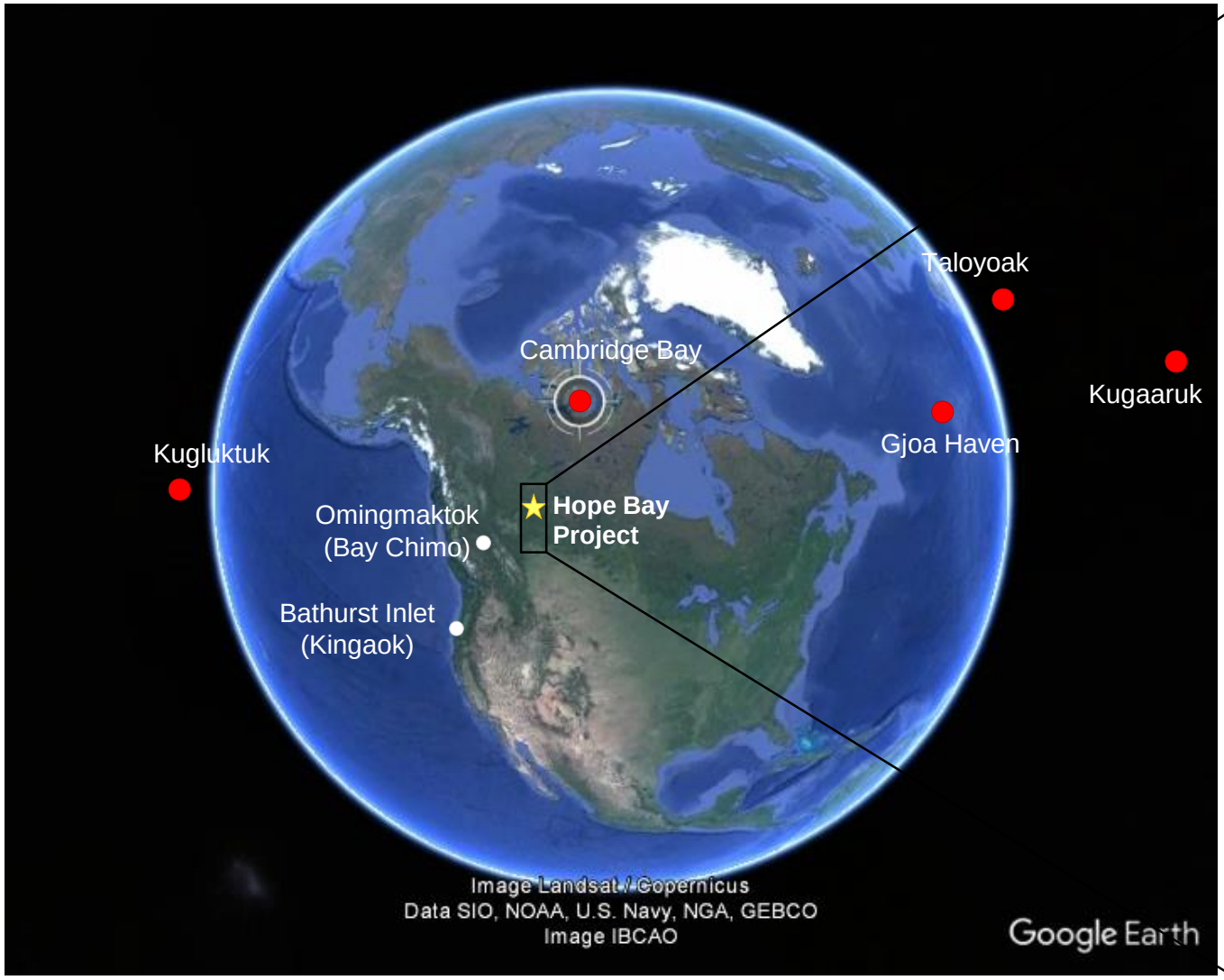
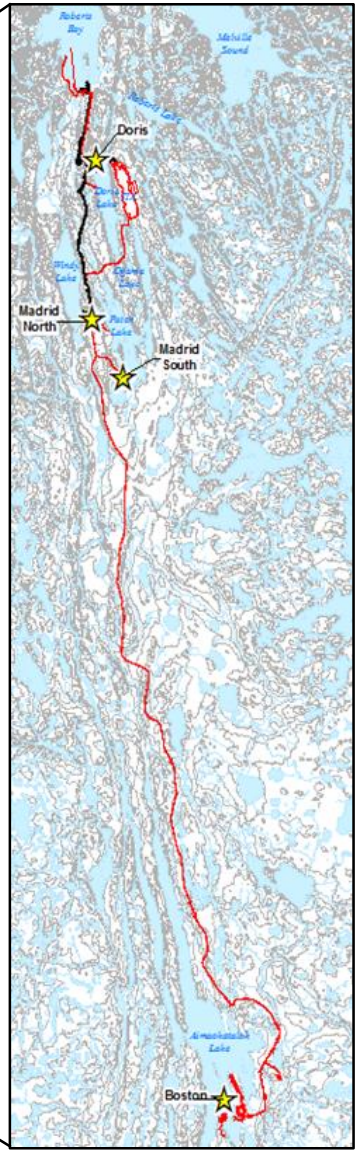
Nunavut Water Board Technical Meeting

May, 2018

Project Location





Approved Doris Project (No.003 and 2AM-DOH1323)

Existing Permits and Licences - Doris

Project Certificate

- **Issued 2006, Amended 2016**
  - **Allows Construction, Development, Production, Closure**
  - **Environmental compliance and protections**
  - **2000 tonnes per day**
  - **Discharge Effluent to Roberts Bay**

Type A Water Licence 2AM-DOH1323

- **Issued 2007, Amended 2016, Applies from 2013 to 2023**
  - **Water Use**
    - **Doris Lake - 480,000 m^3 per year - Mining and Processing**
    - **Windy Lake – 22,000 m3 per year - Domestic**
    - **Reclaim Water – no limit - Processing**
  - **2.5 million tonnes to Tailings Area**
  - **Reclamation Security - $31 Million**

All operations comply with all Federal and Territorial laws and regulations

- **Effluent to comply with Metal Mining Effluent Regulation**

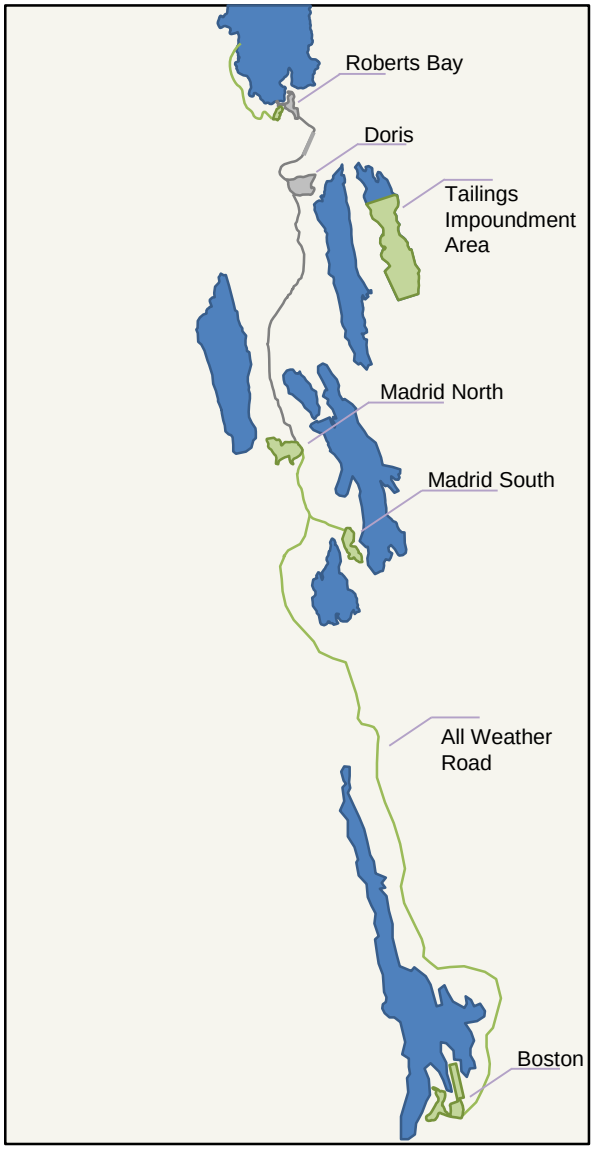
Monitoring and Reporting

- **Aquatic Effects Monitoring Plan**
- **Environmental Effects Monitoring Program**
- **Surveillance Network Program**
  - Type A Water Licence –monthly
  - Type B Water Licence(s)- monthly
- **NWB Annual Reports**
  - Type A and Type B Water Licence
  - Due March 31

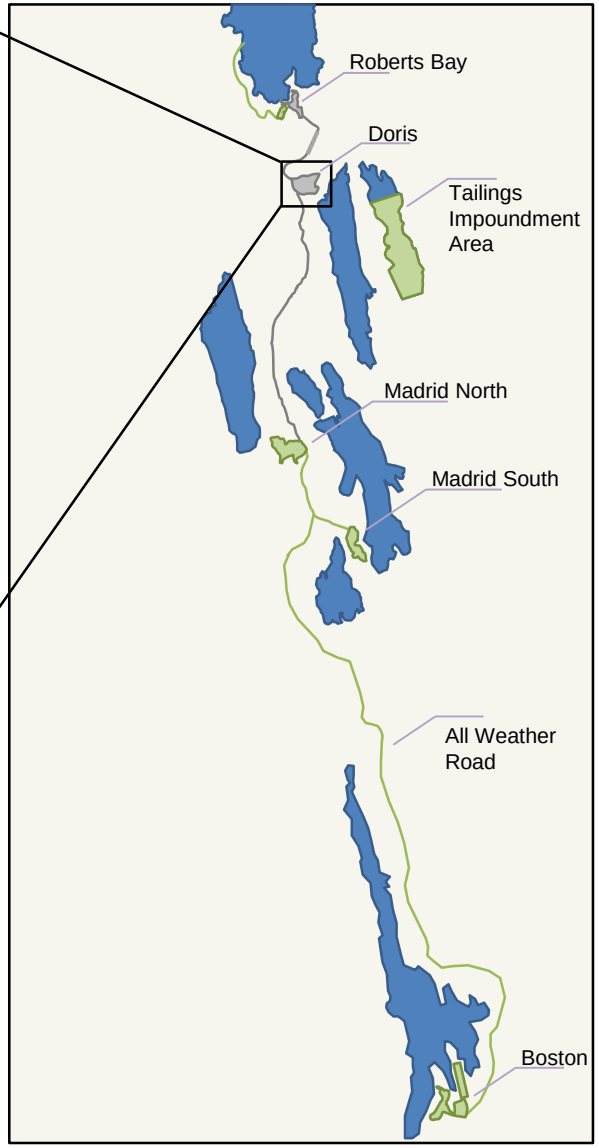
Madrid- Boston Project Highlights

Madrid and Boston Highlights	
Mining	• Underground mining and crown pillar recovery with waste rock stored above ground temporarily and then put back into the underground mines.
Processing	• Nominal capacity of 6,000 tonnes of ore processed per day
Gold Production	• Gold production at Doris and Boston. Concentrates produced at Madrid North
Transportation	• Sealift arrives at Roberts Bay and utilize cargo dock and jetty • Gold bars flown out to market from Doris and Boston • Road connecting Madrid and Boston to Doris and Roberts Bay
Employment	• Fly in-fly out operation from Edmonton and Kitikmeot • 870 workers during peak operations (for approximately 14 years)
Economic Benefit	• Royalties, mineral taxes and other payments of approximately $500 million over the life of the Hope Bay Project for Canada, Nunavut, KIA and NTI (excluding Doris)

Hope Bay Project Layout



Hope Bay Project Layout



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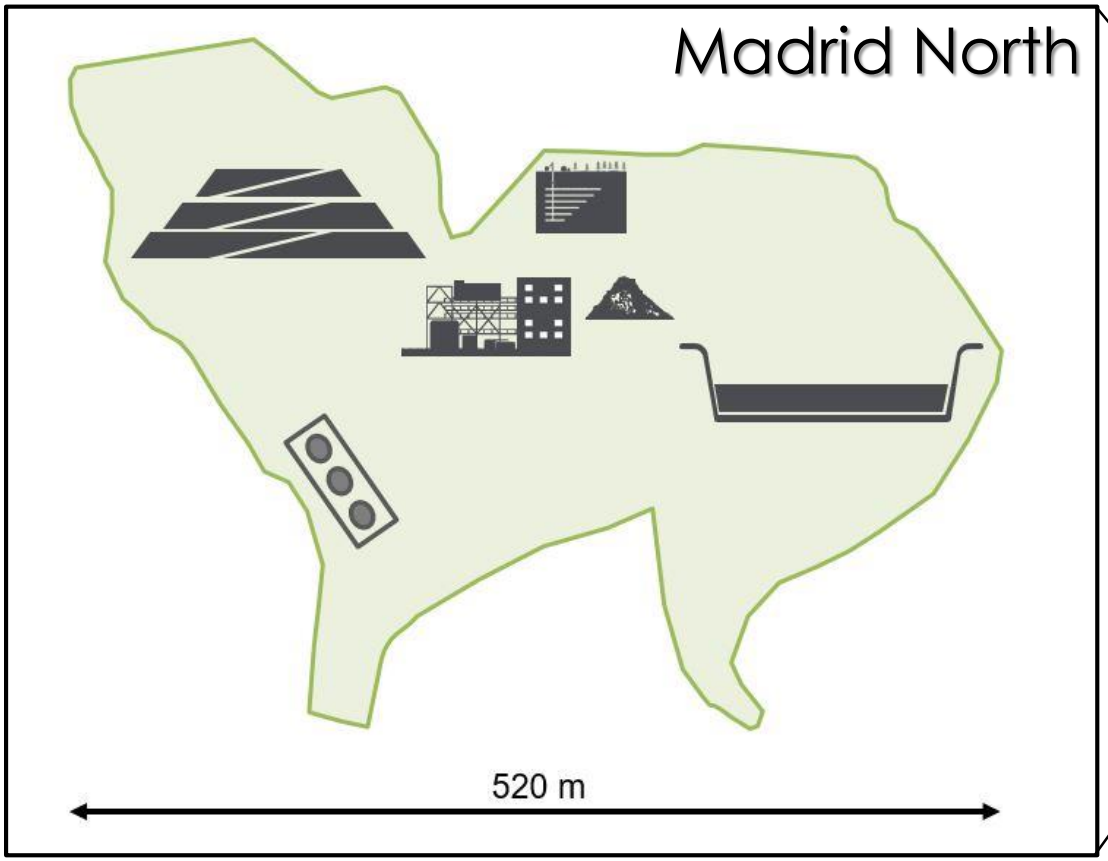

