TECHNICAL MEMORANDUM

DATE 1 November 2019 **Reference No.** 19120487/1030

TO Karyn Lewis
Lupin Mines Inc.

CC Dionne Filiatrault

FROM Ken Bocking **EMAIL kbocking@golder.com**

UPDATED SECURITY ESTIMATE RECLAIM MODEL

1.0 INTRODUCTION

Lupin Mines Incorporated (LMI) has applied for a renewal and amendment of their existing Type "A" water licence No. 2AM-LUP1520 (Water Licence). A Final Closure and Reclamation Plan (FCRP) was filed as part of the application. In connection with the application, a Technical Meeting / Pre-Hearing Conference (TM/PHC) was held in Kugluktuk on June 6 and 7, 2019. The decision from the TM/PHC is provided in Nunavut Water Board (NWB), 2019. Appended to the decision was a list of commitments for additional information to be provided to the NWB.

This Technical Memo addresses Commitment 2, which requires LMI to submit an updated security estimate RECLAIM model to reflect updated final closure and reclamation planning.

2.0 EXISTING FINANCIAL SECURITY

The current reclamation security amount pertains to the most recently approved Interim Closure and Reclamation Plan (ICRP), dated October 18, 2017. In 2016, LMI arranged for their reclamation security estimate to be compiled into the RECLAIM costing tool consistent with direction provided in Part C, Item 5 of the Water Licence. On March 28, 2017, the NWB issued Amendment No. 1 to the Lupin Mine Water Licence to set the amount of reclamation security required under Part C, Item 1 of the Water Licence at $34.65 million. This amendment was subsequently approved by the federal Minister responsible for Crown Indigenous Relation and Northern Affairs Canada (CIRNAC) on May 12, 2017.

On April 18, 2018, the NWB issued Amendment 2, which reduced the reclamation security amount to $29.305 million. The specific reasons for the decision for a security reduction of $5.34 million were documented in NWB (2018). Amendment No. 2 was accepted in recognition of reclamation work that had been completed as of July 1, 2017.

LMI subsequently requested a further reduction in the reclamation security amount for additional reclamation work that had been completed between July 1, 2017 and July 5, 2018. In December 2018, the NWB and CIRNAC agreed to a further security reduction of $3.197 million incorporated into Amendment No. 3. The Water Licence Part C, Item 1 (amended) currently requires posting of $ 26.107 million in security with the Minister of CIRNAC.

Golder Associates Ltd.
16820 107 Avenue, Edmonton, Alberta, T5P 4C3, Canada T: +1 780 483 3499 F: +1 780 483 1574

3.0 BASIS FOR CHANGES

The unit costs that were used in the ICRP estimate were largely based on two sources:

- values taken from the unit cost database in the RECLAIM v7.0, and
- actual costs charged to undertake site-specific progressive reclamation work.

It is understood that the values in the RECLAIM database are all-inclusive unit costs based on precedent work undertaken at other northern mine sites. As such, they provide useful guidance; however, the costs depend on the specific circumstances of the precedent project(s). These RECLAIM values should therefore be used with caution and due consideration of the different circumstances at Lupin (e.g., the nearby availability of granular borrow in the Esker gravel pit). The actual progressive reclamation costs reflect work that was done with a limited fleet of generally small capacity equipment.

LMI has a contract with a Third-Party Contractor (“the Contractor”) to undertake the work required to implement final closure and reclamation. The unit costs from the Contractor quotation have been used in preparing the updated cost estimate for the FCRP. These unit costs are more appropriate than the values in the RECLAIM database because they are specific to the Lupin site and the specific work required to implement final closure. The Contractor is generally using a fleet of larger more efficient equipment.

The unit costs from the Contractor are typically lower than the unit rates from the RECLAIM. In part this reflects the use of a more efficient fleet of equipment. It should however also be noted that the Contractor costs are structured differently. The unit costs are not all-inclusive hourly rates. Items that are excluded from the unit costs and costed separately include: fuel (some supplied by LMI and some imported to site and costed separately), equipment maintenance, costs of equipment during mob/demob, contractor’s profit and equipment depreciation costs.

