

Appendix 17.4-A

Tailings Management, High-Level Tailings Alternatives Assessment

AJAX PROJECT

**Environmental Assessment Certificate Application / Environmental Impact Statement
for a Comprehensive Study**

April 19, 2013

File No.:VA101-246/15-A.01
Cont. No.:VA13-00814



Mr. Bill Matheson
Manager, Construction Projects
KGHM International
Suite 500-200 Burrard Street
Vancouver, BC V6C 3L6

Dear Bill,

**Re: Ajax Project – Tailings Management
High-Level Tailings Alternatives Assessment**

KGHM Ajax Mining Inc. (KGHM) is in the process of completing the Feasibility Design of the Ajax Mine to support the permitting of the project. The current design of the Tailings Storage Facility (TSF) is for a thickened tailings facility with a rockfill surround with the objective of creating a “dry” tailings stack, and the design is currently being completed by Golder Associates (Golder). The proposed tailings technology involves a relatively new concept that is without precedent in British Columbia and hence will require an independent review as part of the permitting process. KGHM are keen to evaluate alternative tailings disposal technologies and locations with the objective of identifying alternatives that could form part of a contingency plan during the initial years of operation, or an alternative to the current design.

Knight Piésold Limited (KPL) submitted a proposal dated March 18, 2013 to carry out a high-level tailings alternatives assessment, and received approval to proceed on March 20, 2013. The findings of the alternatives assessment is summarised in this letter report.

Summary of Alternatives

Ken Brouwer and Jeremy Haile of KPL carried out a site visit on March 26, 2013 in conjunction with Norm Thompson of KGHM, and held a subsequent meeting with Bill Matheson. A number of alternative sites were visited and the following sites were considered candidates for inclusion in the Alternatives Assessment. The Design Basis and candidate sites are summarised in Tables 1 and 2, and shown on Figure 1.

Table 1 – Design Basis

Parameter	Units	Value
Tailings Throughput	tpd	60,000
Tailings Throughput	Mtpa	21
Design Life	yrs	23
Total Tonnes	Mt	483
Specific Gravity		2.76
Final average Dry Density	t/m ³	1.5
Final Volume Required	Mm ³	322

Table 2 – Candidate Tailings Storage Facility Locations

Site	Location	Capacity (Mm ³)
A1	Existing Afton TSF	322+
A1(4)	Existing Afton TSF and limited to 4 years operation	56
A2(4)	Upstream of existing Afton TSF and limited to 4 years operation	56
A3(4)	Upstream of existing Afton TSF and limited to 4 years operation	56
G1	Existing Golder design	322+
S1	Area south of Ajax pit with oil pipeline relocation	322+
S2	Area south of Ajax pit without oil pipeline relocation	322+

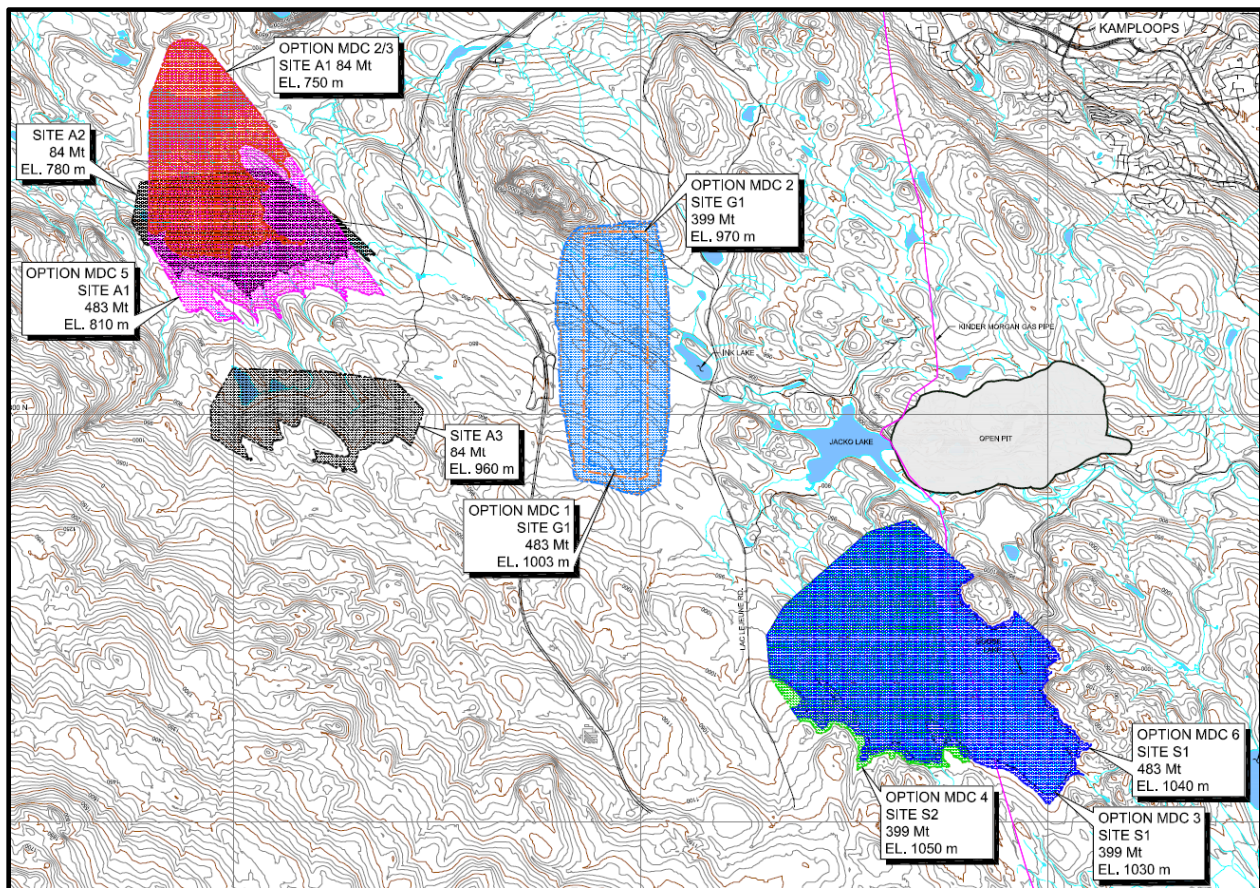


Figure 1 – Location of Tailings Storage Facility Alternatives

Depth-Area-Curves for all of the above potential TSF sites are included in Appendix A to this letter.

The existing Afton TSF, site A1, has been included for consideration because it is currently owned by KGHM and represents an opportunity to provide a relatively cheap option to get the mine started. Various combinations of usage for A1 have been considered including using it for the entire Ajax mine life, or for the first few years, assumed to be 4 years for this study. Using it for the first 4 years, option A1(4), would provide the opportunity to develop other long term sites after mine start-up and/or prove up the viability of the G1 technology.

The layouts and cost estimates associated with different development options for Site A1 have been previously studied by KPL and submitted in a report titled “Scoping Level Design for Preliminary Assessment, Ref. No. VA101-246/7-1, April 24, 2009.” Data from this report has been used for this alternatives assessment and selected figures and presentations at time have been included in Appendix B.

The area immediately south and east of the open pit has excellent storage characteristics and is close to the open pit so that all embankments can be constructed using mine waste for the main shell zones. The area is crossed by the existing Kinder Morgan oil pipeline and two options have been evaluated: S1, with relocation of the oil pipeline, and S2, without relocation of the pipeline.

Estimating the Dam Classification for each of the alternate locations and concepts has not yet been carried out. However, it can be assumed that all facilities will have at least a VERY HIGH dam classification and other potential risks are addressed in the matrix evaluation discussed below.

Alternative Mine Development Concepts

In order to develop a comparative costs estimate between alternative tailings storage facilities, it is necessary to include all combinations of facilities in unique alternative Mine Development Concepts (MDCs). Each viable MDC contains combinations of facilities and sequencing that make practical sense, and not all MDCs are considered here.

The existing proposed Golder facility, G1, has been included as stand-alone MDC starting in Year 1, the existing feasibility Study design, and as a potential option with G1 phased in slowly, while utilizing A1 for the first 4 years of operation. The design assumptions for G1 have been obtained from KGHM based on Golder information available to date, although it is understood that the concept may be modified in the final design, with an increased volume of waste rock required.

A preliminary assessment of the storage efficiency, location and likely costs associated with Sites A2(4) and A3(4) resulted in these sites being dropped from any MDC.

The MDCs considered in this assessment are summarised in Table 3.

Table 3 – Summary of Alternative Mine Development Concepts

Mine Development Concept (MDC)	Tailings Facility Locations	Storage Capacity (Mm³)
MDC 1	Existing Golder concept , G1, from Year 1	322+
MDC 2	A1(4) for first 4 years followed by G1	56 + 266+
MDC 3	A1(4) for first 4 years followed by S1	56 + 266+
MDC 4	A1(4) for first 4 years followed by S2	56 + 266+
MDC 5	Site A1 from year 1	322+
MDC 6	Site S1 from year 1	322+

Comparative Cost Estimates

The conceptual design of each of the tailings facility alternatives has been completed to a level sufficient for comparing each alternative on an economic basis at a high level. For each of the alternatives, conceptual level initial capital, and combined sustaining capital and operating costs have been developed using a standard costing spreadsheet that applies similar rates and assumptions to all alternatives.

For MDC's 3, 4 and 6 utilizing the S1 and S2 sites, it has been assumed that the confining embankments are all constructed using downstream construction and the mine haul trucks without double handling, as there will be significantly more waste rock available than is needed for the embankments. It is also assumed that a transition zone and core zone or geomembrane will be constructed on the upstream face of the waste rock embankments.

For the MDC's involving G1, the cost estimates have been taken from the Feasibility Study, with the sustaining capital factored by 2 to account for double the volume of waste rock that has been included in an updated design completed by Golder to address seismic stability issues (information provided by KGHM).

A summary of the principle characteristics of each MDC in terms of physical parameters is shown in Table 4. An overall summary of estimated costs for each MDC is shown in Table 5.

Table 4 – Summary of MDC Principle Characteristics

	MDC1	MDC2		MDC3		MDC4		MDC5	MDC6
TMF Site Location	G1 ¹	A1(4)	G1 ¹	A1(4)	S1 downstream	A1(4)	S2 downstream	A1	S1 downstream
Starter Embankment									
Impoundment Storage Volume (Mm ³)	-	41.3	-	41.3	-	41.3	-	41.3	15.0
Approximate Dam Crest Elevation (masl)	-	732	-	732	-	732	-	732	960
Approximate Foundation Elevation (masl)	-	700	-	700	-	700	-	700	930
Maximum Dam Height (m)	-	32	-	32	-	32	-	32	30
Embankment Volume (Mm ³)	-	4.9	-	4.9	-	4.9	-	4.9	14.1
Final Embankment									
Impoundment Storage Volume (Mm ³)	302	56.0	250	56.0	266	56.0	266	322.0	322
Approximate Dam Crest Elevation (masl)	1003	750	970	750	1030	750	1050	810	1040
Approximate Foundation Elevation (masl)	820	700	820	700	930	700	930	700	930
Maximum Dam Height (m)	183	50	150	50	100	50	120	110	110
Embankment Volume (Mm ³)	31	10	23	10	50	10	100	35	60
Storage Efficiency	9.7	5.6	11.1	5.6	5.3	5.6	2.7	9.2	5.4
Impoundment Footprint (km ²)	3.9	3.1	3.9	3.1	6.9	3.1	4.8	5.9	7.5
Embankment Footprint (km ²)	-	-	-	-	1.3	-	2.2	-	1.3
Total Footprint (km ²)	3.9	3.1	3.9	3.1	6.9	3.1	4.8	5.6	7.5
Distance from Plant Site to TSF (km)	5	9	5	9	5	9	5	9	5
Catchment Area (km ²)	14	58	14	58	13	58	8	58	13

Table 5 – Summary of MDC Cost Estimates

Mine Development Concept (MDC)	Tailings Facility Locations	Initial Capex	Sustaining Capex and Opex	Total
MDC 1	G1	106,500,000	333,255,100	439,755,100
MDC 2	A1(4) - G1	59,937,700	428,504,600	488,442,300
MDC 3	A1(4) - S1	59,937,700	258,778,800	318,716,500
MDC 4	A1(4) - S2	59,937,700	327,424,300	387,362,000
MDC 5	A1	59,937,700	331,812,600	391,750,300
MDC 6	S1	42,312,000	177,888,200	220,200,200

The above estimated capital, sustaining capital and operating costs are shown graphically on Figure 2 below. The potential advantages of using A1 for the first 4 years of operation in order to defer the major expenditures required for other facilities is evaluated in MDC 2, 3 and 4, and by considering the Net Present Value (NPV) of the cash flow requirements over the life of the mine. The NPV for the different MDC's is plotted on Figure 3.

