

Appendix C: Progressive Reclamation Cost Estimate

COST ESTIMATE

Task	Qty	Unit	Unit Rate	Cost	Total
1. DIRECT COSTS					
1.1 Building Demolition					\$33,490.77
<i>Demolition of Existing Weather Havens</i>					
Demolition of Ulu Camp	4,569	m ³	\$7.33	\$33,490.77	
1) Disposal of waste accounted for under Section 1.2 Non-Hazardous Landfill					
2) Decommissioning of electrical and mechanical accounted for in camp costs					
1.2 Non-Hazardous Waste Landfill					\$287,597.16
<i>Existing Waste Handling</i>					
Transport to Facility (Load and Haul)	6,900	m ³	\$9.98	\$68,862.00	
Transport to Facility (Utilizing Dozer Push/Pull)	4,600	m ³	\$6.68	\$30,728.00	
Placement/Packing in Facility (Excavator/Front End Loader/Dozer)	11,500	m ³	\$2.27	\$26,105.00	
<i>Additional Waste Handling</i>					
Transport Ulu Camp Demolition Waste to Facility (Load and Haul)	1,142	m ³	\$9.98	\$11,399.66	
Transport Additional Waste to Facility - esker, equipment etc. (Load and Haul)	3,400	m ³	\$9.98	\$33,932.00	
Placement/Packing in Facility (Excavator/Front End Loader/Dozer)	4,542	m ³	\$2.27	\$10,310.91	
<i>Closure</i>					
Intermediate Cover (Load, haul and place)	2,485	m ³	\$8.79	\$21,843.15	
Final Cover (Load, haul and place)	3,130	m ³	\$16.16	\$50,580.80	
Contouring of Cover Material	5,615	m ³	\$2.27	\$12,746.05	
<i>Water Management</i>					
Drainage Contouring/Sloping Around Facility Perimeter	480	m ³	\$2.27	\$1,089.60	
Allowance (Pumping, diversion trenching etc.)	1	ea	\$20,000.00	\$20,000.00	
1.3 Soil Treatment Facility					\$517,773.30
<i>Facility Earthworks</i>					
Foundation and Berm Construction - Dozer	9,173	m ³	\$1.69	\$15,502.54	
Foundation and Berm Construction - Excavator & Truck	6,115	m ³	\$15.96	\$97,601.78	
Bedding Placement	845	m ³	\$11.14	\$9,407.73	
Liner Cover Placement	2,252	m ³	\$11.14	\$25,087.28	
<i>Liner Installation</i>					
Geotextile and LLDPE Installation	6,756	m ²	\$15.00	\$101,340.00	
<i>Material Sorting and Placement</i>					
Sorting of PHC Contaminated Material	6,000	m ³	\$7.91	\$47,460.00	
Load and Haul to Facility	4,000	m ³	\$8.79	\$35,160.00	
Placement in STF Facility	4,000	m ³	\$11.14	\$44,560.00	
<i>Monitoring</i>					
Baseline and Post Closure PHC Contamination Testing	10	ea	\$176.75	\$1,767.50	
Operational PHC Contamination Testing	123	ea	\$98.78	\$12,149.94	
Water Quality Sampling	38	ea	\$169.30	\$6,433.40	

