Grinding

Ore will be metered from the fine ore bin via slot feeders and discharged onto the fine ore transport conveyor. The conveyor will discharge to the mill feed conveyor feeding the rod mill. During start-up activities, A small feed hopper will discharge temporary stockpiled ore on the surface onto the mill feed conveyor until all material is removed.

Slurry from the rod mill will discharge into a pumpbox feeding the grinding cyclones. Cyclone underflow, made up of coarse slurry, will be ground further in a ball mill. The ball mill will discharge into the cyclone feed pumpbox with the rod mill discharge. Cyclone overflow, with an 80% passing size of 37 microns, will be the grinding circuit product forwarded to the desliming conditioning tank.

Desliming

Cyclone overflow will be treated with a mixture of sodium silicate and sodium metaphosphate that will act as a slime dispersant. Desliming will occur in three stages of small diameter cyclones: a first stage using 102 mm cyclones, a second stage using 51 mm cyclones and a third stage using 10 mm cyclones. The third stage overflow will be discharged to the tailings tank and the underflows from the three sets of cyclones will be forwarded to magnetic separation for further processing.

Magnetic Separation

The cyclone underflow from the desliming cyclones will be fed to a magnetic separator. The magnetics collected from the magnetic separator will be fed to 102 mm cyclones. The underflow will be reground in a small ball mill to 80% passing 37 micron and fed to a second stage magnetic separator along with the cyclone overflow. The magnetics from the second magnetic separator will be discharged to the tailings tank.

The non-magnetics from both magnetic separators will be collected and treated with sodium sulphide in a pre-treatment tank prior to reporting to the dewatering thickener.

Dewatering and Bulk Conditioning

The non-magnetics will be dewatered and thickened to approximately 62% solids (w/w) prior to being discharged to the bulk conditioning tank. The thickener overflow will then be discharged to the tailings tank.

The thickened non-magnetics, along with some recycle streams, will be treated with fluorosilicic acid and conditioned with the MX3 reagent mix depressant. The conditioned pulp, at a re-adjusted density of 25% solids (w/w), will be forwarded to bulk rougher flotation.

Bulk Flotation

The conditioned pulp from the dewatering circuit will be processed through rougher/scavenger flotation using the KBX3 reagent mix as a collector and the MX3 reagent mix as a gangue depressant.

The bulk rougher concentrate and the bulk scavenger concentrate will be collected and discharged by gravity to the cleaner conditioning tank where they will be conditioned with the MLC3 reagent mix acting as a dispersant/depressant ahead of cleaner flotation.

The bulk scavenger tailings will be discharged to the tailings tank.

Cleaner Flotation

Four cleaning stages will be used to upgrade the rare earths concentrate with upstream recycle of cleaner tails. A scavenger float on the first cleaner tails will recover some metal values which will be returned to the bulk conditioning tank ahead of bulk flotation. Reagents used will include the MX3 depressant reagent mix, the KBX3 collector reagent mix, the MLC3 dispersant/depressant reagent mix and ferric chloride.

The fourth cleaner concentrate will be fed to gravity separation.

Gravity Separation

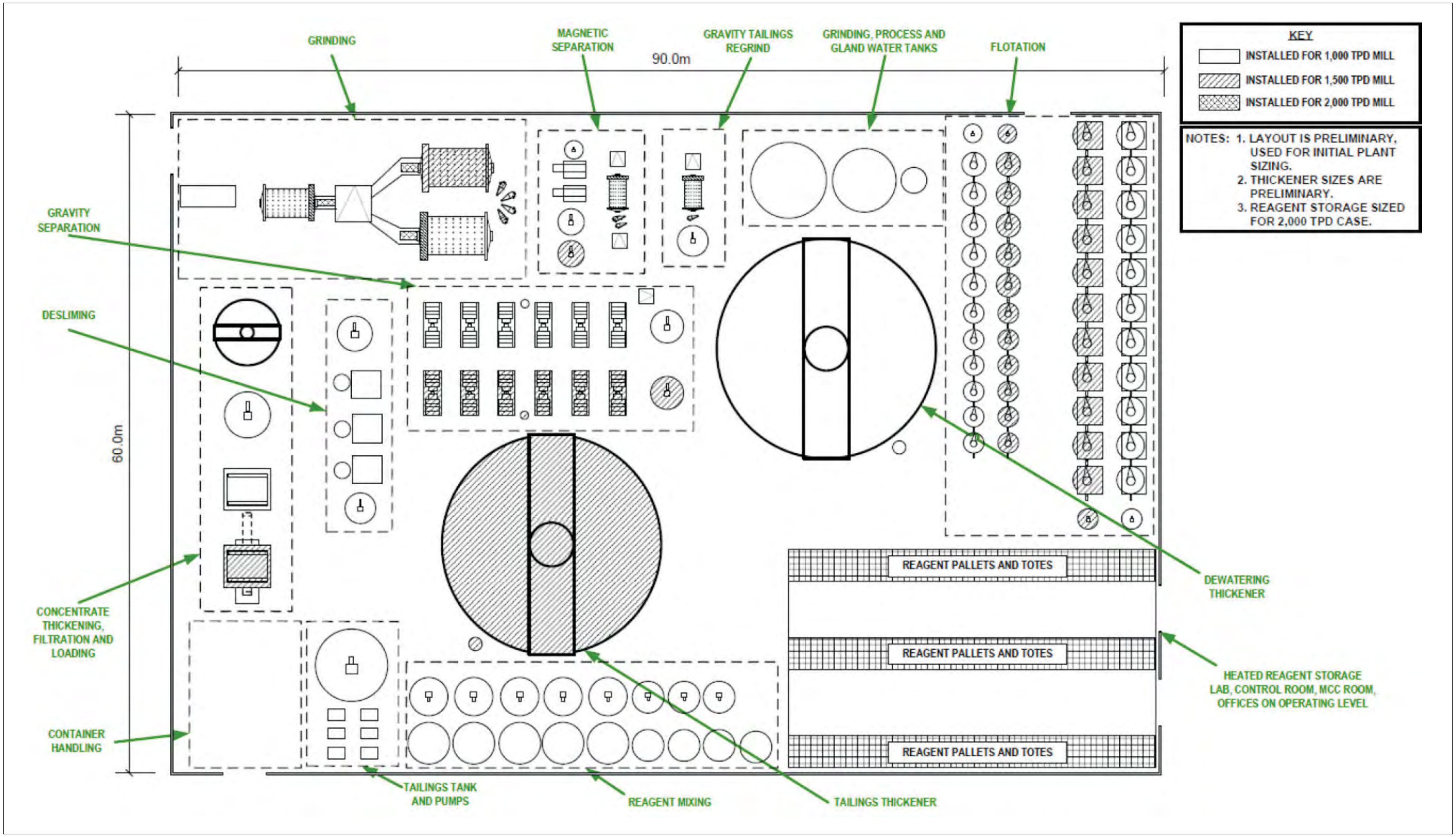
The fourth cleaner concentrate will be conditioned with sodium hydroxide to raise the pH to 12 to disperse the froth contained in the concentrate ahead of gravity separation.

Recovery of gravity concentrate will be accomplished in Mozley C902 multi-gravity separators.

The gravity tails will be cycloned and the cyclone underflow will be reground to 80% passing 37 micron prior to being forwarded to the bulk conditioning tank along with the cyclone overflow. The upgraded gravity concentrate will be collected and forwarded to the concentrate thickener.

Concentrate Dewatering and Loadout

The concentrate thickener underflow will be held in a surge tank and fed to a pressure filter for dewatering to approximately 10% moisture. The filtered concentrate, the final product from the Flotation Plant, representing 18% of the mill feed, will be transferred to concentrate intermodal storage containers for barging to the off-site Hydrometallurgical Plant for further refining.