The final closure activities (FCRP 2018) incorporated a number of technical changes that affect the security cost estimate. These changes included:

- Rather than constructing concrete caps on the shaft and raises as previously proposed, these openings will now be backfilled to surface with waste materials and then covered with 1.0 m of esker materials.
- The previous cost estimate did not allow for the blasting down of the West Zone crown pillar. The current cost estimate now allows for the blasting of 9,250 m^3 of crown pillar rock.
- It is no longer planned to construct additional landfarm cells to bioremediate PHC contaminated soils; instead the excavated soils will now be disposed of in the open crown pillars for isolation.
- It was previously proposed to dispose of PAG waste rock either by stowing it underground or by hauling it to the TCA for covering. It is now proposed to doze the waste rock into a central “dome’ which will then be covered by a 1.0 m layer of esker material.
- Wastes including PHC contaminated soil, rock from “hotspots”, and packaged asbestos containing materials will now be disposed of into the open crown pillars.

4.0 FCRP COST ESTIMATE

In response to Commitment No. 2, the updated FCRP cost estimate is attached.

Relative to the ICRP estimate, the attached FCRP cost estimate also incorporates a number of additional updates, including the following:

- Changes reflecting work completed as progressive reclamation (per Amendments 1, 2 and 3);
- Updates reflecting technical changes incorporated in the FCRP as discussed above;
- Use of unit costs derived from the Contractor quotation;
- Inclusion of all “contractor indirect” costs from the Contractor quotation, which cover: mobilization and demobilization, fuel provided to the site, winter road costs, equipment maintenance, site maintenance, equipment depreciation, and contractor’s management and profit;
- A reduction in the contingency to 5% in light of the reduced uncertainty arising from the receipt of the firm quotation from the Contractor;
- The work under Interim Care and Maintenance (ICM) has been reduced to monitoring activities to be undertaken by LMI. Maintenance of the site for 2020 and 2021 is included in the Contractor estimate.
- Several items have been removed because they have been completed during 2019, including: the crown pillar study, the Human Health and Ecological Risk Assessment (HHERA) and the installation of final instrumentation in the TCA cover.
- Additional items have been added for:
    - disposal of the 1.5 km long freshwater line,
    - removal and disposal of the syphons from J Dam and Dam 2,
    - processing and disposal of the tanks in the Satellite Tank Farm,
    - regrading of the steep slopes on the Pond 2 side of M Dam, and
    - repairing the eroded section on the Pond 2 side of K Dam.

5.0 RECOMMENDATIONS AND NEXT STEPS

As outlined in the PHC Decision, the NWB expects LMI and Interveners, where applicable, to comply with the commitments that were provided in accordance with the timelines set out in the commitments and stipulated that failing to meeting the timelines agreed to in Commitment List could result in delays in the next steps and in the NWB cancelling or rescheduling the Public Hearing, if required. (NWB 2019).

The NWB tentatively set dates for the Public Hearing for the week of January 13-17, 2020. LMI proposes weekly meetings with CIRNAC to minimize potential delays in process in an effort to meet the schedule set by the NWB, to work cooperatively, to provide fulsome clarity, and to resolve potential issues, if any, related to the security estimate as well as Commitment No. 9 with respect to the framework for progressive release of security (due to the NWB no later than November 15, 2019).

6.0 CLOSURE

We trust that this technical memorandum meets your present requirements. If you have any questions, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

REGISTERED PROFESSIONAL ENGINEER
K. A. BOCKING
LICENSEE
N.W.T.

Ken Bocking, Msc, PEng (ON, Sask, Nu/NT)
Principal, Geotechnical Engineer

Dionne Filiatrault, PEng (Nu/NT)
Project Manager

KAB/DF/lm

Attachments: Lupin Mine Reclaim7 FCRP Update

https://golderassociates.sharepoint.com/sites/107254/project files/6 deliverables/security estimate reclaim model/final/191101 2am-lup1520 lmi response commitment_2_coverltr-ilae_final.docx

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 01 Nov 2019
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

REFERENCES

Nunavut Water Board, (NWB 2018), 'Licence No. 2AM-LUP1520 – Nunavut Water Board (NWB) Decision Regarding Request of Lupin Mines Incorporated (LMI) to Amend the Amount of Security Held under Part C, Item 1 of the Licence and further NWB Guidance regarding the Approval of the Interim Abandonment and Restoration Plan and Closure Cost Estimate under the Licence, Part C, Item 4 and Part I, Item 2', April 18, 2018.

NWB (Nunavut Water Board) 2019. 2AM-LUP1520 Application for the Amendment and Renewal of Type "A" Water Licence No: 2AM-LUP1520 - PHC Decision, June 2019.

