2026 Australian Landfill & Transfer Station Conference

Marsden Park Land Restoration

Optimising Geomembrane Protection Layers At the Marsden Park Landfill



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with TRI Environmental, GHD, and thanks to Global Synthetics, and Ecoline Solutions

Marsden Park Landfill
Geomembrane Protection Layer Optimisation

Background

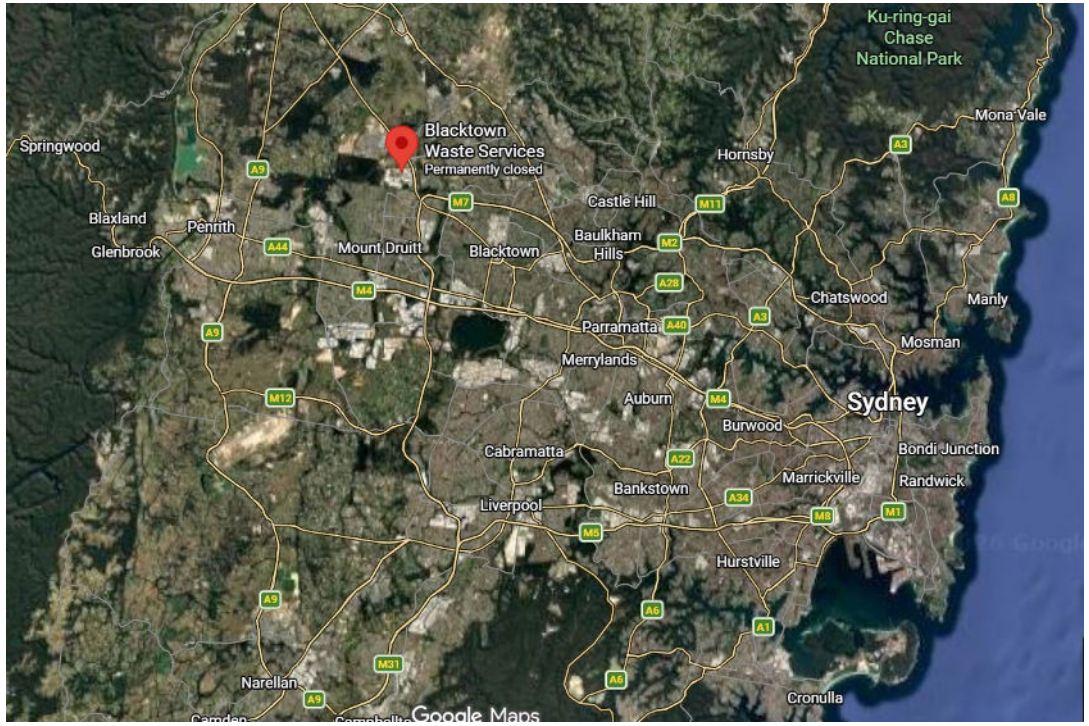


Figure: Google



Figure: Nearmap

Marsden Park Landfill - Closure

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Background

- Obtained approval to quarry and landfill in 2000
- Commenced landfill operations in 2004 (EPL 11497)
- Non-putrescible solid waste + ACM only
- Total landfilled waste: 3.85 million tonnes
- Total LF airspace: 3.4 million m^3
- Ceased landfilling in December 2025
- Not progressively capped







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Background

- Minimise rainfall infiltration – reduced leachate generation
- Minimise LFG emissions/maximise LFG capture
- Increase airspace
- Difficulties with clay material sourcing and stockpiling
- Flatter landform surface = opportunity for future site use

