

SUMMARY OF COSTS

Norman Wells Soil Treatment Facility (S18L1-002)

CAPITAL COSTS	COMPONENT NAME	COST
WELLS AND FACILITIES		\$0
BUILDINGS AND EQUIPMENT		\$500
CHEMICALS AND CONTAMINATED SOIL MANAGEMEN		\$290,200
SURFACE AND GROUNDWATER MANAGEMENT		\$51,953
INTERIM CARE AND MAINTENANCE		<u>\$0</u>
	SUBTOTAL: Capital Costs	<u>\$342,653</u>
	PERCENT OF SUBTOTAL	

INDIRECT COSTS		COST
MOBILIZATION/DEMOBILIZATION		\$0
POST-CLOSURE MONITORING AND MAINTENANCE		\$0
ENGINEERING	5%	\$17,133
PROJECT MANAGEMENT	5%	\$17,133
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	1%	\$3,427
BONDING/INSURANCE	1%	\$3,427
CONTINGENCY	20%	\$68,531
MARKET PRICE FACTOR ADJUSTMENT	0%	<u>\$0</u>
	SUBTOTAL: Indirect Costs	<u>\$109,649</u>

TOTAL COSTS	<u>\$452,302</u>
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2 Building / Equip Name:		Bldg / Equip #:				
ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
OBJECTIVE: DISPOSE MOBILE EQUIPMENT						
Decontaminate and ship off-site		each		#N/A	\$0.00	\$0
Decontaminate, dispose on-site		each		#N/A	\$0.00	\$0
Other		each		#N/A	\$0.00	\$0
OBJECTIVE: BUILDING DECONTAMINATION & HAZ. MATERIAL REMOVAL						
Decontaminate, oil, fuel and glycol systems		mandays		#N/A	\$0.00	\$0
Decontaminate, general		mandays		#N/A	\$0.00	\$0
Mechanical		mandays		#N/A	\$0.00	\$0
Electrical		mandays		#N/A	\$0.00	\$0
Decontaminate maintenance shop		each		#N/A	\$0.00	\$0
Decontaminate power plant		each		#N/A	\$0.00	\$0
Decontaminate bulk fuel storage		each		#N/A	\$0.00	\$0
Decontaminate offices/warehouse/accum		each		#N/A	\$0.00	\$0
Removal of asbestos siding on buildings		each		#N/A	\$0.00	\$0
Removal of friable asbestos on equipment		each		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
OBJECTIVE: REMOVE BUILDINGS - ALL BUILDING AREAS SCALED TO ACCOUNT FOR HEIGHT						
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		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
Consolidate & dump boneyard debris		m3		#N/A	\$0.00	\$0
other - Storage tanks	2 x 63,000 L ASTs	alloc	1	#N/A	\$500.00	\$500
OBJECTIVE: BREAK BASEMENT SLABS						
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
Warehouse, Shops and Other		m2		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
OBJECTIVE: LANDFILL FOR DEMOLITION WASTE						
Place soil cover		m3		#N/A	\$0.00	\$0
Vegetate		ha		#N/A	\$0.00	\$0
Landfill disposal fee		tonne		#N/A	\$0.00	\$0
OBJECTIVE: GRADE AND CONTOUR						
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
OBJECTIVE: LINED SUMPS						
Puncture liner and place soil cover		m3		#N/A	\$0.00	\$0
OBJECTIVE: RECLAIM ROADS						
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
SPECIALIZED ITEMS						
Dispose of misc. debris and laydown area refuse				#N/A	\$0.00	\$0
Total						\$500

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
HAZARDOUS MATERIALS AUDIT						
Phase 1 audit		each		#N/A	\$0.00	\$0
Phase 2 audit		each		#N/A	\$0.00	\$0
CONSOLIDATE HAZARDOUS MATERIALS FOR REMOVAL						
Waste oils		litre	167	OR	\$1.20	\$200
Fuel - Type 1, eg diesel dregs		litre		#N/A	\$0.00	\$0
Fuel - Type 1, eg gasoline dregs		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		litre		#N/A	\$0.00	\$0
Contaminated soils - hydrocarbon	Phase 1 - full capacity	m3	4680	CSRI	\$47.00	\$219,960
Contaminated soils - hydrocarbon	Phase 2 - full capacity	m3	1320	CSRI	\$47.00	\$62,040
Metal contam. soil at conc. load-out		m3		#N/A	\$0.00	\$0
Glycol		litre		#N/A	\$0.00	\$0
Nuclear sources		each		#N/A	\$0.00	\$0
HAZARDOUS MATERIALS						
Transportation to disposal facility	assumed reagents, untreatable soils, etc	allow	1	#N/A	\$5,000.00	\$5,000
Disposal fees		allow		#N/A	\$0.00	\$0
Other				#N/A	\$0.00	\$0
CONTAMINATED SOILS						
Contam. soil investigation - technical		each	3	#N/A	\$1,000.00	\$3,000
Contam. soil investigation - drilling & sampling		each		#N/A	\$0.00	\$0
CONTAMINATED SOIL REMOVAL						
Contaminated soils - hydrocarbon		m2		#N/A	\$0.00	\$0
Metal contam. soil at conc. load-out		m3		#N/A	\$0.00	\$0
Load, haul, dump or doze		m3		#N/A	\$0.00	\$0
Reagents/stabilizing agent		m2		#N/A	\$0.00	\$0
Contour reclaimed area		m3		#N/A	\$0.00	\$0
Type 2, heavy fuel and oil		m3		#N/A	\$0.00	\$0
CONTAMINATED SOIL VERY LOW PERMEABILITY COVER						
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
OTHER						
				#N/A	\$0.00	\$0
Total						\$290,200

