



The Use of Geophysical Surveying for Investigating Historically Buried Debris, British Columbia, Canada

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Overview

Agenda

- Introduction: Site setting, regulatory context, and project description
- Preliminary Field Findings
- Geophysical Investigation and Remediation
- Summary
- Questions

Site Setting

- The Site is a large industrial site in the lower mainland area of British Columbia.
- The Site had a long operating history, when progressive dismantling of the Site commenced in 1995.



Regulatory Context

Under the regulatory framework in British Columbia (Environmental Management Act [EMA], and Contaminated Sites Regulation [CSR]) there are a few different options for managing contaminated sites:

- Risk Management
 - Sites with high-risk conditions (based on Protocol 12) require formal classification with the Ministry of Environment and Climate Change Strategy (BC ENV).
 - Classifications include high-risk or high-risk, risk-managed.
 - Both classifications have regulatory commitments and reporting requirements. Risk classifications can be relatively short term (i.e., risk classification followed by prompt remediation to reduce high-risk conditions) or a longer term solution.
 - Both investigation areas are being risk-managed under Protocol 12.
- Site Closure – Certificate of Compliance
 - Numerical (Impacts are remediated to meet published numerical standards in the CSR).
 - Risk Based (Impacts are remediated in part, or entirely through risk assessment).
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Introduction

Project Description

- WSP was executing a remedial excavation targeting high-risk conditions in shallow soils in Area 1. During excavation waste barrels were identified and appeared to contain waste materials.
- Upon inspection of the excavation walls other barrels were visually identified and the exact spatial extent of the issue was unknown and therefore the remedial excavation was halted.
- WSP completed a detailed geophysical survey to identify the potential number of barrels that were buried in Area 1. The strategy was extended to the Area 2 based on the history of waste disposal.

Preliminary Field Findings

2020 Field Investigation

- A remedial excavation program commenced in late 2020 to remove high-risk issues in soil.
- During excavation a barrel was identified. Additional barrels were spotted in the walls of the excavation and the decision was made to pause the work to get an understanding of the extent of the issue.



Geophysical Investigation

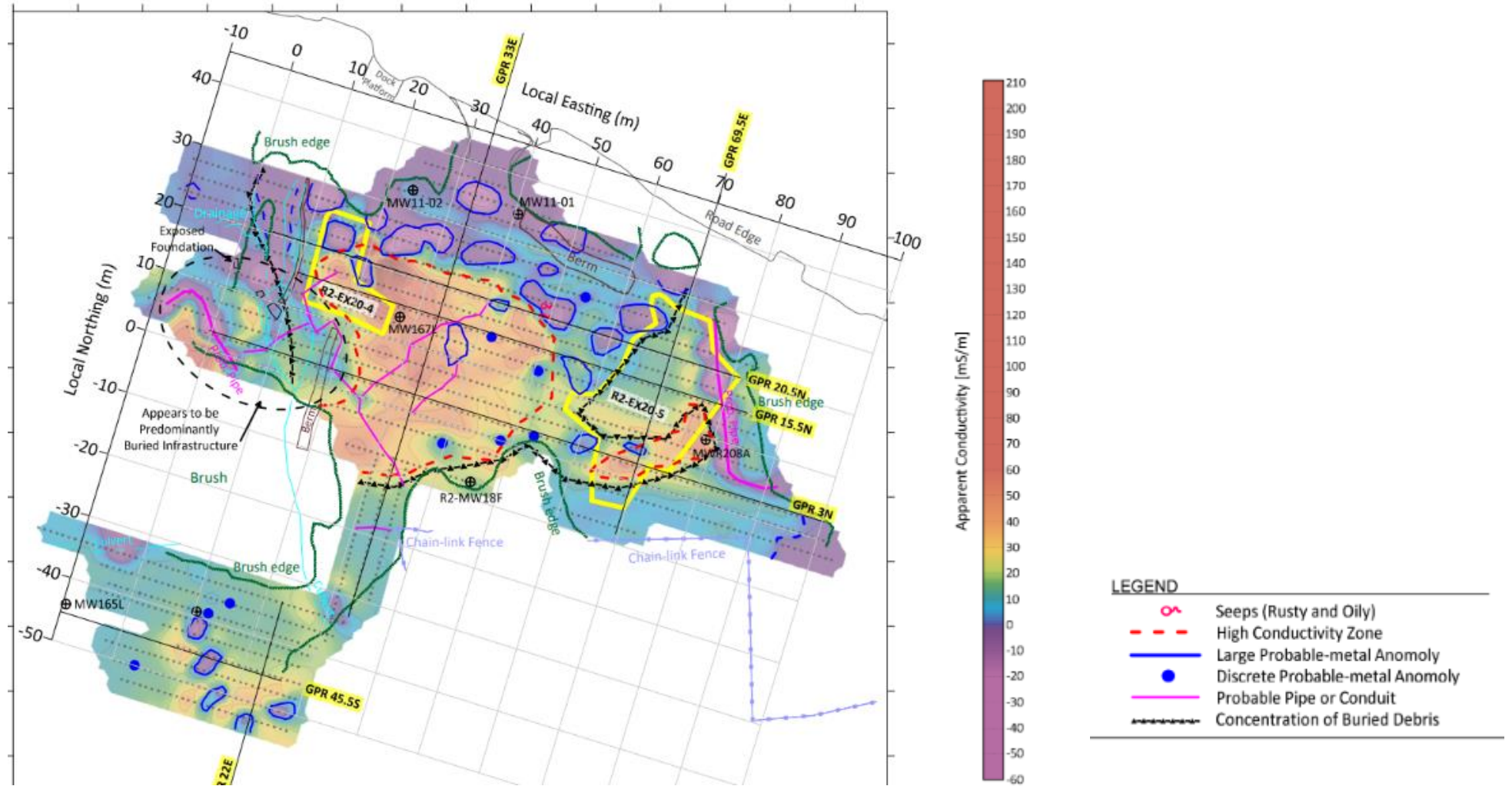
Strategy

The strategy of the investigation was to use two complementary methods to delineate buried debris. The approach was to:

- Use a quick mapping method (EM-31 conductivity mapping) followed by a profiling method (ground-penetrating radar, or GPR) to provide a cross-sectional perspective of select EM features and anomalies.
- EM-31 signatures of interest would be subsequently investigated by GPR to provide a high-resolution cross-sectional perspective assuming adequate depth of penetration of the radar signal. Radar signal depth penetration depends on antenna frequency and on ground conditions during the survey such as water saturation and chemistry, soil grain-size and mineralogy.



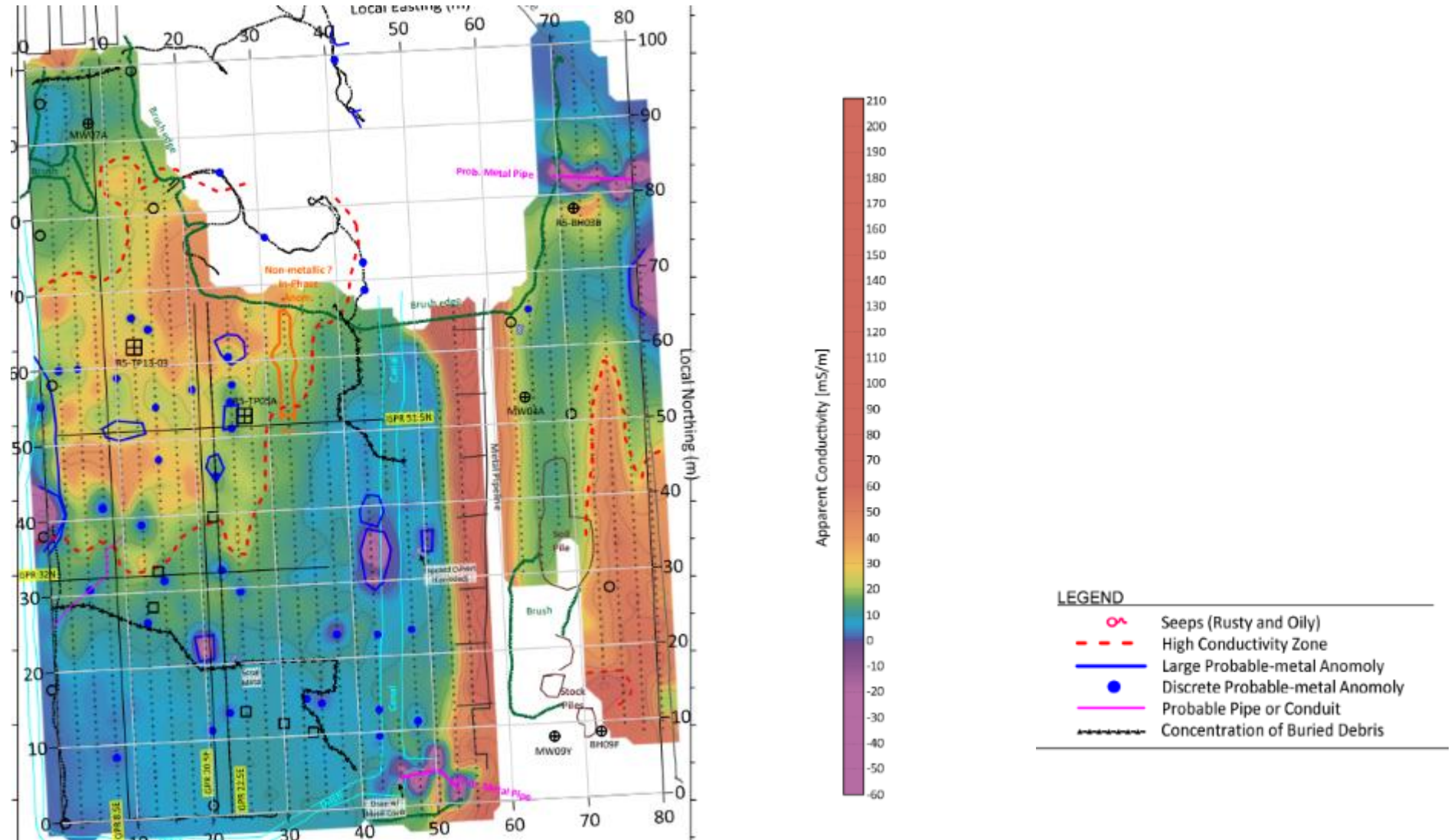
Geophysical Investigation Area 1



Geophysical Investigation Area 1



Geophysical Investigation Area 2



Summary

- Leveraging geophysics for the identification and delineation of buried debris (barrels) allowed WSP to selectively remove known waste while minimizing soil disposal volumes.
- The remedial strategy allowed WSP to support their Client reducing potential liability surrounding buried waste, while also maintaining alignment with the risk reduction/management strategy for the Site.
- The comprehensive figures generated by the geophysics team allowed for more quantitative costing/scheduling and reduced the need for change orders during remediation.

Thank You



Questions?

