BC MEND
Duck Pond Reclamation
ARD Water Management

November 30, 2022

Darren Hennessey

Teck

Agenda

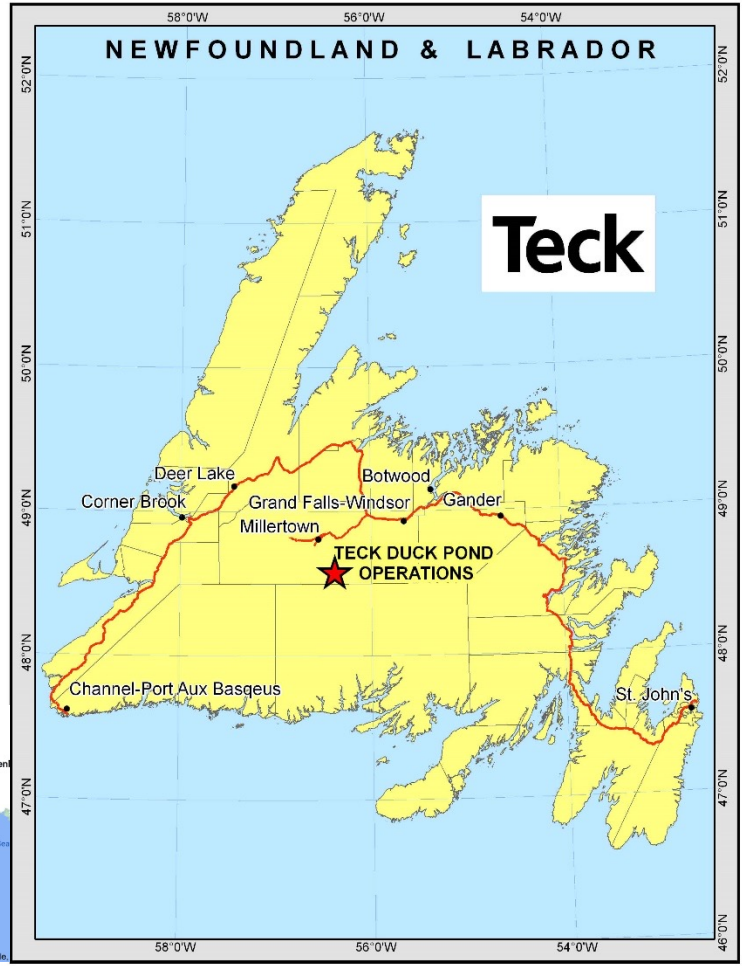
Site Overview
- Location
- Geology
- Site Overview

Water and ARD Management

Site Automation System

Duck Pond Cu-Zn Mine
Location

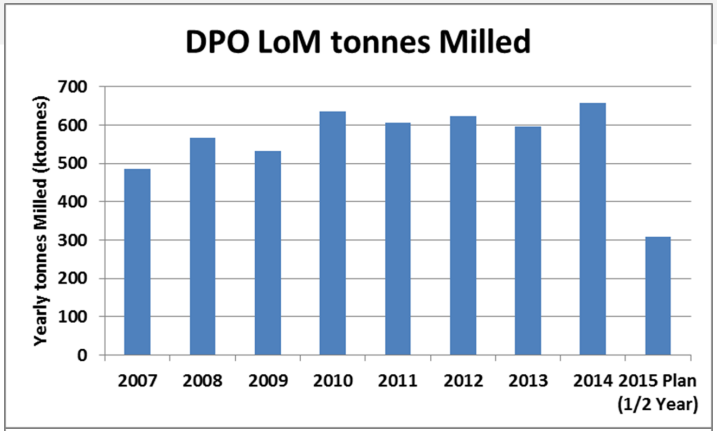
- 30km South of the town of Millertown
- 110km South of the nearest major town of Grand Falls-Windsor
- *Metal and Diamond Mine Effluent Regulations* (MDMER) for the Polishing Pond outlet (DAMC)
- *Duck Pond Closure Water Quality Monitoring Program 2015 (NL)*

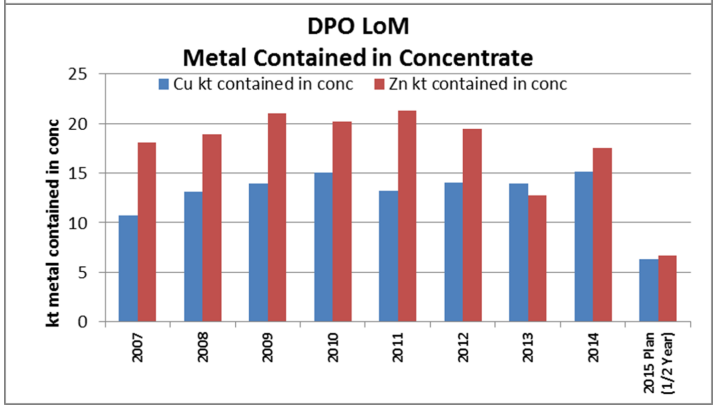


Duck Pond Cu-Zn Mine

History

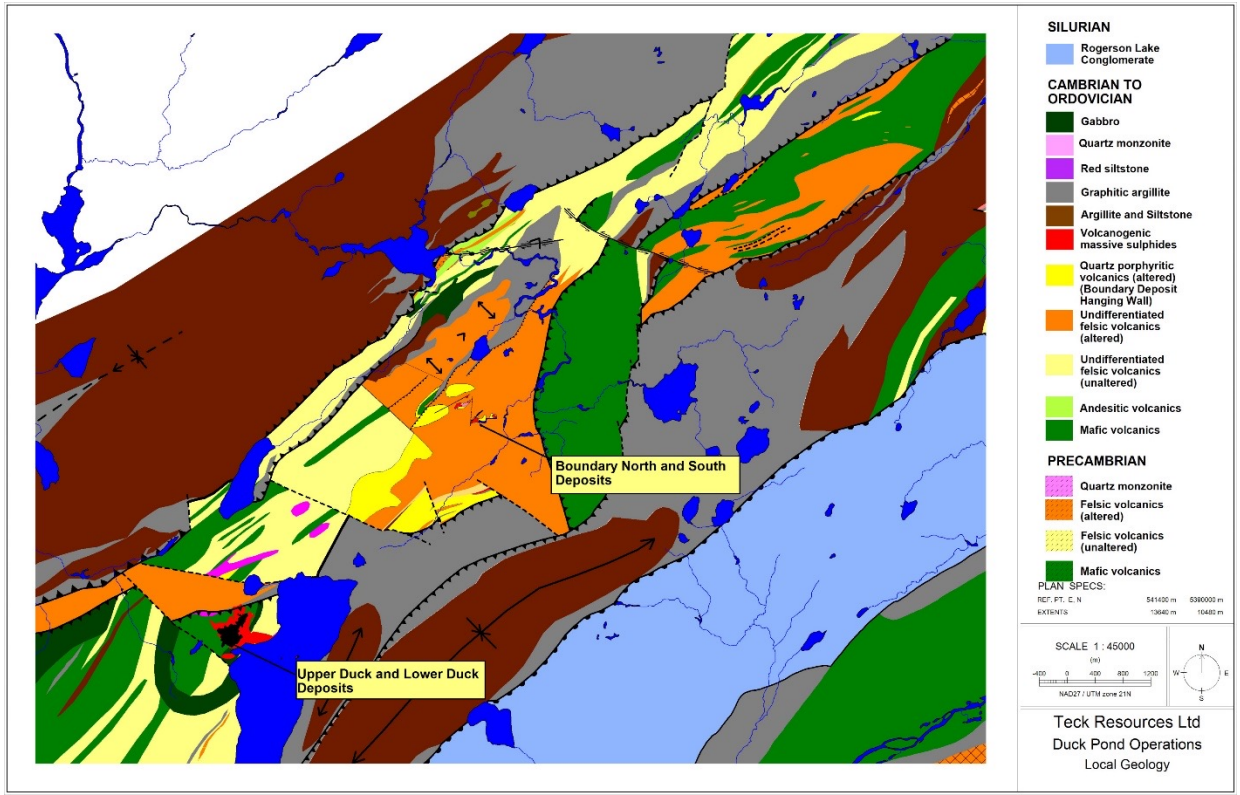
- Operated for 8 years:
  - Production started in 2007
  - Ceased operations in 2015
- Milled 5.01 Mt
- Produced Cu–Zn concentrate
- Underground and open pit operation
- Reclamation activities started in 2015
- Scheduled completion of active closure work Q3 2023