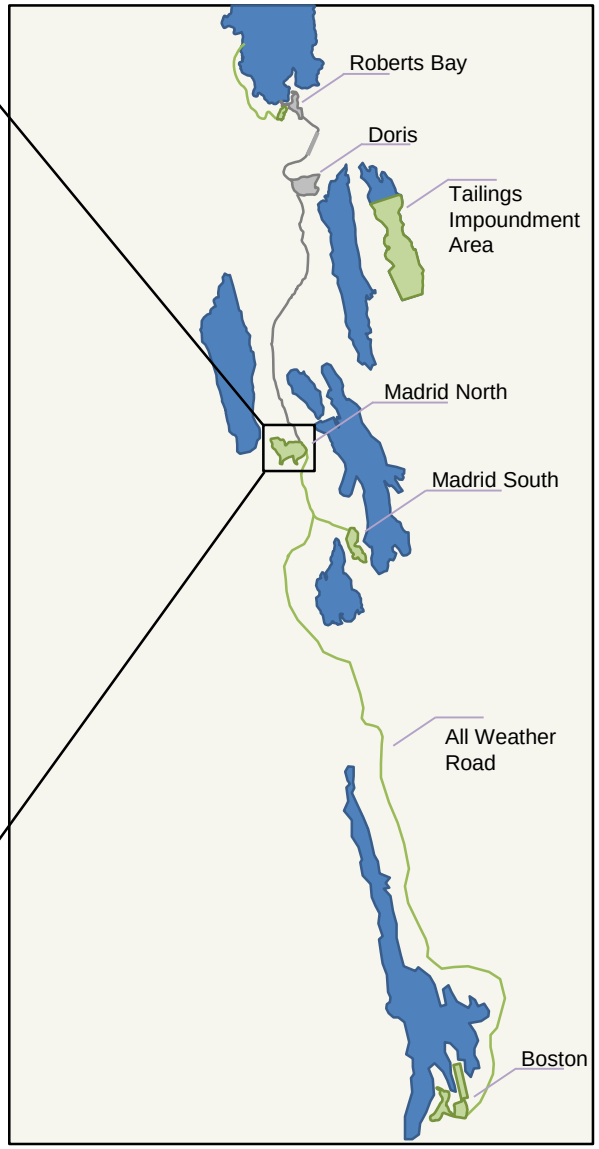

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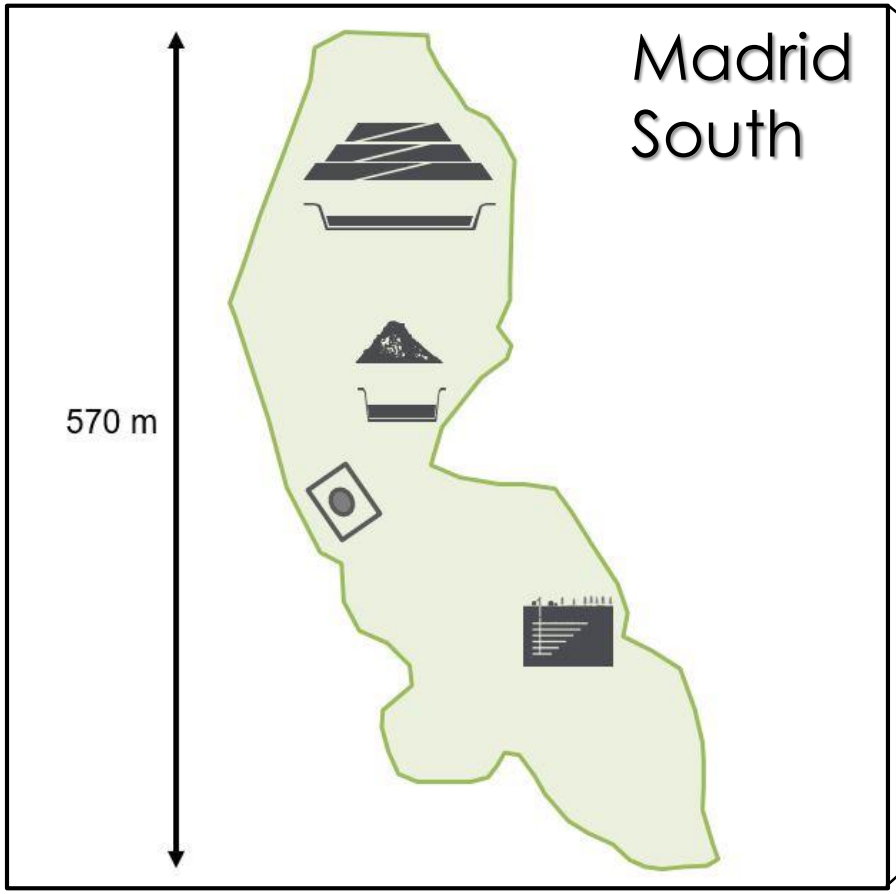

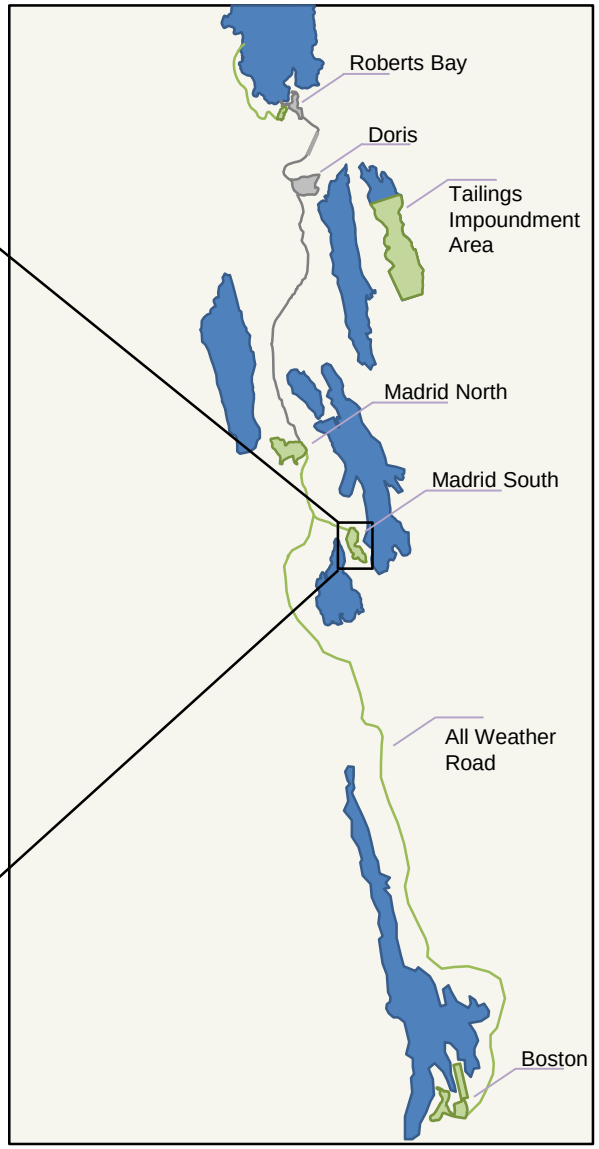

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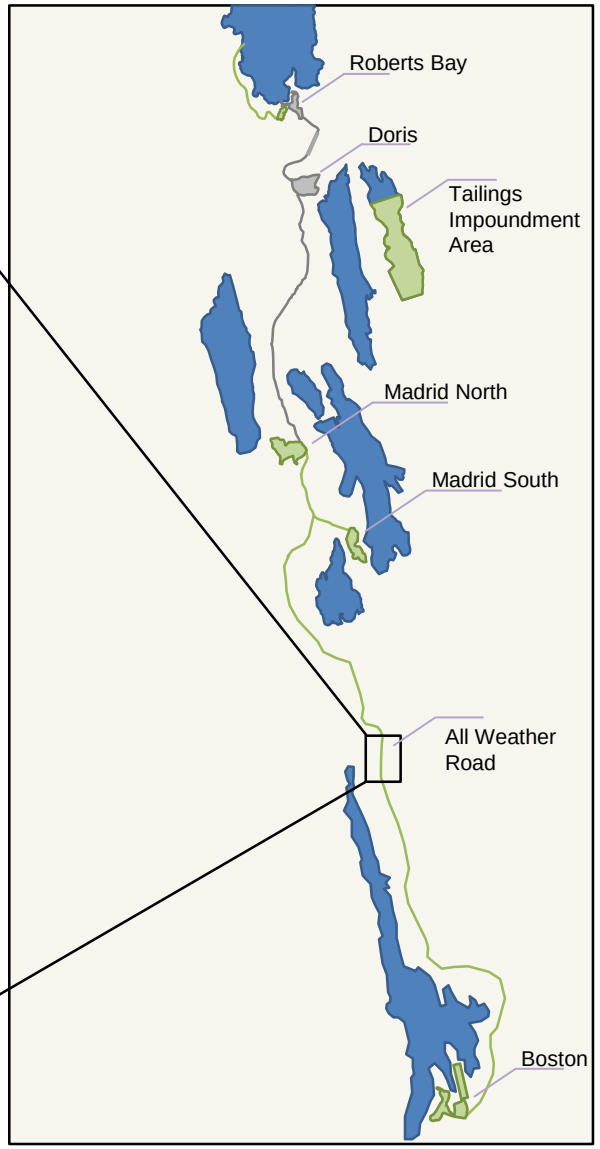

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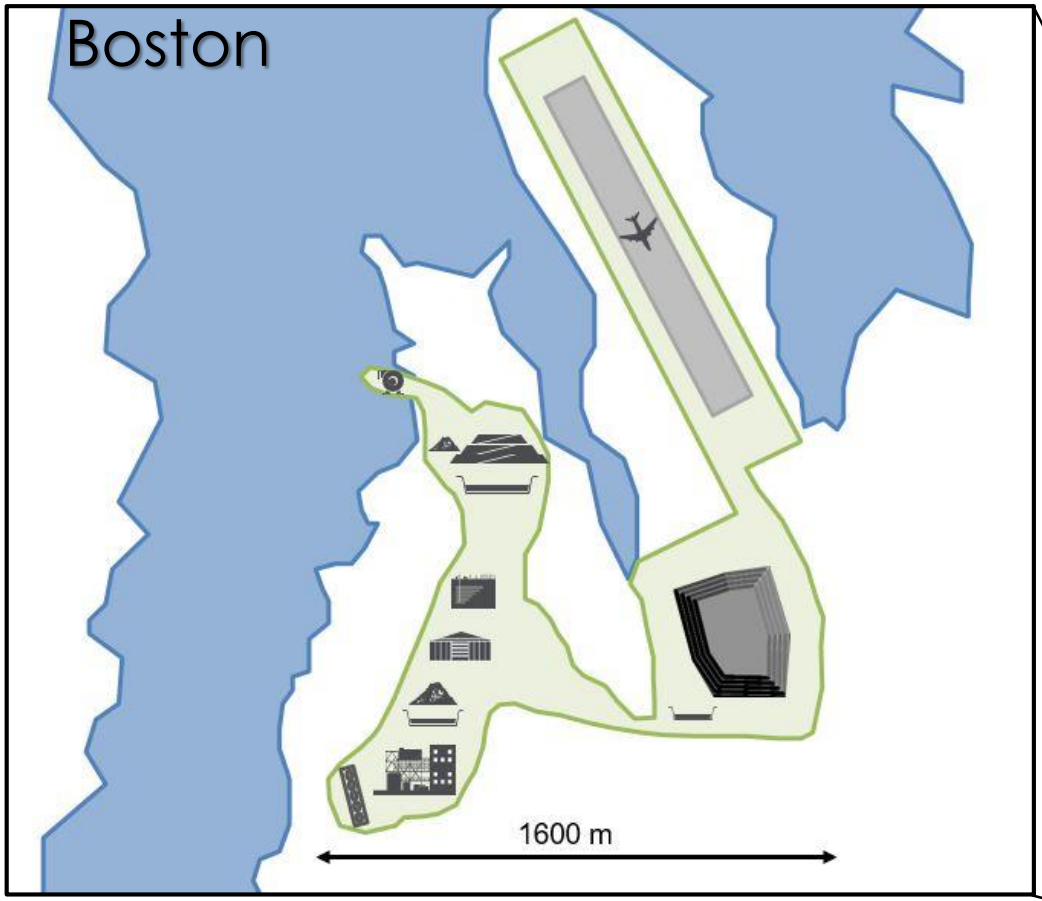

