Total	$96,206	$96,206
					% of Total		100%

1 **Tailings Impoundment Name:** **TSF** **Pond # 1**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Total Cost
CONTROL ACCESS									
Fence		m		#N/A	$0.00	$0		$0	$0
Signs		each		#N/A	$0.00	$0		$0	$0
Berm		m3		#N/A	$0.00	$0		$0	$0
Block roads		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
STABILIZE EMBANKMENT(S)									
Toe buttress, drainage layer		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, bulk fill		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Raise crest		m3		#N/A	$0.00	$0		$0	$0
Flatten slopes		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
COVER TAILINGS									
Grade/shape tailings surface		m3		#N/A	$0.00	$0		$0	$0
Liner bedding		m3		#N/A	$0.00	$0		$0	$0
Subgrade preparation - compact		m2		#N/A	$0.00	$0		$0	$0
Supply geotextile/geosynthetic		m2		#N/A	$0.00	$0		$0	$0
Install geotextile/geosynthetic		m2		#N/A	$0.00	$0		$0	$0
Soil cover		m3		#N/A	$0.00	$0		$0	$0
Rock cover	Included in the quantity for waste rock pile cover (5m of NPAG). See Rock Pile tab.	m3		#N/A	$0.00	$0		$0	$0
Vegetate		m2		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
BURY PAG ROCK									
Relocate PAG rock		m3		#N/A	$0.00	$0		$0	$0
Place cover over PAG rock		m3		#N/A	$0.00	$0		$0	$0
Raise crest of dam		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
STABILIZE DECANT SYSTEM									
Excavate and replace		m3		#N/A	$0.00	$0		$0	$0
Plug/backfill with concrete or clay		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
REMOVE TAILINGS DISCHARGE									
Cyclones		m3		#N/A	$0.00	$0		$0	$0
Pipe		m3		#N/A	$0.00	$0		$0	$0
Remove reclaim barge		allow		#N/A	$0.00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0.00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0		$0	$0
Rip rap in channel base (liner)		m2		#N/A	$0.00	$0		$0	$0
FLOOD TAILINGS									
Doze tailings to final contour		m3		#N/A	$0.00	$0		$0	$0
Raise crest of dam		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
UPGRADE SPILLWAY									
Excavate channel on TSF	Breach west end of dam to existing drainage reporting to Goose Main Pit; 100 m channel.	m3	11,000.0	Sabina	$7.30	$80,300		$0	$80,300
Excavate channel, soil		m3		#N/A	$0.00	$0		$0	$0
Concrete		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3	7,000	RR1L	$13.50	$94,500		$0	$94,500
Other	Geotextile	m2	2,860	GSTL	$3.44	$9,838		$0	$9,838
CONSTRUCT SEEPAGE COLLECTION POND									
Excavate seepage collection pond		m3		#N/A	$0.00	$0		$0	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0		$0	$0
Vegetate spread material		ha		#N/A	$0.00	$0		$0	$0
Bedding layer		m3		#N/A	$0.00	$0		$0	$0
Supply geomembrane		m2		#N/A	$0.00	$0		$0	$0
Install geomembrane		m2		#N/A	$0.00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0		$0	$0
Breach seepage diversion berm		m3	285	Sabina	$7.30	$2,081		$0	$2,081
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m3		#N/A	$0.00	$0		$0	$0
Install pumping wells		m3		#N/A	$0.00	$0		$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0		$0	$0
SPECIALIZED ITEMS									
Install permanent instrumentation, supply & technican		each		#N/A	$0.00	$0		$0	$0
Install permanent instrumentation, drilling		each		#N/A	$0.00	$0			$0
TREAT SEEPAGE - see "Water Management" and "Water Treatment"									
TREAT SUPERNATANT									
Pump water (to pit, U/G)		m3		#N/A	$0.00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0		$0	$0
Supply reagents		tonne		#N/A	$0.00	$0		$0	$0
				Annual treatment costs		$0			
Number of years of treatment		years	0						
				Total treatment costs		$0			$0
					Total	$186,719		$0	$186,719
					% of Total			0%	100%

* for construction of passive treatment system refer to "Water Management"

1 **Rock Pile Name:** **Umwelt, Llama, Echo and TSF**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	Total Cost
STABILIZE SLOPES							
Flatten slopes with dozer		m3		#N/A	$0.00	$0	$0
Flatten "bubble dump" areas		m3		#N/A	$0.00	$0	$0
Divert runon, ditch mat'l A		m3		#N/A	$0.00	$0	$0
Divert runon, ditch mat'l B		m3		#N/A	$0.00	$0	$0
Toe buttress, drain mat'l		m3		#N/A	$0.00	$0	$0
Toe buttress, fill mat'l A		m3		#N/A	$0.00	$0	$0
Toe buttress, fill mat'l B		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
COVER ROCK PILE							
Subgrade preparation - doze surface		m3		#N/A	$0.00	$0	$0
Soil cover - excavate,haul,spread&compact		m3		#N/A	$0.00	$0	$0
Rock cover - excavate,haul & spread	Cover 4 rock piles: Umwelt, Llama, Echo and TSF. Note all WRSAs will be covered progressively by direct hauling NPAG during mining; however Sabina is assuming that 48 ha will still require covering at Closure.	m3	2,400,000	Sabina	$6.00	$14,400,000	$14,400,000
Excavate downslope drainage channel & chute		m3		#N/A	$0.00	$0	$0
Rip rap drainage channel and chute		m3		#N/A	$0.00	$0	$0
Vegetate		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
VERY LOW PERMEABILITY COVER (in addition to above)							
Liner subgrade preparation - compact		m2		#N/A	$0.00	$0	$0
Supply geomembrame		m2		#N/A	$0.00	$0	$0
Install geomembrane		m2		#N/A	$0.00	$0	$0
Protective cover - excavate,haul,spread&compact		m3		#N/A	$0.00	$0	$0
Vegetate		ha		#N/A	$0.00	$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0.00	$0	$0
CONSTRUCT DIVERSION DITCHES							
Excavate ditches -soil		m3		#N/A	$0.00	$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0	$0
CONSTRUCT SEEPAGE COLLECTION POND							
Excavate seepage collection pond	See Water Management tab for berm breaching	m3		#N/A	$0.00	$0	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0	$0
Vegetate spread material		ha		#N/A	$0.00	$0	$0
Bedding layer		m3		#N/A	$0.00	$0	$0
Supply geomembrane		m2		#N/A	$0.00	$0	$0
Install geomembrane		m2		#N/A	$0.00	$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM							
Excavate/install sumps		m3		#N/A	$0.00	$0	$0
Install pumping wells		m3		#N/A	$0.00	$0	$0
Install pumps/pipelines/power supply		allow		#N/A	$0.00	$0	$0
RELOCATE DUMPS							
Load, haul, dump or doze		m3		#N/A	$0.00	$0	$0
Add lime		tonne		#N/A	$0.00	$0	$0
Contour reclaimed area		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
SPECIALIZED ITEMS							
Install ground temperature monitoring cable	Will be installed during Operations to meet opertional monitoring commitments	each		#N/A	$0.00	$0	$0
Install permanent instrumentation, drilling		each		#N/A	$0.00	$0	$0
TREAT ROCK PILE SEEPAGE - see "Water Management"							
HEAP LEACH SEEPAGE TREATMENT - Cyanide Detox							
Cyanide destruction water treatment pumping		m3		#N/A	$0.00	$0	$0
Reagents		tonnes		#N/A	$0.00	$0	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0.00	$0	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0	$0
					Annual treatment costs	$0	
Number of years of treatment		years	0				
					Total treatment costs	$0	$0
HEAP LEACH SEEPAGE TREATMENT - ARD/ML							
Upgrade/modify pumping system - report to WTP		allow		#N/A	$0.00	$0	$0
					Total	$14,400,000	$14,400,000
					% of Total		100%

* For construction of passive treatment system refer to "Water Management".

1 **Building / Equip Name:** **Bldg / Equip #: 1**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	Total Cost
DISPOSE MOBILE EQUIPMENT							
Decontaminate and ship off-site		allow		#N/A	$0.00	$0	$0
Decontaminate and dispose on-site	Drive or transport to landfill; drain fluids; NPAG cover cost below	allow	1	Sabina	$20,000.00	$20,000	$20,000
Other				#N/A	$0.00	$0	$0
REMOVE BUILDINGS - see note below							
Accomodation Complex	Goose Admin: Kitchen/camp. Landfill building materials and pad	m2	1,980	BRS1L	$45.00	$89,100	$89,100
Process Facilities		m2	6,464	BRS1H	$65.00	$420,160	$420,160
Crusher		m2	1,630	BRS1H	$65.00	$105,950	$105,950
Power plant		m2	2,040	BRS1H	$65.00	$132,600	$132,600
Emergency power plant		m2	300	BRS1H	$65.00	$19,500	$19,500
Truck Shop/Office	Goose Admin building	m2	2,349	BRS1L	$45.00	$105,725	$105,725
Cold storage	Goose Admin building	m2	840	BRS1L	$45.00	$37,800	$37,800
Storage Facilites	Waste oil storage Goose Site	Lot	1	Sabina	$43,333.33	$43,333	$43,333
Storage Facility	Goose frieght storage	Lot	1	Sabina	$19,250.00	$19,250	$19,250
Water and Wastewater Treatment Facilities	Water treatment plant Goose Building	m2	647	BRS1L	$45.00	$29,115	$29,115
Sewage Treatment Plant	Remove hazardous materials and dispose of at licensed facility, landfill building materials	Lot	1	Sabina	$11,550.00	$11,550	$11,550
Fuel Tanks	Fuel storage and distribution Goose facility	Lot	1	Sabina	$154,000.00	$154,000	$154,000
Offices, Repair, Lab, Warehouse	MLA infrastructure Port Office	Units	5	Sabina	$2,340.00	$11,700	$11,700
Pipeline	MLA Infrastructure	m	10,000	Sabina	$3.90	$39,000	$39,000
Warehouse, Shops and Others	MLA Infrastructure. Includes: Incinerator and waste management, Warehouses, Genset, Maitenance shop, water storage, WTP/STP, camp/office, freaight storage area, waste area, fuel storage. Cost includes grade and contour pads, disposal at designated areas, remove hazard material when applicable.	LS	1	Sabina	$308,683.33	$308,683	$308,683
Freshwater intakes	pipes will be capped at substrate and left in place.	m2		#N/A	$0.00	$0	$0
Reclaim pumps		m2		#N/A	$0.00	$0	$0
Outfall & Diffuser		m2		#N/A	$0.00	$0	$0
Airstrip lighting, navigation, electrician		manhours	20	elecH	$95.00	$1,900	$1,900
Airstrip lighting, navigation, mechanical		manhours	20	mechH	$72.85	$1,457	$1,457
Break foundation slabs		m2		#N/A	$0.00	$0	$0
Consolidate & dump boneyard debris		m3		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
LANDFILL FOR DEMOLITION WASTE							
Place rock cover		m3	25,000	Sabina	$6.00	$150,000	$150,000
Place soil cover		m3		#N/A	$0.00	$0	$0
Vegetate		ha		#N/A	$0.00	$0	$0
GRADE AND CONTOUR PADS							
Accomodation Complex	Goose Admin: Kitchen/camp. no concrete foundation	ha	0.2	SCFYL	$4,300.00	$860	$860
Process Facilities	concrete foundation demolished to ground level	m2	6,464	BRCS	$6.00	$38,784	$38,784
Crusher	concrete foundation demolished to ground level	m2	1,630	BRCS	$6.00	$9,780	$9,780
Power plant	no concrete foundation	ha	0.3	SCFYL	$4,300.00	$1,290	$1,290
Emergency power plant	no concrete foundation	ha	0.10	SCFYL	$4,300.00	$430	$430
Truck Shop/Office	concrete foundation demolished to ground level	m2	2,349	BRCS	$6.00	$14,097	$14,097
Cold storage	no concrete foundation	ha	0.1	SCFYL	$4,300.00	$430	$430
Water and Wastewater Treatment Facilities	no concrete foundation	ha	0.1	SCFYL	$4,300.00	$430	$430
Sewage Treatment Plant	no concrete foundation	m2	33	BRCS	$6.00	$198	$198
Fuel Tanks	Fuel storage and distribution Goose facility; no concrete foundation	ha	2.2	SCFYL	$4,300.00	$9,460	$9,460
Warehouse, Shops and Other	MLA, includes all storage/laydown, Fual Tanks and camp area	ha	20	SCFYL	$4,300.00	$86,000	$86,000
Place rock cover		m3		#N/A	$0.00	$0	$0
Vegetate		ha		#N/A	$0.00	$0	$0
PUNCTURE LINED SUMPS							
Puncture liner and place soil cover		m3		#N/A	$0.00	$0	$0
RECLAIM ROADS							
Restore drainage, remove culverts haul road	Restore drainage including culverts; Roads will remain intact to facilitate long-term access.	m3	1,488	Sabina	$11.00	$16,368	$16,368
Remove bridges		each		#N/A	$0.00	$0	$0
Scarify and install water breaks		ha		#N/A	$0.00	$0	$0
Restore drainage airstrip		m3	1,020	Sabina	$12.00	$12,240	$12,240
Scarify laydown areas		ha		#N/A	$0.00	$0	$0
Scarify Winter Ice Roads	Fill sections on land - 8 km x 10 m wide = 8.0 ha	ha	8	SCFYH	$6,030.00	$48,240	$48,240
Vegetate		ha		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
SPECIALIZED ITEMS							
Dispose of misc. debris and laydown area refuse				#N/A	$0.00	$0	$0
					Total	$1,939,431	$1,939,431
					% of Total		100%