ATTACHMENTS

Lupin Mine Reclaim7 FCRP Update

SUMMARY OF COSTS

CAPITAL COSTS	COMPONENT NAME	COST	LAND LIABILITY	WATER LIABILITY	
OPEN PIT		$0	$0	$0	
UNDERGROUND MINE		$246,298	$0	$246,298	
TAILINGS FACILITY		$999,674	$0	$999,674	
ROCK PILE		$1,420,840	$0	$1,420,840	
BUILDINGS AND EQUIPMENT		$3,139,434	$0	$3,139,434	
CHEMICALS AND CONTAMINATED SOIL MANAGEMEN		$464,521	$0	$464,521	
CONTRACTOR INDIRECTS		$4,029,017	-	$4,029,017	
SURFACE AND GROUNDWATER MANAGEMENT		$327,480	-	$327,480	
INTERIM CARE AND MAINTENANCE		$70,567	-	$70,567	By LMI
	SUBTOTAL: Capital Costs	**$10,697,831**	**$0**	**$10,697,831**	
	PERCENT OF SUBTOTAL		**0%**	**100%**	Assumed all water liability

INDIRECT COSTS		COST	LAND LIABILITY	WATER LIABILITY	
MOBILIZATION/DEMOB		$10,095,347	$0	$10,095,347	
POST-CLOSURE MONITORING AND MAINTENANCE		$936,257	$0	$936,257	
ENGINEERING	4%	$427,913	$0	$427,913	
PROJECT MANAGEMENT - CONTRACTOR	3.62%	$386,926	$0	$386,926	
PROJECT MANAGEMENT - LMI	1.38%	$147,966	$0	$147,966	
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	0%	$0	$0	$0	
BONDING/INSURANCE	1%	$106,978	$0	$106,978	
CONTINGENCY	5%	$534,892	$0	$534,892	Less uncertainty under firm bid.
MARKET PRICE FACTOR ADJUSTMENT	0%	$0	$0	$0	
	SUBTOTAL: Indirect Costs	**$12,636,278**	**$0**	**$12,636,278**	

TOTAL COSTS	**$23,334,109**	**$0**	**$23,334,109**

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

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
FLOOD PIT-Capital									
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, commissioning/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%

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

ACTIVITY/MATERIAL	Notes	Unit	Qty	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	
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 - 10 m long	m3	250	DRS	$2.06	$515		$0	$515	
Remove CMP		m2	0	BRS1L	$45.00	$0		$0	$0	Leave in place and cover
Backfill portal #2		m3		#N/A	$0.00	$0		$0	$0	
Cap raises - 5 total		m3	0	RRSS	$85,656.00	$0		$0	$0	Not necessary; will be backfilled and covered by waste rock "dome"
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	Esker cap over backfilled West Zone	m3	0	SC4S	$3.98	$0		$0	$0	Included in 1.0 m cover on "dome" area
Concrete cap over open stope		m3		#N/A	$0.00	$0		$0	$0	
Crown Pillar Study		each	0	#N/A	$25,000.00	$0		$0	$0	
CROWN PILLAR BLASTING FOR STORAGE										Final FCRP now proposes to blast 9250 m3 in West Zone only.
Pump out water from crown pillars		m3	5,250	POCS	$1.57	$8,243		$0	$8,243	
West Zone		m3	9,250	#N/A	$25.68	$237,540		$0	$237,540	Cost basis: $22.84 / kg explosive @ 0.44 kg/tonne. Assumed 2.56 tonne/m3.
Central Zone		m3	0	#N/A	$0.00	$0		$0	$0	
East Zone		m3	0	#N/A	$0.00	$0		$0	$0	
Shafts		m3	0	#N/A	$0.00	$0		$0	$0	
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	

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

ACTIVITY/MATERIAL	Notes	Unit	Qty	Code	Unit Cost	Cost % Land	Land Cost	Water Cost
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	$246,298	$0	$246,298
					% of Total		0%	100%

Tailings Impoundment Name:

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	Place coarse esker toe berm to repair wave cut on K Dam	m3	17,000	SC1S	$2.74	$46,580		$0	$46,580	
Rip rap		m3	0	RR3L	$7.00	$0		$0	$0	
Vegetate		ha		#N/A	$0.00	$0		$0	$0	
Raise crest		m3		#N/A	$0.00	$0		$0	$0	
Flatten slopes	Flatten granular fill on Pond 2 side of Dam M	m2	7,500	#N/A	$2.53	$18,975		$0	$18,975	
Other		m3		#N/A	$0.00	$0		$0	$0	
COVER TAILINGS										
Grade/shape tailings surface		m3		SC3S	$4.01	$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	Cell 5 (104,500 m3) and Cell 3 (86,000 m3)	m3	190,500	SC3S	$4.01	$763,905		$0	$763,905	Quantity updated as of 2019.
Vegetate		m2		#N/A	$0.00	$0		$0	$0	
Cover tailings exposed in Cell 4	Place esker cover on tailings exposed at lower water level in Cell 4	m3	14,000	SC3S	$4.01	$56,140		$0	$56,140	
BURY PAG ROCK / TAILINGS										
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	
Remove tailings from emergency dump ponds	Excavate and relocate to TCA Cell 5	m3	300	#N/A	$7.92	$2,376		$0	$2,376	
STABILIZE DECANT SYSTEM										
Remove and dispose of syphons (8) from J Dam and Dam 1A		m	200	PLRL	$22.00	$4,400		$0	$4,400	
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		m	4,000	PLRS	$4.75	$19,000		$0	$19,000	Includes both freshwater pipeline, and tailings pipeline.
Remove reclaim barge		allow		#N/A	$0.00	$0		$0	$0	

Tailings Impoundment Name:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost	
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 SPILLWAYS										
Cell 4 Outlet	Remove culvert and rip rap remaining channel	LS	1	#N/A	$19,009.00	$19,009		$0	$19,009	
Excavate channel, soil	Spillway on Dam 1A and Dam J	m3	12,350	SB1L	$4.30	$53,105		$0	$53,105	To be constructed later by LMI.
Concrete		m3		#N/A	$0.00	$0		$0	$0	
Rip rap	Cover the spillway invert and channel slopes to 2 m flow depth using rip rap recovered from dam slopes.	m3	936	RR3L	$7.00	$6,552		$0	$6,552	To be constructed later by LMI.
Geotextile	Place under spillway rip rap.	m2	2,800	GSTL	$3.44	$9,632		$0	$9,632	To be constructed later by LMI.
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	0	#N/A	$30,000.00	$0		$0	$0	Completed by Stantec in summer 2019.
Install permanent instrumentation, drilling		each	0	#N/A	$30,000.00	$0			$0	Completed by Stantec in summer 2019.
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	$999,674		$0	$999,674	
					% of Total			0%	100%	

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

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	232,000	SC4S	$3.98	$923,360		$0	$923,360	Area per Commitment 5.
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 geomembrane		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	

Rock Pile Name:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	% Cost Land	Land Cost	Water Cost	
CONSOLIDATE ROCK INTO CENTRAL AREA									
Load, haul, dump or doze		m3	191,000	RR4S	$2.48	$473,680	$0	$473,680	
Add lime		tonne		#N/A	$0.00	$0	$0	$0	
Contour area of rock left in place		m2	0	DRL	$1.05	$0	$0	$0	Contouring included in rock placement costs
Environmental Site Assessment		allow	0	#N/A	$200,000	$0	$0	$0	
SPECIALIZED ITEMS									
Install permanent instrumentation	Thermistor strings in rock dome area	each	10	#N/A	$2,000.00	$20,000	$0	$20,000	New item - by LMI
Install permanent instrumentation, drilling	2 hours excavator for each installation	hrs	20	exc-sL	$190.00	$3,800	$0	$3,800	New item - by LMI
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	$0	
				Total		$1,420,840	$0	$1,420,840	
				% of Total			0%	100%	