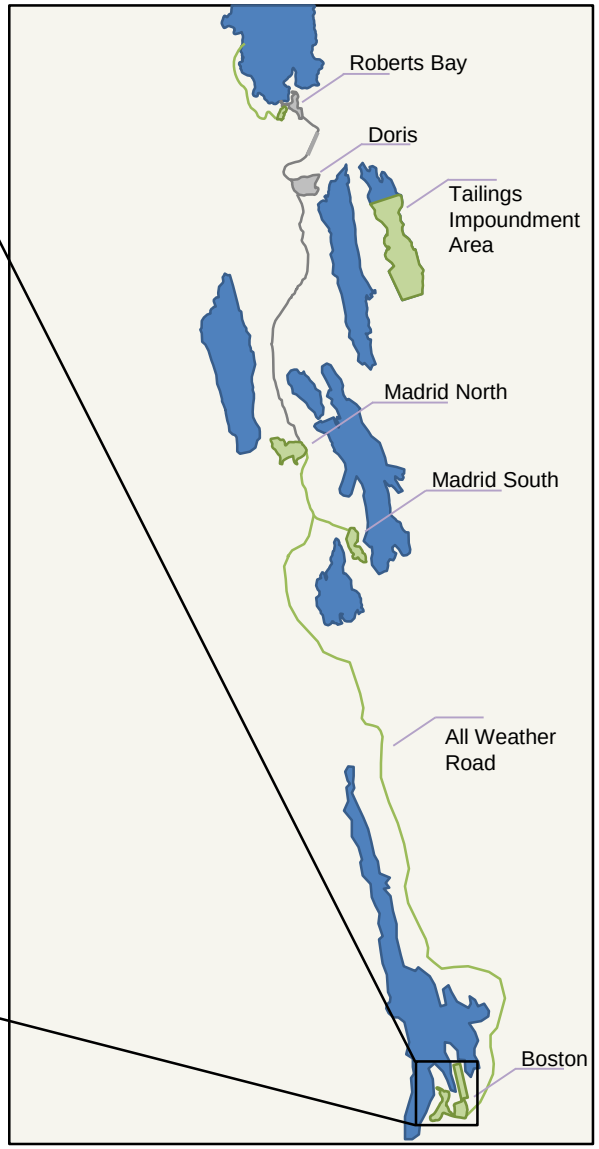

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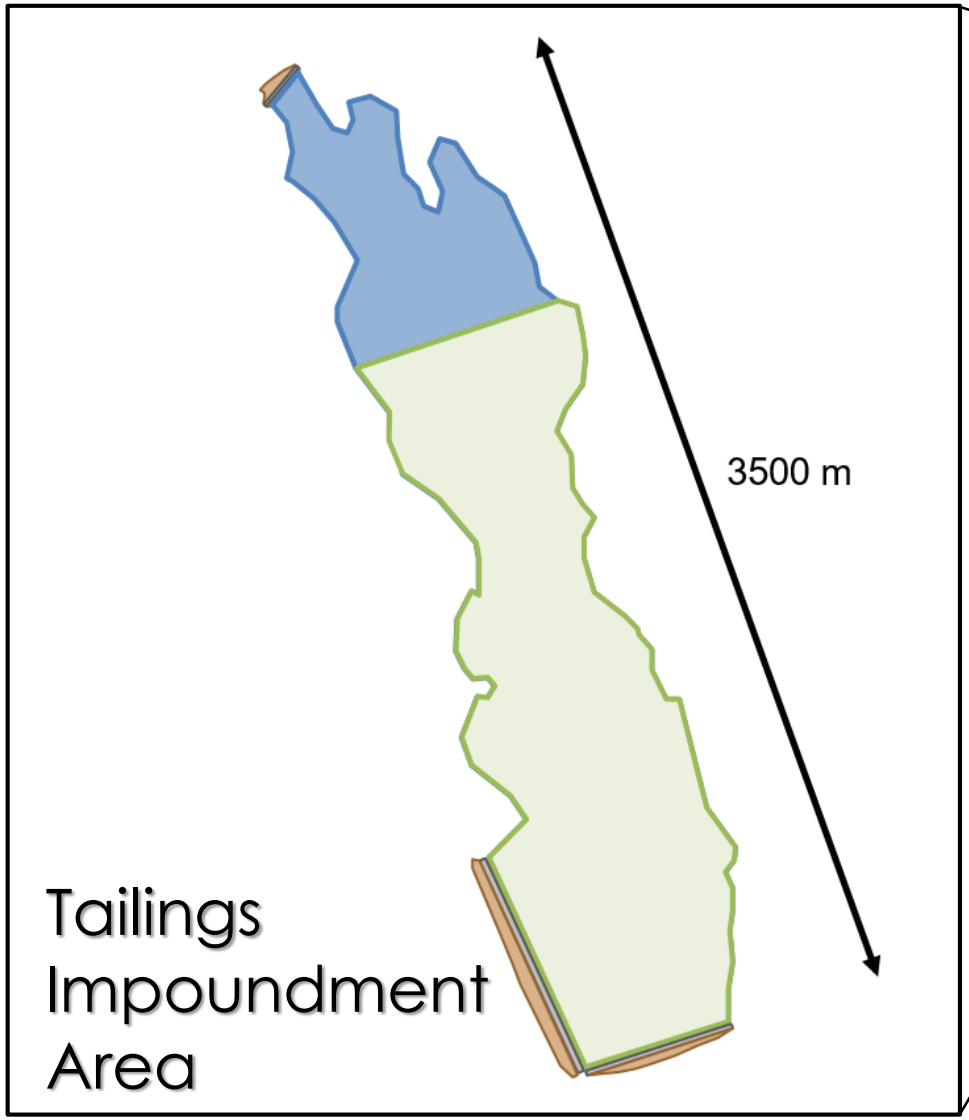
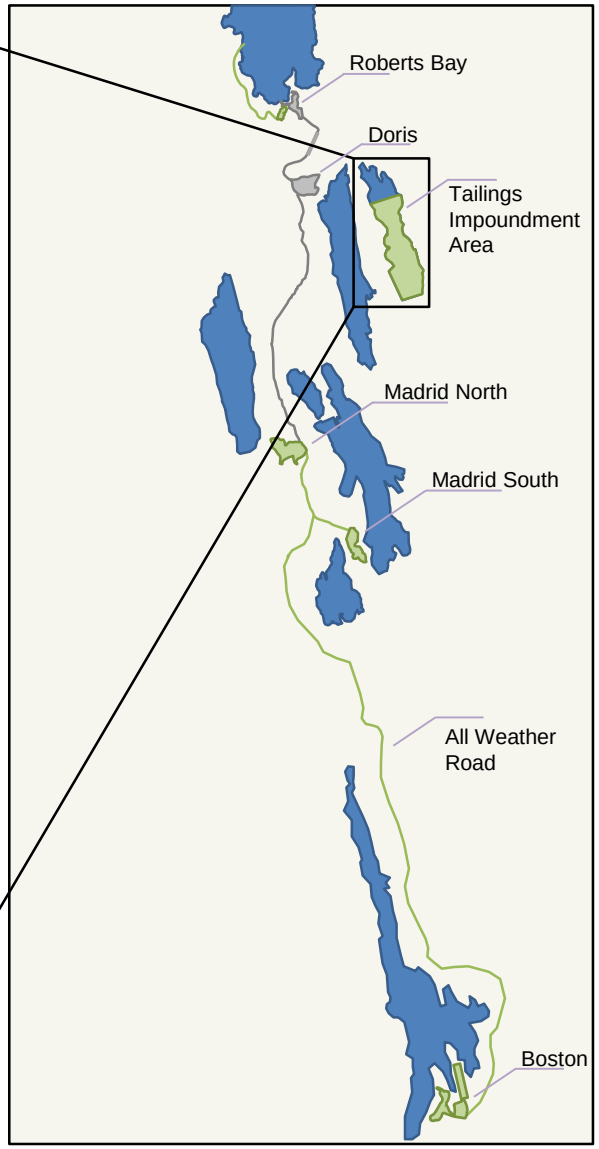
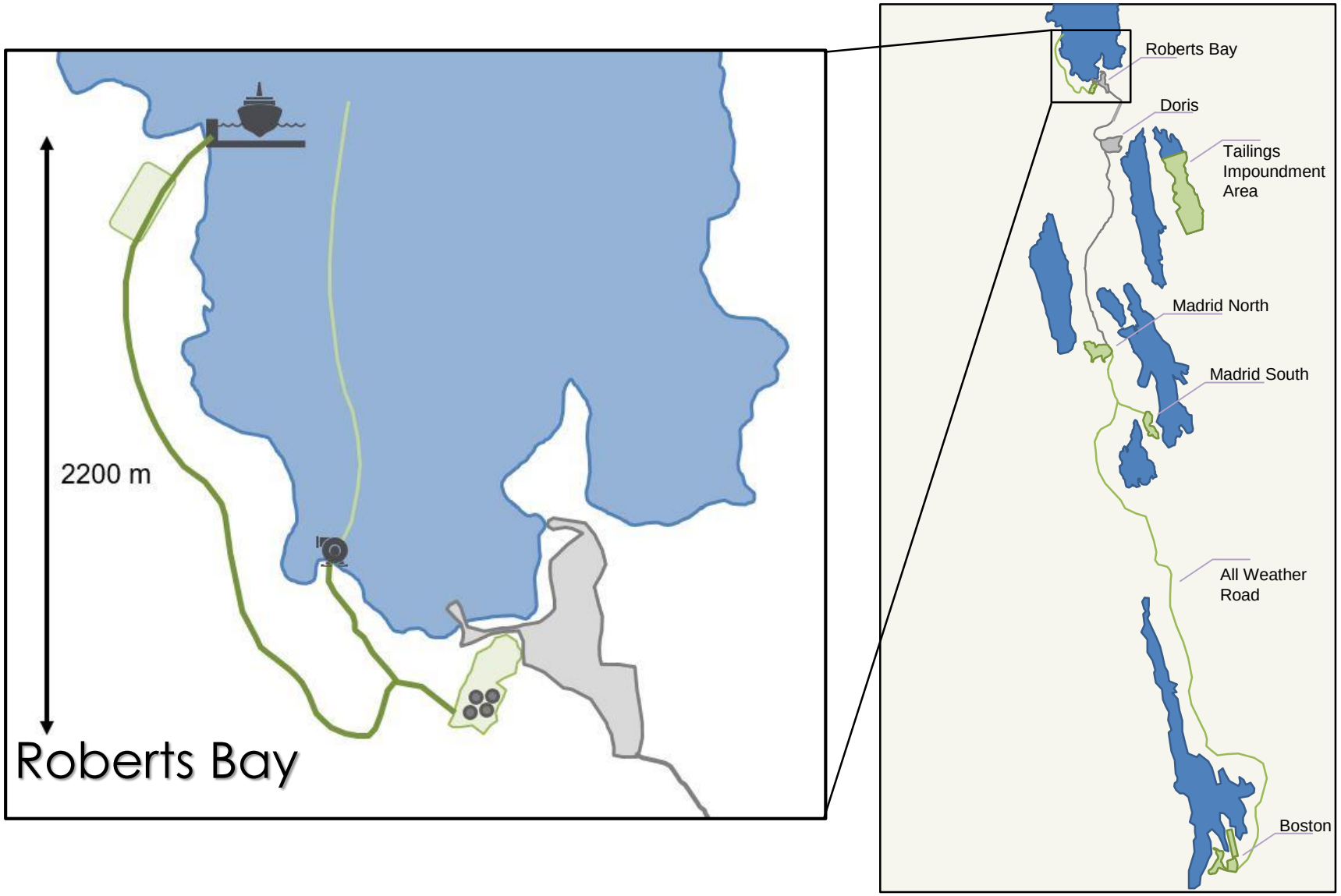




Hope Bay Project Layout



Proposed Amendment No. 2 Type A

- **Scope includes Doris, Madrid Sites and All Weather Road**
  - Expand 2AM-DOH1323 Amendment No. 1 by incorporating into this Licence the scope of all facilities and activities authorized under the Type B Licence 2BB-MAE1727
    - Camp Capacity – 400 persons
    - Expand TIA capacity to 18 million tonnes
    - Water Allowance:
      - Domestic from Windy Lake: 43,800 m3/year
      - Industrial from Doris Lake: 1,930,000 m3/day
    - Concentrator at Madrid
    - AWR to Boston
    - **Allows commercial mining**

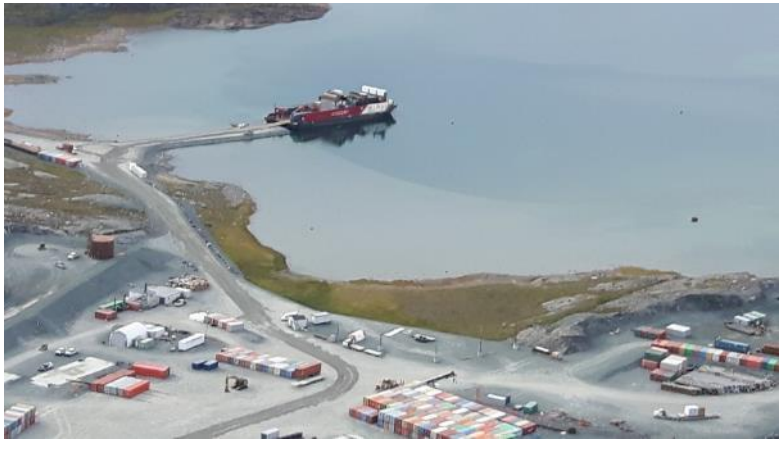
Proposed Boston Type A

Project Certificate and Boston Type A Water Licence

- **Scope:**
- Construct and operate Boston Site
- Camp Capacity – 300 persons
- Tailings Management Area capacity of 5.1 million tonnes
  - Water Allowance:
    - Domestic from Aimaokatalok Lake 33,000m3/year
    - Industrial from Aimaokatlok Lake 450,000m3/year
- 2400 t/d process plant
- Allows water use, waste management and construction of all surface infrastructure
- **Allows commercial mining**

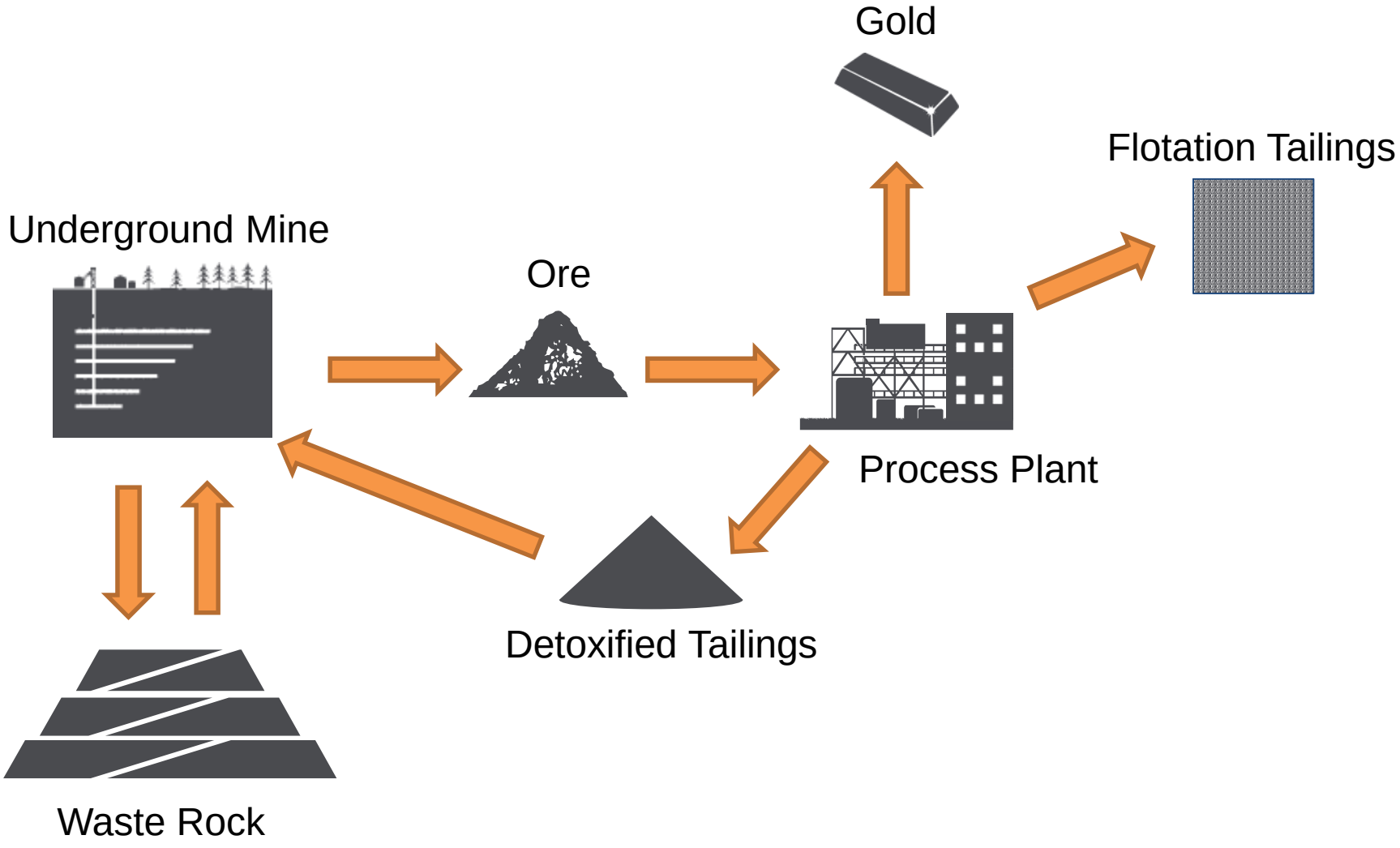
Closure and Reclamation

- **Doris-Madrid Interim Closure and Reclamation Plan was updated**
- **Boston Conceptual Closure and Reclamation Plan was developed**
- **Overall objectives of closure planning at Hope Bay:**
  - Physical Stability
  - Chemical Stability
  - Future use and aesthetics
- **Planning provides basis to estimate financial security**

