Environment AECOM

Government of Yukon

Summary of Estimated Closure Costs Mt. Nansen Mine Site

Prepared by:

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Project Number:

60159089 (402)

Date:

July 2011

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July 6, 2011

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Dear Ms. Randell:

Project No: **60159089 (402)**
Regarding: **Summary of Estimated Closure Costs**
Mt. Nansen Mine Site

Further to our letter proposal dated April 8, 2011, AECOM Canada Ltd. (AECOM) is pleased to provide you with a summary of estimated costs per closure option proposed at the Mt. Nansen Mine Site. The summary is inclusive of all costs previously provided in reports authored by AECOM, Lorax Environmental and Altura Environmental Consulting. Additional costs have been provided for various contingencies and long term operations, care and maintenance following the conclusion of construction activities at the site.

We trust that this meets your current needs and expectation. If you require further clarification or information on any matter, please contact the undersigned at (204) 928-7408.

Sincerely,
AECOM Canada Ltd.

Tom Wingrove, P.Eng.
Executive Vice-President
Deputy Operations Director
North America Environment

KT:dh
Encl.
cc: K. Thiessen

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	K. Thiessen	May 13, 2011	Final Draft
2	K. Thiessen	July 6, 2011	Final

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PERMIT NUMBER: PP066
Association of Professional Engineers of Yukon

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1. Introduction

1.1 Purpose

This report provides a detailed summary of the various costing information that has been provided to, and requested by, the Yukon Government thus far in support of the evaluation of closure options for the Mt. Nansen Mine site, an abandoned gold and silver mine located approximately 60 km west of Carmacks, Yukon. As such, all cost estimates completed to date, including those for additional investigation (Pre-Closure Estimates), construction phase of the each proposed closure option, and long term operation, care and maintenance of the site following closure have been tabulated based on estimated unit prices or allowances (i.e. lump sums) per activity. The costs have largely been synthesized from summary Tables 5.4-10, 5.4-11, 5.5-5, 5.5-6, 5.6-5, and 5.7-4 provided in "*Mount Nansen Options for Closure*", Lorax Environmental Services Ltd. (Lorax), November 2010. Appendices C-1 and C-2, authored by AECOM Canada Ltd. (AECOM) and Altura Environmental Consulting (Altura), respectively, provided the source costs for the aforementioned summary tables.

The primary objective of this document is to provide all information necessary to allow for a meaningful side-by-side comparison of the estimated costs associated with each closure option. As such, all costing information, estimated by Lorax, Altura, and AECOM has been brought forth herein. In addition, costs associated with ongoing operation, care and maintenance at the site have been provided as present values and added to the pre-closure and active closure estimates such that a total estimated capital expenditure is provided for each option. All assumptions made in the development of the costs have been provided for clarity. Also provided in this document is a preliminary schedule of expenditures for the construction phase of the project.

The costs presented in this document have been referenced according to stakeholder comments provided in the most current update of the tracking table, which has been provided in this document as Table 1-1. The table has been edited to include responses to only those items pertaining to cost. Where applicable, references have been made to sections of this report in which the responses can be found.

1.2 Basis for Costing

All documentation provided to the Yukon Government has indicated that the level of detail, performance and costing has been conducted to the pre-feasibility level, and thus, the closure costs provided herein have been defined as Class 'D' estimates (or ASTM E2516-06 Class 5). The Treasury Board Secretariat of Public Works and Government Services Canada (PWGSC) provides the following commentary on Class 'D' cost estimates, also known as 'indicative estimates:

"(A Class 'D' cost estimate is) *to be in unit cost analysis format (such as cost per m² or other measurement unit) based upon a comprehensive list of project requirements (i.e. scope) and assumptions; the Class D estimate is evolved throughout the phases of the Project Identification Stage, finally being incorporated into the cash flows in the Analysis Phase; for more complex projects such as laboratories, elemental cost analysis and the input of specific disciplines may be required; the Class D Indicative estimates developed during the National Project Management System (NPMS) Feasibility Phase shall be revisited with cost planners in the Analysis Phase before finalizing."*

Furthermore, an indicative estimate is defined as:

> *"an estimate that is not sufficiently accurate to warrant Treasury Board approval as a cost objective and provides a rough cost projection used for budget planning purposes in the early stages of concept development of a project. It is usually based: on an operational statement of requirement (SOR), a market assessment of products and technological availability that would meet the requirement and other considerations such as implementation, life cycle costs and operational savings."*

By definition, the cost estimates provided in this document satisfy the criteria for Class 'D' cost estimates, but it must be reinforced that they are based on the best knowledge we have to date and will be re-examined in at specific milestones, such as the 60%, 90% design stages, and prior to tendering of bids. The above definitions can be found on the PWGSC website (http://www.tpsgc-pwgsc.gc.ca/biens-property/sngp-npms/conn-know/couts-cost/definition-eng.html).

Table 1-1: Comment Tracking Table

Agency	Area	Tracking #	Comment	Response	Where Addressed	Second Round of Comments	Response
IPRP	Dam upgrade/Spillway	12	Minor Items to be Resolved #2: The spillway design concept appears to be based upon a very conservative approach. (Mt. Nansen is in a very similar meteorological setting as Faro however the design flows are proportionally 50% greater than at Faro). This is unlikely to materially affect the evaluation of closure options. However, the hydraulic assessment might be revisited in detailed design should in-place stabilization be the preferred closure strategy.	**Faro is a much bigger watershed and probably used a snowmelt event as the design event. A rainfall event is the critical event at Nansen due to a contributing area of only 3.3 km^2. Rainfall on a small watershed has the potential to produce a higher peak flow rate than a snowmelt event for the same watershed. In addition larger watersheds have a smaller difference between flow rates reported as mean daily and instantaneous peaks.** **If required, this is a relatively minor cost addition with spillway excavation and armouring, totaling ~$70,000.**	-		
INAC	Clarification	7	The report indicates that Class D estimates range from -25% to +75% for Common Closure elements but -25% to +40% for the closure options; are these considered Class D estimates with these ranges; which range is used?	**Regardless of the stated range of accuracy, both are considered Class D estimates, as they are considered conceptual in design.**			
INAC	Tailings Area Reclamation	24	Options 3 and 4 indicate tailings and contaminated soil will be moved to the pit. What thickness of contaminated soil is expected and what is the remaining soil stratigraphy, as this will affect costs? There are no closure measures for the tailings storage facility outlined in these options which could significantly change the cost of these options. (pg5-89)	**Soil under the tailings was characterized in 5 locations up to 1m depth below the tails-native soil interface. It was assumed that a soil thickness of 15 cm was relocated to the pit (Appendix B - Section 5.3).** **Quantity of soil excavation is included in this report.**	Item 3C, Table 3-9 and Table 3-11		
INAC	Cost	25	Options 1B and 2B cost for backfilling pit with waste rock is only $5, this value seems low compared to other material unit costs. The cost should be around $9-$10 which would make the estimate approximately $2M short; what assumptions were made for the $5/$m^3$?	**Discussed with local contractor. Pelly construction suggested a rate of $2-3/$m^3$. This is a short haul, and would require no special handling. Previous estimate (2009) at $10 was criticized for being too high. We believe that $5/$m^3$ is appropriate.**	Assumptions 7 and 8, Table 3-3 and Table 3-7, respectively		
INAC	Cost	26	O&M is estimated for Option 4 but has not been calculated for the other three options. O&M estimates should include specific horizons.	**Was included in AECOM's Geotechnical Report (Section 4.1.1)**	Section 4		
INAC	Cost	27	C&M cost estimates are not included in the costing for the options.	**See above.**	Section 4		
INAC	Cost	28	Timeframe of costs.	**A schedule of projected expenditures over the construction period has been provided in this report.**	Section 5		
INAC	Cost	30	Cost estimates cannot be indicative of total cost of project; additional information and costing will be required for closure plan. Example: 5.2.2.3 Where will the mill material be landfilled?	**Noted. This element will be considered once a Closure Option has been selected and detailed design can be pursued. Material will be land-filled in place. INAC should provide specific feedback on specific costs that have not been included.**			

Table 1-1: Comment Tracking Table (continued)

Agency	Area	Tracking #	Comment	Response	Where Addressed	Second Round of Comments	Response
INAC	Cost	31	Report indicates engineering, design or detailed planning is not included in closure cost; however given the complexity of the specific option, these costs could vary greatly. A fixed percentage of total costs or some method should be added to the closure cost option to provide a more meaningful value.	**Agreed. We would suggest that all design phases plus construction supervision be estimated at 15% of capital. Actual costs may vary by option.**	Table 3-1, Table 3-3, Table 3-5, Table 3-7, Table 3-9, and Table 3-11		
INAC	Cost	32	5.4.2.3 Indicates that numerous ongoing O&M costs are required; however, these are not covered in the estimate.	**Agreed. We would suggest that all design phases plus construction supervision be estimated at 15% of capital. Actual costs may vary by option.**	Section 4	Provided response is unclear and does appear to address the issue.	**O&M costs will be provided per option in the supplemental closure costing memo**
INAC	Cost	33	5.4.6 Indicates that design engineering, routine inspections and operations and maintenance are expected to be similar for all options this is believed to not be the case. Example: Waste rock in place would likely require more inspections than if the waste rock was moved to the pit.	**Although not assessed in detail, these varied costs were included in Table 12 (Section 4.1.1) in AECOM's geotechnical report. We agree that actual O & M costs will vary by option.**	Section 4		
INAC	Cost	36	All associated costs with each option need to be included in the cost estimates, such as: life cycle, C&M, capital costs, interim treatment/reclamation.	**See above for notes on O & M costs and engineering allowances.**	Section 4		
INAC	Cost	37	Detailed engineering/allowance and construction services need to be included. I.e. Based on fixed percentages of reclamation cost of each option.	**Agreed. We would suggest that all design phases plus construction supervision be estimated at 15% of capital. Actual costs may vary by option.**	Table 3-1, Table 3-3, Table 3-5, Table 3-7, Table 3-9, and Table 3-11	It is assumed that the allowance for engineering services will be backed out of the contingency allowance, i.e. the contingency will be reduced proportionally.	**The allowance for engineering has been added as a separate estimate. This estimate may be revised or removed, as deemed appropriate by the parties.**
LSCFN	Dam Stability	6	Information should be provided to demonstrate performance at Mt. Nansen and effects need to be considered in the options characterization before proceeding with the evaluation process because the changes may affect cost and risks. It may also affect the flow paths for contaminants and related effects on attenuation mechanisms that have been assumed for geochemical analyses. In my view, the approach taken here does not demonstrate the same level of conservativeness in geotechnical design as that for the tailings relocation options.	**The geotechnical considerations are different between in-pit and in-place options. The geotechnical considerations are more significant for the in-place option, but have been approached with industry standard safety factors for performance.** **Ongoing monitoring and inspection is required for compliance with CDA Guidelines (Options 1, 2 and 3).**	Section 4		

Table 1-1: Comment Tracking Table (continued)

Agency	Area	Tracking #	Comment	Response	Where Addressed	Second Round of Comments	Response
LSCFN	Long-term Thermosyphon Operation and Maintenance	13	AECOM's geotechnical assessment (Section 2.2.11) does not identify the need for long-term maintenance and operation of thermosyphons or other methods for maintaining frozen conditions at the shear key. It is not clear whether the cost estimates for Options 1 and 2 include such costs. This should be confirmed before the evaluation process begins.	**Annual operating costs for thermosyphons are considered nominal. The life-expectancy of thermosyphons is unknown, and we have not allowed for future replacement costs. If temperature increases do not exceed the performance capabilities of the thermosyphons, then future replacement should be expected.**	Section 4		
LSCFN	Water Quality Issues - Mill Area	28	The Lorax Report and attachments provides some characterization of conditions in the mill area. Currently, sources in this area are the dominant contaminant loading to Dome Creek. The "Common Element and Supplemental Cost Estimate" prepared by Altura assumes that these sources will be addressed and no treatment will be required. However, the same report provides the description of closure activities for the mill area and does not include measures that are likely to address the water quality issues. Given the current information available, there appears to be significant likelihood that greater efforts will be required to address closure issues in this area. Costs for this are probably common to all options but are likely to be higher than current estimates.	**Cost estimates for mill closure presented in the Options for Closure Report include the removal of up to 6500 m^3 of mineralized fill, and this action is expected to mitigate some of the Mill Area metal loading to Dome Creek. However it is acknowledged that due to insufficient information, no specific closure measures were included to address the high-volume seep discovered in 2010 just west of the mill. This seep with estimated flow of 75 l/min and concentration of 0.7 mg/L dissolved zinc is likely another primary contributor to Dome Creek zinc loading in this sector. Further investigation is needed to first characterize the path and origin of this flow (which is possibly associated with an historic adit opening) prior to determining what, if any closure measures may be required. For the purposes of a preliminary estimate, a cost equivalent to plugging of the Pony Creek adit ($250,000) has been assumed and added to the mill closure costs.**	Table 2-2		
LSCFN	Cost Consistency for Options	32	A consistency check should be completed for costing for the various options. Some examples that warrant consideration include: Option 3 includes costs for tailings cover maintenance and repair, while Options 1 and 2 do not. The tailings covers are also susceptible to damage with the in-valley options. Potential for damage may be greater in the valley due to continuous water flows. Also, the total cover area is larger for valley options, thus increasing potential maintenance costs.	**For Option 3, maintenance of cover is required because of short-medium term settlement and/or consolidation of tailings. Tailings in valley are already consolidated.**			

Table 1-1: Comment Tracking Table (continued)

Agency	Area	Tracking #	Comment	Response	Where Addressed	Second Round of Comments	Response
LSCFN	Cost Consistency for Options	33	Only in-pit options include costs for water treatment. The bulk of the cost is capital cost for establishing treatment facilities. All options require some re-grading and relocation of tailings. Also, all options require cleanup in the mill area where current seepage concentrations are high and in some cases exceed effluent limits. As a result, there appears to be a high likelihood that water treatment facilities (capital costs) will be required for all options, though operating costs may be slightly different.	**Considering the re-location of tailings, there is potentially a need for water treatment, and short term treatment should be considered. It has been assumed that the mill area does not currently require treatment. Reclamation activities are expected to improve water quality emanating from the mill.**	Section 4.2	Lorax indicates that water treatment costs will not be part of any options that do not include tailings relocation to the pit. As a result, the options characterization assumes that all other options can be undertaken without any adverse effects on water quality for any water that may require discharge. I believe that this would be challenging and would anticipate that water treatment would be required for other options too.	Provisional treatment and associated costs will be provided for all options in a separate memo to be issued by Altura.
GY	Dam Stability	13	We need to have a cost for alternative approaches that will be used for ground freezing for this as it is a residual risk.	**No alternative feasible methods of ground freezing have been identified.**			
GY	Option 1	14	Is there a mitigation for the uncertainty related to the long-term integrity of the sand diffusion layer and, if so, does it have a cost?	**See AECOM memo on wave action and re-suspension of material (AECOM, July 2010). Inlet and outlet areas of the TMA will require erosion protection (as shown on drawings) Inlet and outlet of TMA will be protected with armouring to reduce potential for erosion. Potential for adhesion and transport of sand from diffusion layer, by ice, will need to be monitored, and may require periodic maintenance. An alternative design is provided by Option 2.**	Section 4		
GY	Option 4	26	It is unclear where topsoil required for Option 4 will be found nearby the site. It may form an additional cost.	**Sources of growth and borrow material will be reviewed and provided; ensure cost of excavation, transport and placement in included in the costing.**			
GY	Water Treatment	27	There is no cost estimate for this contingency pumping from the covered pit discussed for Option 4 although it may significantly increase long term maintenance cost.	**Clarification on interim water treatment activities during and after closure implementation for each of the options will be provided. It was assumed water treatment would be required in the short term during primary consolidation. Updated costs will be provided, as required.**	Section 4.2		

