October 2017

REPORT

FINAL REPORT

Closure Cost Update, Lupin Mine, Nunavut

Submitted to:
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Report Number: 1664316-7000

Distribution:

1 PDF Copy: Lupin Mines Incorporated, Toronto, Ontario
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Golder Associates

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APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Lupin Mines Incorporated (Lupin) to update the closure cost estimate for the Lupin Gold Mine located in Nunavut (hereafter referred to as "the Site"). Golder is currently supporting Lupin in the development of an estimation of costs for the closure of the Site. It is understood that Lupin will be submitting a revised cost estimate for closure in mid-October 2017. In addition, Lupin will be applying to the Nunavut Water Board (NWB) for a renewal of their Water License.

2.0 CLOSURE COST REVIEW

2.1 Basis of Review

Lupin submitted a closure cost estimate to NWB in 2014. Since that time, Lupin has completed a number of site activities towards implementing closure. As a result, a number of the quantities for site remediation activities have since been reduced.

The previous Phase I and II Environmental Site Assessment (ESA) for the Site was undertaken in 2005 and is reported in Morrow (2006). As a condition of the water licence renewal, Lupin retained Golder Associates to update the previous ESA. The results of the ESA update are reported separately in Golder (2017). The results of the ESA update were also taken into account in the closure cost update.

2.2 Site Visit

Mr. Ken Bocking, P.Eng. of Golder Associates visited the Site in October of 2016. He viewed the mine and mill site and the Tailings Containment Area (TCA) and observed the closure activities that were underway. At that time, the main activities included:

- Ongoing placement of a granular cover over parts of the TCA,
- Completion of repairs on Dam M,
- Removal of some waste rock material from the Ballpark area for disposal elsewhere,
- Readying the first cell of the landfarm to bioremediate hydrocarbon contaminated soils, and
- Consolidation of hazardous wastes in a containment area in preparation for shipping off site.

Mr. Bocking also participated in discussions between representatives of Lupin, INAC, NWB and Knight-Piesold regarding the closure costs.

2.3 Review of Closure Quantities

Golder reviewed all available reports relevant to the closure costs. Golder also requested and received additional information from Lupin regarding a number of relevant quantities, including:

- The area of tailings that have been covered and remain to be covered,
- The volumes of hazardous and other wastes that have been shipped off site since 2014,
- The volume of diesel fuel currently in storage at the site,

- The volume of waste rock that has been relocated from the ballpark area, and
- The volume of material moved to the landfarm for bioremediation.

Golder reviewed these numbers for reasonableness but otherwise relied on the information received.

The ESA Update (Golder, 2017) provided independent estimates of the following quantities:

- The volume of hydrocarbon contaminated soils requiring bioremediation,
- The volume of soil impacted with cyanide or lead nitrate,
- The volume of material impacted by arsenic,
- The volume of waste rock classified as potentially acid generating, and
- The quantities of asbestos containing materials requiring abatement.

3.0 UPDATED COSTS

An updated estimate of closure costs was prepared using the latest version (Version 7) of the RECLAIM model.

The unit costs used for each aspect of the cost estimate were based on one of the following as most appropriate:

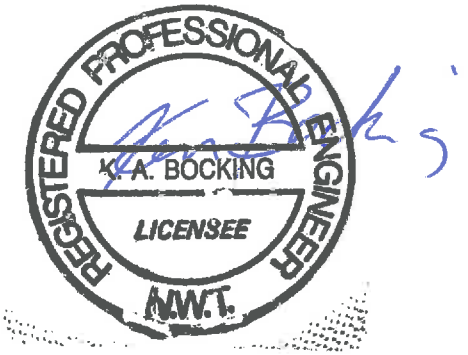
- Documented costs for closure work in progress at Lupin;
- Costs based on contractor quotes,
- Unit costs from the RECLAIM database,
- Unit costs based on experience.

The updated cost model is attached in Appendix A.

4.0 CLOSURE

We trust that this report meets your immediate requirements. If you have any questions regarding the content of this report, please do not hesitate to contact this office.

GOLDER ASSOCIATES LTD.



Ingrid Martinez, P.Eng..
Project Manager

Ken Bocking, P. Eng.
Principal

KAB/jl/

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 20 Oct 2017
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

REFERENCES

Golder 2017. Updated Phase I and II Environmental site Assessment, Lupin Mine, Nunavut. Report No. 1663166-6000. Golder Associates Ltd. October 18, 2017

Morrow. 2006. Phase 1 and 2 Environmental Site Assessment, Lupin Mine Site, Nunavut Territory. (2 Volumes). Report No. A053017. Morrow Environmental Services, January 11, 2006.

APPENDIX A

Updated RECLAIM Cost Estimate

SUMMARY OF COSTS

CAPITAL COSTS	COMPONENT NAME	COST	LAND LIABILITY	WATER LIABILITY
OPEN PIT		$0	$0	$0
UNDERGROUND MINE		$464,445	$0	$464,445
TAILINGS FACILITY		$2,086,597	$0	$2,086,597
ROCK PILE		$3,159,168	$0	$3,159,168
BUILDINGS AND EQUIPMENT		$4,202,397	$0	$4,202,397
CHEMICALS AND CONTAMINATED SOIL MANAGEMEN		$2,284,702	$0	$2,284,702
SURFACE AND GROUNDWATER MANAGEMENT		$277,900	-	$277,900
INTERIM CARE AND MAINTENANCE		$268,038	-	$268,038
	SUBTOTAL: Capital Costs	**$12,743,247**	**$0**	**$12,743,247**
	PERCENT OF SUBTOTAL		**0%**	**100%**