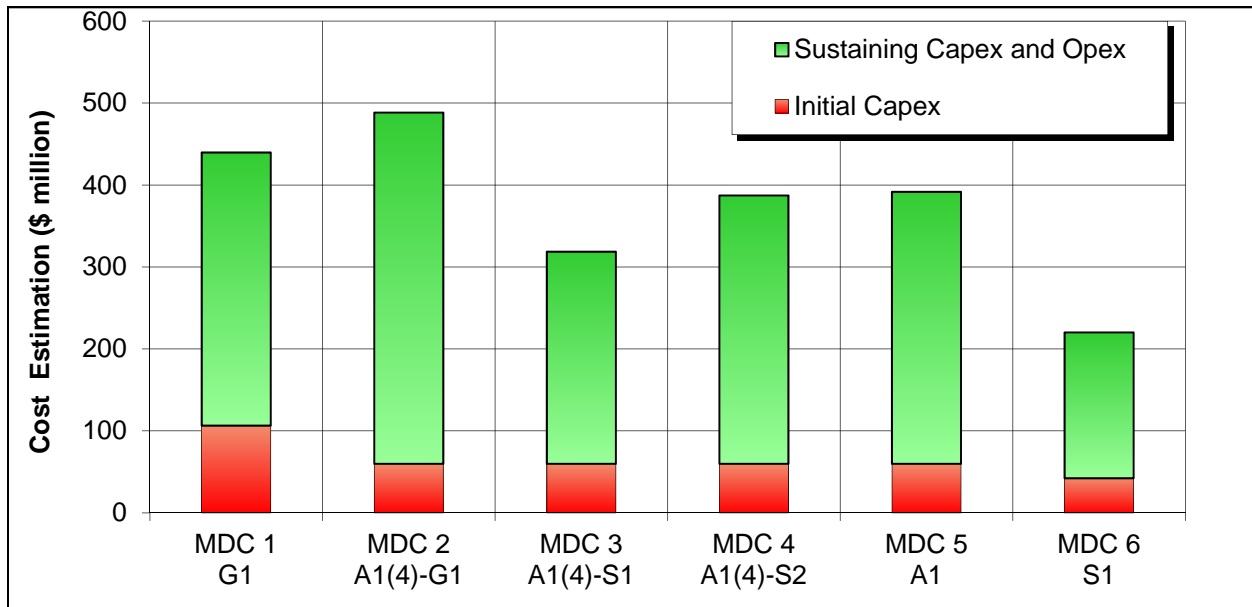


Figure 2 – Summary of MDC Cost Estimates

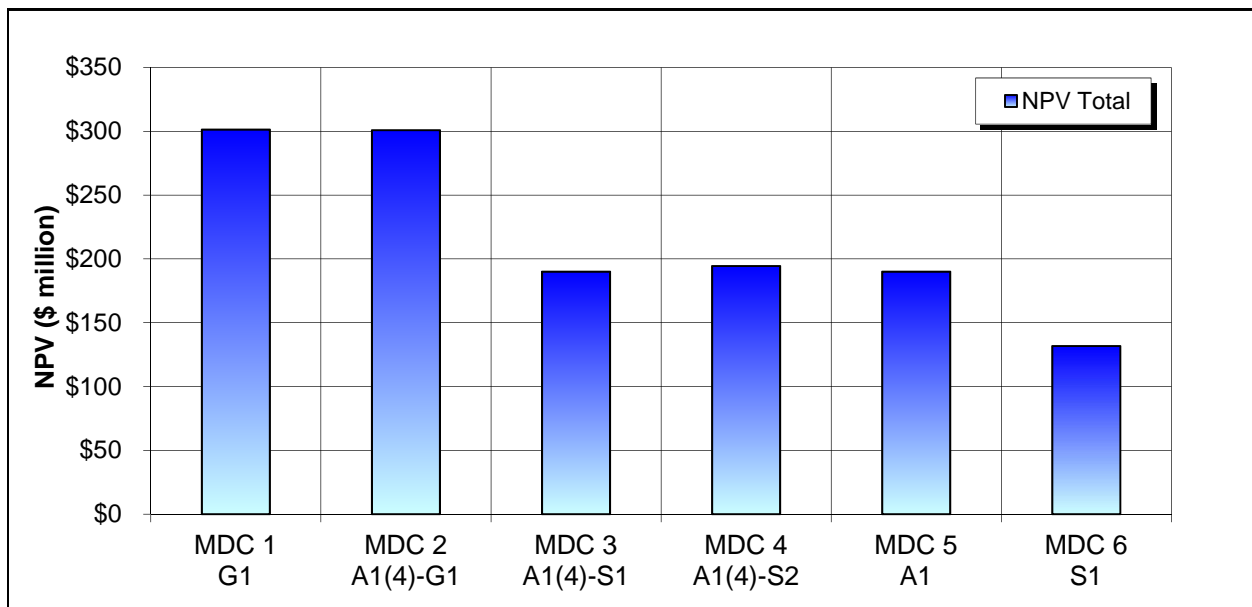


Figure 3 – NPV of Estimated Cash Flow Requirements

Matrix Evaluation

A ranking matrix has been developed to allow for specific criteria to be numerically rated for the MDC alternatives. The highest numerical rating is given to the alternative which has the lowest (least) relative impact for a particular criterion. The evaluation criteria have been separated into four general categories:

- Technical considerations
- Construction considerations
- Environmental and Social considerations, and
- Economic considerations.

A simple matrix summary of potential issues/risks to the project has been developed for each of these categories. The impacts are weighted within each category based on relative importance to the overall project. Most of the considerations are rated based on a subjective assessment of the relative impacts; however, economic criteria have been rated based on the estimated capital and operating requirements developed for each of the conceptual designs.

The matrix evaluation process provides a quantitative assessment of the relative impacts or risks associated with each of the tailings alternatives. The quantitative assessment is, however, based on both quantitative and qualitative data. The system is flexible and readily amenable to include expansion for additional criteria or adjusted weighting of individual criteria or categories. **It is stressed that the conclusions developed from this study are comparative only and provide an indication of the relative merits of the alternatives.**

Table 6 – MDC Ranking Matrix

ISSUES/RISKS	Weighting (0-1)	MDC 1 G1	MDC 2 A1(4) - G1	MDC 3 A1(4) - S1	MDC 4 A1(4) - S2	MDC 5 A1	MDC 6 S1
TECHNICAL							
TMF Height	0.5	1	2	4	3	3	3
TMF Storage Efficiency	0.5	2	3	4	3	3	4
Expansion Potential	0.8	1	2	4	3	2	4
Pipeline Length	0.2	4	2	2	2	2	4
Geotechnical Risk	0.5	1	2	3	3	3	5
Water Management Complexity	0.8	2	2	4	4	3	4
Terrain Hazard Risk	0.2	4	4	4	4	4	4
PAG NPAG Sensitivity	1.0	4	4	5	5	4	5
CONSTRUCTION							
Access requirements	0.5	3	2	3	3	2	4
Seasonal Constraints	0.2	2	2	3	3	3	3
Ease of Temporary Diversions	0.2	3	3	3	3	3	3
Logistical Complexity (including New Gold)	1.0	3	2	2	2	1	4
ENVIRONMENTAL AND SOCIAL							
Location of TMF	1.0	3	3	2	2	5	2
Downstream Environmental Sensitivities	1.0	1	1	3	3	3	4
Permitting Implications	1.0	3	3	2	2	2	2
Proximity to Residents/Visibility	1.0	1	1	3	2	4	3
Property Ownership	1.0	4	4	2	2	3	2
Post Closure Reliability	1.0	3	3	3	3	3	3
TECH/CONSTR./ENVIRO/SOCIAL							
TOTAL RATING		45	45	56	52	53	63
TOTAL WEIGHTED RATING		30.5	30.9	37.8	35.0	36.9	42.2
RANKING (1 = BEST)		6	5	2	4	3	1
COSTS AND BENEFITS							
Initial CAPEX	1.0	2	4	4	4	4	5
Sustaining CAPEX and OPEX	1.0	3	1	4	2	4	5
NPV	1.0	2	3	4	3	4	5
TECH/CONSTR./ENVIRO/SOCIAL/COSTS							
TOTAL RATING		52	53	68	61	65	78
TOTAL WEIGHTED RATING		37.5	38.9	49.8	44.0	48.9	57.2
RANKING		6	5	2	4	3	1

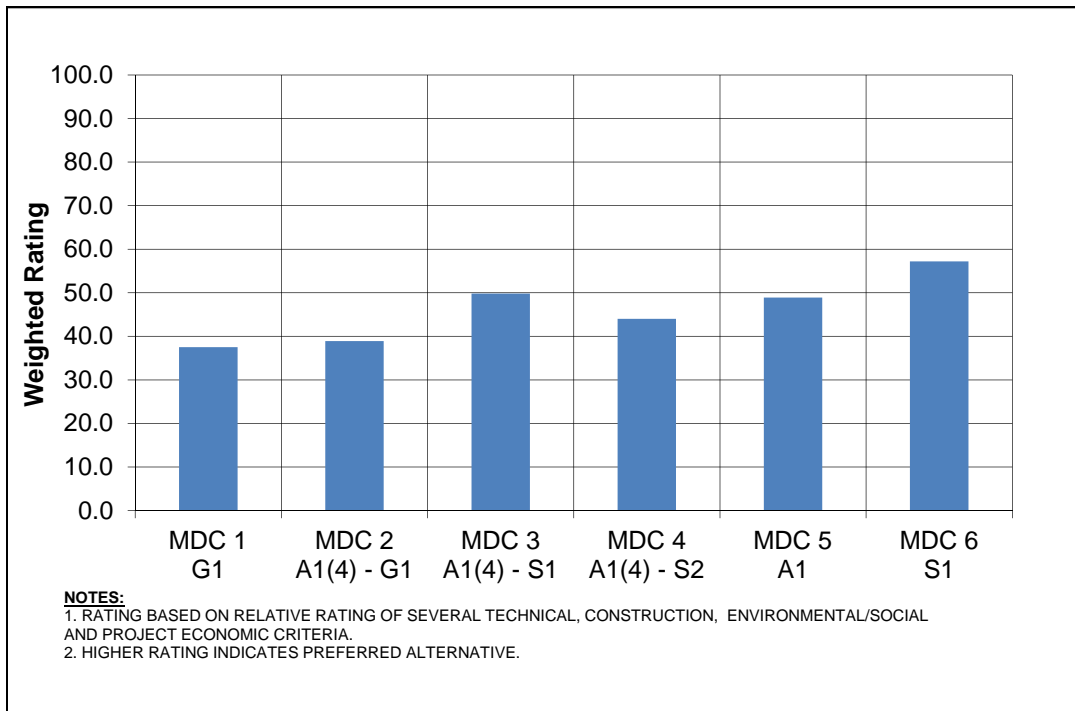


Figure 4 – MDC Rankings

Integration of MDC 6 with South Dump

In order to better visualize the final layout of MDC6 (Site S1), initial and final layouts have been developed and are included as Figures 5 and 6 in plan view, and in Figure 7 when viewed from above, looking east.



Figure 5 – MDC 6 Construction (Year -1)

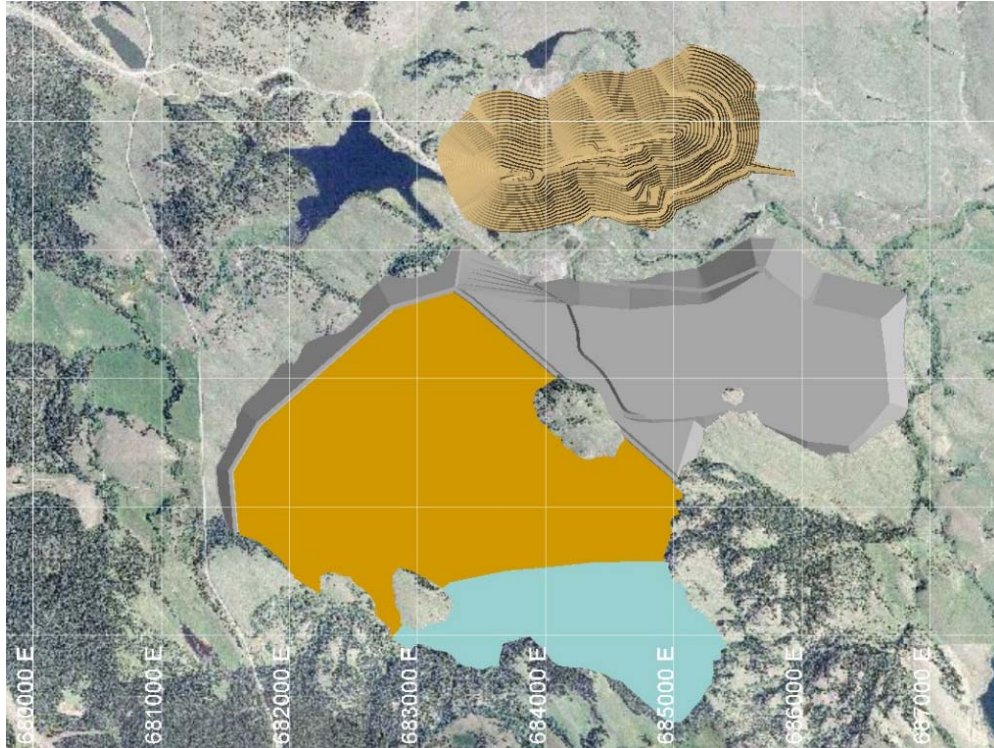


Figure 6 – MDC 6 and South Dump - Final Arrangement

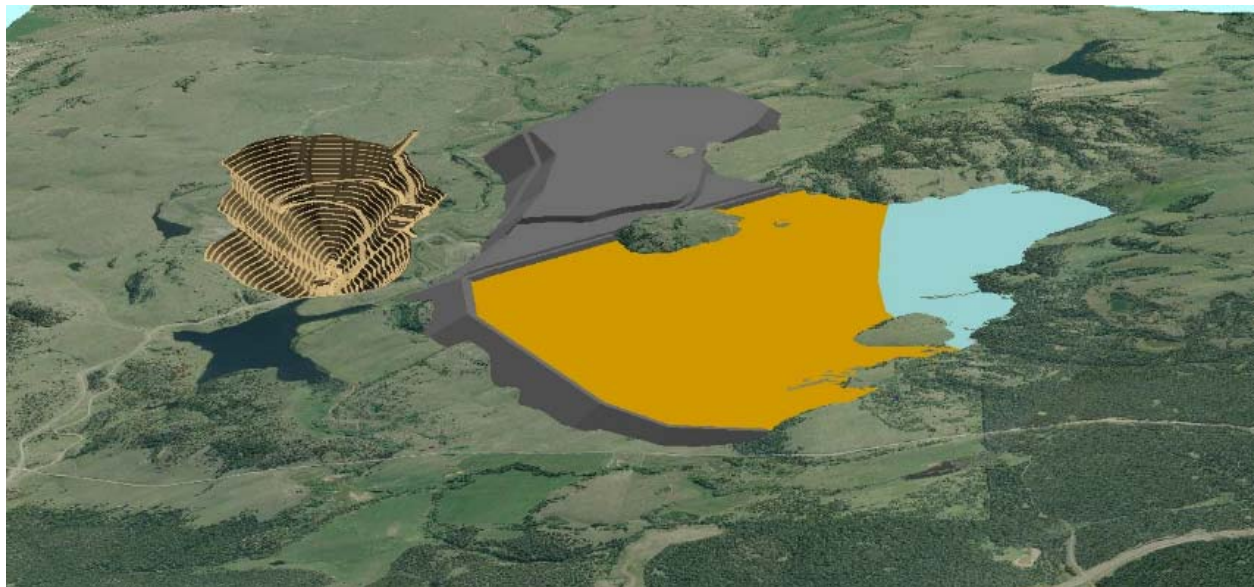


Figure 7 - MDC 6 and South Dump – Perspective View

Summary and Recommendations

This high-level Tailings Storage Facility Alternatives Assessment indicates that the existing feasibility design concepts for the thickened tailings system proposed by Golder may not be the most desirable or cost effective

option. The assessment indicates that MDC 6, using Site S1, with relocation of the Kinder Morgan oil pipeline, is the preferred MDC that should be looked at in more detail.

Significant benefits that can be attributed to MDC 6 can be summarised as follows:

- The TSF can be integrated into the South Dump.
- Most of the embankment construction can be carried out using mine waste and the mine haul trucks.
- All of the impacts associated with the Ajax mine development can be confined into a single watershed, that of Peterson creek draining to the east.
- The TSF embankment can be constructed to its final outside slope from the start allowing for on-going reclamation of the downstream slope.
- With relocation of the plantsite to the south side of Peterson Creek, the entire project footprint could be outside on the Kamloops city limits.

In order to refine this alternatives assessment, it is recommended that the following actions be taken:

- Confirm that the Kinder Morgan oil pipeline can be relocated to avoid the final configuration of the TSF and associated mine infrastructure.
- Re-do the alternative assessment including potential alternative locations of the plantsite and waste rock dump(s).
- Develop the conceptual design of the preferred alternative facilities to at least a pre-feasibility level to allow for more accurate costing.

We would like to thank you for the opportunity to carry out this study and are available to discuss the findings in more detail.

Yours truly,

KNIGHT PIESOLD LTD.