2. Common Element Cost Estimates

2.1 Approach

The draft document produced by Altura Environmental Consulting (Altura) and entitled, "Common Element and Supplemental Cost Estimates for Conceptual Closure Planning", November 2010, there are several common construction elements to be undertaken at the site as part of closure activities, regardless of which remedial alternative is brought forth as preferred. The common closure elements identified by the Government of Yukon have been limited to features located within the Mt. Nansen Order in Council (OIC) Boundary, including the following:

- Mill area;
- Camp and ancillary buildings (i.e. camp, mine shop, water storage tank building above camp);
- Roads;
- Exploration trenches;
- Miscellaneous infrastructure (i.e. power supply infrastructure, pipelines, Victoria Cree pump house, core storage areas); and
- Other areas requiring revegetation and site restoration (i.e. exploration clearings, adit disturbance areas, borrow areas)

Detailed summaries of the pre-closure and active closure phase costs are presented in Table 2-1 and Table 2-2, respectively. In brief, the following broad assumptions have been made:

- While it is recognized that some buildings or infrastructure may be re-purposed in support of ongoing care and maintenance of the site or to provide services to other interested parties (i.e. Little Salmon Carmacks First Nation), the costing assumes that all facilities and working will be fully decommissioned, removed or demolished. In addition to buildings, power lines, pipelines, non-public roads, tanks and other associated equipment will be removed from service. Roads have been distinguished from trails on the basis of information provided by the Government of Yukon. Trails have been identified as needing no specific closure measures.
- Additional investigation will be required in some areas of the site in support of detailed engineering design. The cost for this investigative work is summarized in the "Pre-Closure Phase Costs (Table 2-1). The investigations will be limited in scope and the presented costs are not intended to include any engineering, design, or detailed planning.

Further assumptions are provided in Section 2.2. A summary of all common element costs is provided in Table 2-3.

Table 2-1: Pre-Closure Cost Estimate for Common Elements

Common Element	Component	Proposed Work	Units	Quantity	Unit Price	Estimated Cost
Mill Area	Control of water flow through mill disturbance area	Complete additional investigation above and at the north corner of the mill to source the high volume seep	Allowance	1	$ 10,000.00	$ 10,000.00
	Removal of reactive rock fill from old ore transfer site	No specific assessments identified	-	-	$ -	$ -
	Decommissioning of Pond #1 (Accumulation of Old Tailings)	Additional investigation to determine extent of tailings (literature review and field work).	Allowance	1	$ 7,500.00	$ 7,500.00
	Decommissioning of Pond #2	Additional investigation to confirm presence/absence of tailings (literature review and field work).	Allowance	1	$ 7,500.00	$ 7,500.00
	Decommissioning of Pond #3	Additional investigation to confirm presence/absence of tailings (literature review and field work). Note some of this assessment is deferred to active closure phase once pond liner is removed.	Allowance	1	$ 3,000.00	$ 3,000.00
	Watercourse Restoration	No specific assessments identified	-	-	$ -	$ -
	Removal of fuel storage equipment and hydrocarbon contaminated soil/concrete	Soil investigation for local hydrocarbon contamination	Allowance	1	$ 10,000.00	$ 10,000.00
	Removal of mill buildings and other structures	Final assessment for hazardous products and local soil contamination	Allowance	1	$ 20,000.00	$ 20,000.00
	Removal of hazardous products and refuse around mill	Assess for hazardous products, and as required, local soil assessment	Allowance	1	$ 20,000.00	$ 20,000.00
	Recontouring and revegetating mill disturbance area	No specific assessments identified	Allowance	1	$ -	$ -
					Sub-Total Mill Area	**$ 78,000.00**
Camp and Site Ancillary Buildings	Camp area	Hazardous product inventory	Allowance	1	$ 5,000.00	$ 5,000.00
		Assessment/delineation of hydrocarbon contaminated soil	Allowance	1	$ 15,000.00	$ 15,000.00
	Water tank	No specific assessments identified	-	-	$ -	$ -
	Mine shop and laydown	Hazardous product inventory	Allowance	1	$ 5,000.00	$ 5,000.00
		Assessment/delineation of hydrocarbon contaminated soil	Allowance	1	$ 15,000.00	$ 15,000.00
					Sub-Total Camp Area	**$ 40,000.00**

Table 2-1: Pre-Closure Cost Estimate for Common Elements (continued)

Common Element	Component	Proposed Work	Units	Quantity	Unit Price	Estimated Cost
Roads	Mine roads (all non-public roads within OIC boundary)	(1) Assessment of presence/absence of hydrocarbon contaminated soil (2) Ground-truthing to evaluate decommissioning requirements	Allowance	1	$ 15,000.00	$ 15,000.00
	Haul road	Assessment of presence/absence of hydrocarbon contaminated soil	Allowance	1	$ 10,000.00	$ 10,000.00
	Trails	No closure activities	-	-	$	$ -
					Sub-Total Roads	**$ 25,000.00**
Backfill Trenches		Ground-truthing to assess state of trenches, confirm conceptual estimates, and assess viability of access for reclamation	Allowance	1	$ 15,000.00	$ 15,000.00
					Sub-Total Backfill Trenches	**$ 15,000.00**
Miscellaneous Infrastructure	Power supply infrastructure	Field assessment and inventory	Allowance	1	$ 5,000.00	$ 5,000.00
	Pipelines	Field assessment and inventory	Allowance	1	$ 5,000.00	$ 5,000.00
	Victoria creek pump house	Assess artesian well and develop decommissioning strategy	Allowance	1	$ 5,000.00	$ 5,000.00
	Core storage areas	No specific assessments identified	-	-	$ -	$ -
					Sub-Total Miscellaneous Infrastructure	**$ 15,000.00**
Revegetation and Restoration of Other Areas	Miscellaneous clearings	Field assessment and inventory	Allowance	1	$ 5,000.00	$ 5,000.00
	Tailings peripheral areas	No specific assessments identified	-	-	$ -	$ -
	Waste rock pile and open pit areas	Costs for this element addressed elsewhere	-	-	$ -	$ -
					Sub-Total Revegetation/Restoration	**$ 5,000.00**
					Total Pre-Closure Assessment Costs	**$ 178,000.00**

Table 2-2: Active Closure Cost Estimate for Common Elements (continued)

Common Element	Component	Proposed Work	Units	Quantity	Unit Price	Estimated Cost
Roads	Mine roads (all non-public roads within OIC boundary)[9]	Site preparation	km	11.6	$ 6,250.00	$ 72,500.00
		Revegetation	Hectare	1.74	$ 16,000.00	$ 27,840.00
		Remediate hydrocarbon contaminated soil	Allowance	1	$ 5,000.00	$ 5,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 15,000.00	$ 15,000.00
	Haul road[10]	Site preparation	km	1.2	$ 18,750.00	$ 22,500.00
		Material removal	m^3	1,000	$ 15.00	$ 15,000.00
		Remediate hydrocarbon contaminated soil	Allowance	1	$ 20,000.00	$ 20,000.00
		Revegetation	Hectare	1.2	$ 16,000.00	$ 19,200.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 15,000.00	$ 15,000.00
	Trails	No closure activities	-	-	$ -	$ -
					Sub-Total Roads	**$ 212,040.00**
Backfill Trenches[11]		Backfill remaining deep trenches, Huestis area	km	2	$ 18,750.00	$ 37,500.00
		Backfill all other trenches	km	8.80	$ 15,000.00	$ 132,000.00
		Revegetation	Hectare	2.16	$ 16,000.00	$ 34,560.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 10,000.00	$ 10,000.00
					Sub-Total Backfill Trenches	**$ 214,060.00**
Miscellaneous Infrastructure	Power supply infrastructure[12]	(1) De-activate power lines (2) Remove remnant cable and switchgear, salvage/recycle/dispose as feasible; remove transformer and dispose/salvage (3) Remove newer power poles and salvage as feasibile (4) No allowance for revegetation assumed	Allowance	1	$ 50,000.00	$ 50,000.00
	Pipelines[13]	(1) Remove above-surface pipelines along with remnant insulation and debris, salvage/recycle/dispose as feasible (2) Remove pump shacks and equipment; salvage/recycle/dispose as feasibile (3) No revegetation allowance assumed	Allowance	1	$ 50,000.00	$ 50,000.00
	Victoria creek pump house[14]	(1) Decommission and seal artesian well (2) Remove pump house and equipment; salvage/recycle/dispose as feasible (3) Surface preparation of clearing, minor revegetation allowance assumed	Allowance	1	$ 75,000.00	$ 75,000.00
	Core storage areas[15]	Archive representative drill holes, disposal of remaining drill core	Allowance	1	$ 25,000.00	$ 25,000.00
					Sub-Total Miscellaneous Infrastructure	**$ 200,000.00**
Revegetation and Restoration of Other Areas	Miscellaneous clearings[16]	Surface preparation	Hectare	16	$ 5,000.00	$ 80,000.00
		Revegetation	Hectare	2.4	$ 16,000.00	$ 38,400.00
	Tailings peripheral areas	Final surface preparation and revegetation	Allowance	1	$ 90,200.00	$ 90,200.00
					Sub-Total Revegetation/Restoration	**$ 208,600.00**
					Total Active Closure Costs	**$ 3,657,850.00**

Table 2-2: Active Closure Cost Estimate for Common Elements

Common Element	Component	Proposed Work	Units	Quantity	Unit Price	Estimated Cost
Mill Area	Control of water flow through mill disturbance area[1]	Excavation	m^3	1,500	$ 10.00	$ 15,000.00
		Armouring	m^3	60	$ 35.00	$ 2,100.00
		Geotextile	m^2	400	$ 5.00	$ 2,000.00
		Plug suspected adit	Allowance	1	$ 250,000.00	$ 250,000.00
	Removal of reactive rock fill from old ore transfer site[2]	Temporary sediment control	Allowance	1	$ 5,000.00	$ 5,000.00
		Transport and place potentially acid-generating, leachable material located near saturated zone (lower platform)	m^3	6,500	$ 15.00	$ 97,500.00
	Decommissioning of Pond #1 (Accumulation of Old Tailings)[3]	Temporary sediment control	Allowance	1	$ 20,000.00	$ 20,000.00
		Temporary access improvement	Allowance	1	$ 30,000.00	$ 30,000.00
		Tailings removal	m^3	1,000	$ 100.00	$ 100,000.00
		Re-grading	Hectare	1	$ 10,000.00	$ 10,000.00
		Revegetation	Hectare	0.75	$ 16,000.00	$ 12,000.00
		Excavation	m^3	100	$ 10.00	$ 1,000.00
		Armouring	m^3	40	$ 35.00	$ 1,400.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 30,000.00	$ 30,000.00
	Decommissioning of Pond #2[3,4]	Temporary sediment control	Allowance	1	$ 5,000.00	$ 5,000.00
		Dewater pond (assumes pond water meets licensing requirements)	Allowance	1	$ 3,000.00	$ 3,000.00
		Temporary access improvement	Allowance	1	$ 2,000.00	$ 2,000.00
		Re-grading	Hectare	0.5	$ 6,250.00	$ 3,125.00
		Revegetation	Hectare	0.25	$ 16,000.00	$ 4,000.00
		Excavation (assumes no tailings are presence in Pond #2)	m^3	50	$ 10.00	$ 500.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 2,000.00	$ 2,000.00
	Decommissioning of Pond #3[3,4]	Dewater pond (assumes pond water meets licensing requirements)	Allowance	1	$ 3,000.00	$ 3,000.00
		Characterize and remove solids	Allowance	1	$ 3,000.00	$ 3,000.00
		Remove and dispose of liner	Allowance	1	$ 3,000.00	$ 3,000.00
		Test pitting below liner	Allowance	1	$ 5,000.00	$ 5,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 2,000.00	$ 2,000.00

Table 2-2: Active Closure Cost Estimate for Common Elements (continued)

Common Element	Component	Proposed Work	Units	Quantity	Unit Price	Estimated Cost
Mill Area	Watercourse Restoration	Temporary sediment control	Allowance	1	$ 10,000.00	$ 10,000.00
		Transport and place	m^3	500	$ 15.00	$ 7,500.00
		Excavation	m^3	500	$ 10.00	$ 5,000.00
		Armouring	m^3	300	$ 35.00	$ 10,500.00
		Geotextile	m^2	400	$ 5.00	$ 2,000.00
		Revegetation	Hectare	0.2	$ 16,000.00	$ 3,200.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 3,000.00	$ 3,000.00
	Removal of fuel storage equipment and hydrocarbon contaminated soil/concrete	Removal of residual products	Allowance	1	$ 5,000.00	$ 5,000.00
		Tank and equipment removal (two (2) 45,500 L diesel tanks)	Allowance	1	$ 5,000.00	$ 5,000.00
		Contaminated concrete disposal	Allowance	1	$ 10,000.00	$ 10,000.00
		Contaminated soil excavation/treatment/disposal	Allowance	1	$ 10,000.00	$ 10,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 15,000.00	$ 15,000.00
	Removal of mill buildings and other structures[5,6]	Hazardous product removal, demolition, salvage, recycling as feasible, in-place landfilling of remainder	Allowance	1	$ 1,500,000.00	$ 1,500,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 50,000.00	$ 50,000.00
	Removal of hazardous products and refuse around mill[5]	Hazardous product removal (assumes minor quantities)	Allowance	1	$ 20,000.00	$ 20,000.00
		Surface-exposed refuse removal	Allowance	1	$ 20,000.00	$ 20,000.00
		Sulphur dioxide tank removal (i.e. rail tanker)	Allowance	1	$ 20,000.00	$ 20,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 10,000.00	$ 10,000.00
	Recontouring and revegetating mill disturbance area	Temporary sediment control	Allowance	1	$ 10,000.00	$ 10,000.00
		De-compaction/scarification of roads	m^2	20,000	$ 2.00	$ 40,000.00
		Re-grading	Hectare	4	$ 10,000.00	$ 40,000.00
		Revegetation	Hectare	1	$ 16,000.00	$ 16,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 15,000.00	$ 15,000.00
					Sub-Total Mill Area	**$ 2,438,825.00**