1 **Chemicals/Soil Area Name:**

Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	Total Cost
HAZARDOUS MATERIALS AUDIT							
Hazardous materials audit		mandays		#N/A	$0.00	$0	$0
Phase 1 audit		each	1	CS1L	$7,500.00	$7,500	$7,500
Phase 2 audit		each	1	CS2L	$50,000.00	$50,000	$50,000
BUILDING DECONTAMINATION & CONSOLIDATION OF HAZARDOUS MATERIALS							
Environmental technician/coordinator		mandays		#N/A	$0.00	$0	$0
Decontaminate: oil, fuel		mandays		#N/A	$0.00	$0	$0
Decontaminate maintenance shop		mandays		#N/A	$0.00	$0	$0
Decontaminate power plant		mandays		#N/A	$0.00	$0	$0
Decontaminate bulk fuel storage		mandays		#N/A	$0.00	$0	$0
Decontaminate ANFO plant		mandays		#N/A	$0.00	$0	$0
Decontaminate offices/warehouse/accom		mandays		#N/A	$0.00	$0	$0
Removal of asbestos siding on buildings		m2		#N/A	$0.00	$0	$0
Removal of friable asbestos on equipment		m2		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
HAZARDOUS MATERIALS REMOVAL							
Waste oils	Consume in a waste oil burner on-site	litre	10,000	ORL	$0.43	$4,300	$4,300
Waste fuel	Consume on-site to power an incinerator, or in a waste oil burner	litre	250,000	ORL	$0.43	$107,500	$107,500
Waste batteries	Assumed 10 20-kg batteries generated in the final year of closure	kg	200	PCRH	$2.50	$500	$500
Assay & environmental lab reagents		kg	500	PCRH	$2.50	$1,250	$1,250
Machine shop paints, solvents etc		litre	200	PCRH	$2.50	$500	$500
Glycol		litre	5,000	PCRH	$2.50	$12,500	$12,500
Process reagents		kg	130,000	PCRH	$2.50	$325,000	$325,000
WTP sludge from Water Treatment	Assumes off-site disposal for 7 years of treatment. If sludge passes leach tests, will consider on-site disposal.	kg	21,000	PCRH	$2.50	$52,500	$52,500
Nuclear sources		allow		#N/A	$0.00	$0	$0
Mobile Equipment	Remove hazardous waste from equipment not being salvaged, clean, landfill equipment	each	41	Sabina	$2,280.00	$93,480	$93,480
HAZARDOUS MATERIALS							
Transportation to disposal facility	Included in hazardous materials removal cost	allow		#N/A	$0.00	$0	$0
Disposal fees	Included in hazardous materials removal cost	allow		#N/A	$0.00	$0	$0
Other				#N/A	$0.00	$0	$0
CONTAMINATED SOILS							
Contam. soil investigation - Phase 1		each		#N/A	$0.00	$0	$0
Contam. soil investigation - Phase 2		LS	1	Sabina	$50,000.00	$50,000	$50,000
CONTAMINATED SOIL REMOVAL							
Excavate and transport to onsite facility		m3	10,000	SB1H	$5.90	$59,000	$59,000
Manage hydrocarbon remediation at facility	Operate landfarms	m3	10,000	CSRL	$47.00	$470,000	$470,000
Reagents/stabilizing agent		m2		#N/A	$0.00	$0	$0
Excavate and transport to offsite facility		m3		#N/A	$0.00	$0	$0
Contour decontaminated area	Decommission 2 landfarms and confirmation soil sampling; estimated 6,000m3 at each of Goose and MLA sites.	m3	12,000	SB1L	$4.30	$51,600	$51,600
CONTAMINATED SOIL VERY LOW PERMEABILITY COVER							
Supply geomembrame, HDPE, ES3, GCL		m2		#N/A	$0.00	$0	$0
Upper and lower bedding layers		m3		#N/A	$0.00	$0	$0
Install geomembrane, HDPE, ES3, GCL		m2		#N/A	$0.00	$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0	$0
Vegetate		m2		#N/A	$0.00	$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0.00	$0	$0
Other	Construct landfarm 1 at Goose, 1 at MLA	allow	2	Sabina	$50,000.00	$100,000	$100,000
OTHER							
				#N/A	$0.00	$0	$0
					Total	$1,385,630	$1,385,630
					% of Total		100%

1 **Capital Expenditures and Short Term Water Treatment identified in 'Instructions' worksheet**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
BREACH DYKE EMBANKMENT						
Breach Llama Lake Diversion Berms		m3	665	#N/A	$7.30	$4,855
Breach Llama WRSA Diversion Berm		m3	95	#N/A	$7.30	$694
Breach Llama WRSA Containment Dam		m3	95	#N/A	$7.30	$694
Breach Primary Pond Containment Dam	Breach in Year 2 once Umwelt Pit mining compelte and starts as Umwelt Tailings Facility (TF); Primary Pond will water will gravity flow directly.	m3		#N/A	$0.00	$0
Breach Umwelt WRSA Containment Dam		m3	120	#N/A	$7.30	$876
Breach Umwelt WRSA Diversion Berm		m3	95	#N/A	$7.30	$694
Breach Echo WRSA Containment Dam		m3	190	#N/A	$7.30	$1,387
Breach Echo Diversion Berm (East and West)		m3	190	#N/A	$7.30	$1,387
Breach Echo WRSA Diversion Berm		m3	95	#N/A	$7.30	$694
Breach East Echo Containment Dam		m3	95	#N/A	$7.30	$694
Breach Goose Main Diversion Berm		m3	95	#N/A	$7.30	$694
Breach Ore Stockpile Diversion Berm and Containment Dam		m3	215	#N/A	$7.30	$1,570
Breach SWP Diversion Berms and Containment Dams		m3	430	#N/A	$8.00	$3,440
Remove Liner from all berms	Remove liner from all berms	m2	30,700	Sabina	$0.70	$21,490
Contour water intake area		m3		#N/A	$0.00	$0
STABILIZE SEDIMENT PONDS/WATER MANAGEMENT PONDS						
Place soil cover		m3		#N/A	$0.00	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0
Vegetate spread material		ha		#N/A	$0.00	$0
Rip rap in channel base		each		#N/A	$0.00	$0
REDIRECT RUNOFF/CONSTRUCT DIVERSION DITCHES						
Excavate ditches -soil		m3		#N/A	$0.00	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0
Stabilize side slopes		m3		#N/A	$0.00	$0
Rip rap in channel base		m3		#N/A	$0.00	$0
BREACH DITCHES						
Excavate breaches		m3		#N/A	$0.00	$0
Install flow dissipation		m3		#N/A	$0.00	$0
Vegetate remainder of ditch		m2		#N/A	$0.00	$0
DECOMISSION FRESH WATER SUPPLY						
Breach embankment		m3		#N/A	$0.00	$0
Remove pump		LS		#N/A	$0.00	$0
Remove pipelines		m		#N/A	$0.00	$0
DECOMISSION WATER RECLAIM BARGE						
Decomission reclaim barge from Goose Main TF		LS	1	Sabina	$10,000.00	$10,000
WATER CONTROL IN RECLAMATION QUARRY						
Install pumping system		LS		#N/A	$0.00	$0
Remove pumping system		m		#N/A	$0.00	$0
REMOVE PIPELINES						
Decommission Llama pump and pipeline		m	700	Sabina	$6.36	$4,450
Decomission WTP-Goose Lake pipeline		m	1,140	Sabina	$5.42	$6,175
Remove Umwelt Pond pump and pipeline		m	950	Sabina	$6.10	$5,795
Remove Primary Pond pump and pipeline		m	7,250	Sabina	$3.49	$25,325
Remove Echo WRSA Pond pump and pipeline		m	2,400	Sabina	$3.10	$7,440
Remove Echo NCW pond pump and pipeline		m	220	Sabina	$8.28	$1,822
Remove Ore Stockpile pump and pipline		m	4,550	Sabina	$3.10	$14,105
Decommission WTP pump and pipeline		m	7,520	Sabina	$4.60	$34,581
Decommission WTP		LS	1	Sabina	$9,750.00	$9,750
Concrete plug deep pipes		m3		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
GROUNDWATER COLLECTION SYSTEM						
Excavate/install sumps		m3		#N/A	$0.00	$0
Install pumping wells		m3		#N/A	$0.00	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0
CONSTRUCT CONTAMINATED WATER STORAGE POND						
Excavate pond		m3		#N/A	$0.00	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0
Vegetate spread material		ha		#N/A	$0.00	$0
Bedding layer		m3		#N/A	$0.00	$0
Supply geomembrane		m2		#N/A	$0.00	$0
Install geomembrane		m2		#N/A	$0.00	$0
Erosion protection layer		m3		#N/A	$0.00	$0
CONSTRUCT PASSIVE TREATMENT SYSTEM (e.g. Constructed Wetland)						
Construct access roads		km		#N/A	$0.00	$0
Install HDPE piping system from collection pond		m		#N/A	$0.00	$0
Inter-cell flow structures		allow		#N/A	$0.00	$0
Install liners		m2		#N/A	$0.00	$0
Install growth media		m3		#N/A	$0.00	$0
Wetland vegetation		ha		#N/A	$0.00	$0
CONSTRUCT WATER TREATMENT PLANT						
Build treatment plant	Treatment Plant will be constructed as part of operations	LS		#N/A	$0.00	$0
Build sludge containment facility		LS		#N/A	$0.00	$0
					Total	**$158,608**

For details of long-term/post-closure water treatment see "WATER TREATMENT" Worksheet"; costs included in this tab.