ORIGINAL SIGNED



Signed:
Jeremy Haile, P.Eng.
Principal Consultant



ORIGINAL SIGNED



Approved:
Ken Brouwer, P.Eng.
President

Attachments:

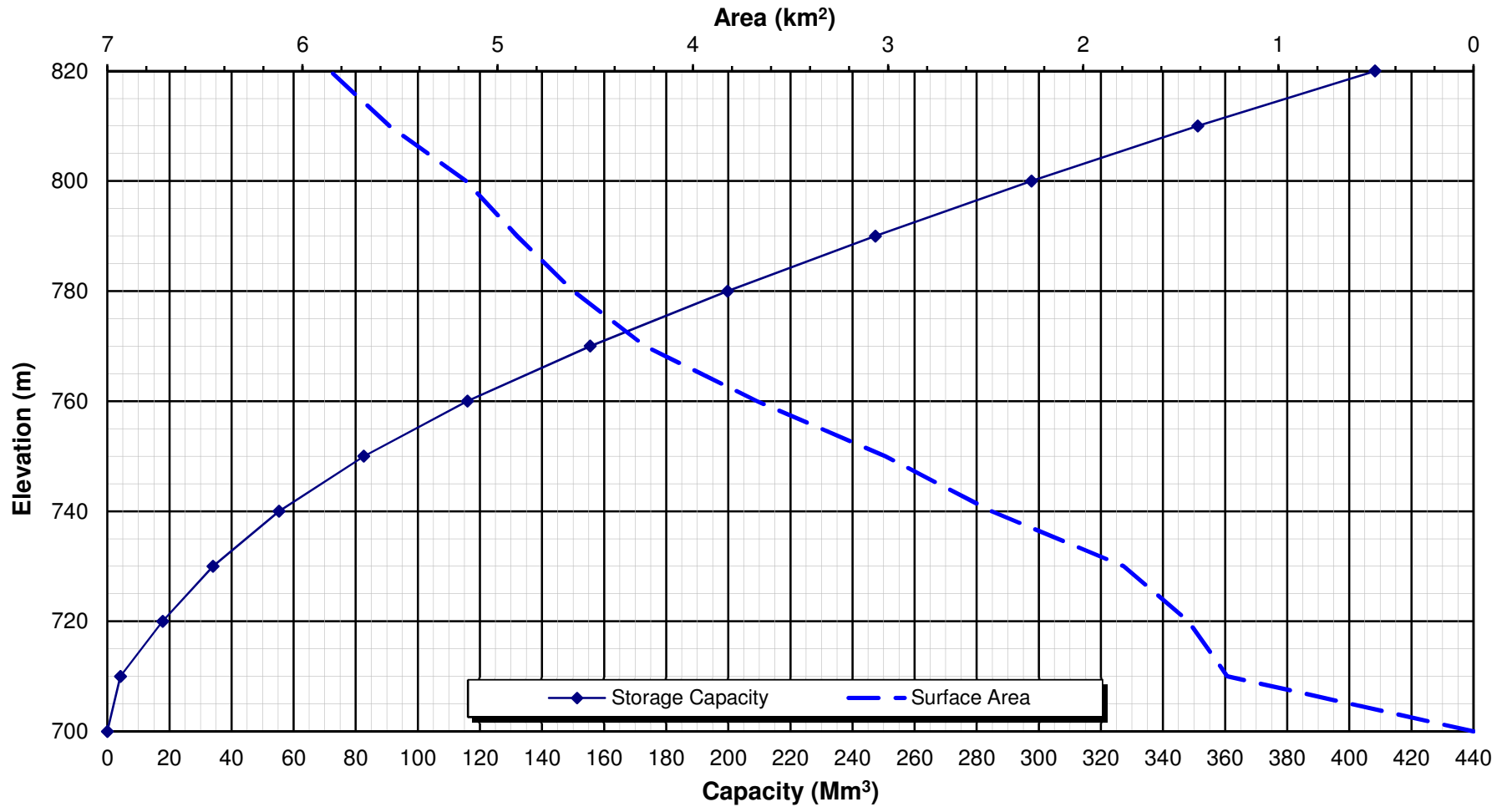
Appendix A	Depth Area Capacity Curves
Appendix B	Reference Figures
Appendix C	Cost Estimating Tables

/jph

APPENDIX A

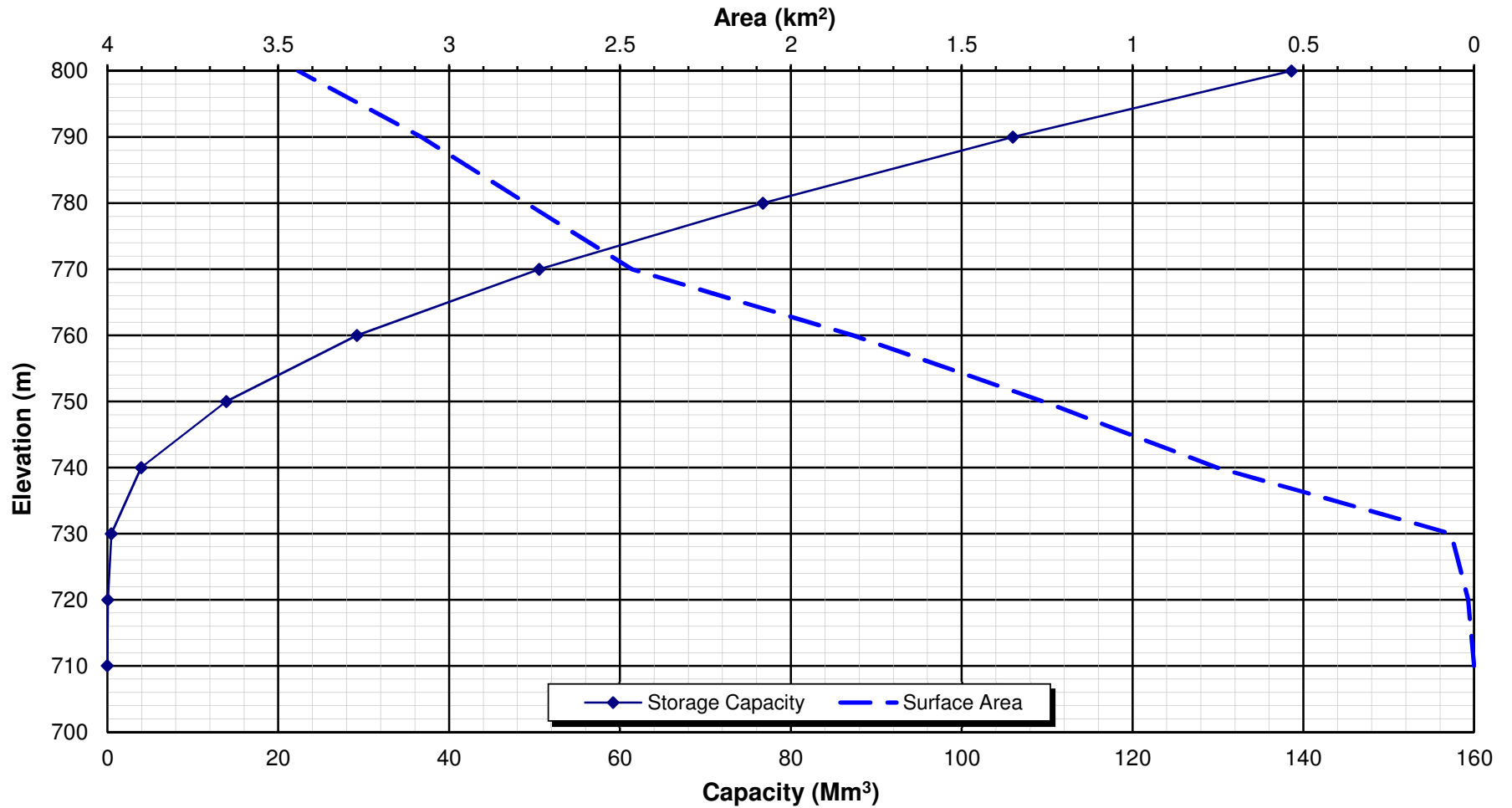
DEPTH AREA CAPACITY CURVES

(Pages A-1 to A-6)