Table 2-2: Active Closure Cost Estimate for Common Elements (continued)

Common Element	Component	Proposed Work	Units	Quantity	Unit Price	Estimated Cost
Camp and Site Ancillary Buildings	Camp area[5 7]	Remove refuse and stored material in laydowns; relocated stored core	Allowance	1	$ 20,000.00	$ 20,000.00
		Remove gasoline tank (4,550 L) and appurtenances; remediated hydrocarbon contaminated soil	Allowance	1	$ 20,000.00	$ 20,000.00
		Remove propane tanks (4 x 1000 lb)	Allowance	1	$ 5,000.00	$ 5,000.00
		Remove hazardous products	Allowance	1	$ 5,000.00	$ 5,000.00
		Dismantle buildings, recycle and salvage as feasibile. In-place landfilling of non-hazardous waste	Allowance	1	$ 100,000.00	$ 100,000.00
		Decommission of septic system	Allowance	1	$ 5,000.00	$ 5,000.00
		De-compaction/scarification of ground surface	m^2	10,000	$ 2.00	$ 20,000.00
		Re-grading	Hectare	2	$ 10,000.00	$ 20,000.00
		Revegetation	Allowance	1	$ 5,000.00	$ 5,000.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 15,000.00	$ 15,000.00
	Water tank	Removal of tank (161,500 L), building	Allowance	1	$ 30,000.00	$ 30,000.00
		Removal of surface-exposed piping	Allowance	1	$ 3,000.00	$ 3,000.00
		Re-grading, surface preparation	Hectare	0.5	$ 6,250.00	$ 3,125.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 3,000.00	$ 3,000.00
	Mine shop and laydown[8]	Removal of scrap and products	Allowance	1	$ 10,000.00	$ 10,000.00
		Remove hazardous products	Allowance	1	$ 5,000.00	$ 5,000.00
		Remediate hydrocarbon contaminated soil	Allowance	1	$ 25,000.00	$ 25,000.00
		Dismantle buildings, recycle and salvage as feasibile	Allowance	1	$ 75,000.00	$ 75,000.00
		De-compaction/scarification of ground surface	m^2	2,000	$ 2.00	$ 4,000.00
		Re-grading, surface preparation	Hectare	0.8	$ 6,250.00	$ 5,000.00
		Revegetation	Hectare	0.2	$ 16,000.00	$ 3,200.00
		Field monitoring and material control, analysis, reporting	Allowance	1	$ 3,000.00	$ 3,000.00
					Sub-Total Camp Area	**$ 384,325.00**

2.2 Assumptions/Notes

1. Although further investigation is required to characterize the path and origin of the flow of contaminated water to Dome Creek (i.e. zinc loading), a preliminary estimate of $250,000 has been provided in the common cost estimate in the event that the flow is related to the presence of a historical adit in the area. This accounts for construction of a concrete plug to seal the adit, with the same costs assumed for plugging the Pony Creek adit.
2. Conservative estimate of 6,500 m^3 of potentially acid-generating/leachable material from the lower mill platform only.
3. Assumes that water in the ponds meets licensing requirements and no treatment will be necessary.(The Altura estimate assumed basic sediment control measures during decommissioning, and conceptually assumed that any required removal of suspended solids during pond dewatering would also be covered.)
4. Assumes tailings are only present in Pond #1.
5. Assumes no asbestos or PCBs are present and only minor quantities of lead-based paint.
6. Assumes sufficient cover material is available for in-place landfilling of mill demolition refuse.
7. Area is 2 hectares, which exists as a series of four (4) platforms connected by roads.
8. Metal-clad building (250 m^2), minor laydowns of supplies and small equipment, 1,500 m^2 metal and miscellaneous scrap yard to southeast, equipment parking platform to the north, potential for hydrocarbon soil contamination due to maintenance activities and fuel tanks during mining.
9. Assumes all mine roads are to be decommissioned, and that all material is geochemically stable, with only a minor amount of hydrocarbon contamination.
10. Assumes that 1,000 m^3 of berm material is potentially leachable and that all other haul road material will have minimal potential effect on water quality. Assumes a minor amount of hydrocarbon contaminated soil is present.
11. Assumes that of the 15 lineal kilometres within the OIC boundary, (i) 2 lineal km of deep trenches were backfilled during care and maintenance; (ii) 2 km of deep trenches require backfilling; and (iii) 80% of the remaining 11 lineal km can feasibly be backfilled.
12. Assumes 5 km of active lines, 4 km of historical lines, no hazardous products are present and that there is limited vehicular access.
13. Assumes 5 km of main pipeline routes, plus 4 km of miscellaneous pipeline sections in other areas, with the majority aboveground. Also assumes no hazardous products are present and that there is limited vehicular access.
14. Assumes one (1) well and that the clearing requiring revegetation is 1,000 m^2 in area.
15. Assumes that the sites are accessible to vehicles and heavy equipment.
16. Requires additional field reconnaissance. Borrow areas have not been finalized.

2.3 Summary of Common Element Costs

The following is a summary of the costs included in Table 2-1 and Table 2-2. Deviations from the costs presented in the Altura report are noted below the table.

Table 2-3: Summary of Common Element Costs

Component	Cost Estimate Pre-Closure Phase	Cost Estimate Active Closure Phase
Mill Area	$ 78,000.00	$ 2,440,000.00[1]
Camp and Site Ancillary Buildings	$ 40,000.00	$ 390,000.00[2]
Roads	$ 25,000.00	$ 210,000.00[3]
Backfill Trenches	$ 15,000.00	$ 210,000.00[4]
Miscellaneous Infrastructure	$ 15,000.00	$ 210,000.00[5]
Revegetation and Restoration of Other Areas	$ 5,000.00	$ 210,000.00[6]
Subtotal	**$ 178,000.00**	**$ 3,670,000.00**
Total Cost	**$3,850,000[7]**	

2.3.1 Table 2-3 Notes

1. Cost has been rounded from that shown in Table 2-2 ($2,438,825.00).Cost for watercourse has been updated from the estimate of $2,190,000 included in Altura Environmental's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010.
2. Cost has been rounded from that shown in Table 2-2 ($384,325.00).
3. Cost has been rounded from that shown in Table 2-2 ($212,040.00).
4. Cost has been rounded from that shown in Table 2-2 ($214,060.00).
5. Cost has been rounded from that shown in Table 2-2 ($200,000.00).
6. Cost has been rounded from that shown in Table 2-2 ($208,600.00).
7. Number rounded up. With the exception of the addition of $250,000 to address contaminated flows potentially related to a historical adit, total costs are consistent with those listed in the Altura report.

The total costs provided in Table 2-3 are included in each of the detailed cost estimates for Options 1A, 1B, 2A, 2B, 3, and 4.

3. Capital Closure Cost Estimates

3.1 Class 'D' Capital Cost Estimates by Option

The following sections present detailed capital cost estimates associated with Options 1A, 1B, 2A, 2B, 3, and 4. The estimates have been updated from those included in the Lorax Environmental report entitled, "*Mount Nansen Options for Closure*". The changes are based on feedback from all stakeholders. Amongst the most significant additions/changes to the tables are the inclusions of:

- A 15% contingency, allowing for engineering design, ongoing consultation and resident and non-resident contract administration during construction. This contingency is in addition to the 30% allowance made for design changes during construction and items that have not been identified at the current level of design.
- Annual and lower-frequency care and maintenance costs associated with each option. These costs have been projected into perpetuity costs and converted to present values.
- Common element costs, as per Table 2-3.
- An allowance for plugging the Pony Creek adit has been added to all options (was not previously included in Options 1A and 2A).
- An allowance for the excavation and relocation of metals contaminated soil underlying the tailings has been added to Options 3 and 4.

Comprehensive lists of assumptions are provided following each detailed cost table.

Table 3-1: Summary of Estimated Capital Costs - Option 1A

Item	Work Item	Description	Units	Quantity	Unit Price	Estimated Cost
1A	Mobilization/ Demobilization	Mobilization	Lump Sum	1	$ 200,000.00	$ 200,000.00
1B		Demobilization	Lump Sum	1	$ 50,000.00	$ 50,000.00
					Sub-Total Mobilization/Demobilization	**$ 250,000.00[1,2]**
2A	Construction of Toe Berm	Crush, transport and place rock fill	m^3	40,000	$ 35.00	$ 1,400,000.00[1]
2B		Geosynthetic filter placement	m^2	5,400	$ 20.00	$ 108,000.00[1]
					Sub-Total Construction of Toe Berm	**$ 1,508,000.00**
3A	Ground Improvement	Thermosyphons	Lump Sum	1	$ 600,000.00	$ 600,000.00[1,3]
3B		Drainage, insulation, site preparation, etc.	Lump Sum	1	$ 900,000.00	$ 900,000.00[1,4]
					Sub-Total Ground Improvement	**$ 1,500,000.00**
4A	Tailings Management Area (TMA)	Regrading	m^2	71,000	$ 5.00	$ 355,000.00[1]
4B		Sand diffusion barrier cover	m^3	18,000	$ 15.00	$ 270,000.00[1]
4C		Soil cover beach	m^3	20,000	$ 15.00	$ 300,000.00[1]
4D		Beach armouring	m^3	3,300	$ 50.00	$ 165,000.00[1]
4E		Replace coarse tails with fine tails	m^3	68,000	$ 12.00	$ 816,000.00[1,5]
4F		Final site preparation, revegetation	Lump Sum	1	$ 34,000.00	$ 34,000.00[6]
					Sub-Total TMA	**$ 1,940,000.00**
5A	Spillway	Excavation	m^3	2,000	$ 10.00	$ 20,000.00[1]
5B		Concrete overflow	Lump Sum	1	$ 150,000.00	$ 150,000.00[1]
5C		Geotextile placement	m^2	3,000	$ 10.00	$ 30,000.00[1]
5D		Armouring	m^3	1,000	$ 50.00	$ 50,000.00[1]
5E		South-side berm – fill	m^3	500	$ 10.00	$ 5,000.00[1]
5F		South-side berm - erosion protection	Lump Sum	1	$ 15,000.00	$ 15,000.00[1]
					Sub-Total Spillway	**$ 270,000.00**
6A	Dome Creek Diversion into TMA	Excavation	m^3	750	$ 10.00	$ 7,500.00[1]
6B		Geotextile placement	m^2	675	$ 10.00	$ 6,750.00[1]
6C		Armouring	m^3	340	$ 50.00	$ 17,000.00[1]
6D		Water level controls	Lump Sum	1	$ 50,000.00	$ 50,000.00[1]
6E		Dome Creek channel and apron	Lump Sum	1	$ 50,000.00	$ 50,000.00[1]
					Sub-Total Dome Creek Diversion	**$ 131,250.00**
7	Dam Raise		Lump Sum	1	$ 25,000.00	**$ 25,000.00[1]**
8A	Diversion/Interceptor Ditch Upstream of Spillway	Fill in interceptor ditch	m^3	3,400	$ 10.00	$ 34,000.00[1]
8B		Fill in interceptor diversion channel	m^3	5,400	$ 10.00	$ 54,000.00[1]
					Sub-Total Diversion/Interceptor Ditch	**$ 88,000.00**
9A	Reslope, Regrade and Revegetate Waste Rock Storage Area	Regrade waste rock	Hectare	7.216	$ 6,250.00	$ 45,100.00
9B		Reslope waste rock	hr/Hectare	41	$ 1,200.00	$ 49,285.00
9C		Revegetation	Lump Sum	1.0	$ 48,000.00	$ 48,000.00
					Subtotal Waste Rock Storage Area	**$ 142,000.00[7]**
10	Road Construction – Base		m^3	900	$ 50.00	**$ 45,000.00[1]**
11	Plug Pony Creek Adit		Lump Sum	1	$ 250,000.00	**$ 250,000.00[1]**
12	Diversion Channel Downstream of Spillway		Lump Sum	1	$ 500,000.00	**$ 500,000.00[1]**
13	Monitoring Instrumentation		Lump Sum	1	$ 200,000.00	**$ 200,000.00[1]**
14	Scale/Flatten Pit Walls		Lump Sum	1	$ 200,000.00	**$ 200,000.00[1]**
15	Pit Safety (Signage and Berm)		Lump Sum	1	$ 24,000.00	**$ 24,000.00[8]**
16	Common Elements - Active Closure					**$ 3,657,850.00[9]**
17	Sub-Total All Items (Construction Costs)					**$ 10,731,100.00**
18	Recommended Contingency - Consulting, Engineering , Design, and Site Supervision (15% of Estimated Construction Costs)					**$ 1,609,665.00[10]**
19	Recommended Contingency (30% of Estimated Construction Costs)``					**$ 3,219,330.00[11]**
20	Pre-Closure Common Elements Cost (Investigation)					**$ 178,000.00[12]**
21	Operation, Care and Maintenance (Life Cycle Costs)					**$ 7,823,250.00[13]**
22					**Total Estimated Cost - Option 1A**	**$ 23,561,345.00[14]**

3.1.1 Option 1A Cost Assumptions/Notes

1. Costs derived from AECOM's report entitled, "*Geotechnical Assessment and Cost of the Mt. Nansen Mine Closure Alternatives*", November 2010 (Appendix C-1 "*Mount Nansen Options for Closure*", Lorax Environmental, November 2010).
2. Mobilization/demobilization costs assume that the majority of the required equipment is available locally.
3. Cost for thermosyphons is based on two (2) rows spaced at 2 m. The estimated cost of supplying and installing the thermosyphons was provided by the supplier who manufactured and installed the thermosyphons that are currently at the site.
4. Assumes that seepage water from the TMA would not require treatment or containment.
5. A portion of the loose tailings against the dam face will be excavated and replaced with fine tailings with no net volume change in the tailings impoundment.
6. Cost derived from Appendix A.1 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. See below.

Table 3-2: Summary of Revegetation Costs – Option 1A

Work Sub-Item	Description	Units	Quantity	Unit Price	Estimated Cost
Final Site Preparation	Beach soil cover	hr	12.5	$ 250.00	$ 3,125.00
	Dam crest and upstream	hr	10		$ 2,500.00
	Downstream dam face	hr	32		$ 8,000.00
	Rock fill toe berm	hr	15		$ 3,750.00
Sub-Total Final Site Preparation					**$ 17,375.00**
Final Site Revegetation	Beach soil cover	Hectare	0.375	$ 16,000.00	$ 6,000.00
	Dam crest and upstream	Hectare	0.1		$ 1,600.00
	Downstream dam face	Hectare	0.4		$ 6,400.00
	Rock fill toe berm	Hectare	0.15		$ 2,400.00
Sub-Total Final Site Revegetation					**$ 16,400.00**
Total Estimated Cost - Final Site Preparation/Revegetation					**$ 33,775.00**

7. Cost derived from Appendix A.6 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.4-10).
8. Cost derived from Appendix A.7 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.4-10).
9. Refer to Table 2-2 for further detail.
10. 15% contingency included to allow for detailed engineering design, consultation, tendering, and resident and off-site contract administration on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
11. 30% contingency included to allow for design changes and items that have not been identified at the current level of design. Applies to on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
12. Refer to Table 2-1 for further detail.
13. Refer to Section 4.1 and Table 4-1 for further detail.
14. Sum of Items 17 to 21.