INDIRECT COSTS		COST	LAND LIABILITY	WATER LIABILITY
MOBILIZATION/DEMOBILIZATION		$4,829,258	$0	$4,829,258
POST-CLOSURE MONITORING AND MAINTENANCE		$936,257	$0	$936,257
ENGINEERING	4%	$509,730	$0	$509,730
PROJECT MANAGEMENT	5%	$637,162	$0	$637,162
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	0%	$0	$0	$0
BONDING/INSURANCE	1%	$127,432	$0	$127,432
CONTINGENCY	10%	$1,274,325	$0	$1,274,325
MARKET PRICE FACTOR ADJUSTMENT	0%	$0	$0	$0
	SUBTOTAL: Indirect Costs	**$8,314,164**	**$0**	**$8,314,164**

TOTAL COSTS	**$21,057,411**	**$0**	**$21,057,411**

1 **Open Pit Name:** **Pit # *1***

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0.00	$0		$0	$0
Signs		each		#N/A	$0.00	$0		$0	$0
Berm at crest		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
STABILITY STUDY									
Conduct stability and setback study		allow		#N/A	$0.00	$0		$0	$0
STABILIZE SLOPES									
Off-load crest, soil A		m3		#N/A	$0.00	$0		$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0		$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0		$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0		$0	$0
Buttress slope		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
COVER/CONTOUR SLOPES									
Place fill, soil A		m3		#N/A	$0.00	$0		$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Vegetate slopes		ha		#N/A	$0.00	$0		$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0		$0	$0
Other				#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		m3		#N/A	$0.00	$0		$0	$0
CONSTRUCT SPILLWAY									
Excavate channel		m3		#N/A	$0.00	$0		$0	$0
Concrete		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
RECLAIM QUARRIES									
Contour slopes		m3		#N/A	$0.00	$0		$0	$0
Place overburden		m3		#N/A	$0.00	$0		$0	$0
Vegetate		m3		#N/A	$0.00	$0		$0	$0
FLOOD PIT-Captital									
Remove stationary equipment (sump pumps)		each		#N/A	$0.00	$0		$0	$0
Remove dewatering pipeline		m		#N/A	$0.00	$0		$0	$0
Remove power lines		each		#N/A	$0.00	$0		$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0		$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0		$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0		$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0		$0	$0
Supply/install pump station		each		#N/A	$0.00	$0		$0	$0
Supply/install piping system		m		#N/A	$0.00	$0		$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0		$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0		$0	$0
FLOOD PIT-Annual Cost									
Operate pumps (power)		m3		#N/A	$0.00	$0		$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0		$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0		$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0		$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0		$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0		$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
					Annual pumping costs	$0			
Number of years of pump flooding		years							
					Total pumping costs	$0		$0	$0
					Total	$0		$0	$0
					% of Total			0%	0%

1 **Underground Mine Name** **UG Mine # 1**

ACTIVITY/MATERIAL	Notes	Unit	Qty	Code	Unit Cost	Cost Land	Cost	Water Cost
CONTROL ACCESS								
Fence		m		#N/A	$0.00	$0	$0	$0
Signs		each		#N/A	$0.00	$0	$0	$0
Block roads		m3		#N/A	$0.00	$0	$0	$0
Berm		m3		#N/A	$0.00	$0	$0	$0
Concrete wall in portal		m3		#N/A	$0.00	$0	$0	$0
Backfill portal #1	Plug portal with waste rock	m3	940	DSS	$3.50	$3,290	$0	$3,290
Backfill portal #2		m3		#N/A	$0.00	$0	$0	$0
Cap raise - 5 total		m3	5	RRSS	$85,656.00	$428,280	$0	$428,280
Cap raise #2		m3		#N/A	$0.00	$0	$0	$0
Cap shaft #1		m3		#N/A	$0.00	$0	$0	$0
Cap shaft #2		m3		#N/A	$0.00	$0	$0	$0
Backfill adits	Covered in portal backfill	m3	0	#N/A	$0.00	$0	$0	$0
Backfill open stope		m3	2,250	DSS	$3.50	$7,875	$0	$7,875
Concrete cap over open stope		m3		#N/A	$0.00	$0	$0	$0
Crown Pillar Study		each	1	#N/A	$25,000.00	$25,000	$0	$25,000
REMOVE HAZARDOUS MATERIALS								
Remove hazardous materials, U/G labor		manhrs		#N/A	$0.00	$0	$0	$0
Remove/decontam. stationary & elect. equip		mandays		#N/A	$0.00	$0	$0	$0
Remove/decontam. mobile equipment		each		#N/A	$0.00	$0	$0	$0
Remove misc. haz. mat & explosives		kg		#N/A	$0.00	$0	$0	$0
Other				#N/A	$0.00	$0	$0	$0
INSTALL BULKHEADS								
Bulkheads to control water flow		each		#N/A	$0.00	$0	$0	$0
Grout bulkhead		m3		#N/A	$0.00	$0	$0	$0
FLOOD MINE								
Supply/install pump		each		#N/A	$0.00	$0	$0	$0
Supply/install piping system		each		#N/A	$0.00	$0	$0	$0
Operate pumps to flood workings		m3		#N/A	$0.00	$0	$0	$0
Other				#N/A	$0.00	$0	$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM								
Excavate/install sumps		m2		#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 water quality monitoring pipes		each		#N/A	$0.00	$0	$0	$0
Install permanent pumping system		each		#N/A	$0.00	$0	$0	$0
Other				#N/A	$0.00	$0	$0	$0
					Total	$464,445	$0	$464,445
					% of Total		0%	100%