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									
Investigation of hazardous materials		allow	0	#N/A	$20,000.00	$0	$0	$0	Done: Arctic Response 2012 industrial hygeine assessment, Golder 2017 ACM survey
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	
Remove all asbestos containing materials	Safe disposal in landfill	m3	100	#N/A	$817.20	$81,720	$0	$81,720	
HAZARDOUS MATERIALS REMOVAL									
Waste oils	Assumed	litre	5,940	ORH	$1.20	$7,128	$0	$7,128	
Waste fuel		litre	36,113	ORL	$0.43	$15,529	$0	$15,529	Allowance to burn excess fuel brought to site. 100 drums to be left for oost-closure use.
Waste batteries		kg	500	#N/A	$0.00	$0	$0	$0	In other hazardous materials below
Assay & environmental lab reagents		kg		#N/A	$0.00	$0	$0	$0	
Machine shop paints, solvents etc.		liter	5,000	ORH	$0.00	$0	$0	$0	In other hazardous materials below
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	Non-ACM to Yellowknife - Assumed Qty.	kg	15,840	PCRL	$0.45	$7,128	$0	$7,128	
HAZARDOUS MATERIALS									
Transportation to disposal facility		allow		#N/A	$0.00	$0	$0	$0	
Disposal fees		allow		#N/A	$0.00	$0	$0	$0	
Non-ACM hazardous materials				#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	Completed July, 2019

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.

CONTAMINATED SOIL REMOVAL									
HHERA for Removal of Contaminated Soils	Assessment on Phase 1 and 2 ESA Data	allow	0	#N/A	$20,000.00	$0	$0	$0	Completed October, 2019
Excavate and transport to onsite facility		m3	0	SC3S	$4.01	$0	$0	$0	
Construct 4 additional landfarm cells		LS	0	#N/A	$180,000.00	$0	$0	$0	Will not construct additional cells.
Excavate treated soils and move to on-site landfill		m3	500	#N/A	$2.29	$1,145	$0	$1,145	
Manage hydrocarbon remediation at facility	Type-1 heavy fuel and oil	m3	0	CSRL	$47.00	$0	$0	$0	
Load, haul and dump into crown pillar	PHC Soils	m3	34,700	#N/A	$1.95	$67,665	$0	$67,665	
Type-2	As, CN- and PbNO3 to crown pillars	m3	16,700	#N/A	$2.22	$37,074	$0	$37,074	
Type-3		m3		#N/A	$0.00	$0	$0	$0	
Lumber/boneyard contaminated soils	Excavate and move to crown pillars	m3	1,966	#N/A	$2.74	$5,387	$0	$5,387	
Waste rock from mill laydown area	Excavate and move to crown pillars	m3	21,700	#N/A	$2.22	$48,174	$0	$48,174	
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 geomembrane, 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	**$464,521**	**$0**	**$464,521**	
					% of Total		0%	100%	

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		m3	540	#NA	$30.49	$16,465	$0	$16,465	
Other				#N/A	$0.00	$0	$0	$0	
REMOVE BUILDINGS - see note below									
Accommodation Complex		m2	7,329	#N/A	$28.13	$206,165	$0	$206,165	
Hoist Room and Travel Ways		m2	463	#N/A	$203.30	$94,128	$0	$94,128	
Shaft House		m2	1,253	#N/A	$203.30	$254,735	$0	$254,735	
Warehouse		m2	4,671	#N/A	$70.72	$330,333	$0	$330,333	
Mill		m2	2,864	#N/A	$208.72	$597,774	$0	$597,774	
Powerhouse		m2	1,645	#N/A	$115.48	$189,965	$0	$189,965	
Headframe		m2	413	#N/A	$203.32	$83,971	$0	$83,971	
Airlock Building and Fresh air Intake		m2	366	#N/A	$29.84	$10,921	$0	$10,921	
Pastefill Plant	Pastefill plant has already been removed	m2		#N/A	$0.00	$0	$0	$0	Landfarm slab will be punctured and then covered under the "dome".
Cold Storage 2 buildings		m2	1,855	#N/A	$50.59	$93,844	$0	$93,844	
Surface Mobile Shop		m2	1,008	#N/A	$0.00	$0	$0	$0	Shop will be left in place to support post-closure.
Carpenter Shop		m2	482	#N/A	$50.59	$24,384	$0	$24,384	
As Treatment Plant Building		m2	177	#N/A	$0.00	$0	$0	$0	As treatment plant will be left in place
Pumphouse		m2	74	#N/A	$124.53	$9,215	$0	$9,215	
Explosives Storage		m2	412	#N/A	$124.53	$51,306	$0	$51,306	
Fire house		m2	31	#N/A	$29.84	$925	$0	$925	
Emergency Power House		m2	117	#N/A	$29.84	$3,491	$0	$3,491	
Weather Station and Storage Buildings		m2	566	#N/A	$29.84	$16,889	$0	$16,889	
Shop		m2	379	#N/A	$29.84	$11,309	$0	$11,309	
Batch Plant		m2	118	#N/A	$29.84	$3,521	$0	$3,521	
ATV Building		m2	172	#N/A	$29.84	$5,132	$0	$5,132	
Storage Facility at Laydown/Airstrip		m2		#N/A	$0.00	$0	$0	$0	Previously removed
Fuel tanks	Main Tank Farm	m2	8,490	BRS1S	$68.49	$581,480	$0	$581,480	
Fuel tanks	Satellite Tank Farm	m2	989	BRS1S	$68.49	$67,737	$0	$67,737	
Fuel Tanks	Piping removal and disposal	m2	2,000	PLRS	$0.00	$0	$0	$0	Included in the above items
Freshwater intake		m2	0	BRCS	$128.00	$0	$0	$0	Included as "pumphouse" above
Reclaim pumps		m2		#N/A	$0.00	$0	$0	$0	
Flush sewage pipelines		LS	1	#N/A	$7,128.00	$7,128	$0	$7,128	
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. Leave in place and cover.	m2	15,000	#N/A	$4.02	$60,300	$0	$60,300	
Boneyard debris and steel from tanks	Place in landfill	m3	20,000	#N/A	$9.14	$182,800	$0	$182,800	
Other		m2		#N/A	$0.00	$0	$0	$0	