Table 3-3: Summary of Estimated Capital Costs - Option 1B

Item	Work Item	Description	Units	Quantity	Unit Price	Estimated Cost
1A	Mobilization/Demobilization	Mobilization	Lump Sum	1	$ 200,000.00	$ 200,000.00
1B		Demobilization	Lump Sum	1	$ 50,000.00	$ 50,000.00
					Sub-Total Mobilization/Demobilization	**$ 250,000.00**[1,2]
2A	Construction of Toe Berm	Crush, transport and place rock fill	m^3	40,000	$ 35.00	$ 1,400,000.00[1]
2B		Geosynthetic filter placement	m^2	5,400	$ 20.00	$ 108,000.00[1]
					Sub-Total Construction of Toe Berm	**$ 1,508,000.00**
3A	Ground Improvement	Thermosyphons	Lump Sum	1	$ 600,000.00	$ 600,000.00[1,3]
3B		Drainage, insulation, site preparation, etc.	Lump Sum	1	$ 900,000.00	$ 900,000.00[1,4]
					Sub-Total Ground Improvement	**$ 1,500,000.00**
4A	Tailings Management Area (TMA)	Regrading	m^2	71,000	$ 5.00	$ 355,000.00[1]
4B		Sand diffusion barrier cover	m^3	18,000	$ 15.00	$ 270,000.00[1]
4C		Soil cover beach	m^3	20,000	$ 15.00	$ 300,000.00[1]
4D		Beach armouring	m^3	3,300	$ 50.00	$ 165,000.00[1]
4E		Replace coarse tails with fine tails	m^3	68,000	$ 12.00	$ 816,000.00[1,5]
4F		Final site preparation, revegetation	Lump Sum	1	$ 34,000.00	$ 34,000.00[6]
					Sub-Total TMA	**$ 1,940,000.00**
5A	Spillway	Excavation	m^3	2,000	$ 10.00	$ 20,000.00[1]
5B		Concrete overflow	Lump Sum	1	$ 150,000.00	$ 150,000.00[1]
5C		Geotextile placement	m^2	3,000	$ 10.00	$ 30,000.00[1]
5D		Armouring	m^3	1,000	$ 50.00	$ 50,000.00[1]
5E		South-side berm – fill	m^3	500	$ 10.00	$ 5,000.00[1]
5F		South-side berm - erosion protection	Lump Sum	1	$ 15,000.00	$ 15,000.00[1]
					Sub-Total Spillway	**$ 270,000.00**
6A	Dome Creek Diversion into TMA	Excavation	m^3	750	$ 10.00	$ 7,500.00[1]
6B		Geotextile placement	m^2	675	$ 10.00	$ 6,750.00[1]
6C		Armouring	m^3	340	$ 50.00	$ 17,000.00[1]
6D		Water level controls	Lump Sum	1	$ 50,000.00	$ 50,000.00[1]
6E		Dome Creek channel and apron	Lump Sum	1	$ 50,000.00	$ 50,000.00[1]
					Sub-Total Dome Creek Diversion	**$ 131,250.00**
7	Dam Raise		Lump Sum	1	$ 25,000.00	**$ 25,000.00**[1]
8A	Diversion/Interceptor Ditch Upstream of Spillway	Fill in interceptor ditch	m^3	3,400	$ 10.00	$ 34,000.00[1]
8B		Fill in interceptor diversion channel	m^3	5,400	$ 10.00	$ 54,000.00[1]
					Sub-Total Diversion/Interceptor Ditch	**$ 88,000.00**
9A	Backfill Pit with Waste Rock	Load, haul, backfill pit with waste rock	m^3	510,000	$ 5.00	$ 2,550,000.00[1,7]
9B		Regrade and revegetate pit fill, safety measures	Lump Sum	1	$ 53,000.00	$ 53,000.00[8]
9C		Plug Pony Creek adit	Lump Sum	1	$ 250,000.00	$ 250,000.00[1]
					Sub-Total Pit Backfilling	**$ 2,853,000.00**[9]
10A	Reslope, Regrade and Revegetate Waste Rock Storage Area	Regrade waste rock	Hectare	12	$ 6,250.00	$ 75,000.00
10B		Revegetation	Lump Sum	1.0	$ 48,000.00	$ 48,000.00
					Subtotal Waste Rock Storage Area	**$ 123,000.00**[10]
11	Road Construction – Base		m^3	900	$ 50.00	**$ 45,000.00**[1]
12	Diversion Channel Downstream of Spillway		Lump Sum	1	$ 500,000.00	**$ 500,000.00**[1]
13	Monitoring Instrumentation		Lump Sum	1	$ 200,000.00	**$ 200,000.00**[1]
14	Scale/Flatten Pit Walls		Lump Sum	1	$ 200,000.00	**$ 200,000.00**[1]
15	Common Elements - Active Closure					$ 3,657,850.00
16	Sub-Total All Items (Construction Costs)					$ 13,291,100.00[11]
17	Recommended Contingency - Consulting, Engineering , Design, and Site Supervision (15% of Estimated Construction Costs)					$ 1,993,665.00[12]
18	Recommended Contingency (30% of Estimated Construction Costs)					$ 3,987,330.00[13]
19	Pre-Closure Common Elements Cost (Investigation)					$ 178,000.00[14]
20	Operation, Care and Maintenance (Life Cycle Costs)					$ 7,500,000.00[15]
21					**Total Estimated Cost - Option 1B**	$ 26,950,095.00[16]

3.1.2 Option 1B Cost Assumptions/Notes

1. Costs derived from AECOM's report entitled, "*Geotechnical Assessment and Cost of the Mt. Nansen Mine Closure Alternatives*", November 2010 (Appendix C-1 "*Mount Nansen Options for Closure*", Lorax Environmental, November 2010).
2. Mobilization/demobilization costs assume that the majority of the required equipment is available locally.
3. Cost for thermosyphons is based on two (2) rows spaced at 2 m. The estimated cost of supplying and installing the thermosyphons was provided by the supplier who manufactured and installed the thermosyphons that are currently at the site.
4. Assumes that seepage water from the TMA would not require treatment or containment.
5. A portion of the loose tailings against the dam face will be excavated and replaced with fine tailings with no net volume change in the tailings impoundment.
6. Cost derived from Appendix A.1 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. See below.

Table 3-4: Summary of Revegetation Costs – Option 1B

Work Sub-Item	Description	Units	Quantity	Unit Price	Estimated Cost
Final Site Preparation	Beach soil cover	hr	12.5	$ 250.00	$ 3,125.00
	Dam crest and upstream	hr	10		$ 2,500.00
	Downstream dam face	hr	32		$ 8,000.00
	Rock fill toe berm	hr	15		$ 3,750.00
Sub-Total Final Site Preparation					**$ 17,375.00**
Final Site Revegetation	Beach soil cover	Hectare	0.375	$ 16,000.00	$ 6,000.00
	Dam crest and upstream	Hectare	0.1		$ 1,600.00
	Downstream dam face	Hectare	0.4		$ 6,400.00
	Rock fill toe berm	Hectare	0.15		$ 2,400.00
Sub-Total Final Site Revegetation					**$ 16,400.00**
Total Estimated Cost - Final Site Preparation/Revegetation					**$ 33,775.00**

7. Cost verified by local contractor, Pelly Construction.
8. Cost derived from Appendix A.7 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.4-11).
9. Costs do not allow for extensive sorting of waste rock.
10. Cost derived from Appendix A.6 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.4-11).
11. Refer to Table 2-2 for further detail.
12. 15% contingency included to allow for detailed engineering design, consultation, tendering, and resident and off-site contract administration on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
13. 30% contingency included to allow for design changes and items that have not been identified at the current level of design. Applies to on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
14. Refer to Table 2-1 for further detail.
15. Refer to Section 4.1 and Table 4-1 for further detail.
16. Sum of Items 16 to 20.

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Table 3-5: Summary of Estimated Capital Cost

Item	Work Item	imated Cost
1A	Mobilization/Demobilization	200,000.00
1B		50,000.00
		250,000.00[1,2]
2A	Construction of Toe Berm	,400,000.00[1]
2B		108,000.00[1]
		1,508,000.00
3A	Ground Improvement	600,000.00[1,3]
3B		900,000.00[1,4]
		1,500,000.00
4A	Tailings Management Area (TMA)	355,000.00[1]
4B		900,000.00[1]
4C		180,000.00[1]
4D		50,000.00[1]
4E		75,000.00[1]
4F		300,000.00[1]
4G		165,000.00[1]
4H		316,000.00[1,5]
4I		124,000.00[6]
		2,965,000.00
5A	Spillway	20,000.00[1]
5B		150,000.00[1]
5C		30,000.00[1]
5D		50,000.00[1]
5E		5,000.00[1]
5F		15,000.00[1]
		270,000.00
6A	Dome Creek Diversion into TMA	7,500.00[1]
6B		6,750.00[1,7]
6C		17,000.00[1]
6D		50,000.00[1]
6E		50,000.00[1]
		131,250.00
7	Dam Raise	25,000.00[1]
8A	Diversion/Interceptor Ditch Upstrear	34,000.00[1]
8B		54,000.00[1]
		88,000.00
9A	Reslope, Regrade and Revegetate W	45,100.00
9B		49,285.00
9C		48,000.00
		142,000.00[8]
10	Road Construction – Base	45,000.00[1]
11	Plug Pony Creek Adit	250,000.00[1]
12	Diversion Channel Downstream of S	500,000.00[1]
13	Monitoring Instrumentation	200,000.00[1]
14	Scale/Flatten Pit Walls	200,000.00[1]
15	Pit Safety (Signage and Berm)	24,000.00[9]
16	Common Elements - Active Closure	,657,850.00[10]
17	Sub-Total All Items (Construction C	1,756,100.00
18	Recommended Contingency - Const	763,415.00[11]
19	Recommended Contingency (30% o	526,830.00[12]
20	Pre-Closure Common Elements Cos	78,000.00[13]
21	Operation, Care and Maintenance (L	823,250.00[14]
22		5,047,595.00[15]

3.1.3 Option 2A Cost Assumptions/Notes

1. Costs derived from AECOM's report entitled, "*Geotechnical Assessment and Cost of the Mt. Nansen Mine Closure Alternatives*", November 2010 (Appendix C-1 "*Mount Nansen Options for Closure*", Lorax Environmental, November 2010).
2. Mobilization/demobilization costs assume that the majority of the required equipment is available locally.
3. Cost for thermosyphons is based on two (2) rows spaced at 2 m. The estimated cost of supplying and installing the thermosyphons was provided by the supplier who manufactured and installed the thermosyphons that are currently at the site.
4. Assumes that seepage water from the TMA would not require treatment or containment.
5. A portion of the loose tailings against the dam face will be excavated and replaced with fine tailings with no net volume change in the tailings impoundment.
6. Cost derived from Appendix A.1 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. See below.

Table 3-6: Summary of Revegetation Costs – Option 2A

Work Sub-Item	Description	Units	Quantity	Unit Price	Estimated Cost
Final Site Preparation	Soil cover, main tailings mass	hr	162.5	$ 250.00	$ 40,625.00
	Soil cover, beach area	hr	12.5		$ 3,125.00
	Dam crest and upstream face	hr	10		$ 2,500.00
	Downstream dam face	hr	32		$ 8,000.00
	Rock fill toe berm	hr	15		$ 3,750.00
Sub-Total Final Site Preparation					**$ 58,000.00**
Final Site Revegetation	Soil cover, main tailings mass	Hectare	3.25	$ 16,000.00	$ 52,000.00
	Soil cover, beach area	Hectare	0.25		$ 4,000.00
	Dam crest and upstream face	Hectare	0.1		$ 1,600.00
	Downstream dam face	Hectare	0.4		$ 6,400.00
	Rock fill toe berm	Hectare	0.15		$ 2,400.00
Sub-Total Final Site Revegetation					**$ 66,400.00**
Total Estimated Cost - Final Site Preparation/Revegetation					**$ 124,400.00**

7. Cost in AECOM report was $5/m^2.
8. Cost derived from Appendix A.6 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.5-5).
9. Cost derived from Appendix A.7 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.5-5).
10. Refer to Table 2-2 for further detail.
11. 15% contingency included to allow for detailed engineering design, consultation, tendering, and resident and off-site contract administration on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
12. 30% contingency included to allow for design changes and items that have not been identified at the current level of design. Applies to on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
13. Refer to Table 2-1 for further detail.
14. Refer to Section 4.1 and Table 4-1 for further detail.
15. Sum of Items 17 to 21.