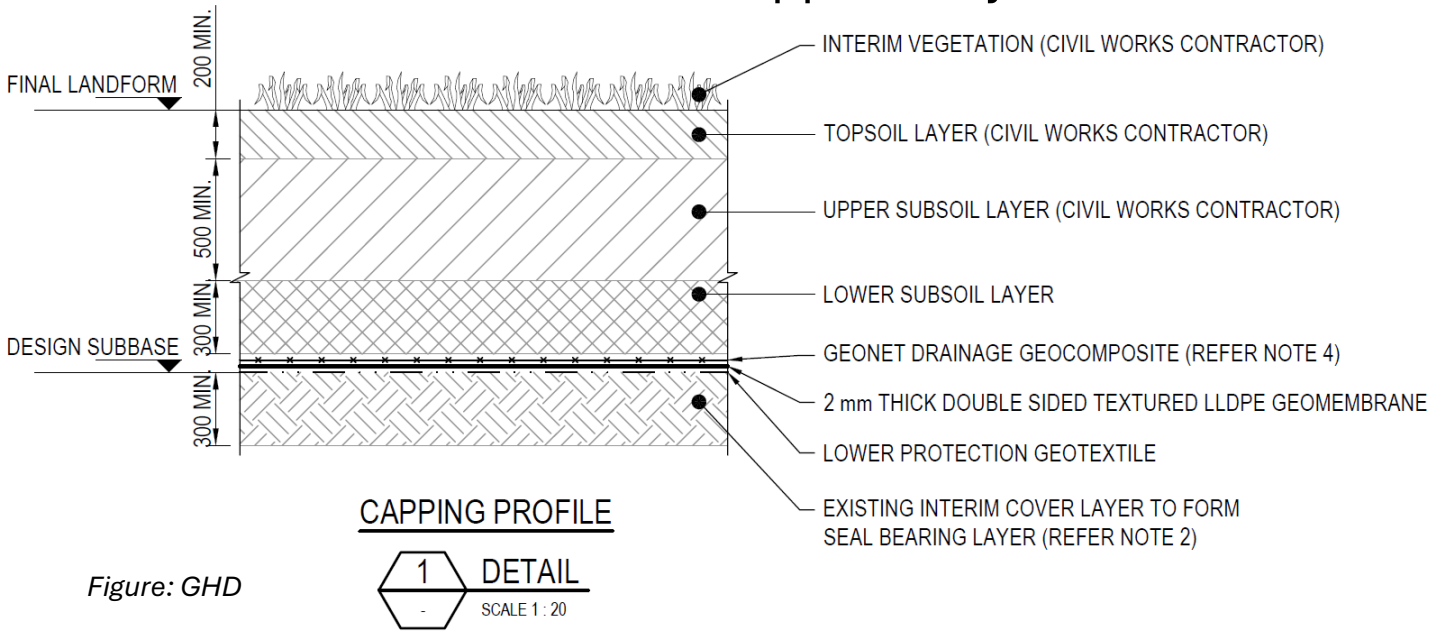


Figure: GHD



Figure: MPLR

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Background

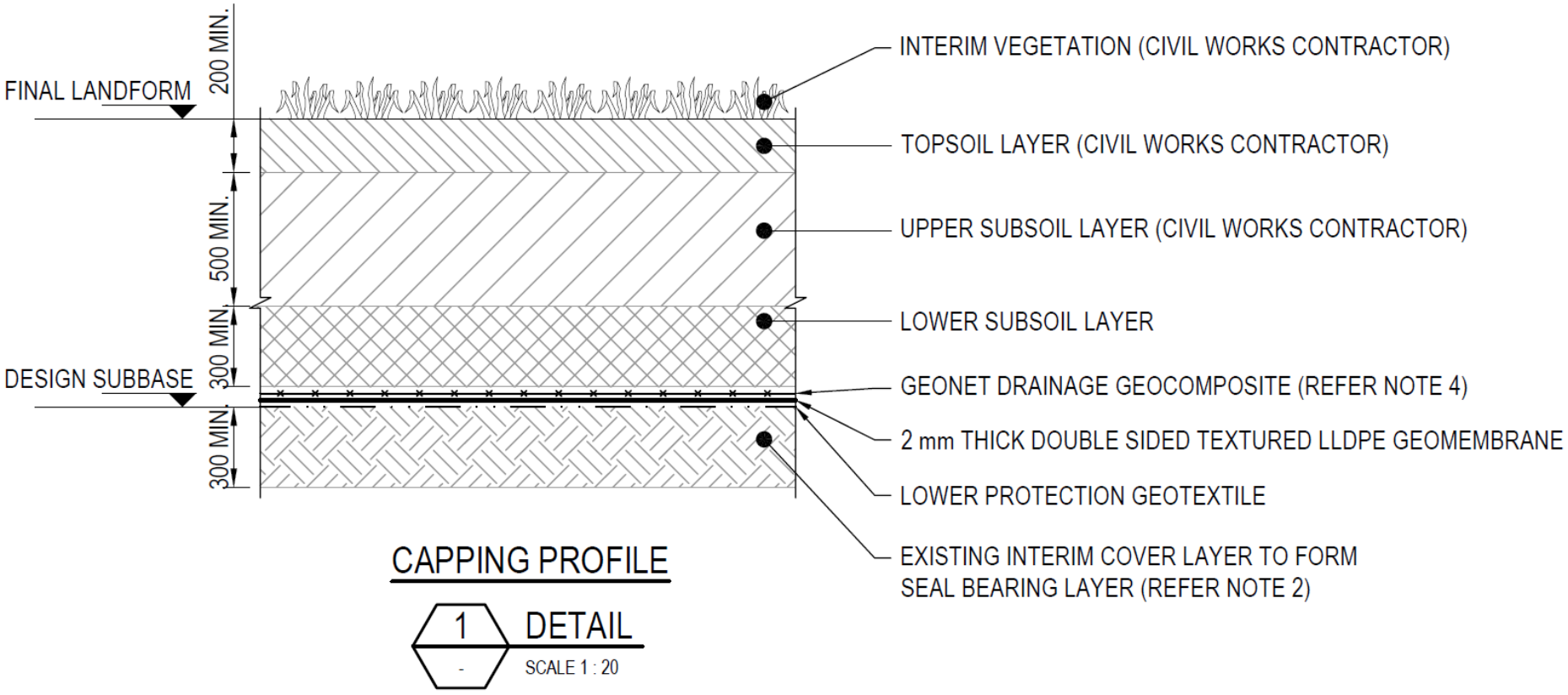


Figure: GHD

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Aims

1. Assess the effectiveness of the proposed Geonet Drainage Geocomposite at protecting the upper surface of the proposed geomembrane layer during construction and potential future loading.
2. Assess the protection required on the underside of the proposed geomembrane layer (to protect the geomembrane from the subgrade).

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Evaluation Criteria

