

### IN-HOUSE TESTING AND DESIGN FOR MINING

# **GEOFABRICS**<sup>®</sup> Sustainable solutions





# WORKING WITH CLIENTS TO DEVELOP THE RIGHT SOLUTION FOR EACH PROJECT



Geosynthetic engineered solutions have been widely used on mine sites since the 1980s. However, a key challenge remains – few civil engineering programmes teach geosynthetic design, so expertise is often only developed through hands-on experience and a long project history. This rarely exists in mining, and many geosynthetic products are now being applied in environments that were once considered unsuitable.

Mine sites expose these materials to a range of environmental stresses and chemical exposures that can accelerate material degradation. To ensure reliable performance, it is critical to understand how geosynthetics interact with site-specific soils, loads, and chemical conditions. This can be achieved through targeted testing and analysis, enabling more accurate predictions and better alignment with their intended function.

In 2009, Geofabrics established the GRID (Geosynthetic Research, Innovation and Development) Laboratory to apply real-world application conditions and access the long-term performance of geosynthetic products. The goal is to link the geosynthetic service life with the operational life of the mine to deliver technical reliability and economic value to the client.

The historic focus in geosynthetic testing and analysis has observed reduced costs, improved environmental performance and safer operations in key site areas including:

### LINING SYSTEMS FOR TAILINGS, MINE WASTE AND WATER

The GRID offers a range of material performance tests to optimise geosynthetic lining systems:

**Cushion testing:** Evaluation of geotextiles used to cushion geomembrane liners, aimed at minimising strain and mechanical damage. This testing highlights that not all geotextiles perform equally in cushioning applications, even when of similar weight—enabling smarter material selection and cost savings

**Site-specific immersion and thin-film accelerated testing:** These tests provide rapid yet reliable predictions of the service life of primary HDPE geomembranes used in tailings storage facilities (TSFs), under actual chemical and thermal conditions.

**Shear Interface Testing:** Conducted with sitewon soils to assess the elongation and damage potential of various geomembranes, including Bituminous Geomembranes, HDPE, and Geosynthetic Clay Liners (GCLs)

**UV degradation analysis:** assessment of geosythetic resistance to ultraviolet exposure over time.

**Thermal, oxidation and hydrolysis testing:** Evaluates long-term material stability under environmental and operational stresses. **Drainage testing:** Our GRID team simulates compressive loads on geocomposite drainage layers within lining systems, under site-specific conditions. This enables the selection and optimisation of drainage materials that deliver both reliable performance and cost savings.

**Dewatering testing:** We offer flocculant testing, Geotube stacking design concepts and technical support to evaluate Geotube dewatering efficiency. This includes assessments of filtrate quality and solids retention, helping determine the viability of Geotube® technology as an effective alternative for tailings dewatering and management.

#### **CLOSURE OF PITS AND TAILINGS**

**Capping reinforcement:** Tailings Storage Facilities (TSFs) are often too soft to support capping with soil and rock without additional basal support. Geosynthetics are used to evenly distribute construction loads over compressible tailings, enabling faster, more cost-effective mine closure. The GRID Laboratory analyses the interaction between site-won cover soils and high-strength geosynthetics, optimising designs to reduce the depth of rock and overall closure costs.

**Geotube dewatering:** Restore storage capacity by dredging existing tailings and sludge ponds into Geotube dewatering containers. We assess viability through flocculant testing and performance evaluations, connecting mine sites with local dredging operators and contractors or providing independent concept designs for mines to manage this function autonomously.

**Wick drains:** We offer tailings consolidation assessments through the use of wick drains, enhancing the efficiency of the closure process.



years of technical leadership & engineering support

**50**+ GAI-LAP accredited geosynthetic test methods





**Over** 

R&D and

projects

innovation

#### **RAIL, ROADS AND RETAINING WALLS**

**Reinforced earth structures:** We design and analyse cost-effective, purpose-built reinforced earth structures, offering a range of systems:

- Verti-Block, a rapid construction gravity concrete block wall with soil reinforcement options
- TW3 retaining wall system, a keystone block wall with simple 100% soil reinforcement connection
- Gabion rock walls available with and without soil reinforcement options
- Green terramesh modular systems, a green facade solution with soil reinforcement options

#### **Stabilised haul roads and working platforms:** We optimise the thickness of working platforms

and hardstands for heavy mining equipment, as well as sealed and unsealed road pavements, using a variety of geosynthetic solutions. This approach reduces construction costs while enhancing the performance and lifespan of access and haul roads.

**Basal reinforcement:** Using the latest design tools, including Plaxis and other relevant software, we assess and design reinforced embankments over soft soils to improve stability.

**Rail:** We analyse and design rail formations to reduce construction costs and improve performance over weak soils by incorporating geosynthetic materials.

**Spanning of voids:** Our GRID experts recommend the most suitable geosynthetic solutions for spanning existing or potential voids, utilising both analytical techniques and, where necessary, numerical modeling.