Table 3-7: Summary of Estimated Capital Cost

Item	Work Item	Price	Estimated Cost
1A	Mobilization/Demobilization	,000.00	$ 200,000.00
1B		000.00	$ 50,000.00
		bilization	$ 250,000.00[1,2]
2A	Construction of Toe Berm	5.00	$ 1,400,000.00[1]
2B		0.00	$ 108,000.00[1]
		Toe Berm	$ 1,508,000.00
3A	Ground Improvement	,000.00	$ 600,000.00[1,3]
3B		,000.00	$ 900,000.00[1,4]
		rovement	$ 1,500,000.00
4A	Tailings Management Area (TMA)	5.00	$ 355,000.00[1]
4B		5.00	$ 900,000.00[1]
4C		3.00	$ 180,000.00[1]
4D		0.00	$ 50,000.00[1]
4E		0.00	$ 75,000.00[1]
4F		5.00	$ 300,000.00[1]
4G		0.00	$ 165,000.00[1]
4H		2.00	$ 816,000.00[1,5]
4I		,000.00	$ 124,000.00[6]
		otal TMA	$ 2,965,000.00
5A	Spillway	0.00	$ 20,000.00[1]
5B		,000.00	$ 150,000.00[1]
5C		0.00	$ 30,000.00[1]
5D		0.00	$ 50,000.00[1]
5E		0.00	$ 5,000.00[1]
5F		000.00	$ 15,000.00[1]
		Spillway	$ 270,000.00
6A	Dome Creek Diversion into TMA	0.00	$ 7,500.00[1]
6B		0.00	$ 6,750.00[1,7]
6C		0.00	$ 17,000.00[1]
6D		000.00	$ 50,000.00[1]
6E		000.00	$ 50,000.00[1]
		Diversion	$ 131,250.00
7	Dam Raise	000.00	$ 25,000.00[1]
8A	Diversion/Interceptor Ditch Upstream	0.00	$ 34,000.00[1]
8B		0.00	$ 54,000.00[1]
		tor Ditch	$ 88,000.00
9A	Backfill Pit with Waste Rock	5.00	$ 2,550,000.00[1,8]
9B		000.00	$ 53,000.00[9]
9C		,000.00	$ 250,000.00[1]
		ackfilling	$ 2,853,000.00[10]
10A	Reslope, Regrade and Revegetate Wa	250.00	$ 75,000.00
10B		000.00	$ 48,000.00
		age Area	$ 123,000.00[11]
11	Road Construction – Base	0.00	$ 45,000.00[1]
12	Diversion Channel Downstream of Sp	,000.00	$ 500,000.00[1]
13	Monitoring Instrumentation	,000.00	$ 200,000.00[1]
14	Scale/Flatten Pit Walls	,000.00	$ 200,000.00[1]
16	Common Elements - Active Closure		$ 3,657,850.00[12]
17	Sub-Total All Items (Construction Co		$ 14,316,100.00
18	Recommended Contingency - Consul		$ 2,147,415.00[13]
19	Recommended Contingency (30% of		$ 4,294,830.00[14]
20	Pre-Closure Common Elements Cost		$ 178,000.00[15]
21	Operation, Care and Maintenance (Lif		$ 7,500,000.00[16]
22		Option 2B	$ 28,436,345.00[17]

3.1.4 Option 2B Cost Assumptions/Notes

1. Costs derived from AECOM's report entitled, "*Geotechnical Assessment and Cost of the Mt. Nansen Mine Closure Alternatives*", November 2010 (Appendix C-1 "*Mount Nansen Options for Closure*", Lorax Environmental, November 2010).
2. Mobilization/demobilization costs assume that the majority of the required equipment is available locally.
3. Cost for thermosyphons is based on two (2) rows spaced at 2 m. The estimated cost of supplying and installing the thermosyphons was provided by the supplier who manufactured and installed the thermosyphons that are currently at the site.
4. Assumes that seepage water from the TMA would not require treatment or containment.
5. A portion of the loose tailings against the dam face will be excavated and replaced with fine tailings with no net volume change in the tailings impoundment.
6. Cost derived from Appendix A.1 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. See below.

Table 3-8: Summary of Revegetation Costs – Option 2B

Work Sub-Item	Description	Units	Quantity	Unit Price	Estimated Cost
Final Site Preparation	Soil cover, main tailings mass	hr	162.5	$ 250.00	$ 40,625.00
	Soil cover, beach area	hr	12.5		$ 3,125.00
	Dam crest and upstream face	hr	10		$ 2,500.00
	Downstream dam face	hr	32		$ 8,000.00
	Rock fill toe berm	hr	15		$ 3,750.00
Sub-Total Final Site Preparation					**$ 58,000.00**
Final Site Revegetation	Soil cover, main tailings mass	Hectare	3.25	$ 16,000.00	$ 52,000.00
	Soil cover, beach area	Hectare	0.25		$ 4,000.00
	Dam crest and upstream face	Hectare	0.1		$ 1,600.00
	Downstream dam face	Hectare	0.4		$ 6,400.00
	Rock fill toe berm	Hectare	0.15		$ 2,400.00
Sub-Total Final Site Revegetation					**$ 66,400.00**
Total Estimated Cost - Final Site Preparation/Revegetation					**$ 124,400.00**

7. Cost in AECOM report was $5/m^2.
8. Cost verified by local contractor, Pelly Construction.
9. Cost derived from Appendix A.7 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.5-6).
10. Costs do not allow for extensive sorting of waste rock.
11. Cost derived from Appendix A.6 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.5-6).
12. Refer to Table 2-2 for further detail.
13. 15% contingency included to allow for detailed engineering design, consultation, tendering, and resident and off-site contract administration on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
14. 30% contingency included to allow for design changes and items that have not been identified at the current level of design. Applies to on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
15. Refer to Table 2-1 for further detail.
16. Refer to Section 4.1 and Table 4-1 for further detail.
17. Sum of Items 17 to 21.

Table 3-9: Summary of Estimated Capital Costs - Option 3

Item	Work Item	Description	Units	Quantity	Unit Price	Estimated Cost
1A	Mobilization/Demobilization	Mobilization	Lump Sum	1	$ 200,000.00	$ 200,000.00
1B		Partial Demobilization	Lump Sum	1	$ 225,000.00	$ 225,000.00
1C		Final Demobilization	Lump Sum	1	$ 75,000.00	$ 75,000.00
					Sub-Total Mobilization/Demobilization	**$ 500,000.00[1,2]**
2A	Transport and Place Tailings	Set up dredges, pumps, and lines	Lump Sum	1	$ 2,000,000.00	$ 2,000,000.00[1]
2B		Dredge tailings	m^3	300,000	$ 9.00	$ 2,700,000.00[1,3]
					Sub-Total Construction of Toe Berm	**$ 4,700,000.00**
3A	Restore Tailings Management Area (TMA)	Relocate dam fill to borrow sources	m^3	80,000	$ 5.00	$ 400,000.00[1]
3B		Relocate dam fill to pit	m^3	80,000	$ 12.00	$ 960,000.00[1]
3C		Excavate metals contaminated soil underlying tailings and relocate to pit	m^3	11,000	$ 12.00	$ 132,000.00[4]
3D		Restoration of Dome Creek valley	Lump Sum	1	$ 1,670,000.00	$ 1,670,000.00[5]
					Sub-Total TMA Restoration	**$ 3,162,000.00**
4A	Construct In-Pit Tailings Dam	Fill material	m^3	10,000	$ 35.00	$ 350,000.00[1]
4B		Tailings dam liner	m^2	1,000	$ 150.00	$ 150,000.00[1]
4C		Foundation preparation	Lump Sum	1	$ 500,000.00	$ 500,000.00[1]
4D		Monitoring instrumentation	Lump Sum	1	$ 200,000.00	$ 200,000.00[1]
					Sub-Total Dam Construction	**$ 1,200,000.00**
5	1 m High Infiltration Cover Over Tailings		m^3	21,000	$ 15.00	**$ 315,000.00**
6A	Spillway	Excavation	m^3	500	$ 20.00	$ 10,000.00[1]
6B		Geotextile placement	m^2	500	$ 10.00	$ 5,000.00[1]
6C		Armouring	m^3	250	$ 50.00	$ 12,500.00[1]
					Sub-Total Spillway	**$ 27,500.00**
7A	Regrade and Repair Cover		m^3	21,000	$ 5.00	**$ 105,000.00[1,6]**
8A	Reslope, Regrade and Revegetate Waste Rock Storage Area	Regrade waste rock	Hectare	7.216	$ 6,250.00	$ 45,100.00
8B		Reslope waste rock	hr/Hectare	41	$ 1,200.00	$ 49,285.00
8C		Revegetation	Lump Sum	1.0	$ 48,000.00	$ 48,000.00
					Subtotal Waste Rock Storage Area	**$ 142,000.00[7]**
9	Plug Pony Creek Adit		Lump Sum	1	$ 250,000.00	**$ 250,000.00[1,8]**
10	Scale/Flatten Pit Walls		Lump Sum	1	$ 200,000.00	**$ 200,000.00[1]**
11	Revegetate Pit Fill, Pit Safety (Signage and Berm)		Lump Sum	1	$ 49,000.00	**$ 49,000.00[9]**
12	Monitoring Instrumentation		Lump Sum	1	$ 200,000.00	**$ 200,000.00[1]**
13	Water Treatment – Total		Lump Sum	1	$ 2,000,000.00	**$ 2,000,000.00[10]**
14	Common Elements - Active Closure					**$ 3,657,850.00[11]**
15	Sub-Total All Items (Construction Costs)					**$ 16,508,350.00**
16	Recommended Contingency - Consulting, Engineering , Design, and Site Supervision (15% of Estimated Construction Costs)					**$ 2,476,252.50[12]**
17	Recommended Contingency (30% of Estimated Construction Costs)					**$ 4,952,505.00[13]**
18	Pre-Closure Common Elements Cost (Investigation)					**$ 178,000.00[14]**
19	Operation, Care and Maintenance (Life Cycle Costs)					**$ 4,525,000.00[15]**
20					**Total Estimated Cost - Option 3**	**$ 28,640,107.50[16]**

3.1.5 Option 3 Cost Assumptions/Notes

1. Costs derived from AECOM's report entitled, "*Geotechnical Assessment and Cost of the Mt. Nansen Mine Closure Alternatives*", November 2010 (Appendix C-1 "*Mount Nansen Options for Closure*", Lorax Environmental, November 2010).
2. Mobilization/demobilization costs assume that the majority of the required equipment is available locally.
3. Assumes that dredging is the preferred transportation method, and that tailings can be adequately blended in-pipe. Two (2) dredges will be used simultaneously. No allowance has been included for accelerating consolidation. It is assumed that an adequate water supply will be available for dredging operations.
4. Assumes areal extent of contaminated soil is 7.3 ha (consistent with area of tailings). Based on current site information, the average thickness of metals impacted soil is on the order of 15 cm. Cost provided is consistent with the cost to move the dam fill into the pit.
5. Cost derived from Appendix A.3, A.4, and A.5 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Cost for this item is consistent with the number provided in the November 2010 Lorax report (Table 5.6-5).

Table 3-10: Summary of Dome Creek Restoration Costs – Option 3

Work Item	Estimated Cost - Tailings Mass and Dam (7.4 ha)	Estimated Cost - Dome Creek Watercourse (4.4 ha)
Design	$ 50,000.00	$ 50,000.00
Phase 1 Activities (After excavation of tailings mass and majority of dam, upstream diversion structures and a small portion of the dam structure left in place to retain and control drainage)	$ 280,000.00	$ 390,000.00
Phase 2 Activities (Following season after completion of Phase 1, and subsequent excavation of remaining dam structures)	$ 140,000.00	$ 170,000.00
Phase 3 Activities (Season after completion of Phase 2)	$ 120,000.00	$ 190,000.00
Sub-Total	**$ 590,000.00**	**$ 800,000.00**
Field Monitoring, Quality Control, Reporting	$ 280,000.00	
Total Dome Creek	**$ 1,670,000.00**	

6. Regrading of cover surface is assumed to be a one (1)-time maintenance item to address uneven settlement.
7. Cost derived from Appendix A.6 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.6-5).
8. Estimated cost for plugging Pony Creek adit was based on the designs and recent construction costs for plugging similar mine adits in the Yukon. Costs are for a massive concrete plug with grouting around the circumference of the adit.
9. Cost derived from Appendix A.7 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.6-5).
10. Costs for water treatment are an update of Mount Nansen Mine Water Treatment Study (AECOM 2009) and includes both capital and operating costs for the duration of the construction activities.
11. Refer to Table 2-2 for further detail.

12. 15% contingency included to allow for detailed engineering design, consultation, tendering, and resident and off-site contract administration on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
13. 30% contingency included to allow for design changes and items that have not been identified at the current level of design. Applies to on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
14. Refer to Table 2-1 for further detail.
15. Refer to Section 4.1 and Table 4-1 for further detail.
16. Sum of Items 16 to 20.

Table 3-11: Summary of Estimated Capital Costs - Option 4

Item	Work Item	Description	Units	Quantity	Unit Price	Estimated Cost
1A	Mobilization/Demobilization	Mobilization	Lump Sum	1	$ 200,000.00	$ 200,000.00
1B		Partial Demobilization	Lump Sum	1	$ 225,000.00	$ 150,000.00
1C		Final Demobilization	Lump Sum	1	$ 75,000.00	$ 50,000.00
					Sub-Total Mobilization/Demobilization	**$ 400,000.00[1,2]**
2	**Transport and Place Tailings**		m^3	300,000	$ 15.00	**$ 4,500,000.00[1]**
3A	Restore Tailings Management Area (TMA)	Relocate dam fill to borrow sources	m^3	80,000	$ 5.00	$ 400,000.00[1]
3B		Relocate dam fill to pit	m^3	80,000	$ 12.00	$ 960,000.00[1]
3C		Excavate metals contaminated soil underlying tailings and relocate to pit	m^3	11,000	$ 12.00	$ 132,000.00[3]
3D		Restoration of Dome Creek valley	Lump Sum	1	$ 1,670,000.00	$ 1,670,000.00[4]
					Sub-Total TMA Restoration	**$ 3,162,000.00**
4	**Waste Rock Placement (Bottom and Top)**		m^3	344,000	$ 5.00	**$ 1,720,000.00[1]**
5	**Low Infiltration Synthetic Cover**		m^3	43,000	$ 55.00	**$ 2,365,000.00[1]**
6	**Regrade and Repair Cover**		m^3	43,000	$ 5.00	**$ 215,000.00[1,5]**
7A	Reslope, Regrade and Revegetate Waste Rock Storage Area	Regrade waste rock	Hectare	12	$ 6,250.00	$ 75,000.00
7B		Revegetation	Lump Sum	1.0	$ 48,000.00	$ 48,000.00
					Subtotal Waste Rock Storage Area	**$ 123,000.00[6]**
8	**Plug Pony Creek Adit**		Lump Sum	1	$ 250,000.00	**$ 250,000.00[7]**
9	**Revegetate Pit Fill, Pit Safety (Signage and Berm)**		Lump Sum	1	$ 46,000.00	**$ 46,000.00[8]**
10	**Monitoring Instrumentation**		Lump Sum	1	$ 200,000.00	**$ 200,000.00[1]**
11	**Water Treatment – Total**		Lump Sum	1	$ 2,000,000.00	**$ 2,000,000.00[9]**
12	**Common Elements - Active Closure**					**$ 3,657,850.00[10]**
13	**Sub-Total All Items (Construction Costs)**					$ 18,638,850.00
14	**Recommended Contingency - Consulting, Engineering , Design, and Site Supervision (15% of Estimated Construction Costs)**					$ 2,795,827.50[11]
15	**Recommended Contingency (30% of Estimated Construction Costs)**					$ 5,591,655.00[12]
16	**Pre-Closure Common Elements Cost (Investigation)**					$ 178,000.00[13]
17	**Operation, Care and Maintenance (Life Cycle Costs)**					$ 3,750,000.00[14]
18					**Total Estimated Cost - Option 4**	$ 30,954,332.50[15]

3.1.6 Option 4 Cost Assumptions/Notes

1. Costs derived from AECOM's report entitled, "*Geotechnical Assessment and Cost of the Mt. Nansen Mine Closure Alternatives*", November 2010 (Appendix C-1 "*Mount Nansen Options for Closure*", Lorax Environmental, November 2010).
2. Mobilization/demobilization costs assume that the majority of the required equipment is available locally.
3. Assumes areal extent of contaminated soil is 7.3 ha (consistent with area of tailings). Based on current site information, the average thickness of metals impacted soil is on the order of 15 cm. Cost provided is consistent with the cost to move the dam fill into the pit.
4. Cost derived from Appendix A.3, A.4, and A.5 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Cost for this item is consistent with the number provided in the November 2010 Lorax report (Table 5.7-4).