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water 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	Dam M has been repaired at lower unit cost	m3	15000	RR1S	$15.20	$228,000		$0	$228,000
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		m3		#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
Soil cover		m3	209828	SC4S	$7.02	$1,472,993		$0	$1,472,993
Vegetate		m2		#N/A	$0.00	$0		$0	$0
Excavate and dispose of tailings from Cell 4		allow	1	#N/A	$100,000.00	$100,000		$0	$100,000
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	8500	PLRS	$18.39	$156,315		$0	$156,315
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		m3		#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, rock		m3		#N/A	$0.00	$0		$0	$0
Excavate channel, soil	Spillway on Dam 1A and Dam J	m3	12350	SB1L	$4.30	$53,105		$0	$53,105
Concrete		m3		#N/A	$0.00	$0		$0	$0
Rip rap	Remove existing rip rap from dam slopes and use to cover the spillway invert and channel slopes to 2 m flow depth.	m3	936	RR3L	$7.00	$6,552		$0	$6,552
Geotextile	Place under spillway rip rap.	m2	2800	GSTL	$3.44	$9,632		$0	$9,632
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
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 & technician		each	1	#N/A	$30,000.00	$30,000		$0	$30,000
Install permanent instrumentation, drilling		each	1	#N/A	$30,000.00	$30,000			$30,000
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	Allowed for on "Water Management" sheet because it will be a one-time treatment just prior to closure.	years							
					Total treatment costs	$0			$0
					Total	$2,086,597		$0	$2,086,597
					% of Total			0%	100%

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

1 **Rock Pile Name:**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
STABILIZE SLOPES									
Flatten slopes with dozer		m3		#N/A	$0.00	$0		$0	$0
Flatten "bubble dump" areas		m3		#N/A	$0.00	$0		$0	$0
Divert runon, ditch mat'l A		m3		#N/A	$0.00	$0		$0	$0
Divert runon, ditch mat'l B		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, drain mat'l		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, fill mat'l A		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, fill mat'l B		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
COVER ROCK PILE									
Subgrade preparation - doze surface		m3		#N/A	$0.00	$0		$0	$0
Soil cover - excavate,haul,spread&compact		m3	364,800	SC4S	$7.02	$2,560,896		$0	$2,560,896
Rock cover - excavate,haul & spread		m3		#N/A	$0.00	$0		$0	$0
Excavate downslope drainage channel & chute		m3		#N/A	$0.00	$0		$0	$0
Rip rap drainage channel and chute		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
VERY LOW PERMEABILITY COVER (in addition to above)									
Liner subgrade preparation - compact		m2		#N/A	$0.00	$0		$0	$0
Supply geomembrame		m2		#N/A	$0.00	$0		$0	$0
Install geomembrane		m2		#N/A	$0.00	$0		$0	$0
Protective cover - excavate,haul,spread&compact		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Install infiltration/seepage instrumentation		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		m3		#N/A	$0.00	$0		$0	$0
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
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		allow		#N/A	$0.00	$0		$0	$0
RELOCATE DUMPS									
Load, haul, dump or doze		m3	45,600	RR4S	$4.72	$215,232		$0	$215,232
Add lime		tonne		#N/A	$0.00	$0		$0	$0
Contour area of rock left in place		m2	364,800	DRL	$1.05	$383,040		$0	$383,040
Environmantal Site Assessment		allow	0	#N/A	$200,000	$0		$0	$0
SPECIALIZED ITEMS									
Install permanent instrumentation		each		#N/A	$0.00	$0		$0	$0
Install permanent instrumentation, drilling		each		#N/A	$0.00	$0		$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	$0
Reagents		tonnes		#N/A	$0.00	$0		$0	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0.00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0		$0	$0
				Annual treatment costs		$0			
Number of years of treatment		years							
				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	$3,159,168		$0	$3,159,168
					% of Total			0%	100%

* For construction of passive treatment system refer to "Water Management". ARD/ML seepage treatment becomes post-closure water treatment cost

