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September 14, 2020

Derek Donald
Technical Advisor
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0

Sent via Email: licensing@nwb-oen.ca; derek.donald@nwb-oen.ca

Re: Type B Water Licence 2BB-BOS1727– Updated Interim Closure and Reclamation Plan for the Boston Advanced Exploration Project

Dear Mr. Donald,

TMAC Resources Inc. (TMAC) is pleased to present an updated Interim Closure and Reclamation Plan, and accompanying revised reclamation cost estimate, to the Nunavut Water Board (NWB) for the Boston Advanced Exploration Project authorized under Type B Water Licence 2BB-BOS1727 (the Water Licence).

Attached to this submission is a revised and updated Interim Closure and Reclamation Plan, completed by SRK Consulting, in fulfilment of Water Licence Condition Part I, Item 2. In fulfilment of Water Licence Condition Part I, Item 4, a memo describing the updated reclamation cost estimate, also prepared by SRK Consulting, is provided in Appendix A of the attachment.

Should you have any questions please feel free to contact me at oliver.curran@tmacresources.com.

Sincerely,

Oliver Curran

Vice President, Environmental Affairs, TMAC

Cc:
Licensing (NWB)
Dave King (TMAC)
Kyle Conway / Sarah Warnock (TMAC)
Adam Grzegorczyk (TMAC)

Attachments:

1. Boston Camp Interim Closure Plan and Interim Closure Cost Estimate 2020 Update (SRK, September 2020)

Hope Bay Project
Boston Camp Interim Closure Plan

Prepared for

TMAC Resources Inc.

Prepared by

SRK Consulting (Canada) Inc.
1CT022.052
September 2020

Hope Bay Project
Boston Camp Interim Closure Plan

September 2020

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Project No: 1CT022.052

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srk consulting

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1 Introduction

The Boston Advanced Exploration Camp (hereafter Boston Camp) was part of the Hope Bay Regional Exploration Project. Boston Camp is located on Inuit Owned Land in the west Kitikmeot region of Nunavut (Figure 1), the camp is authorized under Nunavut Water Board (NWB) Type B Water Licence 2BB-BOS1727. In January 2013, the Hope Bay Regional Exploration Project was acquired by TMAC Resources Inc. from the previous owner Hope Bay Mining Limited (HBML) a wholly owned subsidiary of Newmont Mining Corporation (NMC).

This document presents the closure obligations, the plan for closing the camp and demonstrates how the closure obligations will be met. This closure plan serves as an update to the 2017 Interim Closure Plan (SRK 2017a) according to the provisions set forth in the NWB Water Licence. The Water and Ore/Waste Rock Management Plan developed for the Boston Site (SRK 2017b) is incorporated into this plan.

1.1 Background

Boston Camp is located approximately 170 km southwest of Cambridge Bay, above the high water mark on a peninsula in Aimaokatalok Lake. The camp provides support services for exploration activities in and around the Boston mineral resource located at the south end of the Hope Bay Greenstone Belt (Figure 1). The Boston Camp is currently under care and maintenance. It is considered critical infrastructure for restarting exploration in the Hope Bay Greenstone Belt in the future.

Boston Camp was not modified from its original form until June 2010 when a new sewage treatment plant and a new core processing facility were installed. In 2010 the exploration office structures were rearranged and attached to a central corridor leading to the main camp building. This Interim Closure Plan is consistent with the objectives set forth in the 2014 Interim Closure Plan (SRK 2014a) because site modifications have been limited. The Boston site has been in interim care and maintenance since 2012 and no construction activities were undertaken since. As part of the care and maintenance activities regular inspections were completed. Progressive reclamation activities were undertaken as detailed in Section 4.

1.2 Closure and Reclamation Plan History

This document presents the closure obligations and the plan for closing all facilities and demonstrates how the closure obligations will be met.

Table 1 below provides a summary of the historic closure planning documents issued for the Boston project.

Table 1: Closure and Remediation Plan Revision History

Document Title	Primary Author	Release Date	Document Rationale
Abandonment and Restoration Plan for the Boston Gold Project	Rescan Environmental Services Ltd.	1997	
Abandonment and Restoration Plan for the Boston Gold Project	Rescan Environmental Services Ltd.	September 1998	Initial closure cost estimate submitted in support of the original Type B Water License NWB1BOS9801
Abandonment and Restoration Plan Boston Gold Project Water License NWB1BOS9801	Hope Bay Joint Venture	May 2001	Submitted in support of the Type B Water License NWB1BOS9801 Renewal Application
Abandonment and Restoration Plan Boston Only Scenario Boston Gold Project	Miramar Hope Bay Limited	October 2002	Update to reflect the transfer of ownership under Type B Water License NWB1BOS0106
Boston Exploration Camp Closure and Reclamation Plan	Miramar Hope Bay Limited	December 2006	Required update in accordance with Type B Water Licence NWB1BOS0106 conditions
Closure and Reclamation Plan for the Boston Advanced Exploration Project Nunavut	Miramar Hope Bay Limited	September 2007	Required update in accordance with Type B Water Licence 2BB-BOS0712 conditions
Hope Bay Project Boston Camp Revised Interim Closure Plan. Hope Bay, Nunavut	SRK Consulting (Canada) Inc.	June 2012	Required update in accordance with Type B Water Licence 2BB-BOS0712 conditions, as the project formally entered Care and Maintenance
Hope Bay Project Boston Camp Revised Interim Closure Plan	SRK Consulting (Canada) Inc.	May 2014	Update to reflect the transfer of ownership under Type B Water License 2BB-BOS1217
Hope Bay Project Boston Camp Interim Closure Plan	SRK Consulting (Canada) Inc.	January 2017	Submitted in support of the Type B Water License 2BB-BOS1217 Renewal Application
Hope Bay Project Boston Camp Interim Closure Plan	SRK Consulting (Canada) Inc.	August 2020	Submitted in compliance with the Type B Water License 2BB-BOS1727

1.3 Closure Objective

The overall closure objective for the Boston Camp is to establish chemical and physical stability to protect human health and the environment. Post-closure care and maintenance, including environmental monitoring will be undertaken to ensure that these conditions are met.

1.4 Permits and Leases

Activities at the Boston Camp were completed in accordance with current NWB Water licences at the time, including the most current NWB Water Licence No. 2BB-BOS1727, and a Land Use Licence with the Kitikmeot Inuit Association (KIA). Table 2 provides a table of concordance indicating how the conditions specified in the current Water Licence are satisfied by this closure plan.

Table 2: Table of Concordance

Licence Reference	Licence Condition (2BB-BOS1727)	Closure Plan Reference	Closure Plan Response/Specification
Part I. 1	The Licensee shall submit with the Annual Report an addendum to the Plan to address the following: a. schedule for reclamation of the drill holes and type of material to be used as fill. b. Measures to prevent the fill of drill holes with material susceptible of leaching metals.	3.12, 4	a. Drill hole reclamation will be completed opportunistically, when equipment and resources become available at Boston. Peat may be used where appropriate. b. Only waste rock excavated from the existing camp pad may be used for backfill, as per Water and Ore/Waste Rock Management Plan.
Part I. 2	Prior to September 30, 2020 submit revised Abandonment and Reclamation Plan consistent with Mine Site Reclamation Guidelines for the Northwest Territories (INAC 2007), and consistent with the INAC Mine Site Reclamation Policy for Nunavut, 2002.	N/A	Requirements satisfied by submission of this Interim Closure Plan.
Part I. 3	The Licensee shall submit to the Board for approval, at least one year prior to the Project's planned closure, a Final Mine Closure and Reclamation Plan.		A Final Closure and Reclamation Plan will be submitted within the specified timelines.
Part I. 4	The Licensee shall provide with every Closure and Reclamation plan submission, a revised reclamation cost estimate.	App. A	An updated cost estimate was prepared and attached as Appendix A.
Part I. 5	The Licensee shall, if not approved by the Board, revise the Plan(s) and resubmit within thirty (30) days.	N/A	N/A
Part I. 6	Licensee shall complete all restoration work prior to the expiry of this Licence (July 31, 2027).	5.2	The works will not be completed by this date. Infrastructure at Boston is critical to future exploration when the Hope Bay Greenstone Belt is brought out of Care and Maintenance.
Part I. 7	Complete progressive reclamation of components no longer in use.	4	Progressive reclamation of various project components ongoing.
Part I. 8	Backfill and restore all sumps to the pre-existing natural contours of the land.	3.4 -3.7, 3.10 – 3.12	Areas of site disturbance will as far as practical be filled and recontoured to be consistent with natural contours, provide geotechnical stability, and minimize erosion, permafrost degradation and sedimentation.
Part I. 9	Remove site infrastructure and materials prior to expiry of Licence.	3.4, 3.5, 3.8	All facilities and materials will be removed. The rock fill pad and airstrip will be left in place to ensure geotechnical stability.

Licence Reference	Licence Condition (2BB-BOS1727)	Closure Plan Reference	Closure Plan Response/Specification
Part I. 10	Regrade all roads and airstrip to match natural contours and reduce erosion	3.2, 3.4, 3.7, 3.9 - 3.11	Airstrip, roads, and rock pads will be left in place and regraded to prevent ponding. This is done to ensure geotechnical stability.
Part I. 11	Remove culverts and re-establish drainage path of natural channel. Measures to minimize erosion and sedimentation shall be implemented	3.7	Culvert from the Core Storage Road will be removed, and the natural flow path restored.
Part I. 12	All disturbed areas will be ripped, graded or scarified to conform to natural topography and promote growth of vegetation	3.7, 3.9 - 3.11	Areas of disturbance will be ripped where necessary and practical and regraded to ensure positive drainage, conform to natural topography and to encourage revegetation.
Part I. 13	Remediation of hydrocarbon contaminated soils to the satisfaction of an Inspector to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, 2010. The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.	3.10	Hydrocarbon contaminated soils will either be remediated by landfarming to achieve specified remediation criteria or removed from the site to a licensed disposal facility.
Part I. 14	Restore drill holes and disturbed areas to natural conditions upon completion of drilling, must include removal of drill casing materials and the permanent capping of holes encountering artesian conditions	3.12	All drill steel will be cut at grade, holes will be capped, thermokarst areas backfilled, and soils around the drill sites scarified and revegetated. Artesian holes are routinely sealed by grouting.
Part I. 15	Contour and stabilize all disturbed areas upon completion of work and restore to a pre-disturbed state	3.11	Where practical areas of disturbance will be regraded to ensure positive drainage, and to be consistent with natural topography.
Part I. 16	Store drill cores at least thirty (30) metres above ordinary high water mark of any adjacent water body, where any direct flow into a water body is not possible, and no additional impacts are created.	3.3	All drill core boxes will be consolidated in one area on the existing Boston Camp pad.

2 Closure Scope of Work

The layout of the Boston Camp is shown in Figures 2 and 3. Closure and reclamation activities for Boston Camp include:

- Demolishing and removing remaining site structures;
- Decommissioning and demolition of containment structures;
- Decommissioning the existing portal to underground workings;
- Consolidating and covering ore stockpiles;
- Reclaiming drill sites;
- Collecting and disposing of hazardous wastes;

- Collecting and disposing of non-hazardous wastes;
- Stabilizing permafrost degradation areas;
- Remediating hydrocarbon contaminated soils; and
- Drainage control and revegetation, where appropriate.

Post-closure environmental monitoring will be implemented to confirm conformance with the closure objectives.

3 Permanent Closure Activities

3.1 Decommissioning of Camp Structures and Ancillary Facilities

All utilities to structures and facilities will be dismantled, and the structures emptied prior to demolition. Non-hazardous and hazardous waste will be segregated as discussed in Section 3.8. Tanks used for heating fuel storage will be drained, removed, and temporarily placed within the lined area of the primary tank farm. If possible and/or if a need is demonstrated, furniture, utilities or structures will be salvaged. Where possible salvageable structures will be moved intact, or alternatively they will be carefully dismantled and catalogued to facilitate efficient reassembly. Unusable or unwanted buildings will be demolished, and the waste material segregated into burnable and non-burnable waste and disposed of as described in Section 3.8.1. Salvage value is not included in the closure cost estimate. The following structures and facilities will be demolished:

- Accommodation and Office Complex;
- Core Processing Facility;
- Maintenance Shop;
- Power Generator Complex;
- Crusher Enclosure;
- Water Supply Structure;
- Sewage Treatment Plant;
- Helipad and Docks;
- Incinerator;
- Vent Raise;
- Communications Tower; and
- Small Sheds.

3.2 Airstrip Decommissioning

Following removal of all buildings and structures the airstrip will be decommissioned. Crushed ore used for surfacing material and for repairing the airstrip will be removed and consolidated into the ore stockpile. The main airstrip rock fill will be left in place, and the airstrip will be regraded to ensure positive drainage. Large white X’s will be painted on the ends of the airstrip.

Adjacent to the airstrip are two areas where drill cuttings have been stored. A geotextile underlies the drill cuttings. Drill cuttings will be removed and stockpiled for backfilling depressions during reclamation. The geotextile will be removed, cut into manageable pieces, and disposed of as described in Section 3.8.1. The area will be regraded to ensure positive drainage and prevent

ponding. Areas of permafrost degradation will be covered with a 1 m thick thermal blanket of waste rock and graded to promote positive drainage.

3.3 Drill Core Storage

Drill core will be consolidated on the Boston Camp pad. Drill core boxes will be placed on pallets and strapped, inventoried, and labelled. This area is outside of the 31 m wide fish habitat buffer zone from the shoreline of Aimaokatalok Lake.

3.4 Decommissioning and Demolition of Containment Structures

3.4.1 Tank Farms

Tank farms at Boston Camp include the primary bulk fuel storage to the north of the airstrip, the power plant fuel containment system and the jet fuel containment system all contained within secondary containment structures. There are also Tidy Tanks for heating fuel located within small secondary containment berms. The bedding, containment berm, and protective granular cover for the liners of all containment structures on this site were constructed using crushed ore.

All tanks will be decommissioned, drained, and transported to the Doris North waste management yard. Any remaining fuel will be consolidated and hauled to a designated fuel storage area at Doris Camp. At Doris Camp empty drums will be cleaned, crushed and disposed of as non-hazardous waste (see Section 3.8.1). Rinse water from the washing process will be routed through an oil/water separator and not discharged to the environment until treated water meets water quality standards specified in the water licence. Tidy Tanks and other self-contained tanks will be shipped off-site for resale or disposal. Bulk fuel tanks will be cut into manageable pieces and the steel sheets will be placed in the Doris landfill.

The granular cover layer above the liner will be tested for petroleum hydrocarbons and other contaminants. Depending on the test results, the material will either be consolidated within the ore pile or handled as contaminated soil and treated as described in Section 3.10. Once exposed, the tank farm liner will be cleaned to remove any hydrocarbon contamination, and then cut into manageable pieces for disposal as non-hazardous waste. The underlying bedding soil and containment berm will be tested for the presence of petroleum hydrocarbons. If contaminated, the ore will be remediated as described in Section 3.10, while the uncontaminated ore will be consolidated within the ore stockpile.

The portable pollution control berms situated in the jet fuel containment system will be cleaned, dismantled, and loaded into containers for disposal as non-hazardous waste.

All areas will be regraded for positive drainage after the containment structures are removed. The area will not be revegetated because it was built on a rock pad or bedrock.

3.4.2 Landfarm

The soils within the land farm will be tested for petroleum hydrocarbons. Soil hydrocarbon concentrations will be compared to the Nunavut Tier 1 Environmental Guidelines for Contaminated Site Remediation for industrial land use and coarse grained soils (EBA 2012a,

EBA 2012b). Soils that meet these remediation criteria may be used for reclamation. Soils not meeting these criteria will be hauled to Doris Camp for underground disposal in the Doris North Mine.