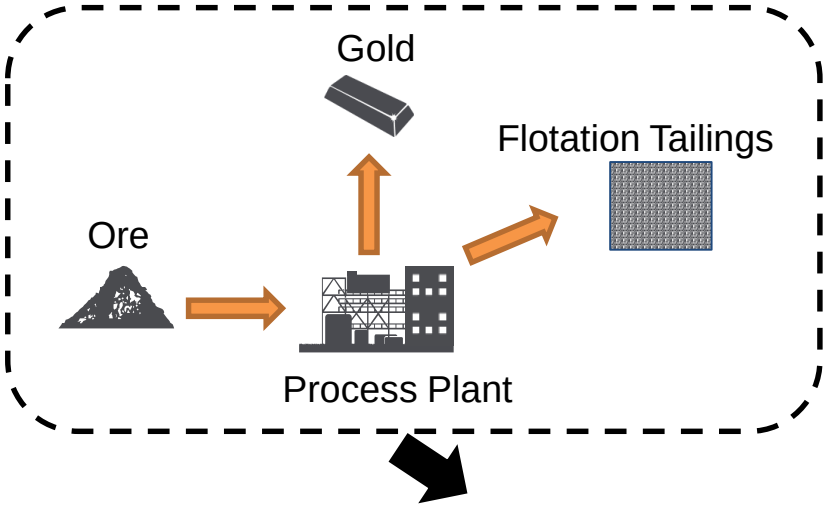


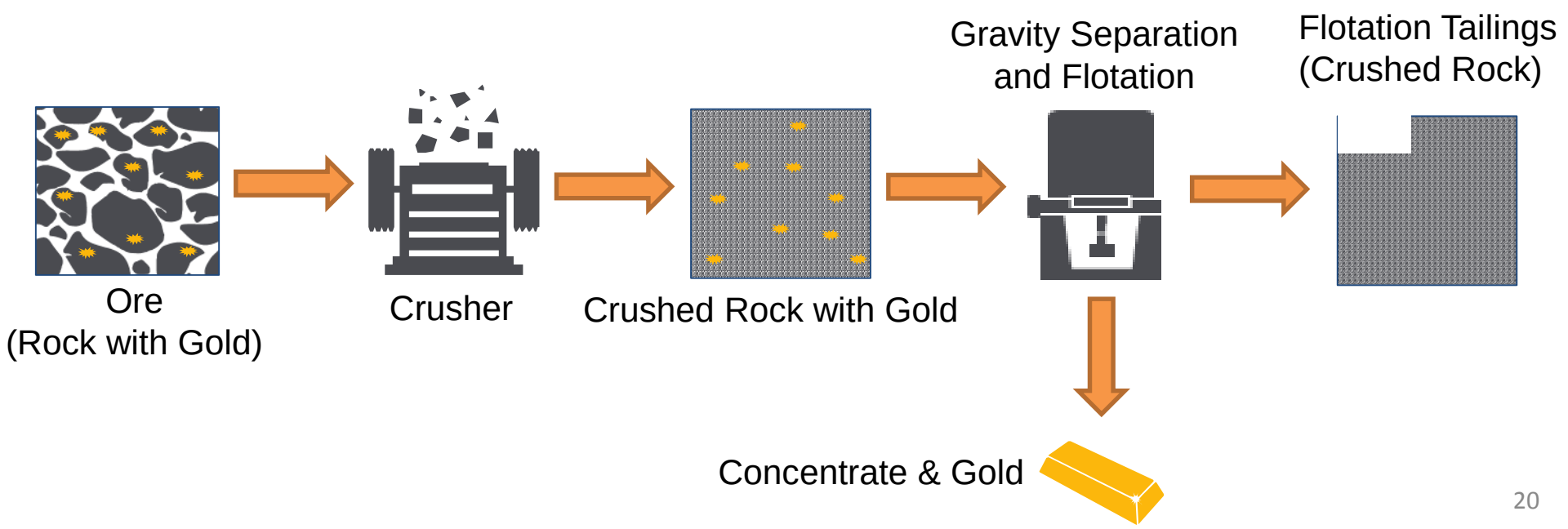
Tailings and Waste Rock Mangement

Tailings and Waste Rock

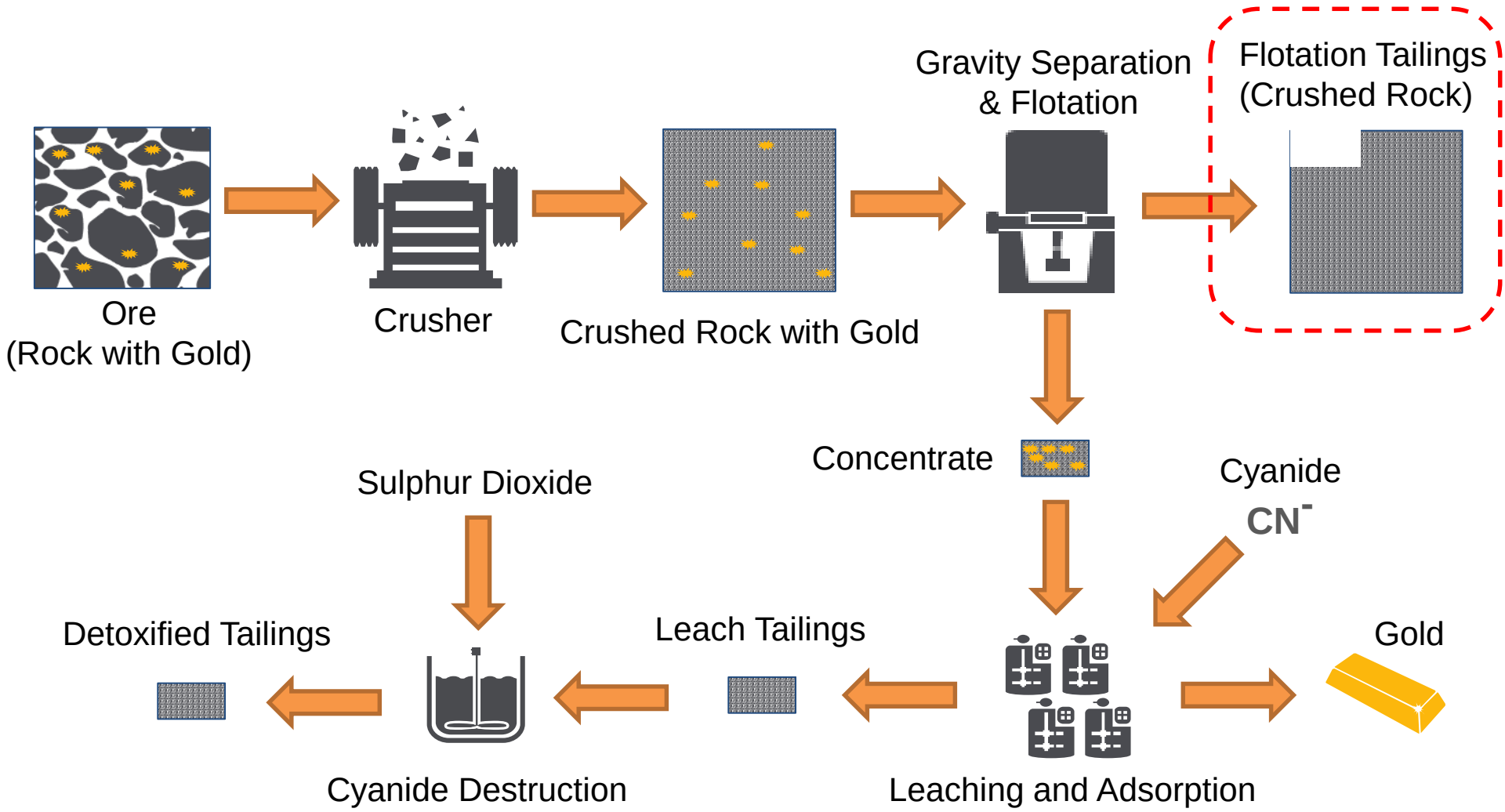


Flotation Tailings

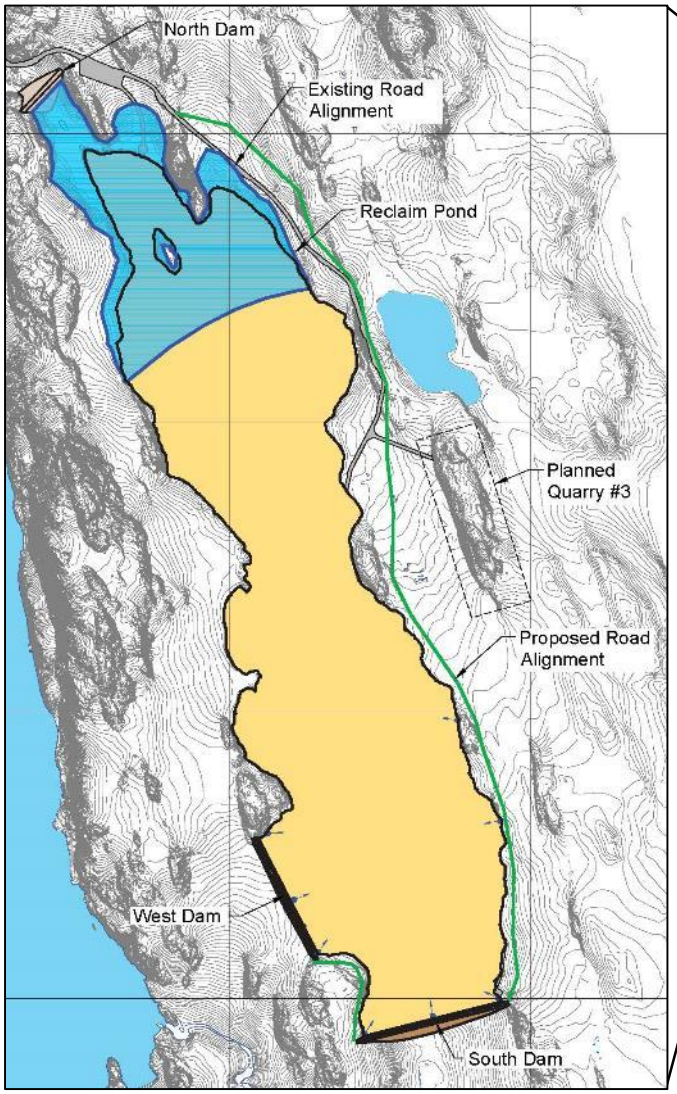


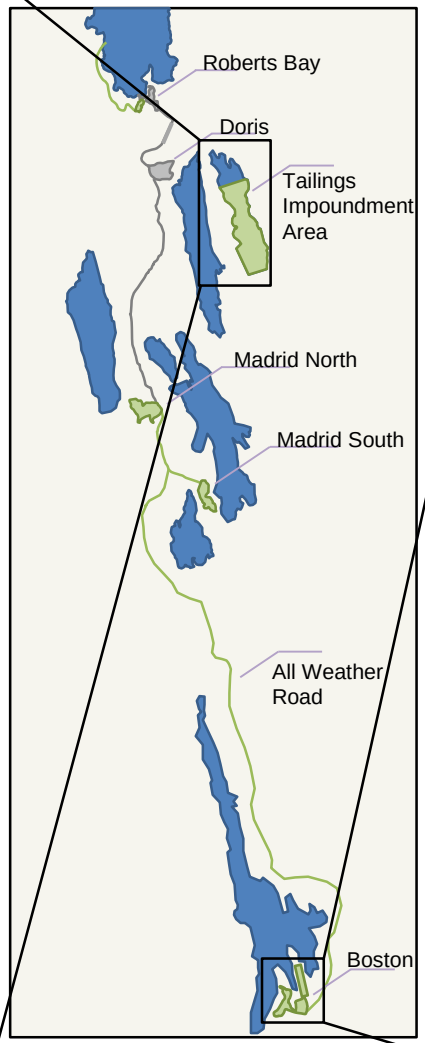


Detoxified Leach Tailings

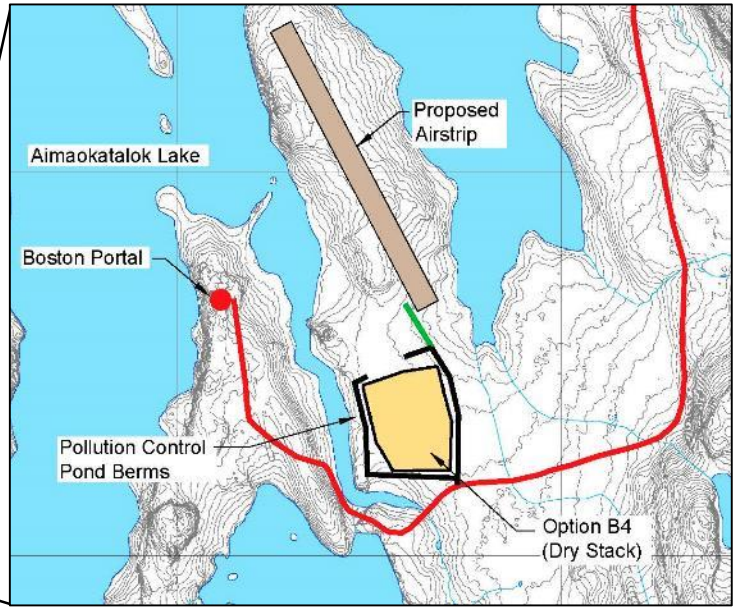


Overview of Tailings Management

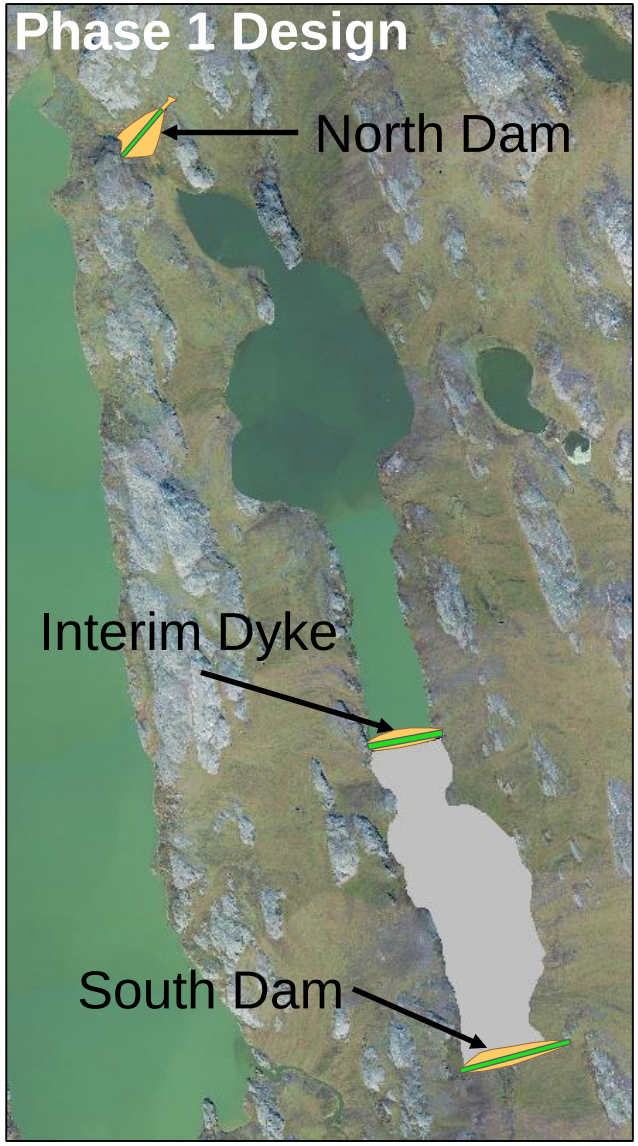


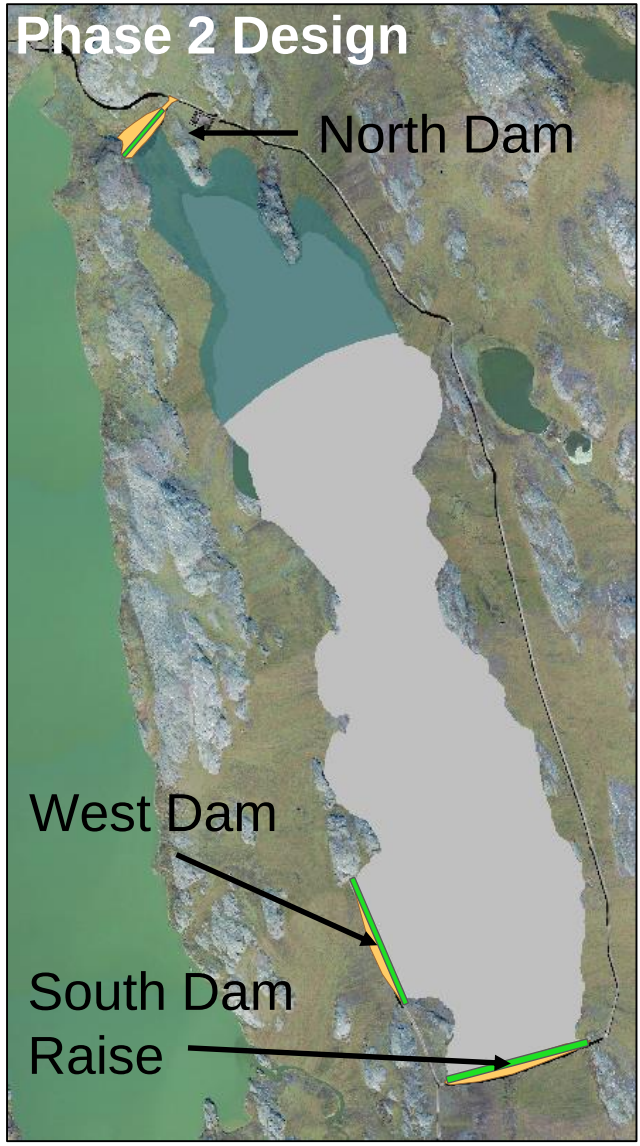


- Doris – Conventional Tailings Impoundment Area
- Boston – Dry Stack Tailings Management Area