NOTES

1. Figure Source: Avalon Rare Metals Inc. (Draft).

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THOR LAKE PROJECT

Simplified Flotation Plant Layout for 1000, 1500, and 2000 tpd

PROJECT NO.	DWN	CKD	REV
V15101007.006	SL	RH	0

OFFICE	DATE
EBA-VANC	March 21, 2011

Figure 4.7-3

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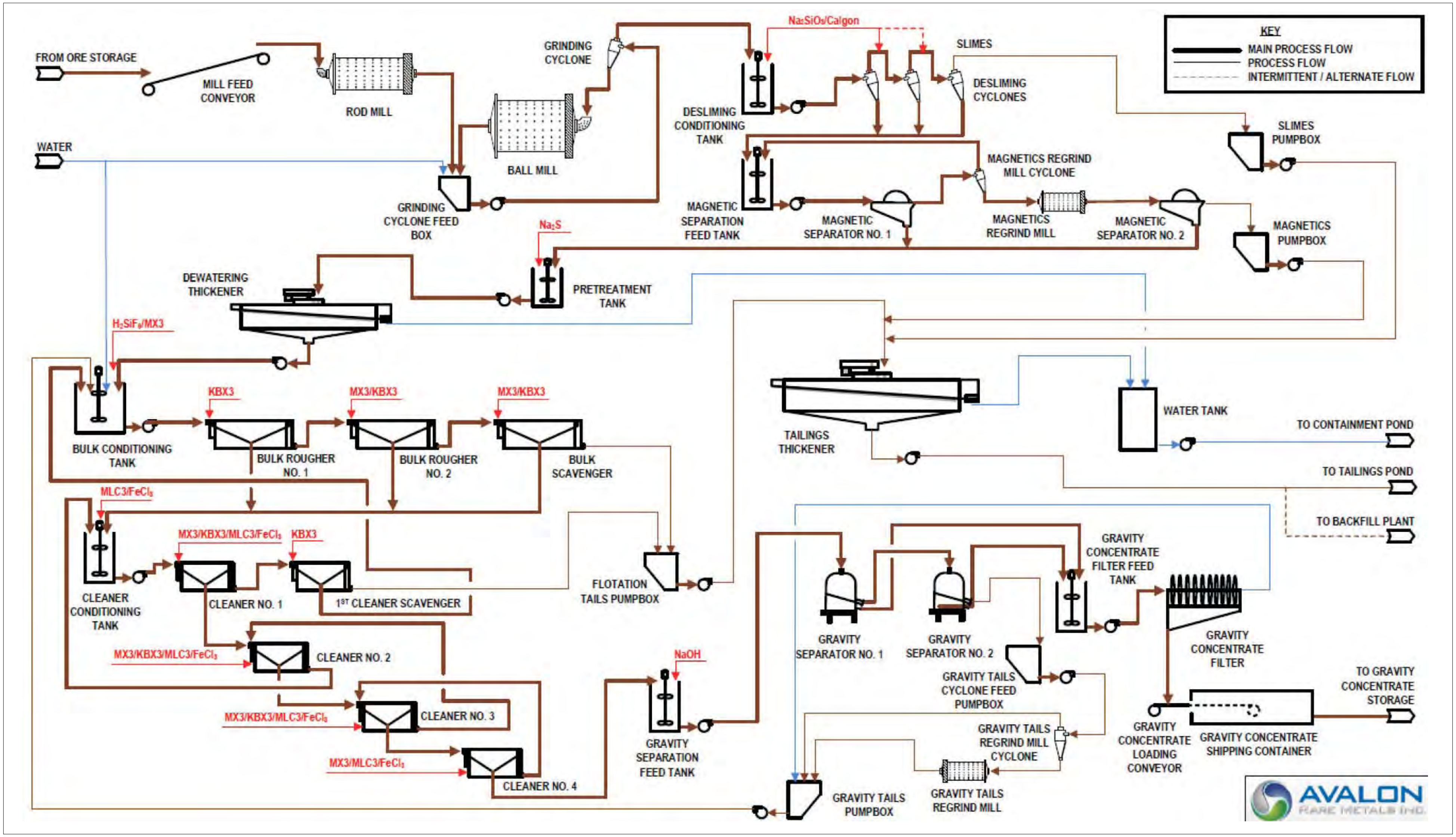

NOTES

1. Figure Source: Avalon Rare Metals Inc.

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AVALON RARE METALS INC.

THOR LAKE PROJECT

Flotation Plant Summary Flowsheet

PROJECT NO.	DWN	CKD	REV
V15101007.006	SL	RH	0
OFFICE	DATE		
EBA-VANC	March 21, 2011		

Figure 4.7-4

EBA Engineering Consultants Ltd.

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4.7.2.4 Reagents

The following reagents are currently planned for use in the Flotation Plant operations although optimization testwork continues (Table 4.7-1).

TABLE 4.7-1: FLOTATION PLANT: AVERAGE REAGENT CONSUMPTION ESTIMATE (TPA)

Reagent	Supplied As		Life of Mine
	Conc. %	Form	2000 tpd Mining Rate
Ferric Chloride ($FeCl_3$)	98	Solid	139.6
Fluorosilicic Acid (H_2SiF_6)	24	Liquid	760
Flocculant (Magnafloc 156)	100	Solid	11.34
Sodium Hexametaphosphate $(NaPO_3)_6$	98	Solid	121
Sodium Hydroxide (NaOH)	99	Solid	129
Sodium Silicate (Na_2SiO_3)	100	Solid	118.6
Sodium Sulphide (Na_2S)	60	Solid	912
Flotinor SM15 (1682)	100	Liquid	256
Aero 845	100	Liquid	152.8
Disponil SLS 101/103	30	Liquid	346
Witcomul 3251	100	Liquid	97.8
Acumer 9400	43	Liquid	216
Rheosperse 3010	100	Liquid	92.8
Alginic Acid ($C_6H_8O_6$)	22	Solid	192.8
Oxalic Acid ($C_2O_2(OH)_2$)	99	Solid	188
Citric Acid ($C_6H_8O_7$)	100	Solid	186.2
Lactic Acid ($C_3H_6O_3$)	88	Liquid	105.8

4.7.2.5 Concentrate Storage – Nechalacho Mine Site

The concentrate produced will be stored in custom-designed, covered containers with removable lids. The containers will be half-height intermodal containers with external dimensions of 6.1 m long (20 ft) by 2.4 m wide (8 ft) by 1.3 m high (4 ft 3 in). Containers will have end doors and removable tops as shown in Photo 4.7-1. Containers will hold 40 t of concentrate on a dry basis.

Approximately 4,200 containers will be required during operations. Avalon will purchase containers for its exclusive use. Approximately 3,285 containers are required on site for the start of operations, but the purchase and delivery of the remaining 915 containers can be deferred until the first shipments of concentrate are outbound from the site.

Containers will be weighed and stored near the Flotation Plant at the Nechalacho mine site through the winter months. As the containers will be stored in a double layer, a 16,000 m^2 storage area is required.

Photo 4.7-1
Half height container with removable top and end door

Loaded containers will be moved throughout the operating season to the dock site storage area adjacent to GSL so that they are in position for loading when the seasonal shipping season commences. Containers will be moved short distances at the Nechalacho mine site and at the dock at GSL by container forklift. For the five kilometre haul to the GSL dock, the containers will be loaded on container trailers at the TLP site and offloaded at the dock site.

4.7.3 Nechalacho Mine and Flotation Plant Waste Management

Avalon contracted SGS Canada Inc. (SGS) to complete environmental characterization of the waste rock, tailings, ore and concentrate from the TLP (SGS 2011; Appendix F). The purpose of the test program was to assess the geochemical, acid rock drainage (ARD), contaminant release potential and geotechnical characteristics associated with the Avalon products. The following section summarizes the results of those tests.

Subsequent subsections discuss Avalon's waste management strategies for:

- Temporary ore and waste rock;
- Flotation Plant tailings;
- Sewage and greywater; and
- Site, solid and hazardous waste.

4.7.3.1 Environmental Characterization of Waste Rock, Tailings, Ore and Concentrate

Environmental tests were conducted on:

- Ore composites, concentrates and tailings from the locked cycle test flotation project;
- A concentrate sample supplied by the hydrometallurgical group; and,
- Waste rock and ore samples generated during semi-autogenous grinding (SAG) tests by the SAGDesign group that were shipped to the SGS facilities by Avalon.

Mineralization

Mineralization in the Nechalacho deposit includes LREE found principally in allanite, monazite, bastnaesite, and synchysite; yttrium, HREE, and tantalum found in fergusonite; niobium in ferro-columbite; HREE and zirconium in zircon; and gallium in biotite, chlorite, and feldspar in albitized feldspathic rocks. This mineralogy has been studied by SGS Minerals Services, XPS Process Services, and McGill University. The abundance of the rare earth bearing minerals as a proportion of the rock is summarized below (Table 4.7-2), with the mineralogy of the concentrates included for comparison purposes (Table 4.7-3).

TABLE 4.7-2: AVERAGE PERCENT OF ORE MINERALS

	All Rock	Upper Zone	Basal Zone	Concentrate
Zircon	65.3%	62.8%	66.2%	63.0%
Fergusonite	3.7%	2.6%	4.3%	5.4%
Bastnaesite	3.8%	4.0%	3.4%	0.7%
Synchysite	4.1%	4.4%	3.8%	1.5%
Monazite	6.4%	9.4%	5.2%	5.5%
Allanite	12.3%	12.0%	13.3%	19.6%
Other REE	0.1%	0.1%	0.0%	0.1%
Columbite	4.3%	4.5%	3.8%	4.1%
Total	**100%**	**100%**	**100%**	**100%**

TABLE 4.7-3: PERCENT OF ROCK OR CONCENTRATE

	Rock Samples							Concentrate	
	11806 -001	11806 -002	11806 -006	11806-006UZ	XPS-UZ-Feed	11806-006BZ	XPS-BZ-Feed	11806 -003	11806-005
Zircon	11.00	13.10	3.79	4.36	7.07	9.35	6.93	35.69	31.25
Fergusonite	0.60	0.70	0.19	0.18	0.30	0.58	0.58	3.05	2.65
Bastnaesite	0.40	0.20	0.26	0.38	0.30	0.51	0.68	0.38	0.40
Synchysite	0.90	0.40	0.28	0.42	0.33	0.32	0.61	0.78	0.82
Monazite	1.50	1.10	0.31	0.59	1.15	0.41	0.40	2.87	2.99
Allanite	3.60	3.70	0.52	0.79	1.42	1.25	0.60	11.03	9.77
Other REE	0.00	0.00	0.01	0.02	0.00	0.02	0.00	0.06	0.06
Columbite	0.90	0.90	0.31	0.40	0.38	0.56	0.20	2.16	2.19
Total	**18.90**	**20.10**	**5.67**	**7.14**	**10.95**	**13.00**	**10.00**	**56.02**	**50.13**

Notes:

11806-001: Average of 30 drill core 2 m samples largely from Basal Zone

11806-002: Metallurgical head test sample

11806-003: Flotation concentrate

11806-005: Flotation concentrate, locked cycle tests

11806-006: Selected samples at 20 m down 3 drill holes through mineralization

11806-006UZ: Selected samples at 20 m down drill hole through mineralization, selected UZ samples, 1.28% TREO, 0.12% HREO

11806-006BZ: Selected samples at 20 m down drill hole through mineralization, selected BZ samples, 2.11% TREO, 0.50% HREO

XPS-UZ-Feed: Upper Zone sample processed by XPS Minerals Services

XPS-BZ-Feed: Basal Zone sample processed by XPS Minerals Services; 1.57% TREO, 0.33% HREO

The total content of ore minerals in the rock ranges from 5.7% to 20%. If samples considered unmineralized are excluded, then the range is from 7% to 20%.