**Heap leach ARD/ML seepage treatment becomes post-closure water treatment cost

0 **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	% Land	Land Cost	Water Cost
HAZARDOUS MATERIALS AUDIT									
Hazardous materials audit		allow	0	#N/A	$0.00	$0		$0	$0
BUILDING DECONTAMINATION & CONSOLIDATION OF HAZARDOUS MATERIALS									
Environmental technician/coordinator		mandays		#N/A	$0.00	$0		$0	$0
Decontaminate: oil, fuel and glycol systems		m2	8,490	#N/A	$22.80	$193,572		$0	$193,572
Decontaminate maintenance shop		mandays		#N/A	$0.00	$0		$0	$0
Decontaminate power plant		mandays		#N/A	$0.00	$0		$0	$0
Decontaminate bulk fuel storage		mandays		#N/A	$0.00	$0		$0	$0
Decontaminate ANFO plant		mandays		#N/A	$0.00	$0		$0	$0
Decontaminate offices/warehouse/accom		mandays		#N/A	$0.00	$0		$0	$0
Removal of asbestos containing vinyl sheet	flooring	m2	941	#N/A	$140.00	$131,740		$0	$131,740
Removal of asbestos containing vinyl floor tiles		m2	218	#N/A	$54.00	$11,772		$0	$11,772
Removal of asbestos containing mastic and	caulking	m	1,943	#N/A	$26.00	$50,518		$0	$50,518
HAZARDOUS MATERIALS REMOVAL									
Waste oils	Assumed	litre	1,000	ORH	$1.20	$1,200		$0	$1,200
Waste fuel		litre	100,000	ORL	$0.43	$43,000		$0	$43,000
Waste batteries		kg	500	#N/A	$25.00	$12,500		$0	$12,500
Assay & environmental lab reagents		kg		#N/A	$0.00	$0		$0	$0
Machine shop paints, solvents etc.		liter	5,000	ORH	$1.20	$6,000		$0	$6,000
Glycol		liter		#N/A	$0.00	$0		$0	$0
Process reagents		kg		#N/A	$0.00	$0		$0	$0
Nuclear sources		allow		#N/A	$0.00	$0		$0	$0
Other hazardous materials		allow		#N/A	$0.00	$0		$0	$0
HAZARDOUS MATERIALS									
Transportation to disposal facility		allow		#N/A	$0.00	$0		$0	$0
Disposal fees		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
CONTAMINATED SOILS									
Contam. soil investigation - Phase 1		each	0	#N/A	$0.00	$0		$0	$0
Contam. soil investigation - Phase 2	Additional investigation of ARD drainage	each	0	CS1L	$7,500.00	$0		$0	$0
CONTAMINATED SOIL REMOVAL									
Excavate and transport to onsite facility		m3	0	SC3S	$7.21	$0		$0	$0
Construct 4 additional landfarm cells		LS	1	#N/A	$180,000.00	$180,000		$0	$180,000
Excavate treated soils and move to on-site landfill		m3	0	SC3S	$7.21	$0		$0	$0
Manage hydrocarbon remediation at facility	Type-1 heavy fuel and oil	m3	35,200	CSRL	$47.00	$1,654,400		$0	$1,654,400
Type-2	Arsenic "hotspots" will be covered in place		2,000	#N/A	$0.00	$0		$0	$0
Type-3	CN- and PbNO3 will be covered in place		800	#N/A	$0.00	$0		$0	$0
Reagents/stabilizing agent		m2		#N/A	$0.00	$0		$0	$0
Excavate and transport to offsite facility		m3		#N/A	$0.00	$0		$0	$0
Contour decontaminated area		m3		#N/A	$0.00	$0		$0	$0
CONTAMINATED SOIL VERY LOW PERMEABILITY COVER									
Supply geomembrame, HDPE, ES3, GCL		m2		#N/A	$0.00	$0		$0	$0
Upper and lower bedding layers		m3		#N/A	$0.00	$0		$0	$0
Install geomembrane, HDPE, ES3, GCL		m2		#N/A	$0.00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0		$0	$0
Vegetate		m2		#N/A	$0.00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
OTHER									
				#N/A	$0.00	$0		$0	$0
					Total	$2,284,702		$0	$2,284,702
					% of Total			0%	100%

Waste and Hazardous Waste Removed from Site

Year	Quantities lbs. Waste	Hazardous waste	Total
2015	40,000	90,000	130,000
May-16	1,100		1,100
Jun-16	2,000	90,000	92,000
Jul-16	1,500	51,500	53,000
Aug-16	3,500	27,000	30,500
Oct-17	-	33,761	33,761
Total	48,100	292,261	340,361

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site		allow		#N/A	$0.00	$0		$0	$0
Decontaminate and dispose on-site		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
REMOVE BUILDINGS - see note below									
Accomodation Complex		m2	7,329	BRS1L	$45.00	$329,805		$0	$329,805
Hoist Room and Travel Ways		m2	463	BRCS	$128.00	$59,264		$0	$59,264
Shaft House		m2	1253	BRCS	$128.00	$160,384		$0	$160,384
Warehouse		m2	4671	BRCS	$128.00	$597,888		$0	$597,888
Mill		m2	2864	BRCS	$128.00	$366,592		$0	$366,592
Powerhouse		m2	1645	BRCS	$128.00	$210,560		$0	$210,560
Headframe		m2	413	BRCS	$128.00	$52,864		$0	$52,864
Airlock Building and Freshair Intake		m2	366	BRCS	$128.00	$46,848		$0	$46,848
Pastefill Plant	Pastefill plant has already been removed.	m2		#N/A	$0.00	$0		$0	$0
Cold Storage 2 buildings		m2	1855	BRS1L	$45.00	$83,475		$0	$83,475
Surface Mobile Shop		m2	1008	BRCS	$128.00	$129,024		$0	$129,024
Carpenter Shop		m2	482	BRS1L	$45.00	$21,690		$0	$21,690
As Treatment Plant Building		m2	177	BRCS	$128.00	$22,656		$0	$22,656
Pumphouse		m2	74	BRCS	$128.00	$9,472		$0	$9,472
Explosives Storage		m2	412	BRCS	$128.00	$52,736		$0	$52,736
Fire house		m2	31	BRCS	$128.00	$3,968		$0	$3,968
Emergency Power House		m2	117	BRCS	$128.00	$14,976		$0	$14,976
Weather Station and Storage Buildings		m2	566	BRS1L	$45.00	$25,470		$0	$25,470
Shop		m2	379	BRCS	$128.00	$48,512		$0	$48,512
Batch Plant		m2	118	BRCS	$128.00	$15,104		$0	$15,104
ATV Building		m2	172	BRS1L	$45.00	$7,740		$0	$7,740
Storage Facility at Laydown/Airstrip		m2		#N/A	$0.00	$0		$0	$0
Fuel tanks	Tanks	m2	8,490	BRS1S	$91.57	$777,429		$0	$777,429
Fuel Tanks	Piping removal and disposal	m2	2,000	PLRS	$18.39	$36,780		$0	$36,780
Freshwater intake		m2	225	BRCS	$128.00	$28,800		$0	$28,800
Reclaim pumps		m2		#N/A	$0.00	$0		$0	$0
Outfall & Diffuser		m2		#N/A	$0.00	$0		$0	$0
Airstrip lighting, navigation, electrician		mandays		#N/A	$0.00	$0		$0	$0
Airstrip lighting, navigation, mechanical		mandays		#N/A	$0.00	$0		$0	$0
Break foundation slabs	Use hoe ram to puncture slabs (25,000 m2 @ 100 m2/hr.) Leave in place and cover.	hrs	25	exc-s	$190.00	$4,750		$0	$4,750
Consolidate & dump boneyard debris		m3	1	#N/A	$350,000.00	$350,000		$0	$350,000
Other		m2		#N/A	$0.00	$0		$0	$0
LANDFILL FOR DEMOLITION WASTE									
Place rock cover		m3		#N/A	$0.00	$0		$0	$0
Place soil cover		m3	0	SB4L	$5.50	$0		$0	$0
Operation of landfill		LS	1	#N/A	$450,000.00	$450,000		$0	$450,000
Vegetate		ha		#N/A	$0.00	$0		$0	$0
GRADE AND CONTOUR PADS									
Grade/Contour Entire Mine Site Area	Covered under "Rock Pile" tab	m2	0	DRL	$1.05	$0		$0	$0
Place 0.3 m granular fill over slabs		m3	7,500	SB4L	$5.50	$41,250		$0	$41,250
Accomodation Complex		ha		#N/A	$0.00	$0		$0	$0
Process Facilities		ha		#N/A	$0.00	$0		$0	$0
Offices, Repair, Lab, Warehouse		ha		#N/A	$0.00	$0		$0	$0
Storage Facilites		ha		#N/A	$0.00	$0		$0	$0
Water and Wastewater Treatment Facilities		ha		#N/A	$0.00	$0		$0	$0
U/G Heating Plant		ha		#N/A	$0.00	$0		$0	$0
Emulsion Plant		ha		#N/A	$0.00	$0		$0	$0
Warehouse, Shops and Other		ha		#N/A	$0.00	$0		$0	$0
Place rock cover		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Other		m3		#N/A	$0.00	$0		$0	$0
PUNCTURE LINED SUMPS									
Puncture liner and place soil cover		m3		#N/A	$0.00	$0		$0	$0
RECLAIM ROADS									
Remove culverts		each	22	#N/A	$500.00	$11,000		$0	$11,000
Remove bridges		each		#N/A	$0.00	$0		$0	$0
Scarify and install water breaks		ha		#N/A	$0.00	$0		$0	$0
Scarify airstriip	Airstrip will stay in place	ha		#N/A	$0.00	$0		$0	$0
Scarify laydown areas	Scarify roads and grade	ha	12	SCFYH	$6,030.00	$72,360		$0	$72,360
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Other	Grade and counter esker borrow area	m3	180,000	DSL	$0.95	$171,000		$0	$171,000
SPECIALIZED ITEMS									
Dispose of misc. debris and laydown area refuse				#N/A	$0.00	$0		$0	$0
					Total	$4,202,397		$0	$4,202,397
					% of Total			0%	100%