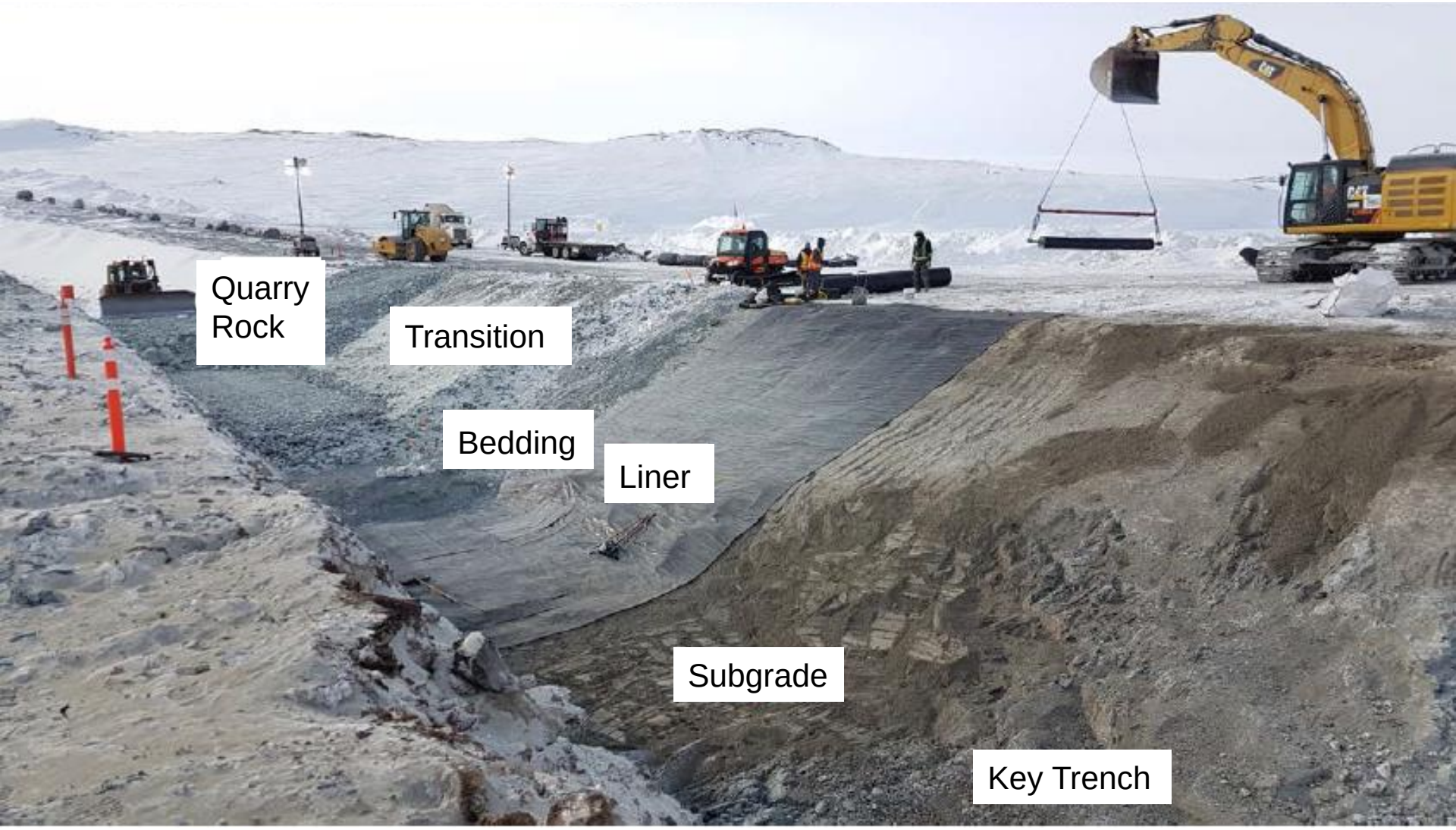
Tailings Impoundment Area - Doris





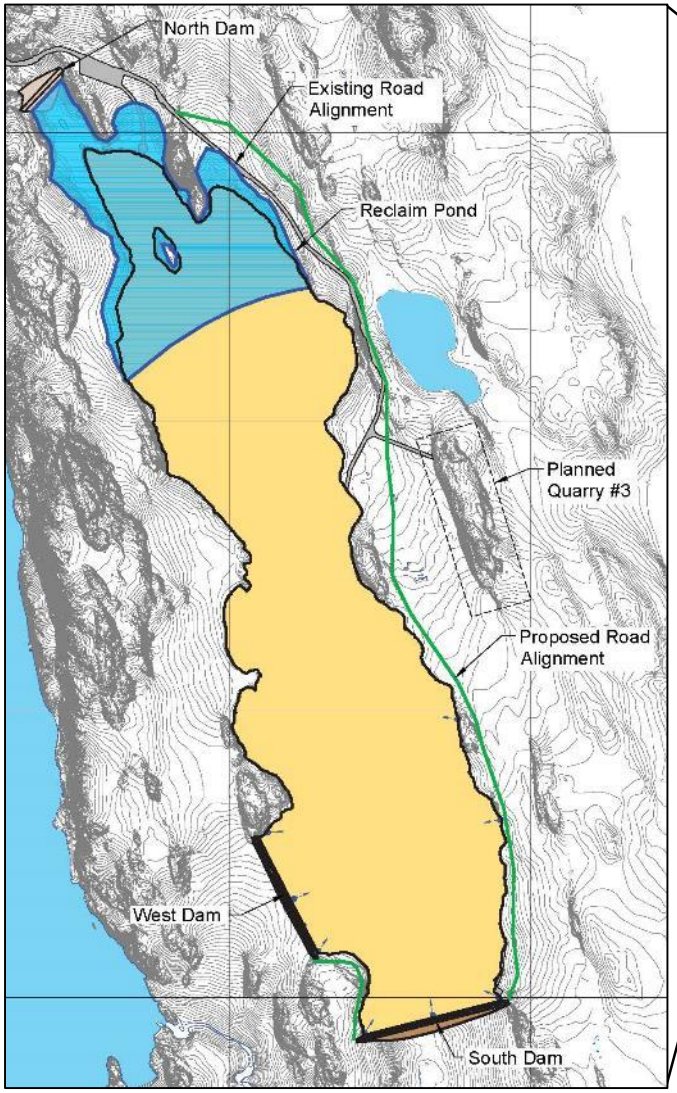
North Dam

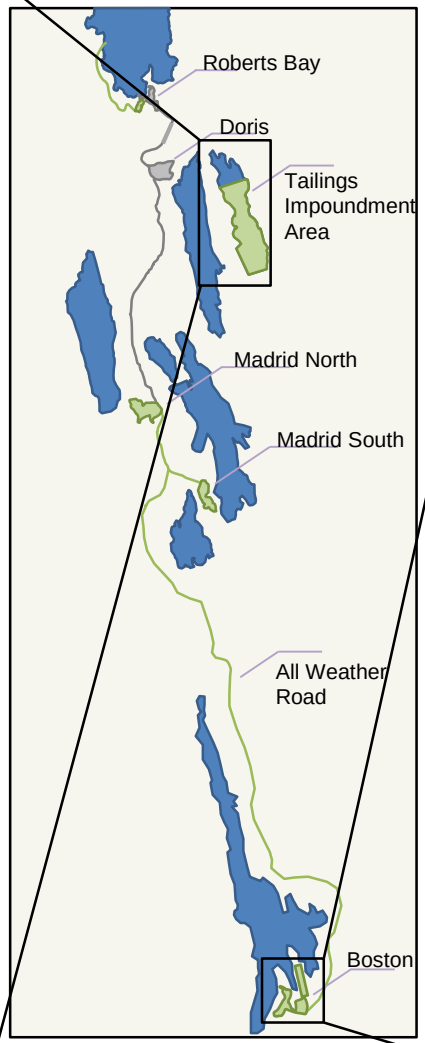
South Dam



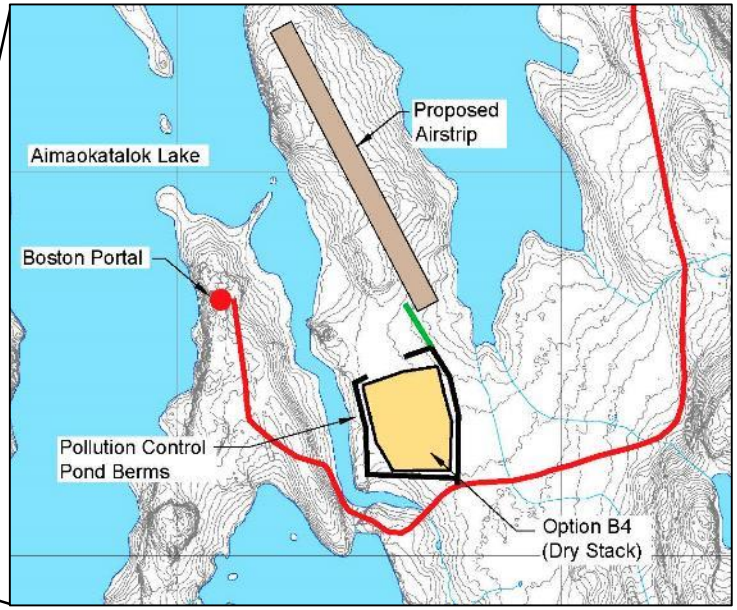
Tailings Impoundment Area - Closure

Summary of Tailings Management



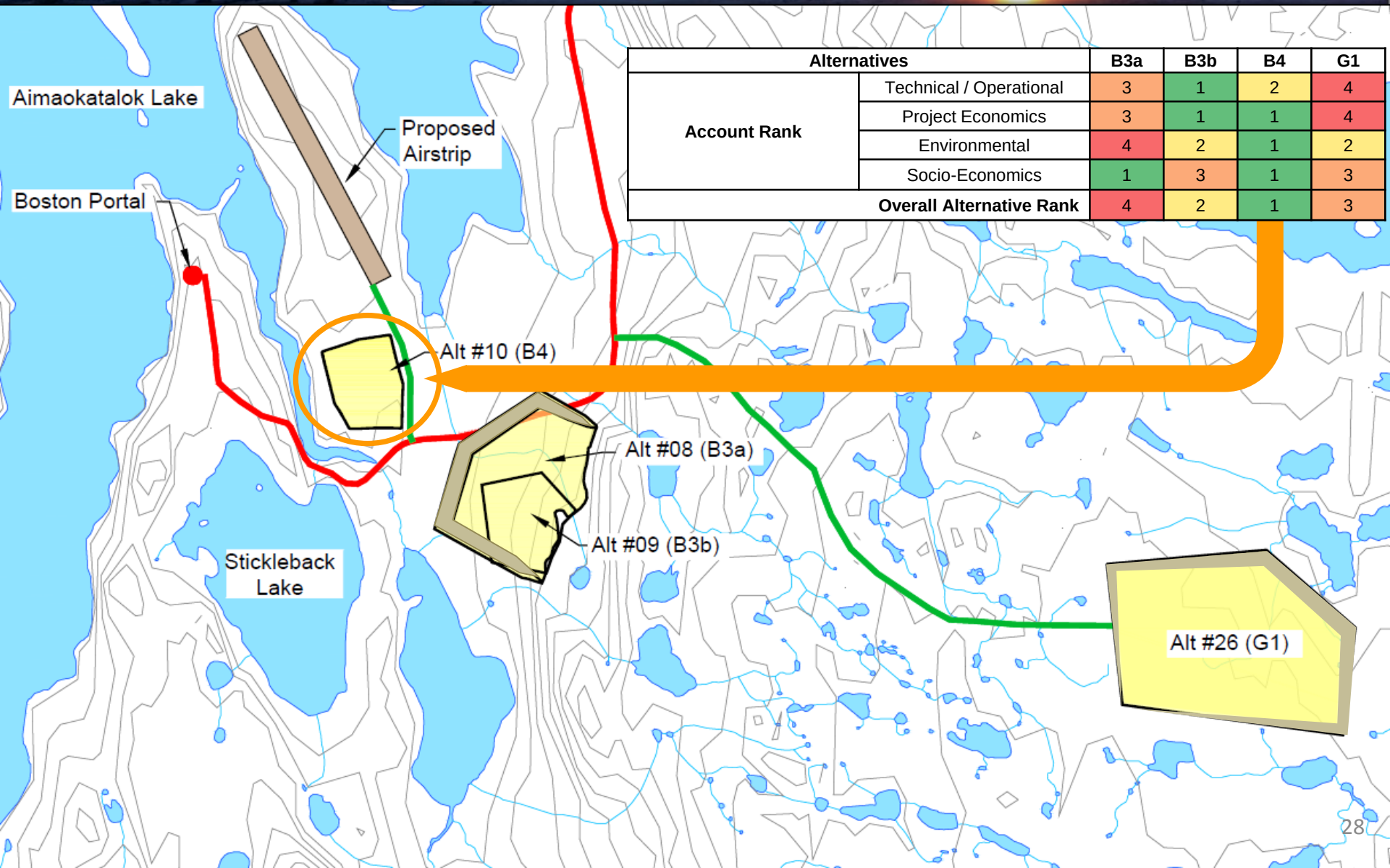


- Doris – Conventional Tailings Impoundment Area
- Boston – Dry Stack Tailings Management Area



Alternative Analysis - Boston

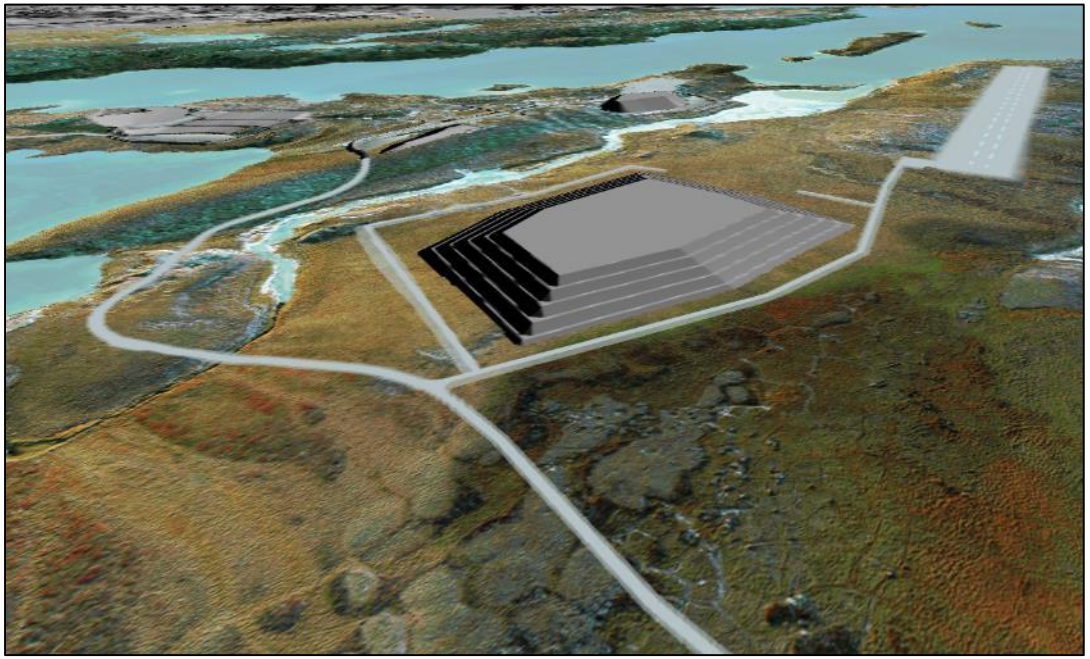
Alternatives		B3a	B3b	B4	G1
Account Rank	Technical / Operational	3	1	2	4
	Project Economics	3	1	1	4
	Environmental	4	2	1	2
	Socio-Economics	1	3	1	3
Overall Alternative Rank		4	2	1	3



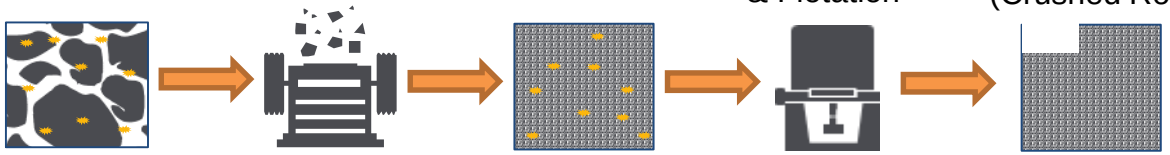
Tailings Management Area - Boston

Tailings Management Area - Boston

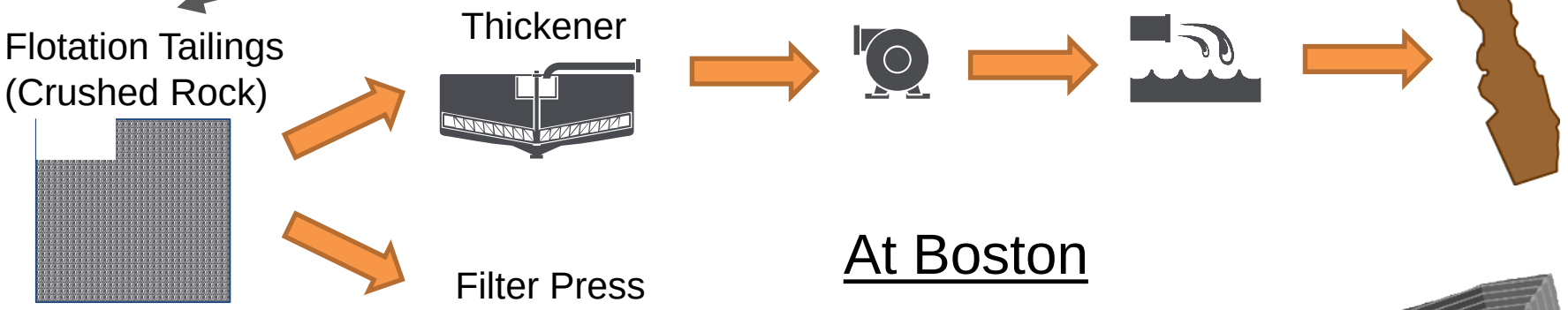
- Filtered tailings
- Trucks, Dozers, Compactors
- Stackable and compactable
- Similar to:
  - Raglan
  - Fort Knox
  - Pogo



