SPIECAPAG

APGA Convention & Exhibition
Adelaide, 14 October 2024

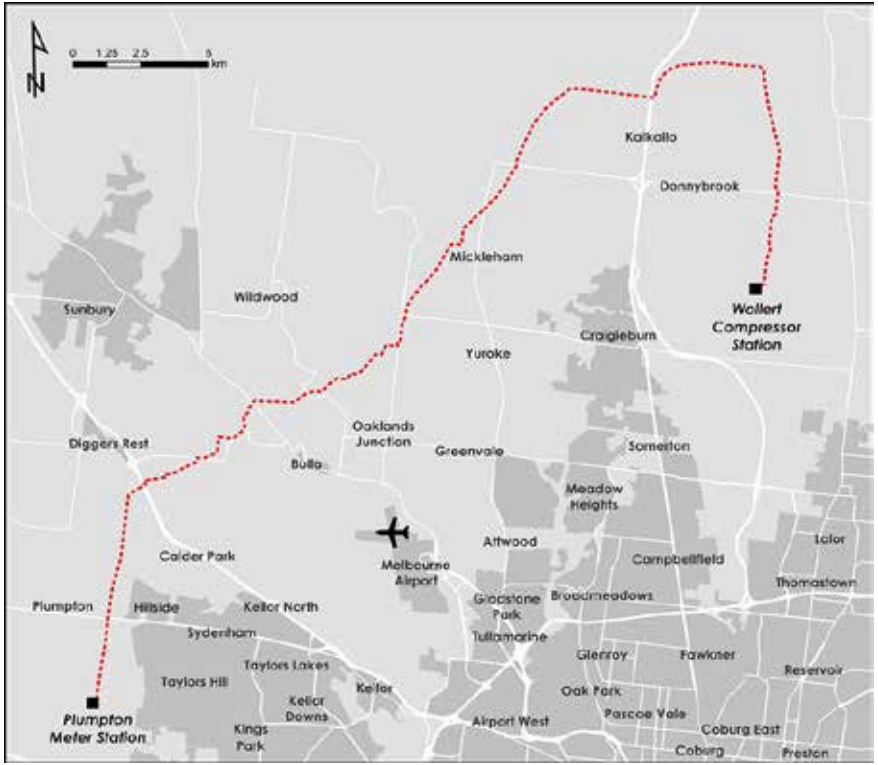
Western Outer Ring Main (WORM) Project
A Contractor ’s Perspective

Presenter: LEIGH SMITH

together @ VINCI

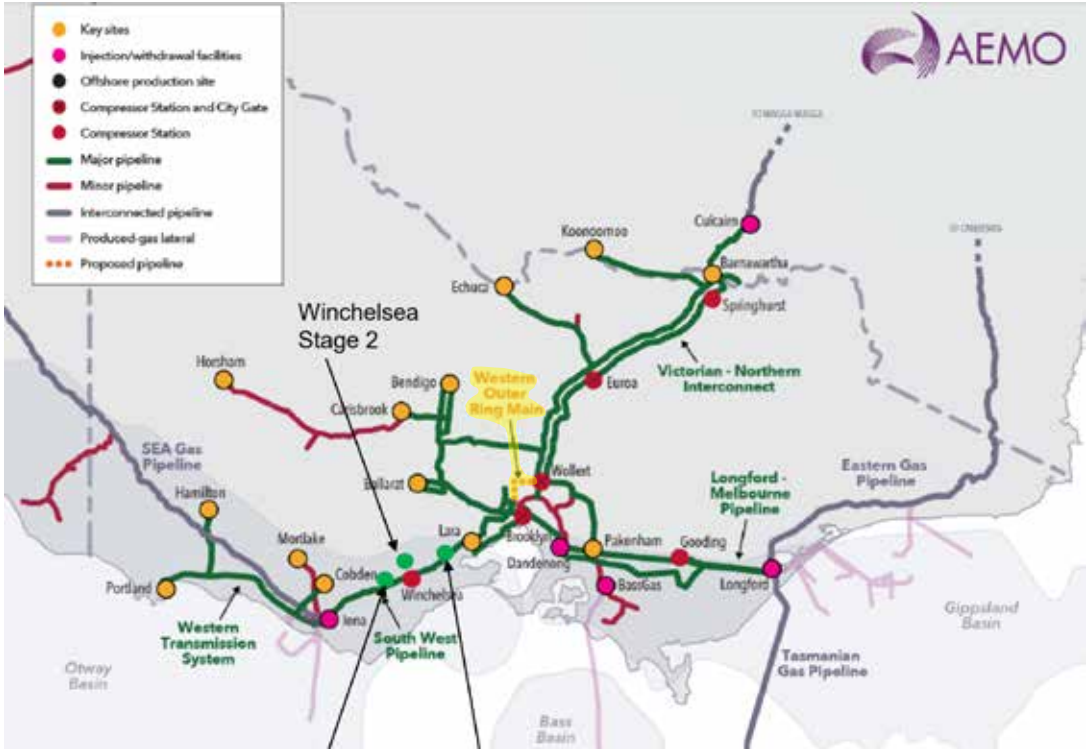
Presentation Overview

1. **Project Introduction (5 min)**
   a) Project Background
   b) Contractor Scope of Work
2. **Construction Challenges (12 min)**
   a) General Overview
   b) Special Crossing Challenge - Wildwood Road Hill
   c) Jacksons Creek HDD
   d) Hydrotest Leak Investigation
3. **WORM Project Outcomes (3 min)**
   a) Summary
   b) Key Lessons Learnt



