



**AVALON**  
RARE METALS INC.  
*MATERIALS FOR CLEAN TECHNOLOGY*

# Technical Session Presentation August 14-17, 2012

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TSX & NYSE AMEX: AVL



# Presentation Content

- Wildlife Review
- Accidents and Malfunctions
- Mine waste management, waste rock and tailings, both sites
- Closure and reclamation, both sites

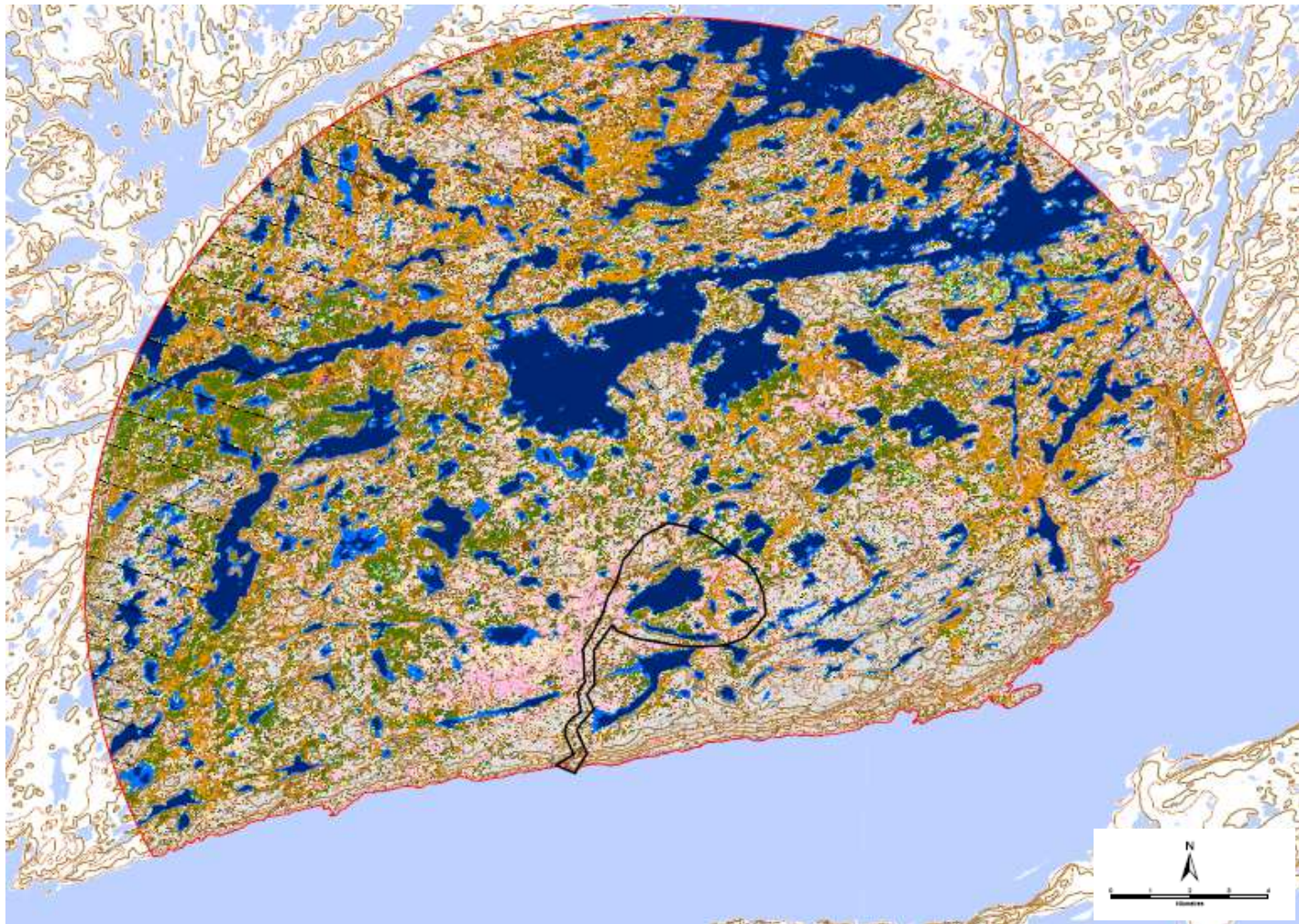


**Day 3 (Aug 16)**  
**NECHALACHO, THOR LAKE**  
*Wildlife Review*





# Local and Regional Study Area





# Valued Ecosystem Components

VEC Grouping	VEC's
Air Quality	Air Quality (indicators)
Water Quality	Surface / Groundwater Quality (indicators)
Fish and Aquatic Resources	Fish and Aquatic Invertebrates
Terrestrial Vegetation	Traditional Use Plants / Rare Plants
Wildlife	Moose Caribou - Barren-ground & Woodland Black Bear Fur-bearers Breeding birds Raptors SARA listed Species