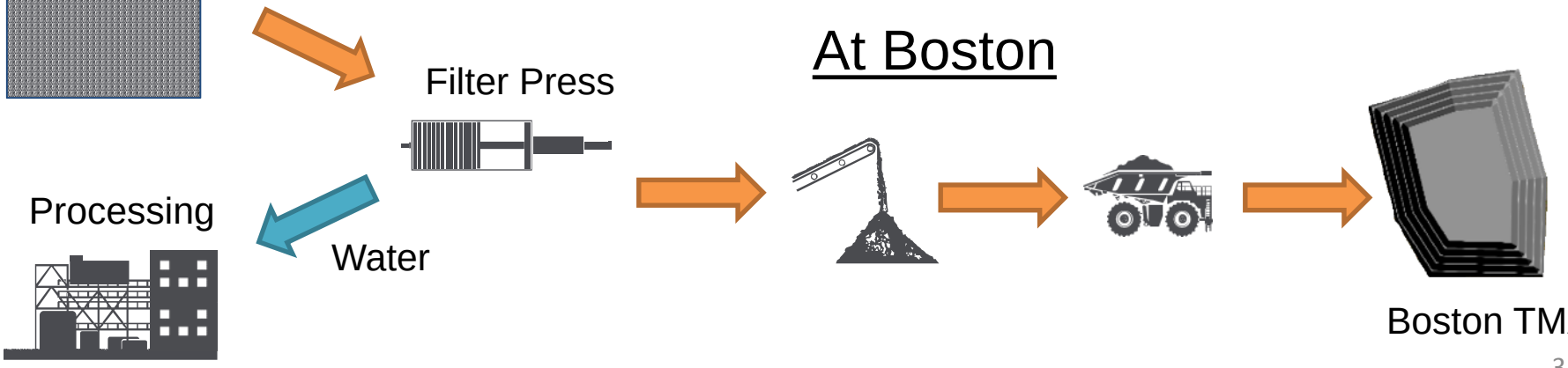
Tailings



At Doris & Madrid



At Boston



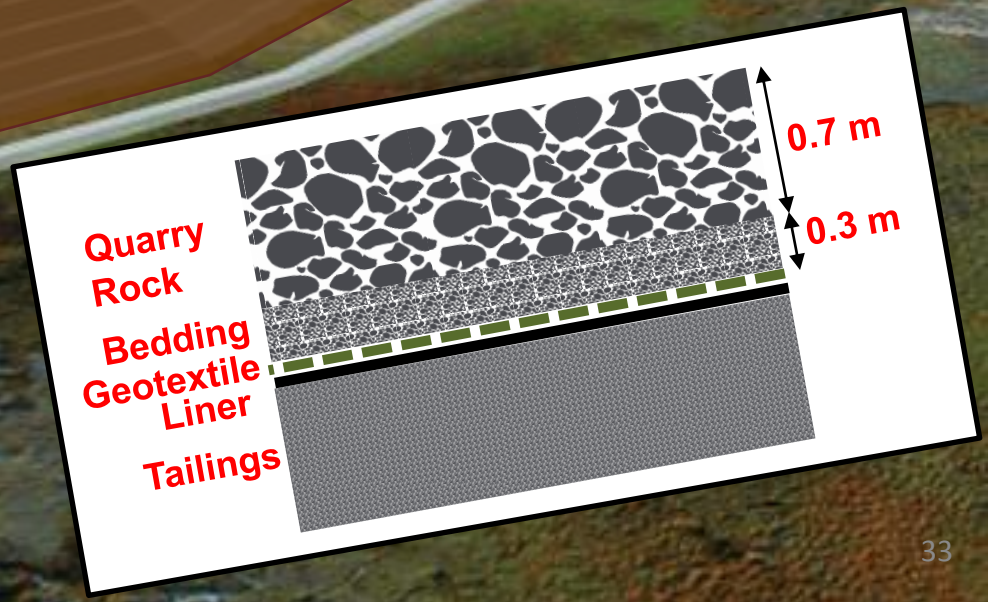
Dust Management

https://www.polymerinnovations.com.au/solutions/road-stabilisation/

http://www.monitoringagency.net/PhotoGallery/tabid/93/Default.aspx

https://www.cooperfluidsystems.com.au/index.php/products/dust-suppression

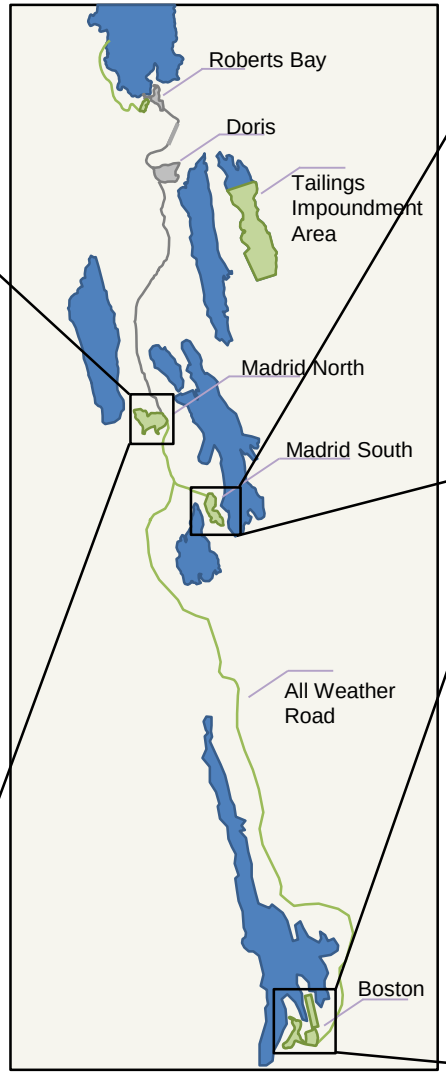
Tailings Management Area - Boston Closure