When remediation is complete, the liner will be cut into manageable pieces for disposal. The containment area will be regraded to ensure positive drainage. These materials will be processed as non-hazardous waste.

3.4.3 Sedimentation Ponds

Two sedimentation ponds were constructed at the Boston Camp (Figures 2 and 3). A high density polyethylene (HDPE) lined pond (Sedimentation Pond 1) and an unlined pond (Sedimentation Pond 2) are located on the east edge of the camp. In 2017, as part of the progressive reclamation efforts, two additional lined facilities were constructed: a temporary pollution control pond and a drill cuttings sump, both on the existing camp pad.

Sedimentation Pond 1 was used to settle drilling mud from regional exploration drilling. Any water contained in the pond will be tested and discharged to the tundra or treated to meet the site-specific discharge criteria. Settled sediments will be allowed to dry, then removed from the pond and temporarily stockpiled to allow for the removal of the liner. Liner will be cleaned, cut into manageable pieces, and disposed of as non-hazardous waste. The pond sediments will be tested for contaminants and depending on the results, will be shipped to a licensed off-site disposal facility or covered in place by pushing the containment berm inwards. The area will be subsequently regraded to ensure positive drainage.

Sedimentation Pond 2 was initially used to settle drilling fluids during underground development but was converted to a Burn Pit to burn all wood waste after the bulk sample was completed. Sediment in the pond will be tested for contaminants and depending on the test results, will be either shipped off-site for disposal in a licensed facility or covered in place with by pushing the containment berm inward. The area will be regraded to ensure positive drainage. All solid waste other than fine sediments will be collected and disposed of as described in Section 3.8.1.

For cost estimating purposes, it was assumed the sediments within the sedimentation ponds can be disposed of on site without special treatment.

The drill cuttings sump was used for drill cuttings management. Water accumulated in this sump will be tested and discharged to the tundra or treated to meet the site-specific discharge criteria. Settled sediments will be allowed to dry, then removed from the pond and temporarily stockpiled to allow for the removal of the liner. Liner will be cleaned, cut into manageable pieces, and disposed of as non-hazardous waste. The pond sediments will be tested for contaminants, and depending on the results will be hauled to Doris for underground disposal or covered in place by pushing the containment berm inwards. The area will be subsequently regraded to ensure positive drainage.

The Temporary Pollution Control Pond was used to manage outflows from the sewage treatment plant and contact water from the fuel berms originating from precipitation. At closure, any water contained in the pond will be tested and discharged to the tundra or treated to meet the

site-specific discharge criteria. All accumulated sediments will be allowed to dry and will either be hauled to Doris for underground disposal or covered in place by pushing the berm inward and over the sediments. The area will be regraded for positive drainage.

3.5 Decommission Mine Workings

3.5.1 Underground Portal

The underground portal will be closed in accordance with regulations. A 15 m thick rockfill plug will be installed in the underground portal. The portal opening will be backfilled with waste rock. The backfilled area will be contoured to prevent surface water ponding. The entire area will be regraded to promote positive drainage and to conform to the site topography.

3.5.2 Vent Raise

The wooden collar and cribbing and the ventilation fan will be removed and disposed of as non-hazardous waste. The raise will be capped with reinforced concrete with gas vent in accordance with the appropriate mining regulations.

3.6 Ore Stockpile Closure

The ore stockpile will be consolidated and managed to reduce metal loading to the receiving environment. Ore which has been used as surface dressing, repairs, or for construction of the various containment facilities around site will be collected and consolidated within the existing ore stockpile

The ore piles will be consolidated in an area approximately two-thirds of the original footprint, regraded to prevent ponding, and covered with an HDPE liner. A protective cover of 0.3 m of waste rock would be placed over the geomembrane, with a geotextile separation layer on either side of the liner.

3.7 Decommission Camp Rock Fill Pad

All rock pads on site were built using rock from underground development. The waste rock is non-acid generating and has a significant acid neutralisation potential (SRK 2009). Some of the waste rock from the camp pad may be excavated and used as backfill material where required, but the pad will always have a minimum thickness of 1 m. The rock fill pad will be left in place, regraded to promote positive drainage and prevent the ponding of surface water. The culvert from the Core Storage Road will be removed and a swale created to restore the natural flow path.

3.8 Collection and Disposal of Waste

3.8.1 Non-Hazardous Waste

Following dismantling, demolition, and removal of all structures, a general site wide cleanup will be conducted to gather all waste on site.

The demolition debris from camp structures and other facilities will be collected and segregated for proper disposal. Wood debris will be separated into burnable and non-burnable based on the appropriate guidelines for burning and incineration and/or landfilling (GN 2012, GNWT 2004, particularly Schedules III and IV). Wood waste will either be chipped or burned. Wood waste suitable for burning will be transported to an approved burn pan. Prior to on-site burning, appropriate approvals and permissions will be attained.

Ashes from the incinerator will be managed according to existing management plans.

Non-burnable non-hazardous waste will be loaded into containers and hauled to Doris, and placed into the Doris non-hazardous landfill at Quarry #3.

Prior to demolition, all water supply and sewage pipelines are to be flushed and the sludge and waste water will be collected and loaded into 55 gallon drums. The drums will be transported to the Doris North camp treatment facility for processing.

3.8.2 Hazardous Waste

Hazardous wastes and chemicals will be collected and stored in appropriately sealed and labelled containers and/or empty drums, in accordance with the appropriate guidelines for hazardous waste management (GN 2010). This includes any remaining fuel, hydraulic oil, antifreeze, lubricants, paint, paint thinners, cleaning supplies, degreasing agents and any other chemicals that cannot be used for their intended purpose. The containers will be hauled to Doris North and consolidated with other hazardous waste for transport and disposal off-site. Materials shipped off site will be disposed of in a licensed facility in accordance with appropriate Federal, Territorial, Provincial or Municipal hazardous waste regulations.

3.9 Stabilization of Permafrost Degradation

A few areas were previously identified as permafrost degradation areas which require stabilization. These areas of permafrost degradation are as follows:

- Airstrip (permafrost degradation ponds can be found at different locations along the east and west shoulders of the airstrip due to historic drilling activities) (SRK 2013);
- Drill Road;
- Drill sites;
- Core Storage Road;
- Diamond Drill Cuttings and Sedimentation Pond;
- Road to Dock (possible small pockets of permafrost degradation) (SRK 2013);
- Road to airstrip (SRK 2013); and
- Sewage Treatment Plant discharge.

Areas of depression should be filled in with and/or covered with a 1 m thick thermal blanket consisting of rock, overburden, drill cuttings, wood chips or a mixture of these during the winter season. The surface of the areas will be regraded to ensure positive drainage.

3.10 Remediation of Hydrocarbon Impacted Soils

A Phase 3 Environmental Site Assessment (SRK 2014a - Appendix A) was conducted in 2012. Soil hydrocarbon concentrations were compared to the Nunavut Tier 1 Environmental Guidelines for Contaminated Site Remediation for industrial land use and Coarse grained soils (EBA 2012a, EBA 2012b). Soils that meet these remediation criteria may be used for reclamation. Soils not meeting these criteria will be remediated or disposed of in an approved underground repository.

A field investigation will be completed after demolition and debris removal to define the nature and extent of hydrocarbon contamination. Remediation options will be assessed after the field investigation. Selection of the type of remediation used to address each of these areas is dependent on the following site-specific factors:

- Size of the impacted area and volume of impacted soils;
- Type of hydrocarbons present; and
- Ground conditions of the impacted area (i.e., solifluction and/or potential for permafrost degradation).

Remediation alternatives will be the same as proposed for Windy Camp and the Patch Lake facility (SRK 2014b). Off-site disposal and in situ bioremediation/landfarming are the preferred alternatives.

Impacted soils will be excavated and disposed of underground in the Doris North mine. Smaller isolated areas of hydrocarbon impact may be remediated in situ using bioremediation.

The bioremediation method may consist of aerobic treatment whereby a proprietary oxygen-releasing compound (EHC-O manufactured by Adventus Americas) will be applied to the affected area at an application rate of about 2.5 g EHC-O per kg of soil. This compound will be tilled into the active zone of the soil (done in the summer season). At least one season after the compound has been added the impacted soil will be tested to determine if microbial activity has resulted in a reduced hydrocarbon contamination. If the soils still exceed compliance criteria, the treatment may be repeated or the soils will be excavated and removed as described below.

Excavated soils or soils previously land farmed which meet the remediation criteria will be used for reclamation or stockpiled.

The open excavations will then be backfilled with suitable backfill to prevent surface water ponding and permafrost degradation. Backfilled excavations will be covered with a minimum 1 m thick layer of waste rock to prevent permafrost degradation and erosion.

The option to encapsulate impacted soils in place is also preserved should it be demonstrated that hydrocarbon risk is minimal and/or other remediation methods are ineffective or inappropriate for a given area.

3.11 Drainage Control and Revegetation

Once all surface infrastructure has been removed and the area has been cleared of debris, the areas will be regraded to ensure no ponding of water. In the summer prior to regrading, the areas should be staked in the field to be easily identified during the winter reclamation work.

Additional areas will not be disturbed during regrading. Any remaining depressions which cannot be regraded will be backfilled with suitable backfill to prevent surface water ponding and permafrost degradation. Roads and trails associated with the existing Boston Camp will be ripped and scarified to promote natural revegetation, reduce erosion potential, and ensure the restoration of natural drainage pathways in a low maintenance fashion.

Vegetation has been damaged in the following areas:

- Sewage Treatment Plant Discharge;
- Area South of the Core Storage Road; and
- Area between the Drill Road and the Airstrip.

Areas of complete vegetation dieback and ponding will be backfilled with suitable backfill to prevent surface water ponding and permafrost degradation. The areas will be regraded to ensure positive drainage to support natural revegetation.

3.12 Drill Site Reclamation

Drill holes will be inventoried, and the extent of remediation work required for each location will be assessed.

For drill hole reclamation, above ground casing will be cut at grade, and a cap will be hammered in place to seal the hole. The drill holes will not be grouted, and the steel casing will not be backfilled. The holes drilled into the lake bottom (over the ice) as well as any holes encountering artesian conditions were grouted and sealed as part of the drilling procedure. The drill holes located on dry land intersect cold permafrost to a depth of approximately 500 m and as such water flow through these holes is unlikely.

Areas of permafrost degradation around boreholes, if present, will be covered with a 1 m thick thermal blanket and graded to ensure positive ponding. Only waste rock excavated from the camp pad can be used for backfill to prevent metal leaching (SRK 2017b).

Erosion control measures will be installed where required and vegetation growth will be encouraged where possible by scarifying the soils and seeding. Cost estimates assume that an average area of 10 m^2 will be covered, and that backfilling will be done in the winter using low ground pressure vehicles.

An adaptive management approach will be used to reclaim areas where saline drilling fluid spills have affected vegetation. Management alternatives will be developed and implemented to ensure remediation of the affected area.

4 Progressive Reclamation

Progressive reclamation activities were completed as documented in the annual reports submitted to the NWB as part of the Water License obligations.

Soils from the landfarm area were removed and hauled to Doris for underground disposal. Drilling site west of the airstrip were remediated by removing garbage and spreading peat moss to support revegetation.

Progressive reclamation will continue opportunistically when equipment and resources become available on site.

5 Post–Closure Monitoring

Monitoring to confirm that the closure plan and associated remediation techniques have achieved the stated closure objectives will be carried out as follows:

- Once closure activities have been completed, the site should be visually inspected by a qualified Professional Geotechnical Engineer annually for three consecutive years to ensure that erosion and/or permafrost degradation areas have stabilized and that remediation objectives for hydrocarbon contaminated soils have been achieved.
- The annual seep sampling program should be continued to detect any changes in the waste rock or ore stockpile leachate chemistry during post-closure monitoring.
- Soil quality in the land farm and/or the hydrocarbon impacted areas where in situ bioremediation has been implemented will be monitored every two years until site soil remediation objectives have been met.

6 Cost Estimate and Scheduling

6.1 Closure Cost Estimate

Appendix A provides details of the estimated closure costs for the Boston Camp site. The estimated closure cost for Boston Camp site is $3,722,000 in undiscounted 2020 Canadian dollars. These costs assume that demolition waste is hauled to the Doris Landfill Site and that all salvageable equipment and infrastructure will be relocated to the Doris Camp site.

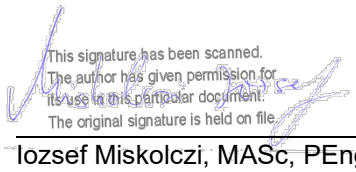
A contingency of 20% of the direct costs is also included. The purpose of the contingency is to account for costs that are uncertain given the current level of information. These items include hydrocarbon impacted soil remediation, drill hole reclamation, and material quantity estimates.

These costs were developed based on equipment and labor rates provided by a third-party contractor, using an NWB approved spreadsheet based cost estimating process that is consistent with the principles of RECLAIM. A detailed description of the cost estimate is provided in Appendix A.

6.2 Scheduling

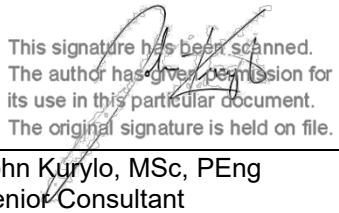
Closure of the Boston Camp will occur upon closure of the entire Hope Bay Project. Removal of waste from site, and equipment demobilization will be completed after decommissioning. In situ bioremediation and/or landfarming of hydrocarbon impacted soil may take several years.

This report, **"Hope Bay Project, Boston Camp Interim Closure Plan"**, was prepared by SRK Consulting (Canada) Inc.