Bearing capacity improvement: For shallow

Protection of buried structures: When

underground utilities or assets (e.g., concrete

pipes) are subjected to heavy live loads due to

shallow overburden, the GRID Laboratory can

on buried pipes, preventing costly remedial

recommend geosynthetics that reduce pressure

foundations on unsuitable grounds, we propose solutions to improve bearing capacity for

applications such as retaining walls, culverts and



**MONASH** University

### The GRID offers **concept designs**

#### **ROCKFALL PROTECTION**

actions.

lightly loaded structures.

The GRID Laboratory can provide concept designs using specialised software for open-cut pinned or anchored rockfall netting systems, underground rockfall mesh, and catch fences.

#### **EROSION AND SOIL MANAGEMENT**

The GRID Laboratory provides expert analysis and recommendations on the most suitable surface erosion systems with innovative and cost- effective sediment management solutions, both biodegradable and synthetic.

It is essential for mining companies to ensure that any geosynthetic solution selected will perform reliably throughout the life of the mine and continue to meet environmental obligations post-closure.

#### **PROJECT CASE STUDIES**

We have been involved in the development of case studies including:

### Bauxite residue disposal areas in Australia and globally

10 years of geosynthetic liner compatibility testing with high pH Bayer liquors.

#### **Rare earths and critical mineral storages**

Lining and drainage compatibility analysis for containment of tailings.

#### **Copper and gold tailings**

Compatibility of lining and drainage systems, including HDPE geomembranes, geonets and GCLs.

#### **Gabion and reno drop structures**

Design of retaining structures and run of mine (ROM) walls, river training.

#### **Erosion and soil management**

Surface erosion, sediment management, revegetation and rehabilitation.

### Technical papers and conference presentations

Exhumed liners in tailings for copper and gold TSFs.

Our GRID specialists conduct ongoing studies of geosynthetic behavior across various real-world applications to assess product capabilities and limitations. This research is supported through collaborations with our manufacturing and sales teams, as well as academic institutions and external organisations like Monash University and CSIRO. We regularly partner with consulting engineers, designers, regulators, universities, and government agencies to enhance our insights and solutions.

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# SOLVING ENGINEERING CHALLENGES WITH REAL-WORLD PERFORMANCE TESTING





#### **MINING AND GRID TEAM**



Ryan Hackney Mining and Environmental Manager

Experienced in laboratory testing, with expertise in ISO 17025 & 9001 quality management, calibration of test equipment, and geosynthetic analysis, including physical, mechanical, hydraulic, durability, and interface shear strength assessments. Holds a MSc in Engineering Geology and a BSc in Geology from the University of Leeds.



Matt Golding Mining BDM WA

Assists consulting engineers and mining clients with geosynthetic design solutions, focusing primarily on the waste and water containment sectors. Graduated with honours in Civil Engineering and a Master in Construction Management from Kingston University.



#### Marc Amtsberg Geophysicist and Civil Engineer

Experienced in designing and specifying engineering solutions using geosynthetics in landfill and mining, with expertise in writing key technical papers and advising EPAs on regulatory reviews for Vic BPEM, NSW Solid Waste, and SA EPA Guidelines.



Daniel Gibbs General Manager Technical, Research and Innovation

Detail-oriented professional with over 20 years in management, research, quality auditing, and innovation across geosynthetics and pharmaceuticals. An active member of ASTM and ACICS, with recent work including PFAS attenuation using Sorbseal.



Bowei Yu Technical R&D Lab Manager

Strong academic and industry background with a PhD, BEng, and MEng in Geotechnical Engineering, and experience as a NATA technical assessor specialising in soil and rock laboratory testing. Expertise includes unsaturated soil mechanics, soil testing, and the performance of geosynthetic materials in geoenvironmental engineering.



Abid Ali Senior Applications Engineer Geotechnics

Highly motivated Geotechnical Engineer with over 10 years of experience in industry and research, specialising in advanced techniques to solve geotechnical problems using geosynthetics. Holds a PhD in Civil Engineering from the University of Newcastle.



# PROTECTING THE ENVIRONMENT THROUGH GEOSYNTHETIC RESEARCH AND INNOVATION





Geofabrics is the only geotextile manufacturer in Australia, with plants in Albury and Ormeau. We pride ourselves on providing unrivalled service to our customers. We can recommend the best geosynthetic product to achieve the objectives of your project and ensure it's available when you need it.

Over 40 years of experience allows our technical staff to provide practical support, based on local conditions. We are proud to have been recognised in the AFR Most Innovative Company list in 2020 with Bidim Green and 2021 with Sorbseal.

With a view to the future, we are committed to improving the sustainability of our business by reducing waste to landfill, lowering our carbon emissions and investing in our people.

### — FINANCIAL REVIEW BOSS — MOSTINNOVATIVE



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Sustainable solutions