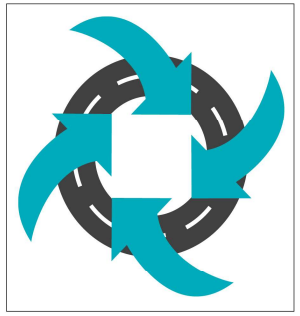
Designing roads for reuse and resilience

Dennis Walsh, Chief Engineer
Department of Transport and Main Roads



Australian Pavement Recycling and Stabilisation Conference

Designing for Reuse and Resilience

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AUDAX AT FIDELIS
Queensland Government

AustStab
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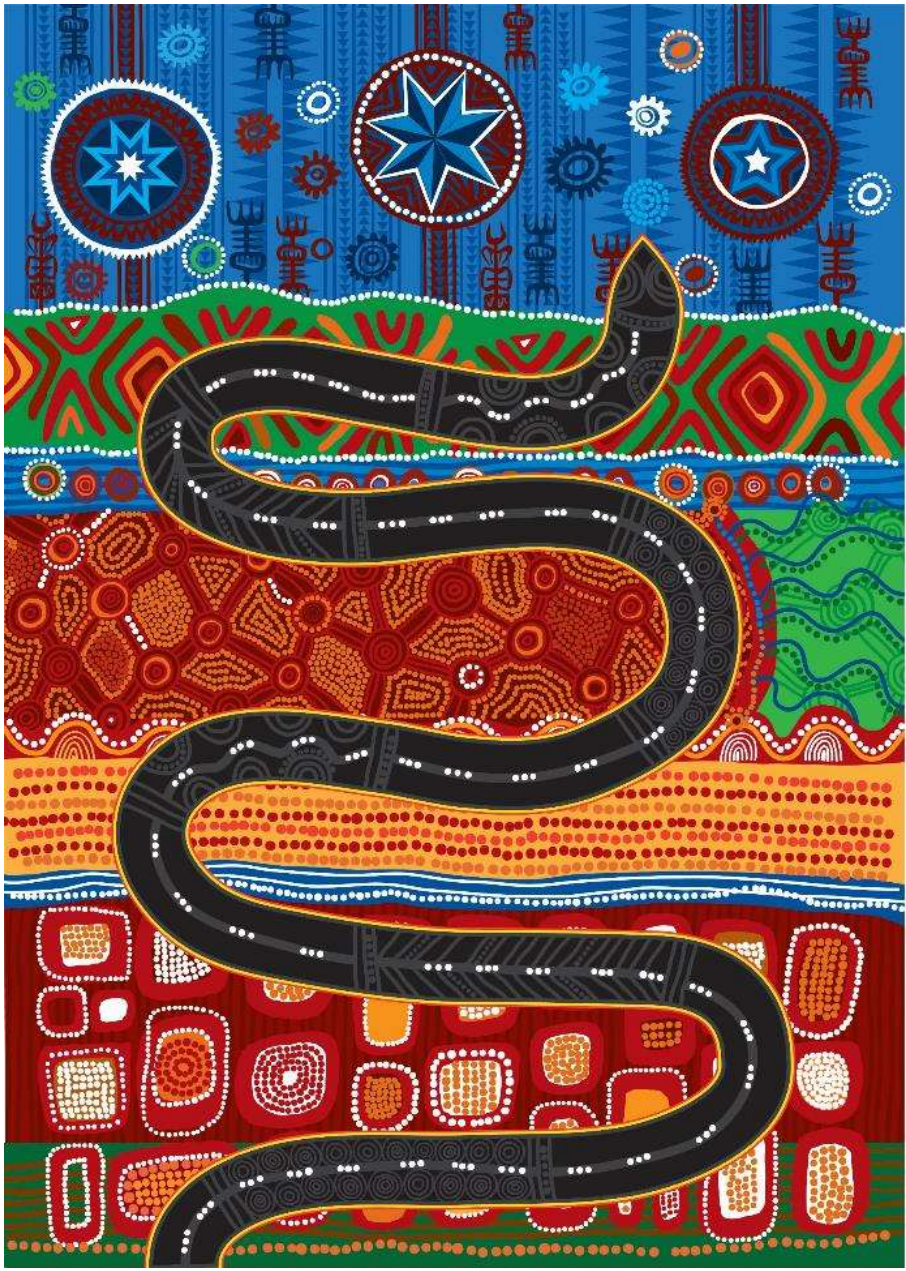
Acknowledgement of Traditional Owners and Elders

I'd like to begin by acknowledging the Traditional Owners of the land where we meet today. I would also like to pay my respects to the Elders both past and present.

I also extend that respect to the Aboriginal and Torres Strait Islander people here today.