Recalculating these abundances as a percent of the ore minerals is shown in Table 4.7-4. Note that the minerals occur in relative abundance from zircon, to allanite, to monazite, with fergusonite, bastnaesite, and synchysite varying considerably from case to case.

TABLE 4.7-4: PERCENT OF ORE MINERALS

	Rock Samples							Concentrate	
	11806-001	11806-002	11806-006	11806-006UZ	XPS-UZ-Feed	11806-006BZ	XPS-BZ-Feed	11806-003	11806-005
Zircon	58.2%	65.2%	66.8%	61.1%	64.6%	71.9%	69.3%	63.7%	62.3%
Fergusonite	3.2%	3.5%	3.4%	2.5%	2.7%	4.5%	5.8%	5.4%	5.3%
Bastnaesite	2.1%	1.0%	4.6%	5.3%	2.7%	3.9%	6.8%	0.7%	0.8%
Synchysite	4.8%	2.0%	4.9%	5.9%	3.0%	2.5%	6.1%	1.4%	1.6%
Monazite	7.9%	5.5%	5.5%	8.3%	10.5%	3.2%	4.0%	5.1%	6.0%
Allanite	19.0%	18.4%	9.2%	11.1%	13.0%	9.6%	6.0%	19.7%	19.5%
Other REE	0.0%	0.0%	0.2%	0.3%	0.0%	0.2%	0.0%	0.1%	0.1%
Columbite	4.8%	4.5%	5.5%	5.6%	3.5%	4.3%	2.0%	3.9%	4.4%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

A summary of the results given in Table 4.7-2 shows that the Upper and Basal Zone mineralization both have similar distributions of minerals, with the exception of the higher levels of fergusonite and zircon in the Basal Zone (which both relate to HREE). Other than this difference, the abundance of the minerals is similar in Upper and Basal zones, suggesting that the differences between these zones are in degree rather than absolute terms.

The economically interesting minerals in the Nechalacho deposit are fine-grained and form intimate admixtures which have, in the past, presented metallurgical difficulties.

The Nechalacho deposit alteration system varies between 80 m (L08-65) and 190 m (L08-127) in vertical thickness, with the alteration typically starting at the surface. The complete alteration system is enriched to varying degrees in REE, Zr, Nb and Ta, relative to unaltered syenite, with average values over the whole alteration package of approximately 0.75% to 1.0% TREO. Within this alteration envelope, there are sub-horizontal zones of increased alteration accompanied by increased REE enrichment alternating with less enriched REE zones. Within the more intensely altered zones, the original textures and mineralogy of the host rock are no longer apparent.

These zones of increased alteration, which can vary in thickness from a few metres to tens of metres, can frequently contain TREO grades in the range of 2% and higher. The lowermost band, referred to here as the Basal Zone, contains the highest proportion of HREO. Overall, the HREO proportion of the TREO within the 80 m to 190 m thick alteration system is typically between 7% and 15%. However, within the Basal Zone, this proportion can exceed 30%.

In general, the HREO relative to the LREO show a distinct vertical zonation with increasing HREE to depth. This is not always consistent in individual drill holes, but when averaged over a number of holes, the pattern becomes clear as illustrated in Figure 4.7-5.

This pattern of increasing HREO to depth is clearly important to the economics of any potential mine, as the HREO have higher average prices than the LREO.

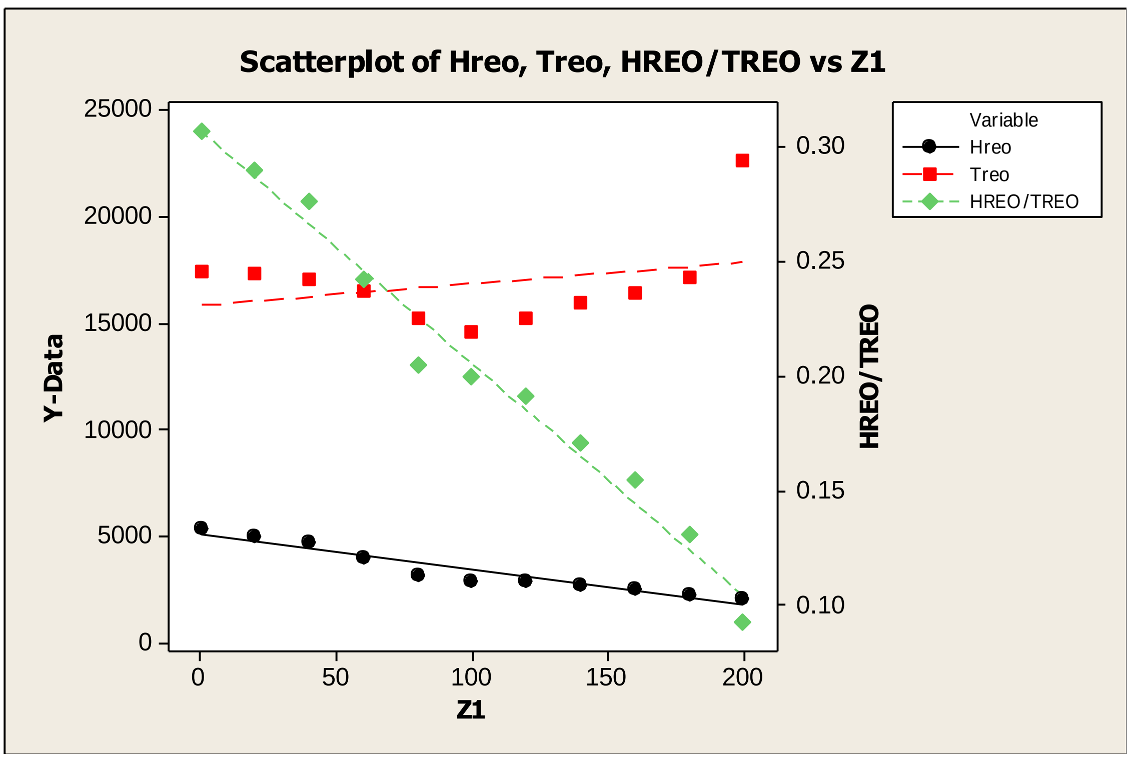


Figure 4.7-5
Scatterplot of Hreo/Treo Versus Elevation Above Sea Level (Z1)

Radionuclide Analysis

Rare earth deposits are often associated with elevated levels of thorium and/or uranium, both of which are radioactive elements. Radioactivity is an issue of concern as it relates to worker health in terms of exposure to radiation underground, mineral processing; transportation of radioactive materials; radioactive releases into the natural environment, and disposal of any radioactive product.

Regulations governing radioactivity include:

- Transportation of Dangerous Goods Regulations (TDGR), with limit of 70 Bq/g;
- Health Canada Regulations on Naturally Occurring Radioactive Material (NORM);
- Northwest Territories Mine Health and Safety Act and Regulations which require control on worker exposures where radon decay product levels exceed 0.4 WLM/y (Working Level Months per year); and,
- Canadian Nuclear Safety Commission if uranium and/or thorium materials are produced.

Thor Lake has uranium levels that are higher than average naturally occurring granite but are far below levels typically experienced in other rare earth deposits. The thorium levels in the Nechalacho deposit are anomalous, but given the lower radioactivity equivalency of thorium relative to uranium, the overall effect of typical Nechalacho mineralization as a rock mass is predicted to be very low.

The rare earth concentration process planned at the Flotation Plant will concentrate the rare earths including the low levels of thorium in the rock minerals. The overall level is predicted to be below Canadian TDGR regulations and will not require special handling as Dangerous Goods.

As expected, the radionuclide analyses of the Nechalacho solids typically reported increased levels of radionuclides in the concentrate samples in comparison to the ore composites, while flotation tailings reported lower levels than the ore samples (SGS 2011; Appendix F). The analysis results typically reported only low levels of radionuclides for the ore composite, tailings and waste rock samples. The results demonstrated that all of the Thor Lake materials, including rock, concentrate and tailings from metallurgical testing for radioactive element leaching were well below World Bank and Canadian requirements.

No production of thorium or uranium will result from the mining, flotation processing and hydrometallurgical processing of the Nechalacho deposit therefore Regulations by the Canadian Nuclear Safety Commission do not apply.

Leach Tests

The shake flask analysis leachates reported all controlled parameters at concentrations well within the World Bank limits (SGS 2011). Similarly, analysis of the fresh and aged tailings solutions reported all controlled parameters, with the exception of total dissolved solids (TSS) in the Day 0 solution, at concentrations well within the designated World Bank limits. Significant amounts of Cl, F, Ca, K, Mg, Na and Si were generally evident in both the shake flask and tailings solutions.