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Table 2: Maximum allowable strains for various geomembrane materials

Geomembrane type	Maximum allowable strain
HDPE smooth	6%
HDPE randomly textured	4%
HDPE structured profile	6%
LLDPE density <0.935 g/cm³	12%
LLDPE density >0.935 g/cm³	10%
LLDPE randomly textured	8%
LLDPE structured profile	10%

Source: EPA Victoria, 2015, page 75, adopting values from Peggs 2003.

Evaluation criteria: from NSW EPA Landfill Guidelines (and Vic EPA)

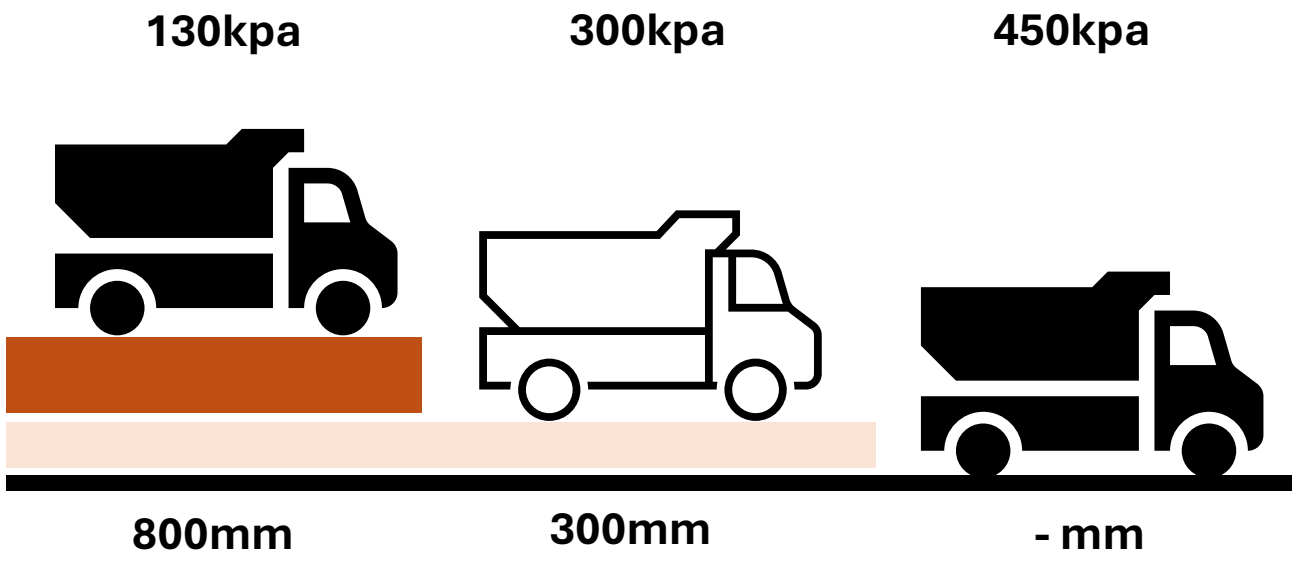
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Testing Overview