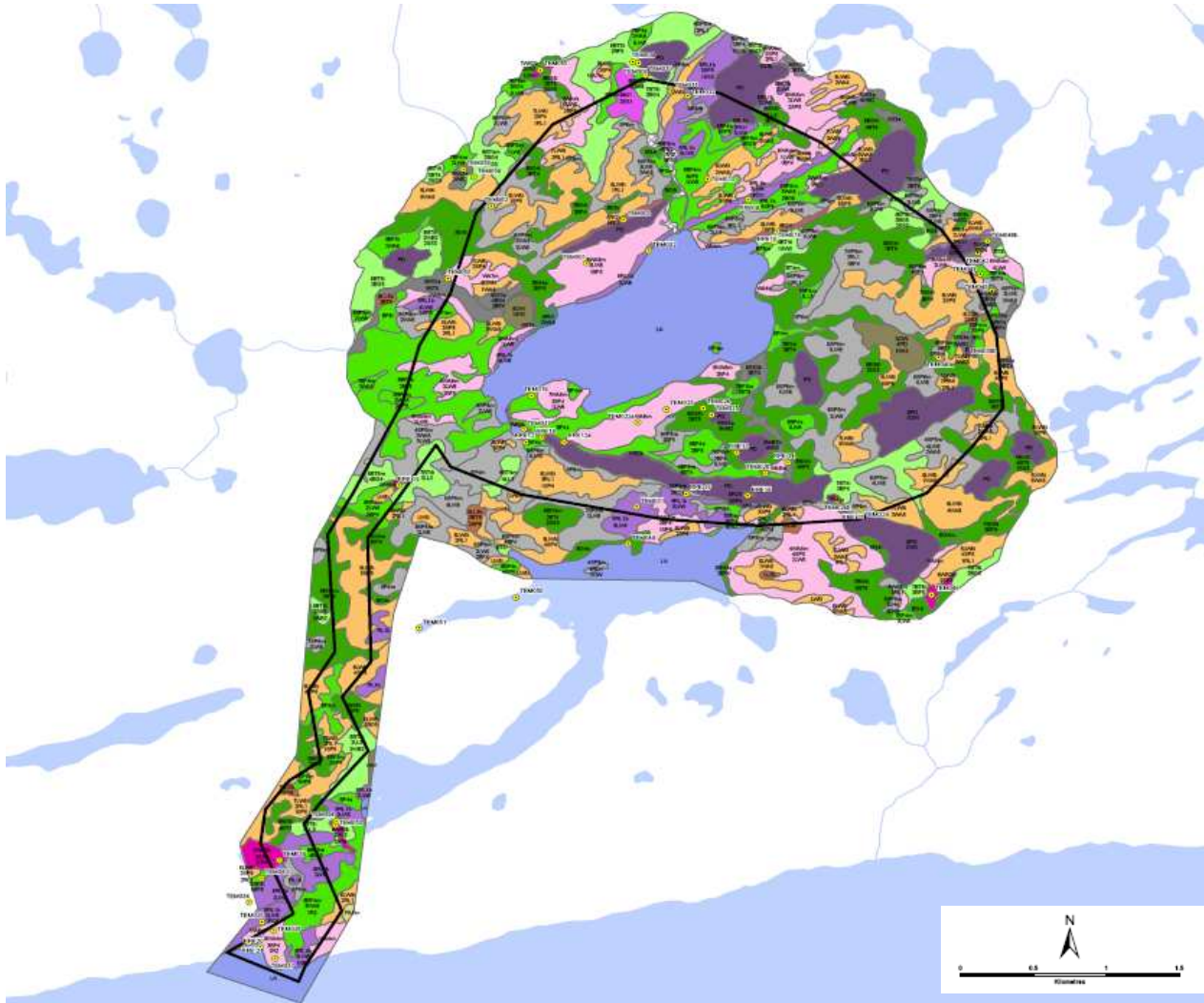
# Vegetation







# Vegetation





# Vegetation

Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Minor loss of vegetation; localized ecosystem fragmentation; potential loss of rare plant habitat, dust generation	<p>Minimize footprint - maximize use of existing disturbed terrain (e.g. at hydromet plant and associated tailings containment facility)</p> <p>Minimize off-site activities. salvage mineral topsoil; implement erosion control measures</p> <p>Avoid development on rare ecosystem types</p> <p>Use of dust suppressants</p>
Operations	<p>Compaction of mineral soil,</p> <p>Air emissions, dust generation</p>	<p>Disposal of all hazardous wastes in approved manner</p> <p>Conformance with Guideline for Ambient Air Quality Standards in the Northwest Territories</p> <p>Use of dust suppressants</p> <p>Progressive site reclamation</p>





