Giant Mine
Remediation Project

Discussion of Upset Conditions from Water Source Selection Study Update

Presentation to Yellowknife City Council – June 16, 2025

Government of Northwest Territories / Gouvernement des Territoires du Nord-Ouest

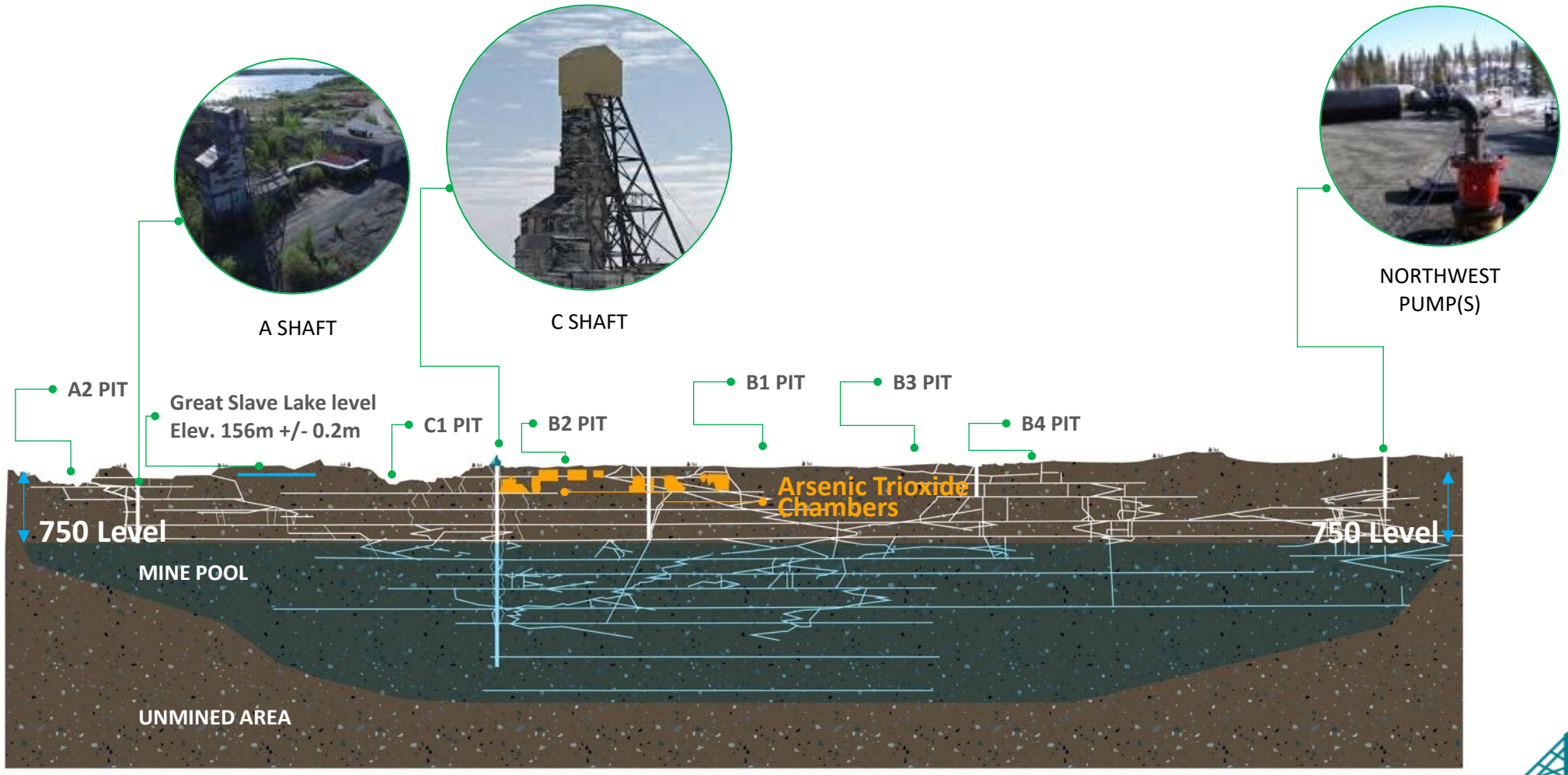
Canada

City of Yellowknife Water Source Selection Study 2024 Update

Upset Conditions:

- **Upset Condition #1** – where the Giant Mine Water Treatment Plant (WTP) fails either partially or in whole for a long duration (months), the mine pond level rises and eventually releases contaminated water to surface and ultimately into the YK Bay.
- **Upset Condition #2** – where the Giant Mine WTP releases effluent with metals concentrations above the effluent targets. This is a hypothetical situation with less impact on arsenic concentrations in the Bay and correspondingly less risk than upset condition #1.