- **Compression Testing**
- Shear Testing
- Soil Materials
- Geosynthetic Materials

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Compression Testing

- Hornsey & Wishaw Strain Measurement Methodology (TRI Australasia)

Layer	Above Geomembrane	Below Geomembrane
1	Geomembrane	Geomembrane
2	Metal Sheet	Metal Sheet
3	Protection Layer Geonet Drainage Geocomposite (GDG) or Protection Geotextile (GT)	Protection Layer Protection Geotextile (GT)
4	Revegetation material Onsite SP or Milled Sandstone	Seal bearing surface

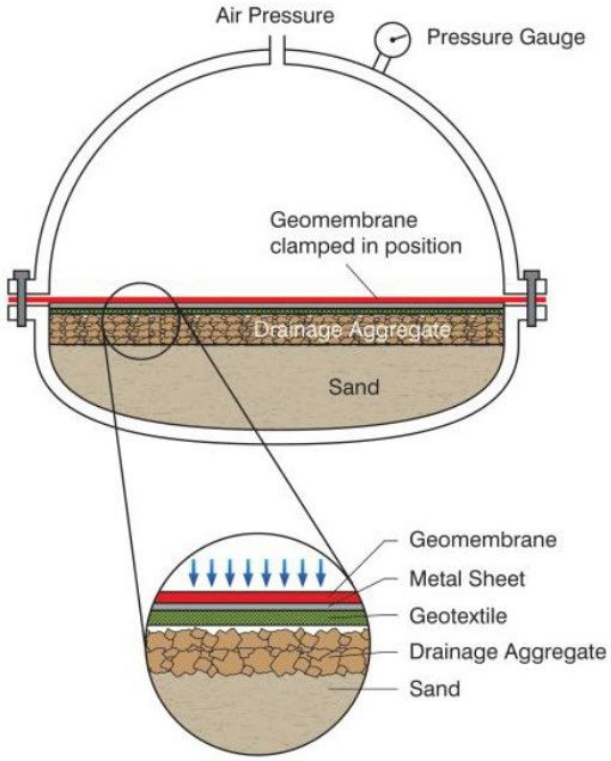
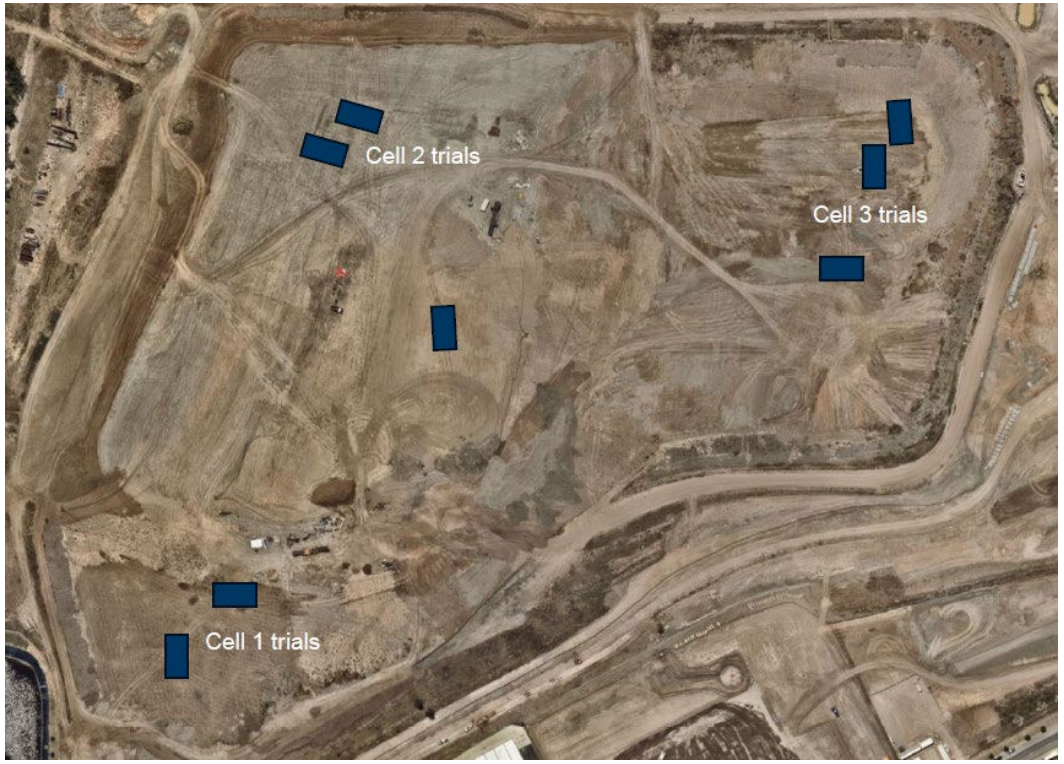