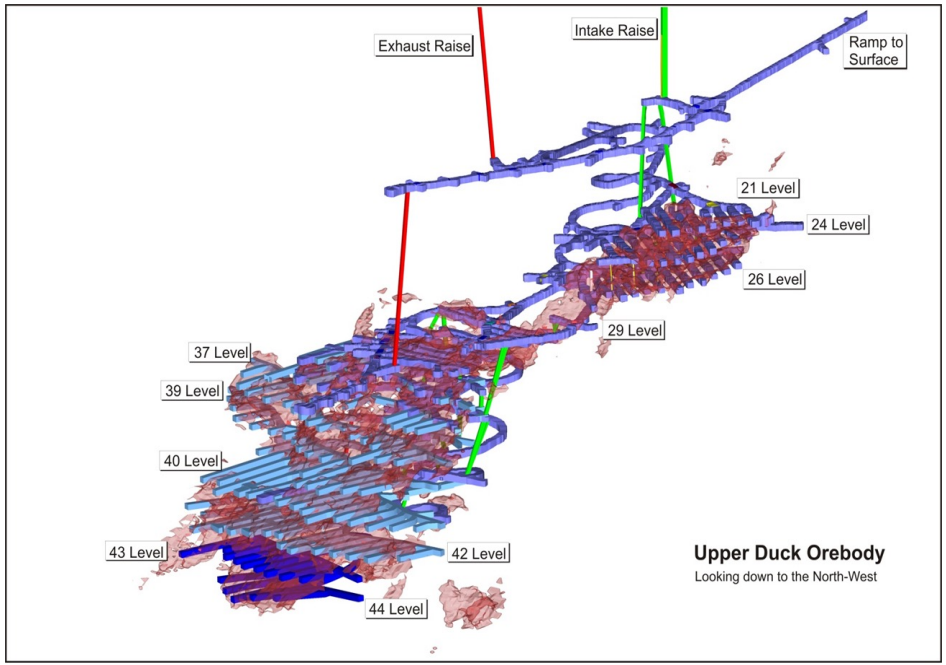
Geological Setting (Local Geology)

- Tally Pond volcanics hosts the Duck Pond and Boundary VMS deposits, and several additional base metal showings
- Massive sulphide lenses consisting mainly of pyrite, chalcopyrite, sphalerite, galena.
- Boundary Deposits are Chalcopyrite-Sphalerite rich with minor chalcocite, bornite and covellite associated within a fault zone between the two deposits.
- Hydrothermal alteration with disseminated and stringer chalcopyrite-pyrite-sphalerite mineralization.

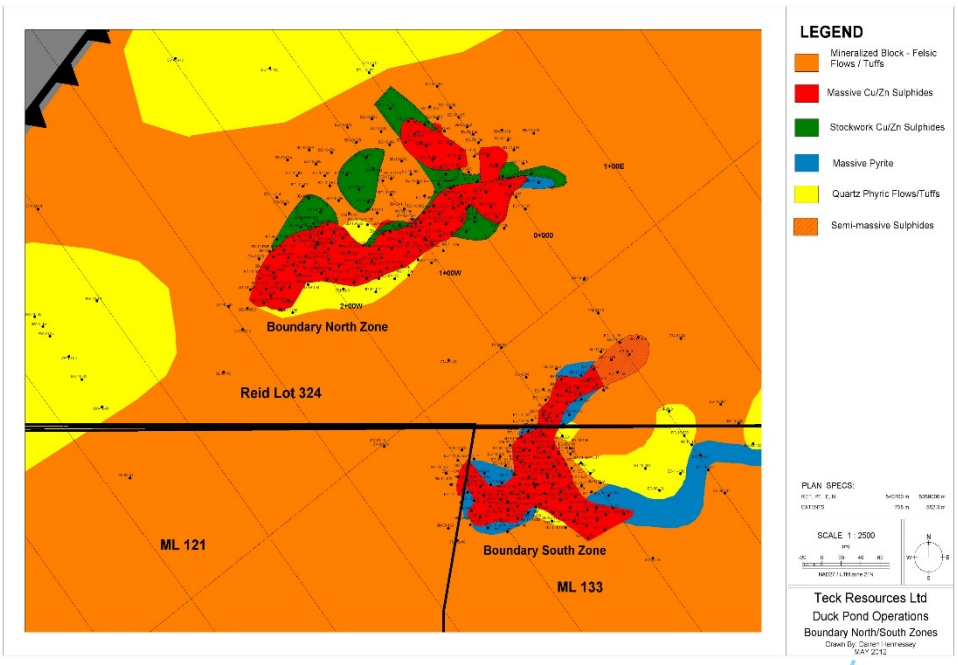


Duck Pond Deposits –Upper Duck and Boundary

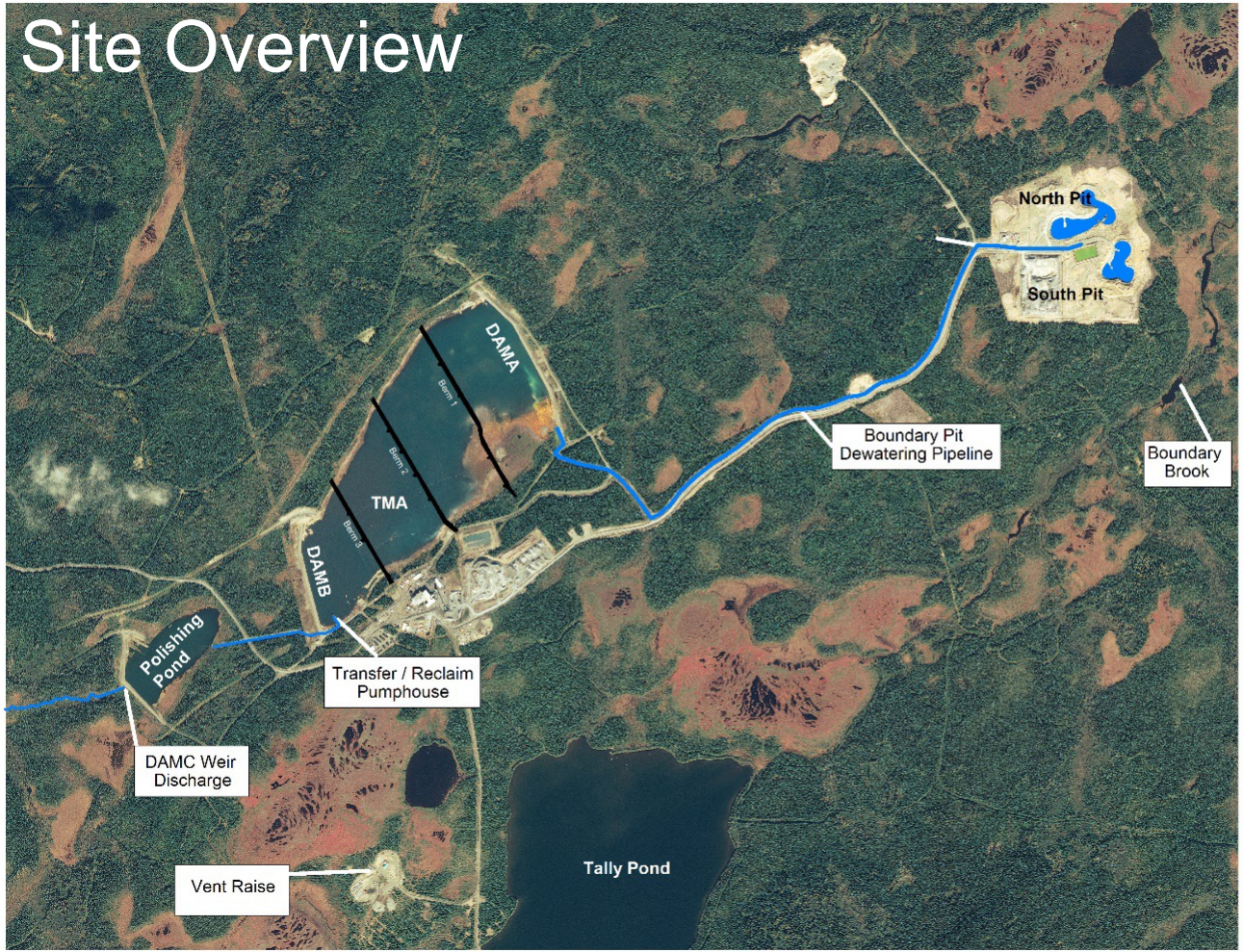
Upper Duck Deposit
~5 Mt at 3.5% Cu and 6% Zn