Acid-base Accounting Tests

Modified acid base accounting (ABA) test results reported by SGS (2011) for the Basal Zone ore composites (*Master Comp 1* and *Master Comp 2*), concentrates (*F-29 Gravity Conc, F-30 Gravity Conc* and *F-3 Conc*), low grade sample (*SW-SAG Reject*) and Basal Zone sample (*S-BZ-A SAG Reject*) indicated that these samples are potentially acid neutralizing (PAN). Similarly, although ABA test results for the upper ore sample (*S-UZ-A SAG Reject*) and the tails samples (*Test F-29 Tls* and *Test F-30 Tls*) suggested some minor uncertainty, the very low sulphide concentrations reported, coupled with the significant carbonate (CO_3) neutralization potential ratios (NP/AP), indicate that these samples are highly unlikely to generate acidity. The alkaline final pH values reported after aggressive oxidation of these samples during net acid generation (NAG) testing, confirmed the highly unlikely acid generation potential of these samples.

ABA testing of the *S-UZ-B SAG Reject* Upper Zone ore sample however, reported a higher sulphide concentration, a negative CO_3 Net NP and CO_3 NP/AP ratio, suggesting insufficient carbonate neutralization potential and the potential for acid generation under oxidizing conditions. Reassay of the *S-UZ-B SAG Reject* sample confirmed the initial results reported. Results of the NAG tests completed on this sample (initial and reassay), however, reported no net acidity generated and near neutral final pH values. Avalon reports that out of 8,158 sulphur assays on drill core intervals, the average sulphur assay is 0.05% and that the drill hole corresponding to the *S-UZ-B SAG Reject* had the highest sulphur content. Therefore, this particular sample is not typical of Upper Zone rock with respect to sulphur. In addition, all mining in the 20 year mine life will be in the Basal zone ores which contain the lowest levels of sulphur and showed a net acid neutralization effect.

Settling Tests

Particle size distribution analyses indicated that both the ore composite samples (*Master Comp 1* and *Master Comp 2*) were comprised primarily of sand sized grains. Only minor fractions of the samples were classified as fines. In comparison, the concentrates (*F-29 Gravity Conc* and *F-30 Gravity Conc*) and tailings (*Test F-29 Tls* and *Test F-30 Tls*) showed a much finer particle size distribution with the majority of the samples being classified as fines.

Results of the settling tests indicated that the *Test F-29 Tls* and *Test F-30 Tls* will settle quite quickly in a tailings pond setting. The addition of drainage to the settling tests resulted in only minor increases to the final % solids reported by the samples.

4.7.3.2 Temporary Ore and Waste Rock Storage

During construction of the main underground access decline ramp, approximately 400,000 tonnes of waste and low grade rock will be hauled to the surface. The material will be temporarily stockpiled on the surface in a designated area, where natural drainage can be collected in the planned settling pond (utilized for Flotation Plant site runoff). Suitable waste rock will be used for surface construction. Once operations commence, the low grade rock will be comingled with underground ore and processed in the Flotation Plant.

4.7.3.3 Flotation Plant Tailings

Tailings from the Flotation Plant will be discharged to the Tailings Management Facility (TMF).

Tailings Management Facility

The proposed Tailings Management Facilility (TMF) will be located up slope from the Flotation Plant and northeast of Thor Lake in the local catchment that currently hosts Ring Lake and Buck Lake (Figure 4.7-6). The location was selected based on a review of available sites within the Project area and consideration of environmental and economic factors:

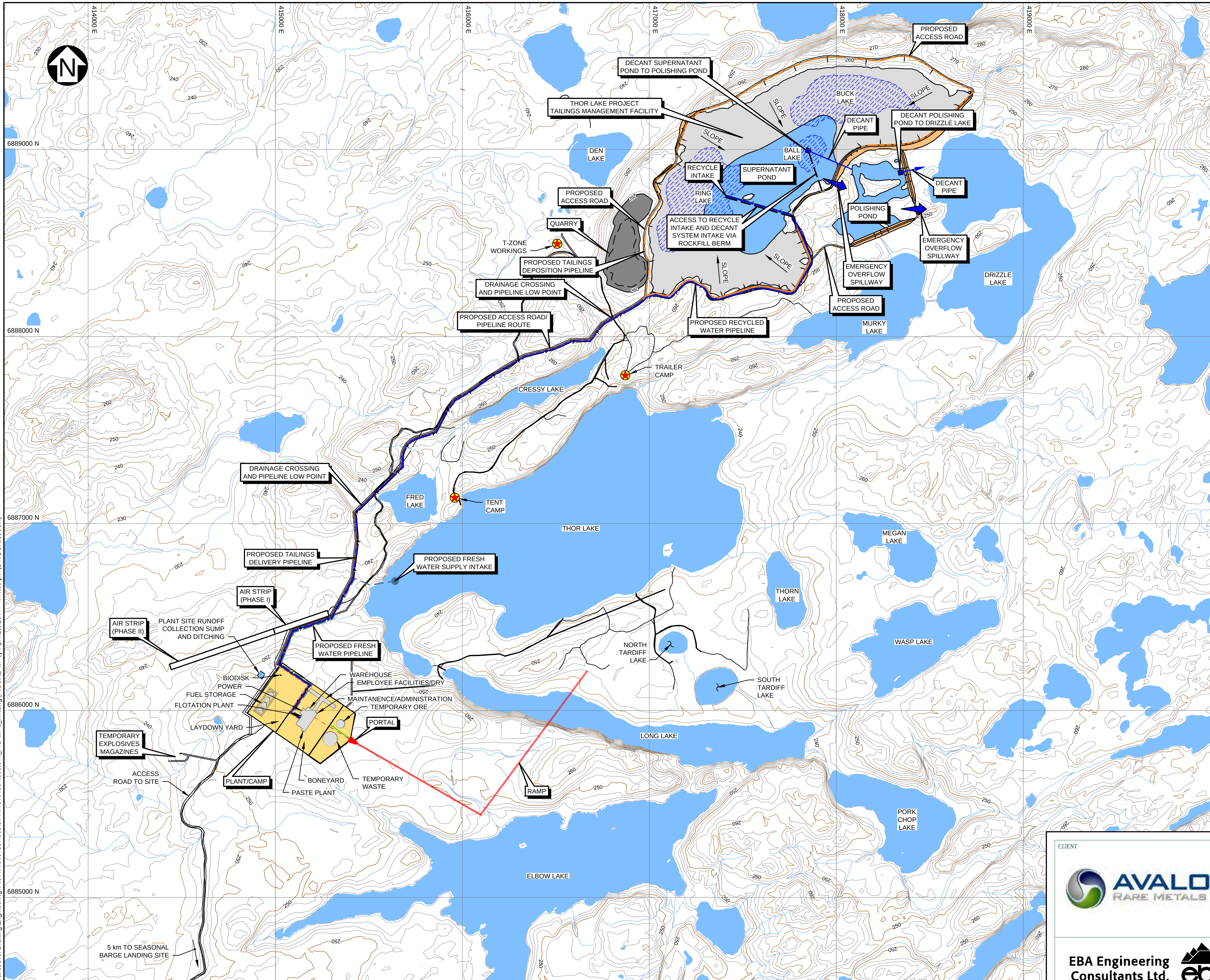
- The Ring and Buck lakes catchment area forms a natural basin that will provide adequate and efficient storage, thereby minimizing embankment construction and development costs;
- Discharge from the TMF will be to Drizzle Lake, which flows to Thor Lake via Murky Lake. This will allow return of excess water from the TMF supernatant pond to Thor Lake during Mine operations to minimize impacts to pre-production flows; and,
- Baseline studies to date indicate that Ring, Buck and Drizzle lakes are non-fish-bearing water bodies.

The principle objective of the TMF design is to ensure protection of the environment during operations and in the long-term (after closure) in order to achieve effective reclamation at Mine closure. The design takes into account the following requirements:

- Permanent, secure and total containment of all tailings solids within an engineered facility;
- Control, collection and removal of free draining liquids from the tailings during operations to recycle process water to the maximum practical extent; and
- Include monitoring features for all aspects of the facility to ensure performance goals are achieved and design criteria and assumptions are met.

The design criteria for the TMF are based on federal standards for the design of dams. In particular, all aspects of the design have been completed in general conformance with:

- Canadian Dam Association (CDA) Dam Safety Guidelines (CDA 2007); and,
- The Mining Association of Canada (MAC) Guide to the Management of Tailings Facilities (MAC 1998).



LEGEND:

- WATER
- TAILINGS
- EXISTING LAKE FOOTPRINT
- EMBANKMENT
- PLANT/CAMP
- EXISTING ACCESS ROAD
- PROPOSED ROAD
- RAMP
- PROPOSED CAUSEWAY
- PROPOSED TAILINGS DELIVERY PIPELINE
- PROPOSED TAILINGS DEPOSITION PIPELINE
- PROPOSED RECYCLE WATER PIPELINE
- PROPOSED FRESH WATER PIPELINE
- PROPOSED POWERLINE
- DISCHARGE

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 12N AND IS IN METRES.
2. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 2 METRES.
3. TAILINGS MANAGEMENT FACILITY FINAL LAYOUT (YEAR 20) DETERMINED FROM WATER/SOLIDS BALANCE ANALYSIS (MEMO NB11-00100).
4. FIGURE SOURCE IS KNIGHT PIÉSOLD CONSULTING REF. NB11-00139 FIGURE 1 DATED MARCH 10, 2011.

