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August 8, 2019

Richard Dwyer  
Manager of Licencing  
Nunavut Water Board  
PO Box 119  
Gjoa Haven, NU  
X0B 1J0

Dear Mr. Dwyer,

#### **Re. Estimate of Current Liability in RECLAIM for 2BM-ULU1520**

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The purpose of this letter and the attached RECLAIM model is to outline Blue Star Gold Corp.'s (Blue Star) estimate of remaining liabilities associated with the Ulu Gold Project (Ulu), for the purposes of the water licence assignment process.

Further to a recent joint site visit to Ulu involving the Assignor Bonito Capital Corporation (Bonito), the Assignee Blue Star, the Kitikmeot Inuit Association (KIA) and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Blue Star's engineering team has assessed the remaining liability at Ulu. Blue Star estimates that the current existing security held by CIRNAC under water licence 2BM-ULU1520 is sufficient to carry out reclamation activities, as summarized in the attached security estimate.

The existing water licence 2BM-ULU1520 expires in May 2020, and following licence assignment, Blue Star plans to undertake an application to amend and renew 2BM-ULU1520. Through this amendment process, Blue Star will seek approval of a new *Interim Closure and Reclamation Plan (ICRP)* that will consider alternate waste management methods and facilities such establishment of a landfarm, or soil treatment facility (STF), to treat petroleum hydrocarbon-contaminated soils. In anticipation of this process and facility, the STF and related costs have been included in the attached RECLAIM model, and Blue Star has entered into an agreement with the KIA to post security in advance of the water licence amendment process, equivalent to the current estimated costs associated with the STF, being \$500,000. Accordingly, the reclamation costs for Ulu as presented in the RECLAIM model, and associated security are outlined in Table 1.

Table 1. Summary of reclamation costs for the Ulu Gold Project and related security.

Item	Estimated Security Amount (\$CAD)	Security Posted <sup>1</sup>	
		Amount (\$CAD)	Party
Future soil treatment facility	500,000	500,000	KIA
Current liability on site	1,618,127	1,685,542	CIRNAC
<b>Total</b>	<b>2,118,127</b>	<b>2,185,542</b>	

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<sup>1</sup> Funds transfer is currently underway.



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Given the values listed in Table 1, following the assignment process Blue Star will be overbonded by \$67,415. Blue Star feel that this is satisfactory given the imminent commencement of regulatory proceedings relating the licence renewal and amendment.

Further, as addressed elsewhere in this assignment application submission to the Nunavut Water Board (NWB), and supported by expected forthcoming documentation from both the KIA and CIRNAC, Blue Star is in the process of posting \$500,000 of new security with the KIA and \$1,685,542 replacement security with CIRNAC. The funds are expected to be in place prior to the conclusion of this water licence assignment process.

Should the NWB have questions regarding the security arrangement and estimate, don't hesitate to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Peter Kuhn', is written over a horizontal line.

Peter Kuhn  
General Manager  
Blue Star Gold Corp.  
[Kjgold2010@gmail.com](mailto:Kjgold2010@gmail.com)  
778.379.1433

Encl.

cc. G. Okonkwo, Crown-Indigenous Relations and Northern Affairs Canada  
G. Clark, Kitikmeot Inuit Association  
B. Labatte, Mandalay Resources

**SUMMARY OF COSTS**

<b>CAPITAL COSTS</b>	<b>COMPONENT NAME</b>	<b>COST</b>	<b>LAND LIABILITY</b>	<b>WATER LIABILITY</b>
OPEN PIT		\$0	\$0	\$0
UNDERGROUND MINE		\$10,000	\$0	\$10,000
TAILINGS FACILITY		\$0	\$0	\$0
ROCK PILE		\$0	\$0	\$0
BUILDINGS AND EQUIPMENT		\$382,480	\$0	\$382,480
CHEMICALS AND CONTAMINATED SOIL MANAGEMENT		\$447,252	\$0	\$447,252
SURFACE AND GROUNDWATER MANAGEMENT		\$22,410	-	\$22,410
INTERIM CARE AND MAINTENANCE		\$480,000	-	\$480,000
<b>SUBTOTAL: Capital Costs</b>		<b>\$1,342,142</b>	<b>\$0</b>	<b>\$1,342,142</b>
<b>PERCENT OF SUBTOTAL</b>			<b>0%</b>	<b>100%</b>