Boundary North and South Pits
~0.5 Mt at 3.5% Cu and 4% Zn



Site Overview



Teck

PLAN SPECS:

REF. PT. E, N	538600 m	5388000 m
EXTENTS	5761 m	4426 m
REF. ELEV. +/-	1143 m	2302 m

SCALE 1 : 19000

(m)

-100 0 100 200 300 400 500 600

NAD27 / UTM zone 21N

N

W E

S

Teck Resources Ltd

Duck Pond Site Plan

Strategy to Manage ARD at Duck Pond

Tailings

- Considered PAG
- Closure approach is to keep tailings saturated and under a water cover
- Treat water at the TMA before transfer to the Polishing Pond
- PAG rock was used to construct three internal berms across the TMA to reduce to wave fetch to minimize risk of resuspending tailings
- Metal-impacted soils from site reclamation work were also placed in the TMA for long term storage

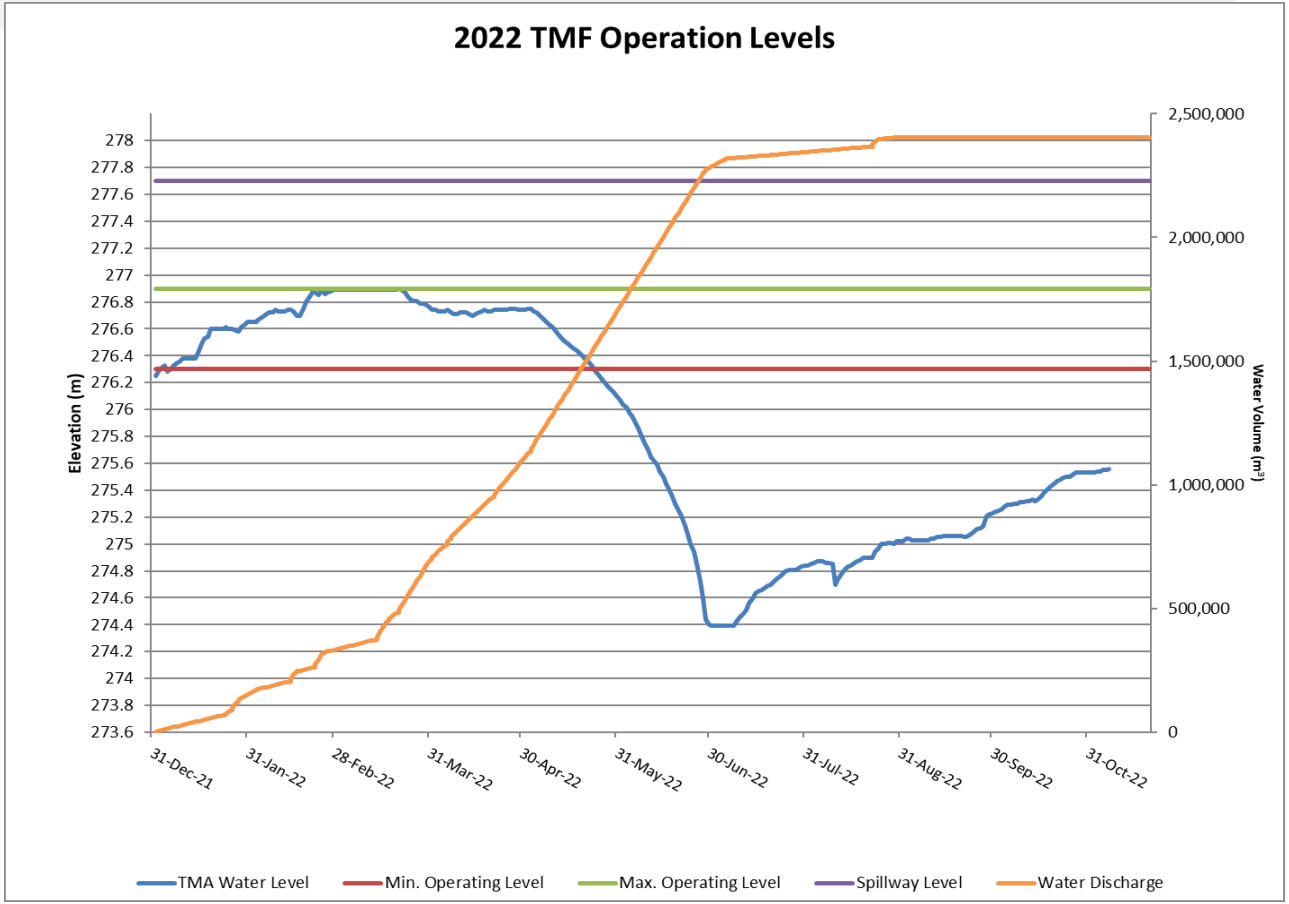
Waste Rock

- Underground waste rock remaining on surface was used to build the internal berms
- Boundary waste rock was placed in the pits with added quicklime
- Pump water from pits to the TMA to mitigate potential impacts
- A water cover is maintained in the pits
- Underground is flooded and plugged at the raises and portal

Water Management

Permitted Final Discharge Point - DAMC

- Managed 2.4M m^3 of effluent
- Lowered TMA for the placement of metal impacted soils
- Exposed portion of tailings for ~6 months