Underground and Minewater



Minewater Management - Existing

Underground Water

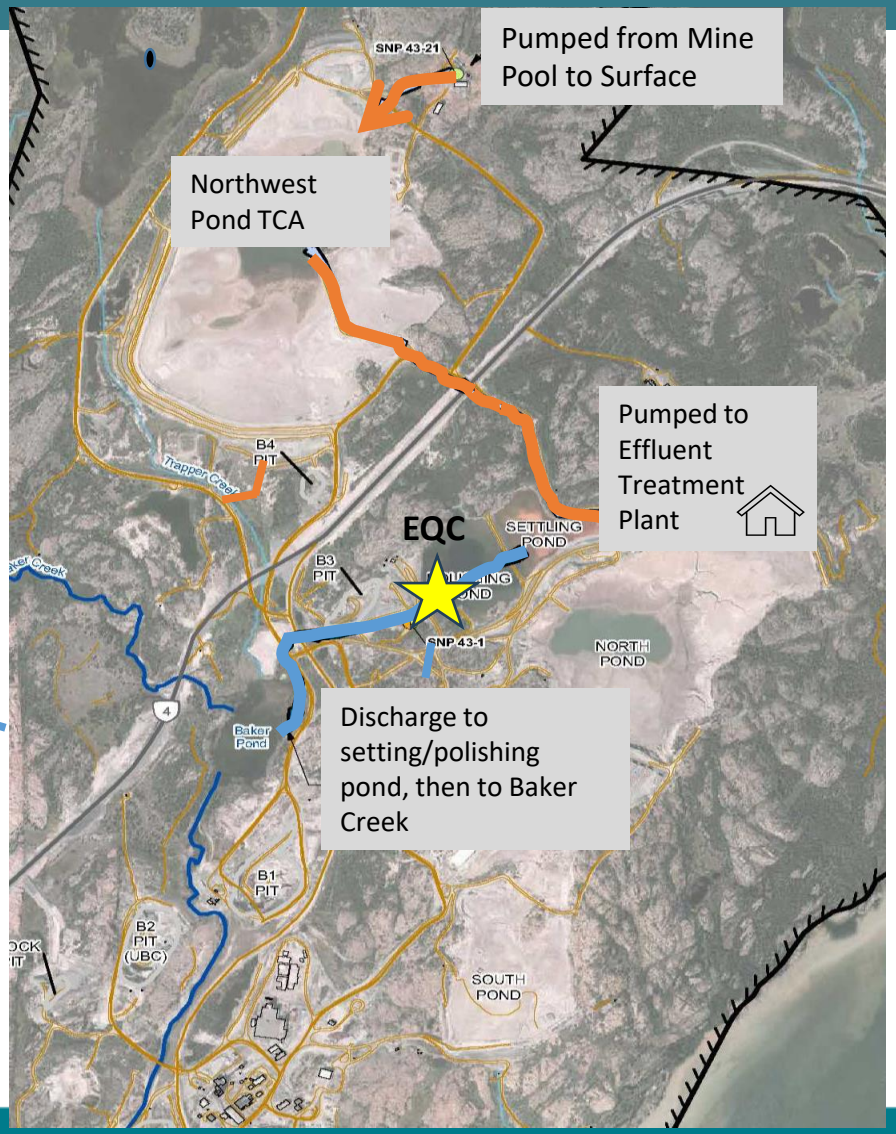
- Water is pumped from the Underground to surface (Northwest Pond TCA)

Surface Water

- Water is stored on surface in the TCA's
- Contact water is collected, brought to the TCA's for storage and then treatment