Note: Unit costs are based on 3m high, single storey building. Scale larger building areas accordingly. E.g. 10m high building multiply area by 3.3 (10/3)

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	
BREACH DYKE EMBANKMENT							
Remove fill		m3	0	#N/A	$0.00	$0	
Rip rap slope protection		m3	0	RR4L	$7.60	$0	
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	
Backfill/recontour		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	Includes on Bldgs & Equipment	m		#N/A	$0.00	$0	
Remove pump		LS	1	#N/A	$10,000.00	$10,000	
Remove pipeline	Assumed leave pipeline left in place	m	0	#N/A	$0.00	$0	
WATER CONTROL IN RECLAMATION QUARRY							
Install pumping system		LS		#N/A	$0.00	$0	
Remove pumping system		LS		#N/A	$0.00	$0	
REMOVE PIPELINES							
Remove pipes		m		#N/A	$0.00	$0	
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		LS		#N/A	$0.00	$0	
Build sludge containment facility							
Treatment Plant Operation	Lime treatment	m3	1786000	TPOS	$0.15	$267,900	Water quatity to be lime treated. estimated as follows: Pond 2 1000 x 700 m x 1.9 m and Pond 1 800 x 300 x 1.9 m. One time treatment only - not required after cover is completed.
					Total	$277,900	

For cost of long-term/post-closure water treatment see "WATER TREATMENT" Worksheet"

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
ADDITION OF REAGENTS TO WTP						
H2O2		kg		#N/A	$0.00	$0
lime	Covered under "Water Management" tab	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
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
	Costs for one-time treatment to lower ponds is provided in "Water Management" tab				**Annual water treatment costs**	$0
Number of years of water treatment	Assumed water treatment is not required post-closure because the TCA is covered.	years				
					Total	$0

1 **Interim Care and Maintenance**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
INTERIM CARE & MAINTENANCE						
on-site caretaker		manmonths		#N/A	0	$0
Spring extra personnel		manmonths	3	#N/A	13194	$39,582
-electrician		manmonths		#N/A	0	$0
-mechanic		manmonths	2	#N/A	11517	$23,034
annual fuel	Available on site.	litre		#N/A	0	$0
misc. supplies	Available on site.	allow		#N/A	0	$0
pick-up truck	Available on site.	each		#N/A	0	$0
small dozer	Available on site.	allow		#N/A	0	$0
small excavator	Available on site.	allow		#N/A	0	$0
snow machine	Available on site.	allow		#N/A	0	$0
communications		allow	1	#N/A	25000	$25,000
SNP/AEMP water sampling & reporting	From "PostClosure" sheet	each	1	#N/A	12360	$12,360
geotechnical assessment	From "PostClosure" sheet	each	1	#N/A	22923.49	$22,923
interim water treatment	Covered under "Water Management"			#N/A		$0
Worker accomodations		mandays	150	ACCMS	74.13	$11,120
				Annual	Interim C&M Cost	$134,019
Number of years of ICM		years	2		**Total**	$268,038