1 **Post Closure Water Treatment - Identified as long term/post-closure in 'Instructions' worksheet**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
ADDITION OF REAGENTS TO WTP						
H2O2		kg		#N/A	$0.00	$0
lime		kg		#N/A	$0.00	$0
ferric sulphate		kg		#N/A	$0.00	$0
ferrous sulphate		kg		#N/A	$0.00	$0
flocculents		kg		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
LABOUR AND SUPPLIES						
Annual fuel		litres		#N/A	$0.00	$0
Annual power		kW-h		#N/A	$0.00	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0.00	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0
Misc. supplies, hoses, tools		allow		#N/A	$0.00	$0
Communications		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
WATER MANAGEMENT						
Pump from Goose Main TF to WTP	7.5 Mm3 for treatment in total	m3	1,071,429	POCL	$0.12	$128,571
Treat water from Goose Main TF in WTP		m3	1,071,429	TPOL	$0.35	$375,000
Pump from WTP recirc. into Goose Main TF		m3	1,071,429	POCL	$0.12	$128,571
WTP WATER SAMPLING AND ANALYSES						
Sampling equipment		allow		#N/A	$0.00	$0
Analyses		allow		#N/A	$0.00	$0
Shipping to laboratory		allow		#N/A	$0.00	$0
Reporting		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SITE ACCESS						
Road maintenance (incl. snow removal)		allow		#N/A	$0.00	$0
Winter road tariff		allow		#N/A	$0.00	$0
Truck rental		allow		#N/A	$0.00	$0
Air support		allow		#N/A	$0.00	$0
				Annual water treatment costs		$632,143
Number of years of water treatment		years	7			
					Total	$4,425,002

1 **Interim Care and Maintenance**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
INTERIM CARE & MAINTENANCE						
Camp operation	Caretaker and summer personnel	mandays	306	Sabina	110	$33,660
On-site staff	Caretaker and summer personnel	manhours	1,440	ENVCO	74.16	$106,790
extra personnel		manmonths		#N/A	0	$0
-electrician		manmonths		#N/A	0	$0
-mechanic		manmonths		#N/A	0	$0
annual fuel	Fuel for vehicles; fuel for pumping included in water treatment cost	litre	5,000	FCDH	1.39	$6,950
misc. supplies		allow	1	Sabina	20000	$20,000
pick-up truck		each		#N/A	0	$0
small dozer		allow		#N/A	0	$0
small excavator		allow		#N/A	0	$0
snow machine		allow		#N/A	0	$0
communications		allow		#N/A	0	$0
SNP/AEMP water sampling & reporting	Sampling and lab costs	each	1	WSH	10000	$10,000
geotechnical assessment	Annual geotechnical inspection	each	1	RPTH	20000	$20,000
interim water treatment	Captured under Water Treatment	each	1	#N/A	0	$0
other		each		#N/A	0	$0
			Annual	Interim C&M Cost		$197,400
Number of years of ICM		years	3		**Total**	$592,201

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7 Years (Year 11 to 17)

ACTIVITY/MATERIAL - WATER TREATMENT	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
MONITORING & INSPECTIONS						
Total geotechnical inspections (1 yearly)		year	-	#N/A	$0.00	$0
Waste Rock Piles		year		#N/A	$0.00	$0
Pit Walls		year		#N/A	$0.00	$0
WR GTC Monitoring		year		#N/A	$0.00	$0
Survey inspection		each		#N/A	$0.00	$0
Regulatory costs		year		#N/A	$0.00	$0
Site water monitoring		each		#N/A	$0.00	$0
- Active closure and flooding		each		#N/A	$0.00	$0
- Post pit flooding		each		#N/A	$0.00	$0
Wildlife Effects Monitoring Program (WEMP)		year		#N/A	$0.00	$0
Terrestrial Animal Monitoring		year		#N/A	$0.00	$0
Vegetation Monitoring		each		#N/A	$0.00	$0
Maintain gravel road surface		each		#N/A	$0.00	$0
Maintain airstrip surface		each		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
COVER MAINTENANCE						
Repair erosion - infill gullies		allow		#N/A	$0.00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0
Remove problem vegetation		allow		#N/A	$0.00	$0
Repair animal damage		allow		#N/A	$0.00	$0
Repair/upgrade access controls		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SPILLWAY MAINTENANCE						
Repair erosion		m3		#N/A	$0.00	$0
Clear spillway		each		#N/A	$0.00	$0
CWTS MAINTENANCE						
Maintain flow, restore vegetation		allow		#N/A	$0.00	$0
POST-CLOSURE WATER TREATMENT						
Annual water treatment cost, from "Water Treatment"	Treatment for Closure Period (7 years)	LS	1	#N/A	$632,143	$632,143
Subtotal, Annual post-closure costs						$632,143
Discount rate for calculation of net present value of post-closure cost, %				3.00%		
Number of years of post-closure activity				7	years	
Present Value of payment stream						$3,938,430
Combined NPV of payment stream						**$5,565,651**

8 Years (Year 11 to 18)

ACTIVITY/MATERIAL - GEOTECHNICAL INSPECTIONS OF TSF	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
MONITORING & INSPECTIONS						
Total geotechnical inspections (1 yearly)	Annual inspection of the TSF from Closure until embankment breaching in Year 18 (8 years).	year	1	RPTH	$20,000.00	$20,000
Waste Rock Piles		year		#N/A	$0.00	$0
Pit Walls		year		#N/A	$0.00	$0
WR GTC Monitoring		year		#N/A	$0.00	$0
Survey inspection		each		#N/A	$0.00	$0
Regulatory costs		year		#N/A	$0.00	$0
Site water monitoring		each		#N/A	$0.00	$0
- Active closure and flooding		each		#N/A	$0.00	$0
- Post pit flooding		each		#N/A	$0.00	$0
Wildlife Effects Monitoring Program (WEMP)		year		#N/A	$0.00	$0
Terrestrial Animal Monitoring		year		#N/A	$0.00	$0
Vegetation Monitoring		each		#N/A	$0.00	$0
Maintain gravel road surface		each		#N/A	$0.00	$0
Maintain airstrip surface		each		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
COVER MAINTENANCE						
Repair erosion - infill gullies		allow		#N/A	$0.00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0
Remove problem vegetation		allow		#N/A	$0.00	$0
Repair animal damage		allow		#N/A	$0.00	$0
Repair/upgrade access controls		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SPILLWAY MAINTENANCE						
Repair erosion		m3		#N/A	$0.00	$0
Clear spillway		each		#N/A	$0.00	$0
CWTS MAINTENANCE						
Maintain flow, restore vegetation		allow		#N/A	$0.00	$0
POST-CLOSURE WATER TREATMENT						
Annual water treatment cost, from "Water Treatment"		LS		#N/A	$0.00	$0
Subtotal, Annual post-closure costs						$20,000
Discount rate for calculation of net present value of post-closure cost, %				3.00%		
Number of years of post-closure activity				8	years	
Present Value of payment stream						$140,394

						10 Years (Year 11 to 20)
ACTIVITY/MATERIAL - WEMP and TERRESTRIAL	**Notes**	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Total Cost**
MONITORING & INSPECTIONS						
Total geotechnical inspections (1 yearly)		year		#N/A	$0.00	$0
Waste Rock Piles		year		#N/A	$0.00	$0
Pit Walls		year		#N/A	$0.00	$0
WR GTC Monitoring		year		#N/A	$0.00	$0
Survey inspection		each		#N/A	$0.00	$0
Regulatory costs*		year		#N/A	$0.00	$0
Site water monitoring		each		#N/A	$0.00	$0
- Active closure and flooding		each		#N/A	$0.00	$0
- Post pit flooding		each		#N/A	$0.00	$0
Wildlife Effects Monitoring Program (WEMP)	Aquatics - Non-contact water basins (10 years)	year	1	Sabina	$4,800.00	$4,800
Terrestrial Animal Monitoring	Terrestrial Animal Monitoring (10 years)	year	1	Sabina	$24,000.00	$24,000
Vegetation Monitoring		each		#N/A	$0.00	$0
Maintain gravel road surface		year		#N/A	$0.00	$0
Maintain airstrip surface		year		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
COVER MAINTENANCE						
Repair erosion - infill gullies		allow		#N/A	$0.00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0
Remove problem vegetation		allow		#N/A	$0.00	$0
Repair animal damage		allow		#N/A	$0.00	$0
Repair/upgrade access controls		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SPILLWAY MAINTENANCE						
Repair erosion		m3		#N/A	$0.00	$0
Clear spillway		each		#N/A	$0.00	$0
CWTS MAINTENANCE						
Maintain flow, restore vegetation		allow		#N/A	$0.00	$0
POST-CLOSURE WATER TREATMENT						
Annual water treatment cost, from "Water Treatment"		LS		#N/A	$0.00	$0
Subtotal, Annual post-closure costs						$28,800
Discount rate for calculation of net present value of post-closure cost, %				3.00%		
Number of years of post-closure activity				10	years	
Present Value of payment stream						$245,670

13 Years (Year 11 to 23)

ACTIVITY/MATERIAL - Monitoring & Maintenance	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
MONITORING & INSPECTIONS						
Total geotechnical inspections (1 yearly)		year		#N/A	$0.00	$0
Waste Rock Piles	Annual inspection of WR piles from closure to post-closure (13 years)	year	1	Sabina	$8,300.00	$8,300
Pit Walls	Annual inspection of pit walls from closure to post-closure (13 years)	year	1	Sabina	$4,000.00	$4,000
WR GTC Monitoring	Umwelt, Llama, and TSF WRSA ground temp cable annual monitoring. No GTCs at Echo WRSA (13 years)	year	1	Sabina	$14,400.00	$14,400
Survey inspection		each		#N/A	$0.00	$0
Regulatory costs	annual reporting, management plans, progress reports (13 years)	year	1	Sabina	$25,000.00	$25,000
Site water monitoring	All pits and WR piles closure and post closure monitoring (13 years)	year	1	Sabina	$9,120.00	$9,120
- Active closure and flooding		each		#N/A	$0.00	$0
- Post pit flooding		each		#N/A	$0.00	$0
Wildlife Effects Monitoring Program (WEMP)		year		#N/A	$0.00	$0
Terrestrial Animal Monitoring		year		#N/A	$0.00	$0
Vegetation Monitoring		each		#N/A	$0.00	$0
Maintain gravel road surface	maintence from closure to post-closure (13 years)	year	1	Sabina	$13,650.00	$13,650
Maintain airstrip surface	maintence from closure to post-closure (13 years)	year	1	Sabina	$3,900.00	$3,900
Other				#N/A	$0.00	$0
COVER MAINTENANCE						
Repair erosion - infill gullies		allow		#N/A	$0.00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0
Remove problem vegetation		allow		#N/A	$0.00	$0
Repair animal damage		allow		#N/A	$0.00	$0
Repair/upgrade access controls		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SPILLWAY MAINTENANCE						
Repair erosion		m3		#N/A	$0.00	$0
Clear spillway		each		#N/A	$0.00	$0
CWTS MAINTENANCE						
Maintain flow, restore vegetation		allow		#N/A	$0.00	$0
POST-CLOSURE WATER TREATMENT						
Annual water treatment cost, from "Water Treatment"		LS		#N/A	$0.00	$0
Subtotal, Annual post-closure costs						$78,370
Discount rate for calculation of net present value of post-closure cost, %				3.00%		
Number of years of post-closure activity				13	years	
Present Value of payment stream						$833,461