Table 3-12: Summary of Dome Creek Restoration Costs – Option 4

Work Item	Estimated Cost - Tailings Mass and Dam (7.4 ha)	Estimated Cost - Dome Creek Watercourse (4.4 ha)
Design	$ 50,000.00	$ 50,000.00
Phase 1 Activities (After excavation of tailings mass and majority of dam, upstream diversion structures and a small portion of the dam structure left in place to retain and control drainage)	$ 280,000.00	$ 390,000.00
Phase 2 Activities (Following season after completion of Phase 1, and subsequent excavation of remaining dam structures)	$ 140,000.00	$ 170,000.00
Phase 3 Activities (Season after completion of Phase 2)	$ 120,000.00	$ 190,000.00
Sub-Total	**$ 590,000.00**	**$ 800,000.00**
Field Monitoring, Quality Control, Reporting	$ 280,000.00	
Total Dome Creek	**$ 1,670,000.00**	

5. Regrading of cover surface is assumed to be a one (1)-time maintenance item to address uneven settlement.
6. Cost derived from Appendix A.6 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.7-4).
7. Estimated cost for plugging Pony Creek adit was based on the designs and recent construction costs for plugging similar mine adits in the Yukon. Costs are for a massive concrete plug with grouting around the circumference of the adit.
8. Cost derived from Appendix A.7 in Altura's report entitled, "*Common Element and Supplemental Cost Estimates for Conceptual Closure Planning*", November 2010. Total cost for this item has been rounded, consistent with the number provided in the November 2010 Lorax report (Table 5.7-4).
9. Costs for water treatment are an update of Mount Nansen Mine Water Treatment Study (AECOM 2009) and includes both capital and operating costs for the duration of the construction activities.
10. Refer to Table 2-2 for further detail.
11. 15% contingency included to allow for detailed engineering design, consultation, tendering, and resident and off-site contract administration on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).

12. 30% contingency included to allow for design changes and items that have not been identified at the current level of design. Applies to on **construction costs only** (i.e. contingency does not apply to pre-closure investigation or operation, care, and maintenance).
13. Refer to Table 2-1 for further detail.
14. Refer to Section 4.1 and Table 4-1 for further detail.
15. Sum of Items 14 to 18.

4. Life Cycle Costs

4.1 Operation, Care and Maintenance Cost Estimates

Each of the detailed cost estimates provided in Section 3 includes an approximation of potential expenditures associated with operation, care and maintenance. A more detailed presentation is provided in Table 4-1.

Table 4-1: Summary of Predicted Operation, Care and Maintenance Costs by Option

Option	Work Item	Frequency	Assessment Period	Projected Unit Price	Estimated Initial Investment (Net Present Value)
1A	Thermosyphons	50 years	Perpetuity	$ 600,000.00	$ 98,250.00
	Site Monitoring	Annual		$ 100,000.00	$ 2,500,000.00
	Miscellaneous	Annual		$ 200,000.00	$ 5,000,000.00
	Dam Safety Assessments	7 years		$ 70,000.00	$ 225,000.00
Sub-Total Option 1A					**$ 7,823,250.00**
1B	Site Monitoring	Annual	Perpetuity	$ 100,000.00	$ 2,500,000.00
	Miscellaneous	Annual		$ 200,000.00	$ 5,000,000.00
Sub-Total Option 1B					**$ 7,500,000.00**
2A	Thermosyphons	50 years	Perpetuity	$ 600,000.00	$ 98,250.00
	Site Monitoring	Annual		$ 100,000.00	$ 2,500,000.00
	Miscellaneous	Annual		$ 200,000.00	$ 5,000,000.00
	Dam Safety Assessments	7 years		$ 70,000.00	$ 225,000.00
Sub-Total Option 2A					**$ 7,823,250.00**
2B	Site Monitoring	Annual	Perpetuity	$ 100,000.00	$ 2,500,000.00
	Miscellaneous	Annual		$ 200,000.00	$ 5,000,000.00
Sub-Total Option 2B					**$ 7,500,000.00**
3	Site Monitoring	Annual	Perpetuity	$ 75,000.00	$ 1,875,000.00
	Miscellaneous	Annual		$ 100,000.00	$ 2,500,000.00
	Dam Safety Assessments	10 years		$ 70,000.00	$ 150,000.00
Sub-Total Option 3					**$ 4,525,000.00**
4	Site Monitoring	Annual	Perpetuity	$ 50,000.00	$ 1,250,000.00
	Miscellaneous	Annual		$ 100,000.00	$ 2,500,000.00
Sub-Total Option 4					**$ 3,750,000.00**

As indicated in Table 4-1, the estimated operation, care and maintenance costs have been converted to present values. Such estimates represent the total amount of money that would have to be invested today in order to cover the lifetime costs of operation, care and maintenance of the site. Present values are widely used in economics to provide a meaningful, "apples to apples" comparison of cash flows at different times. At this stage of conceptual design, it is assumed that operation, care and maintenance costs should be projected into perpetuity.

4.1.1 Annual Costs

Annual costs, such as those associated with site monitoring (i.e. collection of samples, laboratory analysis, visual inspections) and miscellaneous expenditures associated with maintaining site structures such as tailings covers, tailings dams, etc. are converted to present values through the relation:

$$P = \sum_{n=1}^{n=\infty} \frac{A}{(1+i)^n}; \text{ or } P = \frac{A}{i} * \left(1 - \frac{1}{(1+i)^n}\right)$$

Where:

P	=	Present value
A	=	Annual payment
n	=	Number of time periods
i	=	Interest rate per time period (4%)

Using the above equation, factoring in the specified annual operation, maintenance and care costs (in current year dollars) and a discounted interest rate (i.e. the rate of interest earned on the initial capital expenditure, reduced to account for annual inflation rates) of 4%, the present values of these annual costs, projected into perpetuity can be calculated. Note that the present value of yearly costs projected into perpetuity is simply the equivalent of the annual cost divided by the discount rate.

The choice of the discount rate in net present value calculations is a function of several factors, including the forecasted return on investment and inflation. AECOM has chosen to use an annual discount rate of 4% for this analysis. This value has been used by AECOM and others for similar assessments in the past. The value of 4% is similar to the 3.5% discount rate that is used in British Columbia as directed by the Supreme Court of British Columbia (pursuant to section 56 of the Law and Equity Act). For a project such as this, with replacement and maintenance costs that may extend to perpetuity, it is not reasonable to calculate a discount rate based on short term economic conditions, and historical rates should be considered. The long term costs for all options have been calculated using the same discount rate, and are therefore comparable.

4.1.2 Periodic Costs

In addition to the abovementioned annual monitoring and maintenance costs, Options 1A, 2A, and 3 also include ongoing periodic expenditures. An allowance has been made in Options 1A and 2A for complete replacement of the thermosyphons associated with the tailings dam. Information available at this time indicates that a reasonable lifespan for the thermosyphons is on the order of fifty (50) years. In addition, periodic dam safety inspections will also be required under Options 1A, 2A, and 3, in accordance with the Canadian Dam Association *Dam Safety Guidelines*, 2007. Dam safety reviews should be conducted at 7 and 10 year intervals for *High* and *Significant* consequence dams respectively. It is unknown at this time whether or not the pit tailings dam included in Option 3 would meet the definitions of the regulation; therefore, it is considered reasonable that such an inspection would be completed every ten (10) years, as opposed to on a seven (7) year frequency as in the case of Options 1A and 2A.

All options include allowances for annual site monitoring (i.e. collection of samples, laboratory analysis, visual inspections) and miscellaneous expenditures associated with maintaining site structures such as tailings covers, tailings dams, etc. Options 1A and 2A include estimates for replacement of the thermosyphons associated with the refurbished tailings dam. The cost of completing periodic dam safety inspections under each of Options 1A, 2A, and 3 have also been provided.

Present values for the periodic expenditures are calculated through the equation:

$$P = \sum_{n}^{\infty} \frac{F}{(1+i)^n}$$

Where:

P	=	Present value
F	=	Future sum of money
n	=	Number of time periods
i	=	Discounted interest rate per time period (4%)

The above relation indicates that the longer the period of time under study, the lower the initial capital investment required to "earn" the money required for this expenditure due to the term over which interest is allowed to compound. This is evident through comparison of the present values for the dam safety inspections and thermosyphon replacement. Although future costs thermosyphon replacement is expected to cost more than eight (8) times more than the cost of dam safety inspections, the initial investment required to cover perpetual costs is actually lower due to the decreased frequency of expenditure.

4.2 Provisional Cost Estimates

The cost estimates provided in Table 3-1, Table 3-3, Table 3-5, Table 3-7, Table 3-9, and Table 3-11 represent the design solutions proposed under each closure option, in reflection of the current level of knowledge of the site conditions. It is recognized; however, that the Government of Yukon has requested the estimation of costs for the 'worst case scenario', incurred as a result of either unforeseen circumstances or failure of the option as designed. These costs are referred to as provisional costs, and should be differentiated from contingent costs in that the latter have been accounted for on the basis of the limited amount of site data presently available at the pre-feasibility stage of this project. The intent of this report is to provide the Government of Yukon with clarity in terms of the development of those cost estimates that have already been provided for known activities required under each closure option.

The provisional cost estimates have been developed for such items as:

- Temporary collection and treatment of metals contaminated water in the vicinity of the Mill (All Options);
- Temporary collection and treatment of tailings pond water and porewater (Options 1A/B and 2A/B)
- Long term semi-passive biological treatment in Dome Creek valley downstream of tailings dam (Options 1A/B and 2A/B);
- Mitigation of elevated metal concentrations in pit water either via semi-passive biological treatment, or by partially backfilling the pit above the maximum historical elevation of the pit lake (Options 1A/2A);
- Long term collection and treatment of porewater within or downgradient of the pit (Options 3/4); and
- Ground improvements at the toe of the tailings dam (Options 1A/B and 2A/B);

Estimates of provisional costs for water quality mitigation are summarized in Table 4-2 and Table 4-3. As noted in Section 1.2, these costs are intended solely for the purpose of facilitating an estimate of residual risk for each of the Mt. Nansen closure options.

It should be noted that if active treatment is required for multiple aspects of a single option, only one (1) capital investment for a treatment plant is assumed. This is reflected in the costs shown in Table 4-2 and Table 4-3. For the long term costs summarized in Table 4-3, it should be kept in mind that the capital and annual operation and

maintenance (O&M) are estimated based on 2011 costs and conditions; however, issues described in the context of provisional costs may arise at some unknown timeframe following active closure.

Estimates of provisional costs for water quality mitigation summarized in Table 4-2 and 4-3 are based on considerations identified during the course of several discussions amongst Yukon Government Assessment and Abandoned Mines, Lorax, AECOM, Gomm Environmental Engineering Consulting (Gomm), and Altura. The reader is referred to the Altura (2011) memorandum, "*Mount Nansen Mine Site – Provisional Cost Estimates for Water Quality Mitigation*" for further detail.

Table 4-2: Summary of Short Term Provisional Treatment Costs by Option[1]

Closure Option	Item	Capital	Annual O&M
Option 1A/2A	Treatment of Metals (Mill and/or Tailings Area)	$ 2,200,000.00	$ 33,000.00
	Sludge Management	$ 50,000.00	$ 5,000.00
Option 1B/2B	Treatment of Metals (Mill, Tailings Area, and/or Pit)	$ 2,200,000.00	$ 33,000.00
	Sludge Management	$ 50,000.00	$ 5,000.00
	Pit Lake Alternative 2: Semi-Passive Biological Treatment	$ 64,850.00	$ -
	Pit Lake Alternative 3: Staged Backfill	$ 100,000.00	$ -
Option 3/4	Treatment of Metals (Mill, Tailings Area, and/or Pit)	$ - (Allowance in Base Case)	$ - (Allowance in Base Case)
	Sludge Management	$ - (Allowance in Base Case)	$ - (Allowance in Base Case)

Notes:

1. Costs are based on tables and text presented by Altura (2011).

Table 4-3: Summary of Long Term Provisional Treatment Costs by Option[1]

Closure Option	Item	Capital	Annual O&M	Life Cycle Costs (Net Present Value[3])	
				O&M	Replacement (Frequency)
Option 1A/2A	Passive Biological Treatment System, Tailings Area	$ 292,531.00	$ 7,000.00	$ 175,000.00	$ -
	Alternative 1: Semi-Passive Biological Treatment of Pit Lake	$ 64,850.00	$ -	$ -	$ 1,100,000.00 (5 years, assumed)
	Alternative 2: Partial Backfill of Pit with Waste Rock	$ 270,000.00	$ -	$ -	$ -
Option 1B/2B	Passive Biological Treatment System, Tailings area	$ 292,531.00	$ 7,000.00	$ 175,000	$ -
Option 3/4	Long Term Collection and Treatment of Porewater	$ 2,200,000.00[2]	$ 33,000.00	$ 825,000	$ 1,679,000.00 (20 years)
	Sludge Management	$ 50,000.00	$ 5,000.00	125,000	$ 42,000.00 (20 years)

Notes:

1. Costs are based on tables and text presented by Altura (2011).
2. The capital cost for an identical treatment system is incurred during the active closure phase for this option; therefore, an additional expenditure of $2.2M may not be required if the initially constructed treatment system remains on-site and is functional for future use.
3. Calculated using an annual discount rate of 4% over a period of 150 years.

At the request of the Government of Yukon, AECOM has considered additional concepts for stabilizing the Mt. Nansen tailings dam that are not dependent on maintaining permafrost conditions. These measures could be implemented if: (i) it was found that the permafrost could not be maintained, or; (ii) it was determined that a long term stabilization solution, independent of climate change, was desired at present time. A more detailed discussion of the ground improvement alternatives was presented in the AECOM memorandum "*Additional Concepts for the Long-Term Stabilization of Mt. Nansen Tailings Dam*", 2011. As discussed in the memorandum, there are several options for ground improvement. The most economical and appropriate technology is a function of several significant unknowns, the most important being the depth to which improvements are required and the characteristics of in-situ soils. Based on the current level of knowledge of the site, it is not reasonable or meaningful to develop cost estimates for all potential conditions and improvement techniques; however, the cost of installing rockfill caissons to a depth of 12 m has been evaluated as a provisional item for ground improvement. The benefit of rockfill caissons is that they can be constructed while the ground is still frozen, offering flexibility in the timing of implementation. As a result, the uncertainties regarding actively thawing the ground and the associated cost do not require consideration. With input from experienced contractors, AECOM preliminarily estimates the cost of constructing rockfill caissons to a depth of 12 m in consistent, frozen ground conditions to be on the order of $12,500,000. It should be noted that this is a rough estimate that could vary significantly based on ground conditions.