  

<b>INDIRECT COSTS</b>		<b>COST</b>	<b>LAND LIABILITY</b>	<b>WATER LIABILITY</b>
MOBILIZATION/DEMOBILIZATION		\$346,500	\$0	\$346,500
POST-CLOSURE MONITORING AND MAINTENANCE		\$0	\$0	\$0
ENGINEERING	5%	\$67,107	\$0	\$67,107
PROJECT MANAGEMENT	5%	\$67,107	\$0	\$67,107
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	1%	\$13,421	\$0	\$13,421
BONDING/INSURANCE	1%	\$13,421	\$0	\$13,421
CONTINGENCY	20%	\$268,428	\$0	\$268,428
MARKET PRICE FACTOR ADJUSTMENT	0%	\$0	\$0	\$0
<b>SUBTOTAL: Indirect Costs</b>		<b>\$775,985</b>	<b>\$0</b>	<b>\$775,985</b>

  

<b>TOTAL COSTS</b>		<b>\$2,118,127</b>	<b>\$0</b>	<b>\$2,118,127</b>
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1	Underground Mine Name	UG Mine # 1				
ACTIVITY/MATERIAL	Notes	Unit	Qty	Code	Unit Cost	Cost
<b>CONTROL ACCESS</b>						
Fence		m		#N/A	\$0.00	\$0
Signs		each		#N/A	\$0.00	\$0
Block roads		m3		#N/A	\$0.00	\$0
Berm		m3		#N/A	\$0.00	\$0
Concrete wall in portals		m3		#N/A	\$0.00	\$0
Backfill portal #1	complete	m3		#N/A	\$0.00	\$0
Backfill portal #2		m3		#N/A	\$0.00	\$0
Cap raise # 1	Seal vent raise w steel/concrete cover	m3	1 VRS		\$10,000.00	\$10,000
Cap raise #2		m3		#N/A	\$0.00	\$0
Cap shaft #1		m3		#N/A	\$0.00	\$0
Cap shaft #2		m3		#N/A	\$0.00	\$0
Backfill adits		m3		#N/A	\$0.00	\$0
Backfill open stope		m3		#N/A	\$0.00	\$0
Concrete cap over open stope		m3		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>REMOVE HAZARDOUS MATERIALS</b>						
Remove hazardous materials, U/G labor		mandays		#N/A	\$0.00	\$0
Remove/decontam. stationary & elect. equip		mandays		#N/A	\$0.00	\$0
Remove/decontam. mobile equipment		each		#N/A	\$0.00	\$0
Remove misc. haz. mat & explosives		kg		#N/A	\$0.00	\$0
Other	complete			#N/A	\$0.00	\$0
<b>INSTALL BULKHEADS</b>						
Bulkheads to control water flow		each		#N/A	\$0.00	\$0
Grout bulkhead		m3		#N/A	\$0.00	\$0
<b>FLOOD MINE</b>						
Supply/install pump		each		#N/A	\$0.00	\$0
Supply/install piping system		each		#N/A	\$0.00	\$0
Operate pumps to flood workings		m3		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>INSTALL GROUNDWATER COLLECTION SYSTEM</b>						
Excavate/install sumps		m2		#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
<b>SPECIALIZED ITEMS</b>						
Install water quality monitoring pipes		each		#N/A	\$0.00	\$0
Install permanent pumping system		each		#N/A	\$0.00	\$0
Other	Mine sump decommissioning included in landfill			#N/A	\$0.00	\$0
<b>Total</b>						\$10,000
<b>% of Total</b>						