Beyond Post Closure (Long Term 1 to 5, 7, 10, 15, 25)

ACTIVITY/MATERIAL - Long Term Monitoring	Notes	Units	Quantity	Cost Code	Unit Cost	Total Cost
MONITORING & INSPECTIONS						
General Water Sampling and Stability Monitoring	long term general monitoring	year	1	Sabina	$40,000.00	$40,000
Waste Rock Piles		year		#N/A	$0.00	$0
Pit Walls		year		#N/A	$0.00	$0
WR GTC Monitoring		year		#N/A	$0.00	$0
Survey inspection		each		#N/A	$0.00	$0
Regulatory costs		each	1	RPTH	$20,000.00	$20,000
Site water monitoring		year		#N/A	$0.00	$0
- Active closure and flooding		each		#N/A	$0.00	$0
- Post pit flooding		each		#N/A	$0.00	$0
Wildlife Effects Monitoring Program (WEMP)		year		#N/A	$0.00	$0
Terrestrial Animal Monitoring		year		#N/A	$0.00	$0
Vegetation Monitoring		each		#N/A	$0.00	$0
Maintain gravel road surface		year		#N/A	$0.00	$0
Maintain airstrip surface		year		#N/A	$0.00	$0
Other - Site Access	Float plane access	each	1	MWH	$9,100.00	$9,100
COVER MAINTENANCE						
Repair erosion - infill gullies		allow		#N/A	$0.00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0
Remove problem vegetation		allow		#N/A	$0.00	$0
Repair animal damage		allow		#N/A	$0.00	$0
Repair/upgrade access controls		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SPILLWAY MAINTENANCE						
Repair erosion		m3		#N/A	$0.00	$0
Clear spillway		each		#N/A	$0.00	$0
CWTS MAINTENANCE						
Maintain flow, restore vegetation		allow		#N/A	$0.00	$0
POST-CLOSURE WATER TREATMENT						
Annual water treatment cost, from "Water Treatment"		LS		#N/A	$0.00	$0
Subtotal, Annual post-closure costs						$69,100
Discount rate for calculation of net present value of post-closure cost, %				3.00%		
Number of years of post-closure activity			See Long Term	years		
Present Value of payment stream						$407,696

Annual Discout Rate:			3%		
Project Phase	Project Year	Closure Year	Post-Closure Monitoring Year	Long Term Monitoring (GTCs, physical, water)	
				One Time Cost	Yearly Total NPV
Operations	1				$0
	2				$0
	3				$0
	4				$0
	5				$0
	6				$0
	7				$0
	8				$0
	9				$0
	10				$0
Active Closure	11	1			$0
	12	2			$0
Passive Closure	13	3			$0
	14	4			$0
	15	5			$0
	16	6			$0
	17	7			$0
	18	8			$0
Post Closure	19	9	1	$69,100	$54,548
	20	10	2	$69,100	$52,959
	21	11	3	$69,100	$51,417
	22	12	4	$69,100	$49,919
	23	13	5	$69,100	$48,465
Beyond Post Closure	24	14	6		$0
	25	15	7	$69,100	$45,683
	26	16	8		$0
	27	17	9		$0
	28	18	10	$69,100	$41,807
	29	19	11		$0
	30	20	12		$0
	31	21	13		$0
	32	22	14		$0
	33	23	15	$69,100	$36,063
	34	24	16		$0
	35	25	17		$0
	36	26	18		$0
	37	27	19		$0
	38	28	20		$0
	39	29	21		$0
	40	30	22		$0
	41	31	23		$0
	42	32	24		$0
	43	33	25	$69,100	$26,834
			Net Present Value:		**$407,696**

1 Mobilization/Demobilization:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MOBILIZE HEAVY EQUIPMENT	Assumes mining equipment on abandoned mine site is operable and available.					
Light duty vehicles	Purchase pickups and Vans	each		#N/A	0	$0
Telehandlers	Purchase (standby)	each		#N/A	0	$0
Excavators	Purchase (320 Ex)	each		#N/A	0	$0
Dump trucks	Purchase 30T	each		#N/A	0	$0
Dozers	Purchase (D6T)	each		#N/A	0	$0
Grader	Purchase (140M)	each		#N/A	0	$0
Demolition shears	For a 320 Exc	each		#N/A	0	$0
Crane	Purchase	each		#N/A	0	$0
Loader	Purchase (966 Loader)	each		#N/A	0	$0
Manlifts	Ourchase (standby)	each		#N/A	0	$0
Small Equipment		LS		#N/A	0	$0
Compactor		each		#N/A	0	$0
MOBILIZE MISC. EQUIPMENT	Assumes mining equipment on abandoned mine site is operable and available.					
Pump shipping		each		#N/A	0	$0
Pipe shipping		m		#N/A	0	$0
Minor tools and equipment		allow		#N/A	0	$0
Truck tires		allow		#N/A	0	$0
Other				#N/A	0	$0
MOBILIZE CAMP						
Build 20 Person Camp	Goose Closure Camp	LS	1	Sabina	$19,250.00	$19,250
Build 20 Person Power Plant	Goose Closure Camp	LS	1	Sabina	$19,250.00	$19,250
Reclamation activities		allow		#N/A	0	$0
Long term reclamation activities (eg pump flooding)		allow		#N/A	0	$0
WORKER ACCOMODATIONS						
Camp operation		mandays	12,000	Sabina	$110.00	$1,320,000
Reclamation activities		manmonths		#N/A	0	$0
Long term reclamation activities (eg pump flooding)		manmonths		#N/A	0	$0
MOBILIZE FUEL						
Fuel freight - reclamation activities		litre		#N/A	0	$0
Fuel freight - long term reclamation activities		litre		#N/A	0	$0
Oil & Other		litre		#N/A	0	$0
Fuel freight accomodations		litre		#N/A	0	$0
GENERAL CONSTRUCTION INDIRECT						
Tooling, consumables, office & safety supplies	covered in Summary tab indirects	mandays		#N/A	0	$0
DEMOBILIZE HEAVY EQUIPMENT						
Excavators		km		#N/A	0	$0
Dump trucks		km		#N/A	0	$0
Dozers		km		#N/A	0	$0
Demolition shears		km		#N/A	0	$0
Crane		km		#N/A	0	$0
Loader		km		#N/A	0	$0
Compactor		each		#N/A	0	$0
Light duty vehicles		km		#N/A	0	$0
Other		km		#N/A	0	$0
DEMOBILIZE CAMP						
Food and Freight		kg	27,600	Sabina	$12.00	$331,200
Freight		Lot	1	Sabina	$500,000.00	$500,000
Mobilization		tonnes	500	Sabina	$1,500.00	$750,000
MOBILZE & DEMOBILIZE WORKERS						
Crew travel time - inbound & outbound	16 manhours per rotation	manhours	6,864	lab-sh	$49.60	$340,454
Crew transportation - inbound & outbound	28 day rotations - 12,000 man days	each	429	Sabina	$572.46	$245,583
WINTER ROAD						
Construction and operation	Assumes construction and maintance of 2-160 km winter ice roads; once during Active Closure and once in approximately Year 18.	km	320	WRCL	$2,000.00	$640,000
Limited winter use		km		#N/A	0	$0
Winter road tarriff		km		#N/A	0	$0
					Total	**$4,165,738**

Sabina Closure Component Estimating

							Labour					Const Equip Use		Other		Total	
Code	Description	NOTES	EQUIPMENT NUMBER	ESTIMATE SOURCE DOCUMENT	Qty	Unit of Measure	Unit Man-hrs	Prod Fact	Total Man-hrs	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost
	Open Pit Closure																
	Place Boulder Fence																
	Umwelt Open Pit			x	1,635	m	0.06	1.00	98	95	9,320	175.00	17,168		-	16	26,487
	Echo open pit			x	750	m	0.06	1.00	45	95	4,275	175.00	7,875		-	16	12,150
	Goose open pit			x	1,900	m	0.06	1.00	114	95	10,830	175.00	19,950		-	16	30,780
	Llama open pit	Permieter needed only where pit edge will not abute the final flooded lake footprint. i.e. 400m length.		x	400	m	0.06	1.00	24	95	2,280	175.00	4,200		-	16	6,480
	Remove Pump and Pipeline																
	Umwelt pit sump	Occurs during Operations		x	1,740	m	0.02	1.00	35	95	3,306	175.00	6,090		-	5.40	9,396
	Llama pit sump	Occurs during Operations		x	2,850	m	0.02	1.00	57	95	5,415	175.00	9,975		-	5.40	15,390
	Goose pit sump			x	4,325	m	0.02	1.00	87	95	8,218	175.00	15,138		-	5.40	23,355
	Echo pit sump	Occurs during Operations		x	820	m	0.02	1.00	16	95	1,558	175.00	2,870		-	5.40	4,428
	Breech Pits into Receiving Waters																
	Umwelt open pit			x	1,200	m3	0.12	1.00	144		-	5.00	6,000		-	5.00	6,000
	Llama open pit	Natural drainage connection		x	-	m3	0.12	1.00	-		-	5.00	-		-	-	-
	Echo open pit	Natural drainage connection		x	-	m3	0.12	1.00	-		-	5.00	-		-	-	-
	Goose open pit			x	600	m3	0.12	1.00	72		-	5.00	3,000		-	5.00	3,000
	Landfill Mobile Equipment																
	Goose Site Mobile Equipment			x	41	units	24.00	1.00	984	95	93,480	-	-		-	2,280	93,480
	Underground Closure																
	Saline Water Pond (SWP) / WTP																
	Relocate pipeline to Umwelt UG from Llama UG			x	800	m	1.00	1.00	24	95	2,280	6.00	1,500		-	4.73	3,780
	Dewater SWP to Umwelt UG			x	763,134	m3	1.00	1.00	153	95	14,535		-	0.11	83,945	0.13	98,480
	Decommission SWP to Umwelt UG pipeline			x	1,200	m	0.02	1.00	24	95	2,280	3.00	3,600		-	4.90	5,880
	Adjust pipeline to route to Llama UG	Completed during Operations		x	500	m	0.03	1.00	65	95	6,175		-		-	12.35	6,175
	Dewater SWP to Llama UG			x	324,234	m3		1.00	80	95	7,600		-	0.11	35,666	0.13	43,266
	Adjust pipeline to route to Goose UG			x	4,500	m	0.03	1.00	185	95	17,575		-		-	3.91	17,575
	Dewater SWP to Goose UG			x	391,630	m3		1.00	215	95	20,425		-	0.11	43,079	0.16	63,504
	Decommission SWP to Goose UG pipelines			x	10,800	m	0.02	1.00	216	95	20,520		-		-	1.90	20,520
	Breach SWP Diversion Berms and Containment Dams			x	430	m3	0.12	1.00	52		-	8.00	3,440		-	8.00	3,440
	Decomission WTP-Goose Lake pipeline			x	1,140	m	0.02	1.00	65	95	6,175		-		-	5.42	6,175
	Llama UG																
	Decommission pipeline	Completed during Operations		x	2,700	m	0.02	1.00	54	95	5,130	3.00	8,100		-	4.90	13,230
	Umwelt portal																
	Plug declines with waste rock			x	150	m3	0.05	1.00	8		-	6.00	900		-	6.00	900
	Llama portal																
	Plug declines with waste rock			x	150	m3	0.05	1.00	8		-	6.00	900		-	6.00	900
	Goose portal																
	Plug declines with waste rock			x	150	m3	0.05	1.00	8		-	6.00	900		-	6.00	900
	Echo portal																
	Plug declines with waste rock			x	150	m3	0.05	1.00	8		-	6.00	900		-	6.00	900
	Umwelt vent/circular backfill raises																
	Plug vent raises with concrete plug			x	1	LS	1.00	1.00	60		-	-	-		-	120,000	120,000
	Llama vent/circular backfill raises																
	Plug vent raises with concrete plug			x	1	LS	1.00	1.00	60		-	-	-		-	50,000	50,000
	Goose vent/circular backfill raises																
	Plug vent raises with concrete plug			x	1	LS	1.00	1.00	60		-	-	-		-	50,000	50,000
	Echo vent/circular backfill raises																
	Plug vent raises with concrete plug			x	1	LS	1.00	1.00	60		-	-	-		-	50,000	50,000
	Echo crown pillar																
	Plug UG stopes			x	3,550	m3	0.05	1.00	178		-	6.00	21,300		-	6.00	21,300
	Waste Rock Stockpiles and Landfills																
	WR Pile Closure																
	Cap and Slope WR Piles			x	2,400,000	m3	0.06	1.00	144,000		-	6.00	14,400,000		-	6.00	14,400,000