1. Project Introduction– Western Outer Ring Main (WORM)

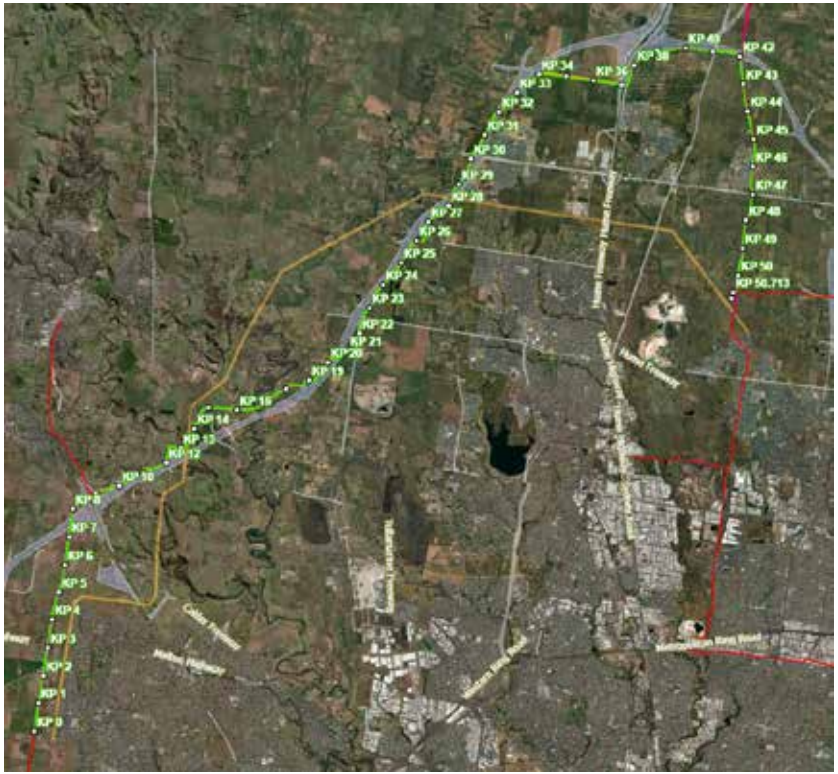
a) Background



- Spiecapag was engaged by APA Group to construct the pipeline.
- Primary benefit of the WORM is to enable east-west flows of gas between Longford and Iona, and also gas to and from the Victorian Northern Interconnect (VNI).
- Opportunity for natural gas supply to new growth areas in the Northwest of Melbourne (Sunbury, Merrifield & Kalkallo).

1. Project Introduction– Western Outer Ring Main (WORM)

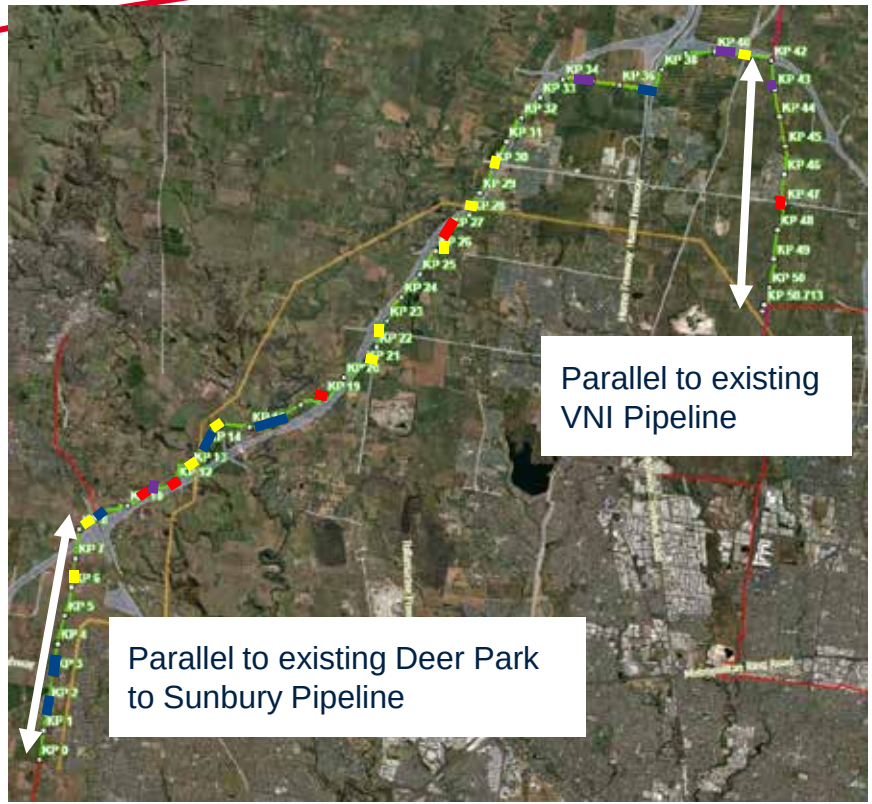
b) Contractor's Scope of Work



- The installation of 51km X52 20" (DN500) Gas Transmission Pipeline between Plumpton & Wollert
- Combination of Standard Wall (10.31mm) and Heavy Wall (12.70mm)
- Construction of 3 off Main Line Valve Stations
- Construction of 450m pipeline between WORM Scraper Station & WORM Control Valve