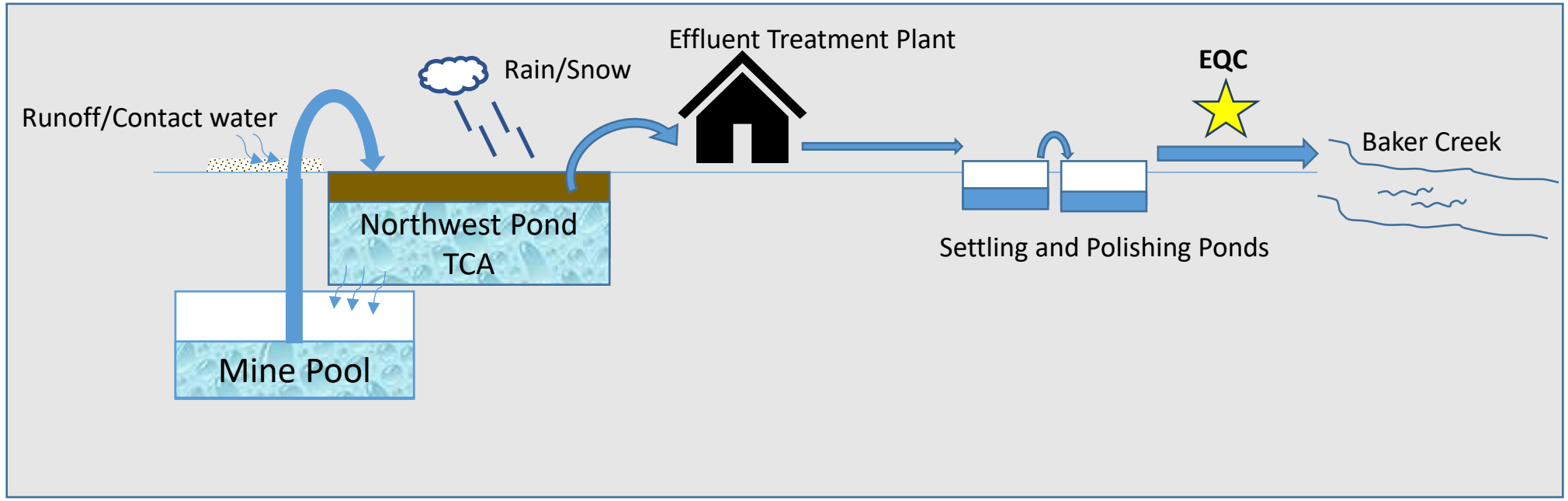
- Water from Northwest Pond TCA pumped to the effluent treatment plant (ETP)
- Seasonal effluent discharge to Baker Creek

TCA = Tailings Containment Area



Minewater Management - Existing

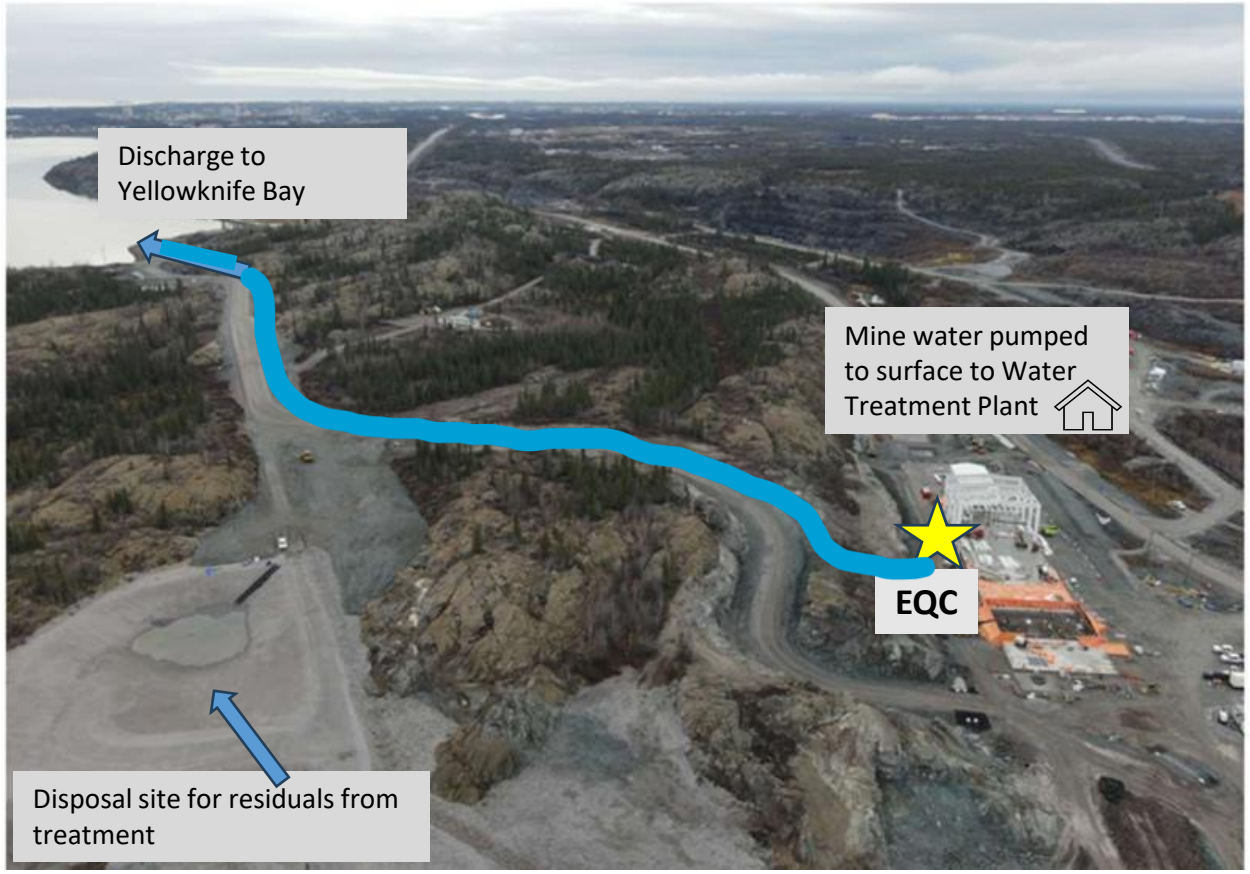
How is water pumped on Site?