1 **Post-Closure Monitoring & Maintenance:**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MONITORING & INSPECTIONS						
Annual geotechnical inspection		each	10	#N/A	$22,923.49	$229,235
Survey inspection		each		#N/A	$0.00	$0
Monitoring years - 10	Includes Maintenance	Year	3	LMI	$100,000.00	$300,000
Regulatory costs*		each		#N/A	$0.00	$0
Site water monitoring (AEMP and SNP)	Water sampling	each	10	#N/A	$12,360.00	$123,600
- Active closure and flooding		each		#N/A	$0.00	$0
- Post pit flooding		each		#N/A	$0.00	$0
Air Quality Monitoring Program (AQMP)	Not required	each	0	#N/A	$0.00	$0
Environmental Effects Monitoring (EEM) after 3 years		each	1	#N/A	$126,079.00	$126,079
Wildlife Effects Monitoring Program (WEMP)	Not required	each	0	#N/A	$0.00	$0
Vegetation Monitoring		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"						$0
Subtotal for first 10 years, undiscounted						$778,914
Discount rate for calculation of net present value of post-closure cost, %				3.00%		
Number of years of post-closure activity				25	years	
Net Present Value of payment stream						$936,257

One time lime treatment allowed for in "Water Management". No further treatment will be required after the cover is completed.

*Regulatory costs - annual reporting, management plans, progress reports etc.

Annual Discount 3%

	Geotechnical and Water Sampling		Monitoring and Maintenance		EEM		
Year	Cost	Discounted Cost	Every 3 years	Discounted Cost	One Time	Discounted Cost	Total Yearly
1	-	-		-		-	-
2	-	-		-		-	-
3	35,283.5	32,289.4	100,000	91,514	126,079	115,380	239,184
4	35,283.5	31,348.9		-		-	31,349
5	35,283.5	30,435.8		-		-	30,436
6	35,283.5	29,549.4	100,000	83,748		-	113,298
7	35,283.5	28,688.7		-		-	28,689
8	35,283.5	27,853.1		-		-	27,853
9	35,283.5	27,041.9	100,000	76,642		-	103,684
10	35,283.5	26,254.2		-		-	26,254
11		-		-		-	-
12		-	100,000	70,138		-	70,138
13		-		-		-	-
14		-		-		-	-
15	35,283.5	22,647.1	100,000	64,186		-	86,833
16		-		-		-	-
17		-		-		-	-
18		-	100,000	58,739		-	58,739
19		-		-		-	-
20		-		-		-	-
21		-	100,000	53,755		-	53,755
22		-		-		-	-
23		-		-		-	-
24		-	100,000	49,193		-	49,193
25	35,283.5	16,851.6		-		-	16,852
Net Present Value:		272,960.2		547,916		115,380	936,257

Costs for geotechnical and water sampling in years 1 and 2 are covered in 2 years of interim care and maintenance (see ICM sheet)

1 **Mobilization/Demobilization:**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	
MOBILIZE HEAVY EQUIPMENT							
Excavators		each	1	#N/A	150000	$150,000	Assumed the use of equipment on site, 2014 LMI estimation includes an additional 10 units of equipment will be brought in.
Dump trucks		each	1	#N/A	50000	$50,000	
Dozers		each	1	#N/A	150000	$150,000	
Demolition shears		each	2	#N/A	300000	$600,000	
Crane		each	1	#N/A	150000	$150,000	
Loader		each	1	#N/A	150000	$150,000	
Compactor		each		#N/A	0	$0	
Light duty vehicles		each	3	#N/A	20000	$60,000	
MOBILIZE MISC. EQUIPMENT							
Pump shipping		each		#N/A	0	$0	
Pipe shipping		m		#N/A	0	$0	
Minor tools and equipment		allow	1	#N/A	100000	$100,000	
Truck tires		allow		#N/A	0	$0	
Other				#N/A	0	$0	
MOBILIZE CAMP							
Reclamation activities		allow		#N/A	0	$0	
Long term reclamation activities (eg pump flooding)		allow		#N/A	0	$0	
MOBILIZE WORKERS							
Reclamation activities - transport	Twin Otter flights	each	48	MWL	4500.00	$216,000	
Reclamation activities - transport	Dash 7 flights	each	20	MWH	9100.00	$182,000	
Reclamation activities - transport	Hercules flights	each	5	#N/A	20000	$100,000	
Rotation over reclamation period		manhours	0	lab-sL	41	$0	
Reclamation activities - travel time		manday	0	ACCMH	175	$0	
Long term reclamation activities (eg pump flooding) - transport		each		#N/A	0	$0	
Long term reclamation activities (eg pump flooding) - travel time		each		#N/A	0	$0	
Monitoring Airfare		each		#N/A	0	$0	
WORKER ACCOMMODATIONS							
Reclamation activities		mandays	6,600	ACMMS	74.13	$489,258	
Long term reclamation activities (eg pump flooding)		manmonths		#N/A	0	$0	
MOBILIZE FUEL							
Fuel freight - reclamation activities		liter		#N/A	0	$0	
Fuel freight - long term reclamation activities		liter		#N/A	0	$0	
Fuel freight accommodations		liter		#N/A	0	$0	
WINTER ROAD							
Construction and operation	366 km GK to site times 2 seasons	km	732	WRCL	2000	$1,464,000	
Limited winter use		km		#N/A	0	$0	
Winter road tariff	20,000 tonnes x 220 km x 2 seasons	ntonne	8,800,000	WRUS	0.11	$968,000	
DEMOBILIZE HEAVY EQUIPMENT							
Excavators	Rental of equipment while on site is under "Mobilize". Mob/demob is under "Winter Road"	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 WORKERS							
crew travel time		mandays		#N/A	0	$0	Time is covered in contractor's quote for demolition.
crew transportation		each		#N/A	0	$0	Demob cost is covered in fligts under "Mobilization"
					Total	**$4,829,258**	

