



BALANCING SUSTAINABILITY AND PERFORMANCE IN TUNNELLING

The Role of Water Quality in Backfill Grouts

One of the most pressing global challenges of our time is clean water scarcity. By 2030, the global demand for freshwater is expected to exceed supply by 40%, with the construction industry accounting for approximately 15% of total freshwater consumption¹.

For example, a Sydney tunnelling project estimated water requirements at 550 megalitres to support tunnelling works along the 16 km section, equivalent to 220 Olympic-sized swimming pools². These statistics underscore the importance of water-efficient practices in construction.

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THE ROLE OF SUSTAINABLE METHODS AND MATERIALS IN TUNNELLING

The tunnelling industry is increasingly focusing on strategies to reduce environmental impacts. From mitigating carbon footprints to optimising water usage and managing soil effectively, sustainability now lies at the heart of modern tunnel design and construction. One key aspect is using sustainable construction materials that offer long-term benefits while minimising environmental costs.

Backfill grout is a material which is crucial in Tunnel Boring Machine (TBM) operations. In Australia, many specifications have aimed at reducing the environmental impact of backfill grouts through limitations on embodied carbon and freshwater usage. To minimise freshwater use, some projects have implemented recycled water treated on-site for backfill grout production. While these measures are well-intentioned, they can bring unintended consequences if the grout mix design isn't compatible with the water chemistry.

THE IMPACT OF WATER QUALITY ON GROUT PERFORMANCE

Water quality is a critical factor in the performance of backfill grouts. Even after treatment, impurities in water can severely affect the grout's rheological properties.

To successfully use recycled water, MAPEI's R&D laboratory designed a stabilising liquid polymer, MAPEDRILL FR10, to address the high bleed and low viscosity caused by the water's impurities. This solution ensures the grout's technical performance while achieving sustainability goals.

MAPEDRILL FR 10 can be used in mechanised tunnelling with TBMs in injection and drilling. It is versatile and can have different properties depending on the application demanded and the dosage.



Scan the QR code to learn more about MAPEDRILL FR10



MAPEI SOLUTION

Modern infrastructure projects are complex and are increasingly multidisciplinary endeavours. They require careful planning, collaboration, and integrating expertise across various fields to ensure the infrastructure endures the test of time.

Mapei provides the technology and knowledge to support businesses in green solutions for backfill grout to achieve a balance between sustainability goals, technical performance, and project success.

For more information, reach out to:



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¹ The fresh water crisis is now as urgent as making the transition to zero carbon—WorldGBC launches new position paper outlining role of the built environment in tackling the global water shortage—World Green Building Council—worldgbc.org/article/the-water-paper/

² Consistency Assessment Approval Form—Change to Tunnel Alignment between Waterloo—sydneymetro.info/sites/default/files/document-library/Consistency%20Assessment%20Approval%20Form%20-%20Change%20to%20Tunnel%20Alignment%20between%20Waterloo.pdf