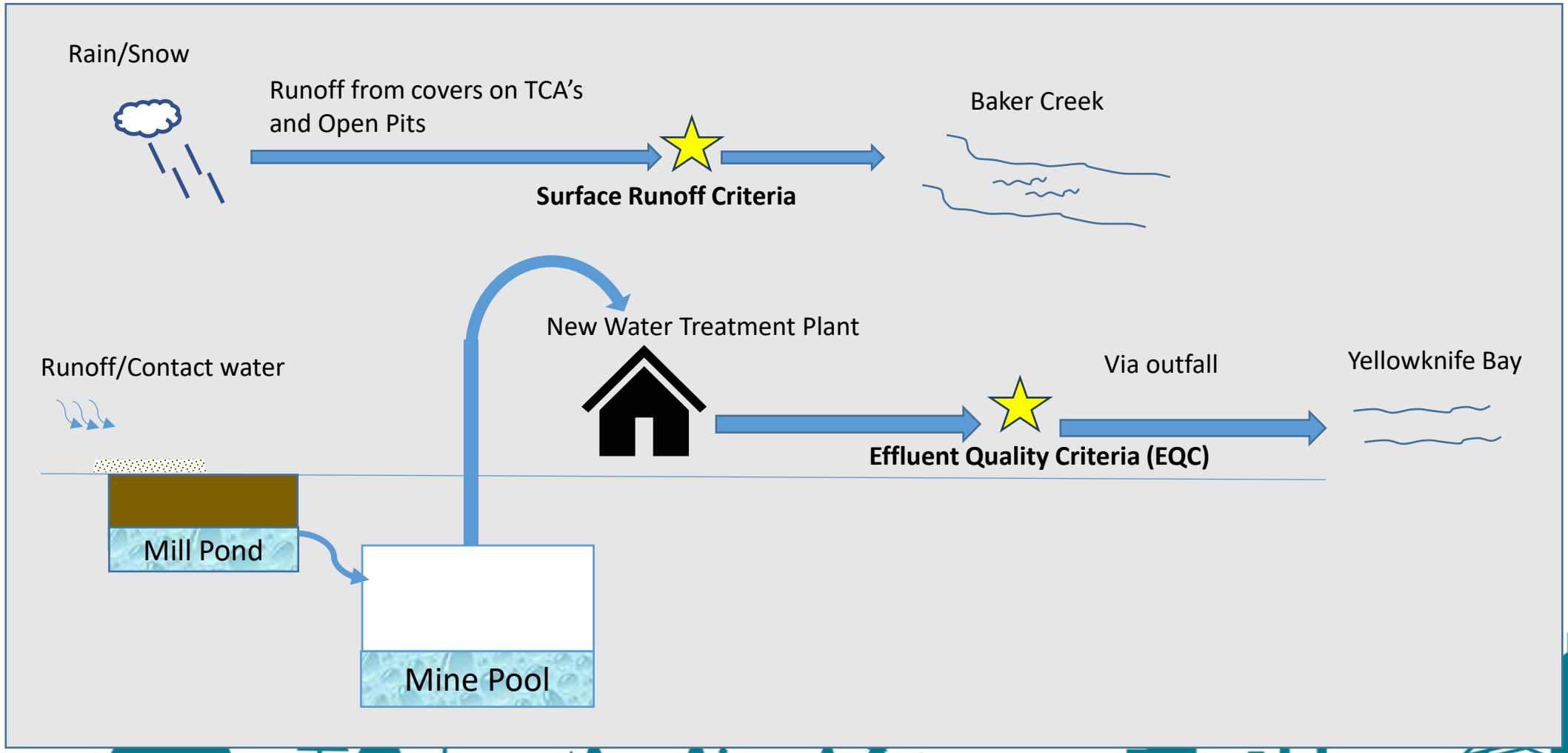
Minewater Management - Future

How will water underground be managed during and upon completion of remediation?

- In late 2026, operation of the new Water Treatment Plant (WTP) will allow water to be pumped directly from the Underground for treatment.
- Treated water from WTP is discharged directly to Yellowknife Bay on a year-round basis.
- Water is no longer stored on surface in the Tailings Containment Areas (TCA's)
- Minewater elevation will be monitored continuously using sensors at 4 locations across site.