# Wildlife





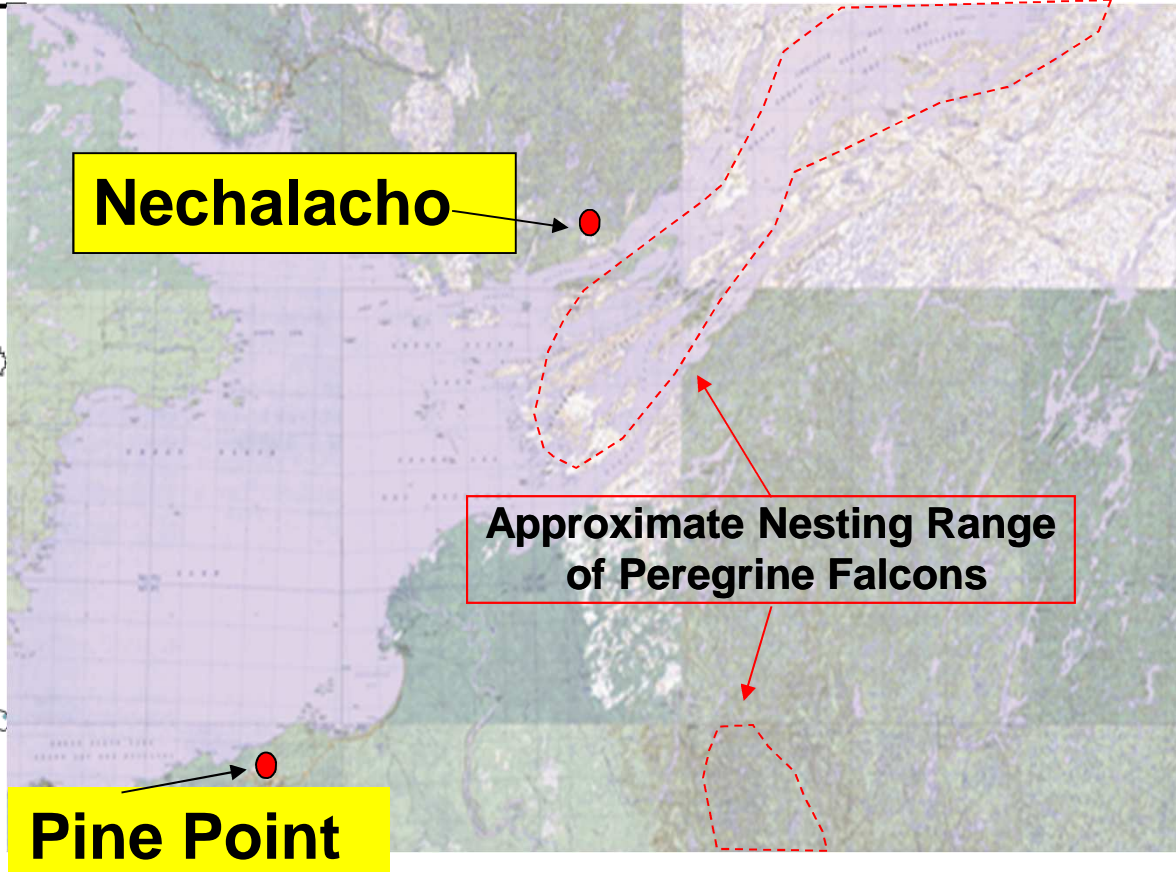


# Barren-Ground Caribou – Winter Range





# Wildlife: Peregrine Falcon







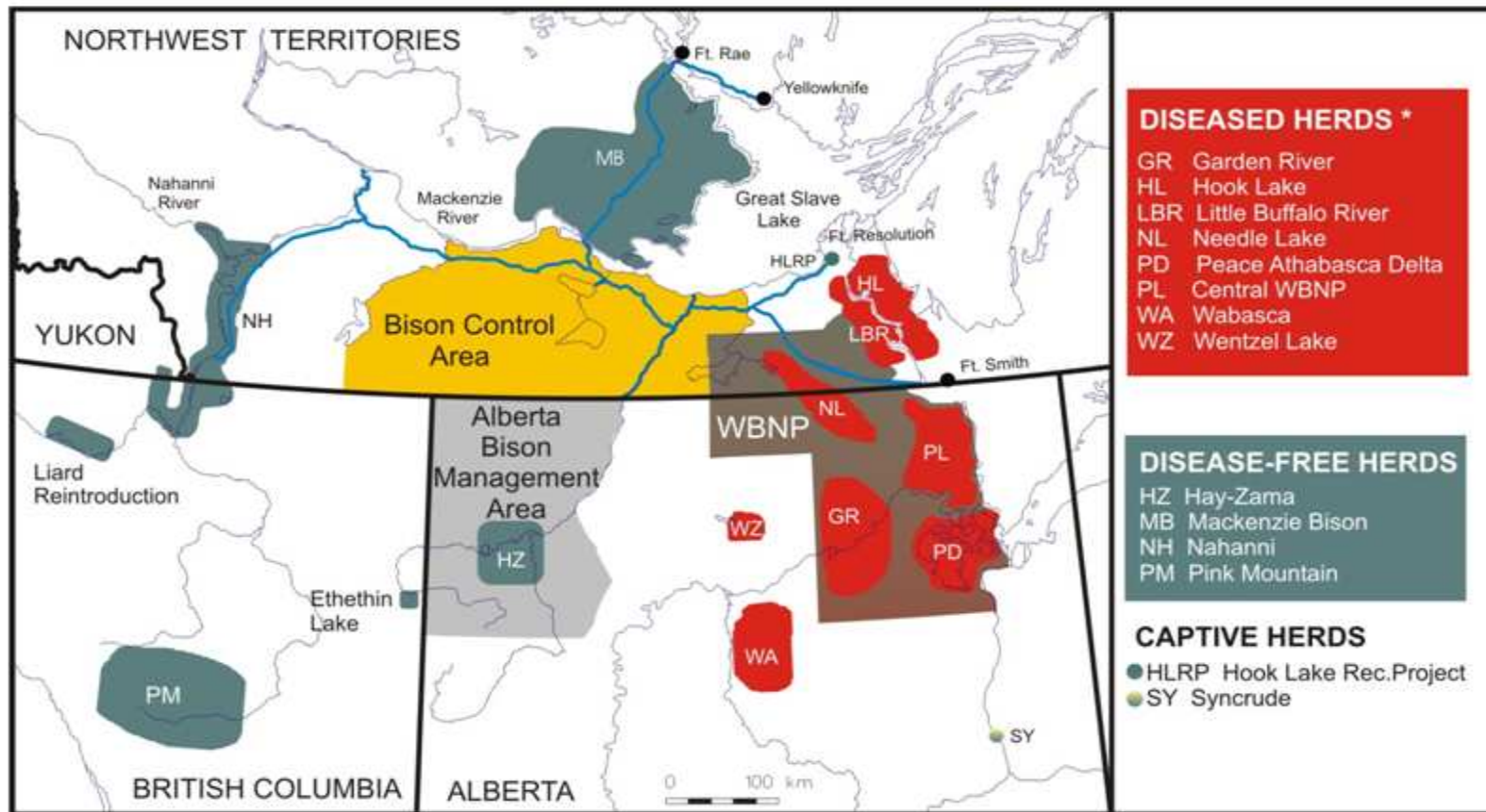
# Wildlife: Woodland Caribou

- Woodland Caribou occur in low numbers in Hydromet Plant area year-round
- Calve in upland wooded areas - not present in Project area