COST ESTIMATE

Task	Qty	Unit	Unit Rate	Cost	Total
<i>Annual Operations</i>					
Tilling/mechanical turning of material 2020	16	days	\$1,602.30	\$25,636.80	
Material Removal 2021	2,400	m ³	\$11.14	\$26,736.00	
Material Transfer/Placement 2021	800	m ³	\$11.14	\$8,912.00	
Material Removal 2022	800	m ³	\$11.14	\$8,912.00	
Material Transfer/Placement 2022	800	m ³	\$11.14	\$8,912.00	
Material Removal 2023	800	m ³	\$11.14	\$8,912.00	
Material Transfer/Placement 2023	800	m ³	\$11.14	\$8,912.00	
Material Removal 2024	800	m ³	\$11.14	\$8,912.00	
<i>Closure</i>					
Liner removal	5,630	m ²	\$0.91	\$5,123.30	
Levelling of Facility Berms	6,115	m ³	\$1.69	\$10,335.03	
1.4 Ore Management					\$80,410.72
<i>Repair of Mine Sump</i>					
Remove of Mineralised Material in Sump Berms	50	m ³	\$2.27	\$113.50	
Load and Haul Material for Sump Berms	50	m ³	\$15.96	\$798.00	
Placement of Material for Sump Berms	50	m ³	\$2.27	\$113.50	
Replace Base Liner System	680	m ²	\$15.00	\$10,200.00	
<i>Ore Placement in Mine Sump</i>					
Load and Haul Ore in Mine Sump	1,850	m ³	\$15.96	\$29,526.00	
Placement of Ore in Sump	1,850	m ³	\$11.14	\$20,609.00	
<i>Cover</i>					
Liner Cover	1,040	m ²	\$15.00	\$15,600.00	
Esker Sand Cover Load and Haul to Sump	312	m ³	\$8.79	\$2,742.48	
Esker Sand Placement and Contouring	312	m ³	\$2.27	\$708.24	
1.5 Mine Workings					\$55,760.32
<i>Portal Cover (Allowance)</i>					
Placement of Temporary Barrier (Sea Cans)	1	allow	\$1,309.76	\$1,309.76	
<i>Steel Vent Raise Cover (Allowance)</i>					
Engineering Design	1	allow	\$23,360.00	\$23,360.00	
Fabrication and Installation of Steel Vent Cover	1	allow	\$31,090.56	\$31,090.56	
1.6 Hazardous Material Management					\$55,491.59
<i>Hazardous Materials</i>					
Treatment of Hazardous Material on site (Allowance)	1	allow	\$7,000.00	\$7,000.00	
Treatment of Hazardous Material Removed from Site	110	m ³	\$260.00	\$28,600.00	
<i>Hydrocarbon Contaminated Material Initial Earthworks and sampling</i>					
Dozer work ripping frozen ground	6,000	m ³	\$1.69	\$10,140.00	
PHC Contamination sampling	81	ea	\$120.39	\$9,751.59	

COST ESTIMATE

Task	Qty	Unit	Unit Rate	Cost	Total
1.7 Borrow & Quarry					\$4,806.90
<i>Contouring of Borrow Area(s)</i>					
Contouring of Esker Borrow Area	3	days	\$1,602.30	\$4,806.90	
1.8 Construction Material Transport to Site					\$39,418.49
<i>Liner</i>					
Soil Treatment Facility Liner	9,323	kg	\$3.37	\$31,419.45	
Mine Sump and Ore Management Liner	2,374	kg	\$3.37	\$7,999.03	
SUBTOTAL - DIRECT COSTS					\$1,074,749.25
2. INDIRECT COSTS					
2.1 Mobilization					\$421,140.00
Mobilization	1	ea.	\$148,500.00	\$148,500.00	
Camp Operations	1	ea.	\$198,000.00	\$198,000.00	
Miscellaneous Small Camp Equipment Rebuild/Repair	1	ea.	\$30,000.00	\$30,000.00	
Annual Camp Closure (Temporary closure: Buildings, Storage Facilities, Mobile Equipment and Waste Management during STF operations)	4	years	\$11,160.00	\$44,640.00	
2.2 Waste Rock ML/ARD Investigation					\$43,418.35
<i>Site Investigation and Reporting</i>					
Transport and Accommodation	1	ea	\$3,000.00	\$3,000.00	
Consultant Fieldwork	84	hrs	\$167.00	\$14,028.00	
Test Pits (Excavator)	5	days	\$1,379.60	\$6,898.00	
Laboratory Testing	37	ea	\$256.55	\$9,492.35	
Reporting	1	ea	\$10,000.00	\$10,000.00	
2.3 Monitoring and Reporting					\$205,539.34
<i>Annual Visual Inspections (Landfill and STF)</i>					
Visual Inspection of STF and Landfill	5	years	\$2,820.00	\$14,100.00	
<i>Annual Geotechnical Inspection</i>					
Field Inspection and Technical Report	10	Years	\$17,848.00	\$178,480.00	
<i>Water Quality Laboratory Testing</i>					
Water Quality Laboratory Testing	86	ea	\$150.69	\$12,959.34	
2.4 Management and QA/QC					\$145,600.00
<i>Survey</i>					
Survey Control STF and Landfill	4	day	\$2,400.00	\$9,600.00	
Transport to/from Site	2	allow	\$3,000.00	\$6,000.00	