1

Rock Pile Name:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
<b>STABILIZE SLOPES</b>						
Flatten slopes with dozer		m3		#N/A	\$0.00	\$0
Flatten "bubble dump" areas		m3		#N/A	\$0.00	\$0
Divert runoff, ditch mat'l A		m3		#N/A	\$0.00	\$0
Divert runoff, ditch mat'l B		m3		#N/A	\$0.00	\$0
Toe buttress, drain mat'l		m3		#N/A	\$0.00	\$0
Toe buttress, fill mat'l A		m3		#N/A	\$0.00	\$0
Toe buttress, fill mat'l B		m3		#N/A	\$0.00	\$0
Other	task included in landfill			#N/A	\$0.00	\$0
<b>COVER ROCK PILE</b>						
Subgrade preparation - doze surface		m3		#N/A	\$0.00	\$0
Soil cover - excavate, haul, spread & compact		m3		#N/A	\$0.00	\$0
Rock cover - excavate, haul & spread		m3		#N/A	\$0.00	\$0
Excavate downslope drainage channel & chute		m3		#N/A	\$0.00	\$0
Rip rap drainage channel and chute		m3		#N/A	\$0.00	\$0
Vegetate		ha		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>VERY LOW PERMEABILITY COVER (in addition to above)</b>						
Liner subgrade preparation - compact		m2		#N/A	\$0.00	\$0
Supply geomembrane		m2		#N/A	\$0.00	\$0
Install geomembrane		m2		#N/A	\$0.00	\$0
Protective cover - excavate, haul, spread & compact		m3		#N/A	\$0.00	\$0
Vegetate		ha		#N/A	\$0.00	\$0
Install infiltration/seepage instrumentation		allow		#N/A	\$0.00	\$0
<b>CONSTRUCT DIVERSION DITCHES</b>						
Excavate ditches -soil		m3		#N/A	\$0.00	\$0
Excavate ditches -rock		m3		#N/A	\$0.00	\$0
Rip rap in channel base		m3		#N/A	\$0.00	\$0
<b>CONSTRUCT SEEPAGE COLLECTION POND</b>						
Excavate seepage collection 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
<b>INSTALL GROUNDWATER COLLECTION SYSTEM</b>						
Excavate/install sumps		m3		#N/A	\$0.00	\$0
Install pumping wells		m3		#N/A	\$0.00	\$0
Install pumps/pipelines/power supply		allow		#N/A	\$0.00	\$0
<b>RELOCATE DUMPS</b>						
Load, haul, dump or doze		m3		#N/A	\$0.00	\$0
Add lime		tonne		#N/A	\$0.00	\$0
Contour reclaimed area		ha		#N/A	\$0.00	\$0
Other	Dump relocation included in landfill (covers)			#N/A	\$0.00	\$0
<b>SPECIALIZED ITEMS</b>						
Install permanent instrumentation		each		#N/A	\$0.00	\$0
Install permanent instrumentation, drilling		each		#N/A	\$0.00	\$0
<b>TREAT ROCK PILE SEEPAGE - see "Water Management"</b>						
<b>HEAP LEACH SEEPAGE TREATMENT - Cyanide Detox</b>						
Cyanide destruction water treatment pumping		m3		#N/A	\$0.00	\$0
Reagents		tonnes		#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
Annual treatment costs						\$0
Number of years of treatment	years					
Total treatment costs						\$0
<b>HEAP LEACH SEEPAGE TREATMENT - ARD/ML**</b>						
Upgrade/modify pumping system - report to WTP		allow		#N/A	\$0.00	\$0
<b>Total</b>						\$0
<b>% of Total</b>						