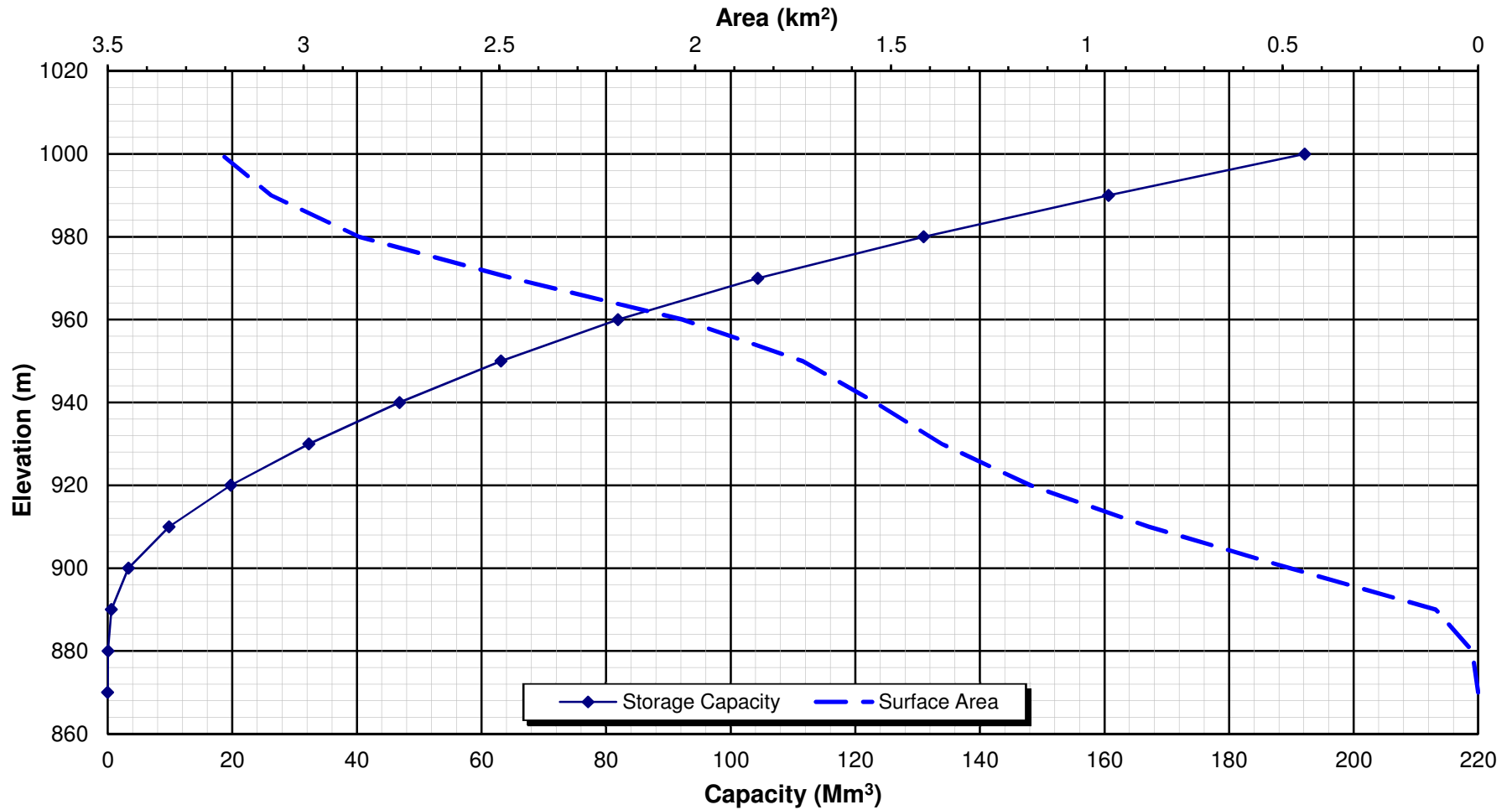
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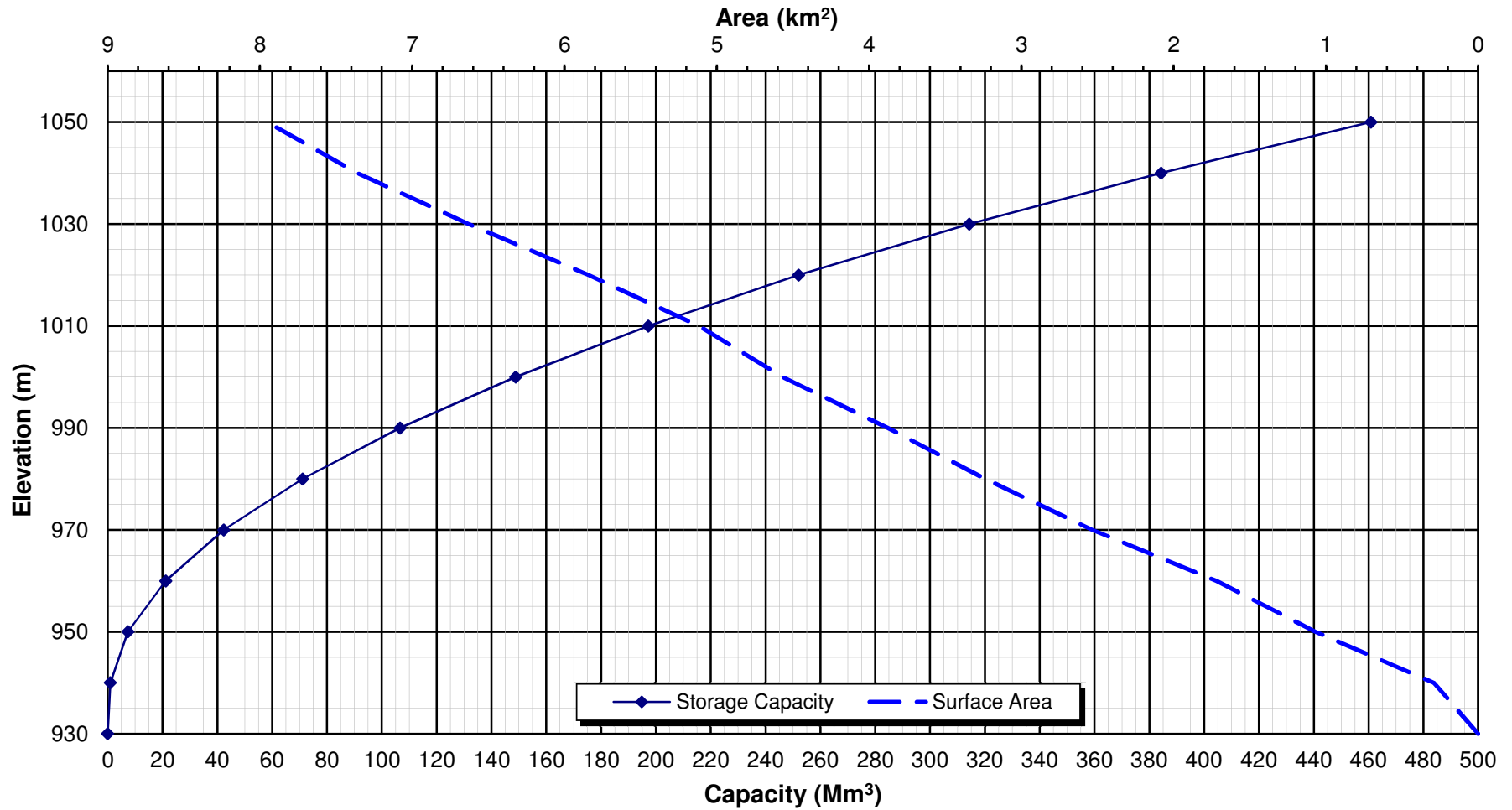
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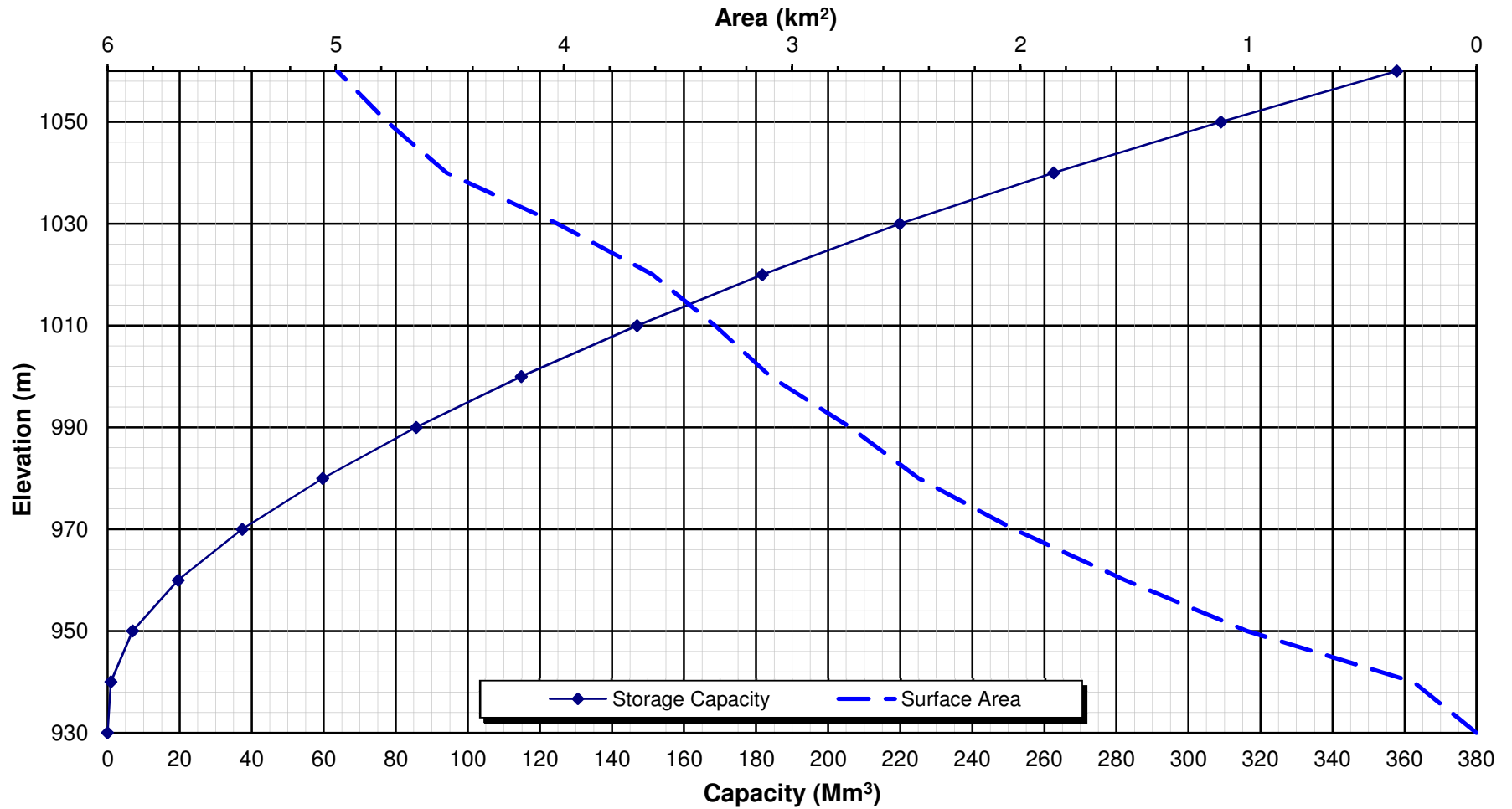
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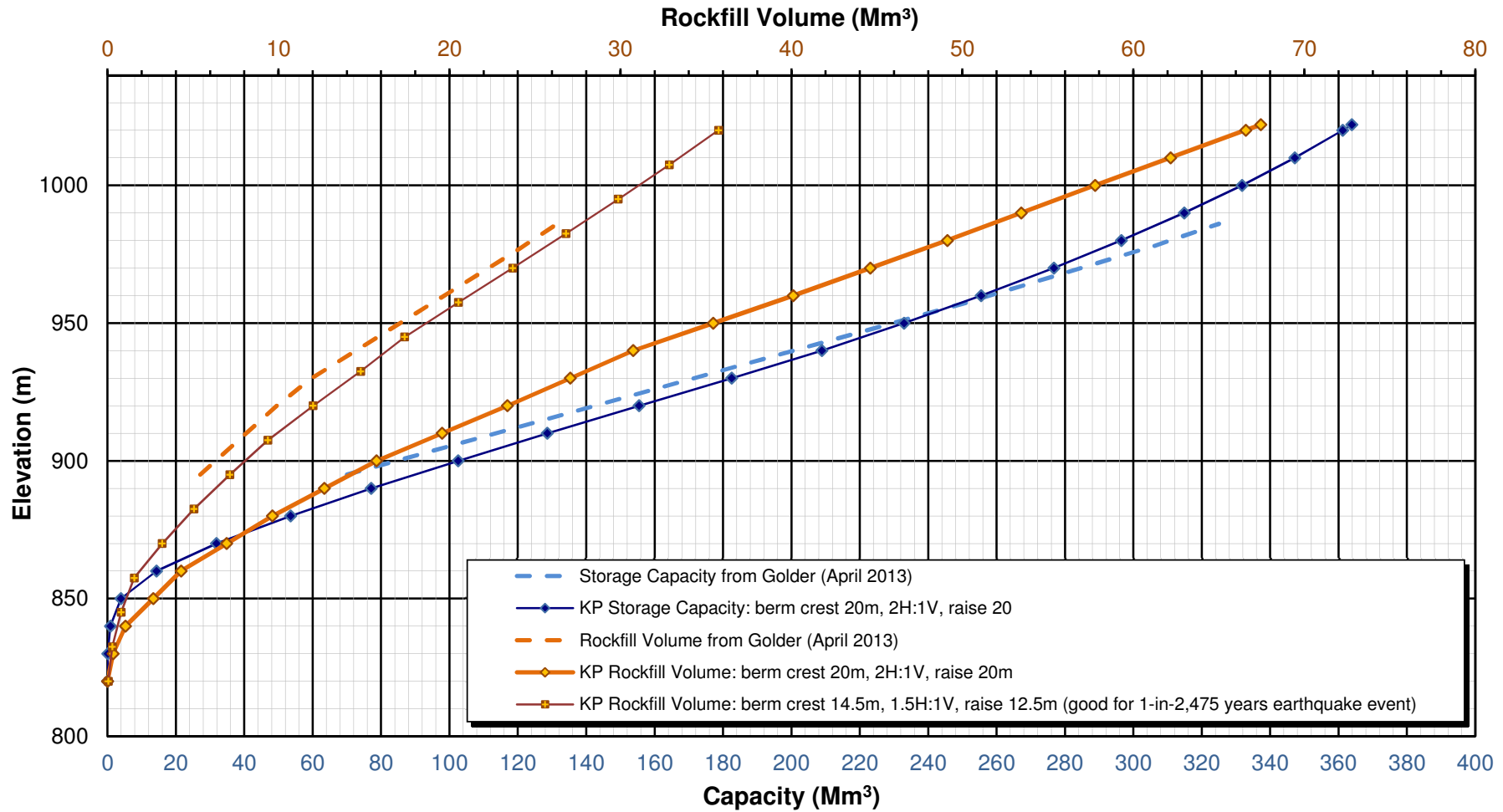
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FIGURE A.4	
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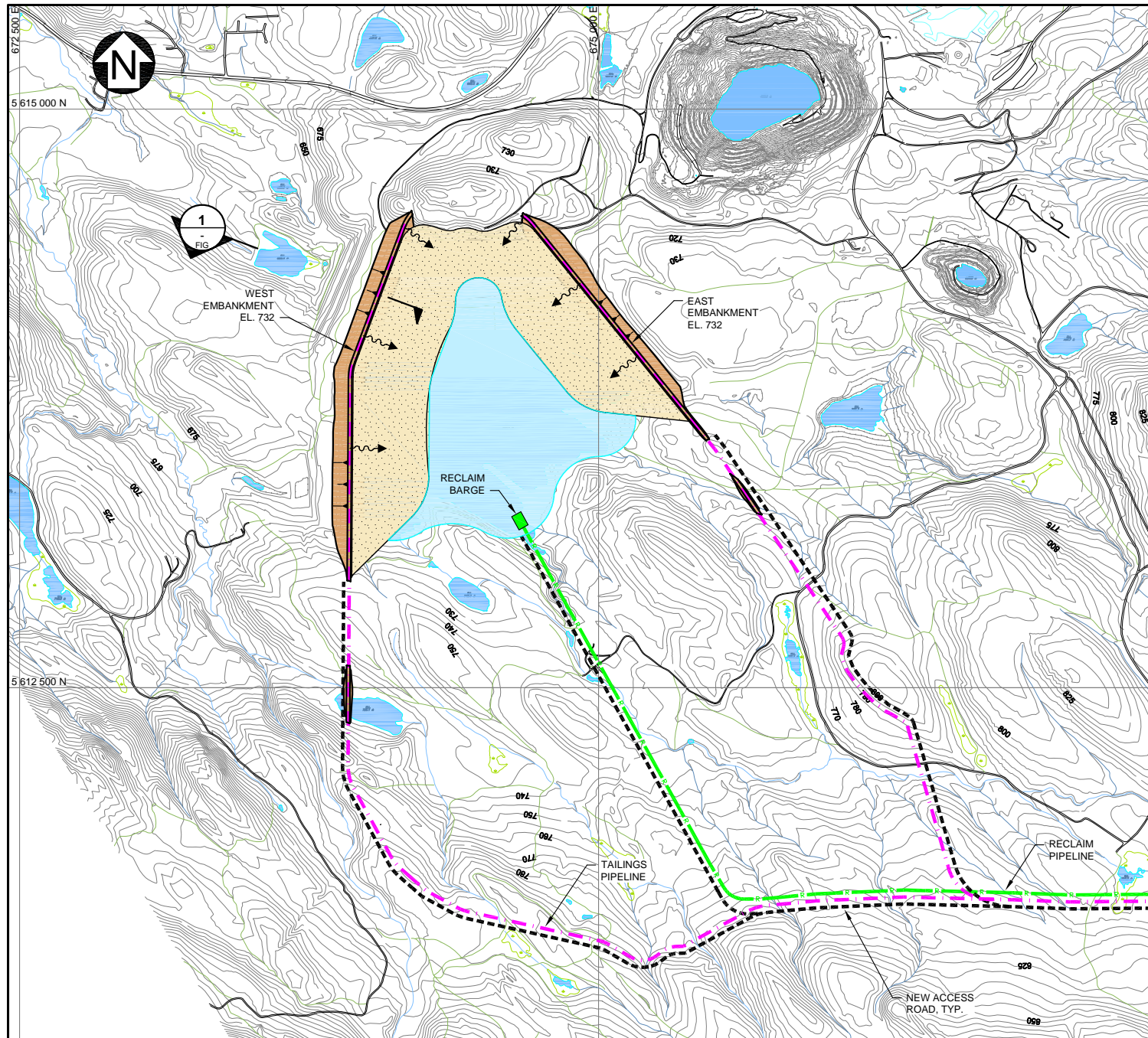
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FIGURE A.6	
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APPENDIX B

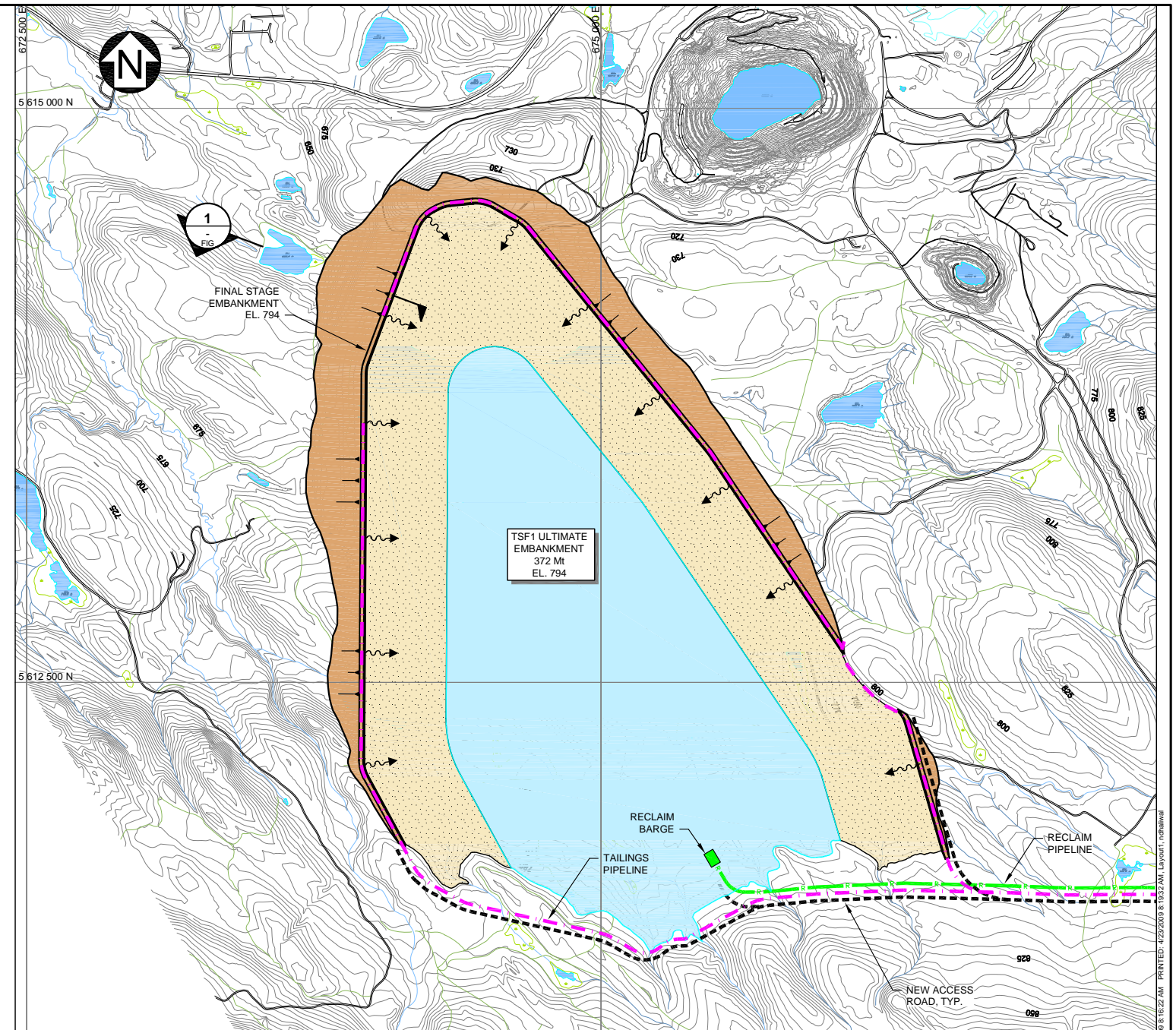
REFERENCE FIGURES

(Pages B-1 to B-10)