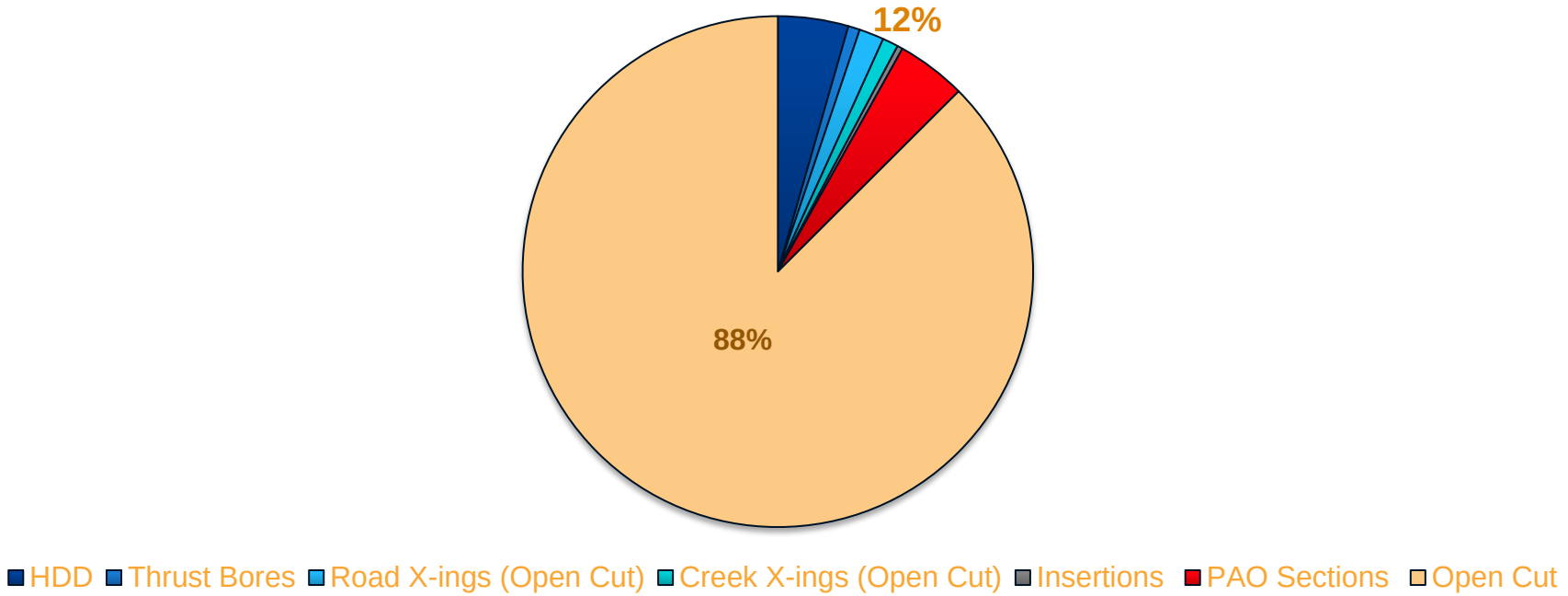
2. Construction Challenges– Western Outer Ring Main (WORM)

a) General Overview



- Alignment follows the Future OMR (Outer Metropolitan Ring Road)
  - 8x Additional Depth of cover crossings (3-4m cover) Due to pipeline being within PAO – Public Acquisition Overlay
- 6x HDD Crossings
- 10x Micro tunnel Crossings
  - 2x Rail Crossings
- 5x open cut road Crossings
- 4x Open cut Creek Crossings