Iozsef Miskolczi, MASc, PEng
Senior Consultant

and reviewed by



John Kurylo, MSc, PEng
Senior Consultant

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

7 References

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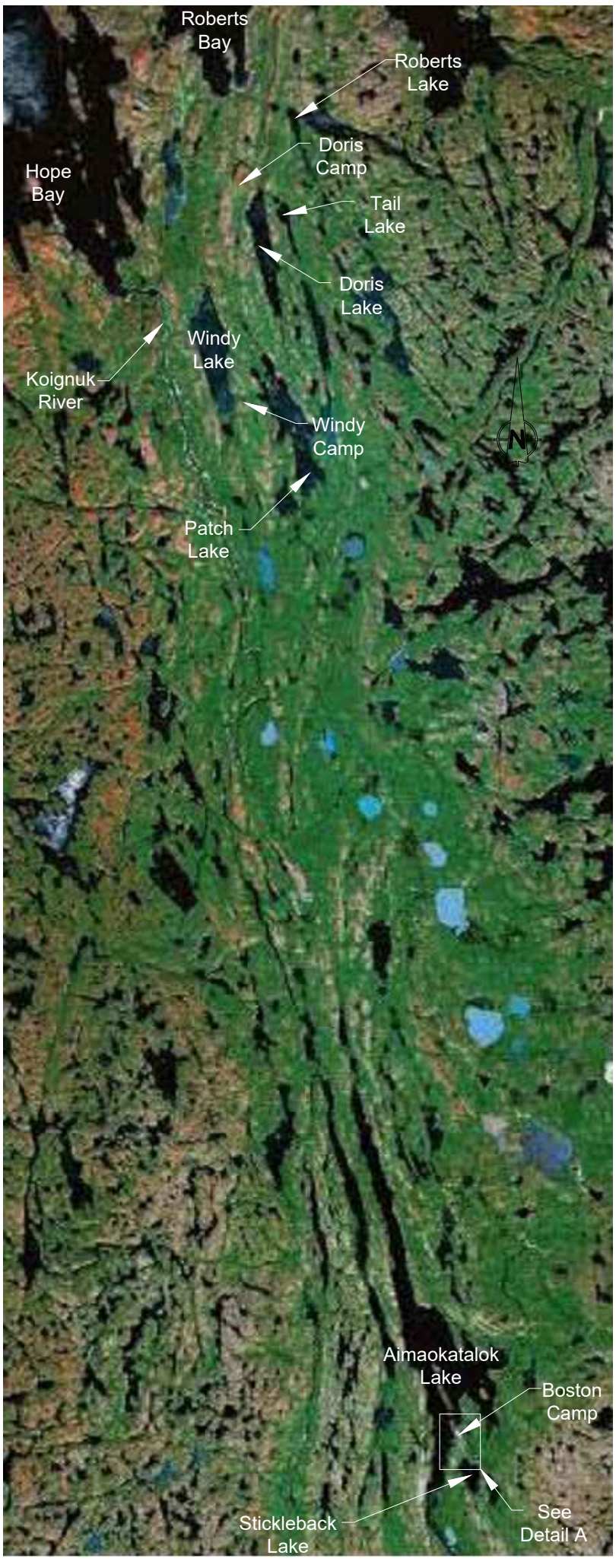
Figures



REGIONAL SATELLITE PHOTOGRAPH

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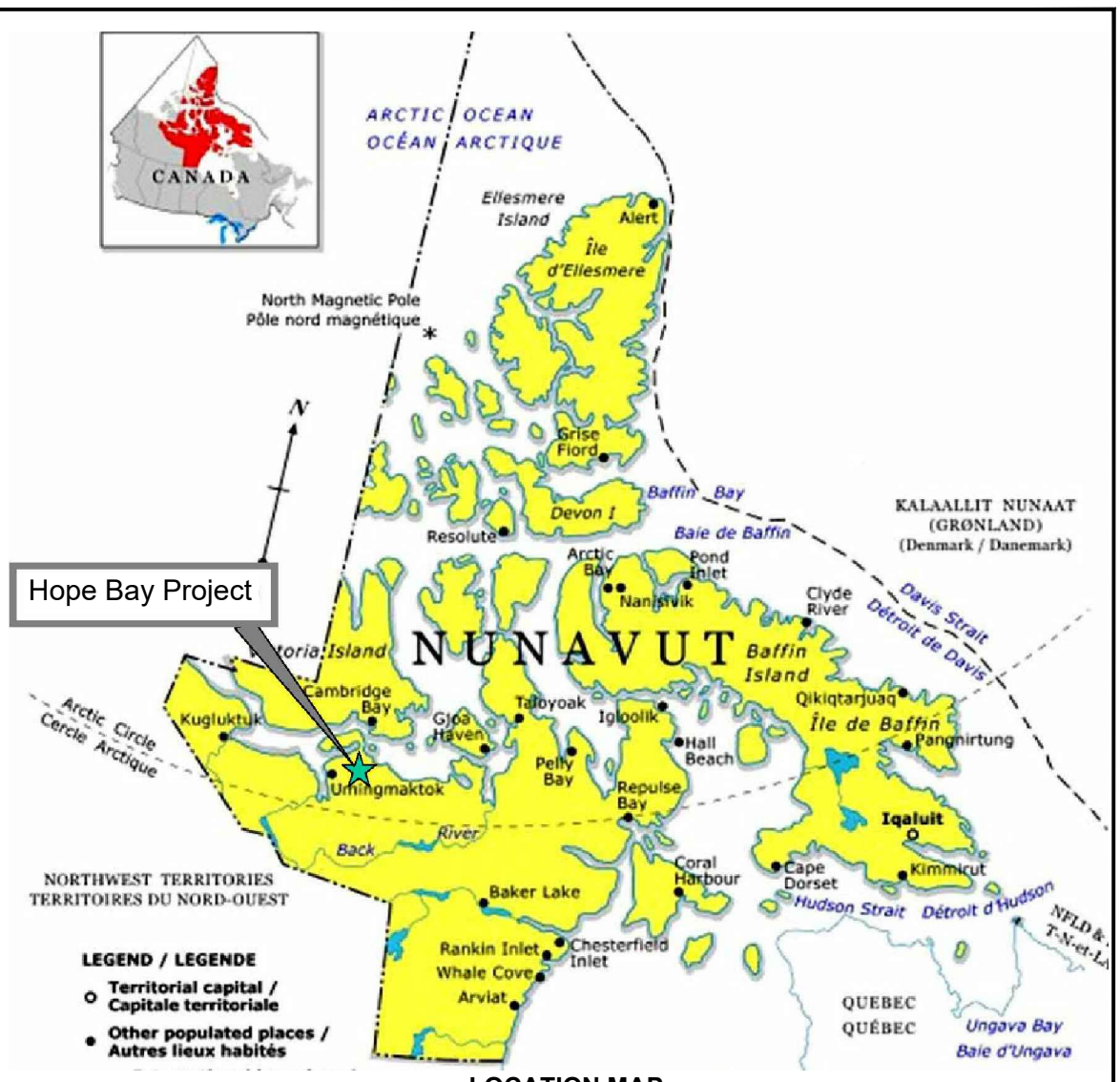
Scale in Kilometers



LOCATION MAP

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DETAIL A

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srk consulting

SRK JOB NO.: 1CT022.006.Task 600

FILE NAME: 1CT022.006-600_Figure 1.dwg

TMAC RESOURCES

TMAC Resources Inc.

Boston Camp Updated Interim Closure Plan

Location Map

DATE:	APPROVED:	FIGURE:
Jan 2017	IM	1

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\\van-svr0\Projects\01_SITES\Hope Bay\1CH008.033 Infras. Design Support Services 2011\300_2011 Engineering Site Supervision\Site Back-ups\Doris Drive_20110921\1\2011 Infrastructure Construction QA\Photos\2011.07.28\IMGP3582.JPG

Photo Taken July 2011

srk consulting	TMAC RESOURCES	Boston Camp Updated Interim Closure Plan
SRK JOB NO.: 1CT022.006.Task 600	TMAC Resources Inc.	Boston Site Layout Looking South-West
FILE NAME: BOSTON_SitePlan_1CT022.006_Rev01_IM.dwg		DATE: Jan 2017 / APPROVED: IM / FIGURE: 2

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Photo Taken August 5, 2018

srk consulting	TMAC RESOURCES	Boston Camp Updated Interim Closure Plan
Job No: 1CT022.052 Filename: BOSTON_SitePlan_1CT022.052_Rev01_AN.ppt.pptx	**TMAC Resources Inc.**	**Boston Site Layout Looking West**
		Date: July 2020 / Approved: IM / Figure: **3**

Appendix A: Boston Interim Closure Plan Cost Estimate – 2020 Update

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Memo

To:	Oliver Curran, VP Environmental Affairs, TMAC	**Client:**	TMAC Resources Inc.
From:	Ameeta Bhabra, EIT	**Project No:**	1CT022.052
Reviewed:	Iozsef Miskolczi, MASc, PEng John Kurylo, MSc, PEng	**Date:**	September 11, 2020
Cc:	Adam Grzegorczyk, TMAC		
Subject:	Boston Camp - Interim Closure Cost Estimate – 2020 Update		

1 Introduction

As part of the compliance requirements for Water License 2BB-BOS1727, TMAC Resources Inc (TMAC) must submit an updated Closure and Reclamation Plan to the Nunavut Water Board for the Boston site. TMAC has retained SRK Consulting (Canada) Inc (SRK) to update the Boston Camp Interim Closure Plan and associated Closure Cost Estimate. These documents were last updated in 2017, as part of the submission for the water license renewal application. Updates to the Interim Closure Plan are provided in the body of the 'Hope Bay Project, Boston Camp Interim Closure Plan' text and are not included in this memorandum.

This memo documents changes to the Closure Cost Estimate and provides the rationale for any changes to the assumptions and components of the estimate. The resulting cost was increased by approximately $111,000 from the 2017 closure cost of $3,611,000 to the updated 2020 closure cost of $3,722,000. Financial security under Water License 2BB-BOS1727 is posted by TMAC wholly to the Receiver General of Canada under the administration of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC).

2 Changes

2.1 Inflation Rate

The average annual inflation rate used to update unit rate and lump sum costs was assumed to be 2.0%. This rate was based annual inflation rate data provided monthly by Statistics Canada. The average annual inflation rate between 2012 and 2020 was calculated to be 1.68% based on a trimmed Consumer Price Index (CPI-trim) and was conservatively increased to 2.0% for this evaluation. For comparison, the previous update to the Closure Cost Estimate completed by SRK in 2017 used an inflation rate of 3.0%. This 2020 update determined a rate of 3.0% to be over-conservative (high values compared to the overall Canada CPI), and a 2.0% rate (as outlined above) was adopted for this analysis.

2.2 Rate Updates

Most unit rates and indirect lump sum costs were inflated from the originally estimated unit rates, to the 2020 rate, using the 2.0% annual rate (Section 2.1). Shipping rates and commercial flight costs were obtained from current sources, rather than inflating previous estimates.

The detailed cost estimate is provided as Attachment 1. Orange highlighted cells in Tables 2, 3, and 4 of Attachment 1, indicate increases to lump sums, general unit rates, and mobilization / demobilization unit rates.

Quantities were adjusted based on progressive reclamation activities. In addition, the sumps newly built on site as part of the progressive reclamation were included. Green and yellow highlighting in Table 2 of Attachment 1 identifies the areas, respectively, where full and partial reclamation are considered. Red highlighting indicates areas where reclamation quantities increased. Progressive reclamation details, and the new lined facilities descriptions, are provided in the subsections of the following section.

2.3 Progressive Reclamation

Progressive reclamation was undertaken at the Boston area in 2017 and focused on two areas:

- the landfarm treatment area (LTA) and
- the legacy drill holes.

2.3.1 Landfarm Treatment Area

Contaminated materials from the LTA were excavated, stockpiled, and transported to Doris where they were disposed of in the underground workings. In the original closure plan and cost estimate, contaminated soils were expected to be tested in order to determine their suitability for other reclamation works. Areas where soil samples failed testing requirements, were transported and disposed in the underground workings at Doris. All tasks under the ‘Current landfarmed soils’ activity (Table 1) were considered to be completed by these remedial works resulting in a cost reduction of the total closure cost of $9,500. Detailed costs are provided in Attachment 1.

Table 1. Landfarm Treatment Remediation Task Status

Activity	Task	Status
Current landfarmed soils	Test existing soils in landfarm	All contaminated soils removed; no testing required. Completed.
	Use passing soils for reclamation	
	Load failing soils into containers for transport	Completed.
	Haul soils to Doris for underground disposal	Completed.

Notes:

1. Adapted from detailed cost estimate (Attachment 1).
2. Status based on TMAC KIA report (2018) and email correspondence with K.Conway (2020).

Remaining remediation activities for the soil treatment facility include removing the soil stored in drums, removing the liner, and regrading the area.

2.3.2 Legacy Drill Holes

The 2017 reclamation focused on seven legacy drill sites with a total of 32 drill holes. Drilling debris was removed from the sites in megabags, and coconut matting was removed in areas with poor regrowth to prevent wildlife from getting caught in the plastic netting of the decomposed matting. Peat was placed at five of the seven drill sites. Drill sites 2 and 6 have a total of 11 drill holes that may still require peat. The remediation of the legacy drill holes reduces the total closure cost by approximately $3,000. The status of the drill hole remediation tasks is summarized in Table 2. Detailed costs are provided in Attachment 1.

Table 2. Legacy Drill Hole Remediation Task Status

Activity[(1)]	**Task[(1)]**	**Status[(2)]**
Drill piping	Cut of top of drill pipes and cap.	Completed for 32/112 legacy holes
	Load top debris into containers for transport to Roberts Bay	Additional debris removed from drill hole sites. Completed for 32/112 legacy holes.
	Haul debris to Doris Landfill	Completed for 32/112 legacy holes.
Core	Remove any core to the core storage area	Completed for 32/112 legacy holes.
Regrade	Fill in low-lying areas (assumed sourced within 0.5km)	Peat placed at 5/7 legacy sites (21/112 legacy holes).
Revegetate	Revegetate: Supply and place coconut matting	Coconut matting with black netting was removed in some areas with poor vegetation regrowth to prevent wildlife from getting caught.
	Revegetate: Seed/Fertilize, by hand, high application rate	Not completed. May not be required, pending monitoring of natural revegetation in legacy drill site areas.

Notes:

1. Adapted from detailed cost estimate (Attachment 1)
2. Status based on TMAC 2018 and email correspondence with K.Conway, 2020.

2.3.3 Drill Cuttings Sump

A new drill cuttings sump was constructed on the camp pad to manage cuttings from recent drilling operations. The sump is similar in size to Settling Pond #1 and will be reclaimed using the same methods as for the other lined ponds described in the body of the Interim Closure and Reclamation Plan report. The cost of reclaiming this sump is estimated as $4,000.

2.3.4 Temporary Pollution Control Pond

A lined pond was constructed on the camp pad to manage contact water, such as the effluent from the sewage treatment plant and hydrocarbon contaminated water from the temporary fuel

berms around site. This pond was lined with an impermeable membrane which was left exposed, i.e. no protective overliner crush material was placed. The size of the pond is about two thirds of the fuel storage facility or about 350 m2 in area. This area will be reclaimed using the same methods as for the other lined ponds described in the body of the Interim Closure and Reclamation Plan report. The cost of reclaiming this pond is estimate as $4,000.

2.3.5 Additional Landfarm Liner

Once soils were removed from the landfarm, a new liner was laid onto the existing liner, with the same footprint of 368 m^2. Removal and disposing of this additional liner was added to the cost estimate and resulted in a cost increase of approximately $1,500.

3 Overall Cost Comparison

The total closure cost increased by $134,000 based on updated 2020 rates. This is an increase of 4% from the 2017 estimate. Table 3 below provides a comparative summary of the 2017 and 2020 Interim Closure and Reclamation Cost estimates. Note that the summary tables include costs rounded to the nearest thousand. Due to this rounding, the variations between the 2017 compared to the 2020 cost may not be apparent for some of the items in Table 3. To highlight any variation between the old and new estimate a “Percent Increase’ column has been included in Table 3. Minor inconsistencies (for example in the ‘Contaminated Soil Implementation Plan’ line item) were found in the 2017 estimate and corrected as part of this estimate update. These inconsistencies did not have a major influence on the total cost.