PLAN - STAGE 1 EMBANKMENT

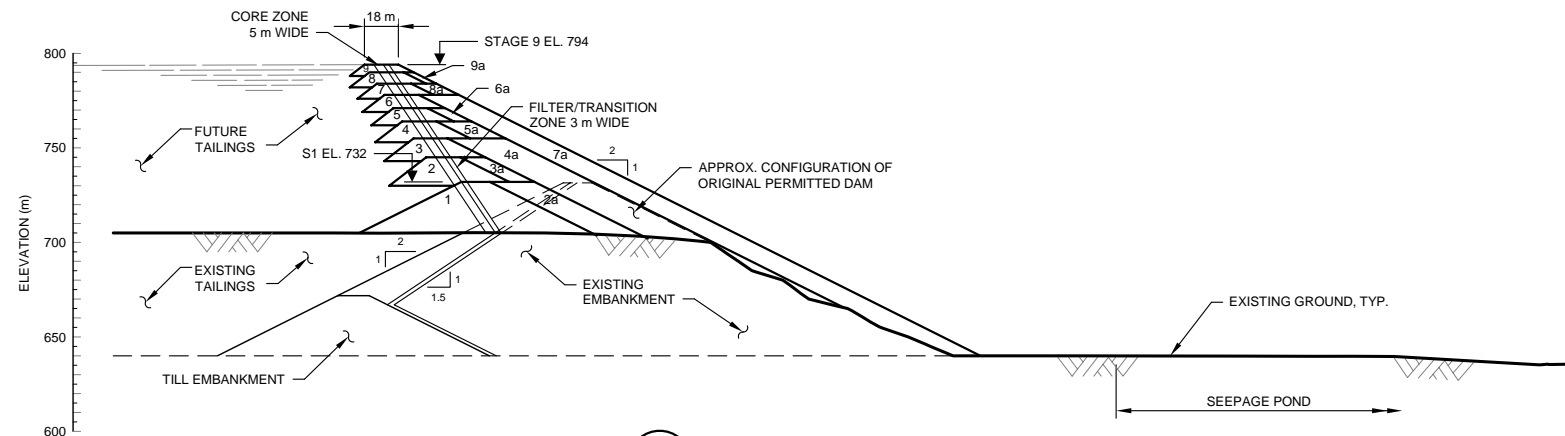
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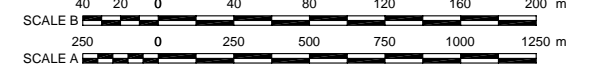
PLAN - STAGE 9 EMBANKMENT

FINAL STAGE

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SECTION
SCALE B

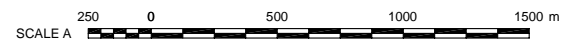
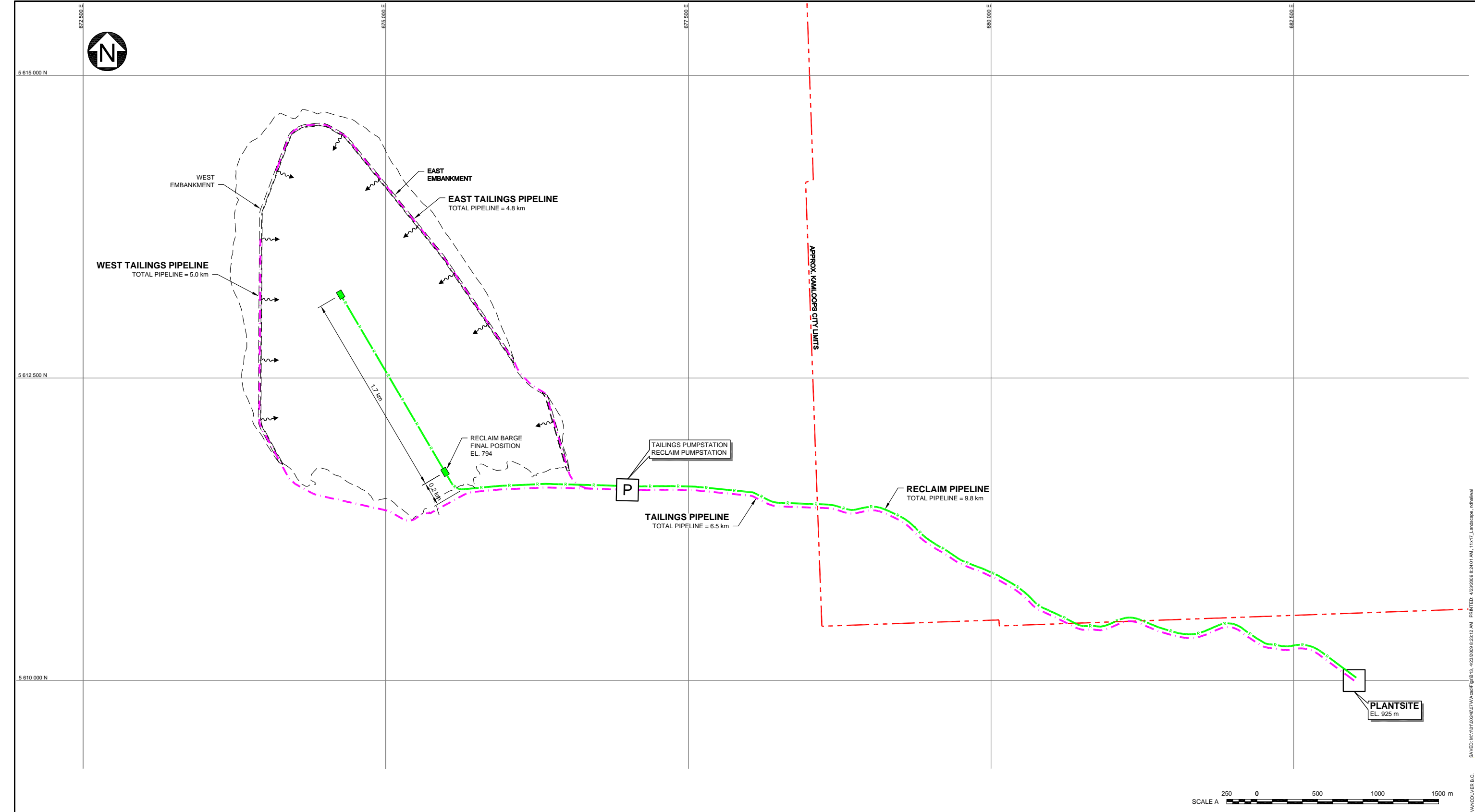


ABACUS MINING AND EXPLORATION CORP.	
AJAX PROJECT	
TAILINGS STORAGE FACILITY	
STAGE 1 AND FINAL GENERAL ARRANGEMENTS	
PLAN AND SECTION	
Knight Piésold CONSULTING	PIA NO. VA101-246/7
FIGURE	REF. NO. 1
FIGURE 3.1	REV. 0

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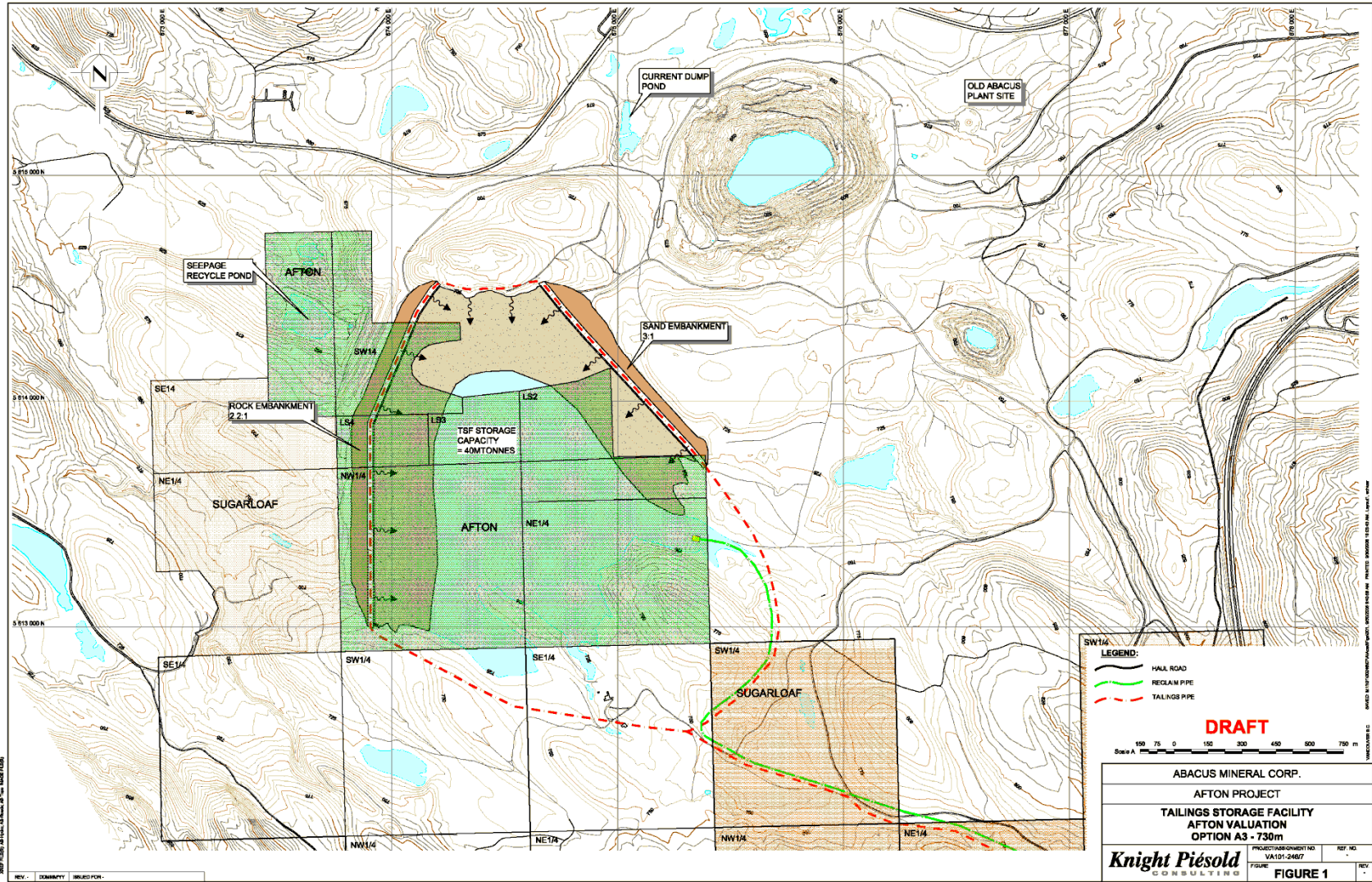
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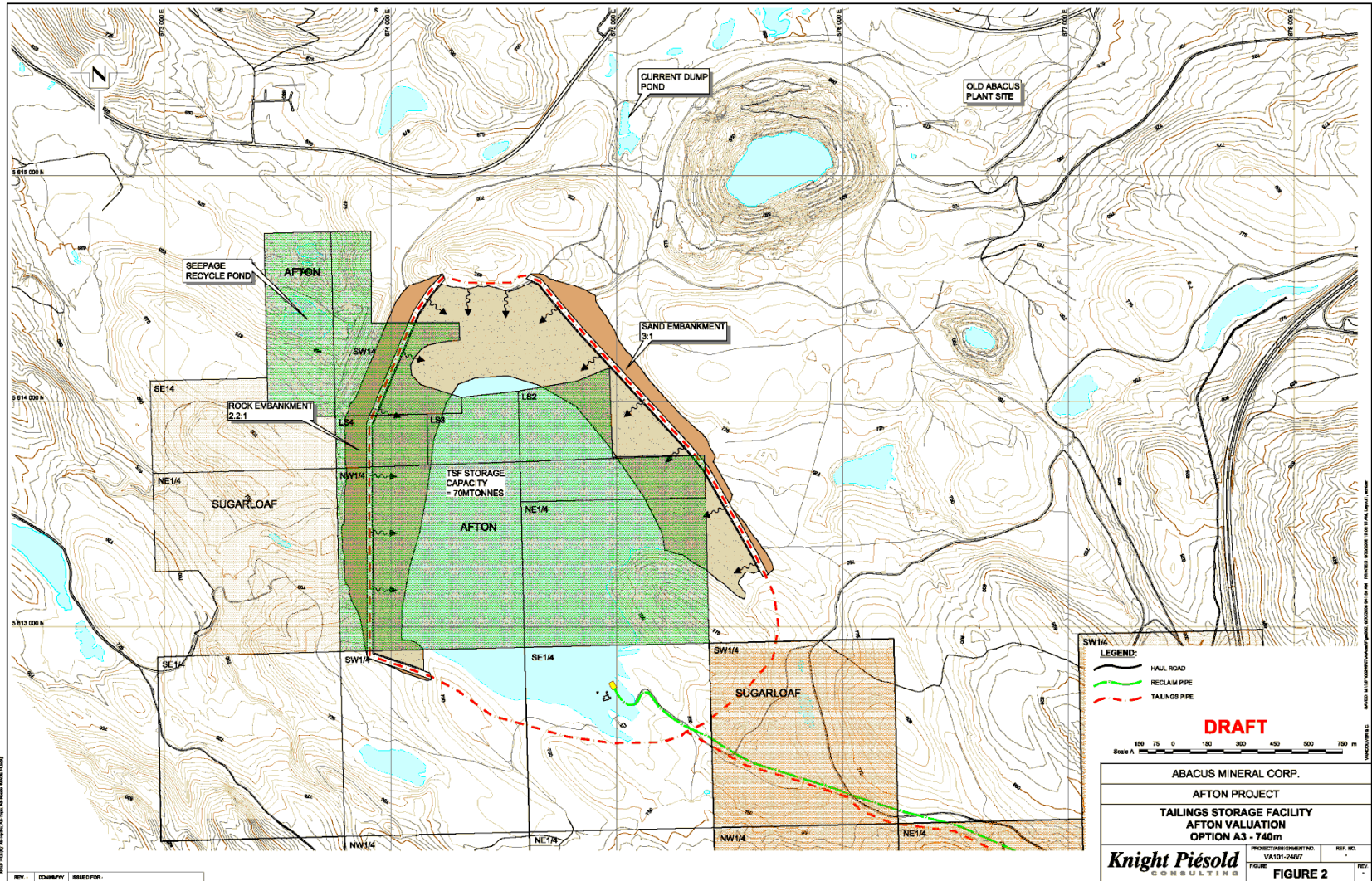
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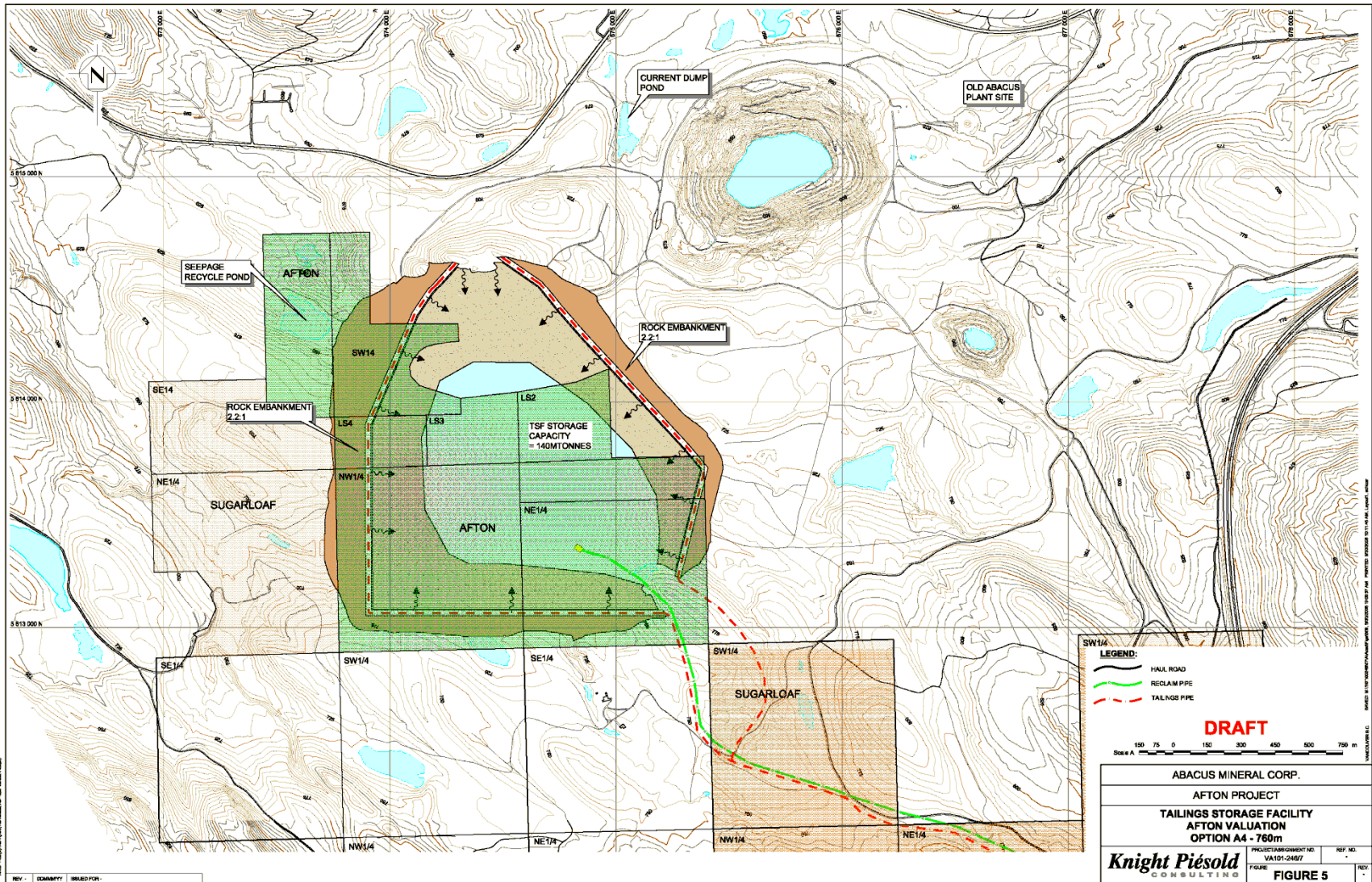
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AJAX PROJECT		
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	FIGURE	REV. 0
FIGURE 3.2		