WORM Pipeline Construction Methodologies

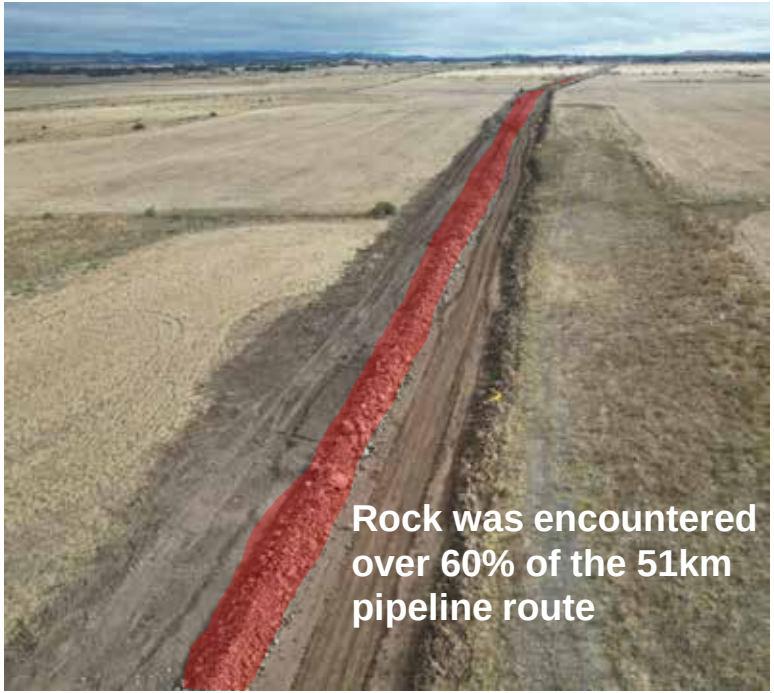


2. Construction Challenges– Western Outer Ring Main (WORM)

a) General Overview – Surrounding Areas

2. Construction Challenges– Western Outer Ring Main (WORM)

a) General Overview – Inclement Weather, Flooding & Ground Conditions



b) Wildwood Road Hill Construction

2. Construction Challenges– Western Outer Ring Main (WORM)

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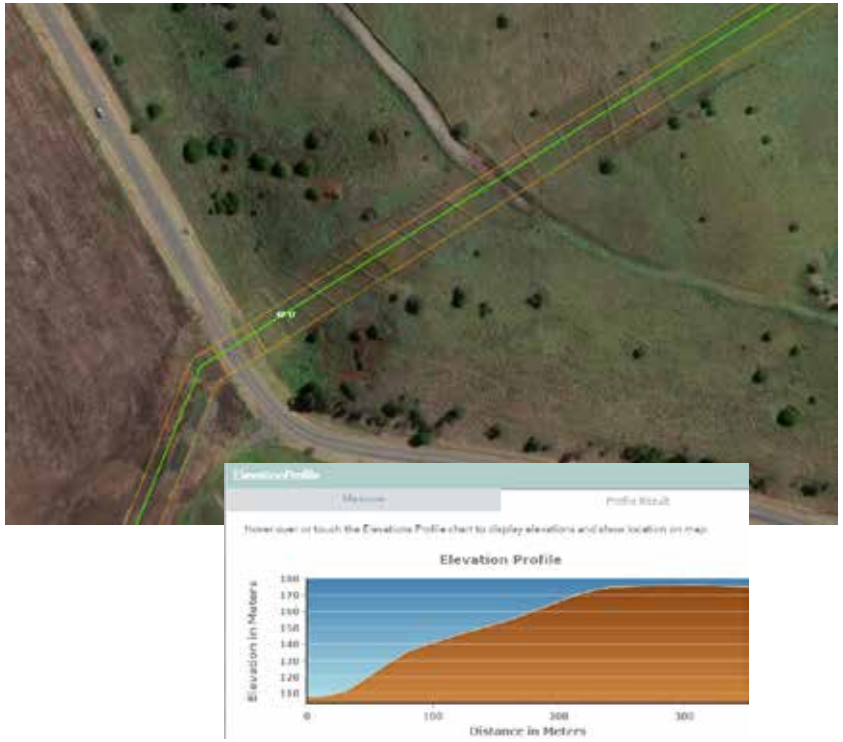

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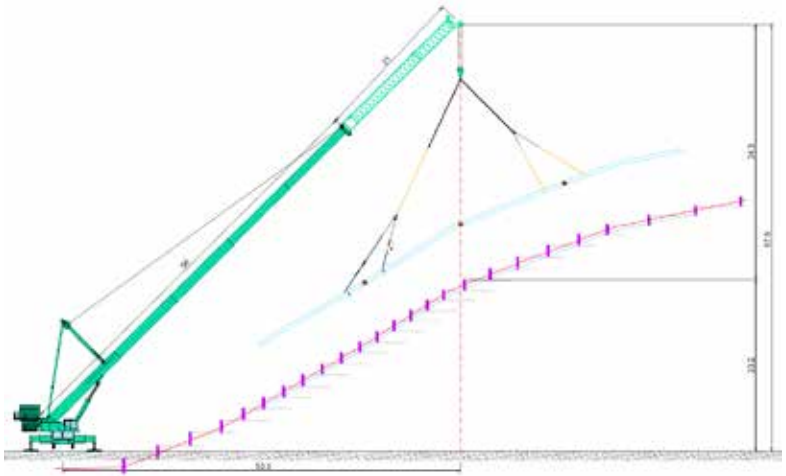

c) Jacksons Creek HDD Construction

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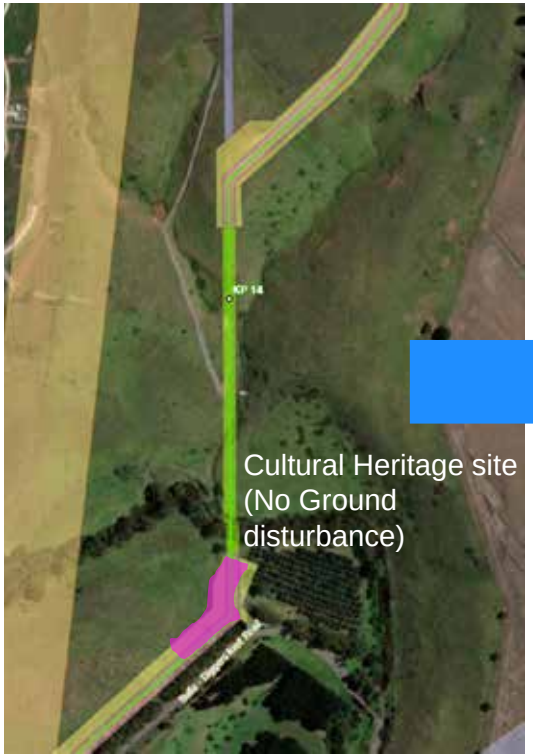