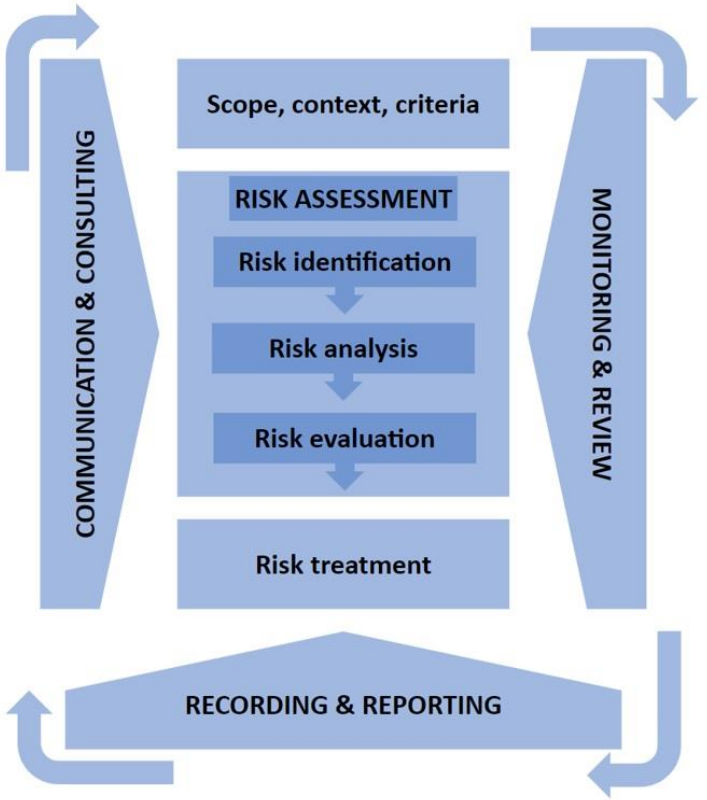


Minewater Management – Future



How does the project manage risk?

- **Quantitative Risk Assessment (QRA) for the Giant Mine Remediation Project (GMRP) looked at what could go wrong at the site, how likely those problems are, and how bad the consequences might be. The goal was to identify risks, figure out how to handle them, and guide the design of the remediation.**
- **Design Plans submitted to the Mackenzie Valley Land and Water Board took into consideration the risks identified in the QRA.**
- **The GMRP uses a proactive risk management process to manage risks and identify mitigation measures during implementation of the project.**

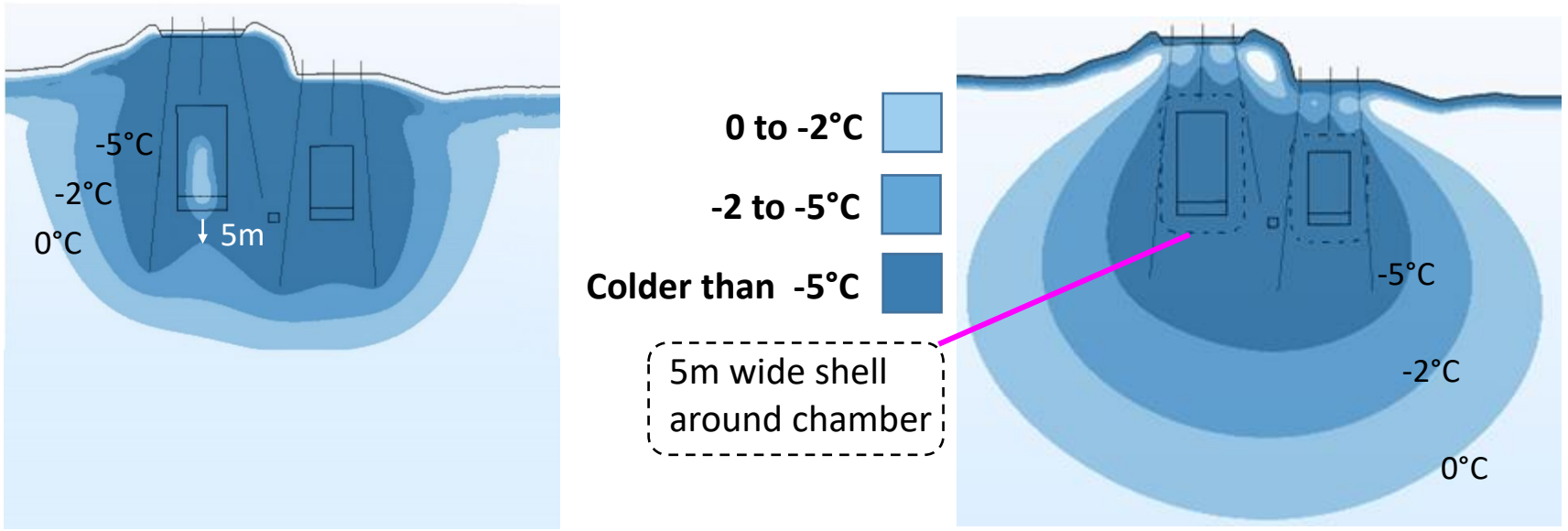


Visualization of risk management process by ISO 31000

How does the remediation help reduce the risk?