Table 3. Summary of 2017 and 2020 costs

Work Task	Cost[1]		Percent Increase [2],[4]
	May 2017	May 2020	
Direct Cost Items			
1. Underground Mine	**$23,000**	**$24,000**	**1.1%**
Portal/Decline	$8,000	$9,000	0.9%
Vent Raise	$15,000	$15,000	1.3%
2.Rock Pile	**$475,000**	**$479,000**	**1.0%**
Ore Stockpiles	$434,000	$438,000	1.0%
Contaminated Soil Implementation Plan	$41,000	$41,000	0.0%
3. Buildings and Equipment	**$489,000**	**$494,000**	**0.7%**
Facilities Demolition			
Accommodation Complex/Buildings	$106,000	$108,000	1.9%
Maintenance Shop Complex	$29,000	$30,000	0.9%
Crusher Enclosure	$7,000	$7,000	0.9%
Water Treatment Facilities	$69,000	$70,000	0.9%
Incinerator	$3,000	$3,000	0.9%
Mobile Equipment	$8,000	$8,000	0.8%
Other Structures	$39,000	$40,000	1.3%
Primary Tank Farm	$67,000	$67,000	0.9%
Power Plant Fuel Containment	$3,000	$3,000	0.9%
Jet Fuel Containment System	$4,000	$4,000	3.2%
Soil Treatment Facility[3]	$27,000	$19,000	-28.0%
Camp Complex Foundation Pad	$15,000	$16,000	1.5%
Transporation Infrastructure			
Helipads	$6,000	$6,000	0.9%
Road to Aimaokatalok Lake	$3,000	$3,000	0.9%
Road to Airstrip	$5,000	$5,000	0.9%
Airstrip	$15,000	$15,000	0.9%
Core Storage Road	$3,000	$3,000	1.0%
Drill Road	$3,000	$3,000	0.9%
Permafrost Remediation and Revegetation	$41,000	$42,000	0.3%
Drill Sites/Drill Hole Abandonment			
Drill Sites/Drill Hole Abandonment[3]	$16,000	$14,000	-16.4%
Non-Process Ponds & Reservoirs			
Settling Pond #1	$4,000	$4,000	0.9%
Settling Pond #2	$3,000	$3,000	0.9%
Diamond Drill Cuttings Settling Pond	$4,000	$4,000	0.9%
Temporary Pollution Control Pond	n/a	$4,000	n/a
Drill Cuttings Sump	n/a	$4,000	n/a
Off-Site Shipping for Disposal	$3,000	$3,000	6.5%
Off-Site Disposal Fees	$6,000	$6,000	1.9%
Total Direct Costs	**$987,000**	**$1,019,000**	**4.2%**
4. Interim Care and Maintenance	$80,000	$85,000	6.2%
5. Mobilization & Demobilization	$1,249,000	$1,260,000	0.8%
6. Post-closure Monitoring	$200,000	$212,000	6.2%
7. Engineering and Consultants Services	$150,000	$159,000	6.2%
8. Project Management	$723,000	$762,000	5.5%
9. Health & Safety Plans/Monitoring and QA/QC	$10,000	$10,000	0.8%

Work Task	Cost[1]		Percent Increase [2],[4]
	May 2017	May 2020	
10. Bonding / Insurance	$10,000	$10,000	0.8%
11. Contingency	$202,000	$204,000	0.8%
Total Indirect Costs	**$2,624,000**	**$2,703,000**	**3.0%**
Total Closure Cost	**$3,611,000**	**$3,722,000**	**3.3%**

Notes:

1. Costs rounded to the nearest thousand. Costs may not add exactly, due to this rounding.
2. Percent increase before rounding.
3. Highlighted rows indicate areas where reclamation tasks were performed.
4. Zero percent increases aside from reclamation tasks are due to calculation errors in the previous estimate.

4 Conclusion

This memo documents the updates to the Interim Closure and Reclamation Cost estimate for the Boston site. The changes include an update of all unit rates and indirect costs to 2020 values and account for progressive reclamation that has occurred between 2017 and 2020 at the Boston site. Minor calculation errors and inconsistencies in the previous estimate were identified and corrected (such as for the 'Contaminated Soil Implementation Plan'). These changes and updates resulted in an increase of $111,000 to the total closure cost, thereby increasing the 2017 estimate from $3.611 million dollars to the updated 2020 estimate value of $3.722 million dollars.

5 References

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Conway, K. 2020. Personal Communication (email correspondence). June 29, 2020.

Attachment 1 – Detailed Cost Estimate

Table 1. Summary of Costs

Work task	Cost (Rounded to the nearest thousand)	
	May 2017	May 2020
Direct Cost Items		
1. Underground Mine	**$23,000**	**$24,000**
Portal/Decline	$8,000	$9,000
Vent Raise	$15,000	$15,000
2.Rock Pile	**$475,000**	**$479,000**
Ore Stockpiles	$434,000	$438,000
Contaminated Soil Implementation Plan	$41,000	$41,000
3. Buildings and Equipment	**$489,000**	**$494,000**
Facilities Demolition		
Accommodation Complex/Buildings	$106,000	$108,000
Maintenance Shop Complex	$29,000	$30,000
Crusher Enclosure	$7,000	$7,000
Water Treatment Facilities	$69,000	$70,000
Incinerator	$3,000	$3,000
Mobile Equipment	$8,000	$8,000
Other Structures	$39,000	$40,000
Primary Tank Farm	$67,000	$67,000
Power Plant Fuel Containment	$3,000	$3,000
Jet Fuel Containment System	$4,000	$4,000
Soil Treatment Facility	$27,000	$19,000
Camp Complex Foundation Pad	$15,000	$16,000
Transporation Infrastructure		
Helipads	$6,000	$6,000
Road to Aimaokatalok Lake	$3,000	$3,000
Road to Airstrip	$5,000	$5,000
Airstrip	$15,000	$15,000
Core Storage Road	$3,000	$3,000
Drill Road	$3,000	$3,000
Permafrost Remediation and Revegetation	$41,000	$42,000
Drill Sites/Drill Hole Abandonment		
Drill Sites/Drill Hole Abandonment	$16,000	$14,000
Non-Process Ponds & Reservoirs		
Settling Pond #1	$4,000	$4,000
Settling Pond #2	$3,000	$3,000
Diamond Drill Cuttings Settling Pond	$4,000	$4,000
Cuttings Sump	n/a	$4,000
Lined Emergency Sump	n/a	$4,000
Off-Site Shipping for Disposal	$3,000	$3,000
Off-Site Disposal Fees	$6,000	$6,000
Total Direct Costs	**$987,000**	**$1,019,000**
4. Interim Care and Maintenance	**$80,000**	**$85,000**
5. Mobilization & Demobilization	**$1,249,000**	**$1,260,000**
6. Post-closure Monitoring	**$200,000**	**$212,000**
7. Engineering and Consultants Services	**$150,000**	**$159,000**
8. Project Management	**$723,000**	**$762,000**
9. Health & Safety Plans/Monitoring and QA/QC	**$10,000**	**$10,000**
10. Bonding / Insurance	**$10,000**	**$10,000**
11. Contingency[1]	**$202,000**	**$204,000**
Total Indirect Costs	**$2,624,000**	**$2,703,000**
Total Closure Cost	**$3,611,000**	**$3,722,000**

Table 2. Cost Itemized by Task

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
DIRECT COSTS												
Camp Structures												
Accommodation Complex/Buildings											$ 107,758	
B01	1	1	1	Portable Trailers	Decommission (electrical, mechanical)	1	ls	C.1.05	$ 666.53	$ 667		
B01	1	1	2		Prep Trailers for movement (remove boards/piping, etc.).	12	ea	C.1.08	$ 870.62	$ 10,447		
B01	1	1	3		Haul trailers to Doris North for re-use.	12	ea	C.4.06	$ 3,916.50	$ 46,998		
B01	1	2	1	Recreation Tent	Remove heating stove	1	ea	C.1.01	$ 55.87	$ 56		
B01	1	2	2		Demolish	9	m^3	C.3.05	$ 12.43	$ 111		
B01	1	2	3		Collect Debris	23	m^2	C.3.10	$ 0.15	$ 3		
B01	1	2	4		Load debris into containers for transport	12	m^3	C.4.01	$ 9.55	$ 110		
B01	1	2	5		Haul debris to Doris Landfill	12	m^3	C.4.08	$ 95.19	$ 1,101		
B01	1	3	1	Site Office	Demolish	50	m^3	C.3.05	$ 12.43	$ 625		
B01	1	3	2		Collect Debris	62	m^2	C.3.10	$ 0.15	$ 9		
B01	1	3	3		Load debris into containers for transport	101	m^3	C.4.01	$ 9.55	$ 961		
B01	1	3	4		Haul debris to Doris Landfill	101	m^3	C.4.04	$ 88.79	$ 8,934		
B01	1	4	1	Geotech Tent	Remove heating stove	1	ls	C.1.01	$ 55.87	$ 56		
B01	1	4	2		Demolish	13	m^3	C.3.05	$ 12.43	$ 158		
B01	1	4	3		Collect Debris	33	m^2	C.3.10	$ 0.15	$ 5		
B01	1	4	4		Load debris into containers for transport	17	m^3	C.4.01	$ 9.55	$ 158		
B01	1	4	5		Haul debris to Doris Landfill	17	m^3	C.4.08	$ 95.19	$ 1,577		
B01	1	5	1	Core Shack and Core Splitter	Remove heating stoves	2	ls	C.1.01	$ 55.87	$ 112		
B01	1	5	2		Demolish	102	m^3	C.3.05	$ 12.43	$ 1,262		
B01	1	5	3		Collect Debris	115	m^2	C.3.10	$ 0.15	$ 17		
B01	1	5	4		Load debris into containers for transport	198	m^3	C.4.01	$ 9.55	$ 1,889		
B01	1	5	5		Haul debris to Doris Landfill	198	m^3	C.4.08	$ 95.19	$ 18,819		
B01	1	6	1	Muster Station	Remove heating stoves	1	ls	C.1.01	$ 55.87	$ 56		
B01	1	6	3		Demolish	44	m^3	C.3.05	$ 12.43	$ 550		
B01	1	6	4		Collect Debris	49	m^2	C.3.10	$ 0.15	$ 7		
B01	1	6	5		Load debris into containers for transport	66	m^3	C.4.01	$ 9.55	$ 635		
B01	1	6	6		Haul debris to Doris Landfill	66	m^3	C.4.08	$ 95.19	$ 6,322		
B01	1	7	1	Communication Equipment	Dismantle and package Satellite Dish and communication equipment	1	ls	C.1.07	$ 366.85	$ 367		
B01	1	8	1	Generators	Decommission generator	1	ls	C.1.06	$ 702.97	$ 703		
B01	1	8	2		Transport Trailer to Doris Camp for re-use/salvage	1	ls	C.4.06	$ 3,916.50	$ 3,916		
B01	1	9	1	Hazardous Waste	Collect and place in suitable containers	0.48	m^3	C.2.01	$ 2,281.22	$ 1,084		
B01	1	9	2		Haul to Doris North	0	m^3	C.4.03	$ 84.26	$ 40		
Maintenance Shop Complex											$ 29,571	
B01	2	1	1	Heating System	Relocate tanks to tank farm for draining/cleaning	2	ea	C.1.01	$ 55.87	$ 112		
B01	2	2	1	Maintenance Shop	Decommission electrical, mechanical (including connections to generator house & transformer)	1	ls	C.1.05	$ 666.53	$ 667		
B01	2	2	3		Demolish (steel modular structure)	17	m^3	C.3.05	$ 12.43	$ 214		
B01	2	2	4		Demolish wood structures (survival, electrical and compressor sheds)	48	m^3	C.3.05	$ 12.43	$ 595		
B01	2	2	5		Collect Debris	306	m^3	C.3.10	$ 0.15	$ 46		
B01	2	2	6		Load debris into containers for transport	98	m^3	C.4.01	$ 9.55	$ 933		
B01	2	2	7		Haul debris to Doris Landfill	98	m^3	C.4.08	$ 95.19	$ 9,298		
B01	2	3	1	Powerhouse	Decommission (electrical)	1	ls	C.1.05	$ 666.53	$ 667		
B01	2	3	2		Demolish	49	m^3	C.3.05	$ 12.43	$ 607		
B01	2	3	3		Collect Debris	61	m^2	C.3.10	$ 0.15	$ 9		
B01	2	3	4		Load debris into containers for transport	98	m^3	C.4.01	$ 9.55	$ 934		
B01	2	3	5		Haul debris to Doris Landfill	98	m^3	C.4.08	$ 95.19	$ 9,302		
B01	2	4	1	Transformer building	Decommission (electrical)	1	ls	C.1.05	$ 666.53	$ 667		
B01	2	4	2		Demolish (hazardous material removed above)	33	m^3	C.3.05	$ 12.43	$ 404		
B01	2	4	3		Collect Debris	41	m^2	C.3.10	$ 0.15	$ 6		
B01	2	4	4		Load debris into containers for transport	49	m^3	C.4.01	$ 9.55	$ 466		
B01	2	4	5		Haul debris to Doris Landfill	49	m^3	C.4.08	$ 95.19	$ 4,644		
Crusher Enclosure											$ 6,894	
B01	3	1	1	Equipment	Dismantle hopper/crusher parts for transport	1	ls	C.3.08	$ 413.50	$ 414		
B01	3	1	2		Load equipment into containers for transport	20	m^3	C.4.01	$ 9.55	$ 189		
B01	3	2	1	Crusher building	Demolish (tent/steel enclosure)	37	m^3	C.3.05	$ 12.43	$ 456		
B01	3	2	2		Collect Debris	467	m^2	C.3.10	$ 0.15	$ 70		
B01	3	2	3		Load debris into containers for transport	55	m^3	C.4.01	$ 9.55	$ 526		
B01	3	2	4		Haul debris to Doris Landfill	55	m^3	C.4.08	$ 95.19	$ 5,239		
Water Treatment Facilities											$ 70,056	
B01	4	1	1	Water Supply Pipelines	Cut pipelines into manageable pieces	607	m	C.3.03	$ 2.30	$ 1,397		
B01	4	1	2		Load debris into containers for transport	182	m^3	C.4.01	$ 9.55	$ 1,741		
B01	4	1	3		Haul debris to Doris Landfill	182	m^3	C.4.08	$ 95.19	$ 17,343		
B01	4	2	1	Sewage water pipelines	Flush sewage water pipelines	1	ls	C.2.06	$ 590.90	$ 591		
B01	4	2	2		Cut pipelines into manageable pieces	489	m	C.3.03	$ 2.30	$ 1,125		
B01	4	2	3		Load debris into containers for transport	147	m^3	C.4.01	$ 9.55	$ 1,402		
B01	4	2	4		Haul debris to Doris Landfill	147	m^3	C.4.08	$ 95.19	$ 13,965		
B01	4	3	1	Camp Water Intake	Collect and dismantle intake system	1	ls	C.1.03	$ 1,246.11	$ 1,246		