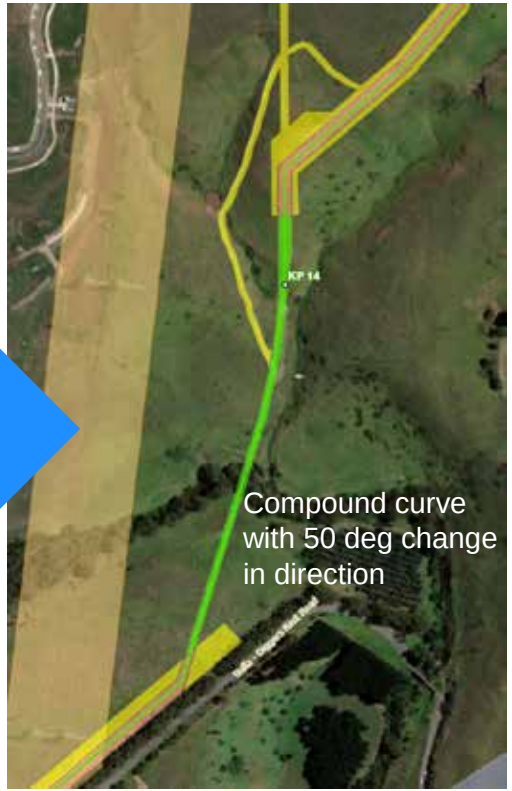

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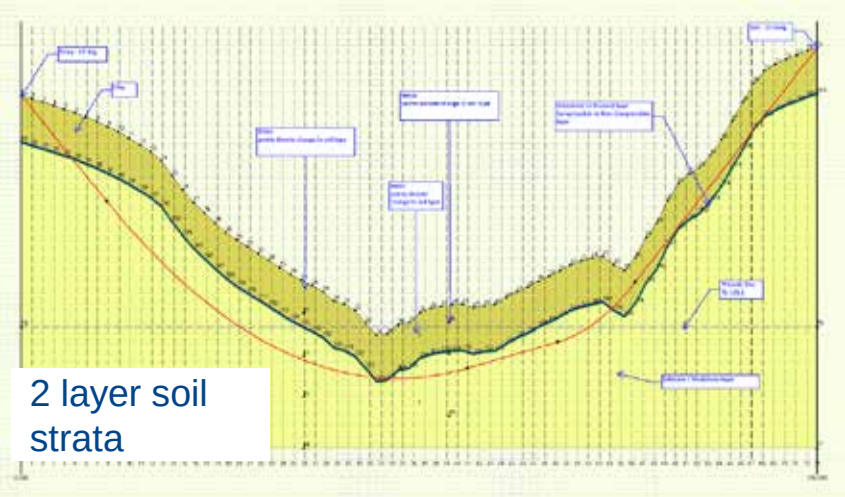
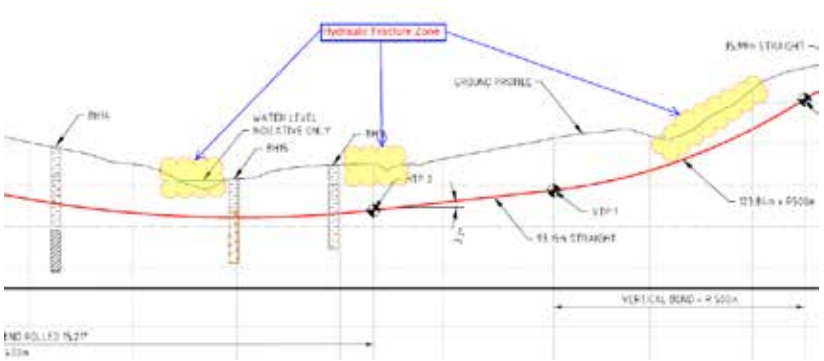


2 layer soil strata



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c) Jacksons Creek HDD Construction

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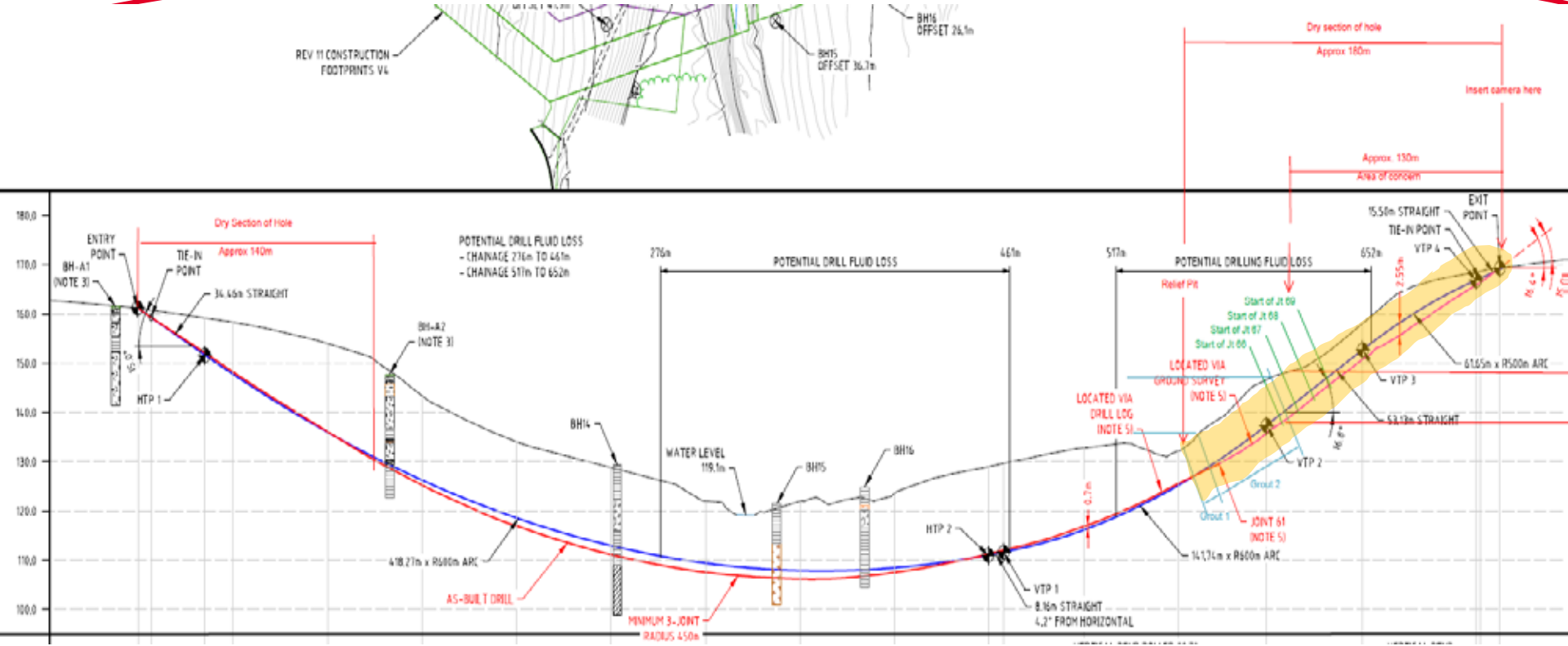