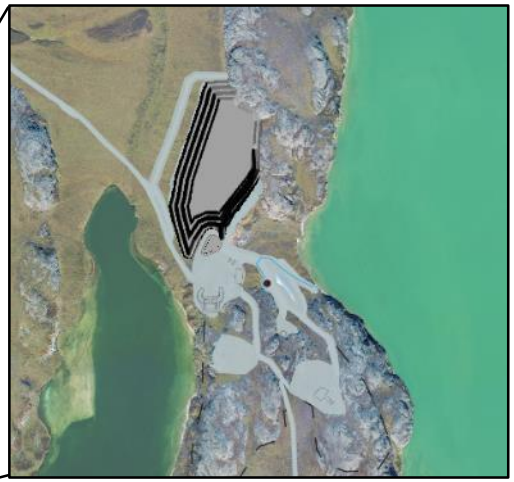
Summary of Waste Rock Management

Temporary Waste Rock Piles

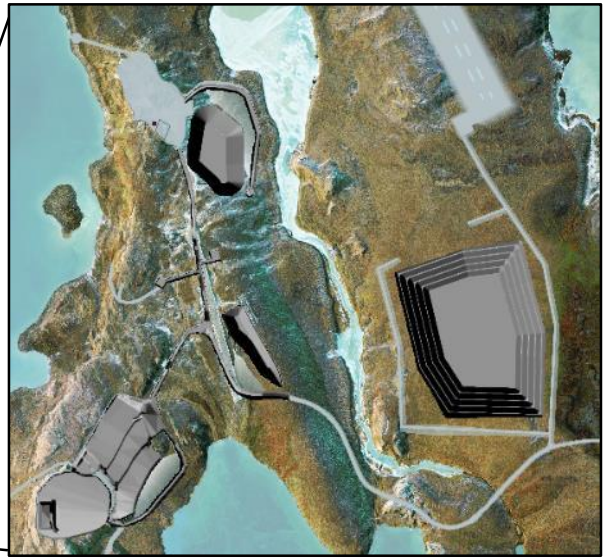
Madrid North



Madrid South

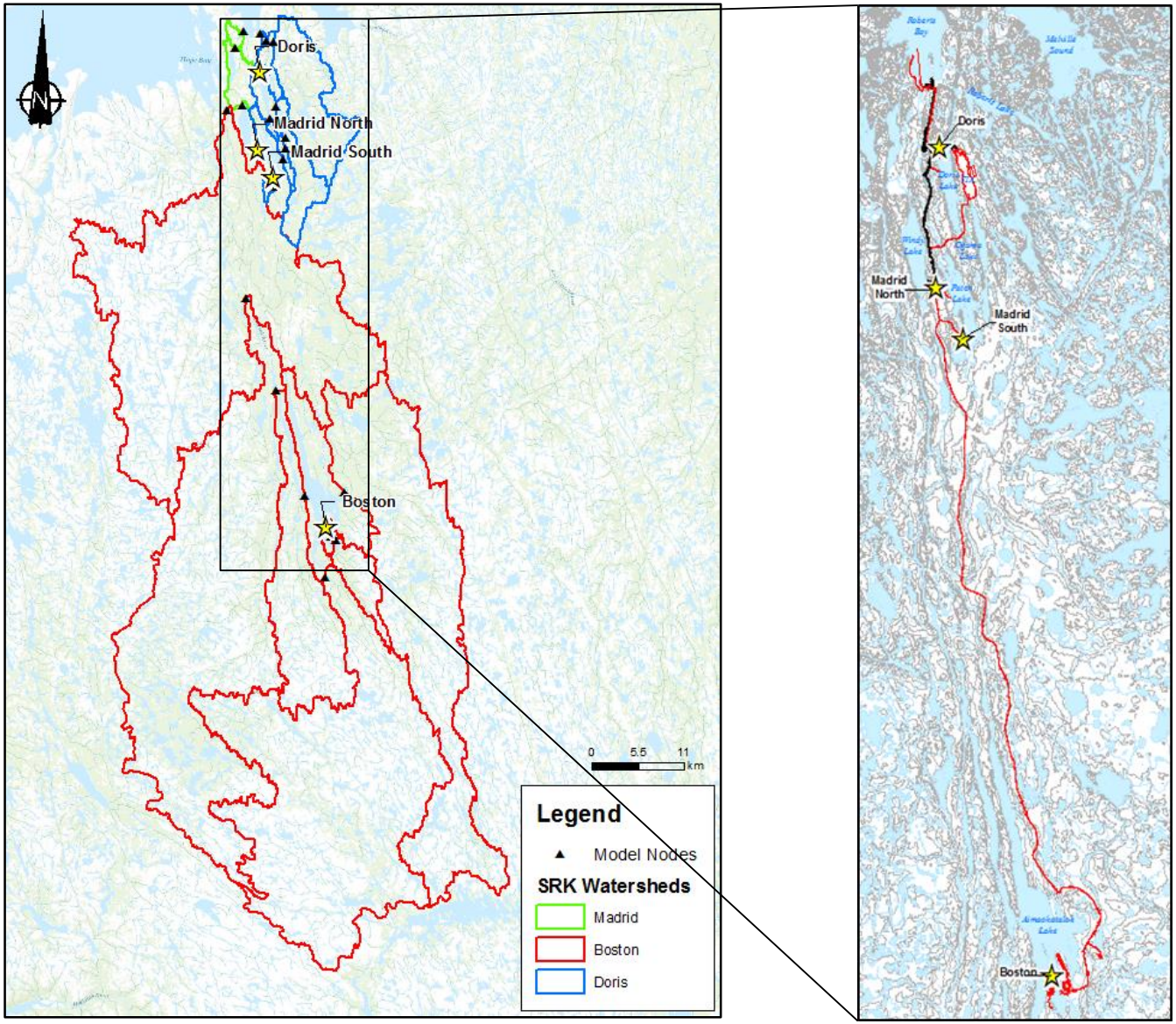


Boston

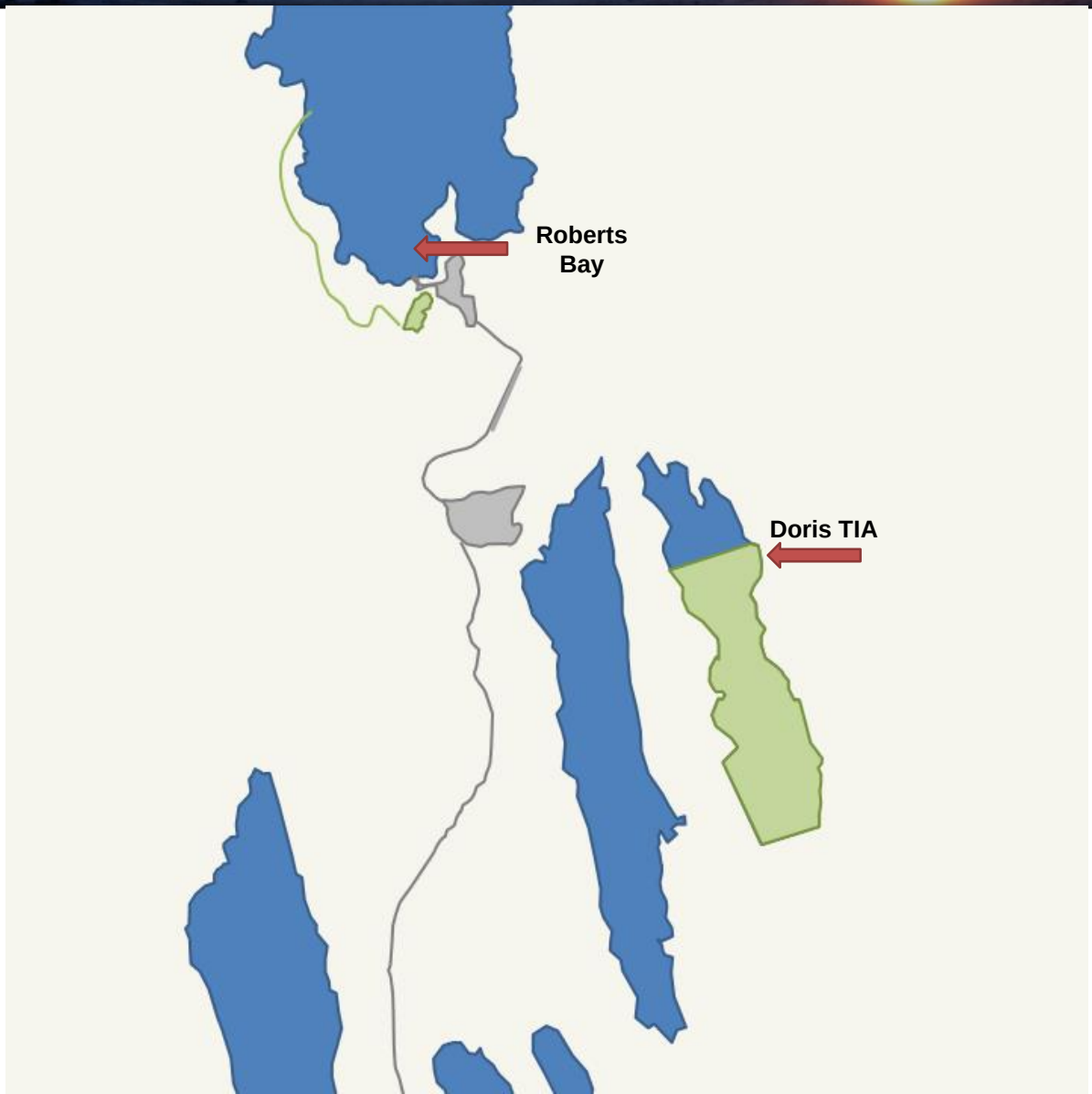


Water Management

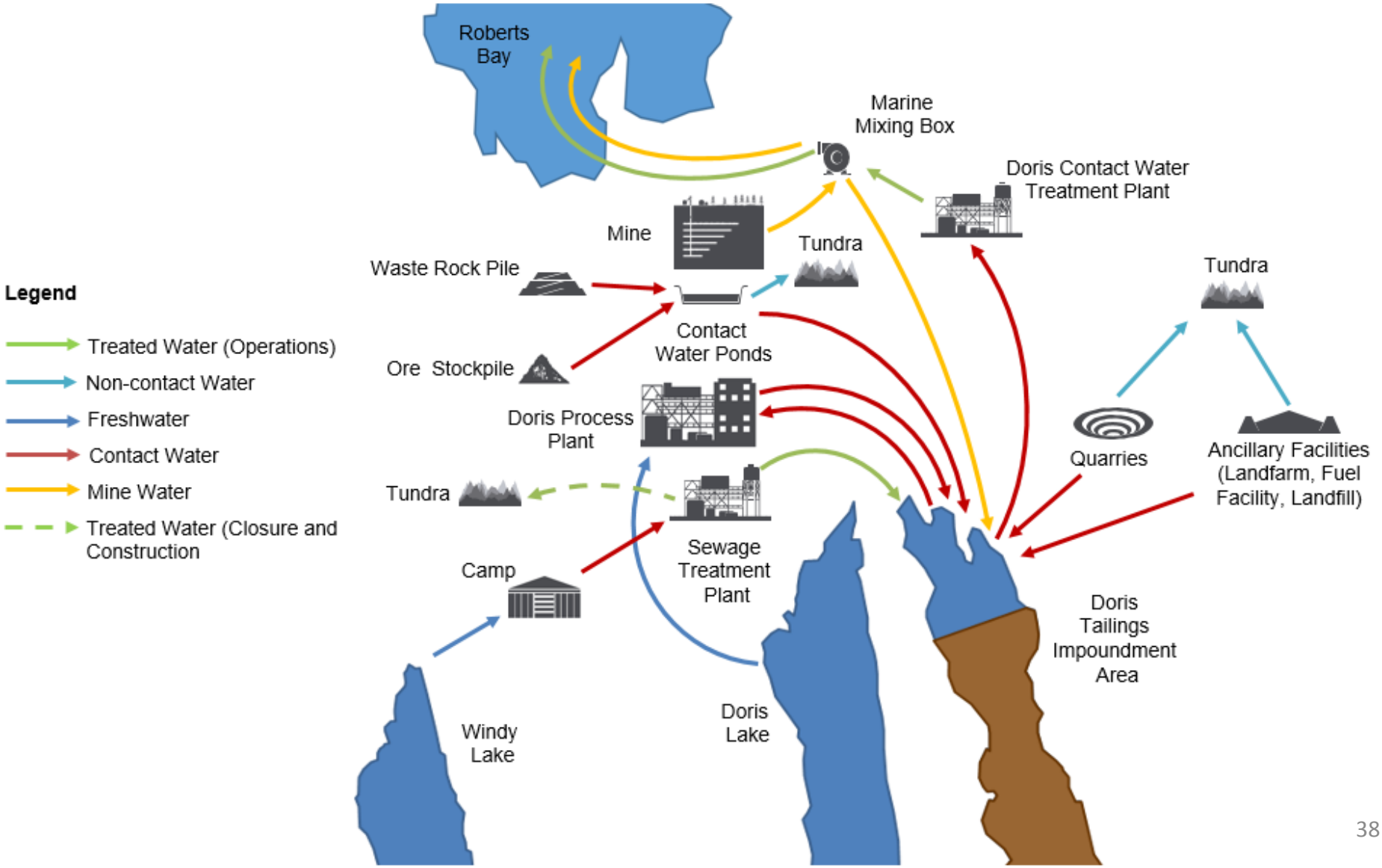
Hydrological Setting



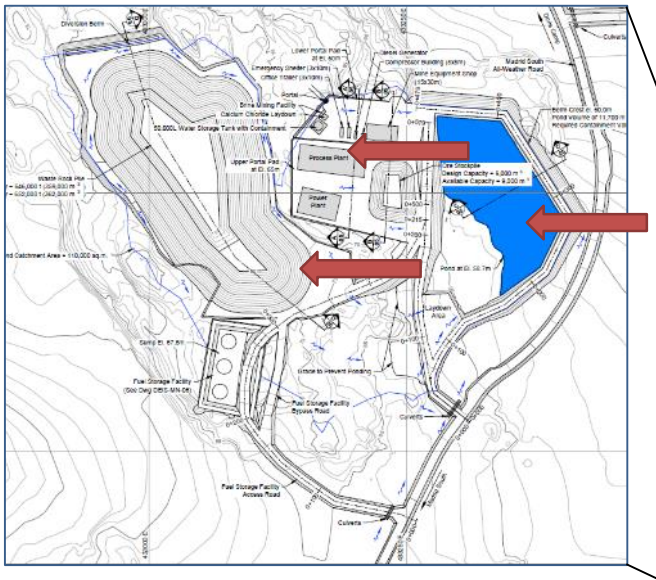
Doris Water Management



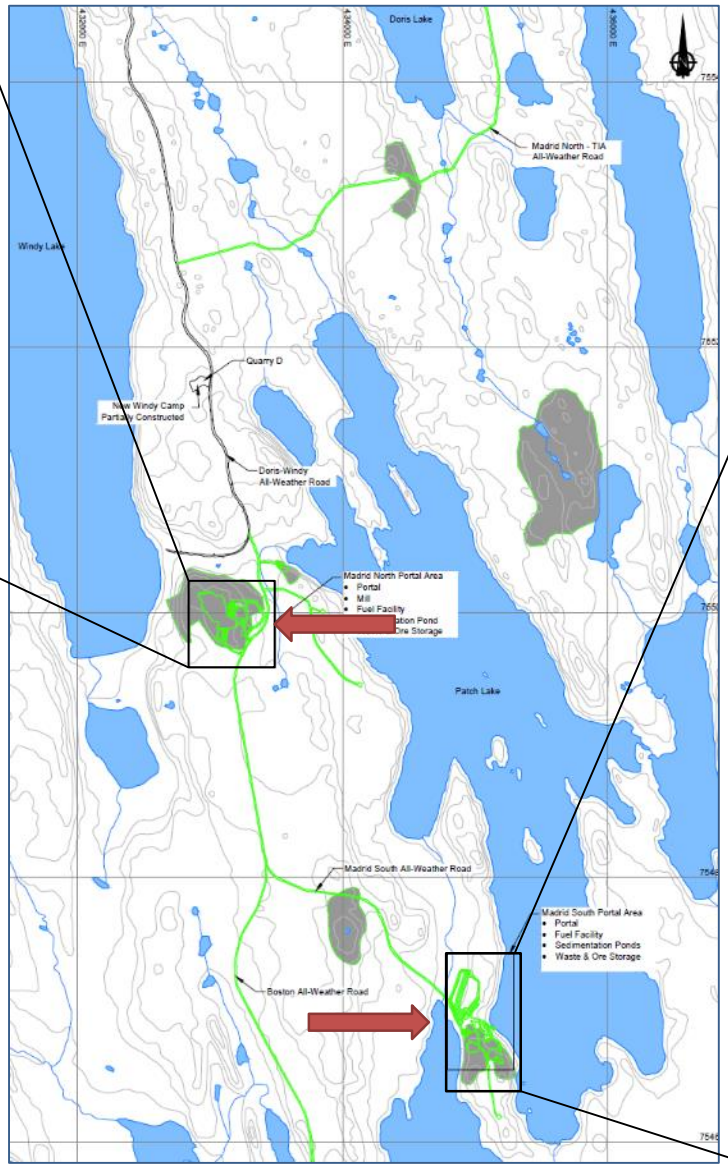
Doris Water Management



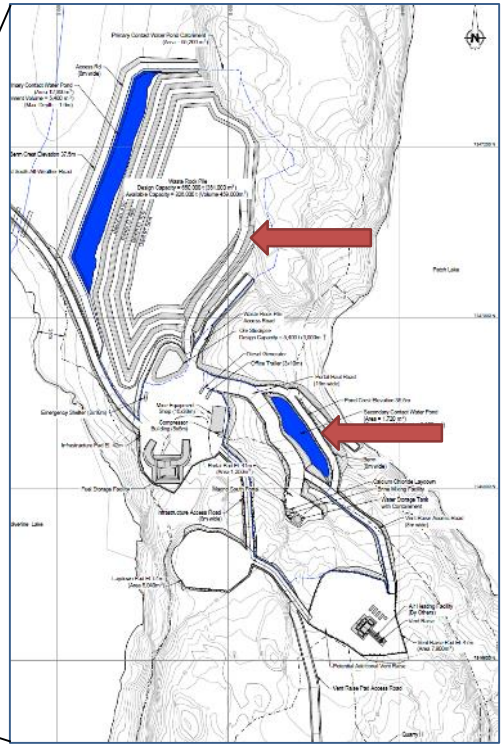
Madrid Site Layout



Madrid North



Madrid South



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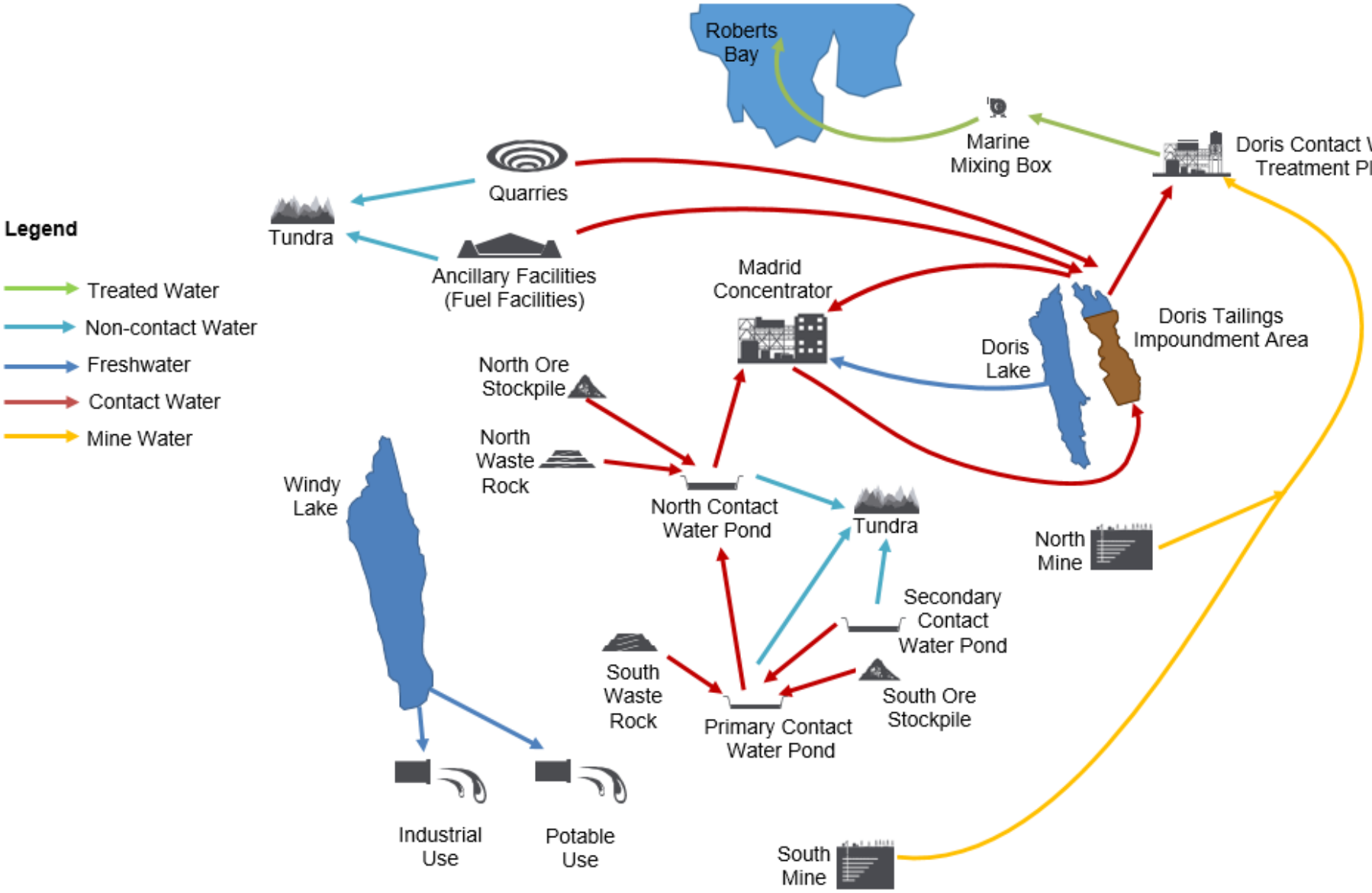
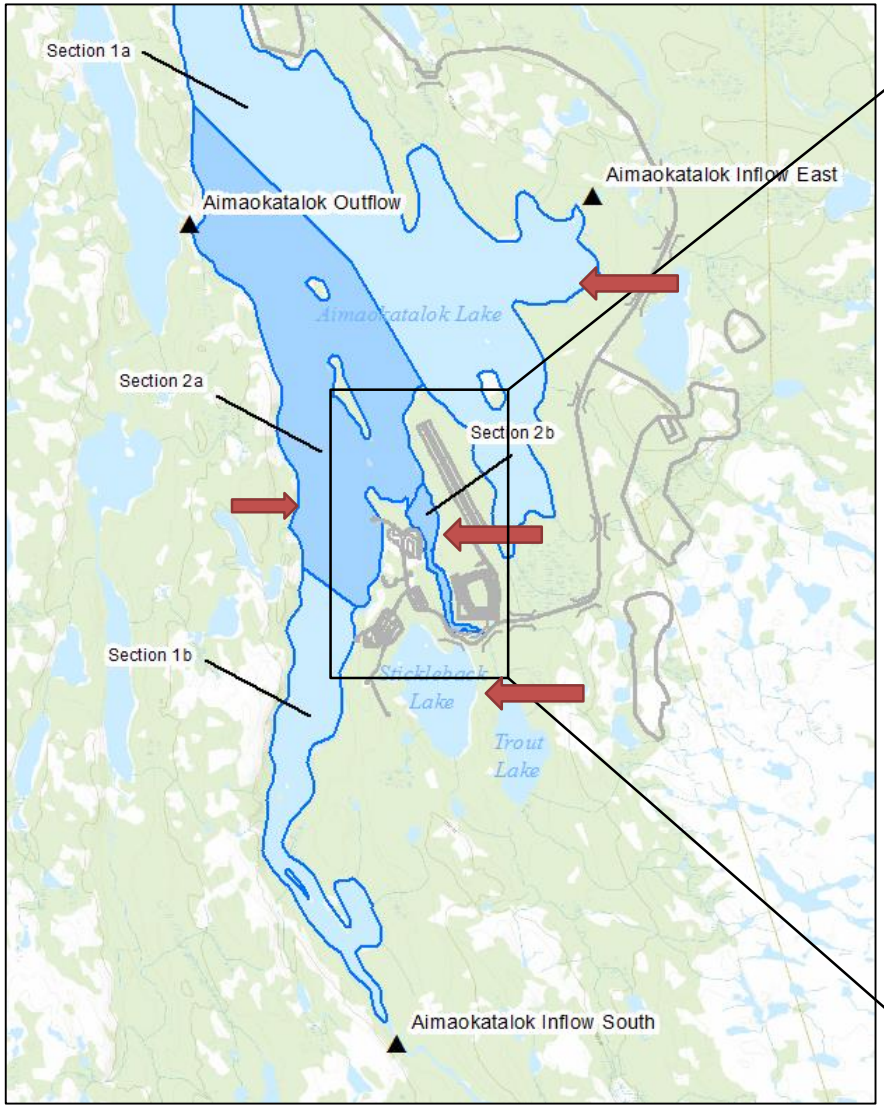
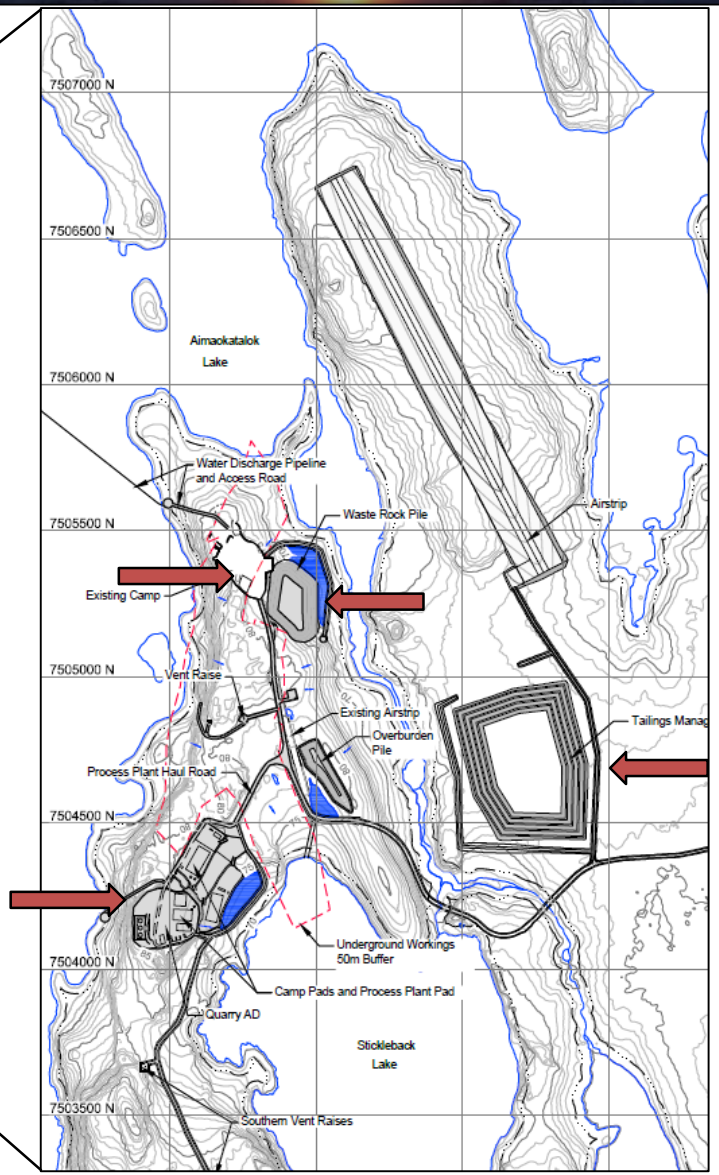
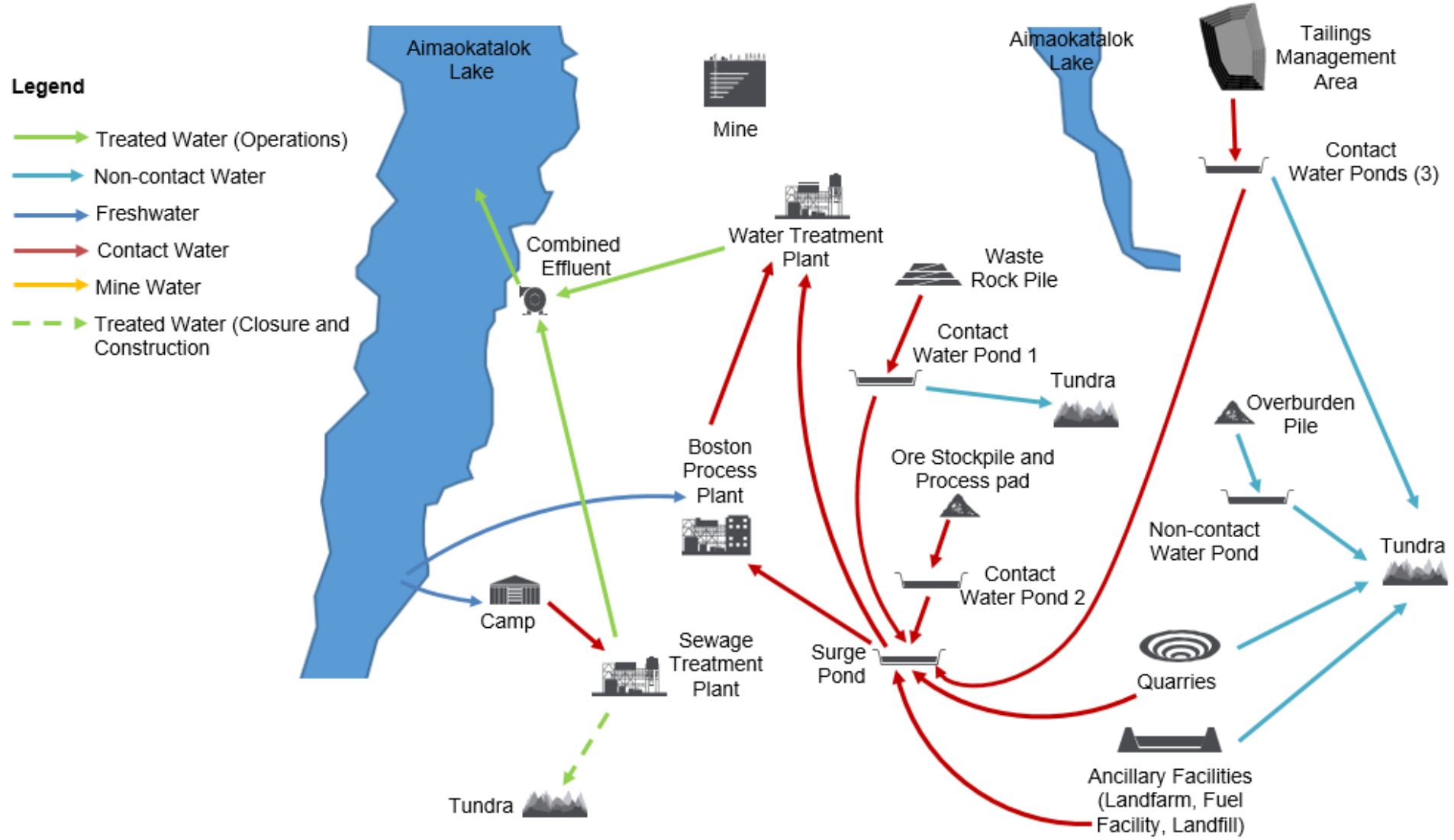