SCALE 1:20,000

200 0 200 400 800m

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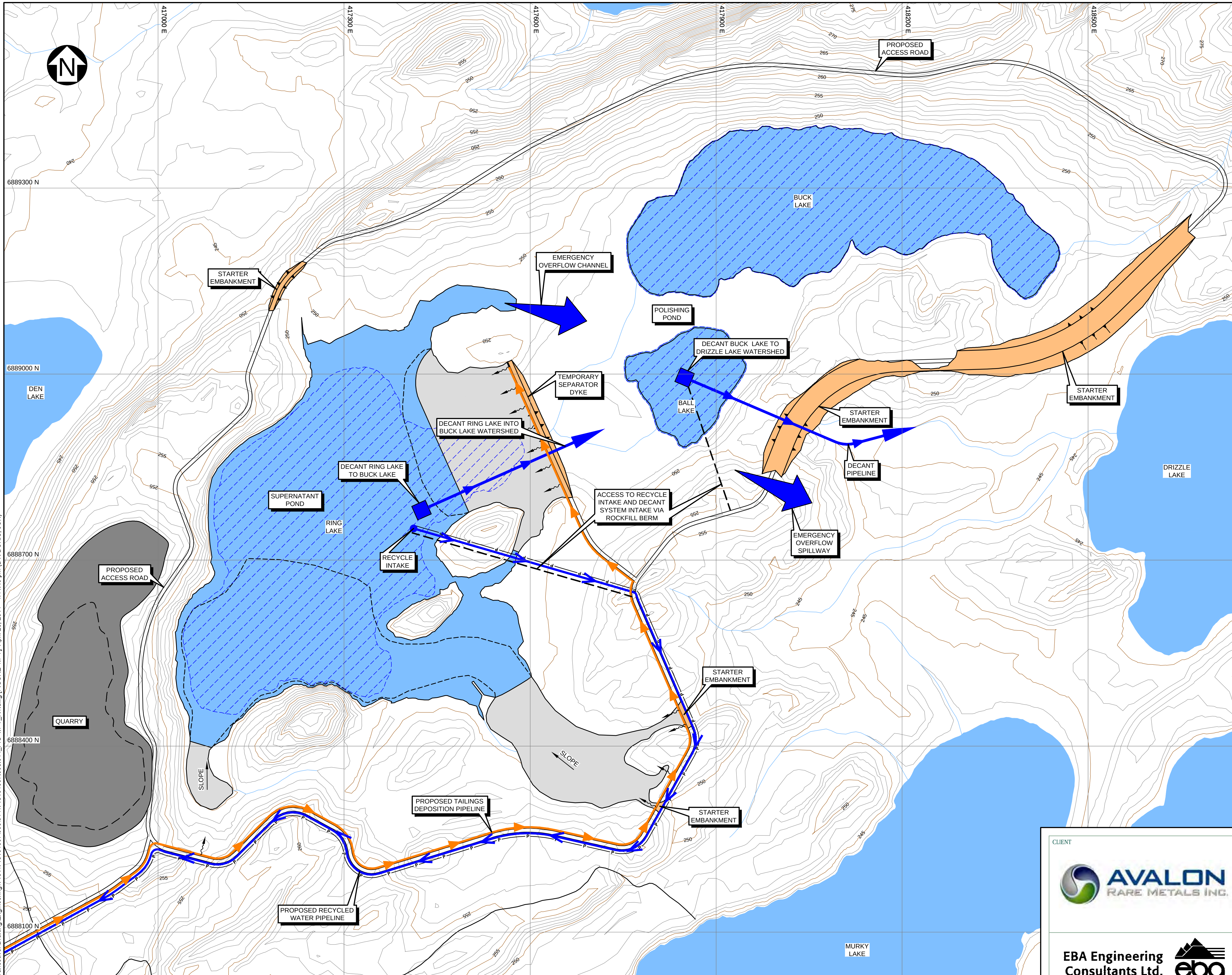
CLIENT	THOR LAKE PROJECT				
AVALON RARE METALS INC.	Tailings Management Facility Feasibility Design Summary General Arrangement				
EBA Engineering Consultants Ltd.	PROJECT NO. V15101007.006.014	DWN JAB	CKD RH	REV 1	Figure 4.7-6
	OFFICE VANC	DATE April 28, 2011			



LEGEND:

- WATER
- TAILINGS
- EMBANKMENT
- EXISTING LAKE FOOTPRINT
- EXISTING ACCESS ROAD
- PROPOSED ROAD
- PROPOSED CAUSEWAY
- PROPOSED TAILINGS DELIVERY PIPELINE
- PROPOSED TAILINGS DEPOSITION PIPELINE
- PROPOSED RECYCLED WATER PIPELINE
- PROPOSED POWERLINE
- DISCHARGE

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 12N AND IS IN METRES.
2. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1 METRE.
3. TAILINGS CONFIGURATION SHOWN REPRESENTS ESTIMATED LAYOUT FOR END OF YEAR 2 OPERATIONS. EMBANKMENT HEIGHTS ARE BASED ON RESULTS OF WATER/SOLIDS BALANCE ANALYSIS (MEMO NB11-00100).
4. FIGURE SOURCE IS KNIGHT PIÉSOLD CONSULTING REF. NB11-00139 FIGURE 2 DATED MARCH 10, 2011.

SCALE 1:6000

50 0 50 150 250m

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AVALON RARE METALS INC.

THOR LAKE PROJECT

Tailings Management Facility
Feasibility Design Summary
Phase 1 Tailings Facility Plan

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
V15101007.006.014	JAB	RH	1
OFFICE	DATE		
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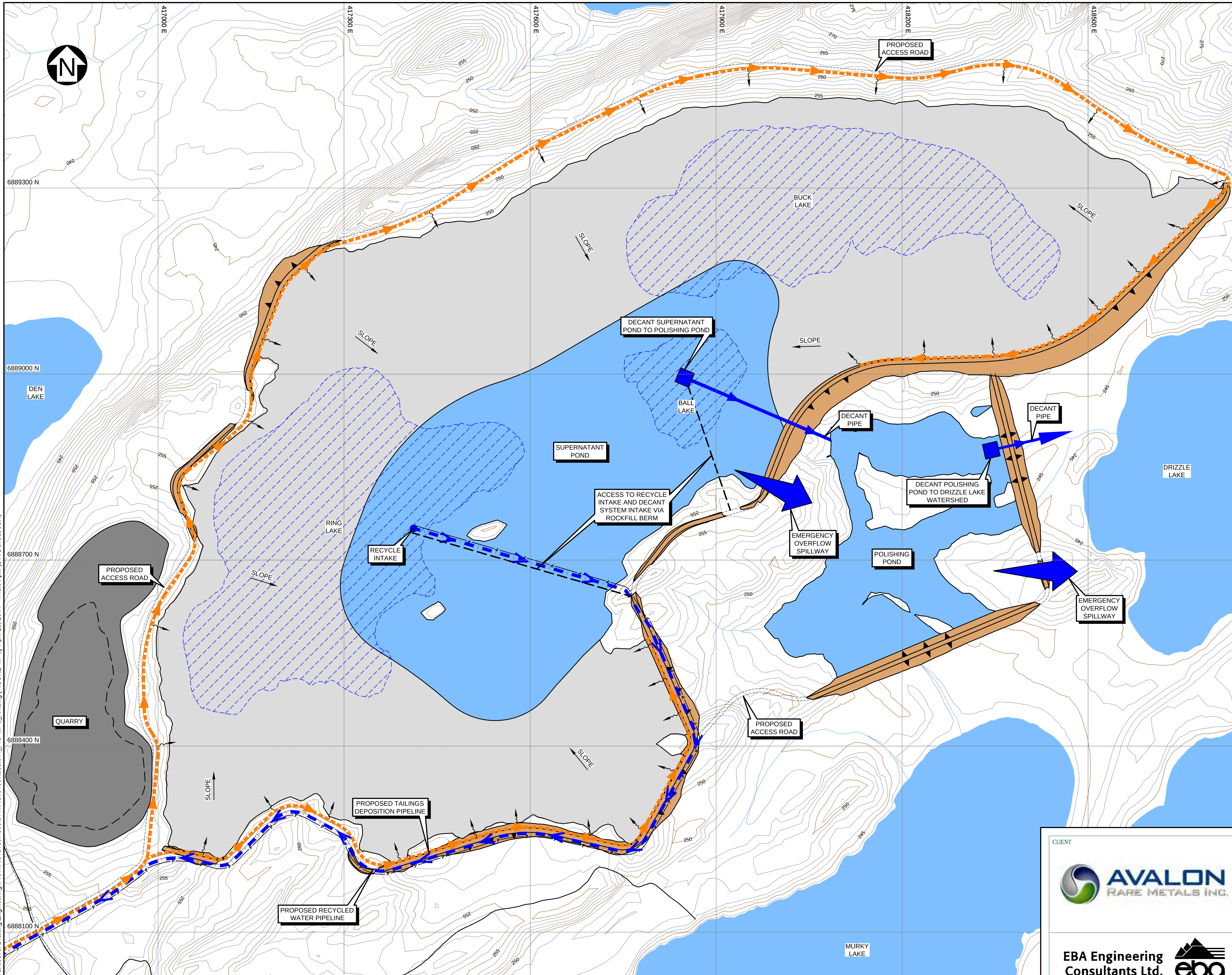
Figure 4.7-7

Q:\Vancouver\Drafting\Engineering\V151\V15101007\006\014\V15101007.006.014_FIG 4.7-7_R1.dwg [FIGURE 4.7-7] April 28, 2011 - 4:44:49 pm (BY: BOKIC, JON)



LEGEND:

- WATER
- TAILINGS
- EMBANKMENT
- EXISTING LAKE FOOTPRINT
- EXISTING ACCESS ROAD
- PROPOSED ROAD
- PROPOSED CAUSEWAY
- PROPOSED TAILINGS DELIVERY PIPELINE
- PROPOSED TAILINGS DEPOSITION PIPELINE
- PROPOSED RECYCLED WATER PIPELINE
- PROPOSED POWERLINE
- DISCHARGE

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 12N AND IS IN METRES.
2. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1 METRE.
3. TAILINGS CONFIGURATION SHOWN REPRESENTS ESTIMATED LAYOUT FOR END OF YEAR 20 OF OPERATIONS. EMBANKMENT HEIGHTS ARE BASED ON RESULTS OF WATER/SOLIDS BALANCE ANALYSIS (MEMO NB11-00100).
4. FIGURE SOURCE IS KNIGHT PIÉSOLD CONSULTING REF. NB11-00139 FIGURE 3 DATED MARCH 10, 2011.