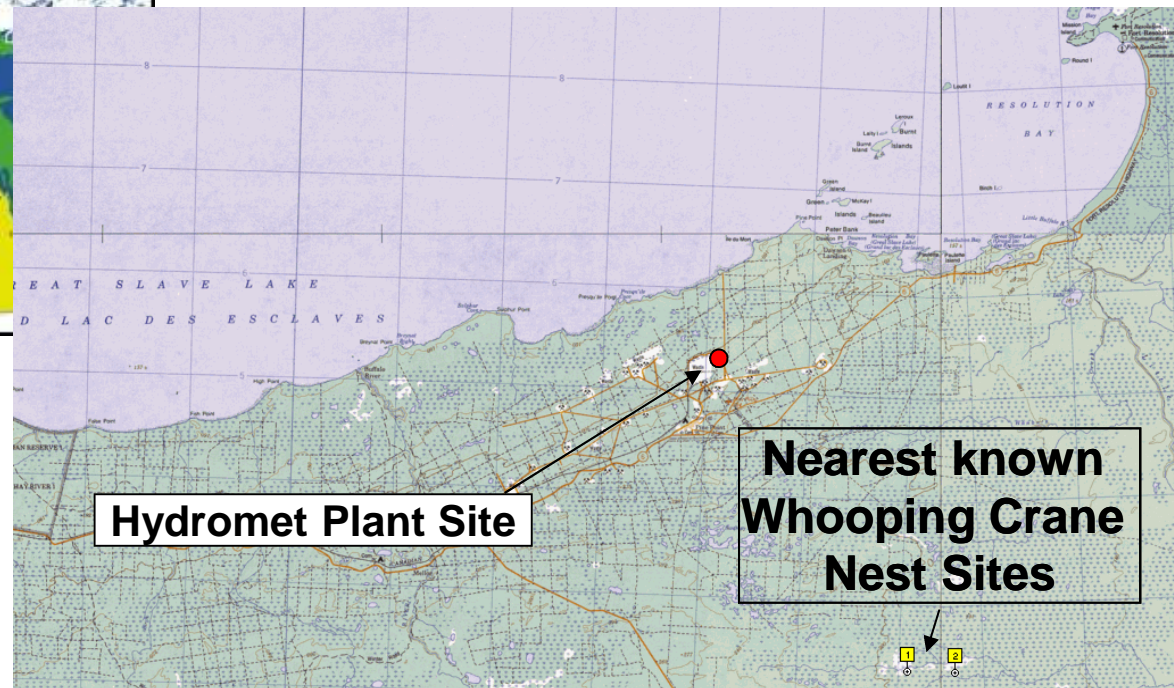
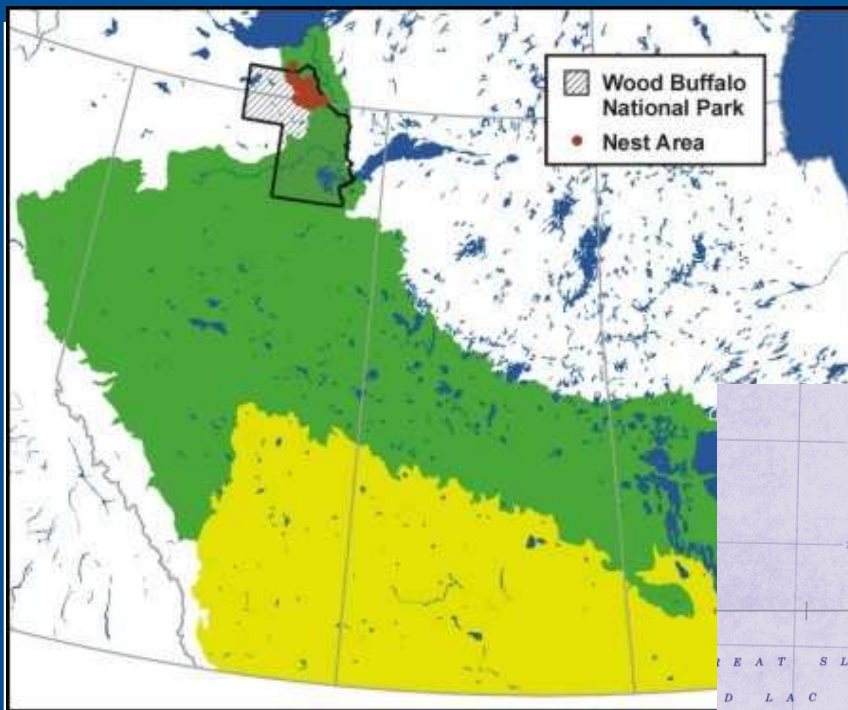
# Wildlife: Wood Bison

Project Located in Bison Control Area





# Wildlife: Whooping Crane







# Wildlife

Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Disturbance and removal of wildlife habitat	Minimize footprint, maximize use of existing disturbed terrain, avoid sensitive areas
Plant Site	Disturbance and removal of wildlife habitat	Minimize footprint, maximize use of existing disturbed terrain, avoid sensitive areas
Underground Mining	No impacts anticipated	None required
Process Wastes	Potential hazard to local wildlife	Process wastes contained in engineered tailings containment facilities to be reclaimed in accordance with Avalon reclamation plan and regulatory requirements
Solid Waste and Hazardous Waste	Some solid wastes can attract wildlife, which can become a safety hazard	Combustible wastes incinerated - Hazardous wastes stored & disposed of in approved manner
Other Infrastructure	Temporary, rapidly reversible disturbance	Application of wildlife protection measures - wildlife have the right-of-way



# Summary of Anticipated Environmental Effects

- Avalon is confident that with the application of:
  - Sound engineering environmental planning and best management practices,
  - Aboriginal participation and collaboration, and
  - Compliance with anticipated permits, licenses, approvals, existing federal and territorial environmental regulations and guidelines,
- **That the environmental concerns associated with the development and operation of the Thor Lake Project can be effectively addressed, managed and mitigated.**
- Avalon's goals for closure and reclamation will be consistent with INAC's guidelines for closure and reclamation planning for mines as well as the requirements of the anticipated Land Use Permit.



## **NECHALACHO, THOR LAKE**

### ***Accidents & Malfunctions***





# Accidents & Malfunctions

- Tailings Dam Failure (Nechalacho)
  - Canadian Dam Association (CDA) Dam Safety Guidelines
  - The Mining Association of Canada (MAC) Guide for the Management of Tailings Facilities
- Barging on Great Slave Lake (GSL)
  - Potential barge sinking causing containers to spill into GSL;
    - 75 years with no incident (NTCL)
    - Proven safe operations
  - Effects of concentrate in GSL;
    - Unlikely however, Avalon would require Barge Company to utilize existing recovery methods to retrieve materials
    - Test work has identified the concentrate to be inert, non-reactive and thus insoluble
  - Potential fuel spillage from barging operations;
    - Isolated compartments
    - Not loaded to full capacity
    - Annual barge inspections and certifications