5. Schedule of Capital Expenditures (Active Phase)

Based on the expected duration of construction activities, the schedule of expenditures has been estimated per option. The graphs below show the construction work taking place over the most compressed timeframe possible, one (1) year in most cases and only represent construction phase activities. It is assumed that pre-closure common element costs will be executed in the year prior to initiation of closure activities. Contingent costs are not included.

The cost projections indicate an onset of construction activities on April 1, 2012; however, the schedule can be adjusted in the future when more accurate timelines become available. The timelines shown in this document are reflective of the information provided by Merit Consultants International Inc. in their report dated March 18, 2011.

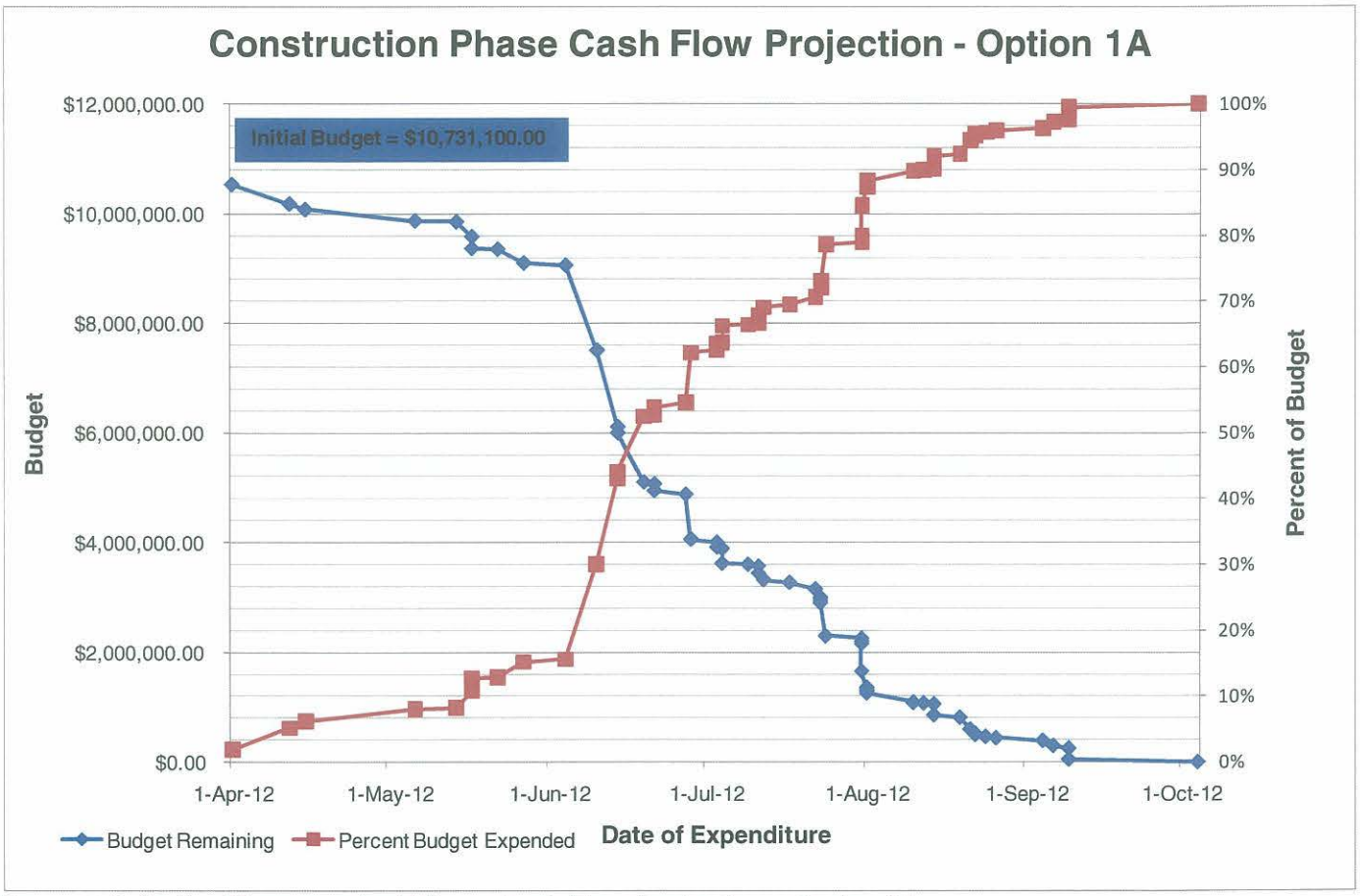

Figure 5-1: Active (Construction) Phase Cash Flow Projection – Option 1A

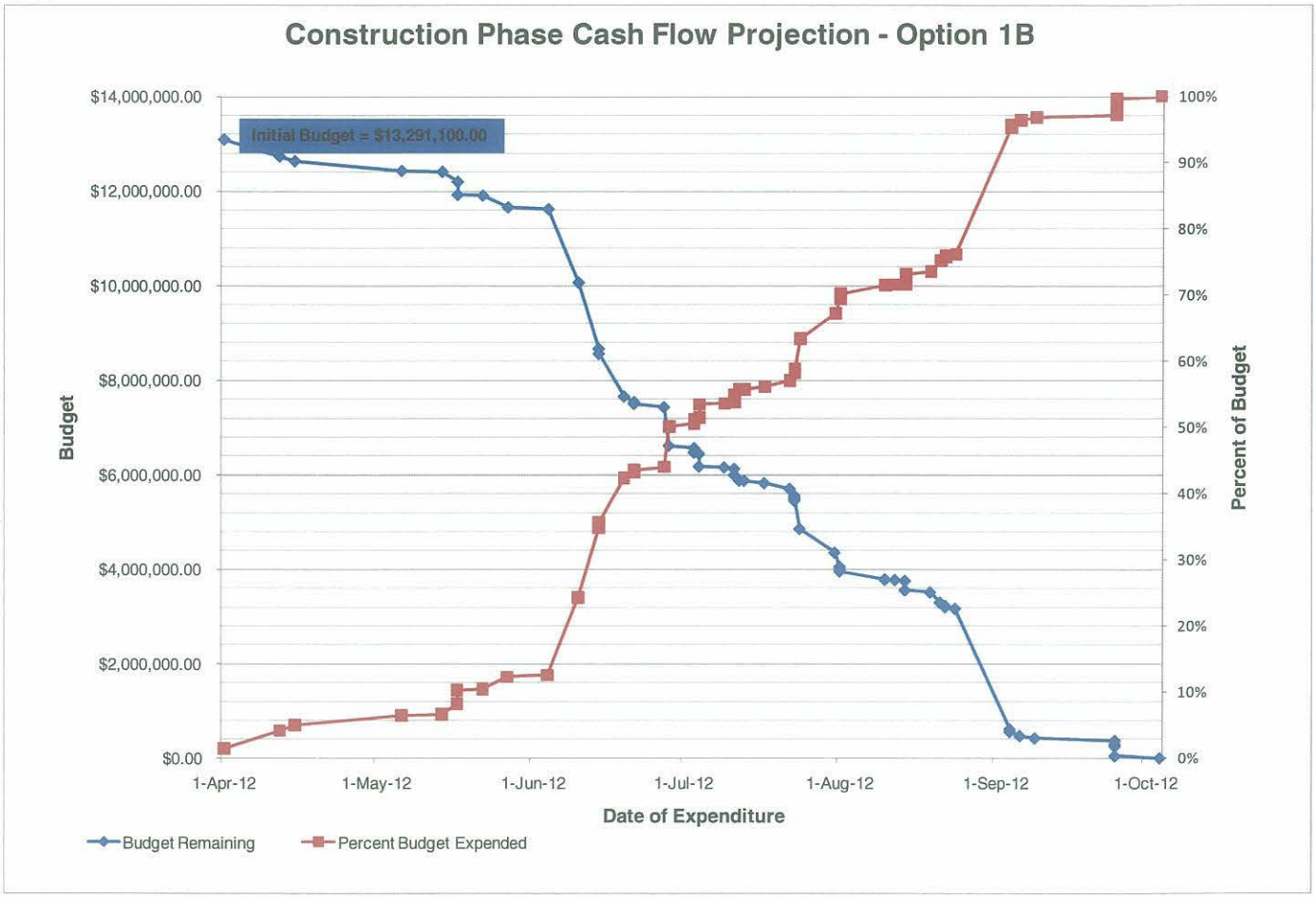

Figure 5-2: Active (Construction) Phase Cash Flow Projection – Option 1B

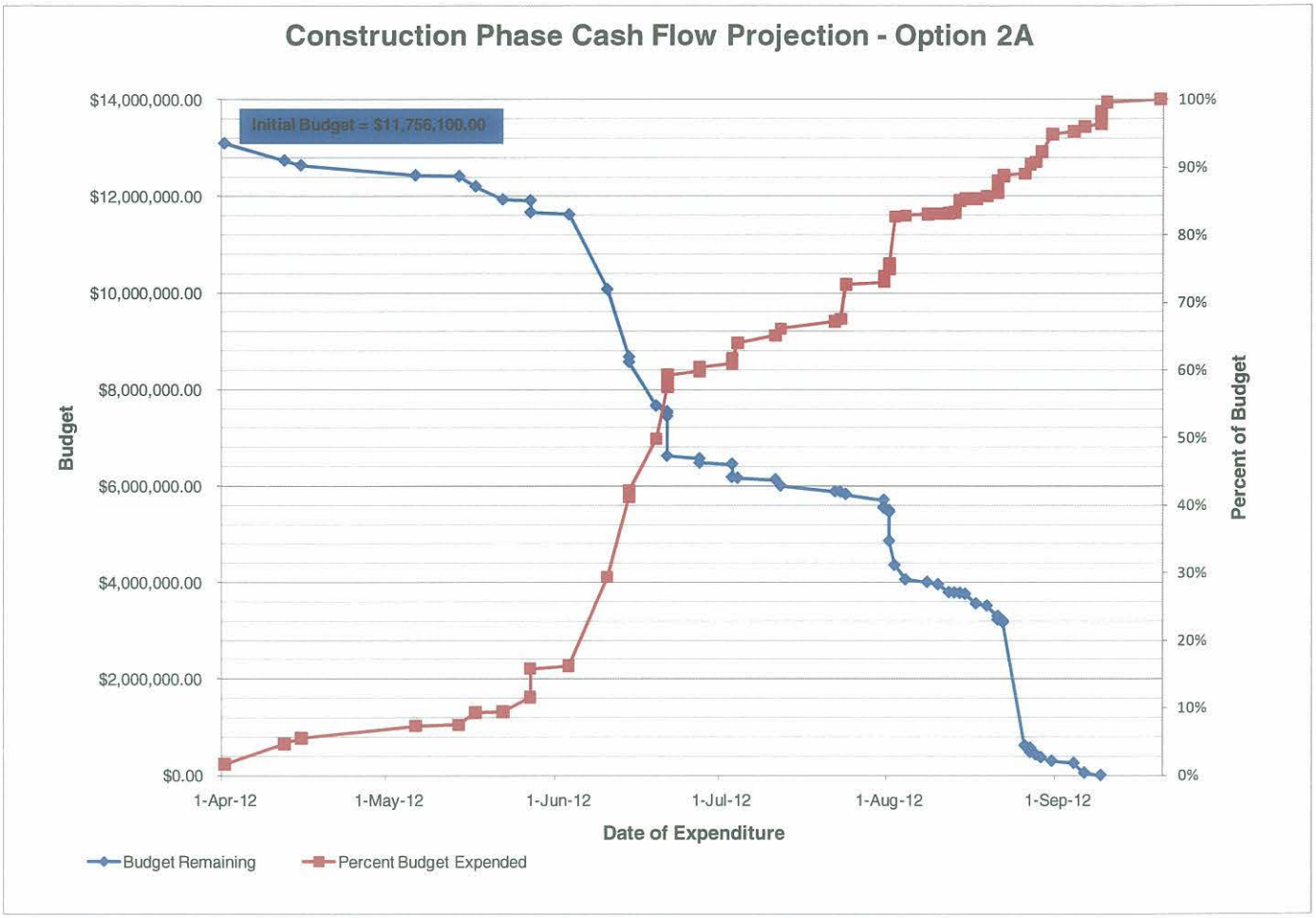

Figure 5-3: Active (Construction) Phase Cash Flow Projection – Option 2A

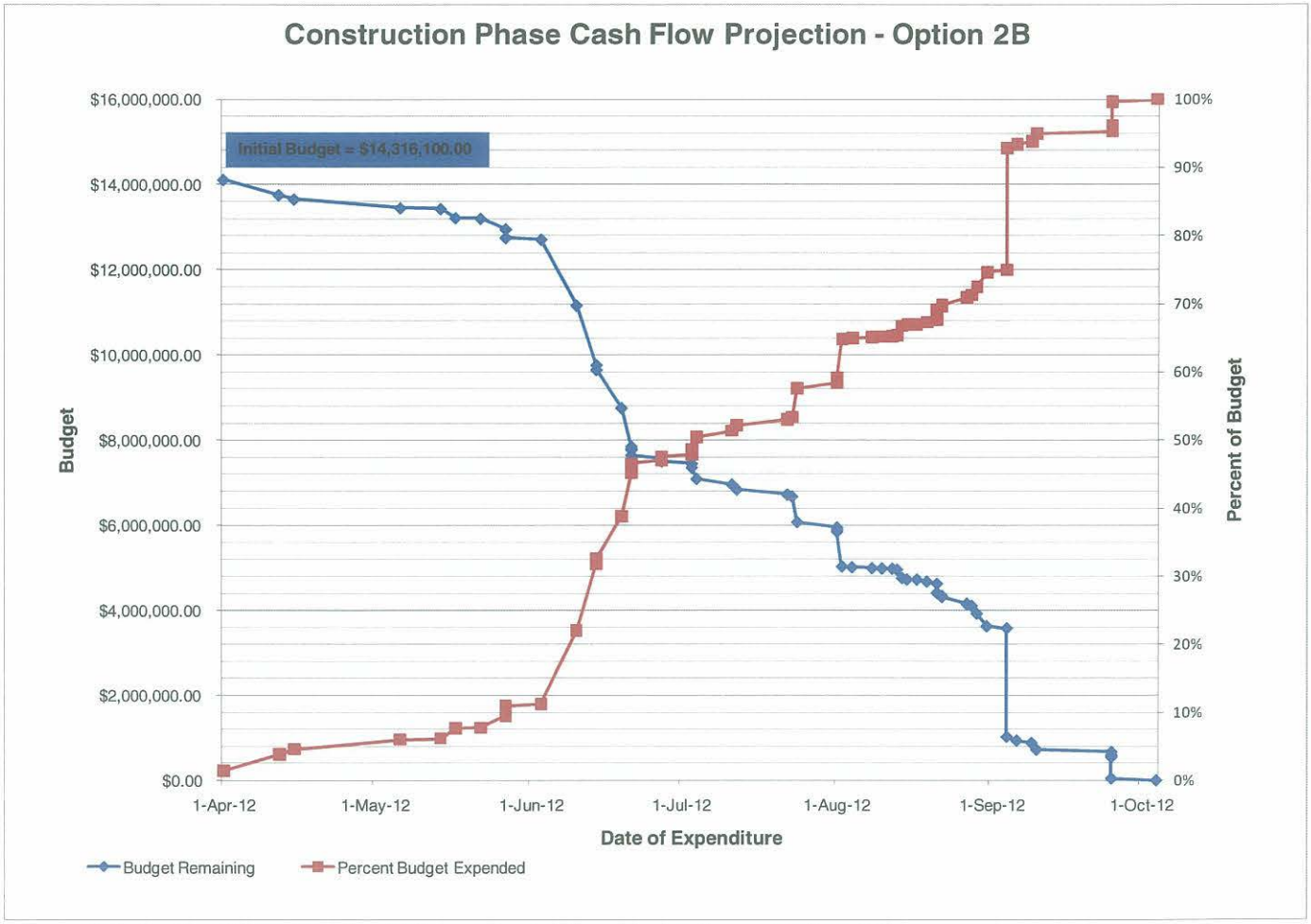

Figure 5-4: Active (Construction) Phase Cash Flow Projection – Option 2B

As shown in Figure 5-1, Figure 5-2, Figure 5-3, and Figure 5-4, current estimates indicate that total expenditure of each Option budget could occur over a one (1) year period, notwithstanding implementation of any provisional items.