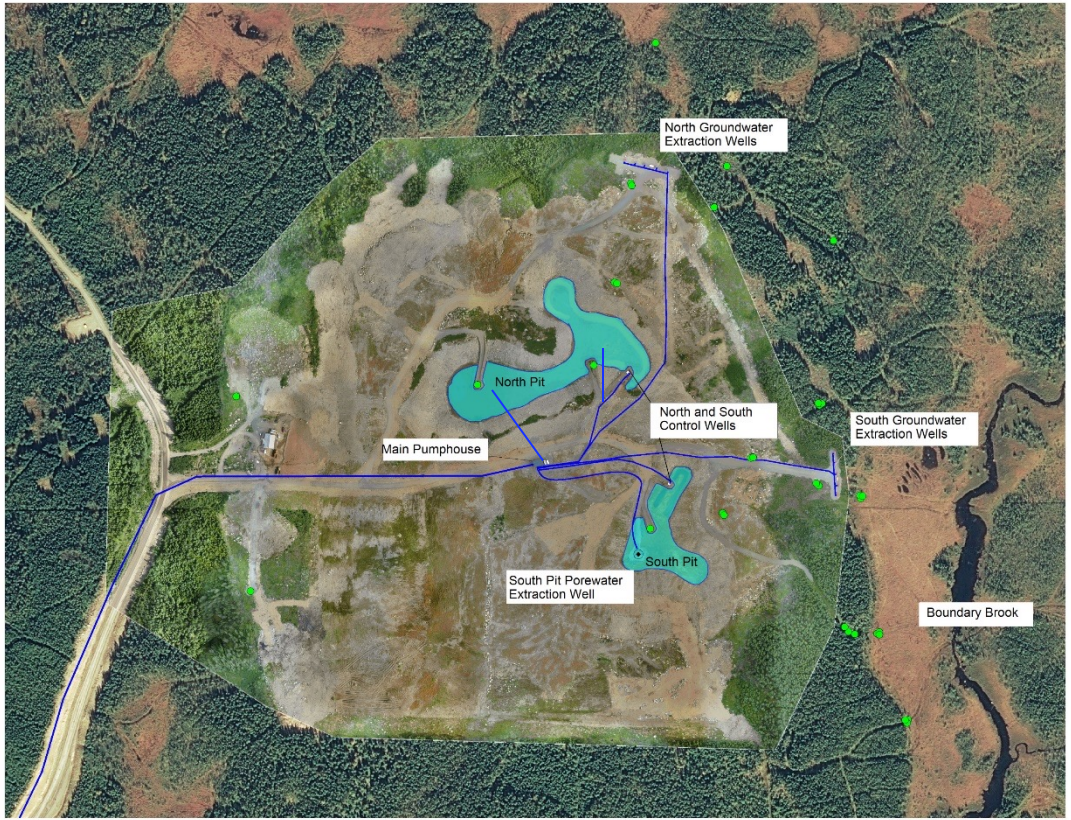
Teck

Boundary Site

Water Management

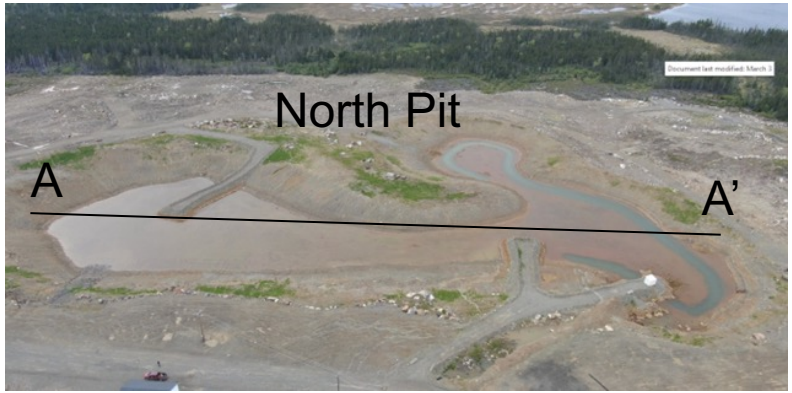
- Water is pumped from three main areas to a central pumphouse, then conveyed to the TMA These areas include:

1. Pit surface water
2. Pit porewater
3. Groundwater extraction wells

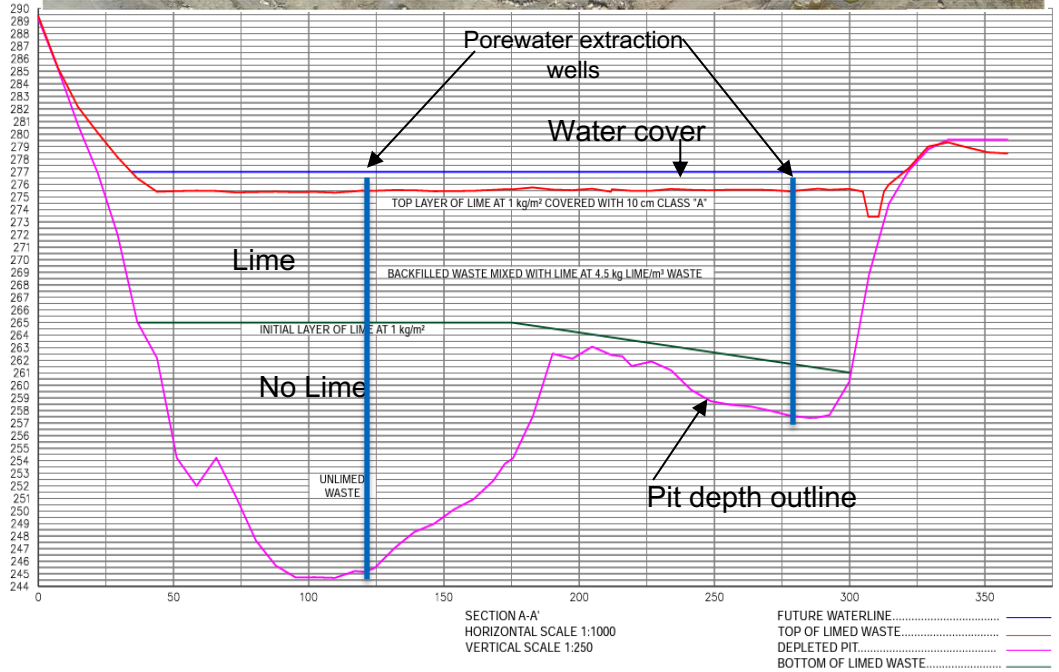


Management of PAG waste rock (Boundary)

- 180,000 m3 of PAG waste rock backfilled in the North and South pits
- Pit PAG mixed with quicklime during backfilling
- Remainder of PAG waste rock was placed in the TMF for long-term storage

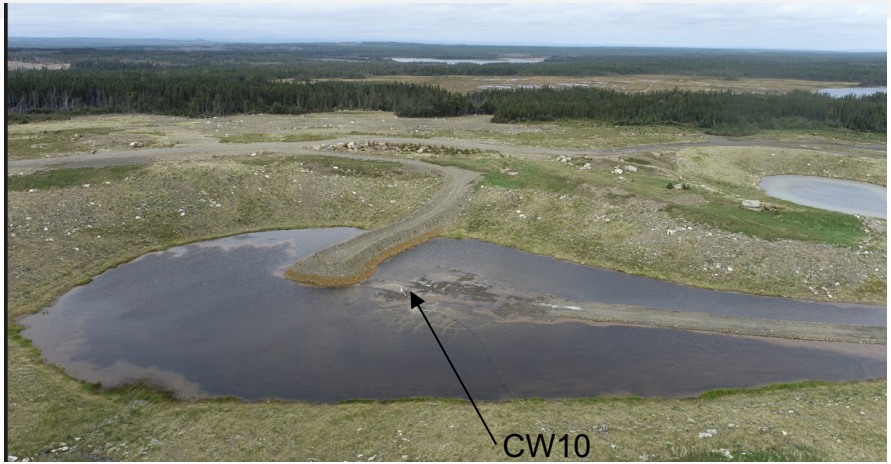


North Pit cross section west to east



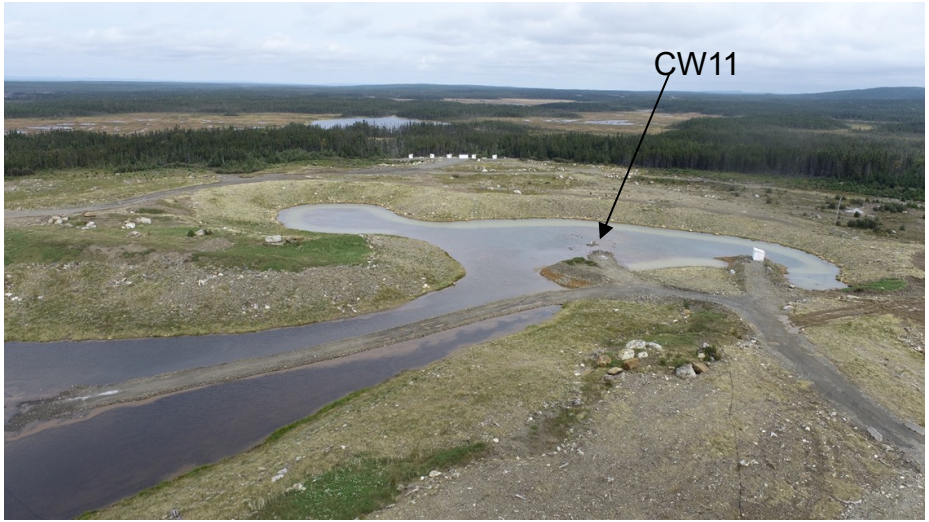
Teck

Porewater Extraction (Chimney) Wells



- CW10 drilled to 88 ft
- Continuous draw 27 GPM
- VFD controlled

- CW10 drilled to 65 ft
- Continuous draw 27 GPM
- Programmed on pit surface elevation