**NECHALACHO, THOR LAKE**  
*Mine Waste Management, Waste  
Rock and Tailings*



# Waste Management Commitments

- Hazardous materials will not be incinerated at either site
- Used oils will be burnt and approved in used oil heaters
- All solid, non-combustible and non-hazardous waste will be consolidated and disposed in approved landfills
- Disposal of hazardous wastes in an approved manner
- All solid wastes will be managed in accordance with NWT regulations
- Avalon will develop a conceptual waste management plan that complies with all applicable legislation



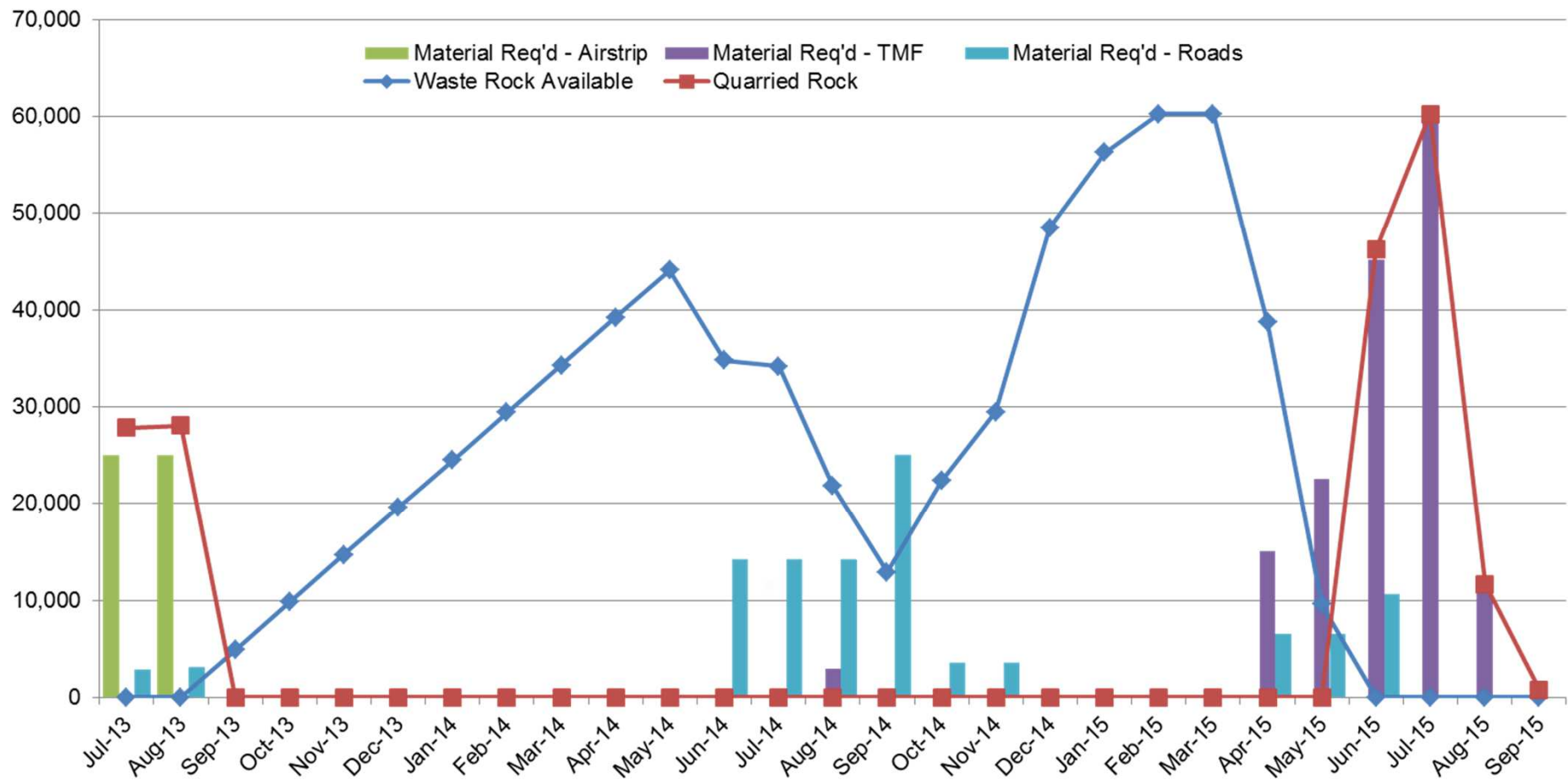


# Construction Summary (Waste vs Quarry)

Item	Cut/Fill	Material Type	Material Source	Total Volume
				(m <sup>3</sup> )
<i>Pre-production Underground Waste Rock Development</i>	<i>Cut</i>	<i>Rockfill (tonnes)</i>	<i>Underground</i>	<i>275,786</i>
Pre-production Underground Waste Rock Development	Cut	Rockfill (m <sup>3</sup> )	Underground	-137,891
Pre-production Phase 1 Quarry Development	Cut	Rockfill (m <sup>3</sup> )	Quarry	-174,809
North Access Road - Fill	Fill	Rockfill	Quarry	56,700
Phase 2 Airstrip	Fill	Rockfill	Quarry	50,000
Fresh Water Supply Access Road - Fill	Fill	Rockfill	Quarry	1,000
Fresh Water Supply Access Road - Road Topping	Fill	Road Topping	Processed Material	450
Temporary Separator Dyke - Foundation Pad	Fill	Rockfill	Waste Rock	3,000
Temporary Separator Dyke	Fill	Rockfill	Waste Rock	2,900
North Access Road - Road Topping	Fill	Road Topping	Processed Material	15,000
North Access Road - Containment/Safety Berms	Fill	Rockfill	Processed Material	4,500
North Access Road - Pipe Ballast/Anchors	Fill	Ballast	Processed Material	2,600
North Access Road - Arch Culvert Cover	Fill	Rockfill	Processed Material	300
TMF Perimeter Access Road - Fill (not on embankment sections)	Fill	Rockfill	Waste Rock	13,000
TMF Perimeter Access Road - Road Topping	Fill	Road Topping	Processed Material	10,600
TMF - Rockfill Access Causeway	Fill	Rockfill	Waste Rock / Quarry	200
TMF - Clean Rockfill Access Causeway	Fill	Rockfill	Waste Rock / Quarry	250
TMF Perimeter Embankments - Rockfill	Fill	Rockfill	Waste Rock / Quarry	105,000
TMF Perimeter Embankments - Processed Fill	Fill	Various Fill	Processed Material	45,600
Spillways and Outlet Ditches - Rip Rap	Fill	Rockfill	Waste Rock / Quarry	1,600