Figure: TRI Australasia

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Seal Bearing Layer Mould Creation

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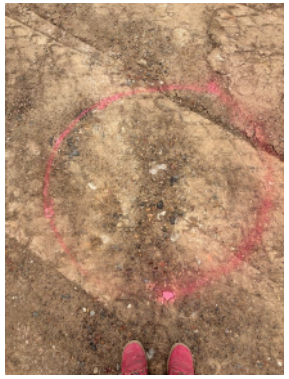
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Seal Bearing Layer Mould Creation

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Images 1-7: Mould creation process (MPLR), Image 8: Reverse mould (TRI Australasia)

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Upper Protection Layer - Results

Test Number	Revegetation Layer	Protection Layer	GM	Strain (%) @130kpa	Strain (%) @300kpa	Strain (%) @450kpa
1	Onsite SP	GDG	GM1	1.97		
2	Milled Sandstone	GDG	GM1	0.93	1.2	1.8
3	Onsite SP	GT	GM1	1.92		
4	Milled Sandstone	GT	GM1	2.25		

GDG: TN270-1-270 +AS801 Geocomposite (supplied by Global Synthetics), GM1: 2.0mm smooth LLDPE geomembrane (supplied by Solmax), GT: Bidim A64 (supplied by Ecoline Solutions)

Table 2: Maximum allowable strains for various geomembrane materials

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Source: EPA Victoria, 2015, page 75, adopting values from Peggs 2003.

Evaluation criteria: from NSW EPA Landfill Guidelines (and Vic EPA)

Lower Protection Layer - Results

Test Number	Seal Bearing Layer Mould	Protection Layer	GM	Strain (%) @130kpa	Strain (%) @300kpa	Strain (%) @450kpa
1	M1	GT	GM1	4.3	5.7	8
2	M3	GT	GM1	2.6		

GM1: 2.0mm smooth LLDPE geomembrane (supplied by Solmax), GT: Bidim A64 (supplied by Ecoline Solutions)

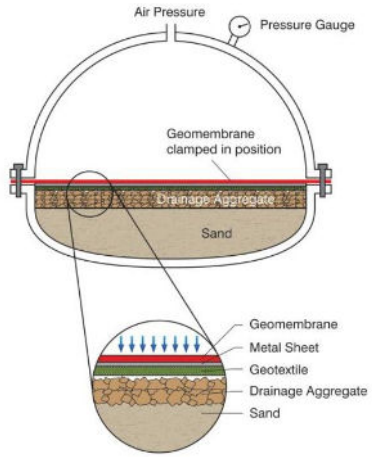


Figure: TRI Australasia

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Recording Plates and Strain Distribution Maps