SCALE 1:6000

50 0 50 150 250m

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AVALON RARE METALS INC.

THOR LAKE PROJECT

Tailings Management Facility
Feasibility Design Summary
Final (Phase 2) Tailings Facility Plan

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
V15101007.006.014	JAB	RH	1
OFFICE	DATE		
VANC	April 28, 2011		

Figure 4.7-8

Q:\Vancouver\Drafting\Engineering\V151\V15101007\006\014\V15101007.006.014_FIG 4.7-8_R1.dwg [FIGURE 4.7-8] April 28, 2011 - 4:45:01 pm (BY: BOKIC, JON)

Tailings Management Facility Embankment Construction

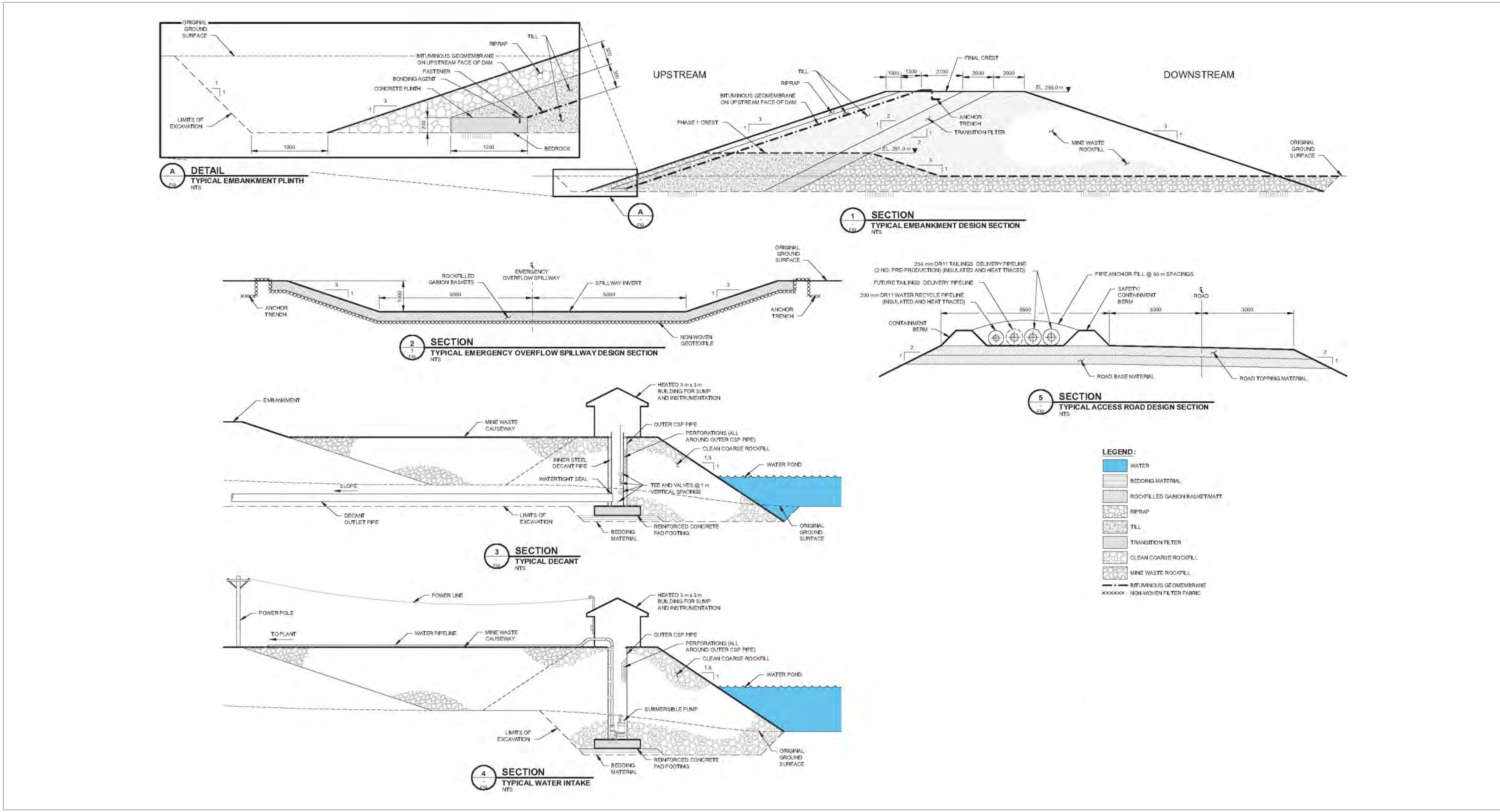
During Phase 1, Ring Lake will act as the Tailings Basin and Buck Lake will act as the Polishing Pond, with a separator dyke constructed between them. Several small embankments will be constructed around Ring Lake to contain the tailings and around Buck Lake to establish a polishing pond. Phase 2 of the facility will include the raising of the existing phase one tailings basin embankments and the construction of two additional small embankments to establish a downstream polishing pond, if required.

The TMF embankments will be constructed from rock fill (mine development and/or waste rock) and till (local borrow). Construction of the two phases will be completed to meet scheduling requirements related to solids containment and water management. The embankments will be raised using the downstream method of construction. The embankment section will consist of a downstream rockfill zone and upstream till zone with a transition/filter zone.

A bituminous geomembrane will be placed on the upstream slope of the till zone, tied into the foundation with a concrete plinth to reduce seepage. A till cover and riprap layer will be placed on top of the geomembrane as a protection layer. The Phase 1 temporary separator dyke will be constructed of waste rock and/or till as its primary purpose is to contain tailings solids. The maximum elevations of the tailings basin and polishing pond embankments will be El. 255.6 m and El. 249 m, respectively. The final crest width will be 9.0 m and slide slopes will be 3H:1V. Typical details of the embankment sections are illustrated in Figure 4.7-9.

A review of the geotechnical conditions in the Thor Lake Project area was completed based on a brief site visit in 2009 and a more thorough site investitgation in 2010 plus a review of available information and previous baseline studies. The geotechnical conditions are summarized in Knight Piésold 2010d, 2009c, 2010j (Appendix C). In addition, a review of the available hydrogeological data was completed (Knight Piésold 2009b).

The available information and site review indicates that the majority of TMF basin and embankments will be underlain by syenite bedrock, with localized areas of till deposits. The bedrock at surface is typically strong, slightly weathered and competent, providing good foundation conditions for embankment construction. Review of available data suggests that bedrock permeability will be low and is a function of discontinuities within the rockmass. Some glaciolacustrine or glaciofluvial deposits may also be present in low lying areas, the characteristics of which will be confirmed during the Phase 2 geotechnical site investigations scheduled to take place and the end of March, 2011. Discontinuous permafrost may be present in these fine grained soils as well as north facing rock outcrops.



NOTES

1. Dimensions are in millimetres and elevations are in metres, unless noted otherwise.
2. Figure Source: Figure 6-5. Scott Wilson RPA 2010.
   *Note: Original figure source is Knight Piesold Consulting, 2010

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THOR LAKE PROJECT

Tailings Facility Cross Sections

PROJECT NO.	DWN	CKD	REV
V15101007.006	SL	RH	0
OFFICE	DATE		
EBA-VANC	May 9, 2011		

Figure 4.7-9

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Foundation preparation for the embankment will mainly consist of the removal of organics and unsuitable materials from the bedrock surface. In some areas, removal of unsuitable material (organics or frozen soils with high ice content) may be completed up to a depth of 2.5 m in low lying areas. For estimating purposes, an average foundation excavation depth of approximately one metre has been assumed for areas where overburden is present. Removal of unsuitable materials would include the removal of organic soils and frozen soils with high ice content. Foundation preparation may also include the treatment of fractures and discontinuities within the bedrock surface with slush grout to reduce any potential foundation seepage.

Tailings Delivery and Distribution

Tailings will be pumped from the flotation plant to the TMF via a tailings delivery pipeline to designated discharge locations from the tailings basin embankments. Tailings deposition to the basin will consist of single end-of-pipe discharge from the tailings deposition pipeline to reduce icing concerns during the winter months. During the first year of operations, 100% of the tailings solids at an approximate rate of 53 m^3 per hour, will be pumped to the tailings basin at a slurry consistency of 50% solids. Starting in year five approximately 50% of the tailings will be bypassed and utilized in the on-site cement pastefill plant for redirection underground.