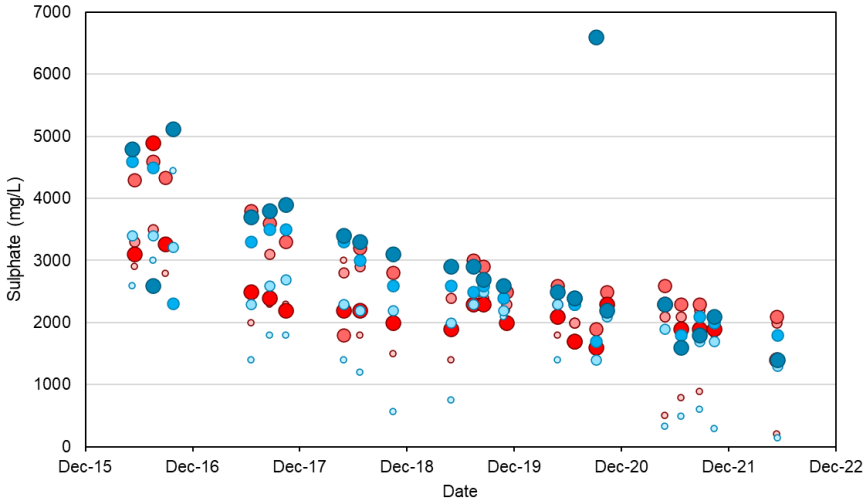


Water Quality – North Pit

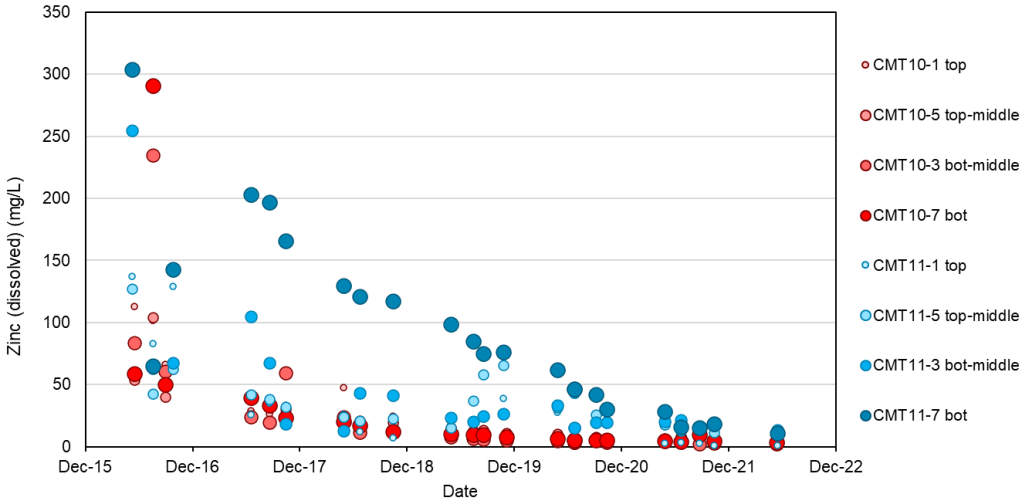
Porewater

- Historical ARD evident in wells (CMT)
- Installed two pump wells to extract pit porewater at depth
- System replicated in the South Pit

Sulphate



Zinc



Boundary

North Pit

- Both pits are treated with slacked lime while extracting the pit porewater
- 0.2-0.5 m water cover is maintained
- PAG has a 0.5m NAG cap

Site Water Management Automation

- The DPO site is currently 95% automated
- DAMC weir discharge is our only manual operation (final discharge point)
- Automation implemented to:
  - Reduce human error
  - Reduce employee time to focus on other tasks
  - Optimize water quality
  - Reduce maintenance cost
  - Reduce both long and short-term risks
  - Ability to operate the site from anywhere
  - Optimize as lessons are learned

Water Treatment System

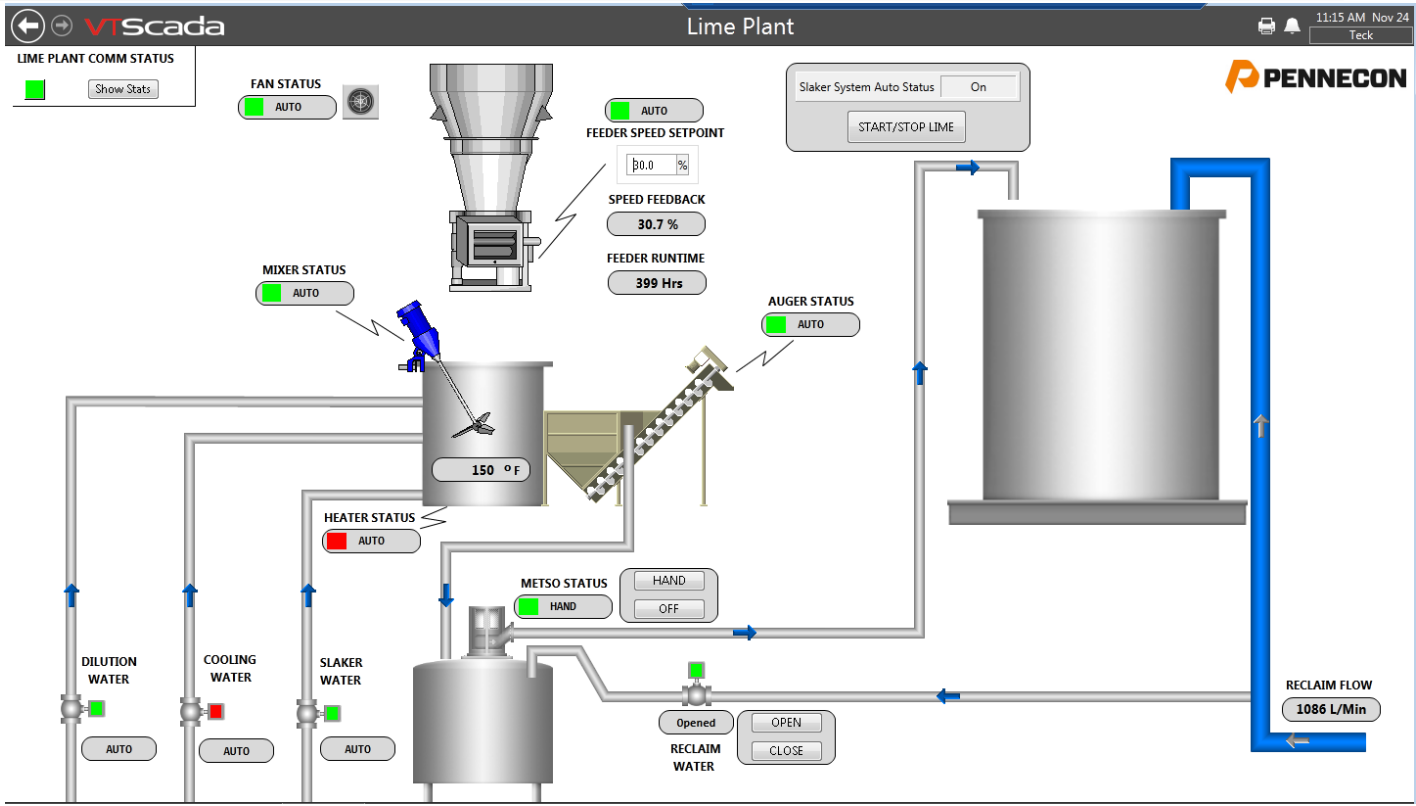
Quick Lime automated slaking system

- Redesign of the water treatment distribution system
- Ability to treat each individual cell of the TMA
- Result in a more efficient water management