\* 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

## 1 Chemicals/Soil Area Name:

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
<b>HAZARDOUS MATERIALS AUDIT</b>						
Hazardous materials audit		mandays		#N/A	\$0.00	\$0
<b>BUILDING DECONTAMINATION &amp; CONSOLIDATION OF HAZARDOUS MATERIALS</b>						
Environmental technician/coordinator		mandays		#N/A	\$0.00	\$0
Decontaminate: oil, fuel	incl. drums and machinery and off-site disposal of lubricants	mandays	7 ORTS		\$1,000.00	\$7,000
Decontaminate maintenance shop		mandays		#N/A	\$0.00	\$0
Decontaminate power plant		mandays		#N/A	\$0.00	\$0
Decontaminate bulk fuel storage		mandays		#N/A	\$0.00	\$0
Decontaminate ANFO plant		mandays		#N/A	\$0.00	\$0
Decontaminate offices/warehouse/accom		mandays		#N/A	\$0.00	\$0
Removal of asbestos siding on buildings		m2		#N/A	\$0.00	\$0
Removal of friable asbestos on equipment		m2		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>HAZARDOUS MATERIALS REMOVAL</b>						
Waste oils		litre		#N/A	\$0.00	\$0
Waste fuel	included with decontaminate; oil, fuel above	litre		#N/A	\$0.00	\$0
Waste batteries		kg		#N/A	\$0.00	\$0
Assay & environmental lab reagents		kg		#N/A	\$0.00	\$0
Machine shop paints, solvents etc	complete	litre		#N/A	\$0.00	\$0
Glycol		litre		#N/A	\$0.00	\$0
Process reagents		kg		#N/A	\$0.00	\$0
Nuclear sources		allow		#N/A	\$0.00	\$0
Other hazardous materials		allow		#N/A	\$0.00	\$0
<b>HAZARDOUS MATERIALS</b>						
Transportation to disposal facility		allow		#N/A	\$0.00	\$0
Disposal fees		allow		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>CONTAMINATED SOILS</b>						
Contam. soil investigation - Phase 1	Hydrocarbon and ML/ARD investigation conducted in 2019	each		#N/A	\$0.00	\$0
Contam. soil investigation - Phase 2		each		#N/A	\$0.00	\$0
<b>CONTAMINATED SOIL REMOVAL (Soil treatment facility)</b>						
Excavate contaminated material	volume estimate is preliminary	m3	4000 RRSS		\$8.00	\$32,000
Material screening	pass soil through a screen and characterize	m3	4000 CS3S		\$6.72	\$26,880
Load and transport to onsite facility	preliminary estimate of the quantity of soil requiring treatment	m3	3050 SB1H		\$5.90	\$17,995
Manage hydrocarbon remediation at facility	preliminary cost to be revised based on 2019 soil investigation	m3	3050 CSRS		\$113.24	\$345,382
Reagents/stabilizing agent		m2	#N/A		\$0.00	\$0
Excavate and transport to offsite facility	unload treated soil off of the onsite facility	m3	3050 SB1H		\$5.90	\$17,995
Contour decontaminated area		m3	#N/A		\$0.00	\$0
<b>CONTAMINATED SOIL VERY LOW PERMEABILITY COVER</b>						
Supply geomembrane, HDPE, ES3, GCL		m2	#N/A		\$0.00	\$0
Upper and lower bedding layers		m3	#N/A		\$0.00	\$0
Install geomembrane, HDPE, ES3, GCL		m2	#N/A		\$0.00	\$0
Erosion protection layer		m3	#N/A		\$0.00	\$0
Vegetate		m2	#N/A		\$0.00	\$0
Install infiltration/seepage instrumentation		allow	#N/A		\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>OTHER</b>						
				#N/A	\$0.00	\$0
<b>Total</b>						\$447,252
<b>% of Total</b>						