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost	
LANDFILL FOR DEMOLITION WASTE										
Place rock cover	10,650 + 500 to fill voids	m3	11,150	RR4S	$3.07	$34,231		$0	$34,231	
Place soil cover		m3	13,500	SB4L	$3.95	$53,325		$0	$53,325	
Clean burn pit and incinerator	Dispose waste in on-site landfill	LS	1	#N/A	$11,880.00	$11,880		$0	$11,880	
Operation of landfill		LS	0	#N/A	$240,000.00	$0		$0	$0	Included in placement.
Load, haul and dump in landfill		m3	30,000	SB1S	$3.07	$92,100		$0	$92,100	
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	0	SB4L	$5.50	$0		$0	$0	Covered by general 1.0 m "dome" cover.
Accommodation 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 Facilities		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	$199.00	$4,378		$0	$4,378	Includes culvert removal and road scarification.
Remove bridges		each		#N/A	$0.00	$0		$0	$0	
Scarify and install water breaks		ha		#N/A	$0.00	$0		$0	$0	
Scarify airstrip	Airstrip will stay in place	ha		#N/A	$0.00	$0		$0	$0	
Scarify laydown areas	Scarify roads and grade	ha	0	SCFYH	$6,030.00	$0		$0	$0	Item for culvert removal includes road scarification.
Vegetate		ha		#N/A	$0.00	$0		$0	$0	
Other	Grade and contour esker borrow area	m3	180,000	DSS	$0.22	$39,600		$0	$39,600	
SPECIALIZED ITEMS										
Dispose of misc. debris and laydown area refuse				#N/A	$0.00	$0		$0	$0	
					Total	**$3,139,434**		$0	**$3,139,434**	
					% of Total			0%	100%	

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	
BREACH DYKE EMBANKMENT							
Upper and Lower Sewage Lakes	Excavate spillways and place rip rap	LS	1	#N/A	$11,880.00	$11,880	
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	0	#N/A	$10,000.00	$0	Included under Pumphouse in B&E.
Remove pipeline		m	0	PLRS	$4.75	$0	Included under "Pipe" on tailings sheet.
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	

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	
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	Repair existing As treatment plant	LS	1	#N/A	$35,000.00	$35,000	
Build sludge containment facility							
Treatment Plant Operation	Lime treatment	bag	5000	#N/A	$56.120	$280,600	Unit price per bag of lime includes purchase, delivery, application and management.
					Total	$327,480	

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

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

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	0	#N/A	$13,194	$0	Included in Contractor site maintenance under "Mobilization"
-electrician		manmonths		#N/A	$0	$0	
-mechanic		manmonths	0	#N/A	$11,517	$0	Included in Contractor site maintenance under "Mobilization"
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	0	#N/A	$25,000	$0	Included in Contractor site maintenance under "Mobilization"
SNP/AEMP water sampling & reporting	From "PostClosure" sheet	each	1	#N/A	$12,360	$12,360	
geotechnical assessment	From "PostClosure" sheet	each	1	#N/A	$22,923	$22,923	
interim water treatment	Covered under "Water Management"			#N/A	$0	$0	
Worker accommodations		mandays	8	#N/A	$0	$0	Provided in contract with Contractor.
					Annual Interim C&M Cost	$35,283	
Number of years of ICM		years	2		Total	$70,567	