Table 2. Cost Itemized by Task

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
B01	4	4	1	Old Sewage Treatment (RBC)	Flush and remove sewage plumbing	1	ls	C.2.06	$ 590.90	$ 591		
B01	4	4	2		Load sewage sludge/waste water in 55 gallon drums	1	m^3	C.2.06	$ 590.90	$ 591		
B01	4	4	3		Demolish buildings	37	m^3	C.3.05	$ 12.43	$ 459		
B01	4	4	4		Collect Debris	35	m^2	C.3.10	$ 0.15	$ 5		
B01	4	4	5		Load debris into containers for transport	55	m^3	C.4.01	$ 9.55	$ 529		
B01	4	4	6		Haul debris to Doris Landfill	55	m^3	C.4.08	$ 95.19	$ 5,273		
B01	4	4	7		Regrade treatment foundation pad to ensure positive drainage	460	m^2	C.5.05	$ 2.79	$ 1,282		
B01	4	5	1	New Sewage Treatment System	Flush and remove sewage plumbing	1	ls	C.2.06	$ 590.90	$ 591		
B01	4	5	2		Load sewage sludge/waste water in 55 gallon drums	1	m^3	C.2.06	$ 590.90	$ 591		
B01	4	5	3		Decommission (electrical)	1	ls	C.1.05	$ 666.53	$ 667		
B01	4	5	4		Demolish buildings/tanks	122	m^3	C.3.05	$ 12.43	$ 1,515		
B01	4	5	5		Collect Debris	30	m^2	C.3.10	$ 0.15	$ 5		
B01	4	5	6		Load debris into containers for transport	183	m^3	C.4.01	$ 9.55	$ 1,747		
B01	4	5	7		Haul debris to Doris Landfill	183	m^3	C.4.08	$ 95.19	$ 17,401		
Helipads											$ 5,802	
B01	5	1	1	Demolish	Demolish pads	32	m^3	C.3.05	$ 12.43	$ 395		
B01	5	1	2		Collect debris	21	m^2	C.3.10	$ 0.15	$ 3		
B01	5	1	3		Load debris into containers for transport	48	m^3	C.4.01	$ 9.55	$ 455		
B01	5	1	4		Haul debris to Doris Landfill	48	m^3	C.4.08	$ 95.19	$ 4,532		
B01	5	2	1	Regrade	Regrade area to ensure positive drainage	150	m^2	C.5.05	$ 2.79	$ 418		
Incinerator											$ 1,784	
B01	8	1	1	Disassemble	Collect ashes and place in containers	0.01	m^3	C.2.07	$ 626.93	$ 6		
B01	8	1	2		Dismantle (welding crew)	1	ls	C.1.04	$ 1,070.84	$ 1,071		
B01	8	1	3		Load into containers for transport (to Roberts Bay)	7	m^3	C.4.01	$ 9.55	$ 64		
B01	8	1	4		Haul debris to Doris Landfill	7	m^3	C.4.08	$ 95.19	$ 643		
Mobile Equipment											$ 7,936	
B01	9	1	1	Decontaminate	Wash/decontaminate misc. equipment in lined facility	5	ea	C.3.08	$ 413.50	$ 2,068		
B01	9	1	2		Operate oil/water separator (qnty = # of tanks/equip. treated)	5	ea	C.2.08	$ 53.28	$ 266		
B01	9	2	1	Disassemble	Dismantle (welding crew)	5	ea	C.3.08	$ 413.50	$ 2,068		
B01	9	2	2		Load into containers for transport	34	m^3	C.4.01	$ 9.55	$ 322		
B01	9	2	3		Haul debris to Doris Landfill	34	m^3	C.4.08	$ 95.19	$ 3,213		
Other Structures											$ 39,569	
B01	10	1	1	Demolish	Demolish buildings and other structures	44	m^3	C.3.05	$ 12.43	$ 547		
B01	10	1	2		Dismantle radio towers	2	each	C.3.11	$ 16,048.58	$ 32,097		
B01	10	1	3		Collect debris	80	m^2	C.3.10	$ 0.15	$ 12		
B01	10	1	4		Load debris into containers for transport	66	m^3	C.4.01	$ 9.55	$ 631		
B01	10	1	5		Haul debris to Doris Landfill	66	m^3	C.4.08	$ 95.19	$ 6,282		
Subtotal Direct Costs - Camp Structures											**$ 269,371**	
Containment Structures												
Primary Tank Farm											$ 67,484	
B02	1	1	1	Above ground storage tanks	Drain fuel and consolidate in one tank	8	ea	C.2.03	$ 266.95	$ 2,136		
B02	1	1	2		Decommission fuel tanks	8	ea	C.1.02	$ 466.74	$ 3,734		
B02	1	1	3		Pressure wash tanks	8	ea	C.2.04	$ 292.73	$ 2,342		
B02	1	1	4		Operate oil/water separator	8	ea	C.2.08	$ 53.28	$ 426		
B02	1	1	5		Demolish and cut tanks into manageable pieces	8	m^3	C.3.07	$ 4,667.54	$ 37,340		
B02	1	1	6		Haul residual fuel on skid to Doris Camp	1	ls	C.4.06	$ 3,916.50	$ 3,916		
B02	1	1	7		Load into containers for transport	25	m^3	C.4.01	$ 9.55	$ 236		
B02	1	1	8		Haul debris to Doris Landfill	25	m^3	C.4.08	$ 95.19	$ 2,356		
B02	1	2	1	Heating Systems Tanks	Drain of fuel (consolidate in one tank) and pressure wash tank	7	ea	C.2.02	$ 22.25	$ 156		
B02	1	2	2		Operate oil/water separator (qnty = # of tanks/equip. treated)	7	ea	C.2.08	$ 53.28	$ 373		
B02	1	2	3		Load into containers for transport (to Roberts Bay)	5	m^3	C.4.01	$ 9.55	$ 50		
B02	1	2	4		Haul debris to Doris Landfill	5	m^3	C.4.08	$ 95.19	$ 500		
B02	1	3	1	Secondary containment system	Excavate liner cover material and consolidate on ore pile	406	m^3	C.5.02	$ 20.46	$ 8,300		
B02	1	3	2		Load HC contaminated bedding in containers for transport	-	m^3	C.4.01	$ 9.55	$ -		
B02	1	3	3		Cut liner into manageable pieces and clean	825	m^2	C.3.02	$ 2.50	$ 2,065		
B02	1	3	4		Load liner into container for transport	12	m^3	C.4.01	$ 9.55	$ 118		
B02	1	3	5		Haul debris to Doris Landfill	12	m^3	C.4.08	$ 95.19	$ 1,178		
B02	1	3	6		Regrade area to ensure positive drainage	810	m^2	C.5.05	$ 2.79	$ 2,257		
Power Plant Fuel Containment											$ 3,331	
B02	2	1	1	Green Storage tanks (2)	Drain of fuel and consolidate in one tank	2	ea	C.2.03	$ 266.95	$ 534		
B02	2	1	2		Pressure wash tanks	2	ea	C.2.04	$ 292.73	$ 585		
B02	2	1	3		Operate oil/water separator	2	ea	C.2.08	$ 53.28	$ 107		
B02	2	1	4		Load into containers for transport (to Roberts Bay)	2	ea	C.4.07	$ 144.60	$ 289		
B02	2	1	5		Haul debris to Doris Landfill	2	ea	C.4.08	$ 95.19	$ 190		
B02	2	2	1	Secondary containment system	Excavate liner cover material and consolidate on ore pile	60	m^3	C.5.02	$ 20.46	$ 1,228		
B02	2	2	2		Load HC contaminated bedding in containers for transport	-	m^3	C.4.01	$ 9.55	$ -		
B02	2	2	3		Cut liner into manageable pieces and clean	12	m^2	C.3.02	$ 2.50	$ 30		
B02	2	2	4		Load liner into container for transport (to Roberts Bay)	0.2	m^3	C.4.01	$ 9.55	$ 2		
B02	2	2	5		Haul debris to Doris Landfill	0	m^3	C.4.08	$ 95.19	$ 17		
B02	2	2	6		Regrade area to ensure positive drainage	125	m^2	C.5.05	$ 2.79	$ 348		

Table 2. Cost Itemized by Task

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
Jet Fuel Containment System											$ 4,279	
B02	3	1	1	Tidy Tanks/Jet fuel Drums	Remove to Doris Camp for reuse	1	ls	C.4.06	$ 3,916.50	$ 3,916		
B02	3	2	1	Portable Pollution Control Berm	Dismantle and prep for shipping	1	ls	C.3.04	$ 266.95	$ 267		
B02	3	2	2		Haul to Doris Camp for reuse (include in jet fuel trip)	1	ls	-	$ -	$ -		
B02	3	2	3		Haul debris to Doris Landfill	1	ls	C.4.08	$ 95.19	$ 95		
Settling Pond #1											$ 4,195	
B02	4	1	1	Remove liner	Excavate settled material, temp. stockpile	79	m^3	C.5.04	$ 3.00	$ 238		
B02	4	1	2		Remove liner and cut into manageable pieces	400	m^2	C.3.02	$ 2.50	$ 1,001		
B02	4	1	3		Load liner into container for transport (to Roberts Bay)	6	m^3	C.4.01	$ 9.55	$ 57		
B02	4	1	4		Haul debris to Doris Landfill	6	m^3	C.4.08	$ 95.19	$ 571		
B02	4	2	1	Backfill pond	Backfill pond with settled solids and drill cuttings	79	m^3	C.5.04	$ 3.00	$ 238		Cutting placement included elsewhere
B02	4	2	2		Regrade over pond with pad/berm materials	750	m^2	C.5.05	$ 2.79	$ 2,090		
Settling Pond #2 (incl. Burn Pit)											$ 2,101	
B02	5	1	1	Remove Solid Waste	Load into containers for transport (to Roberts Bay)	-	m^3	C.4.01	$ 9.55	$ -		
B02	5	2	1	Backfill pond	Backfill pond with settled solids and drill cuttings	59	m^3	C.5.04	$ 3.00	$ 178		
B02	5	2	2		Regrade over pond with pad/berm materials	690	m^2	C.5.05	$ 2.79	$ 1,923		
Soil Treatment Facility											$ 19,358	
B02	7	1	1	Current landfarmed soils	Test existing soils in landfarm	-	ea	C.6.01	$ 100.87	$ -		No tests performed. All contaminated soils removed (2017)
B02	7	1	2		Use passing soils for reclamation	-	m^3	-	$ -	$ -		No tests performed. All contaminated soils removed (2017)
B02	7	1	3		Load failing soils into containers for transport	-	m^3	C.4.01	$ 9.55	$ -		All contaminated soils removed (2017)
B03	7	1	4		Haul soils to Doris for underground disposal	-	m^3	C.4.03	$ 84.26	$ -		All contaminated soils removed (2017)
B02	7	2	1	Soil in drums	Empty Drums	100	ea	C.2.09	$ 108.45	$ 10,845		
B02	7	2	2		Wash drums (in tank farm)	100	ea	C.2.05	$ 19.16	$ 1,916		
B02	7	2	3		Crush drums	100	ea	C.3.01	$ 17.76	$ 1,776		
B02	7	2	4		Load into containers for transport (to Roberts Bay)	6	m^3	C.4.01	$ 9.55	$ 61		
B02	7	2	5		Haul debris to Doris Camp	6	m^3	C.4.03	$ 84.26	$ 536		
B02	7	3	1	Remove liner	Remove liner and cut into manageable pieces	736	m^2	C.3.02	$ 2.50	$ 1,842		Additional liner added in 2017
B02	7	3	2		Load liner into container for transport (to Roberts Bay)	11	m^3	C.4.01	$ 9.55	$ 105		Additional liner added in 2017
B02	7	3	3		Haul debris to Roberts Bay	11	m^3	C.4.08	$ 95.19	$ 1,051		Additional liner added in 2017
B02	7	4	1	Regrade	Regrade area to ensure positive drainage	440	m^2	C.5.05	$ 2.79	$ 1,226		
Diamond Drill Cuttings Settling Pond											$ 3,643	
B02	8	1	1	Excavate cuttings	Stockpile cuttings on-site	336	m^3	C.5.04	$ 3.00	$ 1,009		
B02	8	2	1	Remove pond	Excavate textile and place in container for transport	5	m^3	C.4.01	$ 9.55	$ 43		
B02	8	2	2		Regrade area to ensure positive drainage	930	m^2	C.5.05	$ 2.79	$ 2,591		
Cuttings Sump											$ 4,195	
B02	9	1	1	Remove liner	Excavate settled material, temp. stockpile	79	m^3	C.5.04	$ 3.00	$ 238		
B02	9	1	2		Remove liner and cut into manageable pieces	400	m^2	C.3.02	$ 2.50	$ 1,001		
B02	9	1	3		Load liner into container for transport (to Roberts Bay)	6	m^3	C.4.01	$ 9.55	$ 57		
B02	9	1	4		Haul debris to Doris Landfill	6	m^3	C.4.08	$ 95.19	$ 571		
B02	9	2	1	Backfill pond	Backfill pond with settled solids and drill cuttings	79	m^3	C.5.04	$ 3.00	$ 238		Cutting placement included elsewhere
B02	9	2	2		Regrade over pond with pad/berm materials	750	m^2	C.5.05	$ 2.79	$ 2,090		
Lined Emergency Sump											$ 4,179	
B02	10	1	1	Remove liner	Treat and discharge water	1	ea	C.2.03	$ 266.95	$ 267		
B02	10	1	2		Remove liner and cut into manageable pieces	352	m^2	C.3.02	$ 2.50	$ 881		
B02	10	1	3		Load liner into container for transport (to Roberts Bay)	5	m^3	C.4.01	$ 9.55	$ 50		
B02	10	1	4		Haul debris to Doris Landfill	5	m^3	C.4.08	$ 95.19	$ 503		
B02	10	2	1	Backfill pond	Backfill pond with settled solids and drill cuttings	324	m^3	C.5.04	$ 3.00	$ 973		Cutting placement included elsewhere
B02	10	2	2		Regrade over pond with pad/berm materials	540	m^2	C.5.05	$ 2.79	$ 1,505		
Subtotal Direct Costs - Containment Structures											**$ 112,764**	
Site Regrading												
Camp Complex Foundation Pad											$ 15,692	
B03	1	1	1	Regrade	Stake-out low-lying areas in summer to place fill	1	days	C.5.14	$ 7,345.33	$ 7,345		
B03	1	1	2		Regrade to fill in any low lying areas	2,995	m^2	C.5.05	$ 2.79	$ 8,346		
Road to Aimaokatalok Lake											$ 2,154	
B03	2	1	1	Regrade	Regrade (crown)	773	m^2	C.5.05	$ 2.79	$ 2,154		
Road to Airstrip											$ 4,912	
B03	3	1	1	Regrade	Regrade to fill in any low lying areas and crown road	1,763	m^2	C.5.05	$ 2.79	$ 4,912		
Airstrip											$ 14,868	
B03	4	1	1	Regrade	Regrade to fill in any low lying areas	5,222	m^2	C.5.05	$ 2.79	$ 14,551		
B03	4	2	1	Decommission	Place large white X's at each end of strip	1	ls	C.1.09	$ 316.95	$ 317		
Core Storage Road											$ 1,532	
B03	5	1	1	Remove Wind Sock & Culvert	Excavate culvert	7	m^3	C.5.15	$ 100.26	$ 695		
B03	5	1	2		Dismantle windsock	1	ls	C.3.08	$ 413.50	$ 414		
B03	5	1	3		Load culvert/sock/pole/drum into container for transport (to Roberts Bay)	0.3	m^3	C.4.01	$ 9.55	$ 3		
B03	5	1	4		Haul debris to Doris Landfill	0	m^3	C.4.08	$ 95.19	$ 26		
B03	5	2	1	Regrade	Regrade to fill in any low lying areas and crown road	142	m^2	C.5.05	$ 2.79	$ 396		
Drill Road											$ 853	
B03	1	1	1	Regrade	Regrade to fill in any low lying areas and crown road	306	m^2	C.5.05	$ 2.79	$ 853		
Subtotal Direct Costs - Camp Surface Infrastructure											**$ 40,011**	
Underground Mine												
Portal/Decline											$ 8,516	