1	Building / Equip Name:	Bldg / Equip #: 1				
ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
<b>DISPOSE MOBILE EQUIPMENT</b>						
Decontaminate and ship off-site		allow		#N/A	\$0.00	\$0
Decontaminate and dispose on-site	included as waste in landfill	allow		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>REMOVE BUILDINGS - see note below</b>						
Accommodation Complex		m2		#N/A	\$0.00	\$0
Process Facilities		m2		#N/A	\$0.00	\$0
Offices, Repair, Lab, Warehouse		m2		#N/A	\$0.00	\$0
Storage Facilities		m2		#N/A	\$0.00	\$0
Water and Wastewater Treatment Facilities		m2		#N/A	\$0.00	\$0
U/G Heating Plant		m2		#N/A	\$0.00	\$0
Emulsion Plant		m2		#N/A	\$0.00	\$0
AN Storage Facility		m2		#N/A	\$0.00	\$0
Warehouse, Shops and Other		m2		#N/A	\$0.00	\$0
Storage Facility at Laydown/Airstrip		m2		#N/A	\$0.00	\$0
Fuel tanks	decontamination complete, included as waste in landfill	m2		#N/A	\$0.00	\$0
Fuel Tanks		m2		#N/A	\$0.00	\$0
Freshwater intake		m2		#N/A	\$0.00	\$0
Reclaim pumps		m2		#N/A	\$0.00	\$0
Outfall & Diffuser		m2		#N/A	\$0.00	\$0
Airstrip lighting, navigation, electrician		mandays		#N/A	\$0.00	\$0
Airstrip lighting, navigation, mechanical		mandays		#N/A	\$0.00	\$0
Break foundation slabs	total of all buildings	m2		#N/A	\$0.00	\$0
Consolidate & dump boneyard debris	Consolidate	m3	13000	BRMS	\$3.00	\$39,000
Other				#N/A	\$0.00	\$0
<b>LANDFILL FOR DEMOLITION WASTE</b>						
Place rock cover	Final surface material	m3	5000	RR3S	\$14.00	\$70,000
Place soil cover	Intermediate layers of rock and soil	m3	7500	SC3H	\$14.20	\$106,500
Load, transport and placement of waste (excavator & truck)		m3	7000	BRTS	\$14.00	\$98,000
Load, transport and placement of waste (bulldozer)		m3	5000	DSS	\$5.00	\$25,000
Labour for site cleanup		mandays	100	lab-usS	\$439.80	\$43,980
Vegetate		ha		#N/A	\$0.00	\$0
<b>GRADE AND CONTOUR PADS</b>						
Accommodation Complex		ha		#N/A	\$0.00	\$0
Process Facilities		ha		#N/A	\$0.00	\$0
Offices, Repair, Lab, Warehouse		ha		#N/A	\$0.00	\$0
Storage Facilities		ha		#N/A	\$0.00	\$0
Water and Wastewater Treatment Facilities		ha		#N/A	\$0.00	\$0
U/G Heating Plant		ha		#N/A	\$0.00	\$0
Emulsion Plant		ha		#N/A	\$0.00	\$0
Warehouse, Shops and Other		ha		#N/A	\$0.00	\$0
Place rock cover		m3		#N/A	\$0.00	\$0
Vegetate		ha		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>PUNCTURE LINED SUMPS</b>						
Puncture liner and place soil cover		m3		#N/A	\$0.00	\$0
<b>RECLAIM ROADS</b>						
Remove culverts		each		#N/A	\$0.00	\$0
Remove bridges		each		#N/A	\$0.00	\$0
Scarify and install water breaks		ha		#N/A	\$0.00	\$0
Scarify airstrip		ha		#N/A	\$0.00	\$0
Scarify laydown areas		ha		#N/A	\$0.00	\$0
Vegetate		ha		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>SPECIALIZED ITEMS</b>						
Dispose of misc. debris and laydown area refuse				#N/A	\$0.00	\$0
<b>Total</b>						\$382,480
<b>% of Total</b>						

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
<b>BREACH DYKE EMBANKMENT</b>						
Remove fill		m3		#N/A	\$0.00	\$0
Contour water intake area		m3		#N/A	\$0.00	\$0
<b>STABILIZE SEDIMENT PONDS/WATER MANAGEMENT PONDS</b>						
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
<b>REDIRECT RUNOFF/CONSTRUCT DIVERSION DITCHES</b>						
Excavate ditches -soil		m3		#N/A	\$0.00	\$0
Excavate ditches -rock	landfill water diversion berm	m3	200	RB2L	\$12.05	\$2,410
Stabilize side slopes		m3		#N/A	\$0.00	\$0
Rip rap in channel base		m3		#N/A	\$0.00	\$0
Water management provision	during landfill construction activities	each	1	WMS	\$20,000.00	\$20,000
<b>BREACH DITCHES</b>						
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
<b>DECOMMISSION FRESH WATER SUPPLY</b>						
Breach embankment		m		#N/A	\$0.00	\$0
Remove pump		LS		#N/A	\$0.00	\$0
Remove pipeline		m		#N/A	\$0.00	\$0
<b>WATER CONTROL IN RECLAMATION QUARRY</b>						
Install pumping system		LS		#N/A	\$0.00	\$0
Remove pumping system		LS		#N/A	\$0.00	\$0
<b>REMOVE PIPELINES</b>						
Remove pipes		m		#N/A	\$0.00	\$0
Concrete plug deep pipes		m3		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
<b>GROUNDWATER COLLECTION SYSTEM</b>						
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
<b>CONSTRUCT CONTAMINATED WATER STORAGE POND</b>						
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
<b>CONSTRUCT PASSIVE TREATMENT SYSTEM (e.g. Constructed Wetland)</b>						
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
<b>CONSTRUCT WATER TREATMENT PLANT</b>						
Build treatment plant		LS		#N/A	\$0.00	\$0
Build sludge containment facility		LS		#N/A	\$0.00	\$0
					<b>Total</b>	<b>\$22,410</b>