Boston Site Layout and Aimaokatalok Lake





Boston Water Management



Freshwater Environment

Freshwater Environment

- **Valued Ecosystem Components**:
  - Surface Hydrology
  - Surface Water Quality
  - Sediment Quality
  - Fish
    - Fish Community
      - Arctic Char
      - Arctic Grayling
      - Lake Trout
      - Arctic Cisco
      - Broad Whitefish
    - Fish Habitat

Assessment Approach

Early Stages of Assessment

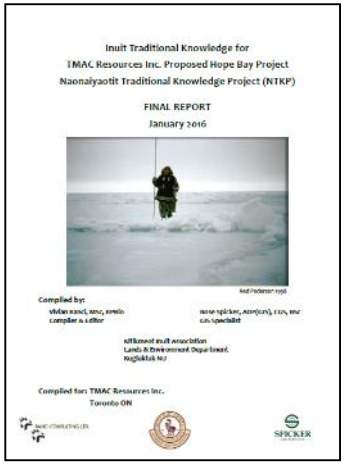
1. Start with Traditional Knowledge
2. Identify Study Areas based on potential Project interactions
3. Collect baseline data from within designated Study Areas

Impact Assessment Approach

4. Identify Project Interactions with Freshwater Environment
5. Identify Mitigations to reduce Project Impacts
6. Model Project Interactions on water quantity and quality
7. Assess potential Residual Effects of Project on Freshwater Environment
8. Develop monitoring approach based on outcome of EIS review

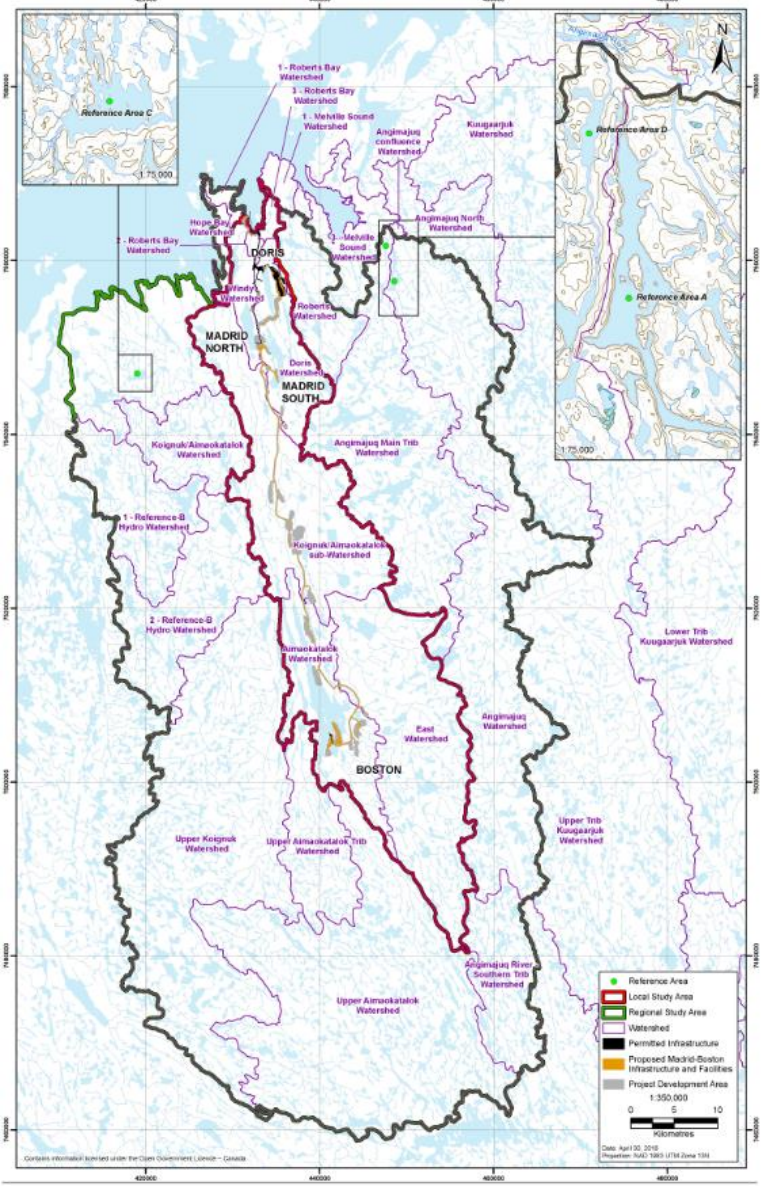
Inuit Engagement

Historical and Current Inuit Comments and Concerns:


Inuit Traditional Knowledge for
TMAC Resources Inc. Proposed Hope Bay Project
Naonaiyaotit Traditional Knowledge Project (NTKP)
FINAL REPORT
January 2016

- shallower lakes and lower water flows
  - frozen to streambed in winter
- mine exploration and development
- contaminant exposure through fish consumption
- potential habitat loss and approach to fisheries offsetting
- no identified drinking water sources in Project area, but water use exists

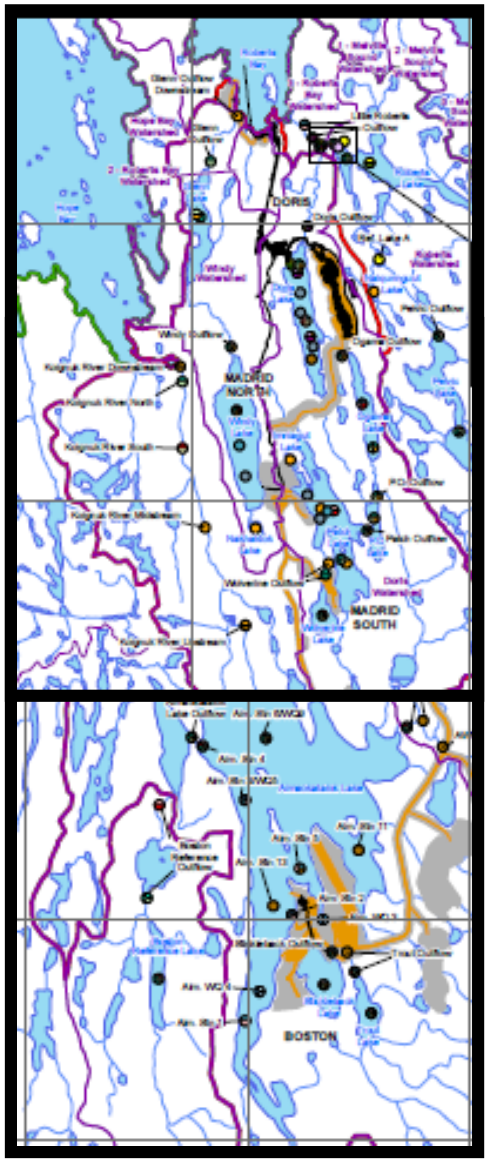
Freshwater Environment – Study Area



Local Study Area – Extending one watershed or sub watershed boundary from Project infrastructure

Regional Study Area – Extending one watershed or sub watershed boundary from LSA

Existing Environment



- **Freshwater data has been collected in Hope Bay Belt since 1993**
  - Project lakes and streams
  - Reference lakes and streams

- **Freshwater lake and stream data includes:**
  - Hydrology (streams) and lake levels
  - Water quality (winter and summer)
  - Sediment quality (summer)
  - Primary producers
  - Secondary producers
  - Fish and fish habitat, including tissue metals

Hydrology Assessment

- **Potential impacts assessed:**
  - **Changes to surface hydrology**
    - Water withdrawal from lakes
    - Construction and use of underground mines
    - Modification of natural drainages

Water and Sediment Quality Assessment

- **Potential impacts assessed:**
  - **Changes to freshwater water or sediment quality**
    - Site preparation, construction and decommissioning
    - Site and mine contact water
    - Explosives
    - Treated discharge
    - Dust Deposition

Fish Assessment

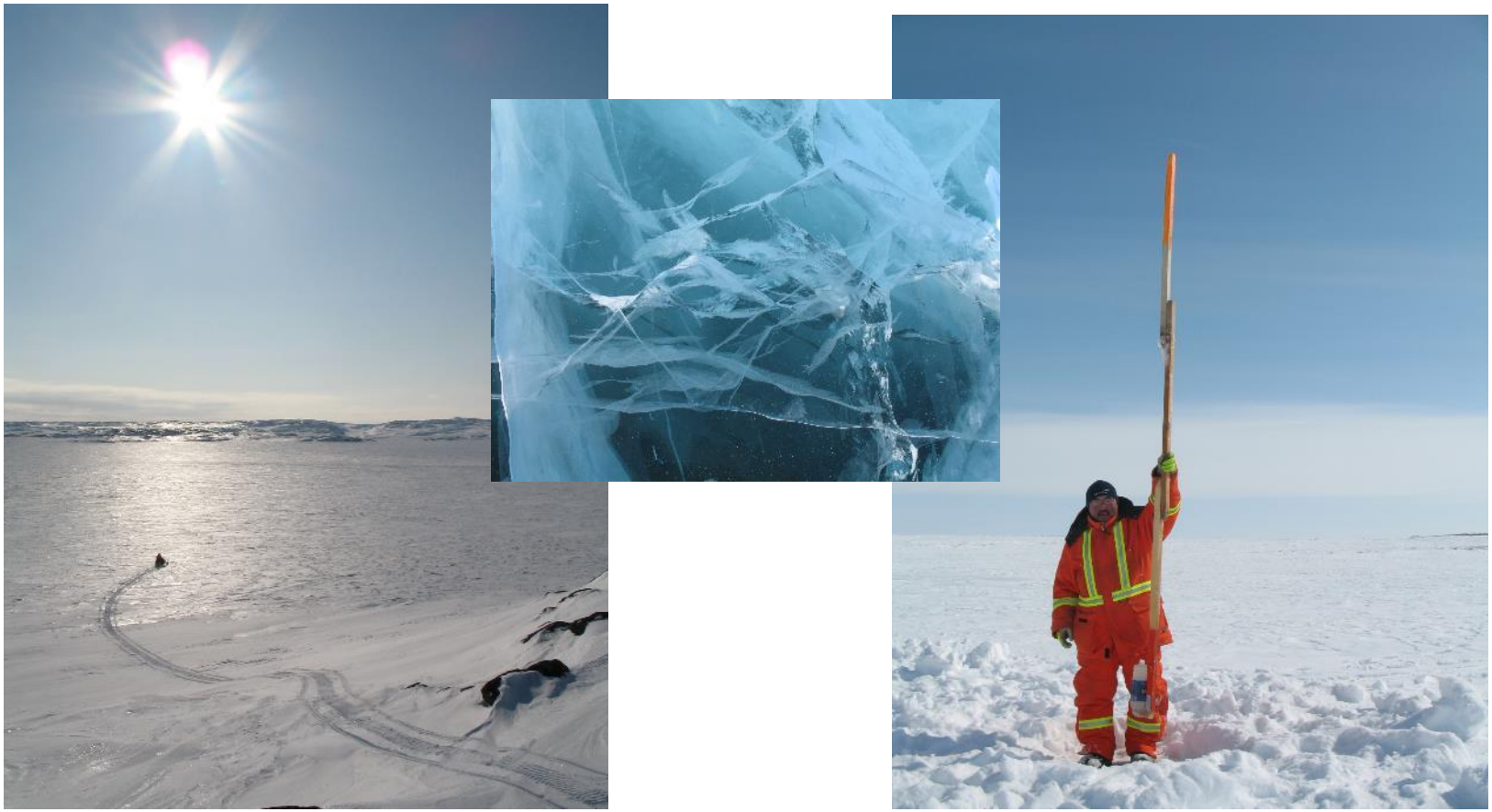
- **Potential impacts assessed:**
  - **Fish habitat loss or alteration**
  - **Fish mortality or changes to population abundance**
    - Project infrastructure and development
    - Water withdrawal and use
    - Changes in water and sediment quality

Freshwater – Monitoring and Management

- **Aquatic Effects Monitoring Plan**
  - Belt-wide plan including Doris, Madrid, and Boston
- **Environmental Effects Monitoring Program**
  - Aimaokatalok Lake
- **Surveillance Network Program**
  - Type A Water Licence
- **Fisheries Offsetting Monitoring Program**
- **Management Plans**

Conclusions of Freshwater Assessments

- **No significant Project or Cumulative impacts**



Thank You, Questions