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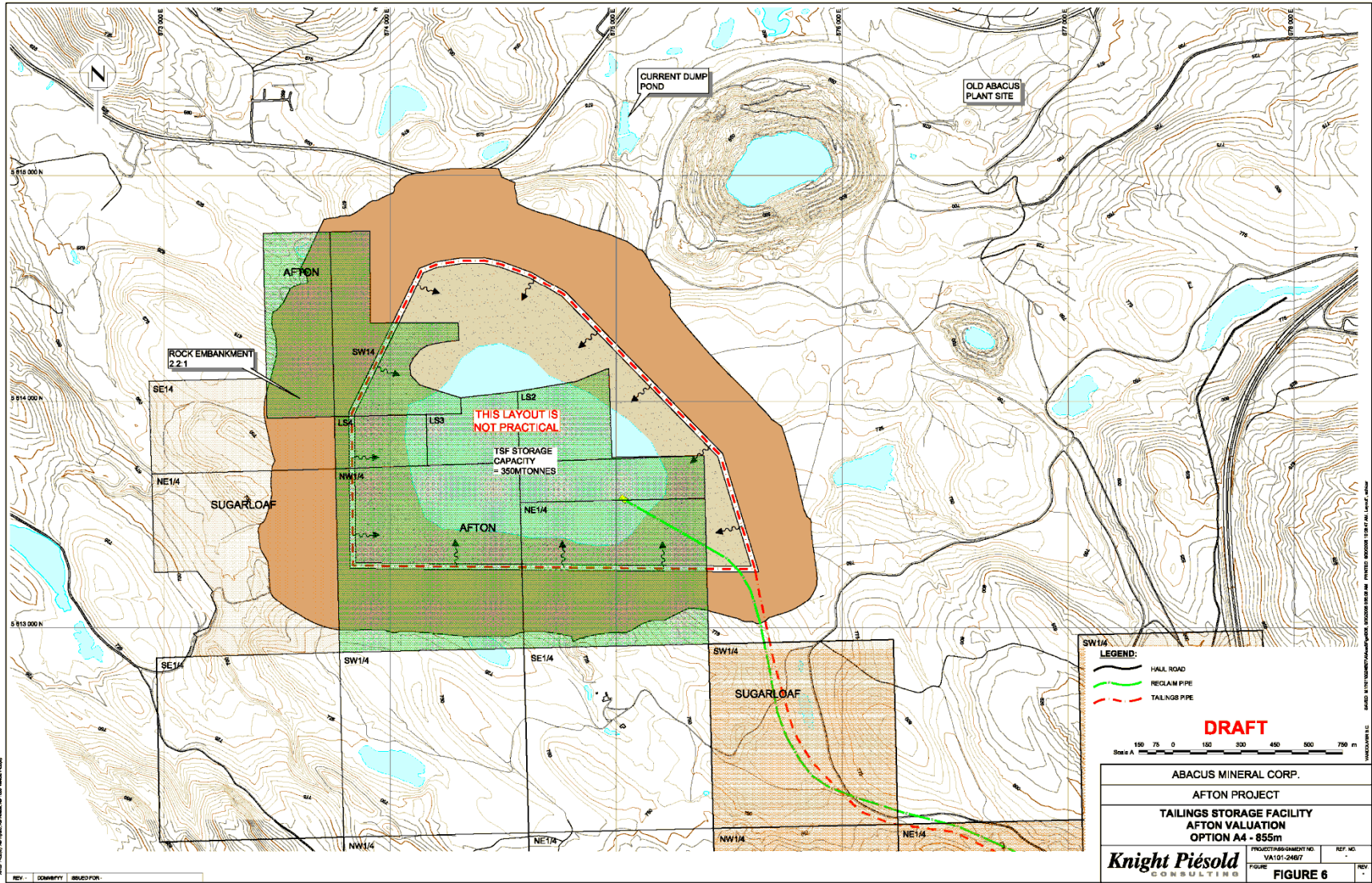
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- RECLAIM PPE
- TAILINGS PPE

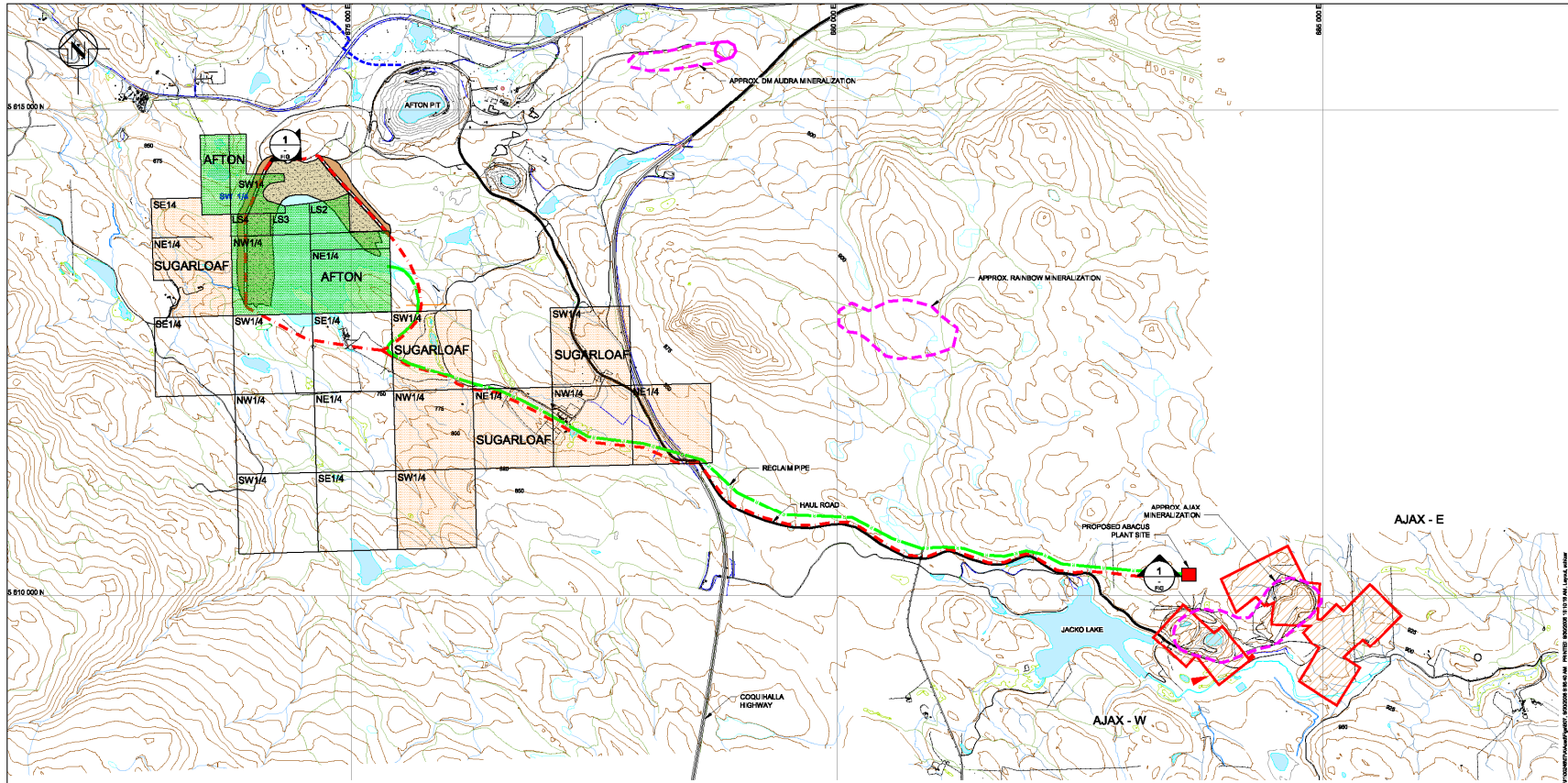
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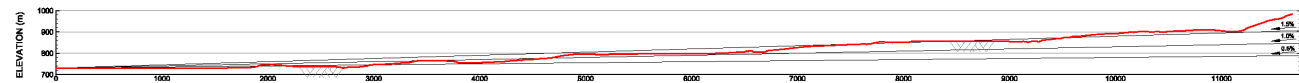
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Knight Piésold CONSULTING	FIGURE 5

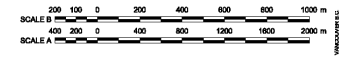




PROJECT: AFTON PT. DATE: 08/11/2010. DRAWN BY: J. B. BROWN. CHECKED BY: J. B. BROWN. SCALE: 1:10,000.

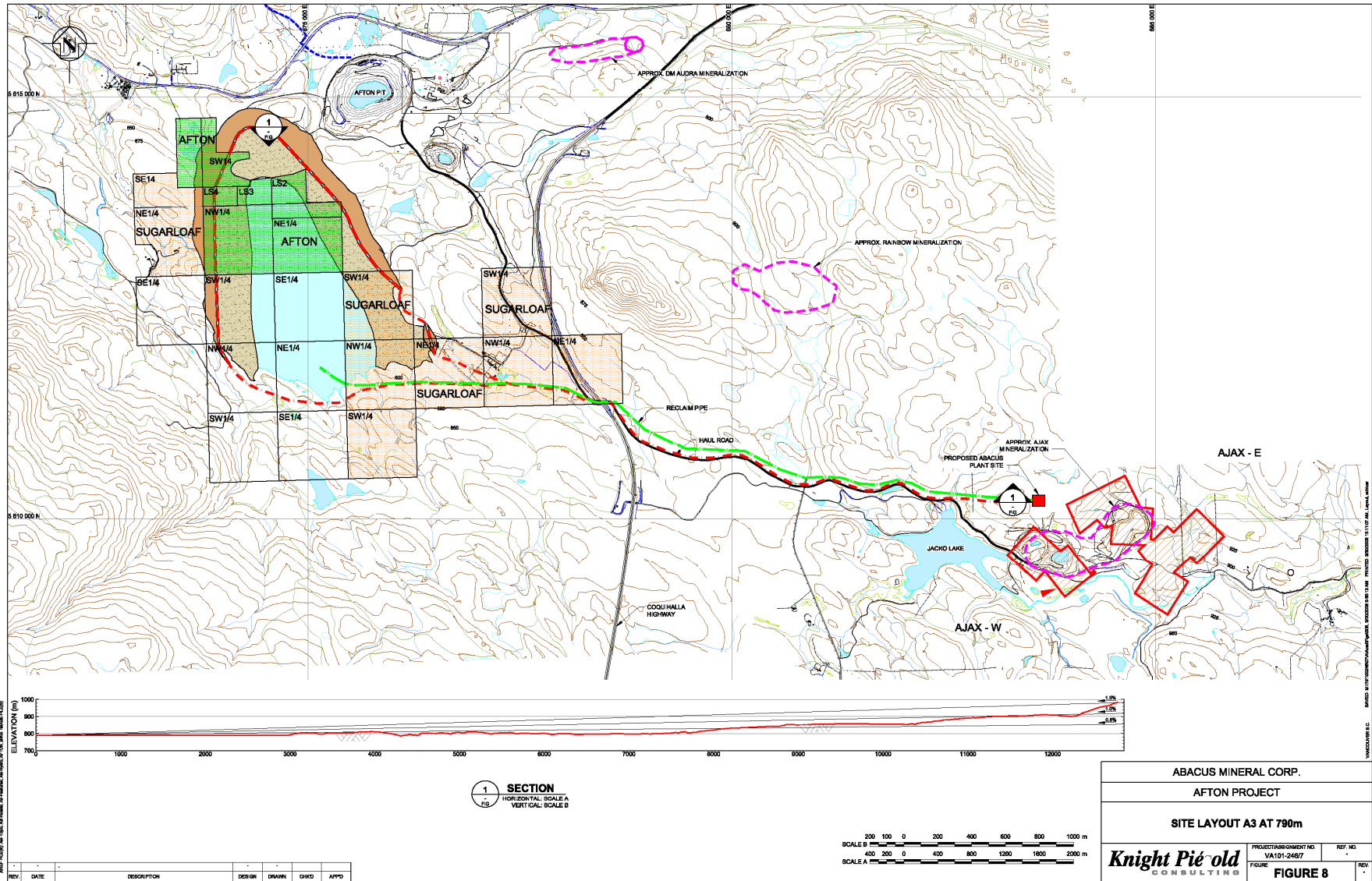


1 SECTION
 HORIZONTAL SCALE: SCALE A
 VERTICAL SCALE: SCALE B



ABACUS MINERAL CORP.	
AFTON PROJECT	
SITE LAYOUT A3 AT 730m	
Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA101-2467 FIGURE FIGURE 7
REV. NO.	REV.