Teck

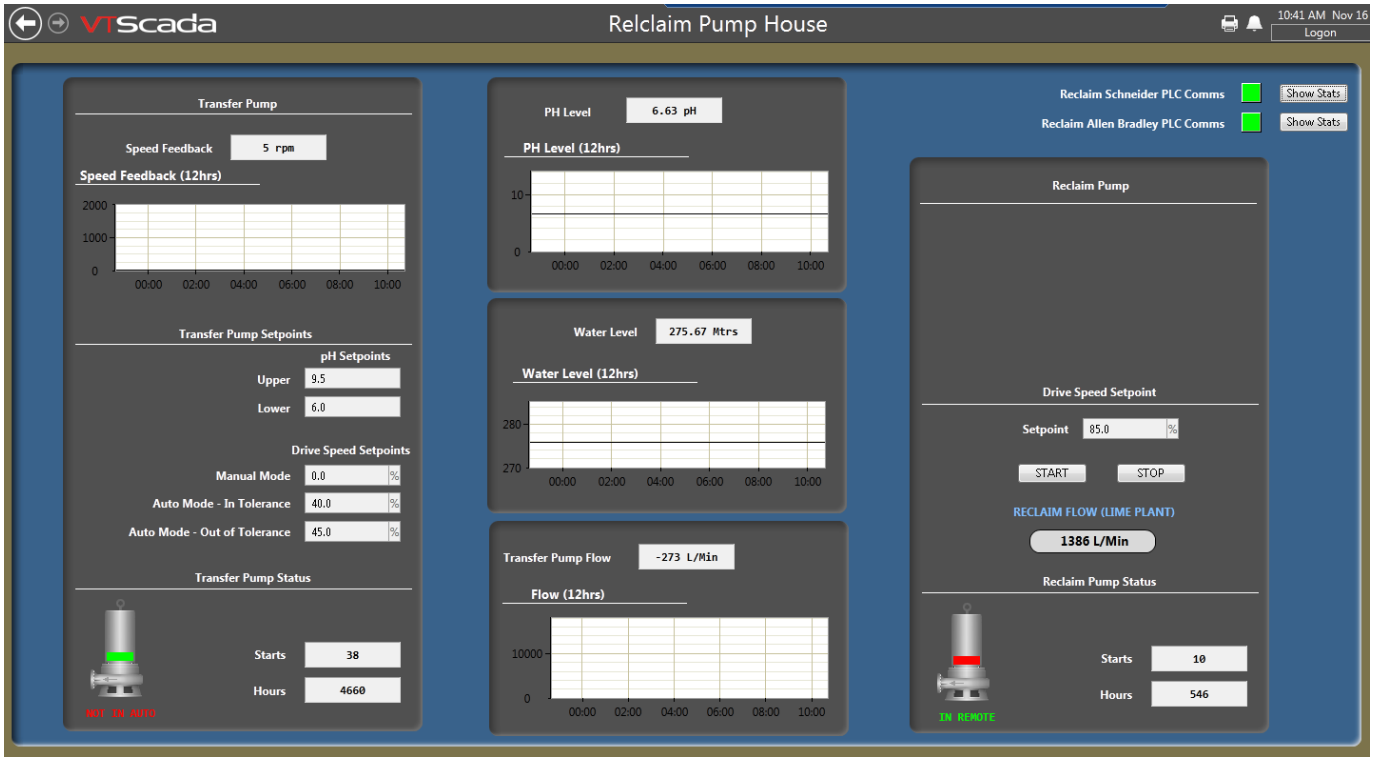
Water Treatment Plant

- Water treatment plant is fully automated and can be remotely started or shutdown
- Reduce exposure
- Monitor lime usage and water reclaim flows
- Flow treatment volumes change depending on which cell of the TMA is being treated
- Water is analyzed on site (Cu, Zn, Fe, Pb, TDS, pH, DO)



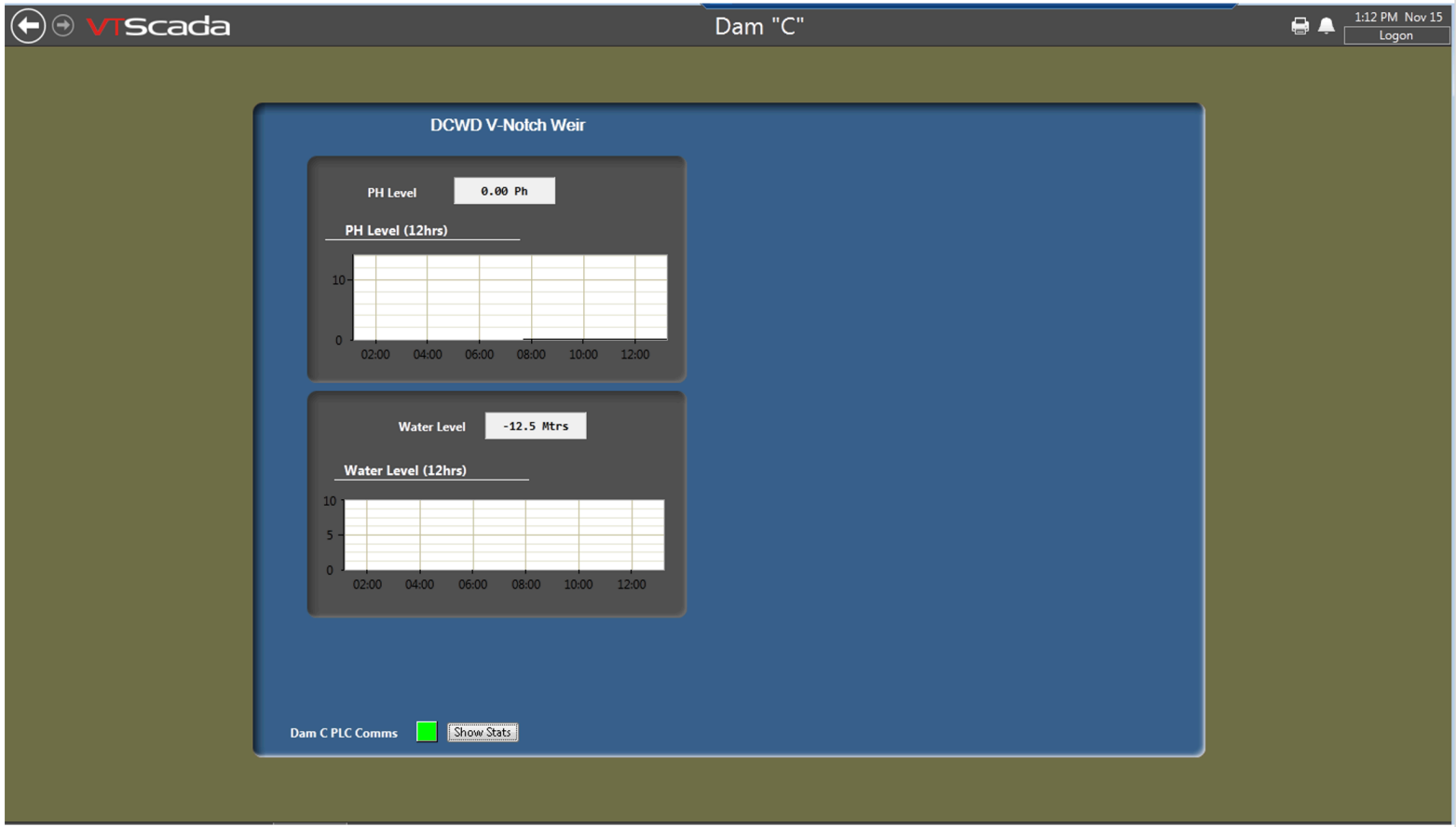
Reclaim and Transfer

- Transfer to the Polishing Pond
- VFD controlled
- PLCs monitor pH
- Pump automatically adjust flow depending on pH
- All can be controlled remotely