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Task	Qty	Unit	Unit Rate	Cost	Total
<i>Construction Oversight</i>					
Consulting (Construction Support STF and Landfill)	1	ea	\$130,000.00	\$130,000.00	
2.5 Bonding/Insurance					\$10,747.49
Bonding/Insurance	1%	of direct costs	\$1,074,749.25	\$10,747.49	
2.6 Health and Safety					\$10,747.49
Health and Safety	1%	of direct costs	\$1,074,749.25	\$10,747.49	
2.7 Project Management					\$53,737.46
Project Management	5%	of direct costs	\$1,074,749.25	\$53,737.46	
2.8 Engineering					\$53,737.46
Engineering	5%	of direct costs	\$1,074,749.25	\$53,737.46	
2.9 Contingency					\$534,949.85
Contingency	20%	of direct costs	\$1,074,749.25	\$214,949.85	
Large Equipment Rebuild/Repair	4	ea.	\$80,000.00	\$320,000.00	
SUBTOTAL - INDIRECT COSTS					\$1,479,617.45
SUBTOTAL - DIRECT COSTS					\$1,074,749.25
TOTAL					\$2,554,366.70

Notes: Direct/Indirect costs based on Contaminated Sites Program, Natural Resources and Environment Branch, Northern Affairs Program, Indian and Northern Affairs Canada. 2006. Contaminated Sites Cost Estimating Guide, October 23, 2006