'Travelling' by Gilimbaa

Collaboration is the key: Creating safer resilient roads – TMR and AustStab

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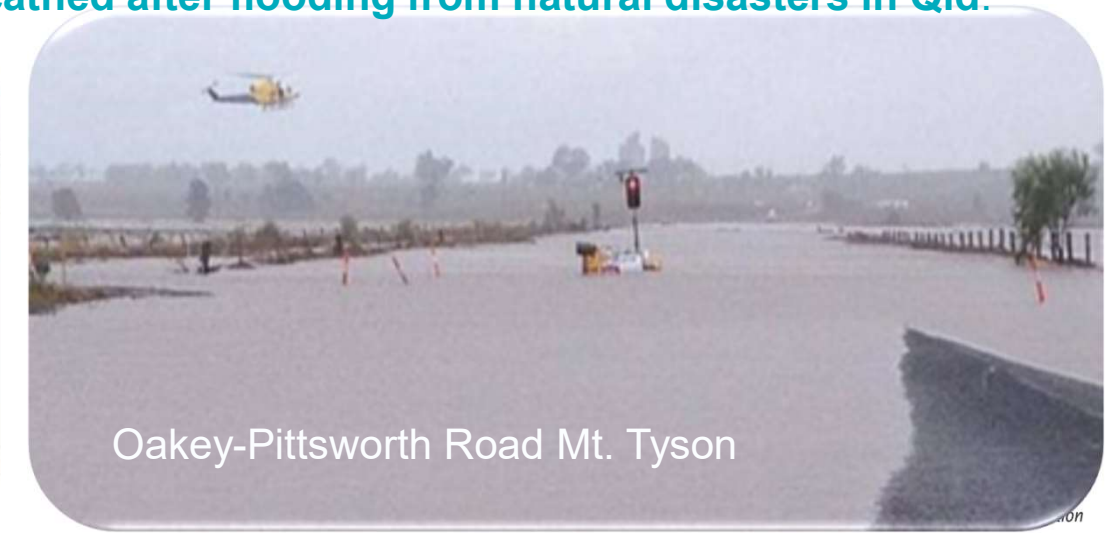
Benefits to TMR – Flood resilience from foamed bitumen


Bruce Highway Yeppen Floodway


Mt. Lindesay Hwy (Camp-Cable Rd)

These foamed bitumen pavements survived unscathed after flooding from natural disasters in Qld.

Yandina - Bli Bli Road


Oakey-Pittsworth Road Mt. Tyson

Pavement recycling for sustainable roads

Insitu stabilisation

Up to 6 000 tonnes of raw material *could be saved per km of road.*

Insitu stabilisation of existing roads is undertaken by pulverising the road and mixing various stabilising agents (including cement, bitumen, fly ash and slag) which provides a strengthened rejuvenated pavement.

This results in very little waste sent to landfill without needing to consume new materials.

https://www.tmr.qld.gov.au/Community-and-environment/Planningfor-the-future/Building-sustainable-roads

Fly ash blends in stabilising agents

Fly ash and blast furnace slag

Up to 70% reduction in greenhouse gas emissions *from the use of fly ash.*

Fly ash and blast furnace slag are industrial wastes from coal fired power plants and steel production. These waste products can be used to replace up to 70 per cent of the cement used in pavements.

Up to 35 per cent of the cement used in structural concrete can be replaced with fly ash, up to 50 per cent with a combination of fly ash and slag, and 60 to 70 per cent with slag alone.