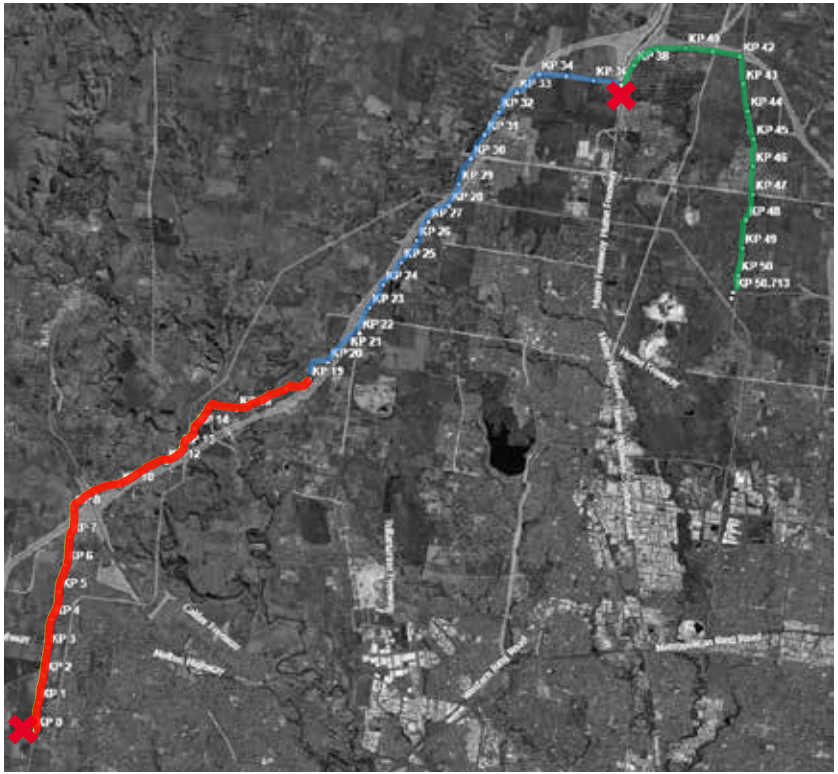
2. Construction Challenges– Western Outer Ring Main (WORM)

c) Jacksons Creek HDD Construction

d) WORM Pipeline Hydrotesting

2. Construction Challenges– Western Outer Ring Main (WORM)

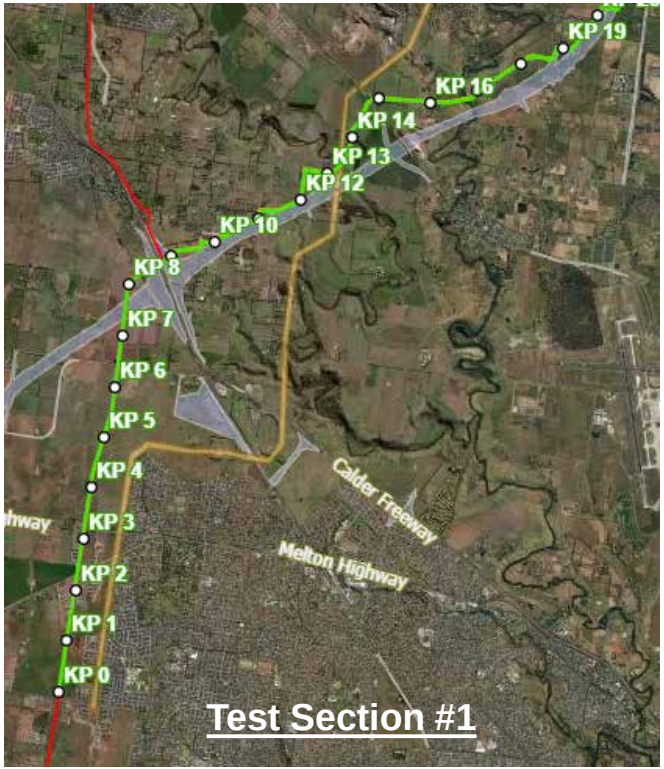
d) Hydrotest Leak Investigation



- **Test Section #1 – 18km**
- **Test Section #2 – 18km**
- **Test Section #3 – 13km**
- **Existing Water Hydrants**
- **Test Section #1 Failure**
- **Total Test Section Volume: 3,484 m³**

2. Construction Challenges– Western Outer Ring Main (WORM)

d) Hydrotest Leak Investigation



Leak Detection Methodologies

Phase 1:

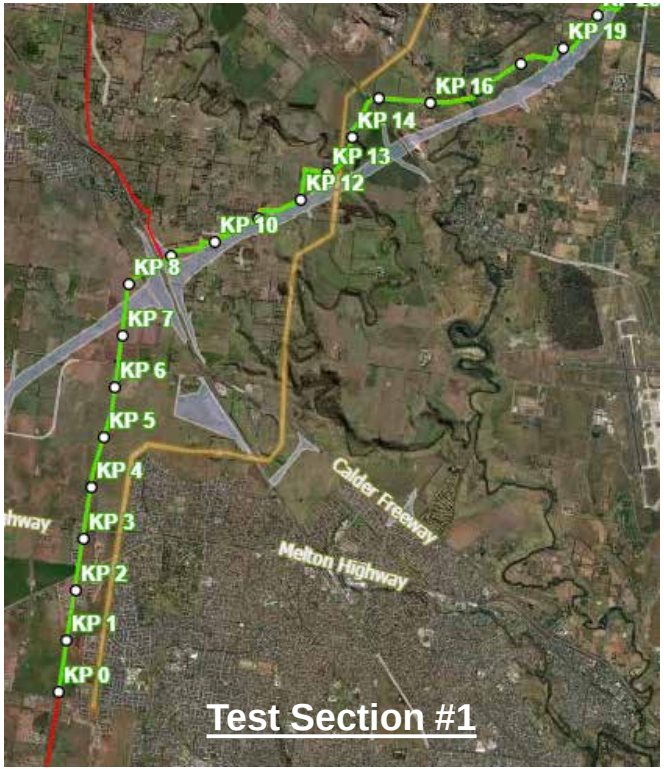
- RoW Patrolling / Visual Inspection
- Acoustic Monitoring
- Direct Current Voltage Gradient (DCVG)

