# Remediation of Petroleum Hydrocarbon-impacted Peat Within a Wetland and Adjacent to an Operating Pipeline

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# Outline

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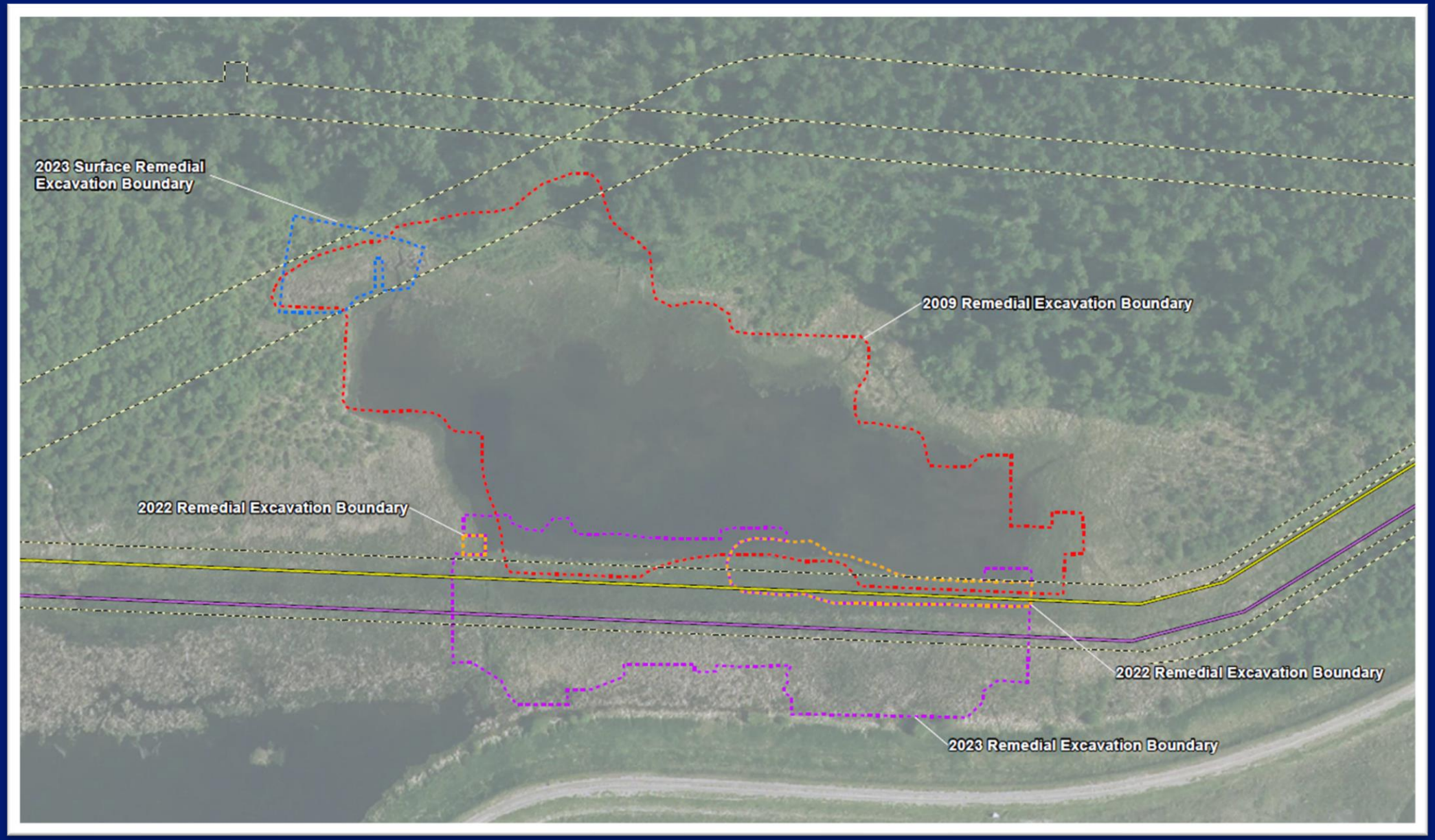
# Background

- 1954 landslide / pipeline break
- Release into wetland
- Remediated to standard of the day
- Pipeline rerouted
- Historical 2009 remediation
- Re-established as a very healthy functioning wetland


2023 Surface Remedial Excavation Boundary
2009 Remedial Excavation Boundary
2022 Remedial Excavation Boundary
2022 Remedial Excavation Boundary
2023 Remedial Excavation Boundary

# Stakeholder Consultation

- Industrial landowner
- Adjacent industrial operations
- Parkland County
- Canada Fisheries and Oceans
- Canada Energy Regulator (CER)
- Alberta Environment and Protected Areas (Alberta EPA)