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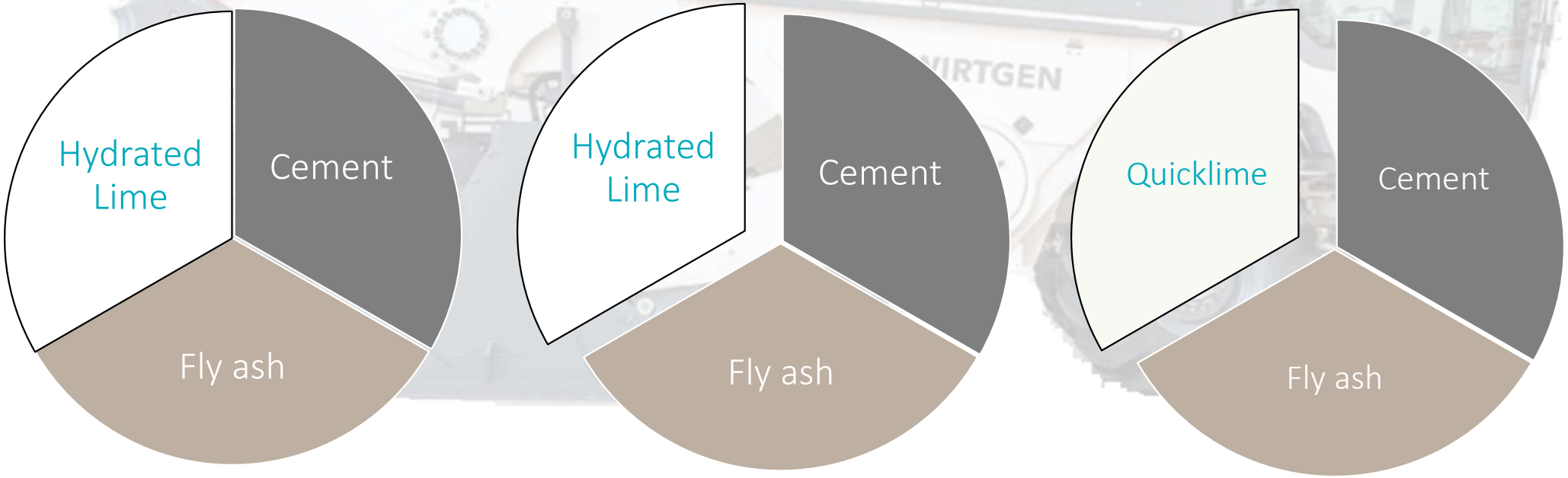
Triple Blend stabilised subbase

Common Triple Blend additives used in TMR

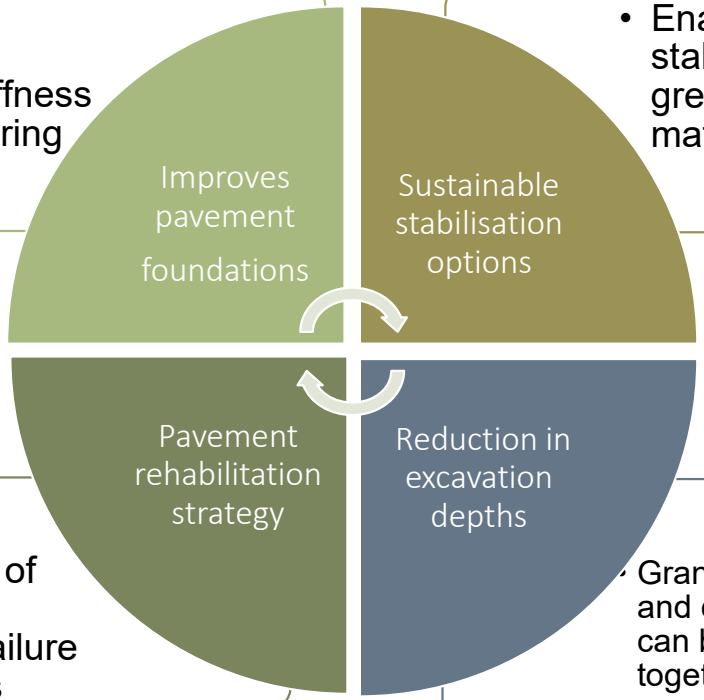


Linear Shrinkage >6 (40% Lime : 30% Cement : 30% Fly Ash)
Linear Shrinkage <6 (30% Lime : 40% Cement : 30% Fly Ash)

Resilient support conditions – Lime and Triple Blend Stabilised substrata

- Triple blend improves the subbases stiffness and load bearing capacity

- Enables insitu stabilisation on a greater variety of materials



- Stabilisation of foundations addresses failure mechanisms

- Granular subbase and clay subgrade can be blended together (hybrid)

Responsible innovation based on sound research - TMR District and Bulwer Island laboratories

TMR Bulwer Island have state of the art facilities and are Australian leaders in foamed bitumen testing