QUANTITIES

Item	Quantity	Units	Source/Comment
LANDFILL			
Total Non-Hazardous Waste	11,500	m ³	Site Inspection with Lidar 2019 incl 30% contingency. Mandalay Supplied volumes 2018 reviewed
Allocated to Load and Haul to Facility	6,900	m ³	Allocated 60% total waste
Allocated to Dozer Push/Pull to Facility	4,600	m ³	Allocated 40% total waste
Total Material to be Packed/Placed in Facility	11,500	m ³	Site Inspection with Lidar 2019 incl 30% contingency. Mandalay Supplied volumes 2018 reviewed
Intermediate Cover	2,485	m ³	Landfill Design Drawing
Final Cover	3,130	m ³	Landfill Design Drawing
Boundary Contouring (Water Management)	480	m ³	Estimated
SOIL TREATMENT FACILITY			
Foundation and Berm Construction	15,289	m ³	STF design drawings
Allocated to dozer work	9,173	m ³	60% of total volume
Allocated to Load and Haul	6,115	m ³	40% of total volume
Liner System Area	5,630	m ²	SF design drawings
Liner System Area	6,756	m ²	STF design drawings + 20% for overlap
Liner Weight	9,323	kg	Tech Spec Sheets (SKAPS and Solmax)
Bedding	845	m ³	STF design drawings
Liner Cover	2,252	m ³	STF design drawings
In Situ PHC Contaminated Material for initial excavations	6,000	m ³	Results of 2019 Contaminated Soil Investigation at Ulu Gold Project
PHC Contaminated Material (Initial for sorting)	6,000	m ³	Results of 2019 Contaminated Soil Investigation at Ulu Gold Project
PHC Contaminated Material (STF Treatment)	4,000	m ³	Results of 2019 Contaminated Soil Investigation at Ulu Gold Project
Tilling of material 2020	16	days	8 weeks @ 2 days per week
Annual Treated Soil Removal 2021	2,400	m ³	Estimated. Total treatment after one full season of mechanical turning.
Annual Treated Soil Placement 2021	800		Estimated. Placed 0.5m thick in larger cell for treatment without mechanical turning. Conservative approach.
Annual Treated Soil Removal 2022	800	m ³	Estimated
Annual Treated Soil Placement 2022	800	m ³	Estimated. Placed 0.5m thick in larger cell for treatment without mechanical turning. Conservative approach.
Annual Treated Soil Removal 2023	800	m ³	Estimated
Annual Treated Soil Placement 2023	800	m ³	Estimated. Placed 0.5m thick in larger cell for treatment without mechanical turning. Conservative approach.
Annual Treated Soil Removal 2024 (allowance for additional PHC contaminated material)	800	m ³	Estimated
Baseline and post-closure sampling	10	units	SRK Estimate
Operations soil sampling	123	units	SRK Estimate
Water quality sampling	38	units	SRK Estimate
OTHER PROGRESSIVE RECLAMATION ACTIVITIES			
Total Contaminated Material for Removal from Site	110	m ³	Site photos and Results of 2019 Contaminated Soil Investigation at Ulu Gold Project
Contouring of Sand (Escher) Borrow Source	3	days	Estimated
Ore Management			
Ore volume	1,850	m ³	Reported by previous owner
Mine sump berm repair	50	m ³	Assumed remove and replace
Mine Sump floor liner	680	m ²	Sump dimension of 30mx15m - 25% additional for overlap
Ore Liner Cover	1,040	m ²	Cover based on a 4m high ore pile
Escher Cover	312	m ³	0.3m cover
Liner Weight	2,374	kg	Tech Spec Sheets (SKAPS and Solmax). Geotextile 0.64kg/m ² and LLDPE 0.74/kg.
Sampling Program			
Seep water quality	86	unit	SRK Estimates
ML/ARD Investigation	27	unit	SRK Estimate
Borrow Investigation	10	unit	SRK Estimate if required
PHC Contamination Initial Sampling	81	unit	SRK Estimate
Additional Waste			
Additional Non-Hazardous Waste	3,400	m ³	Estimate for additional equipment and PHC material allocated to landfill
Remaining building demolition (excl core shack)	1,720	m ²	Drone Image 2019
Remaining building demolition (excl core shack)	4,569	m ³	Global Mapper. Workshop assumed 3m height due to large interior void.
Demolition waste for landfill	1,142	m ³	Global Mapper - assumed 75% reduction in volume. Burning of material where possible.
Total Duration	10	years	Water License duration
Visual Inspection Duration	5	years	No. of years after Progressive Reclamation activities are completed
Annual camp closures	4	years	4 years of STF operations