The tailings deposition pipeline will run along the southern perimeter of the tailings basin (Ring Lake) during Phase one of operations. Tailings deposition to the basin will occur from several locations along the south and east areas of Ring Lake as previously shown in Figure 4.7-7. Tailings discharge will be cycled between deposition locations to develop a relatively flat tailings beach sloping towards the north and west, to maintain a supernatant pond in the central portion of Ring Lake. A temporary separator dyke will be constructed between Ring and Buck Lakes to retain the tailings solids in Ring Lake and to allow Buck Lake to be initially operated as a polishing pond. The Phase 1 configuration is estimated to provide tailings storage for approximately 2 years of operations.

During Phase two of operations, the tailings discharge pipeline will be extended around the TMF perimeter embankments as previously shown in Figure 4.7-8. Additional discharge locations will be installed around the perimeter of the TMF and tailings deposition will be switched between outlet locations to develop a relatively flat tailings beach around the facility and to maintain a supernatant pond in the central portion of the TMF. A new polishing pond will be constructed at the southeast side of the TMF if monitoring and testwork completed during phase one operations indicate that it is required.

4.7.3.4 Sewage and Greywater

Sewage and greywater waste from the operation will be processed through a packaged sewage treatment plant (Rotating Biological Contactor) designed to handle the Nechalacho Mine and Flotation Plant workforce. Treated sewage effluent will report to the tailings sump that will be comingled into the tailings slurry. The slurry will report to the Tailings Management Facility.

4.7.3.5 Site, Solid and Hazardous Waste

Garbage will be collected daily and incinerated consistent with current industry good management practices and in compliance with regulatory requirements. Recyclable materials will be collected separately and shipped out annually for processing. A waste management site will be established on-site for the temporary storage of waste materials prior to removal. Waste oil will be used in oil heaters throughout the facility

Generated solid wastes will be managed in accordance with NWT regulations and issued licenses or permits similar to Avalon's current management of site solids and wastes. Hazardous materials waste will be disposed of in accordance with current GNWT hazardous waste management guidelines using standard best management practices. Waste will be disposed of either on-site or be shipped to an approved off-site facility designed to handle hazardous wastes.

4.7.4 Water Management

The primary objectives of the Nechalacho Mine and Flotation Plant site water management plan are to:

- Water Balance Provide potable water for surface facilities;
- Provide the Flotation Plant with a reliable water supply throughout the Project;
- Dewater the underground operations as necessary to maintain stability and facilitate mining;
- Capture and manage all waters and effluent directed to the proposed tailings management facility.

4.7.4.1 Environmental Characterization of Waste Rock, Tailings, Ore and Concentrate

The tailings and water management strategy for the Nechalacho Mine and Flotation Plant site consists of a closed loop system to minimize effects on the natural hydrologic flows within the Thor Lake watershed area. All tailings solids and fluids, as well as, process effluent from the Flotation Plant will report to the tailings basin. The TMF design currently includes a polishing pond. Excess water from the tailings basin will be treated (if necessary) and discharged from the polishing pond to Drizzle Lake. Ultimately, all water from the TMF will return to Thor Lake via Drizzle and Murky lakes.

Freshwater for operations will be drawn from Thor Lake and reclaim water will be drawn from the tailings basin. The water balance assumes that the process water fed to the Flotation Plant will consist of 50% freshwater and 50% recycled water from the TMF. The components of the Nechalacho Mine and Flotation Plant water balance are illustrated in Figure 4.7-10.

Decant pipeworks have been included in the design to transfer water from the tailings basin supernatant pond to the polishing pond in phases one and two, and to transfer water from the polishing pond to Drizzle Lake.

The overall water balance for the Nechalacho Mine and Flotation Plant site will be managed to ensure that the water level in Thor Lake will conform year-round to the specifications of the 2010 DFO Protocol for Winter Water Withdrawal.

4.7.5 Support Infrastructure

4.7.5.1 Power Supply

All site power is currently planned to be generated by a diesel powered generation facility at the site. Wind, biomass, and geothermal power are also being investigated as supplementary power sources for the Nechalacho Mine and Flotation Plant site however; these alternatives will be subject to a separate review and permitting process. Ongoing third party test work is being conducted in partnership with the Yellowknives Dene First Nation to investigate the feasibility of wind power. Until additional technical support studies identify the feasibility of wind power for the Nechalacho Mine and Flotation Plant site, Avalon has committed to power that will be supplied by diesel generation.

The planned power plant will consist of eight modular diesel generators with a capacity of 1.3 MW. The power requirements will average 8.4 MW for the 2,000 tpd operation (Table 4.7-5). This table does not include separate emergency generators that will be required for the camp and may be required for some areas of the Flotation Plant.

Power will be generated at 4,160 V and distributed to the mill, administration and employee facilities at 4,160 V. Power will also be distributed to the grinding mills, the underground mine, the surface mine fans, mine air heater and the tailings pumps.

At the point of use at the fans and tailings area, the power will be transformed to 600 V for use. Within the Mine, a series of 4,160 V:600 V transformers will be used.

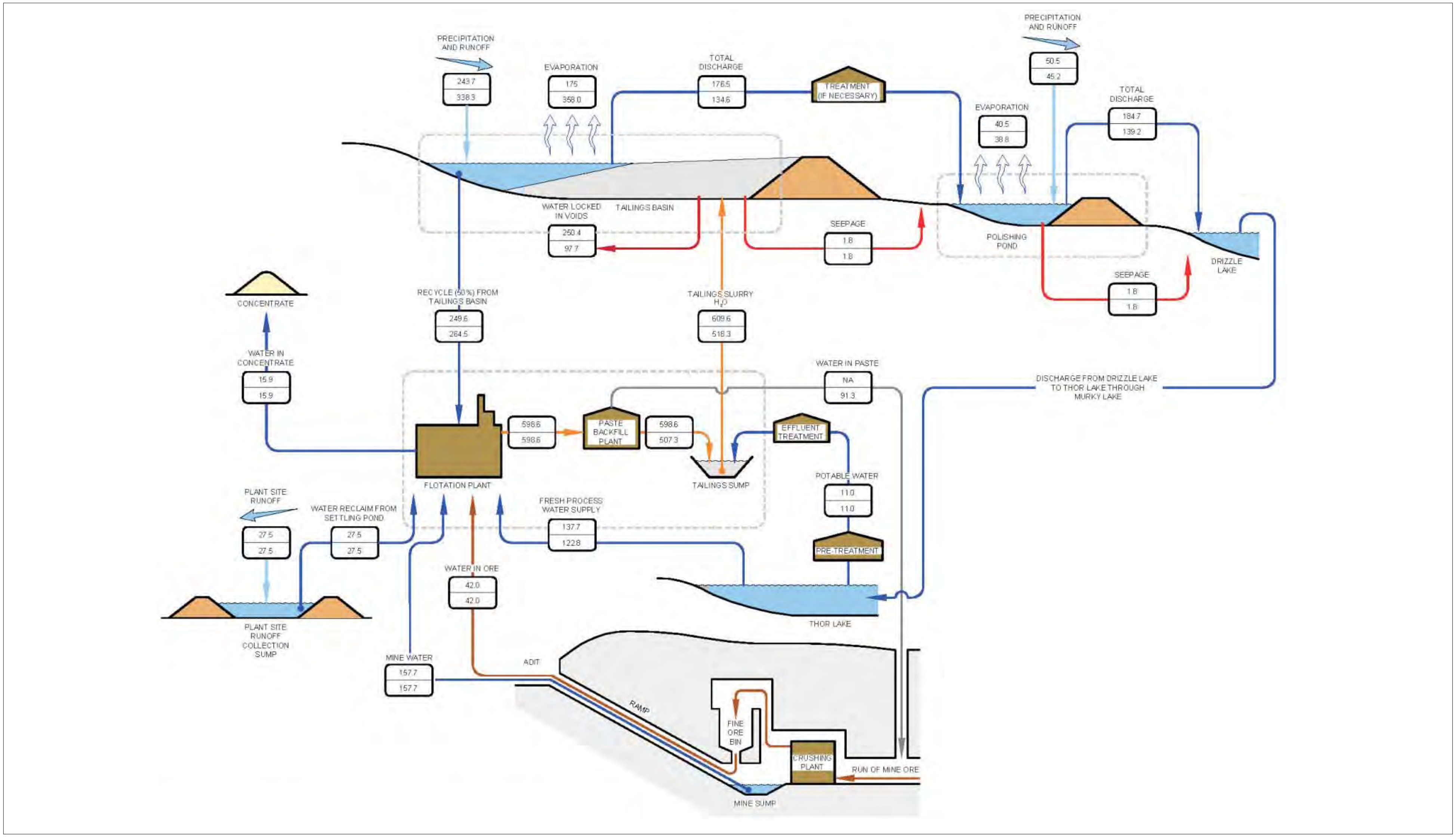
TABLE 4.7-5: ESTIMATED POWER DEMAND

Area	Average (MW) 2,000 tpd
Mill	6.0
Mine	1.2
Camp	0.8
Surface	0.4
Total	**8.4**

Additional Power

Standby diesel generators for the camp and critical Flotation Plant equipment will be required and installed in a separate power house. This will ensure that a major power failure or loss of the main power house will not impact the standby units. Two 500 kW units with the ability to synchronize the two will be installed as emergency back-up power.

A small diesel generator will also be required near the dock facility to provide power for lights, a small office and diesel transfer pumps. A 100 kW unit has been included in the plan for this area. The unit will be mounted in a skid equipped container with its own switchgear and a day tank for operation.



LEGEND:

YEARS 1-4	ANNUAL FLOW IN THOUSAND m³/yr
YEARS 5-20	

NOTES

1. Estimates are for average precipitation conditions and do not include extreme precipitation events.
2. Figure Source: Knight Piesold Consulting, March 2011 (Ref No. NB11-00148, Figure 5).