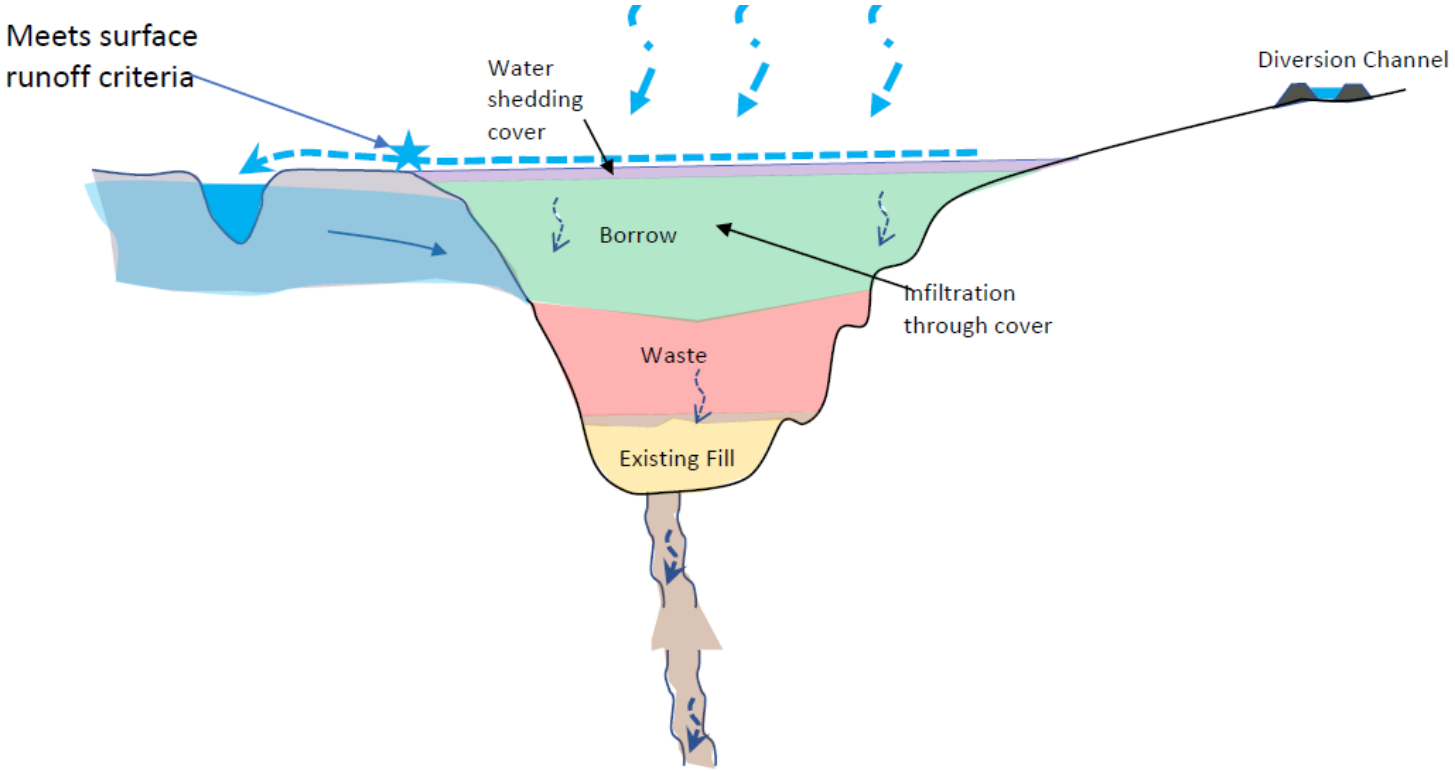
Arsenic Trioxide Freeze Program:

- A frozen shell that is a 5 m wide zone of bedrock or fill at -5°C or colder around each arsenic containing chamber, stope, drift or pit fill.