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHECK	APPD.



APPENDIX C

COST ESTIMATING TABLES

(Pages C-1 to C-5)

TABLE C.1
KGHM AJAX MINING INC.
AJAX PROJECT
TAILINGS STORAGE FACILITY
ESTIMATED COSTS - MDC 2 OPTION

Print Mar/21/13 14:42:58

Item Number	Description	Units	Unit Cost	A1(4)				G1 ¹				Total
				Initial CAPEX		Sustaining CAPEX and OPEX		CAPEX but y4		Sustaining CAPEX and OPEX		
				Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	
100	Site Preparation											
101	Logging	ha	\$ -	0	\$ -	0	\$ -					
102	Clearing and grubbing	ha	\$ 4,000	103	\$ 412,000	140	\$ 672,000					
103	Service road	km	\$ 30,000	7	\$ 210,000	0	\$ -					
104	Pipeline corridor construction	km	\$ 30,000	11	\$ 321,000	0	\$ -					
105	Haul road construction	km	\$ 70,000	2	\$ 140,000	0	\$ -					
106	Topsoil stripping	m ³	\$ 3	24,400	\$ 61,000	35,400	\$ 106,200					
107	Construction dewatering	LS	\$ 50,000	1	\$ 50,000	0	\$ -					
108	Sediment and erosion control BMP's	ha	\$ 200	616	\$ 123,200	0	\$ -					
200	Tailings Facility											
201	Dam footprint foundation preparation	m ²	\$ 0.40	379,600	\$ 151,840	209,600	\$ 100,608					
202	Foundation drains	m	\$ 11	1,030	\$ 11,330	0	\$ -					
203	Embankment drains	m	\$ 11	950	\$ 10,450	895	\$ 11,814					
204	Embankment Filter/Transition Zone	m ³	\$ 12	215,000	\$ 2,580,000	265,000	\$ 3,816,000					
205	Embankment Core Zone	m ³	\$ 4	359,000	\$ 1,436,000	442,000	\$ 2,121,600					
206	Embankment Shell Zone	m ³	\$ 4	4,290,000	\$ 15,015,000	5,164,000	\$ 21,688,800					
207	Mine Waste Rock Placement	m ³	\$ 1	0	\$ -	0	\$ -					
208	Seepage recovery systems	LS	\$ 50,000	1	\$ 50,000	1	\$ 60,000					
209	Liner	m ²	\$ -									
300	Mechanical											
301	Plantsite Thickener	ea	\$ -	0	\$ -	0	\$ -					
302	Pipeline to Tailings Thickening Plant (G1 only)	m	\$ -	0	\$ -	0	\$ -					
303	Tailings Thickening Plant (G1 only)	LS	\$ -	0	\$ -	0	\$ -					
304	Tailings pumpstation	ea	\$ 5,000,000	1	\$ 5,000,000	0	\$ -					
305	Tailings Pipeline	m	\$ 700	12,000	\$ 8,400,000	2,000	\$ 1,680,000					
305a	Tailings Pipeline for Option S1 and S2	m	\$ 823									
306	Reclaim Barge	ea	\$ 1,500,000	1	\$ 1,500,000	0	\$ -					
307	Reclaim Water Pipeline	m	\$ 800	9,000	\$ 7,200,000	0	\$ -					
307a	Reclaim Water Pipeline for Option S1 and S2	m	\$ 734									
400	Electrical											
401	Powerline	km	\$ 100,000	2	\$ 200,000	0	\$ -					
402	Transformer and Switchgear	ea	\$ 1,050,000	1	\$ 1,050,000	0	\$ -					
403	Electrical house with PLC & MCC	ea	\$ 100,000	1	\$ 100,000	0	\$ -					
500	Instrumentation											
501	Geotechnical instrumentation	LS	\$ 25,000	2	\$ 50,000	2	\$ 60,000					
600	ANNUAL OPERATING COST											
601	Service road maintenance	km	\$ 20,000	0	\$ -	68	\$ 1,632,000					
602	Maintenance	year	\$ 50,000	0	\$ -	4	\$ 240,000					
603	Manpower	year	\$ 80,000	0	\$ -	4	\$ 384,000					
604	Power - Tailings pumping	MWh	\$ 50	0	\$ -	0	\$ -					
605	Power - Reclaim pumping	MWh	\$ 50	0	\$ -	189,000	\$ 11,340,000					
606	Power - Seepage recovery pumping	MWh	\$ 50	0	\$ -	1,000	\$ 60,000					
607	Environmental compliance	PS	\$ 250,000	0	\$ -	4	\$ 1,200,000					
608	Engineering support and reporting	PS	\$ 50,000	0	\$ -	4	\$ 240,000					
SUBTOTAL ITEMS 100 TO 500					44,071,820		30,317,022					74,388,842
MOBILIZATION/DEMObILIZATION					1,762,873		1,212,681					2,975,554
INDIRECTS					5,288,618		3,638,043					8,926,661
CONTINGENCY					8,814,364		6,063,404					18,597,211
SUBTOTAL ITEMS 600 - OPEX					0		15,096,000					15,096,000
OVERALL PROJECT TOTAL					59,937,675		56,327,150		106,500,000		265,677,444	488,442,269

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NOTES:

1. G1 COST ESTIMATED BASED ON ABACUS DOCUMENT 1054610300-REP-R004-02 "AJAX COPPER/GOLD PROJECT KAMLOOPS, BRITISH COLUMBIA FEASIBILITY STUDY TECHNICAL REPORT" DATE JANUARY 6, 2012.

0	15APR13	ISSUED WITH LETTER VA13-00814	LM	JPH	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

TABLE C.2
KGHM AJAX MINING INC.
AJAX PROJECT
TAILINGS STORAGE FACILITY
ESTIMATED COSTS - MDC 3 OPTION

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Item Number	Description	Units	Unit Cost	A1(4)				S1				Total
				Initial CAPEX		Sustaining CAPEX and OPEX		CAPEX but y4		Sustaining CAPEX and OPEX		
				Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	
100	Site Preparation											
101	Logging	ha	\$0	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
102	Clearing and grubbing	ha	\$4,000	103	\$ 412,000	140	\$ 672,000	187	\$ 747,480	554	\$ 2,214,848	4,046,328
103	Service road	km	\$30,000	7	\$ 210,000	0	\$ -	5	\$ 150,000	0	\$ -	360,000
104	Pipeline corridor construction	km	\$30,000	11	\$ 321,000	0	\$ -	11	\$ 329,100	0	\$ -	650,100
105	Haul road construction	km	\$70,000	2	\$ 140,000	0	\$ -	2	\$ 140,000	0	\$ -	280,000
106	Topsoil stripping	m ³	\$3	24,400	\$ 61,000	35,400	\$ 106,200	373,740	\$ 934,350	1,107,424	\$ 2,768,561	3,870,110
107	Construction dewatering	LS	\$50,000	1	\$ 50,000	0	\$ -	1	\$ 50,000	0	\$ -	100,000
108	Sediment and erosion control BMP's	ha	\$200	616	\$ 123,200	0	\$ -	187	\$ 37,381	554	\$ 110,742	271,324
					\$ -		\$ -		\$ -		\$ -	
200	Tailings Facility											
201	Dam footprint foundation preparation	m ²	\$0.40	379,600	\$ 151,840	209,600	\$ 100,608	187	\$ 75	554	\$ 221	252,744
202	Foundation drains	m	\$11	1,030	\$ 11,330	0	\$ -	1,000	\$ 11,000	500	\$ 5,500	27,830
203	Embankment drains	m	\$11	950	\$ 10,450	895	\$ 11,814	3,000	\$ 33,000	3,000	\$ 33,000	88,284
204	Embankment Filter/Transition Zone	m ³	\$12	215,000	\$ 2,580,000	265,000	\$ 3,816,000	303,750	\$ 3,645,000	3,225,000	\$ 38,700,000	48,741,000
205	Embankment Core Zone	m ³	\$4	359,000	\$ 1,436,000	442,000	\$ 2,121,600	303,750	\$ 1,215,000	3,225,000	\$ 12,900,000	17,672,600
206	Embankment Shell Zone	m ³	\$4	4,290,000	\$ 15,015,000	5,164,000	\$ 21,688,800	0	\$ -	0	\$ -	36,703,800
207	Mine Waste Rock Placement	m ³	\$1	0	\$ -	0	\$ -	14,100,000	\$ 7,050,000	56,610,000	\$ 28,305,000	35,355,000
208	Seepage recovery systems	LS	\$50,000	1	\$ 50,000	1	\$ 60,000	1	\$ 50,000	0	\$ -	160,000
209	Liner	m ²	\$0	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
					\$ -		\$ -		\$ -		\$ -	
300	Mechanical											
301	Plantsite Thickener	ea	\$0	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
302	Pipeline to Tailings Thickening Plant (G1 only)	m	\$0	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
303	Tailings Thickening Plant (G1 only)	LS	\$0	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
304	Tailings pumpstation	ea	\$5,000,000	1	\$ 5,000,000	0	\$ -	0.2	\$ 1,000,000	0	\$ -	6,000,000
305	Tailings Pipeline	m	\$700	12,000	\$ 8,400,000	2,000	\$ 1,680,000	0	\$ -	0	\$ -	10,080,000
305a	Tailings Pipeline for Option S1 and S2	m	\$823		\$ -		\$ -	5,270	\$ 4,336,999	7,467	\$ 6,144,631	10,481,630
306	Reclaim Barge	ea	\$1,500,000	1	\$ 1,500,000	0	\$ -	0.5	\$ 750,000	0	\$ -	2,250,000
307	Reclaim Water Pipeline	m	\$800	9,000	\$ 7,200,000	0	\$ -	0	\$ -	0	\$ -	7,200,000
307a	Reclaim Water Pipeline for Option S1 and S2	m	\$734		\$ -		\$ -	5,700	\$ 4,182,375	2,166	\$ 1,589,303	5,771,678
					\$ -		\$ -		\$ -		\$ -	
400	Electrical											
401	Powerline	km	\$100,000	2	\$ 200,000	0	\$ -	5	\$ 500,000	0	\$ -	700,000
402	Transformer and Switchgear	ea	\$1,050,000	1	\$ 1,050,000	0	\$ -	1	\$ 1,050,000	0	\$ -	2,100,000
403	Electrical house with PLC & MCC	ea	\$100,000	1	\$ 100,000	0	\$ -	1	\$ 100,000	0	\$ -	200,000
					\$ -		\$ -		\$ -		\$ -	
500	Instrumentation											
501	Geotechnical instrumentation	LS	\$25,000	2	\$ 50,000	2	\$ 60,000	2	\$ 50,000	10	\$ 250,000	410,000
					\$ -		\$ -		\$ -		\$ -	
600	ANNUAL OPERATING COST											
601	Service road maintenance	km	\$20,000	0	\$ -	68	\$ 1,632,000	0	\$ -	50	\$ 1,000,000	2,632,000
602	Maintenance	year	\$50,000	0	\$ -	4	\$ 240,000	0	\$ -	23	\$ 1,150,000	1,390,000
603	Manpower	year	\$80,000	0	\$ -	4	\$ 384,000	0	\$ -	23	\$ 1,840,000	2,224,000
604	Power - Tailings pumping	MWh	\$50	0	\$ -	0	\$ -	0	\$ -	414,000	\$ 20,700,000	20,700,000
605	Power - Reclaim pumping	MWh	\$50	0	\$ -	189,000	\$ 11,340,000	0	\$ -	161,000	\$ 8,050,000	19,390,000
606	Power -Seepage recovery pumping	MWh	\$50	0	\$ -	1,000	\$ 60,000	0	\$ -	9,000	\$ 450,000	510,000
607	Environmental compliance	PS	\$250,000	0	\$ -	4	\$ 1,200,000	0	\$ -	23	\$ 5,750,000	6,950,000
608	Engineering support and reporting	PS	\$50,000	0	\$ -	4	\$ 240,000	0	\$ -	23	\$ 1,150,000	1,390,000
					\$ -		\$ -		\$ -		\$ -	
	SUBTOTAL ITEMS 100 TO 500				44,071,820		30,317,022		26,361,759		93,021,806	193,772,407
	MOBILIZATION/DEMobilIZATION		4%		1,762,873		1,212,681		1,054,470		3,720,872	7,750,896
	INDIRECTS		12%		5,288,618		3,638,043		3,163,411		11,162,617	23,252,689
	CONTINGENCY		20%		8,814,364		6,063,404		5,272,352		18,604,361	38,754,481
	SUBTOTAL ITEMS 600 - OPEX				0		15,096,000		0		40,090,000	55,186,000
	OVERALL PROJECT TOTAL				59,937,675		56,327,150		35,851,993		166,599,656	318,716,474

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ID	ISSUED WITH LETTER	LM	JPH	KJB
REV	DATE	PREP'D	CHEK'D	APP'D
0	15APR13			