TASK UNIT COSTS

			Rates				
Item	Unit	Productivity (unit/hr)	Total Unit Cost	Labour Cost Per Unit, excluding operators (\$/Unit)	Material Cost Per Unit (\$/Unit)	Equipment Cost Per Unit (\$/Unit)	Remark / Source
Relocations							
Waste Rock: load, haul <1km	m³	30	\$ 15.96	\$ 1.07	\$ -	\$ 14.89	Estimated assisted by SRK Production Estimator
Sand: load, haul <1km	m³	57	\$ 8.79	\$ 0.56	\$ -	\$ 8.23	SRK Production Estimator 0.5km haul
Sand: load, haul >1km	m³	31	\$ 16.16	\$ 1.03	\$ -	\$ 15.13	SRK Production Estimator 3km haul
Debris: load, haul, dump <1km	m³	40	\$ 9.98	\$ 2.68	\$ -	\$ 7.31	Assumed Production
Debris: dozer push/pull	m³	40	\$ 6.68	\$ 2.68	\$ -	\$ 4.01	Assumed Production
Earthworks							
Dozer general works	m³	152	\$ 1.69	\$ 0.63	\$ -	\$ 1.06	RSmean 3123164622000 (45m haul) 65% utilization over a 10 hour shift
Sand Sorting (PHC Contaminated sorting)	m³	60	\$ 7.91	\$ 2.67	\$ -	\$ 5.24	Assumed rate to test and sort PHC contaminated material 50m haul.
Sand Placement	m²	29	\$ 11.14	\$ 5.57	\$ -	\$ 5.57	RSMeans 312323160200
Waste Placement & Compaction	m³	202	\$ 2.27	\$ 0.79	\$ -	\$ 1.48	SRK Excavator productivity Estimator 65% Utilization
Sand Sloping/Contouring/Shaping	m³	202	\$ 2.27	\$ 0.79	\$ -	\$ 1.48	SRK Excavator productivity Estimator 65% Utilization
Construction/Demolition							
Vent Raise Cap	ls	1	\$ 31,090.56	\$ 26,124.00	\$ -	\$ 4,966.56	5 day task
Vent Raise Eng Design	ls	1	\$ 23,360.00	\$ 13,360.00	\$ -	\$ 10,000.00	Assumption
Demolition of building (Steel)	m³	57	\$ 7.33	\$ 4.52	\$ -	\$ 2.82	RSMean 024116130100 (569m³/day)
Portal Temporary Barrier	ls	1	\$ 1,309.76	\$ 482.00	\$ -	\$ 827.76	Surveyor Including Equipment
Other							
Survey	day	1	\$ 2,004.00	\$ 2,004.00	\$ -	\$ -	Surveyor Including Equipment
Liner removal	m²	100	\$ 0.91	\$ 0.75	\$ -	\$ 0.16	Assumed production
Annual Visual Inspection	ls/yr	1	\$ 2,820.00	\$ 2,820.00	\$ -	\$ -	Exploration team to conduct inspections for Blue Star
Annual Geotechnical Inspection - Field Inspection	ls/yr	1	\$ 17,848.00	\$ 7,848.00	\$ -	\$ 10,000.00	
Annual Camp Closure	ls/yr	1	\$ 11,160.00	\$ 11,160.00	\$ -	\$ -	
ML/ARD Investigation	ls	1	\$ 25,000.00	\$ -	\$ -	\$ -	Allowance

EQUIPMENT AND LABOUR RATES

EQUIPMENT RATES

Model	Units Available	Equipment Rate, including Operator and Fuel (\$/hour)	Source/Comments
Dozer			
CAT D8	hr	\$160.23	SRK Constructed. Incl. Operator, fuel and mechanic. No capital costs.
CAT D8	day	\$1,602.30	Daily Cost (10 hour shift)
Excavator			
CAT 311	hr	\$137.96	SRK Constructed. Incl. Operator, fuel and mechanic. No capital costs.
CAT 311	day	\$1,379.60	Daily Cost (10 hour shift)
Grader			
CAT 140	hr	\$138.65	SRK Constructed. Incl. Operator, fuel and mechanic. No capital costs.
Truck			
CAT 769C	hr	\$154.43	SRK Constructed. Incl. Operator, fuel and mechanic. No capital costs.
Misc. Equipment			
C-46 Cargo Aircraft	ea	\$15,000.00	Client Supplied
C-46 Cargo cost per kg	\$/kg	\$2.59	C-46 cargo 5800kg
C-46 Cargo cost per kg (factored)	\$/kg	\$3.37	30% contingency added due to aircraft volumetric allowances
Water Pump 2"	ea	\$850.00	Xylem Super 8