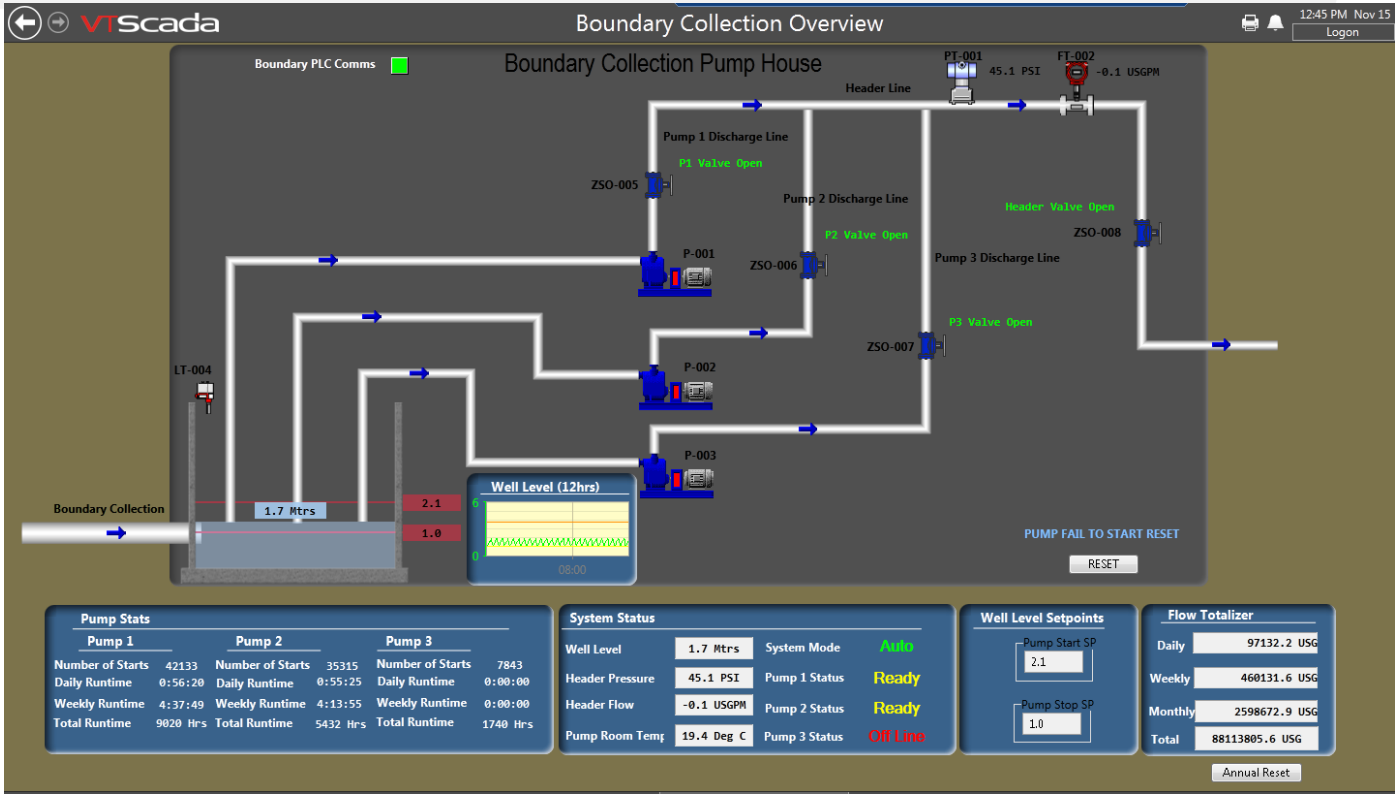
DAMC Final Discharge

- Continuous monitoring of pH at DAMC
- Optimization for more accurate discharge flow currently being reviewed for programming

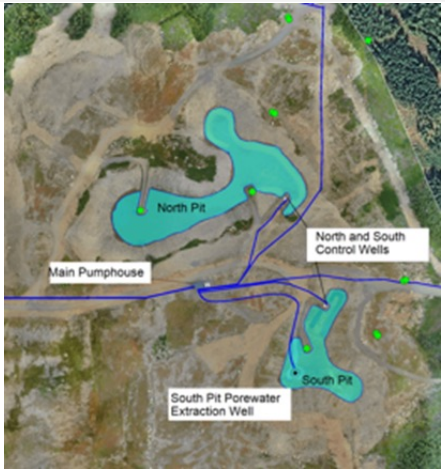


Boundary Site

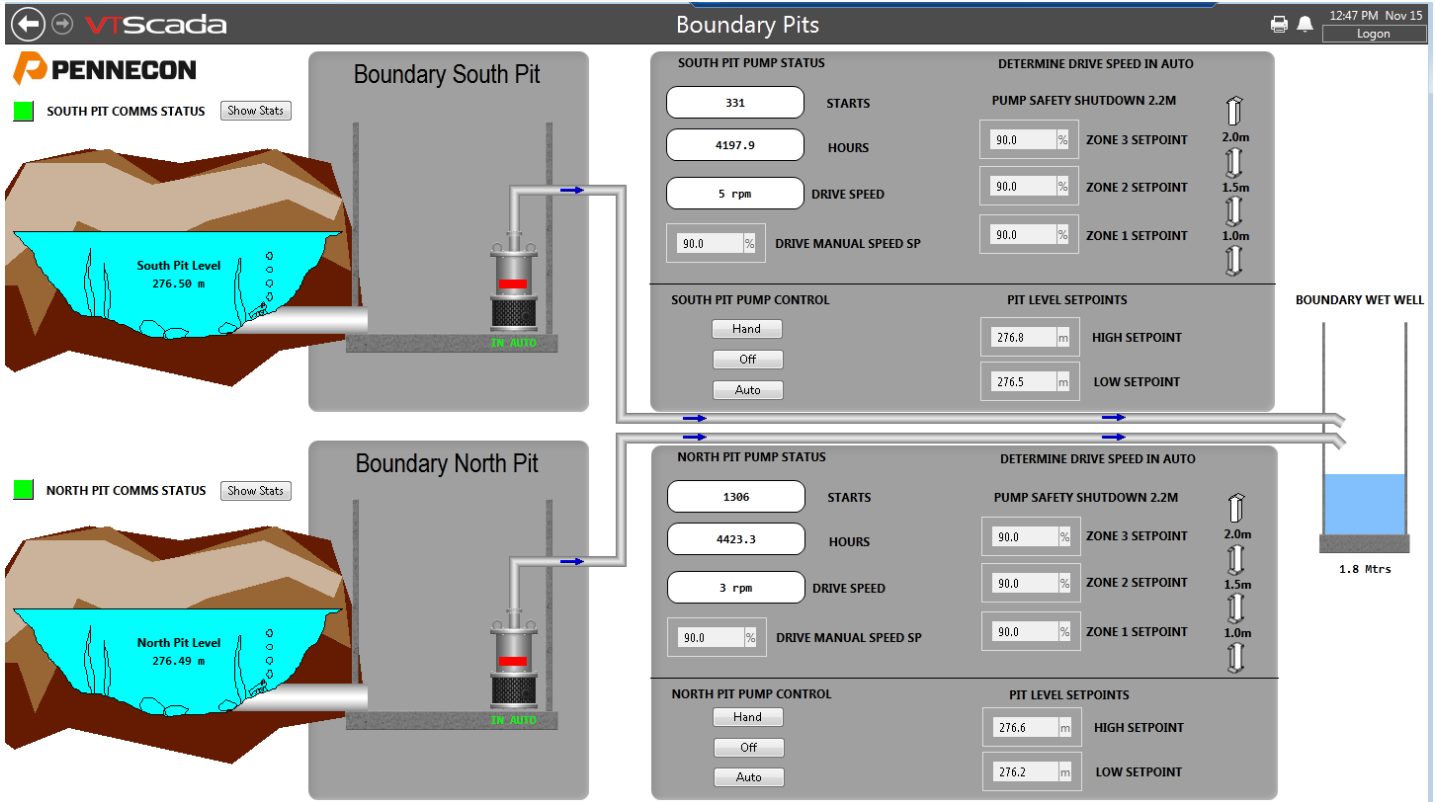
- Pits maintain a controlled elevation (user input)
- Pumped to main pumphouse to collection area where then pumped 4km back to the TMA
- All volumes are logged