TABLE C.3
KGHM AJAX MINING INC.
AJAX PROJECT
TAILINGS STORAGE FACILITY
ESTIMATED COSTS - MDC 4 OPTION

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Item Number	Description	Units	Unit Cost	A1(4)				S2				Total
				Initial CAPEX		Sustaining CAPEX and OPEX		CAPEX but y4		Sustaining CAPEX and OPEX		
				Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	
100	Site Preparation											
101	Logging	ha	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
102	Clearing and grubbing	ha	\$ 4,000	103	\$ 412,000	140	\$ 672,000	167	\$ 666,136	437	\$ 1,748,150	3,498,286
103	Service road	km	\$ 30,000	7	\$ 210,000	0	\$ -	5	\$ 150,000	0	\$ -	360,000
104	Pipeline corridor construction	km	\$ 30,000	11	\$ 321,000	0	\$ -	10	\$ 314,100	0	\$ -	635,100
105	Haul road construction	km	\$ 70,000	2	\$ 140,000	0	\$ -	2	\$ 140,000	0	\$ -	280,000
106	Topsoil stripping	m ³	\$ 3	24,400	\$ 61,000	35,400	\$ 106,200	333,068	\$ 832,670	874,075	\$ 2,185,188	3,185,057
107	Construction dewatering	LS	\$ 50,000	1	\$ 50,000	0	\$ -	1	\$ 50,000	0	\$ -	100,000
108	Sediment and erosion control BMP's	ha	\$ 200	616	\$ 123,200	0	\$ -	167	\$ 33,314	437	\$ 87,408	243,921
200	Tailings Facility											
201	Dam footprint foundation preparation	m ²	\$ 0.40	379,600	\$ 151,840	209,600	\$ 100,608	167	\$ 67	437	\$ 175	252,689
202	Foundation drains	m	\$ 11	1,030	\$ 11,330	0	\$ -	1,000	\$ 11,000	500	\$ 5,500	27,830
203	Embankment drains	m	\$ 11	950	\$ 10,450	895	\$ 11,814	3,000	\$ 33,000	3,000	\$ 33,000	88,264
204	Embankment Filter/Transition Zone	m ³	\$ 12	215,000	\$ 2,580,000	265,000	\$ 3,816,000	382,500	\$ 4,590,000	5,625,000	\$ 67,500,000	78,486,000
205	Embankment Core Zone	m ³	\$ 4	359,000	\$ 1,436,000	442,000	\$ 2,121,600	382,500	\$ 1,530,000	5,625,000	\$ 22,500,000	27,587,600
206	Embankment Shell Zone	m ³	\$ 4	4,290,000	\$ 15,015,000	5,164,000	\$ 21,688,800	0	\$ -	0	\$ -	36,703,800
207	Mine Waste Rock Placement	m ³	\$ 1	0	\$ -	0	\$ -	14,100,000	\$ 7,050,000	85,900,000	\$ 42,950,000	50,000,000
208	Seepage recovery systems	LS	\$ 50,000	1	\$ 50,000	1	\$ 60,000	1	\$ 50,000	0	\$ -	160,000
209	Liner	m ²	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
300	Mechanical											
301	Plantsite Thickener	ea	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
302	Pipeline to Tailings Thickening Plant (G1 only)	m	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
303	Tailings Thickening Plant (G1 only)	LS	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
304	Tailings pumpstation	ea	\$ 5,000,000	1	\$ 5,000,000	0	\$ -	0.2	\$ 1,000,000	0.0	\$ -	6,000,000
305	Tailings Pipeline	m	\$ 700	12,000	\$ 8,400,000	2,000	\$ 1,680,000	0	\$ -	0	\$ -	10,080,000
305a	Tailings Pipeline for Option S1 and S2	m	\$ 823	0	\$ -	0	\$ -	5,270	\$ 4,336,999	9,027	\$ 7,428,448	11,765,448
306	Reclaim Barge	m	\$ 1,500,000	1	\$ 1,500,000	0	\$ -	0.5	\$ 750,000	0	\$ -	2,250,000
307	Reclaim Water Pipeline	m	\$ 800	9,000	\$ 7,200,000	0	\$ -	0	\$ -	0	\$ -	7,200,000
307a	Reclaim Water Pipeline for Option S1 and S2	m	\$ 734	0	\$ -	0	\$ -	5,200	\$ 3,815,500	1,976	\$ 1,449,890	5,265,390
400	Electrical											
401	Powerline	km	\$ 100,000	2	\$ 200,000	0	\$ -	5	\$ 500,000	0	\$ -	700,000
402	Transformer and Switchgear	ea	\$ 1,050,000	1	\$ 1,050,000	0	\$ -	1	\$ 1,050,000	0	\$ -	2,100,000
403	Electrical house with PLC & MCC	ea	\$ 100,000	1	\$ 100,000	0	\$ -	1	\$ 100,000	0	\$ -	200,000
500	Instrumentation											
501	Geotechnical instrumentation	LS	\$ 25,000	2	\$ 50,000	2	\$ 60,000	2	\$ 50,000	12	\$ 300,000	460,000
600	ANNUAL OPERATING COST											
601	Service road maintenance	km	\$ 20,000	0	\$ -	68	\$ 1,632,000	0	\$ -	50	\$ 1,000,000	2,632,000
602	Maintenance	year	\$ 50,000	0	\$ -	4	\$ 240,000	0	\$ -	23	\$ 1,150,000	1,390,000
603	Manpower	year	\$ 80,000	0	\$ -	4	\$ 384,000	0	\$ -	23	\$ 1,840,000	2,224,000
604	Power - Tailings pumping	MWh	\$ 50	0	\$ -	0	\$ -	0	\$ -	448,500	\$ 22,425,000	22,425,000
605	Power - Reclaim pumping	MWh	\$ 50	0	\$ -	189,000	\$ 11,340,000	0	\$ -	34,500	\$ 1,725,000	13,065,000
606	Power -Seepage recovery pumping	MWh	\$ 50	0	\$ -	1,000	\$ 60,000	0	\$ -	9,000	\$ 450,000	510,000
607	Environmental compliance	PS	\$ 250,000	0	\$ -	4	\$ 1,200,000	0	\$ -	23	\$ 5,750,000	6,950,000
608	Engineering support and reporting	PS	\$ 50,000	0	\$ -	4	\$ 240,000	0	\$ -	23	\$ 1,150,000	1,390,000
SUBTOTAL ITEMS 100 TO 500					44,071,820		30,317,022		27,052,785		146,187,758	247,629,385
MOBILIZATION/DEMobilIZATION				4%	1,782,873		1,212,681		1,082,111		5,847,510	9,905,175
INDIRECTS				12%	5,288,618		3,638,043		3,246,334		17,542,531	29,715,526
CONTINGENCY				20%	8,814,364		6,063,404		5,410,557		29,237,552	49,525,877
SUBTOTAL ITEMS 600 - OPEX					0		15,096,000		0		35,490,000	50,586,000
OVERALL PROJECT TOTAL					59,937,675		56,327,150		36,791,787		234,305,351	387,361,964

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

TABLE C.4
KGHM AJAX MINING INC.
AJAX PROJECT
TAILINGS STORAGE FACILITY
ESTIMATED COSTS - MDC 5 OPTION

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Item Number	Description	Units	Unit Cost	A1				Total
				Initial CAPEX		Sustaining CAPEX and OPEX		
				Quantity	Cost	Quantity	Cost	
100	Site Preparation							
101	Logging	ha	\$0	0	\$ -	0	\$ -	0
102	Clearing and grubbing	ha	\$4,000	103	\$ 412,000	441	\$ 2,116,800	2,528,800
103	Service road	km	\$30,000	7	\$ 210,000	0	\$ -	210,000
104	Pipeline corridor construction	km	\$30,000	11	\$ 321,000	0	\$ -	321,000
105	Haul road construction	km	\$70,000	2	\$ 140,000	0	\$ -	140,000
106	Topsoil stripping	m ³	\$3	24,400	\$ 61,000	287,420	\$ 862,260	923,260
107	Construction dewatering	LS	\$50,000	1	\$ 50,000	0	\$ -	50,000
108	Sediment and erosion control BMP's	ha	\$200	616	\$ 123,200	0	\$ -	123,200
200	Tailings Facility							
201	Dam footprint foundation preparation	m ²	\$0.40	379,600	\$ 151,840	1,085,840	\$ 521,203	673,043
202	Foundation drains	m	\$11	1,030	\$ 11,330	490	\$ 6,468	17,798
203	Embankment drains	m	\$11	950	\$ 10,450	4,207	\$ 55,532	65,982
204	Embankment Filter/Transition Zone	m ³	\$12	215,000	\$ 2,580,000	1,250,200	\$ 18,002,880	20,582,880
205	Embankment Core Zone	m ³	\$4	359,000	\$ 1,436,000	2,081,800	\$ 9,992,640	11,428,640
206	Embankment Shell Zone	m ³	\$4	4,290,000	\$ 15,015,000	33,597,200	\$ 141,108,240	156,123,240
207	Mine Waste Rock Placement	m ³	\$1	0	\$ -	0	\$ -	0
208	Seepage recovery systems	LS	\$50,000	1	\$ 50,000	2	\$ 120,000	170,000
209	Liner							
300	Mechanical							
301	Plantsite Thickener	ea	\$0	0	\$ -	0	\$ -	0
302	Pipeline to Tailings Thickening Plant (G1 only)	m	\$0	0	\$ -	0	\$ -	0
303	Tailings Thickening Plant (G1 only)	LS	\$0	0	\$ -	0	\$ -	0
304	Tailings pumpstation	ea	\$5,000,000	1	\$ 5,000,000	1	\$ 6,000,000	11,000,000
305	Tailings Pipeline	m	\$700	12,000	\$ 8,400,000	2,800	\$ 2,352,000	10,752,000
305a	Tailings Pipeline for Option S1 and S2	m	\$823					
306	Reclaim Barge	ea	\$1,500,000	1	\$ 1,500,000	0	\$ -	1,500,000
307	Reclaim Water Pipeline	m	\$800	9,000	\$ 7,200,000	0	\$ -	7,200,000
307a	Reclaim Water Pipeline for Option S1 and S2	m	\$734					
400	Electrical							
401	Powerline	km	\$100,000	2	\$ 200,000	0	\$ -	200,000
402	Transformer and Switchgear	ea	\$1,050,000	1	\$ 1,050,000	0	\$ -	1,050,000
403	Electrical house with PLC & MCC	ea	\$100,000	1	\$ 100,000	0	\$ -	100,000
500	Instrumentation							
501	Geotechnical instrumentation	LS	\$25,000	2	\$ 50,000	11	\$ 330,000	380,000
600	ANNUAL OPERATING COST							
601	Service road maintenance	km	\$20,000	0		391	\$ 9,384,000	9,384,000
602	Maintenance	year	\$50,000	0		23	\$ 1,380,000	1,380,000
603	Manpower	year	\$80,000	0		23	\$ 2,208,000	2,208,000
604	Power - Tailings pumping	MWh	\$50	0		121,765	\$ 7,305,882	7,305,882
605	Power - Reclaim pumping	MWh	\$50	0		932,176	\$ 55,930,588	55,930,588
606	Power - Seepage recovery pumping	MWh	\$50	0		8,794	\$ 527,647	527,647
607	Environmental compliance	PS	\$250,000	0		23	\$ 6,900,000	6,900,000
608	Engineering support and reporting	PS	\$50,000	0		23	\$ 1,380,000	1,380,000
SUBTOTAL ITEMS 100 TO 500					44,071,820		181,468,024	225,539,844
MOBILIZATION/DEMOBILIZATION				4%	1,762,873		7,258,721	9,021,594
INDIRECTS				12%	5,288,618		21,776,163	27,064,781
CONTINGENCY				20%	8,814,364		36,293,605	45,107,969
SUBTOTAL ITEMS 600 - OPEX					0		85,016,118	85,016,118
OVERALL PROJECT TOTAL					59,937,675		331,812,630	391,750,305

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REV	DATE	DESCRIPTION	PREPD	CHK'D	APP'D

TABLE C.5
KGHM AJAX MINING INC.
AJAX PROJECT
TAILINGS STORAGE FACILITY
ESTIMATED COSTS - MDC 6 OPTION

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Item Number	Description	Units	Unit Cost	S1				Total
				Initial CAPEX		Sustaining CAPEX and OPEX		
				Quantity	Cost	Quantity	Cost	
100	Site Preparation							
101	Logging	ha	\$0	0	\$ -	0	\$ -	0
102	Clearing and grubbing	ha	\$4,000	187	\$ 747,480	554	\$ 2,214,848	2,962,328
103	Service road	km	\$30,000	5	\$ 150,000	0	\$ -	150,000
104	Pipeline corridor construction	km	\$30,000	11	\$ 329,100	0	\$ -	329,100
105	Haul road construction	km	\$70,000	2	\$ 140,000	0	\$ -	140,000
106	Topsail stripping	m ³	\$3	373,740	\$ 934,350	1,107,424	\$ 2,768,561	3,702,910
107	Construction dewatering	LS	\$50,000	1	\$ 50,000	0	\$ -	50,000
108	Sediment and erosion control BMP's	ha	\$200	187	\$ 37,381	554	\$ 110,742	148,124
200	Tailings Facility							
201	Dam footprint foundation preparation	m ²	\$0.40	187	\$ 75	554	\$ 221	296
202	Foundation drains	m	\$11	1,000	\$ 11,000	500	\$ 5,500	16,500
203	Embankment drains	m	\$11	3,000	\$ 33,000	3,000	\$ 33,000	66,000
204	Embankment Filter/Transition Zone	m ³	\$12	303,750	\$ 3,645,000	3,547,500	\$ 42,570,000	46,215,000
205	Embankment Core Zone	m ³	\$4	303,750	\$ 1,215,000	3,547,500	\$ 14,190,000	15,405,000
206	Embankment Shell Zone	m ³	\$4	0	\$ -	0	\$ -	0
207	Mine Waste Rock Placement	m ³	\$1	14,100,000	\$ 7,050,000	57,900,000	\$ 28,950,000	36,000,000
208	Seepage recovery systems	LS	\$50,000	1	\$ 50,000	0	\$ -	50,000
209	Liner	m ²	\$ -	0	\$ -	0	\$ -	0
300	Mechanical							
301	Plantsite Thickener	ea	\$0	0	\$ -	0.0	\$ -	0
302	Pipeline to Tailings Thickening Plant (G1 only)	m	\$0	0	\$ -	0.0	\$ -	0
303	Tailings Thickening Plant (G1 only)	LS	\$0	0	\$ -	0.0	\$ -	0
304	Tailings pumpstation	ea	\$5,000,000	1	\$ 5,000,000	0.0	\$ -	5,000,000
305a	Tailings Pipeline for Option S1 and S2	m	\$823	5,270	\$ 4,336,999	8,521	\$ 7,012,031	11,349,030
306	Reclaim Barge	ea	\$1,500,000	1	\$ 1,500,000	0.0	\$ -	1,500,000
307a	Reclaim Water Pipeline for Option S1 and S2	m	\$734	5,700	\$ 4,182,375	2,622	\$ 1,923,893	6,106,268
400	Electrical							
401	Powerline	km	\$100,000	5	\$ 500,000	0	\$ -	500,000
402	Transformer and Switchgear	ea	\$1,050,000	1	\$ 1,050,000	0	\$ -	1,050,000
403	Electrical house with PLC & MCC	ea	\$100,000.0	1	\$ 100,000	0	\$ -	100,000
500	Instrumentation							
501	Geotechnical instrumentation	LS	\$25,000	2	\$ 50,000	11	\$ 275,000	325,000
600	ANNUAL OPERATING COST							
601	Service road maintenance	km	\$20,000	0	\$ -	50	\$ 1,000,000	1,000,000
602	Maintenance	year	\$50,000	0	\$ -	23	\$ 1,150,000	1,150,000
603	Manpower	year	\$80,000	0	\$ -	23	\$ 1,840,000	1,840,000
604	Power - Tailings pumping	MWh	\$50	0	\$ -	432,400	\$ 21,620,000	21,620,000
605	Power - Reclaim pumping	MWh	\$50	0	\$ -	177,100	\$ 8,855,000	8,855,000
606	Power - Seepage recovery pumping	MWh	\$50	0	\$ -	9,000	\$ 450,000	450,000
607	Environmental compliance	PS	\$250,000	0	\$ -	23	\$ 5,750,000	5,750,000
608	Engineering support and reporting	PS	\$50,000	0	\$ -	23	\$ 1,150,000	1,150,000
SUBTOTAL ITEMS 100 TO 500					31,111,759		100,053,796	131,165,555
MOBILIZATION/DEMobilIZATION				4%	1244470.369		4002151.839	5,246,622
INDIRECTS				12%	3733411.106		12006455.52	15,739,867
CONTINGENCY				20%	6,222,352		20,010,759	26,233,111
SUBTOTAL ITEMS 600					0		41,815,000	41,815,000
OVERALL PROJECT TOTAL					42,311,993		177,888,163	220,200,155

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