Phase 2:

- Cut Test Section up & Re-test
- Freeze Plugging

2. Construction Challenges– Western Outer Ring Main (WORM)

d) Hydrotest Leak Investigation



Day 1

Uncontrolled pressure loss

Day 5

Test Excavations to nominate test section breaks

Day 9

Commenced cutting pipe to break up test sections

Day 13

Leak location identified

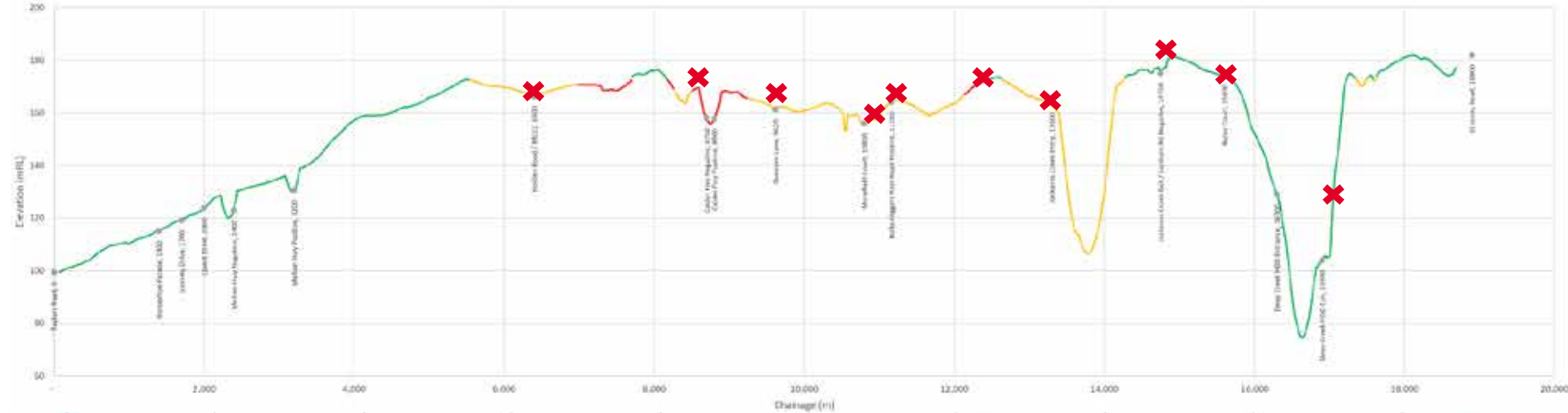
Phase 1

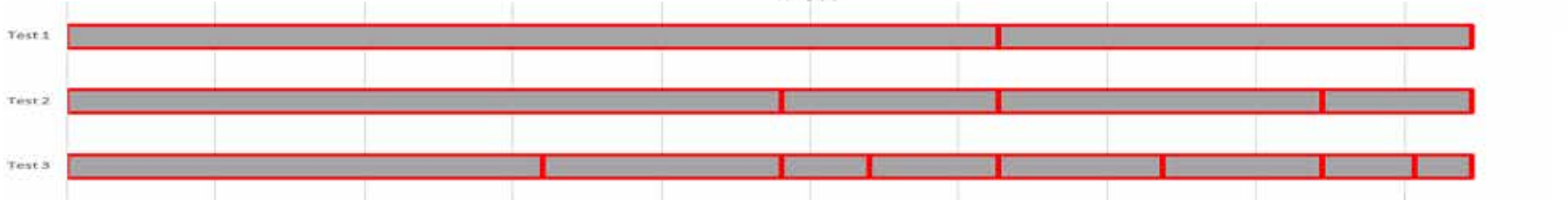
Phase 2

2. Construction Challenges– Western Outer Ring Main (WORM)

d) Hydrotest Leak Investigation

Test Excavations





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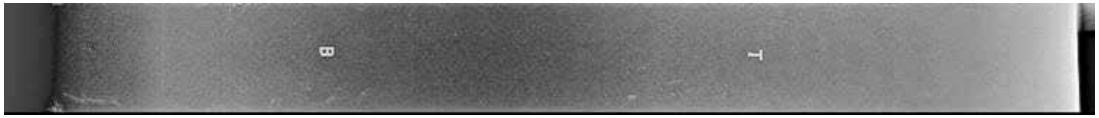
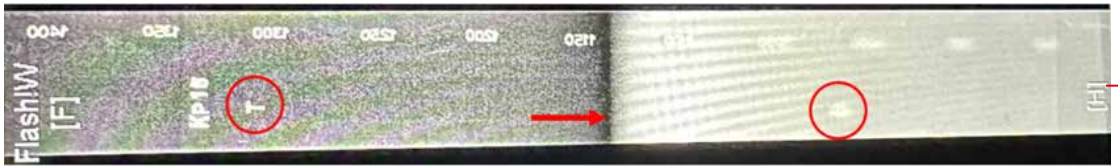
d) Hydrotest Leak Investigation