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



## 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
extra personnel		manmonths		#N/A	0	\$0
-electrician		manmonths		#N/A	0	\$0
-mechanic		mandays	100	mechS	800	\$80,000
Machinery maintenance	allowance for maintenance and repairs	each	5	equ-rS	70000	\$350,000
annual fuel		litre		#N/A	0	\$0
misc. supplies		allow		#N/A	0	\$0
pick-up truck		each		#N/A	0	\$0
small dozer		allow		#N/A	0	\$0
small excavator		allow		#N/A	0	\$0
snow machine		allow		#N/A	0	\$0
communications		allow		#N/A	0	\$0
SNP/AEMP water sampling & reporting		each		#N/A	0	\$0
geotechnical assessment	5 years annual inspection and report	each	5	RPTS	2000	\$10,000
Monitoring and assessment - Transport	following completion of landfill	each	4	MWS	10000	\$40,000
interim water treatment				#N/A		\$0
other		each		#N/A	0	\$0
					<b>Total</b>	<b>\$480,000</b>

**1 Mobilization/Demobilization:**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
<b>MOBILIZE HEAVY EQUIPMENT</b>						
Excavators		each		#N/A	0	\$0
Dump trucks		each		#N/A	0	\$0
Dozers		each		#N/A	0	\$0
Demolition shears		each		#N/A	0	\$0
Crane		each		#N/A	0	\$0
Loader		each		#N/A	0	\$0
Compactor		each		#N/A	0	\$0
Light duty vehicles		each		#N/A	0	\$0
<b>MOBILIZE MISC. EQUIPMENT</b>						
Pump shipping		each		#N/A	0	\$0
Pipe shipping		m		#N/A	0	\$0
Minor tools and equipment		allow		#N/A	0	\$0
Truck tires		allow		#N/A	0	\$0
Other				#N/A	0	\$0
<b>MOBILIZE CAMP</b>						
Reclamation activities		allow		#N/A	0	\$0
Construction related activities	Camp costs during landfill and soil treatment facility construction	mandays	100	MCOS	3065	\$306,500
<b>MOBILIZE WORKERS</b>						
Reclamation activities - transport	transport of construction materials included with specific task	each	4	MWS	10000	\$40,000
Reclamation activities - travel time		manhours		#N/A	0	\$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
<b>WORKER ACCOMODATIONS</b>						
Reclamation activities		manmonths		#N/A	0	\$0
Long term reclamation activities (eg pump flooding)		manmonths		#N/A	0	\$0
<b>MOBILIZE FUEL</b>						
Fuel freight - reclamation activities		litre		#N/A	0	\$0
Fuel freight - long term reclamation activities		litre		#N/A	0	\$0
Fuel freight accomodations		litre		#N/A	0	\$0
<b>WINTER ROAD</b>						
Construction and operation		km		#N/A	0	\$0
Limited winter use		km		#N/A	0	\$0
Winter road tarriff		km		#N/A	0	\$0
<b>DEMOBILIZE HEAVY EQUIPMENT</b>						
Excavators		km		#N/A	0	\$0
Dump trucks		km		#N/A	0	\$0
Dozers		km		#N/A	0	\$0
Demolition shears		km		#N/A	0	\$0
Crane		km		#N/A	0	\$0
Loader		km		#N/A	0	\$0
Compactor		each		#N/A	0	\$0
Light duty vehicles		km		#N/A	0	\$0
Other		km		#N/A	0	\$0
<b>DEMOBILIZE CAMP</b>						
		allow		#N/A	0	\$0
<b>DEMOBILIZE WORKERS</b>						
crew travel time		mandays		#N/A	0	\$0
crew transportation		each		#N/A	0	\$0
<b>WINTER ROAD</b>						
Construction and operation		km		#N/A	0	\$0
Limited winter use		km		#N/A	0	\$0
Winter road tarriff		km		#N/A	0	\$0
<b>Total</b>						<b>\$346,500</b>