# Waste Rock Schedule





# Tailings Design Criteria

- Volume Tailings to TMF:  $3.43 \text{ Mm}^3$  (4.46 Mt) - Life of Mine
- Slurry Consistency: 65% solids
- Settled Dry Density:  $1.3 \text{ t/m}^3$
- CDA Consequence Category for perimeter embankments is “Significant”. Based on the Canadian Dam Association (CDA) guidelines:
  - Emergency Overflow Spillway to convey 1 in 1,000 Year 24 Hour Storm;
  - Maximum Design Earthquake: 1 in 1,000 year (0.035 g).
- Perimeter Embankment Freeboard:
  - Environmental Design Storm (EDS): 1 in 25 year 24 Hour Storm Event (46 mm);
  - Minimum Spillway Freeboard Allowance: IDF (based on hydrology) plus 1.0 m for wave run-up.





# Tailings Operations

- Perimeter containment provided by rockfill embankments (lined upstream slope) and natural bedrock valley containment
- Tailings deposited from western perimeter embankment to form sloping beach sloping from west to east
- Combination of spiggotting and end discharge to manage beach during both summer and winter conditions
- Additional “clean” waters transferred to TMF (underground water and plant site runoff)
- Separator Dyke between Tailings and Polishing Pond
- Supernatant and runoff routed through internal dyke to east side of facility
- Water released to Drizzle Lake via Pump Barge in Polishing Pond
- Between year 7 and 9, second separator dyke constructed downstream (if required for clarification) and initial Separator Dyke allowed to overtop with tailings
- Discharge to Drizzle Lake to follow natural hydrologic patterns to greatest degree possible