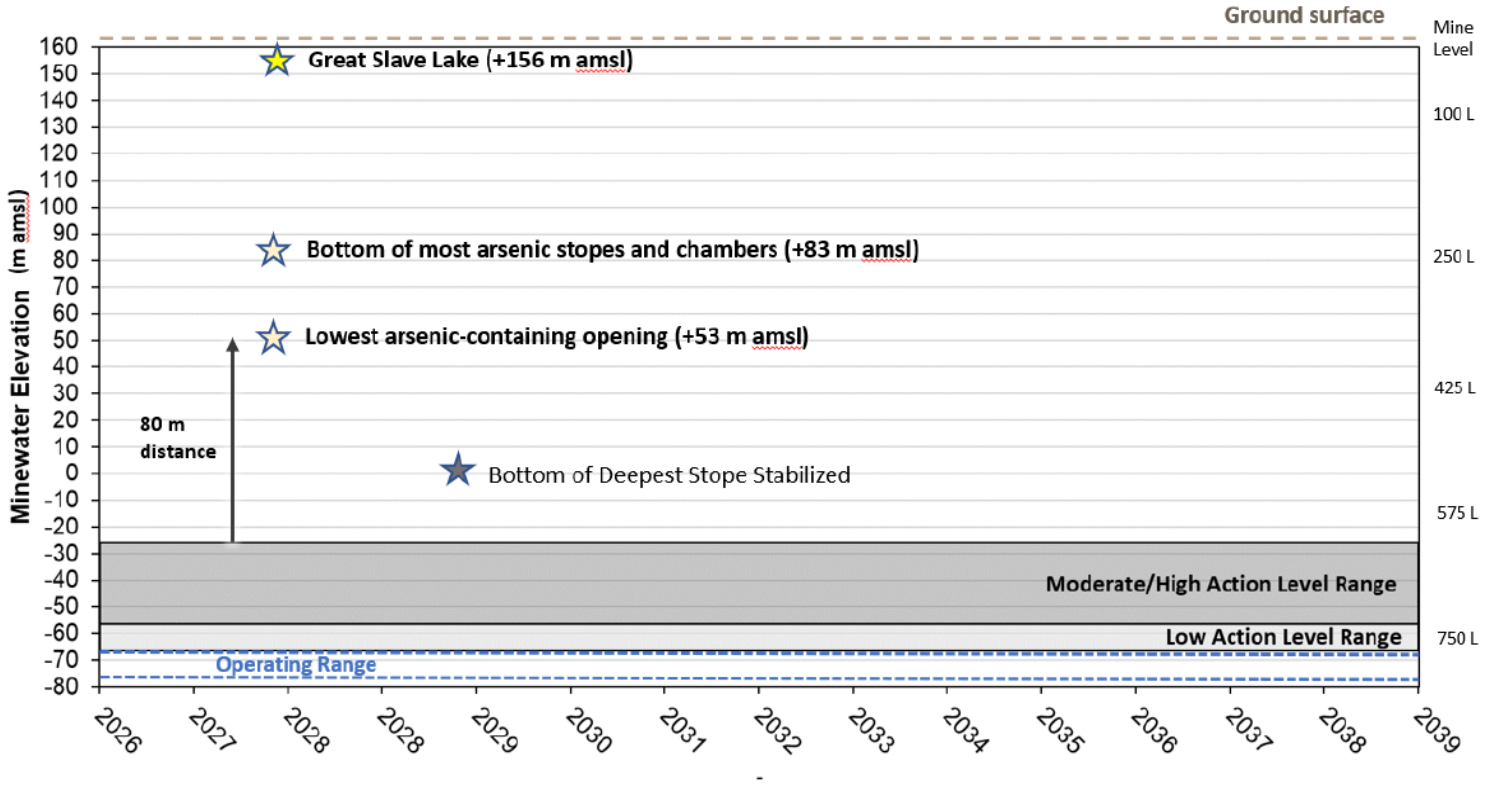
How does the remediation help reduce the risk?

- Baker Creek will be realigned and widened to convey a large flood event.
- Filling and placing a water shedding cover on open pits and Tailings Containment Areas will reduce water infiltration and the risk from flooding of Baker Creek entering the underground.
- Sealing openings to surface in flood prone areas.



Minewater Elevation
Risk Evaluation and Action Levels

Critical Elevations in the Underground



m amsl = metres above mean sea level.