LABOUR RATES

Designation	Units Available	Rate	Source/Comments
Labour			
General Labour	hr	\$75.00	SRK Project Experience - contractor rates on northern site, adjusted for inflation
Supervision	hr	\$160.00	SRK Project Experience - contractor rates on northern site, adjusted for inflation
Trades -Mechanical, Welder, Electrician etc.	hr	\$109.00	SRK Project Experience - contractor rates on northern site, adjusted for inflation
Engineering Consultant	hr	\$167.00	Estimated
Heavy Equipment Operator	hr	\$85.00	SRK Project Experience - contractor rates on northern site, adjusted for inflation
Survey Crew (surveyor, helper and equipment)	day	\$2,400.00	Estimated (\$200/hour *12 hours/day)
Construction Support (Consulting)	ea	\$130,000.00	SRK Proposal 1CB041.001

OTHER RATES

Item	Units Available	Rate	Source/Comments
Fuel			
Diesel Fuel	litre.	\$1.16	Client supplied.
Mobilization			
Transportation and general supplies	allow	\$148,500.00	Client Supplied, based on previous mine owner operational costs, all inclusive.
Camp Running Costs	allow	\$198,000.00	Client Supplied, based on previous mine owner operational costs, all inclusive.
Equipment mechanical work/rebuild	ea.	\$80,000.00	CAT Inspection confirming equipment "in good shape" not trusted, visual inspection only. Allowance value specified by client
Miscellaneous mechanical work (Generators, LDV, pumps etc.)	allow	\$30,000.00	CAT Inspection confirming equipment "in good shape" not trusted, visual inspection only. Allowance value specified by client
Flight and Accommodation to/from Site (per person)	ea.	\$3,000.00	Assumption
Materials			
Liner System (Geotextile and LLDPE Liner)	m²	\$15.00	Supplier quotation supply and install (A&A Technical Services) - excl transport
Laboratory Testing			
Water Quality	ea.	\$150.69	Supplier quotation (varied).
STF Water Quality	ea.	\$169.30	Supplier quotation (varied).
ML/ARD Investigation Testing	ea.	\$256.55	Supplier quotation (varied).
STF Baseline Soil Sampling	ea.	\$176.75	Supplier quotation (varied).
STF Operational Sampling	ea.	\$98.78	Supplier quotation (varied).
STF Initial Excavation Sampling	ea.	\$120.39	Supplier quotation (varied).
Borrow Investigation Sampling	ea.	\$223.30	Supplier quotation (varied).
Hazardous Material Treatment			
Treatment of Hazardous Material/Contaminated Soils (Off Site)	m³	\$260.00	Supplier quotation (KBL) including transport from Yellowknife airport.
Allowances			
Water Management	allow	\$20,000.00	Allowance for pumps, hoses, trenching etc.
Technical Memorandum/Report	ea.	\$10,000.00	Assumption
Hazardous Material Treatment (On Site)	allow	\$7,000.00	Allowance specified by client

EQUIPMENT RATE BUILDING

Equipment	Total \$/hr	Operator rate/hr	Fuel cost/hr	Mechanical Costs	Fuel consumption/hr	Reff machine	Comment
Dozer	\$160	\$84	\$37	\$39	32	D8R	Fuel consumption high value CAT handbook ed 29
Excavator	\$138	\$84	\$15	\$39	13	311DRR	Fuel consumption high value CAT handbook ed 30
Truck	\$154	\$84	\$31	\$39	27	770G	Fuel consumption high value CAT handbook ed 31
Grader	\$139	\$84	\$16	\$39	13	140K	Fuel consumption high value CAT handbook ed 32
Loader	\$160	\$84	\$37	\$39	32	996 Series 2	Fuel consumption high value CAT handbook ed 33

Notes:

Mechanical Costs - Mechanic full work day of 12 hours shared over 4 pieces of equipment assumed to run 70% of the time (8.4hrs/day).

No capital costs included due to mine owned equipment