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)

Mobilization/Demobilization:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MOBILIZE HEAVY EQUIPMENT						
Mobilize equipment fleet	Trucking costs	LS	1	#N/A	$1,888,200	$1,888,200
De-mobilize equipment fleet		LS	1	#N/A	$1,900,775	$1,900,775
De-mobilize salvageable equipment and materials		LS	1	#N/A	$107,479	$107,479
Labour for Mobilization and Demobilization	Labour	LS	1	#N/A	$195,525	$195,525
Equipment Fleet	Provision of equipment fleet (rental/depreciation)	LS	1	#N/A	$3,047,802	$3,047,802
Excavators		each	0	#N/A	$150,000	$0
Dump trucks		each	0	#N/A	$50,000	$0
Dozers		each	0	#N/A	$150,000	$0
Demolition shears		each	0	#N/A	$300,000	$0
Crane		each	0	#N/A	$150,000	$0
Loader		each	0	#N/A	$150,000	$0
Compactor		each	0	#N/A	$0	$0
Light duty vehicles		each	0	#N/A	$20,000	$0
MOBILIZE MISC. EQUIPMENT						
Pump shipping		each		#N/A	$0	$0
Pipe shipping		m		#N/A	$0	$0
Minor tools and equipment	Included in mob/demob.	allow	0	#N/A	$100,000	$0
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	All flights and logistics	LS	1	#N/A	$1,074,795	$1,074,795
Reclamation activities - transport	Dash 7 flights	each	0	MWH	$9,100	$0
Reclamation activities - transport	Hercules flights	each	0	#N/A	$20,000	$0
Rotation over reclamation period	Worker rotation costs	LS	1	#N/A	$491,630	$491,630
Reclamation activities - travel time		mandays	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	Camp services, communications, food, administration, mine management	LS	1	#N/A	$2,898,640	$2,898,640
Long term reclamation activities (eg pump flooding)		manmonths		#N/A	$0	$0
CONSTRUCTION MAINTENANCE						
Site roads and airstrip	Maintain during construction	LS	1	#N/A	$204,300	$204,300
Site equipment and facilities	Maintain during construction	LS	1	#N/A	$434,447	$434,447

Mobilization/Demobilization:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MOBILIZE FUEL						
Fuel for reclamation activities	Supply and ship to site	LS	1	#N/A	$924,776	$924,776
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.	LS	1	#N/A	$955,995	$955,995
Limited winter use		km		#N/A	$0	$0
Winter road tariff	Included in mob/demob.	kmtonne	0	WRUS	$0	$0
DEMOBILIZE HEAVY EQUIPMENT						
Excavators	"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	Covered in rotation costs above.	LS	0	#N/A	$0	$0
crew transportation	Covered in flights and logistics above.	each	0	#N/A	$0	$0
				Total		**$14,124,364**

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	362.33	Specified - Lupin.
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	68.49	Specified - Lupin for Main and Satellite tank farms
	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	2.48	Low cost: doze crest off dump; Specified - Lupin doze to central area
	doze overburden/soil piles	DS	m3	0.95	3.80	0.22	Specified rate - for regrading esker borrow area.
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		2.48	Specified - for relocating rock into central area
	Specified activity	RRS	m3			85,656.00	

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

	Filter by unit					
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	3.07	Specified - for relocationg rubble to landfill
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	2.74	Specified - for placement of coarse esker as toe berm in TCA
excavate/load/long haul	SC2	m3	7.10	11.75		
SC1 + spread and compact	SC3	m3	8.90	14.20	4.01	Low: non-engineered; High:engineered; Specified - placement of TCA cover
SC2 + spread and compact	SC4	m3	9.30	23.20	3.98	Low: non-engineered; High:engineered (e.g. complex covers, low volume dam construction); Specified - placement of Central Area Cover
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

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

	Filter by unit				
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	
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

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

	Filter by unit					
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	7.84	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	4.75	Low: remove/dispose on site; High: remove/re-use; Specified - Lupin pipelines
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		1.57	Specified: pumping water from flooded crown pillars
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	0.103	Specified - Lupin lime addition to pond to raise pH

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

	Filter by unit					
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				
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