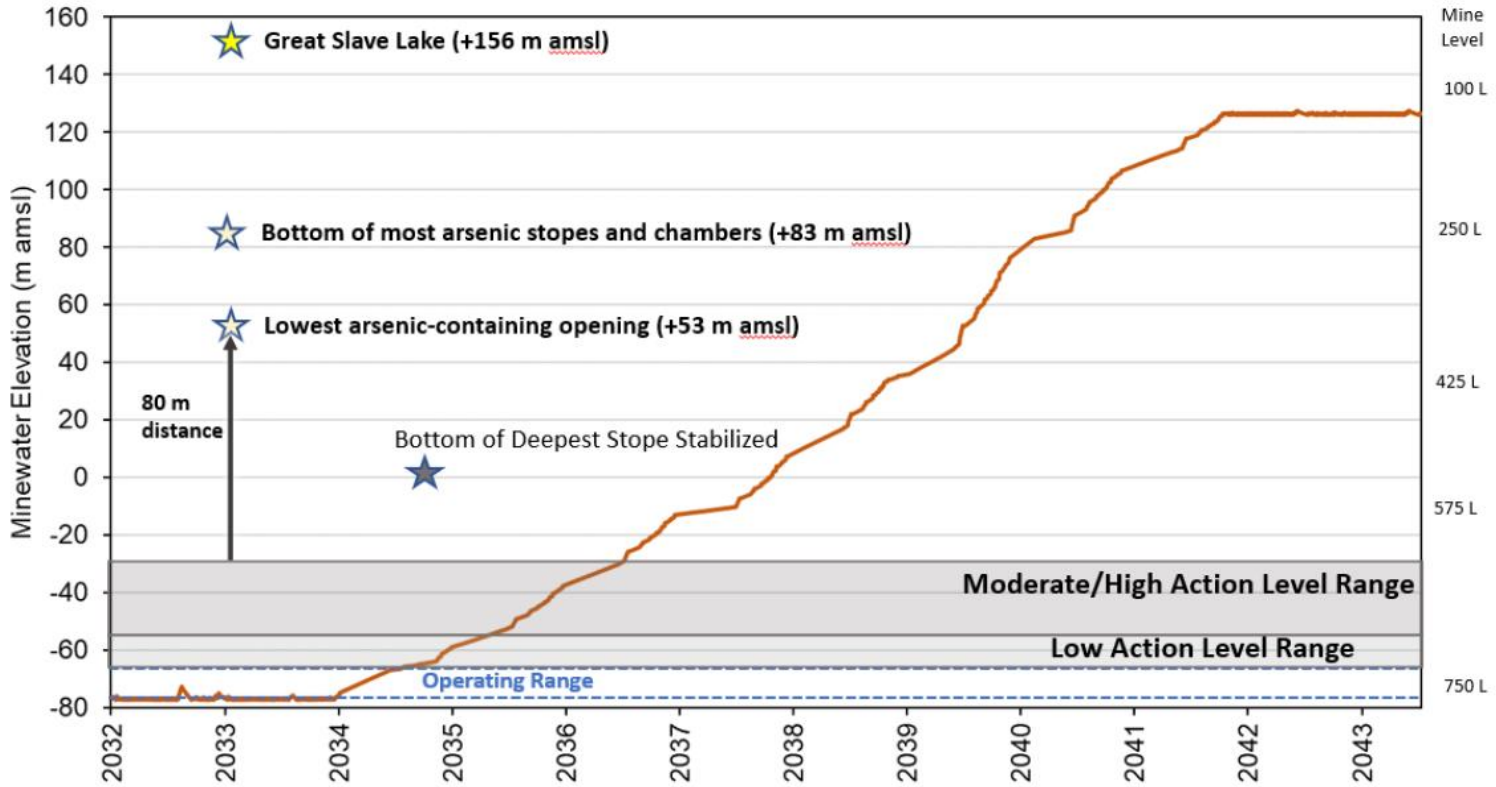
Figure 5-3: Comparison of Action Level Ranges for WTP4-1 from Table 5-6 and Critical Elevations of Underground Stopes and Chambers (wide-scale view)

What if We are Wrong?

What if a failure of the water treatment plant kept going? We tested it with the model

- Tested a **total pump shutdown** for extended period
- **How long would we have?** ~4 *years to lowest arsenic-containing opening under average conditions*
- *~8 years until water reaches surface*

Water Treatment Plant Design Plan



m amsl = metres above mean sea level.

Figure 5-4: **Estimated Minewater Elevation Rise over Time in Post-closure if Pumping Ceases (orange line) with WTP4-1 Action Levels from Table 5-6 and Critical Elevations of Underground Stopes and Chambers (wide-scale view)**

Action Levels for Minewater Elevation

Action Level		Types of Actions and Contingencies (examples)
Low	-67 to -57 m amsl	• Investigate cause and determine if a year over year trend is present. • Continue to pump and treat at maximum capacity
Moderate	Elevation -57 to -27 m amsl for two weeks	• Investigate cause • Continue to pump and treat at maximum capacity • Use available surface water storage if situation suggests trend will persist for multiple months. • Evaluate mitigation options such as increased pumping/treatment (e.g. bring in mobile treatment system).
High	Elevation -57 to -27 m amsl for two months	• Install additional dykes or other surface measures to avoid additional water inputs to the underground • Use Northwest Pumps as backup if required. • If the cause of minewater rise is the loss of an existing pump/well, install a third well to maintain maximum treatment capacity. • Investigate requirement to expand treatment plant capacity

Questions?