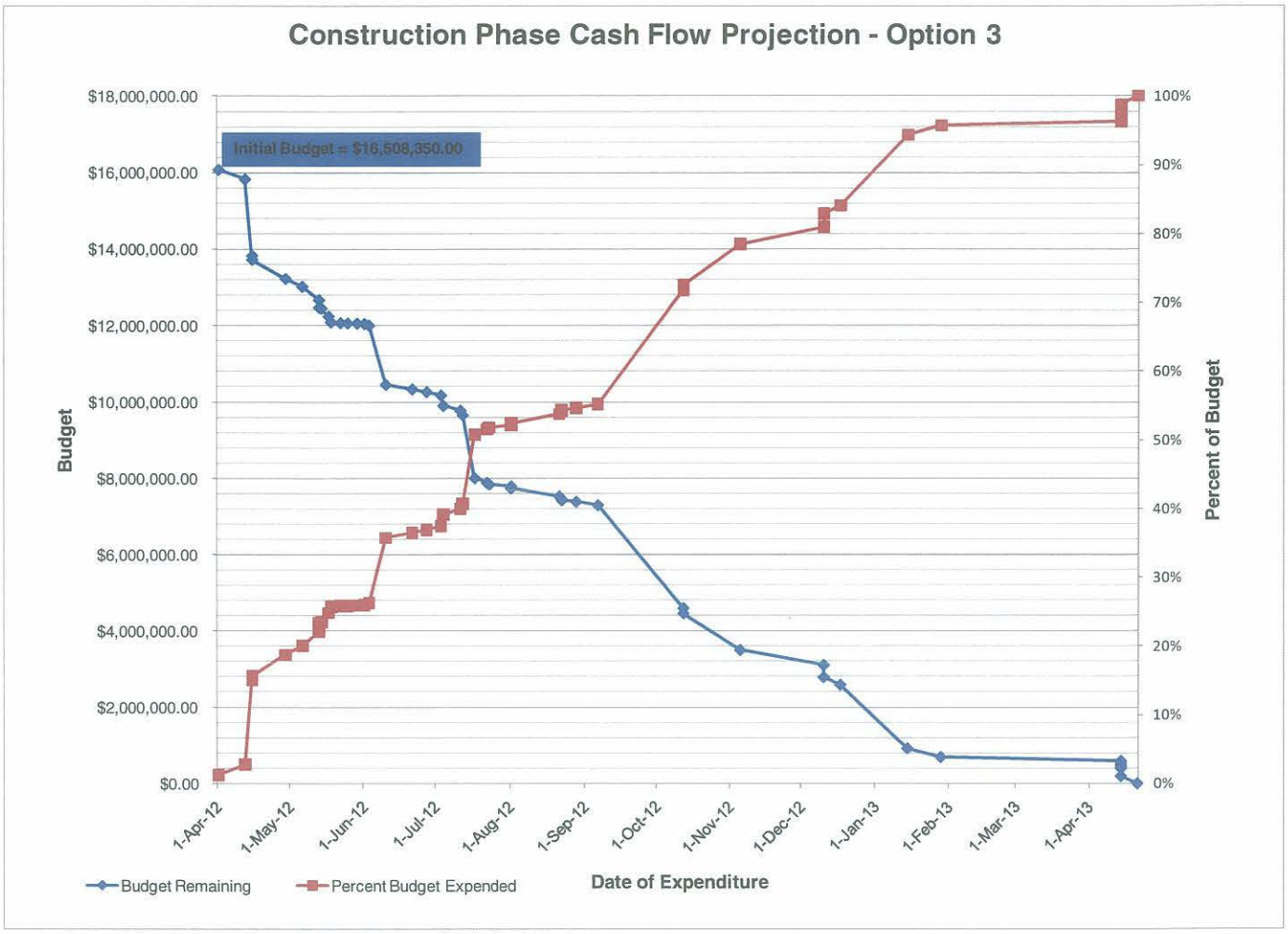

Figure 5-5: Active (Construction) Phase Cash Flow Projection – Option 3

Figure 5-5 projects construction-related expenditures over two (2) fiscal years. The costs of short term treatment of porewater releases in the pit following placement of waste materials or long term provisional water treatment at Dome Creek or Brown-McDade Pit Lake have not been accounted for.

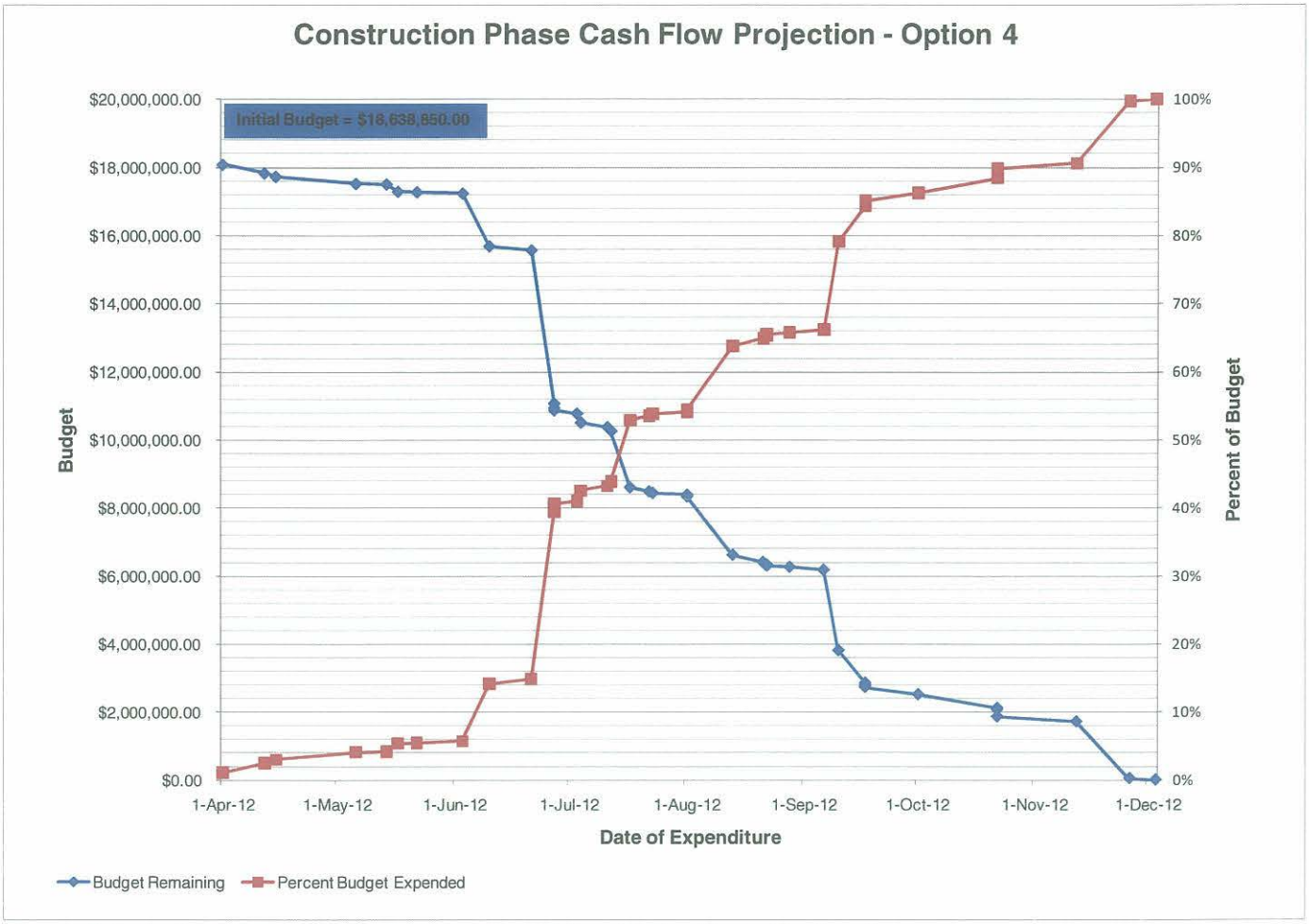

Figure 5-6: Active (Construction) Phase Cash Flow Projection – Option 4

Figure 5-6 projects construction-related expenditures over two (2) fiscal years. The costs of short term treatment of porewater releases in the pit following placement of waste materials or long term provisional water treatment at Dome Creek or Brown-McDade Pit Lake have not been accounted for.

6. Summary of Costs

The following table provides a summary of the Class 'D' estimates of all known project costs. It has been developed based on the information provided in Section3. The intent of the summary is to provide a side-by-side comparison of the options. Notwithstanding provisional costing associated with water treatment, the costs estimates indicate that Option 1A is the most economical option.

Table 6-1: Overall Cost Summary - All Options

Work Item/Area	Description	Estimated Cost Option 1A - Tailings Dam Upgrade with Water Cover, Waste Rock Remains in Place	Estimated Cost Option 1B - Tailings Dam Upgrade with Water Cover, Waste Rock in Pit	Estimated Cost Option 2A - Tailings Dam Upgrade with Water Cover, Waste Rock Remains in Place	Estimated Cost Option 2B - Tailings Dam Upgrade with Saturated Soil Cover, Waste Rock Moved to Pit	Estimated Cost Option 3 - Wet Tailings Pumped into Pit and Covered, Waste Rock Left in Place	Estimated Cost Option 4 - Dry Tailings and Waste Rock Placed in Pit and Covered
Mobilization/Demobilization	Mobilization	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00
	Partial Demobilization	$ -	$ -	$ -	$ -	$ 225,000.00	$ 150,000.00
	Final Demobilization	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 75,000.00	$ 50,000.00
Tailings Management Area (TMA)	Construction of Toe Berm	$ 1,508,000.00	$ 1,508,000.00	$ 1,508,000.00	$ 1,508,000.00	$ -	$ -
	Dam Raise	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ -	$ -
	Ground Improvement	$ 1,500,000.00	$ 1,500,000.00	$ 1,500,000.00	$ 1,500,000.00	$ -	$ -
	Dome Creek Diversion into TMA	$ 131,250.00	$ 131,250.00	$ 131,250.00	$ 131,250.00	$ -	$ -
	Restore Tailings Management Area (TMA)	$ 1,940,000.00	$ 1,940,000.00	$ 2,965,000.00	$ 2,965,000.00	$ 3,162,000.00	$ 3,162,000.00
Water Management	Spillway	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 27,500.00	$ -
	Diversion/Interceptor Ditch Upstream of Spillway	$ 88,000.00	$ 88,000.00	$ 88,000.00	$ 88,000.00	$ -	$ -
	Diversion Channel Downstream of Spillway	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ 500,000.00	$ -	$ -
Waste Rock Area	Reslope, Regrade and Revegetate Waste Rock Storage Area	$ 142,000.00	$ 123,000.00	$ 142,000.00	$ 123,000.00	$ 142,000.00	$ 123,000.00
Open Pit	Plug Pony Creek Adit	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00
	Scale/Flatten Pit Walls	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ -
	Backfill Pit With Waste Rock	$ -	$ 2,603,000.00	$ -	$ 2,603,000.00	$ -	$ 1,720,000.00
	Transport and Place Tailings	$ -	$ -	$ -	$ -	$ 4,700,000.00	$ 4,500,000.00
	Construct In-Pit Tailings Dam	$ -	$ -	$ -	$ -	$ 1,200,000.00	$ -
	Construct Tailings Cover	$ -	$ -	$ -	$ -	$ 315,000.00	$ 2,365,000.00
	Regrade and Repair Cover (i.e. Cover Maintenance)	$ -	$ -	$ -	$ -	$ 105,000.00	$ 215,000.00
	Pit Safety (Signage and Berm)	$ 24,000.00	$ -	$ 24,000.00	$ -	$ 49,000.00	$ 46,000.00
Miscellaneous	Road Construction - Base	$ 45,000.00	$ 45,000.00	$ 45,000.00	$ 45,000.00	$ -	$ -
	Monitoring Instrumentation	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00	$ 200,000.00
	Common Elements - Active Closure	$ 3,657,850.00	$ 3,657,850.00	$ 3,657,850.00	$ 3,657,850.00	$ 3,657,850.00	$ 3,657,850.00
	Water Treatment	$ -	$ -	$ -	$ -	$ 2,000,000.00	$ 2,000,000.00
Contingencies	**Engineering (15% of Estimated Construction Costs)**	**$ 1,609,665.00**	**$ 1,993,665.00**	**$ 1,763,415.00**	**$ 2,147,415.00**	**$ 2,476,252.50**	**$ 2,795,827.50**
	Construction (30% of Estimated Construction Costs)	**$ 3,219,330.00**	**$ 3,987,330.00**	**$ 3,526,830.00**	**$ 4,294,830.00**	**$ 4,952,505.00**	**$ 5,591,655.00**
Pre-Closure Common Elements Cost (Investigation)		**$ 178,000.00**	**$ 178,000.00**	**$ 178,000.00**	**$ 178,000.00**	**$ 178,000.00**	**$ 178,000.00**
Operation, Care and Maintenance (Life Cycle Costs)		**$ 7,823,250.00**	**$ 7,500,000.00**	**$ 7,823,250.00**	**$ 7,500,000.00**	**$ 4,525,000.00**	**$ 3,750,000.00**
Total Estimated Cost		**$ 23,561,345.00**	**$ 26,950,095.00**	**$ 25,047,595.00**	**$ 28,436,345.00**	**$ 28,640,107.50**	**$ 30,954,332.50**