Table 2. Cost Itemized by Task

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
B04	1	1	1	Remove fencing	Collect Debris (ski fence and supports)	2.2	m^3	C.3.05	$ 12.43	$ 28		
B04	1	1	2		Load debris into container for transport (to Roberts Bay)	2.2	m^3	C.4.01	$ 9.55	$ 21		
B04	1	1	3		Haul debris to Doris Landfill	2	m^3	C.4.08	$ 95.19	$ 211		
B04	1	2	1	Scaling	Use excavator to knock down debris	1	hrs	C.5.11	$ 300.32	$ 300		Est. 1 hr. Excavator time
B04	1	3	1	Backfill decline	Load, haul, dump waste ore to plug incline	389	m3	C.5.02	$ 20.46	$ 7,957		
Vent Raise											$ 15,324	
B04	2	1	1	Demolish	Demolish garden shed and wood support structures	13	m^3	C.3.05	$ 12.43	$ 155		
B04	2	1	2		Load debris into container for transport (to Roberts Bay)	19	m^3	C.4.01	$ 9.55	$ 179		
B04	2	1	3		Haul debris to Doris Landfill	19	m^3	C.4.08	$ 95.19	$ 1,785		
B04	2	2	1	Construct Cap	1.5mx2.1m concrete cap with gas vent	1	LS	C.6.03	$ 13,205.00	$ 13,205		
Subtotal Direct Costs - Mine Openings											**$ 23,841**	
Rock Pile												
Consolidate, Reslope, Encapsulate, and Cover (0.3 m)											$ 438,184	
B05	6	1	1	Consolidate stockpiles and dispersed ore	Scrape up and dump ore within consolidated pile	3,803	m^3	C.5.03	$ 27.29	$ 103,766		
B05	6	1	2		Consolidate ore into large pile	8,265	m^3	C.5.03	$ 27.29	$ 225,511		
B05	6	2	1	Reslope stockpile	Dozer - D7	2,026	m^2	C.5.06	$ 3.72	$ 7,526		
B05	6	3	1	Place Synthetic cover	Supply and place HDPE liner	2,330	m^3	C.5.01	$ 36.47	$ 84,965		
B05	6	3	2	Cover stockpile	Load, haul, place cover material (assumed sourced within 0.5km)	802	m^3	C.5.02	$ 20.46	$ 16,416		
Subtotal Direct Costs - Ore Stockpiles											**$ 438,184**	
Contaminated Soils												
Contaminated Soil Implementation Plan											$ 41,333	
B06	1	1	1	Develop Implementation Plan	Includes field investigation, laboratory costs, and reporting	1	ls	-	$ 41,333.33	$ 41,333		
Subtotal Direct Costs - Contaminated Soils											**$ 41,333**	
Other Areas												
Drill Sites											$ 13,633	
B07	1	1	1	Drill piping	Cut of top of drill pipes and cap	80	ea	C.3.09	$ 36.64	$ 2,931	$ 32,830	This value was included in the agreed 2017 cost estimate and continues to be included
B07	1	1	2		Load top debris into containers for transport to Roberts Bay	1	m^3	C.4.01	$ 9.55	$ 13		
B07	1	1	3		Haul debris to Doris Landfill	1	m^3	C.4.08	$ 95.19	$ 128		
B07	1	2	1	Core	Remove any core to the core storage area	-	each	C.5.07	$ 41.12	$ -		Done in 2012
B07	1	3	1	Regrade	Fill in low-lying areas (assumed sourced within 0.5km)	440	m^3	C.5.02	$ 20.46	$ 9,004		51 drill sites requiring complex remediation
B07	1	4	1	Revegetate	Revegetate: Supply and place coconut matting	220	m^2	C.5.08	$ 4.78	$ 1,052		
B07	1	4	2		Revegetate: Seed/Fertilize, by hand, high application rate	550	m^2	C.5.13	$ 0.92	$ 505		
Vegetation Die-Back and Permafrost remediation Areas											$ 41,573	
B07	2	1	1	Areas by the Airstrip (excluding drill sites)	Fill in low-lying areas (assumed sourced within 0.5km)	168	m^3	C.5.02	$ 20.46	$ 3,433		
B07	2	1	1	Area by Drill Road	Fill in low-lying areas (assumed sourced within 0.5km)	267	m^3	C.5.02	$ 20.46	$ 5,462		
B07	2	1	2		Revegetate: Supply and place coconut matting	890	m2	C.5.08	$ 4.78	$ 4,254		
B07	2	1	3		Revegetate: Seed/Fertilize, by hand, high application rate	17,795	m2	C.5.13	$ 0.92	$ 16,336		
B07	2	2	1	Area by Core Storage Road	Fill in low-lying areas (assumed sourced within 0.5km)	149	m^3	C.5.02	$ 20.46	$ 3,039		
B07	2	2	2		Revegetate: Supply and place coconut matting	50	m^2	C.5.08	$ 4.78	$ 237		
B07	2	2	3		Revegetate: Seed/Fertilize, by hand, high application rate	990	m^2	C.5.13	$ 0.92	$ 909		
B07	2	3	1	Area by Grey Water Discharge	Fill in low-lying areas (assumed sourced within 0.5km)	81	m^3	C.5.02	$ 20.46	$ 1,657		
B07	2	3	2		Revegetate: Supply and place coconut matting	270	m^2	C.5.08	$ 4.78	$ 1,290		
B07	2	3	3		Revegetate: Seed/Fertilize, by hand, high application rate	5,398	m^2	C.5.13	$ 0.92	$ 4,955		
Subtotal Direct Costs - Other Areas											**$ 88,035**	
Waste Shipping Off-site												
B08	1	1	1	Non-Hazardous Waste	Ship by barge to Hay River	-	m^3	S.03	$ 222.40	$ -		
B08	1	3	1	Hazardous Waste	Ship by barge to Hay River	0.48	m^3	S.02	$ 361.31	$ 172		
Subtotal Direct Costs - Waste Shipping											**$ 172**	
Waste Disposal												
B09	1	1	1	Non-hazardous waste	Disposal fee at Hay River	-	m^3	M.10	$ 6.33	$ -		
B09	1	2	1	Sewage sludge	RBC + New Treatment system sludge/solid waste	2	m^3	C.4.04	$ 88.79	$ 178		
B09	1	4	1	Hazardous Waste	Dump fee at Hay River	0.48	m^3	M.09	$ 11,486.86	$ 5,456		
Subtotal Direct Costs - Waste Disposal											**$ 5,634**	
TOTAL DIRECT COSTS												
					TOTAL DIRECT COSTS						**$ 1,019,344**	
INDIRECT CLOSURE COSTS												
Interim Care & Maintenance											$ 84,943	
-	1	1	-	18 months ICM	Yearly Monitoring Costs	2	LS	x	$42,471.34	$ 84,943		2017 value ($40,000) increased by 2% inflation to 2020 rate
Mobilization & Demobilization											$ 1,259,886	
-	2	1	-	Winter Closure activities	Equipment Mobilization/Demobilization	1	ls	x	$ 455,123.15	$ 455,123		
				Equipment stand-by		1	LS	x	$ 740,602.38	$ 740,602		
-	2	2	-	Construct and maintain Winter track	Required during closure	1	LS	x	$ 64,160.45	$ 64,160		Assumed open for 4 months
Post-Closure Monitoring and Maintenance											$ 212,357	
-	3	1	-	Compliance Monitoring	Yearly monitoring cost	5	LS	x	$42,471.34	$ 212,357		2017 value ($40,000) increased by 2% inflation to 2020 rate
Engineering and Consultants Services											$ 159,268	
	4	1		Engineering Design		1	LS	x	$53,089.18	$ 53,089		2017 value ($50,000) increased by 2% inflation to 2020 rate
-	4	2	-	Confirmatory sampling and analysis		1	LS	x	$106,178.35	$ 106,178		2017 value ($100,000) increased by 2% inflation to 2020 rate
Project Management											$ 762,416	
General Administration												
-	5	1	-	Travel allowance		1	LS	x	$0.00	$0		

Table 2. Cost Itemized by Task

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
-	5	2	-	Camp Management		119	day	OC.01	$ 578.84	$68,882		
-	5	3	-	Camp Operations		119	days	OC.02	$ 2,208.16	$262,771		
-	5	4	-	Camp Rental		1	4 months	OC.03	$ 84,896.64	$84,897		
	5	5	-	Camp setup and removal		1	LS	x	$43,533.12	$43,533		2017 value ($41,000) increased by 2% inflation to 2020 rate
Field support												
-	5	5	-	Supervision		119	days		$ 1,373.65	$ 163,465		
-	5	6	-	Equipment maintenance support - Mechanic	50% of project duration	59.50	days	x	$ 1,198.75	$ 71,326		
-	5	7	-	Helicopter Support	transport to drill hole locations	7	days	E.08	$ 9,648.96	$ 67,543		4 trips, 6 hrs/day;
Health & Safety Plans/Monitoring and QA/QC											$ 10,193	
-	6	1	-	H&S Plans and As-built Report		1	%	x	$ 1,019,344.31	$ 10,193		
Bonding / Insurance											$ 10,193	
-	7	1	-			1	%	x	$ 1,019,344.31	$ 10,193		
Contingency											$ 203,869	
-	8	1	-	Contingency	20% of direct costs	20	%	x	$ 1,019,344.31	$ 203,869		
Subtotal Indirect Costs												
				Subtotal Indirect Costs							**$ 2,703,125**	
CLOSURE COSTS - TOTAL												
				Subtotal Indirect Costs							**$ 3,722,469**	

Orange cells highlight lump sum estimates inflated to 2020 cost
Green cells indicate completed reclamation activity
Yellow cells indicate partially completed reclamation activity
Red cells indicate increase in reclamation acivities (additional reclamation required)

Table 3. Mobilization/ Demobilization costs

Mob/Demob Costs

Crew mobilization costs included in loaded labour rates.
The barging fee for equipment is calculated on a square foot basis.

No. of units	Description	Units	Quantity	Unit cost (2012)	2020 Task cost	Notes
	Crew					
	Note: Labour costs included in loaded Labour Unit Rates found on the Unit Rates and Task Unit Rates worksheets					
	Construction equipment	Footprint				
1	Bobcat	m^3	14.5	$ 436.22	$ 6,347	From Hay River to Roberts Bay
1	Loader	m^2	116.0	$ 436.22	$ 50,615	From Hay River to Roberts Bay
1	Dozer	m^2	49.1	$ 436.22	$ 21,430	From Hay River to Roberts Bay
1	Excavator	m^2	91.7	$ 436.22	$ 39,995	From Hay River to Roberts Bay
1	Small equipment	m^3	24.1	$ 436.22	$ 10,514	From Hay River to Roberts Bay
1	Trucks (CAT 735)	m^2	173.3	$ 436.22	$ 75,575	From Hay River to Roberts Bay
0	Tractor trailer	m^3	86.8	$ 436.22	$ -	From Hay River to Roberts Bay
1	Crew cab pickup (Ford F350)	each	1.0	$ 4,335.14	$ 4,335	From Hay River to Roberts Bay
8	Truck equipment to Hay River (6 trucks)	per km	1100	$12.00	$ 13,200	= hauling 8 trailers from Edmonton / source: Doris cost estimate
				Subtotal Mobilisation	**$ 222,011**	
				Subtotal Demobilisation	**$ 233,112**	Assumes same cost as mobilisation, increased by 5%
				Total	***$ 455,123***	

Equipment stand-by							
	Stand-by time	days	123	3010.57878		$370,301.19	fall
		days	123	3010.57878		$370,301.19	spring
			246	***Total***		***$740,602***	
			119				

Camp costs

Description	Units	Cost Code	Quantity	Unit Cost	Task Cost	
Camp Management	day	OC.01	119	$578.84	$68,882	
Camp Operations	per day	OC.02	119	$2,208.16	$262,771	Up to 10 person occupancy
Camp Rental	4 months	OC.03	1	$84,896.64	$84,897	
Travel allowance	charter flights	OC.05	0	$24,000.00	$0	Included in camp operation cost
	commercial flights	OC.04	0	$1,200.00	$0	Included in camp operation cost
					$416,550	

Winter Track

Description	Quantity	Units	Cost Code	Unit Cost	Task Cost	
Construct Winter Track	1	ea	C.6.04	$28,169.80	$28,170	Construct the track and install snowfencing
Snow fencing (assumed 50% of track length)	89	roll	M.13	$240.89	$21,440	materials only; installation cost included in construction cost
Maintenance	7	ea	C.6.05	$2,078.72	$14,551	maintenance run every 2 weeks while track open
					$64,160	

Revenue Ton

Equipment Type	Dimensions				Revenue Unit	Value
	Length (m)	width (m)	height (m)	weight (t)	U/M	
Dozer - CAT D8T	3.06	4.64	3.46	38.94	m^3	49
Excavator - Cat 329DL	10.4	2.9	3.04	36	m^3	92
Loader - CAT 980H	9.47	3.25	3.77	30	m^3	116
Motor grader CAT 14H	8.7	2.49	3.29	16.2	m^3	71
Skidder CAT 242	3.96	1.67	2.2	3.2	m^3	15
Truck - CAT 740	11	4.2	3.75	34.4	m^3	173
Tractor Trailer					t	0
Flatbed truck (5 tonne)				3	t	3
Helicopter					t	0
Drill - Sandvik Ranger DX700	7.2	2.5	3.6	15.2	m^3	65
Drum crusher				0.15	t	0
Power washer				0.1	t	0
Welding Equipment				0.25	t	0
Crane	8.46	2.8	3	15	m^3	71
Pickup trucks - F150				1.5	t	2
20 ft containers	7	2.4	2.6	36	m^3	44
Backhoe Loader	7.343	2.438	3.577	6.895	m^3	64

Table 4. Unit Rates

Orange cells highlight updated rate estimates for 2020. All other costs are inflated from previous estimates.