	Landfill Closure																
	Cap and Reslope Landfills			x	25,000	m3	0.06	1.00	1,500		-	6.00	150,000		-	6.00	150,000
	Water Management Structures																
	Llama Structures																
	Breach Llama Lake Diversion Berms			x	665	m3	0.06	1.00	43		-	7.30	4,855		-	7.30	4,855
	Breach Llama WRSA Diversion Berm			x	95	m3	0.06	1.00	6		-	7.30	694		-	7.30	694
	Breach Llama WRSA Containment Dam				95	m3	0.06	1.00	6		-	7.30	694		-	7.30	694
	Decommission Llama pump and pipeline	24 hrs for pump		x	700	m	0.02	1.00	38	95	3,610	1.20	840		-	6.36	4,450
	Umwelt Structures																
	Breach Primary Pond Containment Dam			x	200	m3	0.06	1.00	13		-	7.30	1,460		-	7.30	1,460
	Breach Umwelt WRSA Containment Dam			x	120	m3	0.06	1.00	8		-	7.30	876		-	7.30	876
	Breach Umwelt WRSA Diversion Berm			x	95	m3	0.06	1.00	6		-	7.30	694		-	7.30	694
	Remove Umwelt Pond pump and pipeline			x	950	m	0.02	1.00	49	95	4,655	1.20	1,140		-	6.10	5,795
	Remove Primary pond pump and pipeline			x	7,250	m	0.02	1.00	175	95	16,625	1.20	8,700		-	3.49	25,325
	Echo Structures																
	Breach Echo WRSA Containment Dam			x	190	m3	0.06	1.00	12		-	7.30	1,387		-	7.30	1,387
	Breach Echo Diversion Berm (East and West)			x	190	m3	0.06	1.00	12		-	7.30	1,387		-	7.30	1,387
	Breach Echo WRSA Diversion Berm			x	95	m3	0.06	1.00	6		-	7.30	694		-	7.30	694
	Breach East Echo Containment Dam			x	95	m3	0.06	1.00	6		-	7.30	694		-	7.30	694
	Remove Echo WRSA Pond pump and pipeline			x	2,400	m	0.02	1.00	48	95	4,560	1.20	2,880		-	3.10	7,440
	Remove Echo NCW pond pump and pipeline			x	220	m	0.02	1.00	16	95	1,558	1.20	264		-	8.28	1,822
	Goose Structures																
	Breach Goose Main Diversion Berm			x	95	m3	1.00	1.00	95		-	7.30	694		-	7.30	694
	TSF Structures																
	Breach TSF Dam			x	11,000	m3	0.05	1.00	550		-	7.30	80,300		-	7.30	80,300
	Breach TSF WRSA Diversion Berm			x	285	m3	0.05	1.00	14		-	7.30	2,081		-	7.30	2,081
	Ore Stockpile Structures																
	Remove pump and pipeline			x	4,550	m	0.02	1.00	91	95	8,645	1.20	5,460		-	3.10	14,105
	Breach Ore Stockpile Diversion Berm and Containment Dam			x	215	m3	0.06	1.00	13		-	7.30	1,570		-	7.30	1,570
	Buildings and Equipment																
	Dissassembly - Goose Plant and Crusher																
	Dismantle Plant			x	6,464	m2	1.00	1.00	3,200	95	304,000	100.00	106,667	-	-	63.53	410,667
	Dismantle Crushers			x	1,630	m2	1.00	1.00	800	95	76,000	100.00	26,667	-	-	62.99	102,667
	Dismantle Power Plant			x	2,040	m2	1.00	1.00	1,000	95	95,000	100.00	33,333	-	-	62.91	128,333
	Dismantle Emergency Power - Fuel			x	300	m2	1.00	1.00	150	95	14,250	100.00	5,000	-	-	64.17	19,250
	Dismantle Fuel Storage and Distribution			x	1	Lot	1.00	1.00	1,200	95	114,000	100.00	40,000	-	-	154,000	154,000
	Goose Admin Buildings																
	Demolish Truck Shop/Office			x	2,349	m2	1.00	1.00	1,000	95	95,000	100.00	33,333	-	-	54.62	128,333
	Demolish Kitchen/Camp			x	1,980	m2	1.00	1.00	900	95	85,500	100.00	30,000	-	-	58.33	115,500
	Demolish Cold Storage			x	840	m2	1.00	1.00	150	95	14,250	100.00	5,000	-	-	22.92	19,250
	Demolish Waste/Waste Oil Storage			x	1	Lot	1.00	1.00	100		-	100.00	3,333	40,000	40,000	43,333	43,333
	Remove Freight Storage			x	1	Lot	1.00	1.00	150	95	14,250	100.00	5,000	-	-	19,250	19,250
	Demolish Water Treatment Plant			x	647	m2	8.00	1.00	100	95	9,500	100.00	3,333	-	-	19.84	12,833
	Demolish Sewage Treatment Plant			x	1	Lot	1.00	1.00	90	95	8,550	100.00	3,000	-	-	11,550	11,550
	MLA Infrastructure																
	Demolish Port Office			x	5	Units	12.00	1.00	60	95	5,700	100.00	6,000	-	-	2,340	11,700
	Remove Pipelines			x	10,000	m	0.02	1.00	200	95	19,000	100.00	20,000	-	-	3.90	39,000
	Demolish Incinerator and Waste Management			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Demolish Warehuses			x	1	Lot	1.00	1.00	30	95	2,850	100.00	3,000	-	-	5,850	5,850
	Dismantle Genset			x	1	Lot	1.00	1.00	150	95	14,250	100.00	15,000	-	-	29,250	29,250
	Demolish Maintenance Shop			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Demolish Water Storage			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Demolish WTP/STP			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Demolish camp/offices			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Demolish freight storage area			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Demolish hazardous wate Area			x	1	Lot	1.00	1.00	50	95	4,750	100.00	5,000	-	-	9,750	9,750
	Dismantle Fuel Storage			x	1	Lot	1.00	1.00	1,600	95	152,000	100.00	53,333	-	-	205,333	205,333
	Goose Closure Camp																
	Build 20 Person Camp			x	1	Lot	1.00	1.00	150	95	14,250	100.00	5,000		-	19,250	19,250
	Build 20 Person Power Plant			x	1	Lot	1.00	1.00	150	95	14,250	100.00	5,000		-	19,250	19,250
	Camp Operation	Over 13 years of Closure and Post-Closure		x	12,000	Man Days	1.00	1.00		-	-	-	-	110	1,320,000	110	1,320,000
	Roads and Airstrips																
	Main Haulroad																
	Maintain Road Surface			x	13	Yr	70.00	1.00	910	95	86,450	100.00	91,000		-	13,650	177,450
	Restore Drainage	Remove Culverts		x	1,488	m3	0.06	1.00	89		-	11.00	16,368		-	11.00	16,368