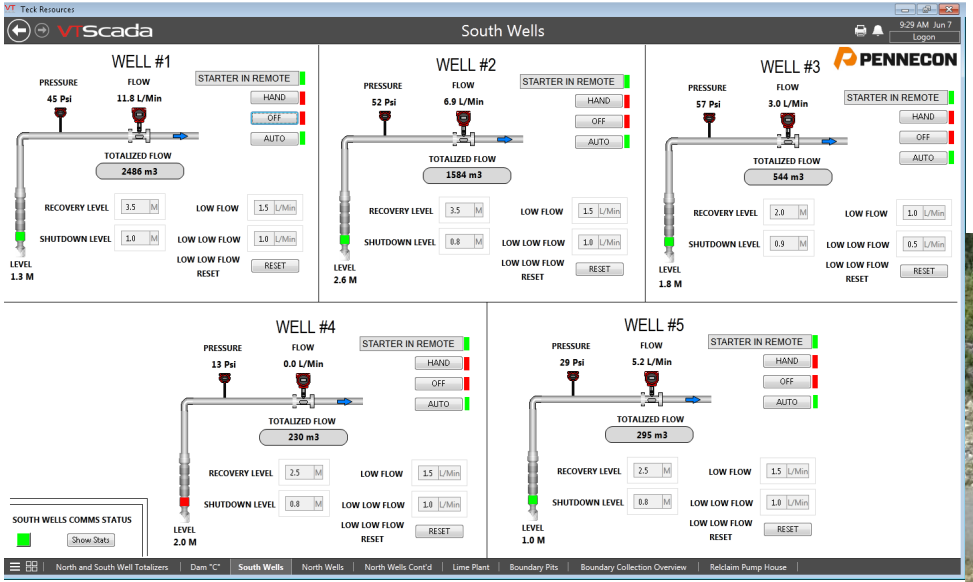
Boundary Pits



- Environmental safety features programmed



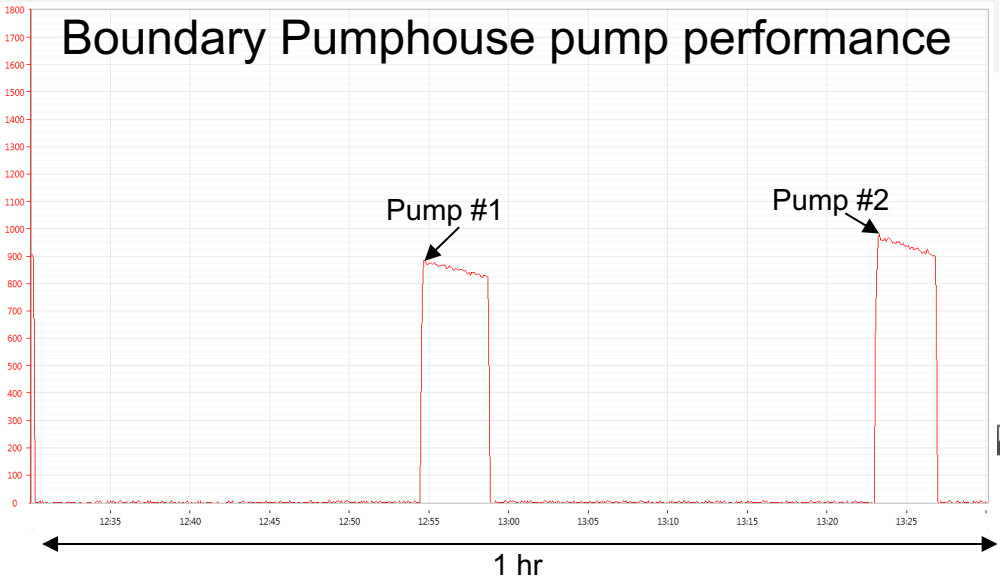
Boundary Ground Water Automation

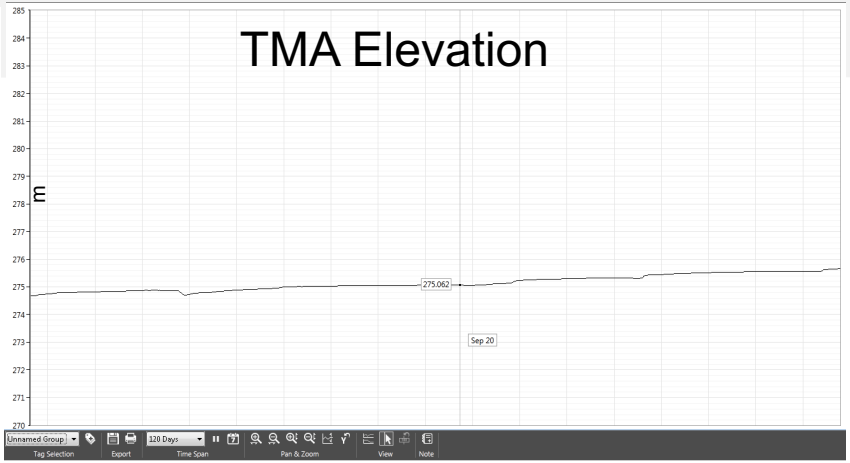


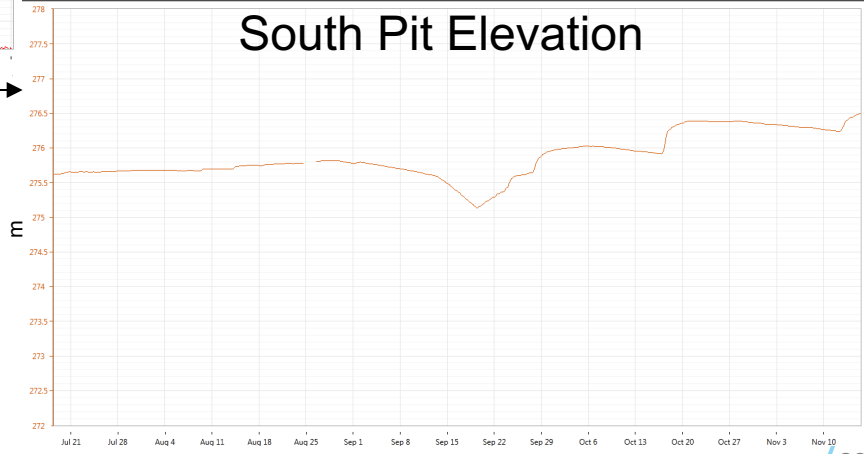
- System replicated in the north

- Optimize groundwater extraction
- Reduce labour/errors
- Track maintenance and pump performance
- VFD controlled
- Maintain specific well elevations

Data Tracking and Recording



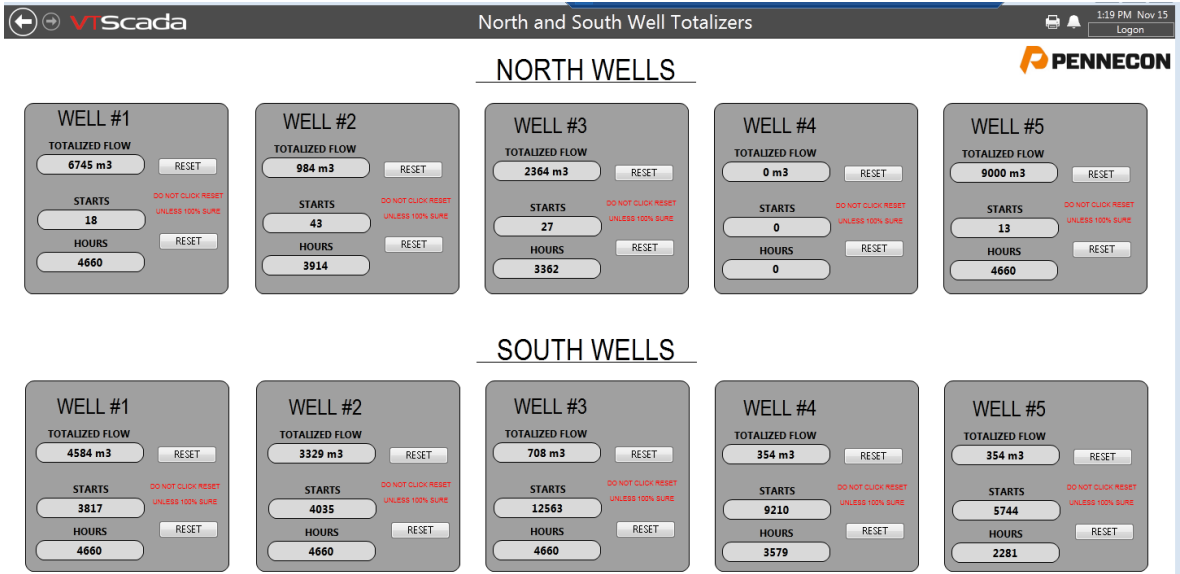




- Data used for:
  - Maintenance planning
  - Pump performance
  - Water Balance
  - Warnings

Flow Volume Totalizers

- All pumps have volume totalizers
- Stats on startups and hrs of operation and performance for better preventative maintenance planning
- Annual reporting



Summary

- Duck Pond's long-term plan to reduce oxidation potential for PAG materials (i.e. for both tailings and waste rock) in closure is to maintain a target water cover
- In-situ treatment of the backfilled pits managing water quality in the TMA
- Automation is supporting continued good management of the site
- Continue to build on lessons learned

Questions