Cost Code	Item	Unit rate	Unit	Comment	Updated Source (2020)
Equipment					
E.01	Dozer (CAT D7)	$ 195.08	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.02	Dozer (CAT D4)	$ 101.47	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.03	Dozer (CAT D4) w/ Tiller	$ 116.69	hr.	15% added for tiller attachment	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.04	Truck (CAT 730)	$ 162.51	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.05	Excavator (CAT 330 CL)	$ 216.76	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.06	Loader (CAT IT38/930)	$ 96.43	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.07	Skidder (CAT Bobcat)	$ 93.85	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
E.08	Helicopter	$ 2,412.24	hr.	fuel surcharge applies	IMiskolczi (from Angela Holtzapfel@HBML ESR)
E.09	Welding Equipment	$ 65.38	day	300 Amps, gas/diesel driven	2009 BC Blue Book + 10% Northern Allowance, 10% fuel factor; Inflated to 2020 cost (2% inflation)
E.10	Power washer	$ 12.89	hr	Hot water pressure washer - 3000 PSI	www.abtoolrentals.com/equipment.asp?action=category&category=190&key=190%2D0079
E.11	Drum crusher	$ 41.71	hr.	30 tones, mobile	2012 cost plus 2% inflation increase to 2020
E.12	Oil-water separator	$ 32.22	hr.	10 GPM, underground	2012 cost plus 2% inflation increase to 2020
E.13	Air Track Drill	$ 352.32	hr.		2015-2016 BC Blue Book + 10% Northern Allowance+10% fuel factor; Inflated to 2020 cost (2% inflation)
E.14	Tucker Sno-Cat	$ 275.12	day	day rate back-calculated from monthly rental	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
Materials					
M.01	Liner - HDPE	$ 33.23	m^2	supply and install	from JDS (Surface Water Management Options Analysis); 2013 cost inflated to 2020 (2%)
M.02	Liner - geotextile	$ 30.58	m^2	supply and install	from JDS (Surface Water Management Options Analysis); 2013 cost inflated to 2020 (2%)
M.03	Fuel (Diesel)	$ 1.48	L	2008 Landed fuel cost at Hope Bay	Maritz (from Jeff Reinson @ Newmont); inflated to 2020 cost (2% inflation)
M.04	Explosives	$ 0.06	lbs	15% freight cost added	Cost Mine 2014 inflated to 2020
M.05	Silt Fencing	$ 1.58	m	15% freight cost added	Cost Mine 2011; original price quoted in linear ft; inflated to 2020 cost
M.06	Coco-matting	$ 2.14	m^2	15% freight cost added	Cost Mine 2011; original price quoted in sq. yards; inflated to 2020 cost
M.07	Seed/Fertilizer	$ 19.49	kg	15% freight cost added	Arctic Alpine seed mix+ fertilizer (2009 increase by 2% per year to 2020)
M.08	Winter road	$ 19,154.33	km	open and maintain for 2 months	NUNA Logistics 2012 (from Court Smith) + 2% per year cost increase to 2020.
M.09	Hazardous Waste Disposal fee	$ 11,486.86	m^3	Disposal + handling and cleaning fee	SRK estimate, inflated to 2020 cost
M.10	Demolition Debris Disposal Fee (@Hay River)	$ 6.33	m^3	Disposal + handling fee	Personal communication with Rob Jamieson@Hay River Disposals Ltd.
M.12	Bentonite chips	$ 655.86	m^3	In 50 pound bags, 15% freight cost added	Holly North Production Supplies Limited
M.13	Snow Fencing	$ 240.89	roll	33 m roll snow fencing with 17 posts	Uline Canada, accessed April 4, 2017; inflated to 2020 cost (2% inflation)
Labour					
L.01	Labour general	$ 66.74	hr.		Nuna Blended 2012 rate, POH included; increased by 2% (yoy) to 2020 cost
L.02	Labour - Trades	$ 99.90	hr.	Electrician, Welder, plumber etc.	Nuna 2015 Electrician and Mechanic Rate (Average); Inflated to 2020 cost (2% inflation)
L.05	Supervision	$ 114.47	hr.		Nuna 2015 Rate; Inflated to 2020 cost (2% inflation)
L.06	Truck Drivers	$ 77.11	hr.	Heavy Equipment	Nuna 2015 Rate; Inflated to 2020 cost (2% inflation)
L.07	Heavy Equipment Operator	$ 83.56	hr.	Light equipment	Nuna 2015 Rate; Inflated to 2020 cost (2% inflation)
L.08	Technician (Consultant)	$ 135.00	hr.	Staff Consultant	SRK-Estimate (all inclusive)
Shipping					
S.01	Outbound Shipping - Soils	$ 1,104.84	m^3	1.7 t/m^3 bulk density	(7.75 m^3/seacan based on 29,000 lbs. limit per seacan, seacan is 38.5 m^3) - NEAS rates for 2020
S.02	Outbound Shipping - Haz Waste	$ 361.31	m^3	1.0 t/m^3 bulk density	(7.75 m^3/seacan based on 29,000 lbs. limit per seacan, seacan is 38.5 m^3) - NEAS rates for 2020
S.03	Outbound Shipping - Demolition	$ 222.40	m^3	0.733 t/m^3 bulk density	$6,700.74/seacan (seacan is 38.5 m3) - from NTCL 17APR 12 - NEAS rates for 2020
Hydrocarbon Soils and Haz Waste					
H.01	Excavate impacted soil	$ 22.03	m^3		WESA estimate; Inflated to 2020 cost (2% inflation)
H.02	Low temperature thermal desorption	$ 114.87	m^3		WESA estimate; Inflated to 2020 cost (2% inflation)
H.03	Rehydrate and backfill	$ 12.28	m^3		WESA estimate; Inflated to 2020 cost (2% inflation)
H.04	Regrade and reshape	$ 2.73	m^2		WESA estimate; Inflated to 2020 cost (2% inflation)
Owner's cost					
OC.01	Camp management	$ 578.84	day		Discovery Camp rental estimate (Apr. 3, 2017); Inflated to 2020 cost (2%)
OC.02	Camp operations	$ 2,208.16	day	Includes food and camp maintenance and travel to/from site	TMAC estimate (2015); Inflated to 2020 cost (2%)
OC.03	Camp rental	$ 84,896.64	4 Mo.	16 man mobile camp - 4 months rental	Discovery Camp rental estimate (Apr. 3, 2017); Inflated to 2020 cost (2%)
OC.04	Commercial flight	$ 1,200.00	each	flight from Yellowknife to Cambridge Bay and return	May 2020 Canadian North Airlines estimate. Not used in estimate
OC.05	Charter flight	$ 24,000.00	flight	Return from Yellowknife	Fuel included,full flight with Tindi Air. 2020 cost. Not used in estimate
Stand by equipment rates					
SB. 01	Dozer (CAT D7)	$ 97.54	hr	50 % hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
SB. 02	Excavator (CAT 330 CL)	$ 108.38	hr	50 % hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
SB. 03	Loader (CAT 966 F)	$ 48.21	hr	50 % hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)
SB. 04	Skidder (CAT 242B)	$ 46.92	hr	50 % hourly equipment rate (less operator)	Nuna 2012 equipment rates; Inflated to 2020 cost (2% inflation)

Table 5. Task Unit Rates

Cost Code	Item	Unit	Productivity (Unit/hr.)	Unit Rates				L.01	L.02	L.02	L.08	L.06	L.07	E.01	E.05	E.06	E.07	E.04	E.08	E.13	E.11	E.10	E.14	E.09	Note / Source
								Labour						Equipment											
								$ 66.74	$ 99.90	$ 99.90	$ 135.00	$ 77.11	$ 83.56	$ 195.08	$ 216.76	$ 96.43	$ 93.85	$162.51	$2,412.24	$ 352.32	$ 41.71	$ 12.89	$ 275.12	$ 6.54	
				Total Unit Cost	Material Unit Rate	Labour Unit Rate	Equipment Unit Rate	General Labour	Tradesman - Electrical	Tradesman - Plumber	Engineer/ Technician	Truck Drivers	Heavy Equipment Operator	Dozer - CAT D7	Excavator Cat 330	Loader (CAT IT38/930)	Skidder CAT 242	Truck - CAT 735	Helicopter	Drill	Drum crusher	Power washer	Tucker	Welding Equipment	
Decommissioning																									
C.1.01	Decommission and remove all heating fuel tanks and place into lined facility	each	4	$ 55.87	$ -	$ 43.81	$ 12.05	2					0.5			0.5									Disconnect and remove all fuel drums and disconnect all Tidy Tanks from all structures
C.1.02	Decommission above ground storage tanks	each	0.5	$ 466.74	$ -	$ 466.74	$ -	2	1																Disconnect all fuel lines and electrical parts
C.1.03	Decommission potable water supply	each	0.25	$ 1,246.11	$ -	$ 1,149.68	$ 96.43	1	1	1			0.25			0.25									Disconnect all electrical and plumbing (intake and distribution)
C.1.04	Decommission waste incinerator	each	0.167	$ 1,070.84	$ -	$ 926.20	$ 144.64	2					0.25			0.25									Disconnect and remove fuel storage
C.1.05	Decommission Main Camp Facility electricity	each	0.25	$ 666.53	$ -	$ 666.53	$ -	1	1																De-energise main electrical board, disconnect auxiliary power (if exists)
C.1.06	Decommission electrical generators	each	0.46	$ 702.97	$ -	$ 598.16	$ 104.81	2	1				0.5			0.5									De-energise main breaker board, disconnect external fuel tanks (if needed) / loader used for lifting; source - RSMeans (260505252100)
C.1.07	Dismantle Satellite/Communication Equipment	each	0.5	$ 366.85	$ -	$ 366.85	$ -	2	0.5																source - SRK estimate
C.1.08	Prep portable trailers for moving (remove cladding, etc.)	each	0.3	$ 870.62	$ -	$ 725.98	$ 144.64	3					0.5			0.5									
C.1.09	Decommission Airstrip - Place large X's at each end of strip	each	0.5	$ 316.95	$ 50.00	$ 266.95	$ -	2																	Assumed material cost for a high density plastic, nails and sandbags.
Decontamination																									
C.2.01	Collect hazardous chemical waste and place in suitable containers	m^3	0.17	$ 2,281.22	$ -	$ 1,702.66	$ 578.57	3					1			1									Includes all chemicals on site / jm_Estimate
C.2.02	Drain and power-wash heating fuel tanks (Tidy Tanks)	each	6	$ 22.25	$ -	$ 22.25	$ -	2																	Drain fuel from tanks and wash exterior with hot water (collect water for treatment)
C.2.03	Drain above ground fuel storage tank	each	0.5	$ 266.95	$ -	$ 266.95	$ -	2																	Drain fuel /source - SRK estimate
C.2.04	Pressure wash above ground fuel tank	each	0.5	$ 292.73	$ -	$ 266.95	$ 25.78	2														1			
C.2.05	Drain and power-wash empty fuel drums	each	12	$ 19.16	$ -	$ 18.09	$ 1.07	2					1									1			Drain fuel and triple-rinse drum (collect water for treatment)
C.2.06	Flush sewage treatment unit and collect sewage sludge	each	0.4	$ 590.90	$ -	$ 438.14	$ 152.76	2					0.5			0.5						1			Flush treatment unit with water (collect water for treatment)/source - SRK estimate
C.2.07	Empty incinerator and collect ashes	m^3	0.25	$ 626.93	$ -	$ 434.08	$ 192.86	1					0.5			0.5									Place ashes and unburned contents into containers / see C.6.04
C.2.08	Operate oil/water separator	each	4	$ 53.28	$ -	$ 50.05	$ 3.22	3														1			Siphon the water than drain the oil - 15 minutes per 55 gal. drum
C.2.09	Empty soil from 45 gallon drums	each	4	$ 108.45	$ -	$ 54.26	$ 54.19	2					1		1										
Demolition																									
C.3.01	Crush empty fuel drums	each	20	$ 17.76	$ -	$ 10.85	$ 6.91	2					1			1					1				Same as C.4.01
C.3.02	Cut Tank Farm geomembrane to manageable size	sq. m	80	$ 2.50	$ -	$ 2.50	$ -	3																	source - SRK estimate
C.3.03	Remove intake hoses and cut to manageable size	Lm	100	$ 2.30	$ -	$ 1.75	$ 0.55	2					0.5			0.5								1	source - SRK estimate
C.3.04	Dismantle pollution control berm	each	0.50	$ 266.95	$ -	$ 266.95	$ -	2																	
C.3.05	Demolish office buildings/ shop structures/ living quarters	m^3	53	$ 12.43	$ -	$ 6.93	$ 5.50	3					2	1		1									Demolish empty wood structures (offices, shacks, etc.)/ source - RSMeans
C.3.06	Demolish helipads/ float plane dock	m^3	75	$ 3.29	$ -	$ 2.00	$ 1.29	1					1			1									Demolish wood structure / source - SRK estimate. Not used in cost estimate
C.3.07	Demolish Above ground storage tanks	each	0.17	$ 4,667.54	$ -	$ 2,764.67	$ 1,902.87	3		1		1	1		1		1							1	
C.3.08	Dismantle Old Equipment (torch)	each	0.5	$ 413.50	$ -	$ 400.43	$ 13.08	3																1	
C.3.09	Cut of tops of drill casings	each	2	$ 36.64	$ -	$ 33.37	$ 3.27	1																1	
C.3.10	Clean up debris from site	m^2	2529	$ 0.15	$ -	$ 0.11	$ 0.04	3					1			1									source - SRK estimate
C.3.11	Dismantle radio tower	each	0.04	$ 16,048.58	$ -	$ 10,846.41	$ 5,202.17	2	1		1		1		1										source - SRK estimate
Material Relocations																									
C.4.01	Load demolition debris/solid waste in containers	m^3	48	$ 9.55	$ -	$ 3.48	$ 6.07						2	1		1									source - SRK calculated from first principles
C.4.02	Empty Seacan of debris at the landfill	each	5	$ 101.41	$ -	$ 29.27	$ 72.14						2	1	1										Not used in cost estimate
C.4.03	Haul materials to Doris Camp in 20 ft. container (33.2 m^3/container)	m^3	3.31	$ 84.26	$ -	$ 25.27	$ 58.99						1	1											source - calculated from first principles
C.4.04	Haul waste to Roberts Bay jetty in 20 ft. container (33.2 m^3/container)	m^3	3.14	$ 88.79	$ -	$ 26.63	$ 62.16						1	1											source - calculated from first principles
C.4.05	Ship demolition waste from Roberts Bay to Hay River	m^3	1	$ -									0												Not used in cost estimate
C.4.06	Haul one skid to Doris Camp	each	0.07	$ 3,916.50	$ -	$ 1,174.52	$ 2,741.98						1	1											
C.4.07	Load reusable items on skids	each	3	$ 144.60	$ -	$ 72.35	$ 72.25	2					1		1										
C.4.08	Haul Waste to Quarry#3 landfill (33.2 m^3/container)	m^3	2.93	$ 95.19	$ -	$ 28.55	$ 66.64						1	1											
Earth works																									
C.5.01	Install HDPE Liner	m^2	175	$ 36.47	$ 33.23	$ 2.00	$ 1.24	4					1		1										
C.5.02	Load, haul, dump, place: 1 truck with <0.5 km haul distance	m^3	40	$ 20.46	$ -	$ 6.11	$ 14.36					1	2	1	1			1							
C.5.03	Load, haul, dump, place: 1 truck with <1.0 km haul distance	m^3	30	$ 27.29	$ -	$ 8.14	$ 19.14					1	2	1	1			1							
C.5.04	Excavate: Spoil locally, no trucks	m^3	100	$ 3.00	$ -	$ 0.84	$ 2.17						1		1										
C.5.05	Regrade surface - rough grading, D7	m^2	100	$ 2.79	$ -	$ 0.84	$ 1.95						1	1											source - RSMeans
C.5.06	Reslope Stockpiles - D7	m^3	75	$ 3.72	$ -	$ 1.11	$ 2.60						1	1											
C.5.07	Relocate core box pallet (<0.5 km)	ea.	6	$ 41.12	$ -	$ 25.05	$ 16.07	1					1			1									
C.5.08	Install soil stabilization measures (straw/coconut matting)	m^2	269	$ 4.78	$ 2.14	$ 1.49	$ 1.15	3.5					2		1		1								source - RSMeans
C.5.09	Drill, blast Quarry	m^3	100	$ 6.93	$ 0.06	$ 3.35	$ 3.52	1.5			0.5		2							1					Not used in estimate
C.5.10	Track pack using loaded rock truck	m^2	100	$ 2.40		$ 0.77	$ 1.63					1						1							Not used in estimate. Source - SRKjm estimate
C.5.11	Scaling (loose rock)	hr.	1	$ 300.32	$ -	$ 83.56	$ 216.76						1		1										
C.5.12	Load, haul, dump place: 2 trucks with <1.0km haul distance	m^3	75	$ 14.11	$ -	$ 4.28	$ 9.82					2	2	1	1			2							Not used in estimate
C.5.13	Seeding/Fertilizing: By hand, high application rate	m^2	320	$ 0.92	$ 0.29	$ 0.63	$ -	3					0												
C.5.14	Summer identification of low-lying areas	day	0.08	$ 7,345.33	$ 100.00	$ 2,420.85	$ 4,824.48	1			1								0.17						
C.5.15	Remove culvert and create swale	lm	5	$ 100.26	$ -	$ 56.91	$ 43.35	2			0.5		1		1										
Other																									
C.6.01	Sample HC contaminated soils / confirmatory samples	each	2	$ 100.87	$ -	$ 100.87	$ -	1			1														Surface grab sample/ hand auger / Source - SRK estimate
C.6.02	Band together core pallets	each	12	$ 11.12	$ -	$ 11.12	$ -	2			0		0			0									Not used in estimate
C.6.03	Construction of Vent Raise Seal	LS	0	$ 13,205.00	$ 3,000.00	$ 9,047.87	$ 1,157.13	3			1		0.5			0.5									$14,000 LS based on project experience; material cost estimated to bring total to $14k; estimated 2 day task duration
C.6.04	Construction of Doris-Boston winter track	each	0	$ 28,169.80	$ -	$ 17,705.43	$ 10,464.37	12			12		24	12										1	4 days; Tucker Sno-Cat & operator and 2 attendants + D7 & operator
C.6.05	Winter Track Maintenance	each	1.000	$ 2,078.72	$ -	$ 1,803.61	$ 275.12	12					12											1	1 day; Tucker Sno-Cat & operator and 1 attendant

Table 6. Relocation Unit Rates

Hauling Distances		
Boston to Doris	61 km	One Way
Boston to Doris Landfill	69.2 km	One Way
Boston to Roberts Bay	64.4 km	One-Way

C.4.03 - Productivity of hauling bulk materials from Boston on winter track to Doris			
By Skid - SnowCAT (equivalent to D7)			Note: Cost of winter road not included
Equipment Cost	$ 195.08	per hr.	Includes fuel
Labour Cost	$ 83.56	per hr.	
Average speed	9	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	skids	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x # of Containers x Space Utilization Ratio
Distance:	61	km	
Time Required 1 round trip:	**14.06**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**3.31**	**m^3/ hr.**	