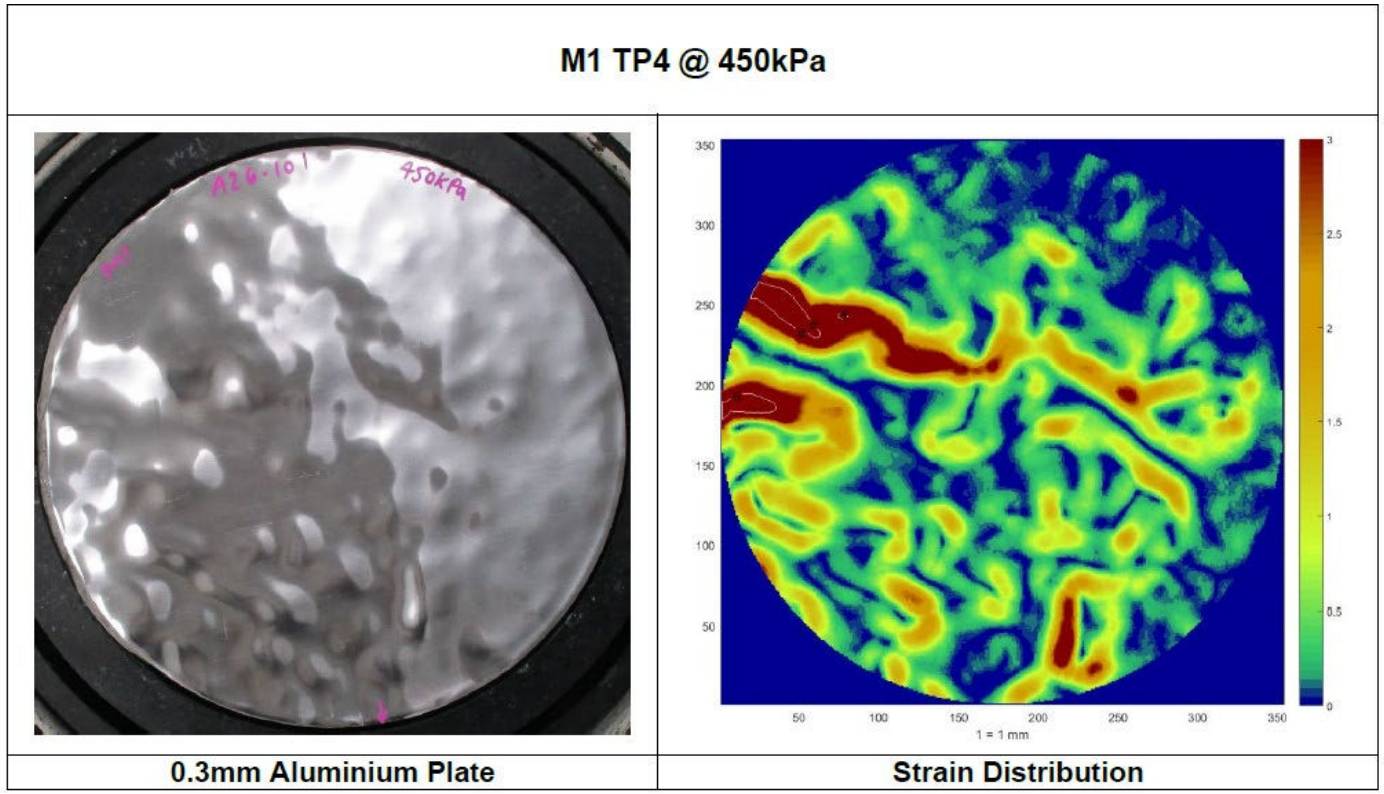


Figure: Recording plates and strain distribution maps – TRI Australasia – Hornsey & Wishaw Strain Measurement Methodology

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Aims

1. *Assess the effectiveness of the proposed Geonet Drainage Geocomposite at protecting the upper surface of the proposed geomembrane layer during construction and potential future loading.*

2. *Assess the protection required on the underside of the proposed geomembrane layer (to protect the geomembrane from the subgrade).*

Outcome

1. The proposed Geonet Drainage Geocomposite was more than sufficient at protecting the upper surface of the proposed geomembrane in the tested loading scenarios.

2. In our worst-case scenario, the underside protection layer used during testing was sufficient under light loads/on the 800mm layer, however, it was not good enough under significant pressure (300kPa and 450kPa load).

Note: this is a static test and does not simulate the dynamic construction loads.

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Cost and Cost Savings

- Testing costs: ~20k
- Material savings: downgrading a protection geotextile by a level (e.g. bidim A84 to A64) saves ~70 cents/m^2
  - On a site our size, this equates to a $100-115k saving.
- Construction savings: could allow the civil works contractor to use heavier trucks after the lower subsoil layer has been placed
  - Heavier trucks -> carry more material -> works completed sooner -> reduced civil works cost.

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Next Steps

- Additional Testing
  - Increase lower protection layer
- Finalise design
- Tender process
- Field trials
  - Dynamic loads

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Weaknesses

- Cover Soil
  - Accessing the same cover soil used during testing
- Seal Bearing Surface
  - Made of grout – not soil/rock
  - Flaws on the mould surface – caused by plastic layer

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Thank you ☺

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Jaidyn Cumming, Dr Stuart Dever, Harry Singh
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