Empty Pipe

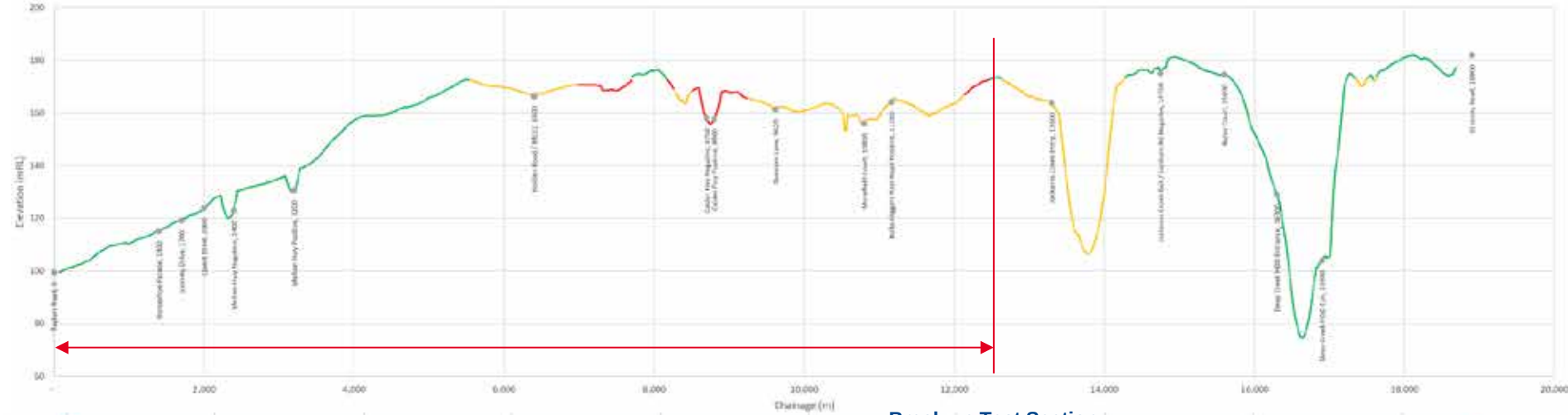
Filled Pipe



½ Filled Pipe

2. Construction Challenges– Western Outer Ring Main (WORM)

d) Hydrotest Leak Investigation



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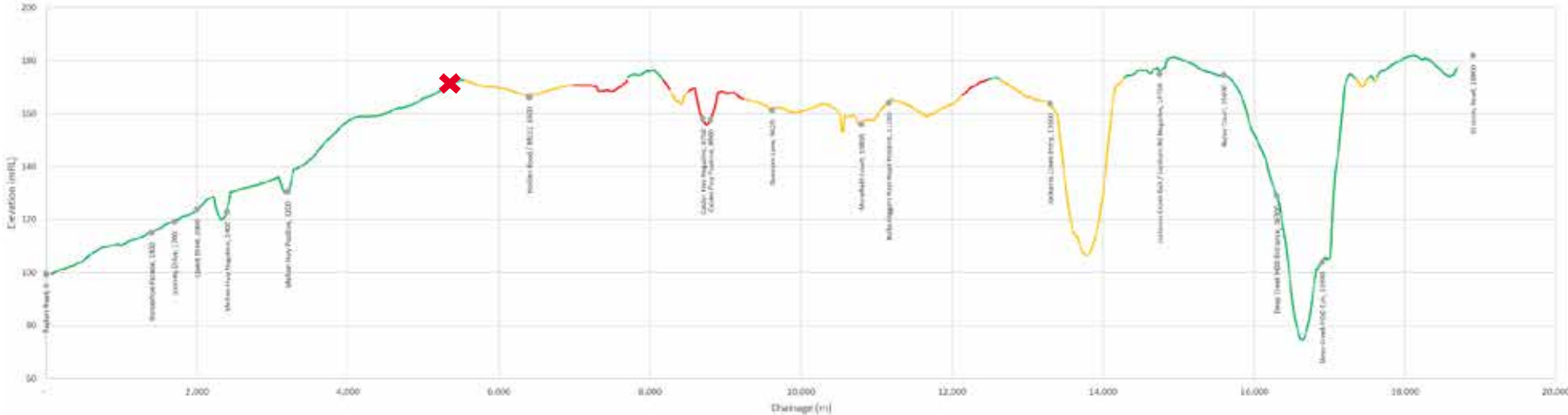
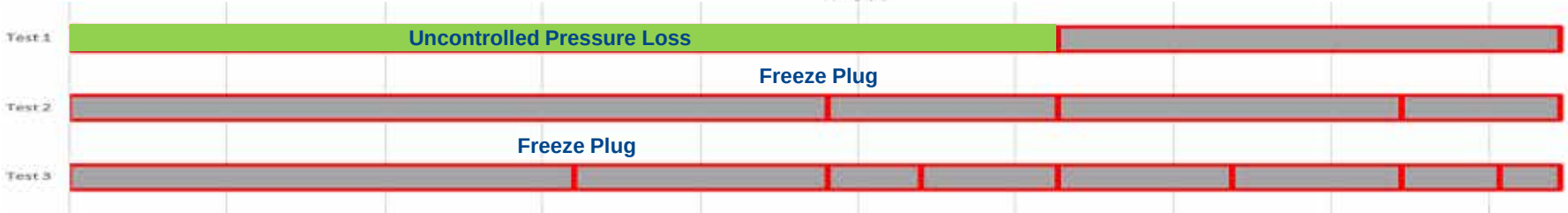
d) Hydrotest Leak Investigation

Leak Identified





2. Construction Challenges– Western Outer Ring Main (WORM)

d) Hydrotest Leak Investigation

3. Project Outcome– Western Outer Ring Main (WORM)

a) Summary

- WORM Pipeline was successfully commissioned in Jan 2024
- Over 750,000 Manhours (LTI Free)
- Over 500 pieces of plant & equipment was utilised across the project
- Significant construction challenges involving multiple crossings whilst contending with inclement weather and unfavourable ground conditions

3. Project Outcome– Western Outer Ring Main (WORM)

b) Key Lessons Learnt

- The importance of land access cannot be underestimated
- Attracting key pipeliners on a 5.5 day/week working roster has its challenges
- Hydrotest failure - despite having stringent QA processes in place, It's not always possible to prevent the unexpected
- It's important to work collaboratively with the client from project inception to fully understand the risks and to avoid additional costs

That’s it for the WORM Project