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THOR LAKE PROJECT

Nechalacho Mine and Flotation Plant Site Water Balance Flowsheet

PROJECT NO.	DWN	CKD	REV
V15101007.006	SL	RH	0
OFFICE	DATE		
EBA-VANC	March 21, 2011		

Figure 4.7-10

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4.7.5.2 Site

The Nechalacho Mine and Flotation Plant facilities will be comprised of a combination of prefabricated and steel structures. The site surface facilities are planned to be organized into a compact footprint to minimize potential environmental effects and to optimize operational considerations. The facilities will be connected by corridors to provide pedestrian access in all weather conditions between the Flotation Plant / warehouse / power plant / maintenance shop / administration offices and employee camp facilities. The linked design will maximize heating efficiencies and minimize energy consumption. An uncovered fuel storage and laydown yard for construction supplies and materials will be located on the west side of the Flotation Plant.

Planned site structures include:

- Flotation Plant;
- Reagent Storage;
- Paste Backfill Plant;
- Warehouse;
- Maintenance Shop and Administration Offices;
- Employee Camp Facilities;
- Dry;
- Power Plant;
- Container Loading Facility.

4.7.5.3 Fuel Storage

Annual diesel fuel requirements are estimated at approximately 21 M litres/year for the life of mine planned production rate. Diesel fuel will be transported from the south side of Great Slave Lake to the barge dock at the Nechalacho Mine and Flotation Plant site. The barging contractor (tentatively Northern Transportation Company Limited) (NTCL) is equipped to load and transfer fuel at its Hay River base and has barges with the capacity to haul 1 M litres per barge. Upon arrival, fuel will be offloaded by pump and piping to two upland receiving 1.5 M litre fuel storage tanks to be located several hundred metres up the access road away from the dock at Great Slave Lake. The fuel will then be transferred by tanker truck to the main storage facility to be located west of the Flotation Plant near the diesel generators.

Dock Fuel Storage Facility

The fuel storage facility at the dock will contain two 1.5 M litre storage tanks as shown in Figure 4.7-11. This size will allow a complete barge load (3 barges) of fuel to be offloaded without disruption. The tank will be in a lined and bermed area approximately 50 m long by 50 m wide. The berm will be approximately 1 m high to provide a bermed storage volume of 110% of a single tank capacity in conformance with the Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Fuel Storage Tanks.

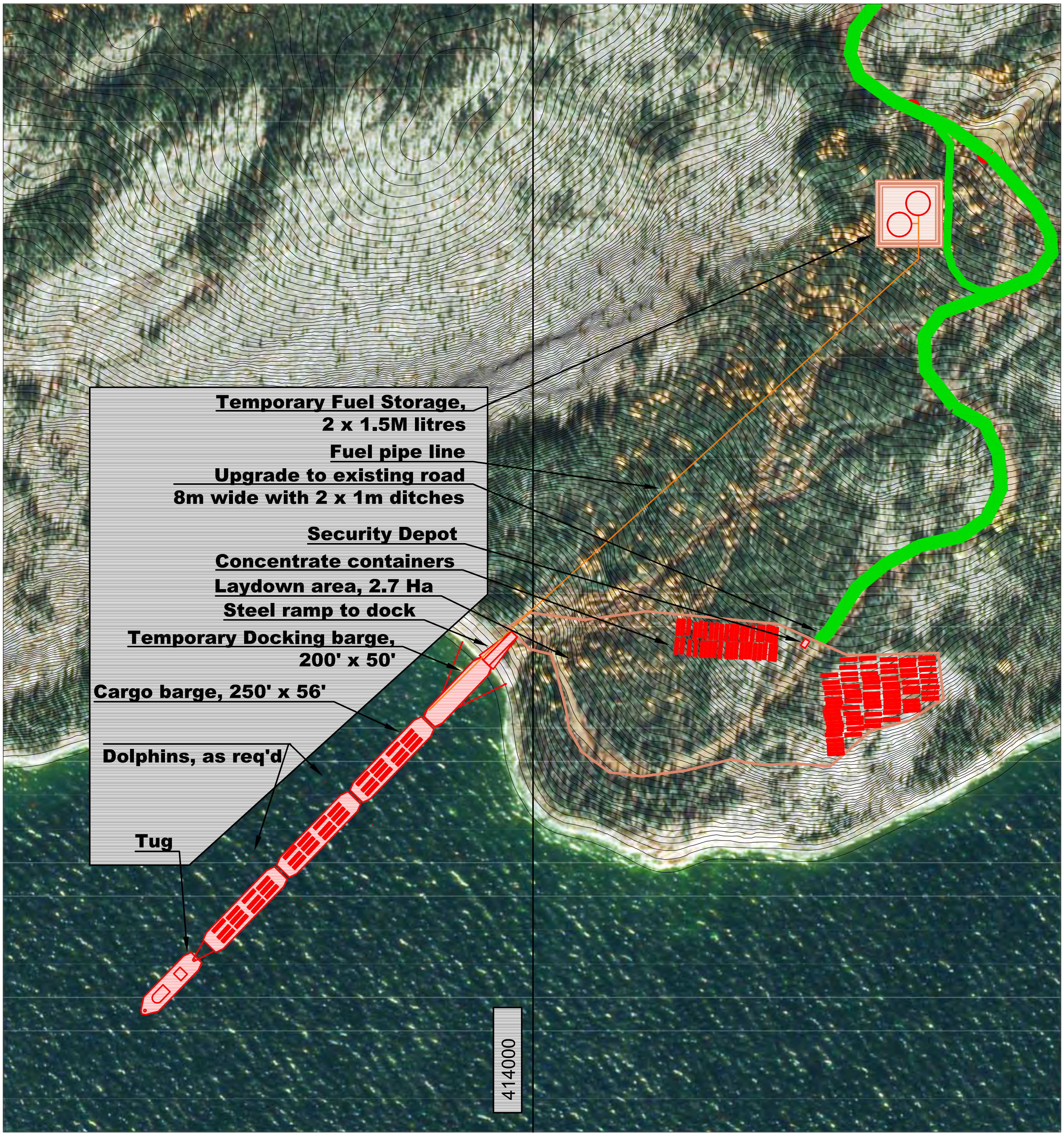
Main Fuel Storage Facility

The fuel will be transported by tandem axle fuel tanker trucks from the dock storage facility to the main fuel storage facility (see Figure 4.5-1). The main storage facility will be located on the west side of the Flotation Plant near the diesel power plant. It will contain four 4.5 M litre capacity tanks within a bermed area. This will include fuel loadout from tankers and a dispensing station for vehicles. All mobile equipment on the Nechalacho Mine and Flotation Plant site, including personnel vehicles, will be diesel fuelled. The final phase of the main storage facility with four tanks will require a berm height of 2.3 m with outside dimensions of approximately 152 m by 55 m to conform with the CCME Code of Practice.

4.7.5.4 Explosives Storage

The storage of explosives will be conducted in accordance with the federal explosives storage guidelines. Explosives will be stored on the surface in a temporary explosives and detonator magazine during construction. Once the underground magazines are constructed, all ANFO explosives and detonators will be stored in separate approved explosives magazines which will be located underground.

The main explosive planned for use at the Nechalacho Mine is ammonium nitrate fuel oil (ANFO). The ANFO will be supplied on a weekly basis from Yellowknife. There will also be a need for "stick" powder for presplitting certain rounds and/or for boosting the ANFO in some applications. These will be provided by a reputable explosives manufacturer in containers which will be stored and inventoried underground.



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NOTES
Avalon, February 22, 2011

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THOR LAKE PROJECT

Nechalacho
Docking Facilities

PROJECT NO.	DWN	CKD	REV
V15101007.006	KW	RH	0
OFFICE	DATE		
EBA-VANC	March 14, 2011		

Figure 4.7-11

During full production at Nechalacho, the mine will utilize approximately 671 kilograms of ANFO each day for both production stope and face blasting. Assuming a 4.0% loss in handling and loading of faces, Avalon has calculated that 3.47 mg/l of ammonia and 11.95 mg/l of nitrates will be present in the process water reporting to the Tailings Management facility. This number is not reflective of natural precipitation additions or further dilution downstream. Calculations are shown in Table 4.7-6.

TABLE 4.7-6: ESTIMATE OF NITRATES RELEASED TO ENVIRONMENT	
Annual Production Tonnes	730,000 Tonnes
Annual Development Tonnes	4,358 Tonnes
Production Powder Factor	0.33 Kg/Tonnes
Development Powder Factor	0.88 Kg/Tonne
Subtotal, production ANFO usage	240,900 Kg
Subtotal, development ANFO usage	3,835 Kg
Total annual ANFO usage	244,735 244,735 Kg
Total daily ANFO usage	671 Kg
% Ammonia Nitrate in ANFO	96.00%
Total Ammonium Nitrate	234,946 Kg
% Ammonia in ANFO	22.50%
% Nitrates in ANFO	77.50%
Daily output ammonia	144.8 Kg
Daily output Nitrates	498.9 Kg
Assumed losses	4.00%
Total est. daily ammonia loss to environment	5.8 Kg
	5,793,180 mg
Total est. daily Nitrate loss to environment	20.0 Kg
	19,954,28 mg
Annual process water output	609,600 m^3
	609,600,000 litres
Daily process water output	1,670,137 litres
Concentration of ammonia in process water	**3.47 mg/l**
Concentration of nitrates in process water	**11.95 mg/l**