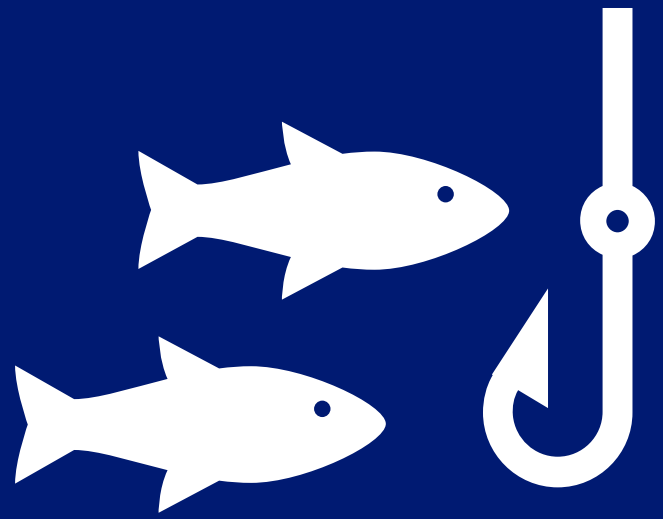
# Site Characterization

- Impact depth is ~2.0 metres (m) to 3.0 m
- Pond adjacent to the north
- Water level at surface of peat most of the year
- Fish-bearing waterbody
- Forested and steep slope to the north
- South is an industrial site
- Sentinel monitoring wells consistently below guidelines
- Water quality in pond is good

# Federal Fisheries and Oceans Permit

Letter of Advice Highlights

- Dewatering/discharge restrictions
- Fish rescue
- Backfilled with drain rock and overlaid with clean peat
- Natural recharge
- Erosion and sediment control
- Post-construction monitoring
- Minimization of deleterious substances



# Fill Material Planning

- Large volume of peat required
- Peat known to contain natural elevated petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs), and boron
- Harvested peat brings challenges for reuse
- Peat material requires donor moss or salvaged peat for re-establishment
- Laboratory tests and forensics confirmed suitable fill
- Aimed to salvage peat

# Dewatering Methods

- Laboratory testing of pre- and post-discharge waters
- Constant pre- and post-discharge monitoring for sheen
- Pre-discharge oil field screening
- Laboratory chromatogram interpretation used
- Forensic scientist utilized to provide interpretation of suspected biogenic toluene
- Filtration used to prevent breakthrough



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# Laboratory Results Forensics

- Natural occurring PHCs, PAHs in surrounding peat
- Approved Remedial Action Plan conditions – allowed for exceedances if justified
- Utilized a combination of methods to confirm/justify biogenic material
  - Biogenic Interference Calculation Scale analyses
  - Biogenic/petrogenic laboratory forensics
  - Third-party forensic interpretation

# 2022 and 2023 Excavation Results

- Salvaged 250 cubic metres ($m^3$) of surficial material
- Remediated approximately 16,000 $m^3$ of impacted peat/soil
- Backfilled with washed rock; approximately 0.5 m upper surface is peat


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# Backfilling

- Wash rock / peat used
- Peat material is hydrophobic
- Utilized salvaged surface material for revegetation
- Approximately 250 $m^3$ of salvaged peat and 3,000 $m^3$ of harvested peat used

# Ongoing Risk Assessment

- RMP prepared in fall 2023 to address areas which could not be remediated
  - Below industrial dyke
  - Surficial material on steep slope, with healthy mature vegetation
  - Hand auger delineation in fall 2023 to confirm impacts remaining in place

# Challenges

- Unpredictable weather – too hot or too cold
- Extensive surface melt during periods of higher temperature
- Natural springs flowed overland at all temperatures
- Completing project in a compressed timeframe
- Dewatering impacted peat
- Remediating within active pipeline corridor and limited space

# Learnings

- Alberta weather is unpredictable
- Complex projects with multiple regulators take many months for approval
- Expect strong regulatory pushback in sensitive areas
- Invest in front end assessment to plan for remediation
- Complex work requires pilot planning
- Assumed excavation would be quicker and easier than reality
- Invest in filtration to prevent impact breakthrough in discharge
- Harvested peat is integral for revegetation

# Acknowledgements


- Land acknowledgement
- Zoe Churchill (Trans Mountain)
- ESAA/RemTech
- Backwoods Energy Services, 100% Indigenous-owned, was the primary construction company
- Fish salvage and water quality monitoring conducted by Aquality Environmental Consulting Ltd.
- Dr. Phil Richards (PR enviroforensics)


# Closing

- Questions?


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# Questions? We are here to help.

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