	Airstrips																
	Maintain Airstrip Surface			x	13	Yr	20.00	1.00	260	95	24,700	100.00	26,000		-	3,900	50,700
	Restore Drainage			x	1,020	m3	0.06	1.00	61		-	12.00	12,240		-	12.00	12,240
	Water Treatment																
	WTP Pipelines and Treatment Plant																
	Pump from Goose Main TF to WTP	Pump and treat water in TF at WTP for 7 years, open water season		x	7,500,000	m3		1.00			-	-	-	0	825,000	0.11	825,000
	Treat water from Goose Main TF in TWP			x	7,500,000	m3		1.00	1,916		-	-	-	0	2,625,000	0.35	2,625,000
	Pump from WTP recirc. into Goose Main TF			x	7,500,000	m3		1.00	-		-	-	-	0	825,000	0.11	825,000
	Decommission WTP pump and pipeline			x	6,700	m	0.02	1.00	158	95	15,010	100.00	15,800		-	4.60	30,810
	Decommission WTP pump and return pipeline			x	820	m	0.02	1.00	40	95	3,838	100.00	4,040		-	9.61	7,878
	Decommission WTP			x	1	Lot		1.00	50	95	4,750	100.00	5,000		-	9,750	9,750
	Contaminated Soil																
	Sitewide Investigation																
	Site Investigation to estimate quantity of contaminated soil	Testpit program with excavator in all parking, fuel storage, washbays truck and maintenance shops and generator areas.		x	1	Lot	1.00	1.00			-	-	-		50,000	50,000	50,000
	Treatment																
	Transport contaminated soil			x	10,000	m3	0.05	1.00	500		-	7.30	73,000		-	7.30	73,000
	Separation plant	Purchase seperation equipment		x	1	Lot	1.00	1.00			-	-	-		100,000	100,000	100,000
	Closure / Post-Closure Monitoring																
	Geotechnical Inspections																
	TSF embankments			x	8	Units	20.00	1.00	160		-	-	-	10,000	80,000	10,000	80,000
	WR piles			x	13	Units	20.00	1.00	260		-	-	-	8,300	107,900	8,300	107,900
	Pit walls			x	13	Units	20.00	1.00	260		-	-	-	4,000	52,000	4,000	52,000
	Ground Temperature Monitoring																
	Umwelt WRSA GTC Monitoring after Closure	Monthly		x	13	Years	24.00	1.00	312	200	62,400	-	-		-	4,800	62,400
	LLama WRSA GTC Monitoring after Closure	Monthly		x	13	Years	24.00	1.00	312	200	62,400	-	-		-	4,800	62,400
	TSF WRSA GTC Monitoring after Closure	Monthly		x	13	Years	24.00	1.00	312	200	62,400	-	-		-	4,800	62,400
	WQ Monitoring - Closure																
	Llama pit	Depends on Breech		x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Llama WR Pile			x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Umwelt pit	Depends on Breach		x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Umwelt WR Pile			x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Echo pit	Depends on Breach		x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Echo WR pile			x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Goose pit	Depends on Breach		x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	TSF WR Pile			x	13	Years	12.00	1.00	156	95	14,820	-	-		-	1,140	14,820
	Aquatic Effects monitoring																
	Aquatic effects monitoring	Non-contact Water Basins		x	10	Years	60.00	1.00	600	80	48,000	-	-		-	4,800	48,000
	Terrestrial Animal Monitoring																
	Terrestrial Animal Monitoring			x	10	Years	300.00	1.00	3,000	80	240,000	-	-		-	24,000	240,000
	Total Direct Costs																24,034,589
	CONSTRUCTION INDIRECTS																
	Freight & Transport																
	Food & Freight	Total Mandays factored		x	27,600	kg		1.00		-	-		-	12	331,200	12	331,200
	Freight	Rental equip, offices, etc..		x	1	Lot	-	1.00	-	-	-	-	-	500,000	500,000	500,000	500,000
	Mobilization			x	500	Tonnes								1,500	750,000	1,500	750,000
	General Construction Indirects																
	Site Services Labour			x	16,000	HRS	1.00	1.00	16,000	65	1,040,000	-	-	-	-	65.00	1,040,000
	Accomodations & Travel																
	Camp Accomodations/Operation			x	12,000	Man Days	1.00	1.00		-	-	-	-	110	1,320,000	110	1,320,000
	Airfare & Transportation			x	429	Each	-	1.00		-	-	-	-	572	245,583	572	245,583
	Contractor Profit																
	Total Component Estimate																28,221,373

Appendix H. Vegetation Monitoring Plan

BACK RIVER PROJECT:
Vegetation Monitoring Program

February 2017

BACK RIVER PROJECT
VEGETATION MONITORING PLAN

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1. Introduction

The proposed Back River Project (the Project) lies in western Nunavut in the continuous permafrost zone of the continental Canadian Arctic. It is composed of two main areas: the Marine Laydown Area (MLA) (Figure 1) and the Goose Property Area (Figure 2), with a winter ice road (WIR) connecting the two (Figure 3).

The MLA is located on the western shore of Southern Bathurst Inlet, approximately 130 kilometres (km) north of the Goose Property (Figure 2). Here, the Project will sealift materials and supplies through Bathurst Inlet to the MLA annually during the open-water season only.

The Goose Property includes four open pits and four underground developments and the Project has an estimated mine life of 10 years with a total production of 19.8 million tonnes (Mt) of ore. Key Project infrastructure at the Goose Property includes:

- four open pits, and four underground mines (Umwelt, Llama, Goose Main, and Echo);
- four waste rock storage areas;
- tailings storage facility;
- underground mining pads;
- a stockpile;
- camp;
- process plant; and
- airstrip and roads, including a culvert for the haul road crossing.

A WIR will be utilized between the MLA and Goose property to allow the movement of supplies during the winter months.

This Plan represents an adaptive approach to understanding the effects of the Project on the landscape and the species that live there. In this context, the Plan is part of a continually evolving process that relies not only on the efficacy of data collection and analytical results, but is also dependent on feedback from the communities, government, Aboriginal groups, and the public. Having an adaptive and flexible program allows for appropriate and necessary changes to the design of monitoring studies, and the mitigation and monitoring plans. Some changes may come about through the observation of unanticipated effects or inadequacies in the sampling methods to detect measurable effects. Other changes may result from ecological knowledge acquired through working with Aboriginal community members and discussions with elders, both in the field and through workshops.

1.1 PURPOSE

During the FEIS Final Hearings, Sabina and GN jointly submitted the following commitment (GN-C-25):

> In consultation with the KIA, GN, and other relevant parties the Proponent shall develop and implement a vegetation monitoring plan for the winter road that is designed to quantify the potential impacts on vegetation. The plan shall be submitted to the NIRB prior to winter road

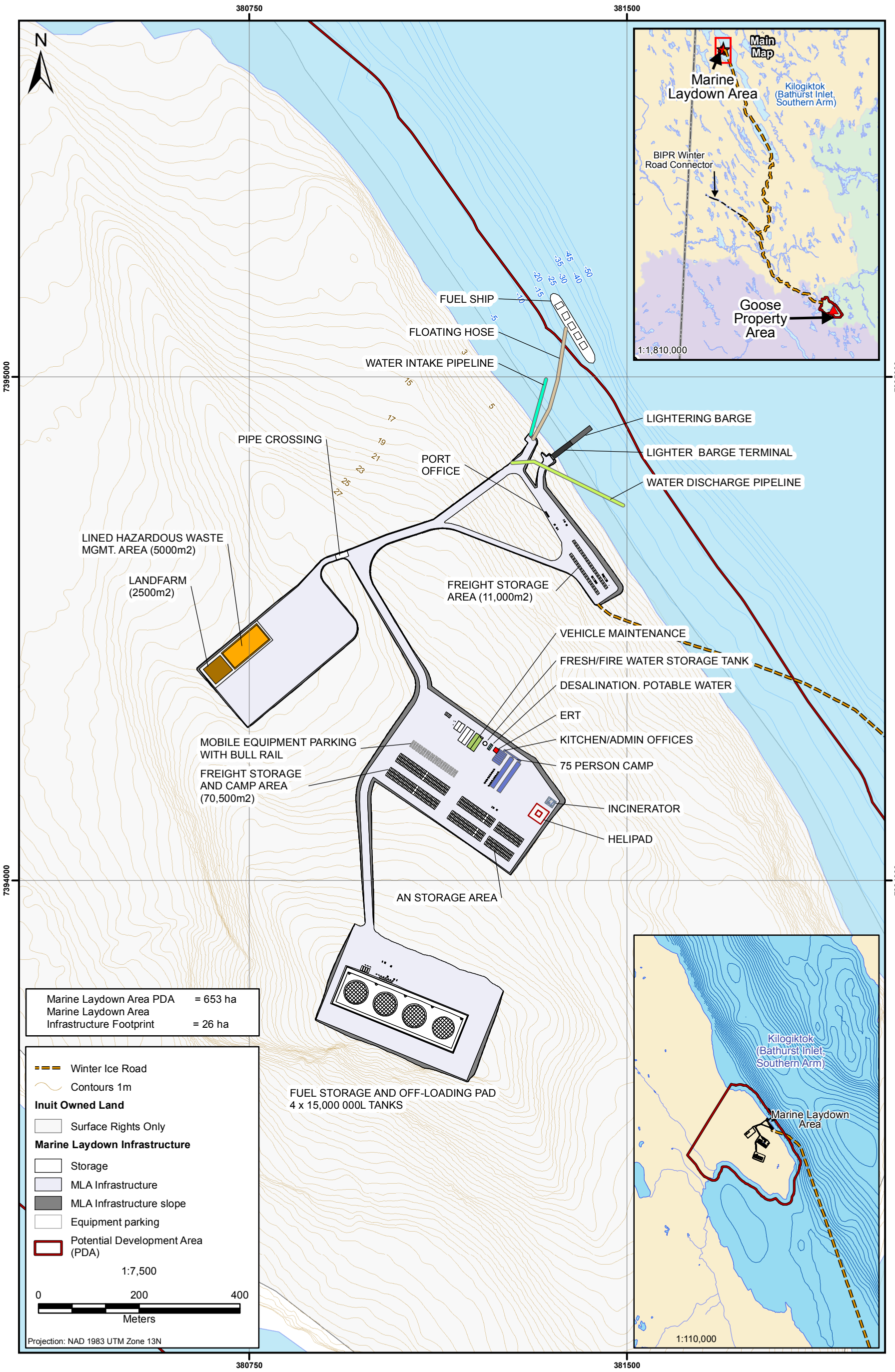
construction. Findings from these studies will be used to inform reclamation planning as appropriate.

Subsequently, the Nunavut Impact Review Board (NIRB) Final Hearing Report encouraged Sabina to consider additional mitigation and monitoring for the protection of vegetation and additional measures to limit potential impacts due to the introduction of invasive species from construction and clearing operations.

Since the FEIS Final Hearing, and in recognition of the NIRB's concerns, Sabina has developed this Vegetation Monitoring Plan (the Plan) which is in line with commitment GN-C-25.

GIS # BR_FEIS_NA_tab_MLASiteLayout_v1

October 21 2015



Sabina GOLD & SILVER CORP.