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

Filter by unit

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	COMMENTS
Accomodation							
		ACCM	manday	100.00	175.00	74.13	From LMI costs of $2225 / manmonth using existing camp
Buildings - Decontaminate							
	Asbestos	BDA	m2	25.60	51.20		Low: removal of asbestos siding & flooring; High: removal of insulated pipes, friable asbestos
Buildings - Remove							Unit costs are based on 3m high, single storey building. Scale areas accordingly.
	Wood	BRW	m2	27.50	41.00		
	Concrete	BRC	m2	40.00	65.00	128.00	Specified: puncture concrete foundation slabs
	Steel - teardown	BRS1	m2	45.00	65.00	91.57	
	Steel - for salvage	BRS2	m2	67.00	100.00		
Concrete work							
	Small pour	CSF	m3	426.50	639.75		Low: YK; High=1.5xLow
	Large pour	CLF	m3	353.50	530.25	2,130.00	Specified: concrete crown pillar
Contaminated Soils							
	ESA Phase 1	CS1	each	7500.00			Low: small, "clean" site
	ESA Phase 1	CS2	each	50000.00			Low: small, "clean" site
	Remediate on site	CSR	m3	47.00	146.00	60.17	Low - 1 cell is complete and cost to construct 4 more cells is already allowed for.
Dozing							
	doze rock piles	DR	m3	1.05	2.40		Low cost: doze crest off dump
	doze overburden/soil piles	DS	m3	0.95	3.80	3.50	Special rate. Ample rock is available near stopes.
Excavate Rock; Low Spec's and QA/QC							
	drill/blast/load/short haul	RB1	m3	11.40	17.05		Low:quarry operations for bulk fill
	drill/blast/load/long haul	RB2	m3	12.05	17.80		
	RB1 + spread and compact	RB3	m3	12.05	17.80		
	RB2 + spread and compact	RB4	m3	12.50	30.75		
	Specified activity	RBS	m3				
Excavate Rock; High Spec's and QA/QC							(e.g. ditch/spillway excavation)
	drill/blast/load/short haul	RC1	m3	12.05	17.80		Low:foundation excavation;High:spillway excavation
	drill/blast/load/long haul	RC2	m3	12.70	18.40		
	RC1 + spread and compact	RC3	m3	12.70	18.40		e,g, cover construction
	RC2 + spread and compact	RC4	m3	13.50	19.20		e,g, cover construction
	Specified activity	RCS	m3			175.00	Specified-drift excavation
Excavate Rip Rap							
	drill/blast/load/short haul/place	RR1	m3	13.50	17.75	15.20	High: quarry & place rip rap in channel
	drill/blast/load/long haul/place	RR2	m3	14.20	20.65		
	source is waste dump/short haul	RR3	m3	7.00			cost includes sorting
	source is waste dump/long haul	RR4	m3	7.60		4.72	S - Based on LMI costs for 2016 haul from Ballpark to TCA and average cycle times to 3 locations.
	Specified activity	RRS	m3			85,656.00	
Excavate Soil; Low Spec's and QA/QC							
	clear & grub	SBC	m2	3.40	5.00		
	excavate/load/short haul	SB1	m3	4.30	5.90		
	excavate/load/long haul	SB2	m3	4.60	7.30		
	SB1 + spread and compact	SB3	m3	5.10	8.90		Low: non-engineered; High:engineered
	SB2 + spread and compact	SB4	m3	5.50	11.00		Low: non-engineered; High:engineered
	Specified activity	SBS	m3	3.20	6.30		Low: rehandle waste rock dump by dozing; High:rehandle waste rock by hauling
	Tailings	SBT	m3	1.35	3.70	15.50	High:contour surface - wet or frozen; Specified:haul/place wet infill
Excavate Soil, High Spec's and QA/QC							
	excavate/load/short haul	SC1	m3	6.80	9.30		
	excavate/load/long haul	SC2	m3	7.10	11.75		
	SC1 + spread and compact	SC3	m3	8.90	14.20	7.21	Low: non-engineered; High:engineered
	SC2 + spread and compact	SC4	m3	9.30	23.20	7.02	Low: non-engineered; High:engineered (e.g. complex covers, low volume dam construction)
	Specified activity	SCS	m3			18.80	Backfill adit with waste rock
Fence							
		FNC	m	13.55	203.00		
Fuel and Electricity							
	Fuel cost - gas	FCG	litre	1.05	1.40		
	Fuel cost - diesel	FCD	litre	0.99	1.39		
	Fuel mobilization	FCM	litre	0.22	0.42		High: winter road usage
	Electricity	FCE	kW-h	0.17	0.19	0.49	Low and High:Yellowknife; Specified:diesel generator
Geo-Synthetics							
	geotextile	GST	m2	3.44			Supply and install
	geogrid	GSG	m2	5.75			
	liner, HDPE	GSHDPE	m2	7.95			Supply and install; large quantity
	liner, ES3	GSES3	m2	20.20			FOB Yellowknife
	geosynthetic installation	GSI	m2	3.16	14.00		Low:geotextile; High:ES3 or HDPE
	bentonite soil ammendment	GSBA	tonne	308.30	348.50		FOB Edmonton, add shipping & mixing
Grouting (/m3 of rock grouted)							
		grout	m3	236.55	286.75		High: cement, FOB Yellowknife
Labour & Equipment Rates							
	Site manager	sman	$/hr	125.00	152.00		
	Supervisor	super	$/hr	52.00	91.84		
	Registered engineer	eng	$/hr	95.00	220.00		
	Environmental coordinator	envco	$/hr	74.16	130.00		
	Evironmental technologist	envtech	$/hr	36.00			
	Electrician	elec	$/hr	74.00	95.00		
	Journeyman - various	journey	$/hr	44.00	71.79		
	Labour - skilled	lab-s	$/hr	41.00	49.60		