## 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		
Buildings - Decontaminate							
	Asbestos	BDA	m2	25.60	51.20		Low: removal of asbestos siding & flooring; High: removal of insulated pipes, friable asbestos Unit costs are based on 3m high, single storey building. Scale areas accordingly.
Buildings - Remove							
	Wood	BRW	m2	27.50	41.00		
	Concrete	BRC	m2	40.00	65.00	6.00	Specified: puncture concrete foundation slabs
	Misc. material sorting	BRM	m2			3.00	
	Steel - teardown	BRS1	m2	45.00	65.00		
	Steel - for salvage	BRS2	m2	67.00	100.00		
	Load and transport waste materials	BRT	m3			14.00	
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
	Screen contaminated soils	CS3	m3			6.72	
	Remediate on site	CSR	m3	47.00	146.00	113.24	
Dozing							
	doze rock piles	DR	m3	1.05	2.40	3.00	Low cost: doze crest off dump
	doze overburden/soil piles	DS	m3	0.95	3.80	5.00	High cost: push up to 300 m
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							
	drill/blast/load/short haul	RC1	m3	12.05	17.80		(e.g. ditch/spillway excavation)
	drill/blast/load/long haul	RC2	m3	12.70	18.40		Low:foundation excavation;High:spillway excavation
	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		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		14.00	cost includes sorting
	source is waste dump/long haul	RR4	m3	7.60			
	Specified activity	RRS	m3			8.00	
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		Low: non-engineered; High:engineered
	SC2 + spread and compact	SC4	m3	9.30	23.20		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		
	Enironmental technologist	envtech	\$/hr	36.00			
	Electrician	elec	\$/hr	74.00	95.00		

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

Filter by unit					
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	439.8 Manday rate
Equipment operator	oper	\$/hr	41.00	65.00	
Heavy duty mechanic	mech	\$/hr	49.00	72.85	800 Manday rate
Water treatment plant operator	oper-wt	\$/hr	41.00	59.86	
Security / first aid	safety	\$/hr	36.00	66.97	
Administrative staff	admin	\$/hr	38.00	57.89	
Equipment rebuild/maintenance	equ-r	\$/hr			70000
Equipment rates include operator and fuel					
Loader - 4 cu.yd (3.06m3)	load-s	\$/hr	175.00		\$123.63 Hourly rate mine owned machinery including Operator and fuel costs
Loader - 7 cu.yd (5.35m3)	load-l	\$/hr	315.00		\$156.21
Excavator - 26.76-30.84 tonnes	exc-s	\$/hr	190.00		\$156.21
Excavator - 68.95+tonnes	exc-l	\$/hr	420.00		\$174.31
Grader	grad	\$/hr	190.00		\$138.11
Dump truck off hwy 30-50 tonnes	truck-s	\$/hr	225.00		\$174.31
Dump truck off hwy 55-75 tonnes	truck-l	\$/hr	300.00		\$101.91
dozer, small	dozers	\$/hr	205.00	260.00	\$101.91
dozer, large	dozerl	\$/hr	490.00	565.00	\$101.91
smooth drum compactor	comp	\$/hr	155.00		\$101.91
scooptram, 6 yd3 bucket	scoop	\$/hr	170.00		\$101.91
flat bed truck with hiab	hiab	\$/hr	155.00		\$101.91
fuel truck	ftruck	\$/hr	150.00		\$101.91
water truck	wtruck	\$/hr	58.00	150.00	\$101.91
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
Camp refurbishment, supplies and operations	MCO	mandays			3,065.00
Mobilize Workers					
flight	MW	each	4500.00	9100.00	10000.00 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
oil removal	ORT	manday			1,000.00 Chemkleen
PCB Removal					
Remove from site	PCBR	litre	40.20	46.90	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	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		
Water management provision	WM	allow			20,000.00
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
Vent raise seal	VR	each			10000.00
Portals	POR	m3	18.80	250.00	1200.00 plug
Site Inspection Report					
Geotechnical inspection	RPT	each	10000.00	20000.00	2000.00 Yearly
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	
Treatment Chemicals					
ferric sulphate	ferric	kg	1.19		
ferrous sulphate	ferrous	kg	1.32		

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

Filter by unit

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		
<b>Vegetation</b>					
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	fertilizer, woodchips)
<b>Water Sampling/Analysis/Reporting</b>					
	WS	each	7000.00	10000.00	
<b>Winter Road</b>					
Construction	WRC	km	2000.00	11500.00	
Usage	WRU	kmtonne	0.29		