C.4.04 - Productivity of hauling bulk materials from Boston on winter track to Roberts Bay			
By Skid - SnowCAT (equivalent to D7)			Note: Cost of winter road not included
Equipment Cost	$ 195.08	per hr.	Includes fuel
Labour Cost	$ 83.56	per hr.	
Average speed	9	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	skids	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo capacity x # of Containers x Space Utilization Ratio
Distance:	64.4	km	
Time Required 1 round trip:	**14.81**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**3.14**	**m^3/ hr.**	

C.4.08 - Productivity of hauling bulk materials from Boston on winter track			
By Skid - SnowCAT (equivalent to D7)			Note: Cost of winter road not included
Equipment Cost	$ 195.08	per hr.	Includes fuel
Labour Cost	$ 83.56	per hr.	
Average speed	9	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	skids	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo capacity x # of Containers x Space Utilization Ratio
Distance:	69.2	km	
Time Required 1 round trip:	**15.88**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**2.93**	**m^3/ hr.**	

Table 7. Structures

Demolition Bulking Factors	
Tents - Empty	1.3
Wood Structures - Empty	1.5
Wood Structures - w/ Interior Wall Allowance	2
Steel Structures - Empty	1.5
Steel Structures - w/ Interior Wall Allowance	2
Mechanical Equipment	1.1
Liners	3
Pipelines	3

Structure Volumes

Area	Structure	Quantity	Length (m)	Width/Dia. (m)	Footprint Area (m)	Avg Height (m)	Wall thickness (m)	Floor Thickness (m)	Roof Length (m)	Roof Thickness (m)	Wall Volume (m^3)	Floor Volume (m^3)	Roof Volume (m^3)	Total Volume (m^3)	Loose Volume (m^3)	Source
Accommodation Complex	Recreation Tent	1	5.1	4.5	23.0	2.5	0.01	0.3	6	0.05	0.48	6.9	1.5	9	**11.56**	Foot Print AutoCAD, height thickness est. from photo
	Site Office	1	12.2	5.1	62.2	2.5	0.15	0.3	5.1	0.3	13.0	18.7	18.7	50	**100.61**	Foot Print AutoCAD, height thickness est. from photo
	Geotech Tent	1	7.5	4.4	33.0	2.5	0.01	0.3	6	0.05	0.6	9.9	2.3	13	**16.57**	Foot Print AutoCAD, height thickness est. from photo
	Core Processing Facility	1	30	7.85	235.5	2.75	0.15	0.3	7.5	0.3	31.2	70.7	67.5	169	**220.19**	Foot Print AutoCAD, height thickness est. from photo
	Core Shack	1	21	5	105.0	2.75	0.15	0.3	6	0.3	21.5	31.5	37.8	91	**181.50**	Foot Print AutoCAD, height thickness est. from photo
	Core Splitter	1	2.6	3.75	9.8	2.5	0.15	0.3	4	0.3	4.8	2.9	3.1	11	**16.21**	Foot Print AutoCAD, height thickness est. from photo
	Muster Station	1	10.4	4.7	48.9	2.75	0.15	0.3	5.5	0.3	12.5	14.7	17.2	44	**66.42**	Foot Print AutoCAD, height thickness est. from photo
	Heating systems liner	2	4	4	16.0			0.05			0.0	0.8	0.0	2	**4.80**	
Maintenance Shop Complex	Maintenance Shop	1	18	12.2	219.6	0	0.05	0	19.2	0.05	0.0	0.0	17.2	17	**25.87**	Foot Print AutoCAD, height thickness est. from photo
	Shop Sheds (survival, elec. Etc.)	1	23	3.75	86.3	2.5	0.1	0.3	3.75	0.1	13.4	25.9	8.6	48	**71.81**	Foot Print AutoCAD, height thickness est. from photo
	Powerhouse	1	12.2	5	61.0	2.5	0.1	0.3	6	0.3	8.6	18.3	22.0	49	**97.72**	Foot Print AutoCAD, height thickness est. from photo
	Transformer Building	1	9	4.54	40.9	2.5	0.1	0.3	5	0.3	6.8	12.3	13.5	33	**48.79**	Foot Print AutoCAD, height thickness est. from photo
Crusher	Crusher Enclosure	1	36.5	12.8	467.2	0	0.01	0	20.1	0.05	0.0	0.0	36.7	37	**55.04**	Foot Print AutoCAD, height thickness est. from photo
	Hopper/Crusher Parts	1	4	2	8.0	1.5	1				18.0	0.0	0.0	18	**19.80**	Estimated
Water Treatment	Water Intake to Portal & Camp	1	607	0.05	30.4	0.05	1				60.7	0.0	0.0	61	**182.21**	Lengths from ACAD
	Sewage Supply Pipelines	1	489	0.05	24.5	0.05	1				48.9	0.0	0.0	49	**146.72**	Lengths from ACAD
	Old Sewage Treatment Bldg.	1	5.5	6.3	34.7	4	0.15	0.3	7.5	0.3	14.2	10.4	12.4	37	**55.40**	Foot Print AutoCAD, height thickness est. from photo
	New Treatment System (5)	5	12	2.5	30.0	2.5	0.15	0.3	2.5	0.15	10.9	9.0	4.5	122	**182.81**	Footprint: ACAD
Helipads	Helipads (3)	3	4.6	4.6	21.2	0	0	0.5	0	0	0.0	10.6	0.0	32	**47.61**	Foot Print AutoCAD, height thickness est. from photo
Docks	Spyder Lake	1	4	3	12.0			0.5			0.0	6.0	0.0	6	**12.00**	Footprint: ACAD
	Stickleback Lake Dock	1	4	3	12.0			0.5			0.0	6.0	0.0	6	**12.00**	Footprint: ACAD
	Stickleback boardwalk	1	133	2.5	332.5	0	0	0.2	0	0	0.0	66.5	0.0	67	**133.00**	Foot Print AutoCAD, height thickness est. from photo
	Bridge E of Stickleback	1	10	5	50.0	0	0	0.5	0	0	0.0	25.0	0.0	25	**37.50**	Made up; have no info
Incinerator	Incinerator	1	1.5	2	3.0	0	0	1.5	0.0	0	0.0	4.5	0.0	5	**6.75**	Foot Print AutoCAD, height thickness est. from photo
Mobile Equipment	Miscellaneous Eq.	5	1.5	2	3.0	0	0	1.5	0.0	0	0.0	4.5	0.0	23	**33.75**	
Primary Tank Farm	Large Above Ground Tanks	6		4.5	0.0	5	0.05	0.05		0.05	2.3	0.0	0.0	14	**20.25**	Foot Print AutoCAD, height thickness est. from photo
	Medium Above Ground Tanks	2		3	0.0	5	0.05	0.05		0.05	1.5	0.0	0.0	3	**4.50**	Foot Print AutoCAD, height thickness est. from photo
	Heating System Tanks	7		1	0.0	5	0.05	0.05		0.05	0.5	0.0	0.0	4	**5.25**	Quantity breakdown shown below, size estimated
	Containment Liner	1	33	25	825.0			0.005			0.0	4.1	0.0	4	**12.38**	ACAD
Power Plant Containment	Green Storage Tank	2	2.5	1.5	3.8	1.5					0.0	0.0	0.0	0	**0.00**	
	Containment Liner	1	4	3	12.0			0.005			0.0	0.1	0.0	0	**0.18**	Estimated
Settling Pond #1	Containment Liner	1	20	20	400.0			0.005			0.0	2.0	0.0	2	**6.00**	Footprint: ACAD
Settling Pond #2	Solid Waste				0.0						0.0	0.0	0.0	0	**0.00**	Estimated from photo
Soil Treatment Facility	45 gallon drums	100		0.6		0.15					0.042	0.0	0.0	4	**6.36**	Estimated from photo
	Containment Liner	2	16	23	736.0			0.005			0.0	1.8	0.0	4	**11.04**	Second liner added in 2017
Drill Cutting Settling Pond	Geotextile or liner	1	30	20	600.0			0.005			0.0	3.0	0.0	3	**4.50**	
Cuttings Settling Sump	Geotextile or liner	1	20	20	400.0			0.005			0.0	2.0	0.0	2	**6.00**	size comparable to Settling Pond #1
Lined Emergency Pond	Containment Liner	1	22	16	352.0			0.005			0.0	1.8	0.0	2	**5.28**	comparative size to primary tank farm
Drill Sites	Top of Casing	80	0.9	0.09	0.1						0.01	0.0	0.0	0	**1.34**	from INAC IR4 to WL type B renewal, March 2017
Core Storage Road	Culvert	1	6	0.3	1.8			0.15			0.0	0.3	0.0	0	**0.27**	Assumed crushed to 1/2 its volume
Mine Openings	Portal Fence	1	61.5	0	0.0	1.2	0.01				1.5	0.0	0.0	1	**2.21**	Estimated from photo
	Vent Raise enclosure	1	5	5	25.0	2.5	0.1	0.15	5	0.15	5.0	3.8	3.8	13	**18.75**	Estimated from photo
Other structures	Other (V-notch weir, sampling points, thermistor housing boxes, other sheds)	1	20	4	80.0	2.5	0.1	0.3	4	0.1	12.0	24.0	8.0	44	**66.00**	Based on site photos, assumed areas
TOTAL:															**1,957.0**	

Demolition Preparation

Area	Structure	# of Units	Decommission			Heating Tanks	Hazardous Material Vol Estimate (L)	Special Item	Special Item Description	Source
			Electrical	Heating System	Plumbing System					
Accommodation Complex	Recreation Tent	1				1	0			Estimated from aerial photo
	Site Office	1				0	1			Estimated from aerial photo
	Geotech Tent	1				1	10			Estimated from aerial photo
	Core Shack/Splitter	1				2	10			Estimated from aerial photo
	Muster Station	1				1	4			Estimated from aerial photo
	Portable Trailers	12	1	1	1	0	25			Estimated from aerial photo
Maintenance Shop Compl.	Maintenance Shop	1	0	0	0	0	60			Estimated from aerial photo
	Shop sheds	4	1			1	25			Estimated from aerial photo
	Powerhouse	1	1			0	50			
	Transformer Building	1	1			0	100			
Crusher	Crusher Enclosure	1	0	0	0	1	20			
Water Treatment	New Facility	5	1	0	0	0	25	1	Sludge/Solid Waste	Estimated
	RBC	1					25	1	Sludge/Solid Waste	Estimated
Incinerator	Incinerator	1	0	0	0	0	0	10	Ashes	Ashes in Liters, estimates
Mobile Equipment	Misc. Equipment on site	5	0	0	0	0	60	10	Residual Fuel (in each)	Estimated from aerial photo
Primary Tank Farm	Above Ground Tanks	8					25	40	Residual Fuel (in each)	Fuel in Liters, estimated
	Heating System Tanks	7					25	10	Residual Fuel (in each)	Fuel in Liters, estimated
Power Plant Containment	Green Storage Tanks	2					10	5	Residual Fuel (in each)	Fuel in Liters, estimated
Soil Treatment Facility	Empty 45 gal drums	100						0.5	Residual Fuel (in each)	Fuel in Liters, estimated
Core Boxes	Total box pallets	520								AutoCAD
	Box pallets located on tundra	400								Estimated based on photos + contingency
TOTAL:						**7**	**475**			

Table 8. Reclamation Areas

Reclamation Areas

Work Area	Location	Total Area (m^2)	Area Sacrificed (m^2)	Area Regraded (m^2)	Area Requiring Fill (m^2)	Cocoa-matting Area (m^2)	Total Area (m^2)	Source/Comment
Camp Structures	Old Water Treatment Foundation Pad	460		460				ACAD/aerial site photo
	Helipads	150		150				ACAD/aerial site photo
Camp Surface Infrastructure	Camp Complex Foundation Pad	29,953	29,953	2,995			29,953	Excludes landfarm/core storage areas; assumed 10% requires regrading
	Road to Spyder Lake	773	773	773		0	0	ACAD
	Road to Airstrip	1,763	1,763	1,763				ACAD
	Airstrip	10,444	10,444	5,222				ACAD; assumed 50% required regrading
	Core Storage Road	142	142	142				ACAD
	Drill Road	306	306	306				ACAD; assumed 50% required regrading
Other Areas	Permafrost Remediation Areas	11,184			559	559	11,184	ACAD, assumed 5% required 0.3m fill in low areas, 5% required matting
	Vegetation Die-Back - Drill Road	17,795			890	890	17,795	ACAD, assumed 5% required 0.3m fill in low areas, 5% required matting
	Vegetation Die-Back - Core Storage Road	990			495	50	990	ACAD, assumed 50% required 0.3m fill in low areas, 5% required matting
	Vegetation Die-Back - Grey Water Dis.	5,398			270	270	5,398	ACAD, assumed 5% required 0.3m fill in low areas, 5% required matting
	Drill Sites	440			440	220	440	51 site included each 10 sq.m. Minus 7 sites remediated in 2017.
	Boston Ore Stockpiles	6,077	6,077	3,039			6,077	ACAD; assumed 50% required regrading

Earthwork Volumes/Quantities

Bulking Factors	
Soil/Rock Pad	1.2
Cover shrinkage factor	1.1

Work Area	Item	Qnty	Length (m)	Width (m)	Height (m)	Side Slope (x:1)	Area (m^2)	In-situ Volume (m^3)	Loose Volume (m^3)	Source / Comments
Core Storage Road	Excavate Culvert	1	5.5	0.5	0.9	1	1.26	7		
Mine Openings	Backfill Decline	1	18	12	3			324	**389**	ACAD estimated
Primary Tank Farm	Excavate Bedding Material				0.5		676	338	**406**	
	Regrade area						810			ACAD estimated
Power Plant Fuel Containment	Excavate Bedding Material				0.5		100	50	**60**	Estimated
	Regrade area						125			Estimated
Settlement Pond #1	Excavate Settled Material		16	9	0.5		144	72	**79**	ACAD estimated
	Regrade area						750			ACAD estimated
Settlement Pond #2	Excavate Settled Material		12	9	0.5		108	54	**59**	ACAD estimated
	Regrade area						690			ACAD estimated
Soil Treatment Facility	Soils				0.5		300	150	**180**	ACAD estimated; assumed 1/2 passing
	Regrade area						440			ACAD estimated
Drill Cutting Settling Pond	Cutting volume				0.5		560	280	**336**	ACAD/aerial site photo
	Regrade area						930			ACAD estimated
Cuttings Settling Sump	Cutting volume				0.5		144	72	**79**	aerial site photo
	Regrade area						750			estimated based on site photo
Lined Emergency Pond	Excavate Bedding Material				0.5		540	270	**324**	aerial site photo
	Regrade area						540			estimated based on site photo
Ore Stockpiles	Original stockpile footprint				1.7		6077	10331	**12397**	ACAD estimated. Volume of ore material from SRK 2008 Boston annual inspection (27,000 tonnes) and assuming a bulk density of 2 tonnes/m^3
	Consolidated Stockpile foot print				6.7		2026	13500	**16200**	Entire volume (13500 m^3) consolidated to 1/3 of existing footprint.
	Relocated Volume (used for construction)							3169	**3803**	scraped up from pads and airstrip (estimate by SRK)
	Relocated volume (consolidation of piles)							6887	**8265**	pushed into the large pile
	Cover Volume				0.3		2228	668	**802**	
	Liner Area						2330			Liner area increased by 15% to account for wastage and conversion between 3D and 2D projection.
Landfill Closure	Bedding (crushed rock) (0.3m on each side of liner)				0.6		700	420	**504**	
	Liner						805			
	Run-of-quarry cover				0.5		700	350	**420**	