

# *Category 3: Excellence in Sustainability and Innovation*

## HCMT Light Rail Maintenance Facility Bulk Earth Stabilisation

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## *2024 AustStab Awards of Excellence*

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# Project Overview

- HCMT Light Rail Maintenance Facility was awarded to Downer Rail and Transit Systems
- This facility will be constructed and managed by Downer in conducting light maintenance on High Capacity Metro Trains
- As a part of the construction process approx. 25,000m<sup>3</sup> general fill was needed to form the rail embankment leading to the maintenance shed.
- The general fill needed to meet the MTM criteria on CBR, Swell, PI and Emerson Class

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# MTM Rail Embankment Requirement

- The following specifications were required in the rail embankment subgrade preparation

Test	Reference	Criteria
Soaked CBR	AS 1289 Test 6.1.1	3% Min
CBR Swell	AS 1289 Test 6.1.1	2.5% Max
PI	AS1289 Test 3.3.1	9-20%
Pin hole dispersity classification	AS1289 Test 3.3.2	ND1 or ND2
Emerson Class No	AS1289 Test 3.8.1	> 3
Free Swell Index	ASTM D4546-14	2.5% Max
Salt Soluble Content	ASTM D4542-07	3% Max

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Cut to fill analysis generated sufficient site won material to construct rail embankment nevertheless was deemed unsuitable as it did not meet the MTM criteria

The two options were as follow:

- Import general fill which met the MTM criteria
- Engineer site won material to meet criteria

## Site won material testing results

CBR 1.5%

Swell 4%

PI 53

Emerson Class No 2

Pin Hole Dispersion

Classification D1 –

Highly Dispersive

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# Stabilisation Treatments Testing

- Laboratory testing was conducted to identify which treatment was most suitable to achieve results required. The results are as following

Test	3% Quicklime	4% Quicklime	3% Quicklime 3% Cement	4% Quicklime 2% Cement
CBR (%)	30 & 35	35	40 & 90	45
Swell (%)	0	0	1.5 & 1	1
PI (%)	30	15	8	10
Pin hole dispersity classification	ND2	ND2	ND2	ND2
Emerson Class No	4	4	4	4

- Upon reviewing results the designers selected to stabilise site won material with 4% Quicklime

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# Project Breakdown

Start Date  
16/04/2024

Spread Rate  
13.5kg/m<sup>2</sup>

Amount of  
product used  
1331.79 Tonnes

Area Stabilised  
96,155.60m<sup>2</sup>

Depth 250mm

Volume  
generated  
24,038.90m<sup>3</sup>

486 man-hrs (2  
Stabilising  
Operators)

Avg 110,000  
litres/ Day

Finish Date  
18/06/2024

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# Issues

Issues	Solution
High Water Demand	Due to the higher percentage of quicklime there was significant demand for water (Avg 110,000 litres) in the mixing process. In order to keep up we utilised a water storage tanker on site which filled a water cart in 3 mins
High Winds	The site was located between existing train stabling yard and farmland and experience high winds. We have utilised the Wirgten WR240 Spack connected to the water carts which helped keep the dust on the ground

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# Achievements

- By engineering the site won material we were able to prevent importing suitable general fill to complete the project. By doing so we managed to achieve the following
  - Reduced cost associated with importing suitable material
  - Avoided exporting cut material to land fill
  - Avoided 600 truck and trailers from the road for importing / exporting purposes

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