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

	Filter by unit					
Labour - unskilled	lab-us	$/hr	31.00	43.98		
Equipment operator	oper	$/hr	41.00	65.00		
Heavy duty mechanic	mech	$/hr	49.00	72.85		
Water treatment plant operator	oper-wt	$/hr	41.00	59.86		
Security / first aid	safety	$/hr	36.00	66.97		
Administative staff	admin	$/hr	38.00	57.89		
Equipment rates include operator and fuel						
Loader - 4 cu.yd (3.06m3)	load-s	$/hr	175.00			
Loader - 7 cu.yd (5.35m3)	load-l	$/hr	315.00			
Excavator - 26.76-30.84 tonnes	exc-s	$/hr	190.00			
Excavator - 68.95+tonnes	exc-l	$/hr	420.00			
Grader	grad	$/hr	190.00			
Dump truck off hwy 30-50 tonnes	truck-s	$/hr	225.00			
Dump truck off hwy 55-75 tonnes	truck-l	$/hr	300.00			
dozer, small	dozers	$/hr	205.00	260.00		
dozer, large	dozerl	$/hr	490.00	565.00		
smooth drum compactor	comp	$/hr	155.00			
scooptram, 6 yd3 bucket	scoop	$/hr	170.00			
flat bed truck with hiab	hiab	$/hr	155.00			
fuel truck	ftruck	$/hr	150.00			
water truck	wtruck	$/hr	58.00	150.00		
Mobilize Heavy Equipment						
Road access	MHER	kmtonne	3.40	10.25		
Air access	MHEA	kmtonne	12.00			cargo rate>500lb
Mobilize Camp						
Road access	MCR	each	50000.00			refurbish existing camp
Mobilize Workers						
flight	MW	each	4500.00	9100.00		Low:e.g. 8 passenger; High: Dash 7
Oil Removal						
oil removal	OR	litre	0.43	1.20		Low:waste oil heater; High: ship offsite
PCB Removal						
Remove from site	PCBR	litre	40.20	46.90	7.21	Low: shipping, handling & disposal from Yellowknife
Pipes, small (<6in dia.)						
remove/dispose on site	PSR	m	1.00	24.00		Low: remove/dispose on site; High: remove/re-use
supply	PSS	m	6.10	11.10		Low:supply; High:supply and ship
install	PSI	m	25.00			
Pipes, large (>6in dia.)						
remove/dispose on site	PLR	m	22.00	72.00	18.39	Low: remove/dispose on site; High: remove/re-use
supply	PLS	m	129.00	143.00		Low:supply; High:supply and ship
install	PLI	m	50.00			
Power Lines						
remove/dispose on site	POWR	m	25.50			
Process Chemicals						
Remove from site	PCR	kg	0.45	2.50		Low: shipping, handling & disposal from Yellowknife
Pumps						
Pump capital cost	PC	each	195000.00			
Pump shipping	PS	each	2500.00			
Pump operating cost	POC	m3	0.12			pump operating costs should be calculated based on pump capacity, fuel costs, etc.
Pump maintenance	PM	allow	25000.00			
Pump sand BackFill						
	PBF	m3	85.00	300.00		
Scarify - road/mine site						
	SCFY	ha	4300	6030	2150	
Shaft, Raise & Portal Closures						
Shaft & Raises	SR	m2	645.00	2132.00		Low:pre-cast concrete slabs, little site prep. Area=shaft+>1m all around
Portals	POR	m3	18.80	250.00	1200.00	Low:unit cost code SCS;High:excavate & backfill collapsed portal;Spec: installed pressure plug
Site Inspection Report						
	RPT	each	10000.00	20000.00		
SpillWay - Clear						
	SW	each	3000.00	7000.00		
Survey/Instrumentation						
	SI	each	1800.00	3600.00		2 person crew
Treatment Plant - Construct						
Small (< 1000 m3/d)	TPS	lump sum	9000000	15000000		
Large (> 1000 m3/d)	TPL	lump sum	15000000	46000000		
Constructed Wetland	CWTS	ha	200000	300000		
Treatment Plant - Operate						
	TPO	m3	0.35	2.00	0.15	TPOS is from Lupin costs for most recent treatment (i.e. simple lime addition to raise pH to 8)
Treatment Chemicals						
ferric sulphate	ferric	kg	1.19			
ferrous sulphate	ferrous	kg	1.32			
lime	lime	kg	0.56			
hydrogen peroxide, 35%	hperox	kg	1.50			
Sodium Metabisulfate	Nametab	kg	1.18			
Caustic soda, 50%	caustic	kg	0.74			
Sulfuric acid, 93%	sulfuric	kg	0.31			
flocculant	flocc	kg	6.00			
copper sulphate	copper	kg				

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

	Filter by unit					
shipping	shipping	kg	0.20			
Vegetation						
Hydroseed, Flat	VHF	ha	4000.00			
Hydroseed, Sloped	VHS	ha	4500.00			
Veg. blanket/erosion mat	VB	ha	13000.00			
Tree planting	VT	ha	2600.00	6000.00		
Wetland species	VW	ha			47.72	Specified= /m3, Wetland Growth Media Substrate mixed and installed (sand, biochar and fertilizer, woodchips)
Water Sampling/Analysis/Reporting						
	WS	each	7000.00	10000.00		
Winter Road						
Construction	WRC	km	2000.00	11500.00		
Usage	WRU	kmtonne	0.29		0.11	LMI quote asuming shared use with diamond mines

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