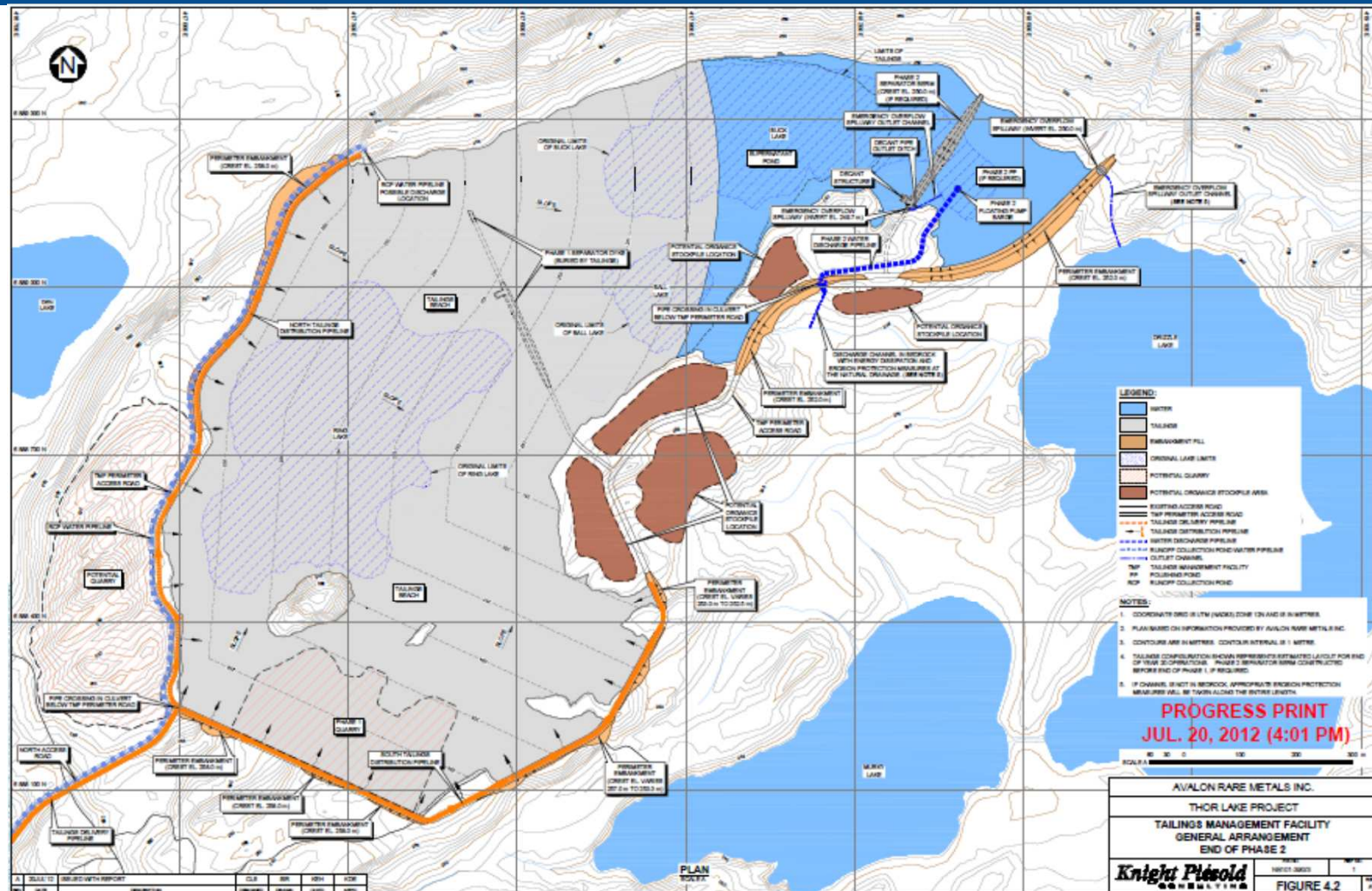
# AVALON







# Tailings Facility (Years 9 - 20)

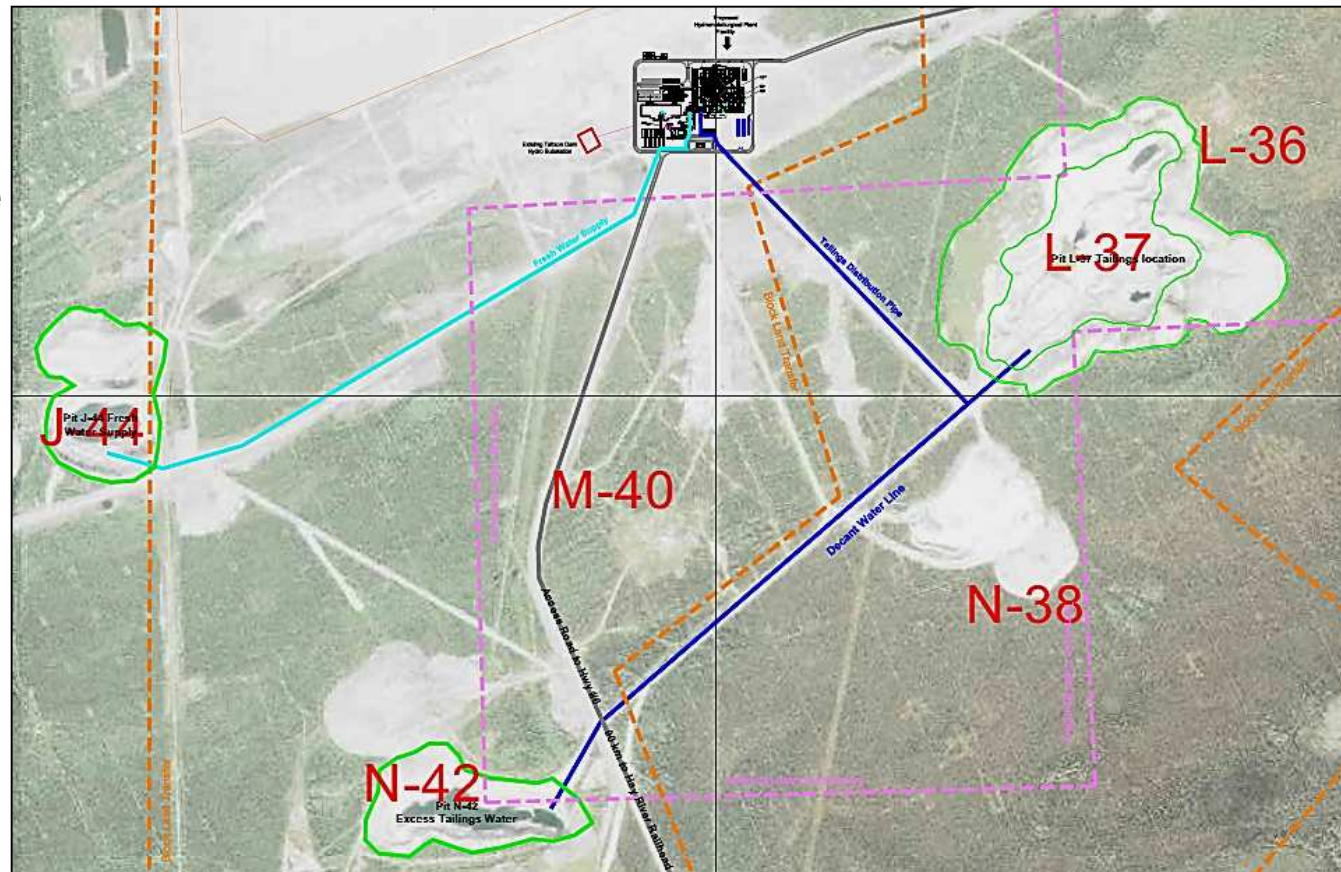






# Hydrometallurgical Tailings Facility (HTF)

- HTF
  - Tailings Deposited into historic L-37 Pit
- Fresh water supply
  - Existing J-44 Pit
- Excess Water Discharge
  - Historic N-42 Pit