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
OBJECTIVE: STABILIZE SEDIMENT PONDS/WATER MANAGEMENT PONDS						
Place soil cover		m3		#N/A	\$0.00	\$0
Doze & spread excavated material	contour berms and pad area (area 8698 m2)	m2	8698	DSH	\$3.80	\$33,052
Vegetate spread material		ha		#N/A	\$0.00	\$0
Rip rap in channel base		each		#N/A	\$0.00	\$0
Puncture liner	restore natural drainage - 2 people, 0.5 day	hours	12	Lab-sl	\$49.60	\$595
OBJECTIVE: 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
OBJECTIVE: 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
OBJECTIVE: FRESH WATER SUPPLY						
Breach embankment		m		#N/A	\$0.00	\$0
Remove pump		LS		#N/A	\$0.00	\$0
Remove pipeline		m		#N/A	\$0.00	\$0
OBJECTIVE: WATER CONTROL IN RECLAMATION QUARRY						
Install pumping system		LS		#N/A	\$0.00	\$0
Remove pumping system		LS		#N/A	\$0.00	\$0
OBJECTIVE: REMOVE WATER 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
OBJECTIVE: 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
OBJECTIVE: 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
OBJECTIVE: 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
OBJECTIVE: WATER TREATMENT						
Water treatment - sampling and reporting	From Water Treatment Spreadsheet	alloc		#N/A	\$0.00	\$18,305
					Total	\$51,953

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

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

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
OBJECTIVE: ADDITION OF REAGENTS TO WTP						
H2O2		kg		#N/A	\$0.00	\$0
lime		kg		#N/A	\$0.00	\$0
ferric sulphate		kg		#N/A	\$0.00	\$0
ferrous sulphate		kg		#N/A	\$0.00	\$0
flocculents		kg		#N/A	\$0.00	\$0
Other	contingency treatment, 63,000 L in ASTs	m3	63	OTPh	\$2.00	\$126
OBJECTIVE: 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
OBJECTIVE: WTP WATER SAMPLING AND ANALYSES						
Sampling equipment	1 hr /sampling for GW - 2 hrs for dischagre	allow	6	Envcol	\$74.16	\$445
Analyses	Year 1 all water - Year 2 only GW	allow	24	WSs	\$291.00	\$6,984
	Year 1 (\$150 x 3 events) and Year 2 (\$150 x 2 events)	allow		#N/A	\$750.00	\$750
Shipping to laboratory						
Reporting (2 annual Reports, O&M, Spill Contingency)	based on contract amount proposed	allow		RPS	\$10,000.00	\$10,000
Other				#N/A	\$0.00	\$0
OBJECTIVE:SITE ACCESS						
Road maintenance (incl. snow removal)		allow		#N/A	\$0.00	\$0
Winter road tariff		allow		#N/A	\$0.00	\$0
Truck rental		allow		#N/A	\$0.00	\$0
Air support		allow		#N/A	\$0.00	\$0
Annual water treatment costs						\$18,305
Number of years of water treatment		years	1			
Total water treatment costs						\$18,305

Costing Scenario: RECLAIM 7.0 Estimate - KBL – Norman Wells Soil Treatment Facility Application - S18L1-002

Notes: This reclaim estimate has been prepared based on information provided by KBL Environmental in their August 7th, 2018 application.

KBL Environmental Ltd. (KBL) submitted applications for a Type “B” Water Licence (Licence) S18L1-002 to the Sahtu Land and Water Board (SLWB) to construct a Soil Treatment Facility (STF) in the Town of Norman Wells Upper Industrial Area. The proposed STF is designed to receive, store, and treat petroleum hydrocarbon contaminated soil and snow generated primarily from residential, commercial, and industrial properties where a hydrocarbon release has occurred. The STF will include operation and maintenance of a biotreatment pad and water retention pond during the summer months. Following bioremediation, treated soil meeting licence criteria will be transferred for use as daily cover at the Norman wells landfill. Soil unsuitable for re-use will be transported off-site to an approved facility.

Assumptions:

- *The facility would be run for one (1) year.*
- *Water treatment would be required annually for the 1 years of operation.*
- *During this operational period:*
 - *An Updated Operation and Maintenance Plan would need to be provided*
 - *Water quality testing would be required at the frequency established in the water licence.*
- *Reporting would include two (2) Annual Reports.*
 - *Following the operating year*
 - *Following remediation of the facility*

RECLAIM Items:

Water Treatment Costs

- Sampling cost – Technician @\$74.00/hr
 - Discharge from pad sump and or storage tanks limited in WL
 - 300 L/min with 50m³ maximum volume = 2-3 hours of discharge.
 - Sampling before and during discharge = 2 hours
 - Sampling groundwater wells (GW) spring = 1 hour
 - Sampling groundwater wells (GW) fall = 1 hour
 - Total Hours: Year 1 = 4 hrs and Year 2 = 2 hrs (6 Hours)
- Sample analysis of SNP and groundwater
 - SNP as per water licence – (assumed to be 7 stations 2 per year)
 - 14 sample events in Year 1
 - 10 sample events in Year 2 (5 groundwater well samples only x2 times)

- Sampling rate provided but only includes analysis not shipping/freight
- Shipping/freight rate assumed to be \$150 per sampling event
 - Assumed \$450 year 1 (3 sampling events)
 - Assumed \$300 year 2 (2 sampling events)

Reports

- Annual Report Year 1
- Annual Report Year 2
- Updated Spill Contingency Plan
- Updated Operation and Maintenance Plan