Figure 1

Potential Development Area and Layout
Marine Laydown Area

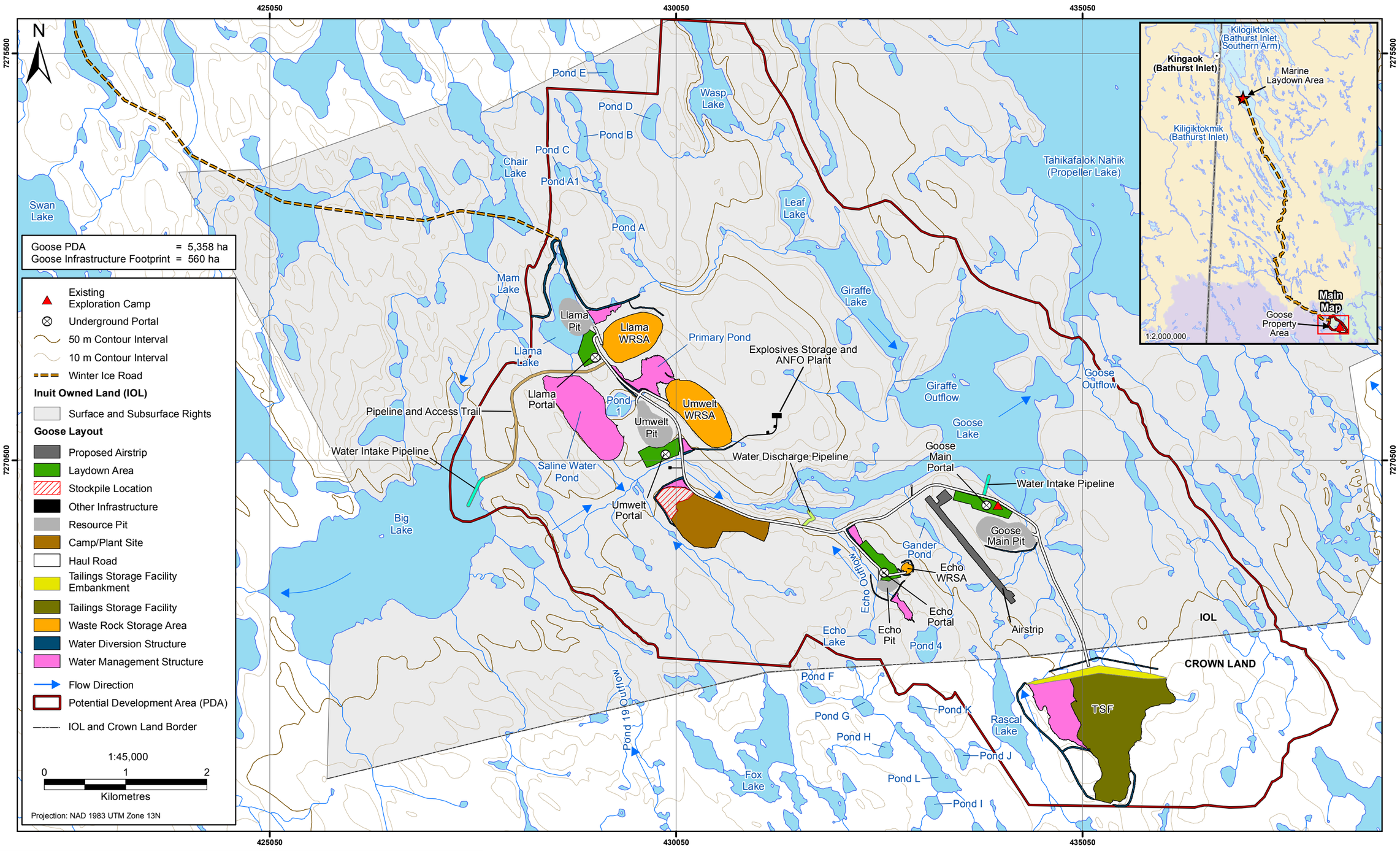


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Figure 2

Potential Development Area and Infrastructure Areas - Goose Property

GIS # BR_FEIS_NA_tab_WinterIceRoadCorridor_v1b

October 13 2015

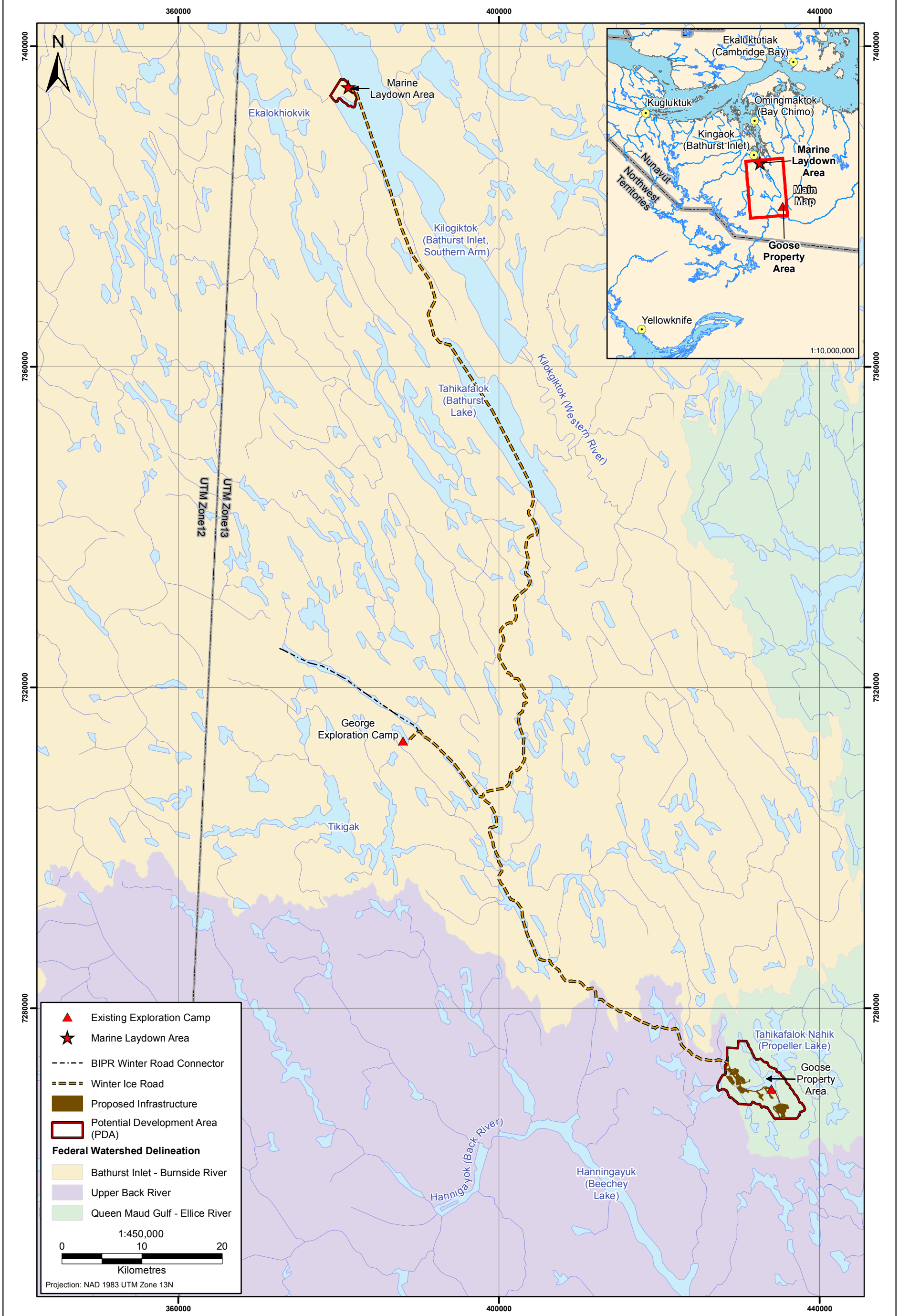

Figure 3

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Winter Ice Road Corridor Overview

2. Incorporation of Inuit Qaujimajatuqangit Principles

Sabina acknowledges the following Inuit Qaujimajatuqangit (IQ) principles, as described by the Government of Nunavut:

1. Inuuqatigiitsiarniq - Respecting others, relationships, and caring for people.
2. Tunnganarniq - Fostering good spirit by being open, welcoming, and inclusive.
3. Pijitsirniq - Serving and providing for family and/or community.
4. Aajiiqatigiinniq - Decision making through discussion and consensus.
5. Pilimmaksarniq/Pijariuqsarniq - Development of skills through practice, effort, and action.
6. Piliriqatigiinniq/Ikajuqtigiinniq - Working together for a common cause.
7. Qanuqtuurniq - Being innovative and resourceful.
8. Avatittinnik Kamatsiarniq - Respect and care for the land, animals, and the environment.

IQ values have helped guide Sabina's decision making for the Project and have been incorporated into the design of the Company's overall Project management approach. Table 3.1-2 in FEIS Volume 3, Chapter 3 outlines the ways in which IQ values have been incorporated into the Project. Furthermore, Sabina actively worked to collect and incorporate regional and Project-specific TK in addition to scientific knowledge throughout the FEIS. This information has also been used to inform Sabina's approach to the terrestrial environment section of the FEIS.

3. Community Engagement and Traditional Knowledge

Sabina initiated a comprehensive community engagement program in the Kitikmeot Region to ensure all regional residents were provided with opportunities to learn about the Project and provide feedback. Likewise, a considerable amount of TK was collected by Sabina and integrated into the FEIS submission. The following reports were prepared by Sabina and later reviewed for TK specific information related to Valued Ecosystem Component (VEC) features:

- *Inuit Traditional Knowledge of Sabina Gold & Silver Corp., Back River (Hannigayok) Project; Naonaiyaotit Traditional Knowledge Project (NTKP)* (KIA 2012) (FEIS Appendix V3-3A);
- *Naonaiyaotit Traditional Knowledge Project - Hannigayok (Sabina Gold & Silver Corp. Proposed Back River Project). Results from Data Gaps Workshops, Final Report (June 2014)* (KIA 2014) (FEIS Appendix V3-3B);
- *Back River Project: Existing and Publically Available Traditional Knowledge from Selected Aboriginal Groups in the Northwest Territories (FEIS Appendix V3-3C); and*
- *Traditional Knowledge Study Report on the Arctic Char Fishery in the Nulahugyuk Creek – Hingittok Lake Area (Bernard Harbour), Nunavut (FEIS Appendix V3-3D).*

Example, in response to TK and a request by the KIA, the WIR north of Tahikafflok Lake (Bathurst Lake) was realigned to address potential impacts to riparian zones identified during two local focus group workshops (Cambridge Bay Hunter Focus Group 2012; Kugluktuk Hunter Focus Group 2012). This request was made during review of the DEIS and was captured, and honoured, in commitment (KIA-5 from PHC Report).

Sabina is committed to considering and incorporating TK into the Plan. The incorporation of TK will occur throughout all stages of the Plan, including identification of mitigation measures, monitoring study design, data collection, and follow-up programs to obtain feedback.

4. Existing Environment and Baseline Information

Vegetation was considered a VEC in the FEIS (Volume 5, Chapter 4). Baseline studies to characterize the baseline vegetation present within the regional and local area of the Project were carried out in 2012. The focus of these studies was on ecosystems, habitat, and vegetation identified by Inuit, scientists, regulators, or the public as ecologically, socially or culturally important. Vegetation information (e.g., rare plant species/communities) was used to inform the operations footprint with the objective to avoid sensitive species-rich plant communities, and areas with high rare plant potential, where possible. For example, as previously mentioned, the WIR north of Tahikafflok Lake (Bathurst Lake) was realigned to address potential impacts to riparian zones in response to TK and a request by the KIA.

The vegetation Local Study Area (LSA) that was established for the baseline study compromises a total of 134,370 ha. The LSA was divided into the following three sub-areas:

- Goose Property Sub-area (32% of LSA);
- Winter Road Sub-area (62% of LSA);
- Marine Laydown Sub-area (6% of LSA);

This information is provided in the 2012 Ecosystems and Vegetation Baseline report (Rescan 2013a, FEIS Appendix V5-4a) and forms the basis for evaluating potential effects of the Project on ecosystems, vegetation, and special landscape features. As outlined in the 2012 Ecosystems and Vegetation Baseline Report (FEIS Appendix V5-4A), extensive baseline studies were conducted; some highlights include:

- Conducting soils and vegetation mapping of a very large local study area of 134,370 ha defined by the local the watersheds;
- Developed an ecological classification system for the area that links soil types with vegetation communities;
- Classified terrain, soils and ecological communities for the entire LSA;
- Conducted 817 field plots to ground truth the mapping, including the project development area, marine laydown area, winter road and control sites; and
- Conducted rare and invasive plant surveys using a qualified botanist.

Table 4-1 provides a summary of ecosystems mapped within the LSA. Table 4-2 provides a list of terrestrial vegetation identified through TK.