# HTF Design Criteria and Operations

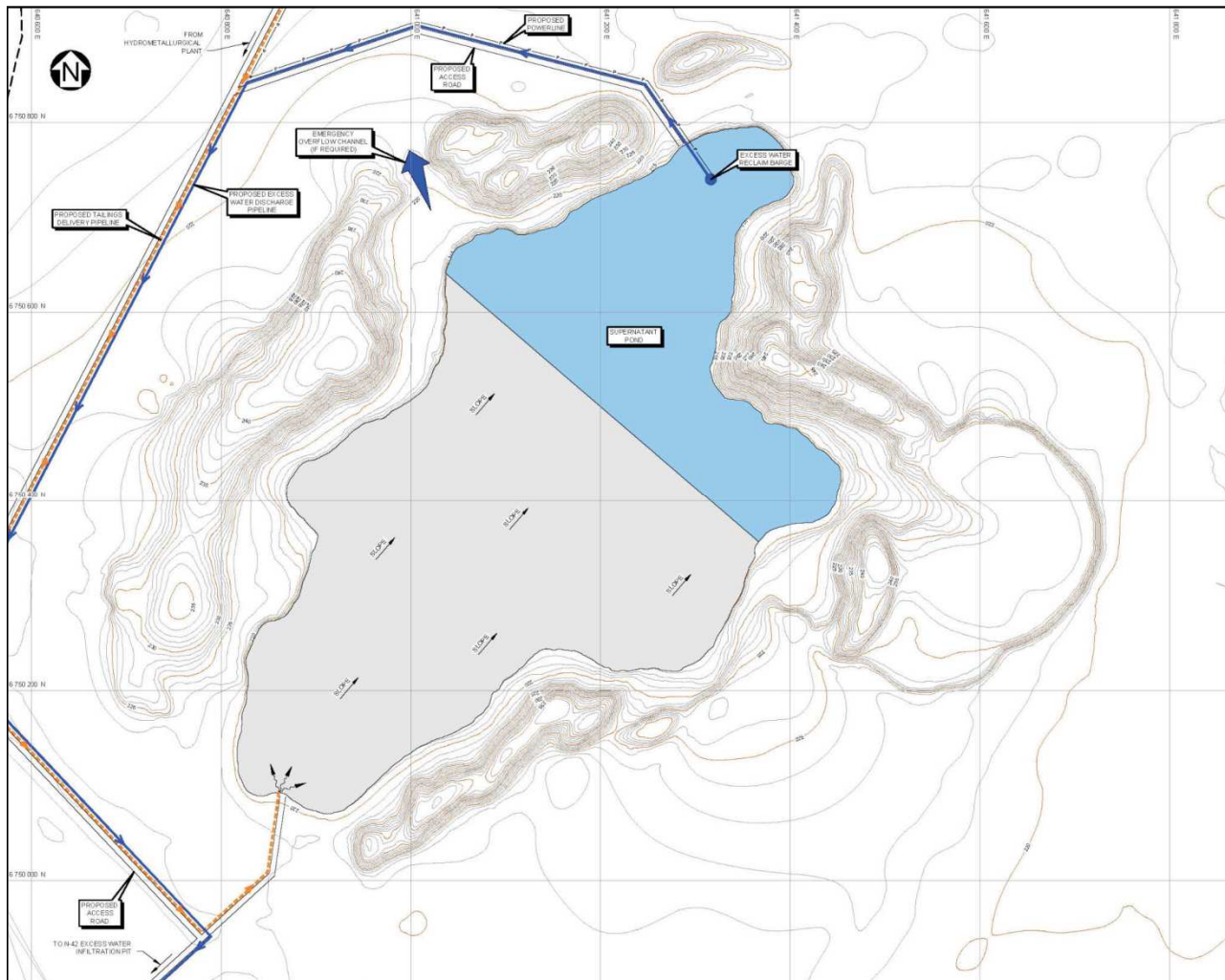
- Volume Tailings to TMF: 3.78 Mm<sup>3</sup> - Life of Mine
- Slurry Consistency: 40% solids
- Settled Dry Density: 0.9 t/m<sup>3</sup>
- Pit floor prepared by grading of existing of existing waste rock and till materials
- End of pipe discharge from southwest side of pit
- Temporary Separator dyke to form pond at north east portion
- Supernatant and runoff expected to infiltrate into groundwater aquifer
- Any excess water will be transferred to N-42 pit via floating pump barge and pipeline for infiltration into aquifer







# HTF – Phase 1 (Years 2 – 20)





# **NECHALACHO, THOR LAKE**

## ***Closure & Reclamation***



# Closure Planning

- As part of the regulatory process and the assessment of the viability of the project, a closure plan is required.
- Present plan is based on the 20 year operating plan and all components in the NWT
- Consultation with our Aboriginal partners, government and local communities will be carried out during the life of the mine.
- The plan will be updated:
  - whenever there is a change in the project;
  - on a minimum 5 year basis;
  - more frequent reviews will be completed in the last 5 years of operation
  - to ensure its validity, ongoing relevance and accuracy and to meet potential changes in expectations of our Aboriginal partners, the community and regulators.





# Closure Goals

- The goals of the closure and reclamation plan are to:
  - Protect public health and safety
  - Minimize the adverse effects of mining on the environment
  - Establish conditions that lead to acceptable long-term physical and chemical stability in reclaimed areas
  - Establish conditions that are appropriate for the surrounding environment and identified end land uses
  - Provide the public and government with a clear understanding of reclamation expectations
  - Sustainably use assets where practical and approved
  - Meet our social responsibilities



# Design for Closure

- Minimize the operating footprint (Avalon continues progress here)
- Salvage of soils during construction for use during closure
- Walk-away closure design (no perpetual treatment or maintenance will be required)
- No landfills on site.
- Progressive reclamation (during operations) will be completed where practical
- Maximize placement of tailing underground as pastefill
- Docks are seasonal and will be removed when no longer required



# Reclamation Strategy

- Reuse or sell for reuse is the preferred option for site infrastructure
- Recycle unusable materials where economically available
- Dispose of all unusable, non recyclable, non-inert or hazardous materials and wastes in approved facilities
- Inert materials (e.g. cement foundations) used for ground stabilization/mine backfill or re-vegetated in place where esthetically appropriate
- All unfilled vertical open holes (e.g. ventilation shafts) will be capped
- All roads and airport facilities not required to remain post closure will be re-vegetated.





# Nechalacho Tailing Reclamation

- Exposed tailing will be capped/seeded and re-vegetated.
- Facility downstream embankments will be progressively reclaimed during operations
- Surface runoff control channels and permanent spillways will be constructed
- Infrastructure not required will be removed for re-use, salvaged and inert materials will potentially be disposed of underground or removed from site.
- Post closure monitoring will include water quality, physical stability, erosion protection, re-vegetation success, and key environmental quality indicators



# Pine Point Metallurgical Tailing

- This tailing will be placed in an abandoned open pit
- On closure, the tailing will be covered with overburden and re-vegetated, rehabilitating an previously damaged site
- Re-vegetation testing will occur during operations
- Post closure monitoring will include water quality, physical stability, erosion protection, re-vegetation success, and key environmental quality indicators





# Social Considerations

- A social action plan will be prepared in advance of planned temporary or final closure that meets the following principles:
  - Treat all employees consistently and fairly and with dignity and respect;
  - Communicate with employees and the communities in a proactive and timely manner,
  - Provide support for and participation in development of outplacement programs (including to other Avalon facilities) to assist employees in training activities and future endeavors;
  - Empower employees to make their own choices and career decisions, and provide for human resources administration after closure.





# Financial Assurance

- The plan will include up to 5 years of post closure monitoring to validate the effectiveness of the implemented plan
- Financial instrument(s) will be acquired to ensure funding is available for planned or unplanned closure costs, as per regulatory requirements, and will be adjusted as required during operations



**AVALON RARE METALS INC.**

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