BC Hydro Rock Bay Remediation Project



Management and Technical Achievements of a Major Remediation Program

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- > Site History
- > Tailored Project Management Approach
- > Remediation History
- > Key Technical Achievements



Location of Rock Bay





Manufactured Gas Plant





History of Rock Bay



Project Management – Working Areas



Risk Register - Background

A **Risk Register** is a management tool for monitoring the risk management process within the project. It is used to identify, assess and manage risks down to acceptable levels*.

Risk Register – implemented due to project complexity and importance of overall project schedule.

* https://www.simplilearn.com/risk-management-framework-article

Risk Register - Implementation

- > Regular ongoing review (every 2 3 months)
- > Risks separated into 40 different categories
- > Risk levels assigned based on probability and consequence severity

Risk Level		Consequence Severity				
		Insignificant	Minor	Moderate	Major	Catastrophic
Probability	Rare	Low	Low	Low	Medium	Medium
	Unlikely	Low	Low	Medium	Medium	High
	Possible	Low	Medium	Medium	High	High
	Likely	Medium	Medium	High	High	Very high
	Frequent	Medium	High	High	High	Very high



Risk Register – "Shelf-Ready" Solutions

REGULATORY: CSAP requires more work to be done following review.

• Early review and engagement with CSAP. Potential concerns were brought forward early allowing them to be addressed.

OFF-SITE PARTIES: Inability to conclude working agreements with off-site third parties. • BC Hydro Project Manager responsible for early communication and negotiation with third parties.

SITE/GROUND/FACILITIES: DNAPL may be present at greater depth at SW corner of WA3

 Excavation in this area to include all of weathered clay to ensure all DNAPL is removed.



Remedial Program – History





Preservation of Heritage Buildings



Instrumentation Building



Rock Bay (Powerhouse) Building



Administration Building



Shoring Techniques

Project size and variability required multiple types of shoring

- Options considered based on depth of excavation, stratigraphy, access and presence of utilities
- > Project team received input from contractors and BC Hydro construction team

Shoring Techniques – Secant Wall





Secant Wall

SNC · LAVALIN

- > Interlocking concrete piles with reinforcing H-piles
- Extended to design depth (15.0 m bgs) or keyed into bedrock
- Capable of drilling through 1 2 m diameter sections of rip rap
- > Excavation to 8 m bgs without slot cutting



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Shoring Techniques – Tar Well

- Identified during the excavation around the perimeter of the Former Instrumentation Building
- > 1.9 m diameter / 14 m depth
- Estimated to contain 26,000 litres of coal tar NAPL





Shoring Techniques – Tar Well

- Overlapping unreinforced secant piles installed surrounding the tar well
- Tar stabilized in-situ with hog-fuel to satisfy treatment facility requirements
- Tar well void backfilled with CDF to encapsulate any residual contamination







Shoring Techniques – Sheet Pile



- > Used where rip rap not present / removed mechanically and in areas of utilities
- > Excavation to 4 to 5 m bgs without slot cutting
- > Excavation to 8.1 m bgs with additional support and/or slot cutting



WA3 - Modified Sheet Pile



Excavation to the property line was required within HW area at WA3

- > Sheet pile wall with backing steel plate installed
- > Material within the void subsequently removed to the depth of excavation (hydrovac)
- > Minimal water infiltration through sheet pile wall observed.

Hazardous Waste Transport

- Reduction of vapours / odours was achieved by wrapping the HW soil with poly
- Reduce potential for spillage during transport









Stockpile Soil Tracking

- > Soil classified based on in-situ data
- Tracking system implemented to insure proper stockpiling of excavated material
- > Coloured card provided to driver
- > Material Movement Approval forms used



Stockpile	Colour	Soil Quality
עו	Code	
A1		Class 1 Commercial/Industrial Soil (CL-) - <u>re-useable as backfill</u>
A2		Class 2 Commercial/Industrial Soil (CL-) - for off-site disposal.
B1		Contaminated Soil (CL+)
B2		Wood Waste
B3		Hazardous Waste (HW)
С		Uncontaminated Clay

WA3 - Over-excavation into Underlying Clay





Purpose: to reduce the potential for residual contamination to negatively effect the post-remediation groundwater quality

- > Excavation extended 0.5 m into the underlying weathered clay
- > Within the HW area, excavation extended 1 2 m to remove weathered clay



WA3 - Storm Water Pipe Reroute





- 0.9 m diameter storm water discharge pipe
 southern area of WA3 excavation
- Located in area of HW contamination requiring excavation to 8 m bgs



WA3 - Storm Water Pipe Reroute

- > Contractor implemented design
- > Two new manholes installed
- Utility rerouted in area previously excavated using a gravity feed system
- > Former storm water pipe replaced









WA4 – Source of Contaminant

- MGP-contaminants migrated across the bay
- Contaminants deposited at bottom of unfilled Rock Bay and buried (primarily between 1884 to 1918) during the filling of portions of the bay;
- Buried sediments called Bay Bottom Sediment



WA4 - Approach

Risk Assessment of MGP-Sourced Contamination

Contamination

- > Difference between pre and post-industrial era sediment quality
- > Widespread contamination in present from surface to BBS
- > MGP contaminant of concern in BBS PAH and LEPH

CofC Approach

- > BC Hydro only responsible for MGP sourced contamination
- > Residual contamination (within the BBS) addressed by means of risk assessment



Rock Bay Achievements

- > 16 Certificates of Compliance
- > 2016 Environmental Managers Association of BC Regulatory Challenge Award Recipient.
- > 2017 Association of Consulting Engineering Companies BC Awards for Engineering Excellence
- > 2017 BROWNIE Award
- > 2018 Engineers and Geoscientists Environmental Award
- Property ready for redevelopment



QUESTIONS?

Values that guide us

Our values keep us anchored and on track. They speak to how we run our business, how we express ourselves as a group, and how we engage with our stakeholders and inspire their trust.

Teamwork & excellence

We're innovative, collaborative, competent and visionary.

Customer focus

Our business exists to serve and add long-term value to our customers' organizations.

Strong investor return

We seek to reward our investors' trust by delivering competitive returns.

Health & safety, security and environment

We have a responsibility to protect everyone who comes into contact with our organization.

Ethics & compliance

We're committed to making ethical decisions.

Respect

We consistently demonstrate respect for all our stakeholders.