Table 4-1. Ecosystem Classes in the Local Study Area

Ecosystem Class	Area (ha)	% of Total LSA
Bedrock	10253	7.6
Disturbed/Barren	190.7	0.1
Esker	1337.1	1.0
Freshwater	24425.1	18.2
Marine	539.9	0.4
Riparian	1445.4	1.1
Riparian (marine)	439.6	0.3
Tundra	74393.6	55.4
Tundra (marine)	7278.4	5.4
Wetland	12760.7	9.5
Wetland (marine)	1305.6	1.0
TOTAL	**134369.1**	**100**

Table 4-2. Ecosystem Classes in the Local Study Area

Inuinnaktun Name(s)	English Name	Latin Name(s)	Specific Use/Part of Plant
Kublak[2]	Bear Berry	*Arctous rubra, A. alpina*	Fruit
Kabluk	Bear Berry	*Arctous rubra, A. alpina*	Fruit
Kublakot	Bear Berry	*Arctous rubra, A. alpina*	Leaves
Akpik; Aaukpik[1]	Cloudberry	*Rubus chamaemorous*	Fruit
Paungak; Paungan[1]; Paurnngait[2]	Crowberry; Blackberries	*Empetrum nigrum*	Fruit
Mahok	Liquorice root	*Hedysarum alpinum*	Root
Qunguliit[2]	Mountain Sorrel	*Oxyria digyna*	Leaves
Kimminait[2]	Bog cranberry	*Vaccinium vitis-idaea*	Fruit
Kigutangirnait[2]	Blueberries	*Vaccinium uliginosum*	Fruit
	Willow	*Salix* spp.	Bark
Qijuktaaqpait[2] (Baffin)	Northern Labrador tea	*Ledum palustre* subsp. *Decumbens*	
Kangayot[1]	Cottongrass	*Eriophorum* spp.	Seed heads
Kablakot[1]	Unknown; plant used for tea	Unknown	
Avalakiak[1]	Unknown; low-growing plant for starting fires	Unknown	
Eehoktin[1]	Unknown; small plant for starting fires	Unknown	
Aatogoayak[1]; igloohoutinnik[1]	Unknown; mushrooms eaten by caribou	Unknown	

[1] From the vocabulary in Section 11 of the NTKP report (KIA 2012). Where only the Inuinnaqtun names are provided, it is difficult to correlate them with corresponding English or Latin names; [2] Inuktitut names from Mallory and Aiken (2004)

5. Objectives

The main objectives of the Vegetation Monitoring Plan are:

- To measure plant species abundance and diversity at vegetation plots along the WIR, MLA, and Goose site;
- Measure direct loss of plant communities as result of the construction and operations of Project infrastructure at Goose Property, the MLA, and WIR;
- Measure plant health (vigour) as part of the vegetation monitoring program;
- Measure distribution and abundance of non-native invasive plant species;
- Monitor and evaluate the effectiveness of mitigation measures;
- Identify unanticipated effects; and
- Provide an early warning of undesirable change in the environment and to inform adaptive management measures.

6. Monitoring Approach

6.1 VEGETATION MONITORING

Vegetation monitoring will occur during Construction, Operations, and Closure of the Project. It will be performed every three years during the flowering period (i.e., July–August) for identification purposes, and for contaminant analysis (presence of berries). The program will focus on objectives noted in Section 5, with heavy focus on vegetation health and invasive plant species. Fugitive dustfall will be documented as part of the Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17) and its relevance considered in the Vegetation Monitoring Plan.

6.1.1 Vegetation Health

Vegetation health monitoring will include two components:

1. Vegetation abundance, richness (diversity), vigour (health); and
2. Contaminant (metal) levels in vegetation.

The first will be conducted through permanent monitoring plots in a variety of habitat types (minimum two plots per habitat type) within the Project area and in control areas within the Regional Study Area. Within each of the plots species richness (diversity), and abundance (percent cover), and vigour of each species (in each strata) will be estimated, in addition to the documentation of any rare plants (if present). The second part of vegetation health monitoring will involve the collection of vegetation samples (lichen and berry-producing plants) which will be sent to accredited laboratories for chemical analysis (Table 6-1).

Table 6-1. Vegetation Monitoring: Vegetation Health

Indicator	Vegetation Health
Measurable Parameter	1) Vegetation diversity (richness), and abundance, and 2) Contaminant (metal) levels in lichen and berry-producing plants.
Key Project Interaction	Effluent, dust and emissions released into the environment have the potential to impact vegetative health. Dust affects the survival of certain plant species (leading to changes in species diversity and abundance). The deposition of contaminants (metals) in the dust, which are absorbed by plants, can enter the food chain via ingestion by animals and humans, and may have an effect on health.
Goal	The project will not result in a significant increase in contaminant uptake in vegetation.
Objective	To quantify through continued monitoring throughout the duration of the Project: 1) vegetation abundance (percent cover), diversity (richness) and vigour (vegetation health), and 2) Contaminant (metal) levels in lichen (caribou forage) and berry-producing plants (traditional use); through continued monitoring throughout duration of the Project.
Threshold	Thresholds for vegetation diversity and abundance to be determined.
Scope of Monitoring Work	Regional Monitoring: Assess baseline vegetation composition/species richness, abundance, and vigour, and contaminant (metal) levels in lichen and berry-producing plants

6.1.2 Invasive Plants

Invasive plant species monitoring will occur during Construction and Operations of the Project. Monitoring will be completed within the Goose Property, MLA and WIR footprint and adjacent habitats to ensure that no invasive plant species are introduced to the Arctic environment. Invasive plant observations will be conducted every three years in conjunction with the vegetation monitoring, and informal observational surveys will occur on an ongoing basis and additional surveys may be triggered by

observations of invasive species (Table 6-2). Prior to Project initiation, staff will be trained on invasive plant establishment pathways, species identification (e.g., photos of common invasive plants in Nunavut) and mitigation measures (see Section 8). Should invasive plant species be found, these will be immediately reported to environment department and be destroyed and, if the pathway of entry can be determined, changes will be made to reduce/eliminate the possibility of further introductions.

Table 6-2. Vegetation Monitoring: Invasive Plant Species

Indicator	Invasive Plant Species
Measurable Parameter	Occurrence of invasive plant species
Key Project Interaction	Introduction of invasive plant species
Goal	The Project will not introduce invasive plant species to the RSA
Objective	To prevent the occurrence/establishment of invasive plant species
Threshold	No introduction of invasive plant species as a result of Project activities
Scope of Monitoring Work	Local monitoring: Surveillance of Project footprint and adjacent habitat, surveys to be conducted every 3 years in conjunction with vegetation monitoring or triggered by observations invasive plants

6.1.3 Dust Monitoring

The Mine is expected to create fugitive dust through various sources, primarily by blasting and crushing rock, and road construction and traffic. As part of the Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17) dustfall monitoring will be conducted via sampling between June and September for a number of experimental and control areas within the LSA to determine the level of dust deposition associated with the mine site and WIR (Table 6-3).

Dust monitoring will be carried out during the Construction and Operation phases of the Project. Sampling locations will be situated at varying distances from the Project site to determine spatial extent of dust fall. Additional details can be found within the Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17).

Table 6-3. Vegetation Monitoring: Dust Fall

Indicator	Dust fall
Measurable Parameter	Surveillance and monitoring
Key Project Interaction	Dust fall has potential to affect vegetation health, as well as forage palatability for caribou
Goal	The Project will not have a significant effect on palatability of vegetation for caribou
Objective	Quantify: The magnitude of dust fall on vegetation surrounding mine infrastructure and WIR; distance from point sources and roadway at which dustfall is measured; and seasonal variation in dust fall through continued monitoring of Project.
Threshold	Refer to Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17)
Scope of Monitoring Work	Refer to Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17)

7. Roles and Responsibilities

Sabina's Environmental Department is responsible for monitoring compliance with applicable regulations and permit requirements. The responsibility of implementation of mitigation measures rests with the VP Operation.

Compliance is achieved through ongoing monitoring, and development and implementation of operational standards, procedures, and employee training.

8. Mitigation and Adaptive Management

The following mitigation measures and best management practices will reduce the potential for loss of vegetation:

- The Project has been designed to employ winter road-only access corridors that travel primarily over lakes and rivers, thereby minimizing potential negative effects on terrestrial vegetation and limiting dust emissions.
- Minimize the Project footprint, thus minimizing the disturbance to the terrestrial environment.
- The clearing of vegetation and removal of soil from unique landscape features will be minimized, including eskers, wetlands, exposed bedrock, cliffs, etc., which often provide high value habitat to wildlife and may support sensitive vegetation communities and growth forms. Exceptions to this management will only be considered after assessing and weighing all implications.

The following mitigation measures and best management practices will reduce the potential for degradation of vegetation:

- The design of the WIR has been optimized to minimize the distance travelled which will minimize emissions.
- All vehicles and machinery will restrict travel to designated road surfaces; thus avoiding creation of ruts in vegetated ecosystems.
- Loads carried by vehicles will be enclosed or covered when possible.
- Regular wheel-cleaning will be undertaken of vehicles travelling around and leaving the site.
- Equipment being brought to site will be inspected for any invasive plant species and be cleaned before being brought on to site.
- Vehicles will be driven at designated speeds on the WIR.

The following mitigation measures will be implemented to prevent the establishment of invasive species:

- Staff education on how invasive plant species can be introduced into an area.
- Staff education on how to identify common invasive plant species.
- Staff education on their individual roles in preventing invasive plant establishment.
- Ensuring vehicles and machinery are clean prior to entry on-site.
- Minimizing ground disturbance, where possible.
- Maintaining a healthy vegetation cover to prevent unwanted vegetation establishment.
- Immediate reporting of any invasive plant sightings to the environmental department.

The need for any corrective actions to on-site management or installation of additional control measures will be determined on a case-by-case basis. Indications of the need for corrective actions and additional control measures may include:

- If vegetation monitoring threshold limits are reached;

- If results from the Site Water Monitoring and Management Plan show non-compliance related to tundra discharges; or
- If results from the Wildlife Mitigation and Monitoring Program Plan, which will monitor select wildlife species and habitat around the mine infrastructure and activities show adverse effects to wildlife or wildlife habitat.

9. Quality Assurance and Quality Control

Quality assurance and quality control will include the following:

- field plant ecologists will be familiar with identification of subarctic plants and plant sampling techniques. Examples of estimating plant cover will be reviewed and rules applied consistently;
- data are to be downloaded from the field immediately upon returning to camp and manually checked by qualified personnel; and
- data will be downloaded consistent with detailed written operating instruction from qualified.

Data analysis will focus on evaluating trends and determining if there are statistical differences in plant species composition and abundance as a function of distance from the Mine and from construction through closure. The variables measured will include the following:

- plant species composition, as defined by plant species richness; and
- plant species abundance, as defined by mean percent species cover.

10. Reporting

An annual Vegetation Monitoring Summary Report for the Project will be completed for the mine, WIR, and associated infrastructure. The purpose of this report is to summarize the annual data collected from the Plan, and to identify and communicate natural variation and potential mine-related changes in vegetation populations and health.

The annual report will provide the objectives, methodology, historical and current year results, as well as a comparison to impact predictions, mitigation and management recommendations of each monitoring program. As the accumulation of data increases, trends will also be reported. The report will be submitted to the KIA, GN, and the NIRB.

11. References

Cambridge Bay Hunter Focus Group. 2012.

Kugluktuk Hunter Focus Group. 2012.

Mallory, C. and S. Aiken. 2004. *Common plants of Nunavut.* Nunavut Department of Education.