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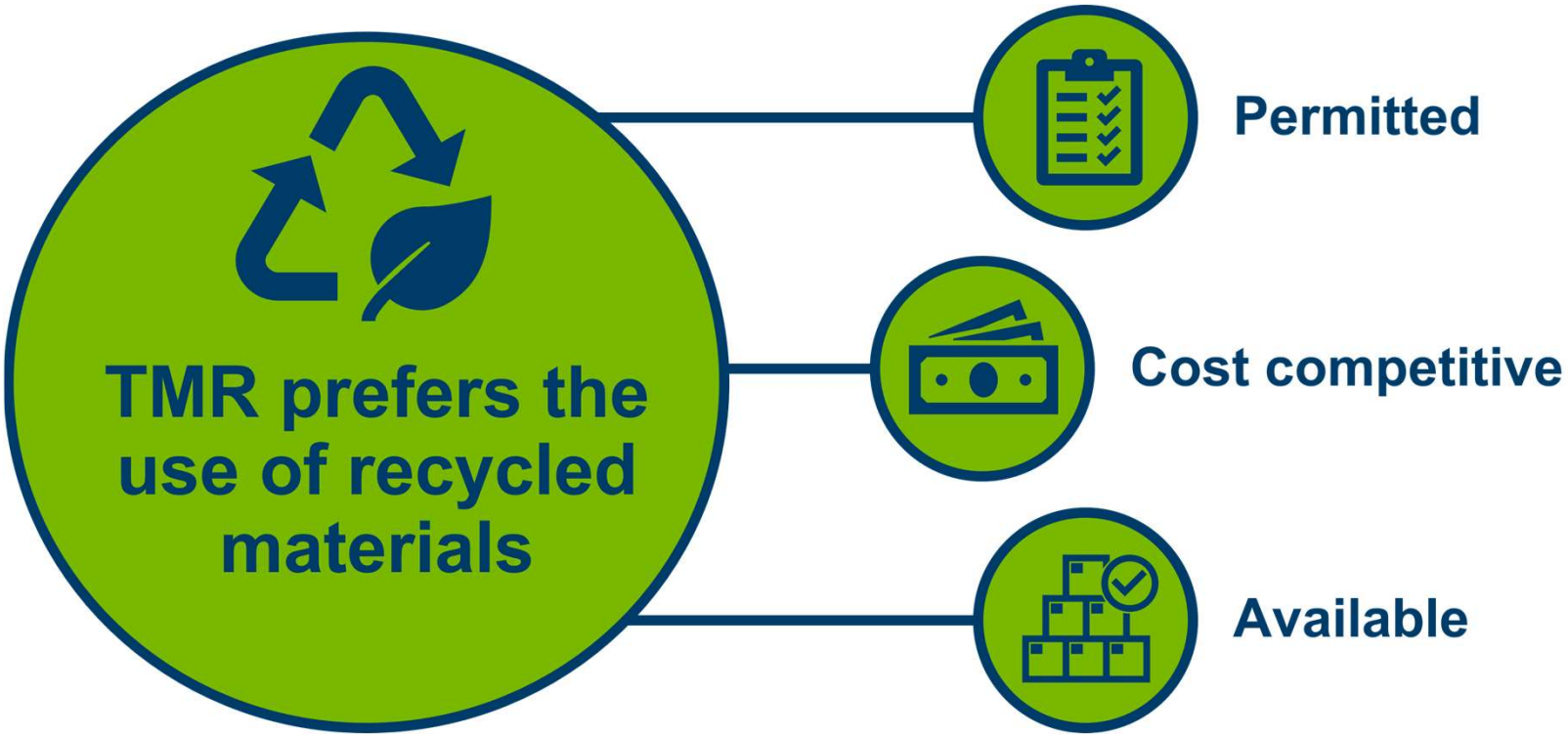
Recycled Materials and the Waste 2 Resource Strategy



Not mandated

Technical Note 193

Application	Recycled material								TMR Specification
	Crushed concrete	Crushed brick	Crushed glass	RAP	Crumb rubber	Fly Ash and Slag	Insitu material	Recycled plastic	
Unbound pavements	✓	✓	✓	✓	-	-	-	-	MRTS05, MRTS36
Sprayed sealing	-	-	-	-	✓	-	-	R	MRTS11, MRTS18,
Asphalt	-	-	✓	✓	R/D	✓ (As filler)	-	R	MRTS30, MRTS32, MRTS36, MRTS101, MRTS102, MRTS103, MRTS18, PSTS112
Concrete	R	-	R	-	-	✓	-	✓ (As fibre)	MRTS70*
Concrete Pavements	-	-	-	-	-	✓	-	-	MRTS39, MRTS40
Stabilisation	✓	✓	✓	✓	-	✓	✓	-	MRTS07B, MRTS07C, MRTS08, MRTS09, MRTS10 , MRTS115
Earthworks, drainage and backfill	R	R	✓	R	-	-	✓	-	MRTS03, MRTS04
Geosynthetics	-	-	-	-	-	-	-	✓ R	MRTS27 MRTS58 MRTS100 MRTS104
Crack & Seat/Rubblisation (Concrete pavements)	-	-	-	-	-	-	R/D	-	
Other (including road furniture)	-	-	-	-	-	-	-	R	

✓ = currently permitted within specified limits/uses R = Research underway D = Demonstration projects underway

Image: Table 2 – Overview of recycled material uses and relevant specifications, Technical Note 193. Source: TMR.

RAP = Reclaimed Asphalt Pavement

Recycled materials in stabilisation

NACOE research into stabilisation of unbound granular materials with significant proportions of:

- recycled crushed concrete,
- recycled asphalt pavements,
- crushed brick and
- recycled crushed glass

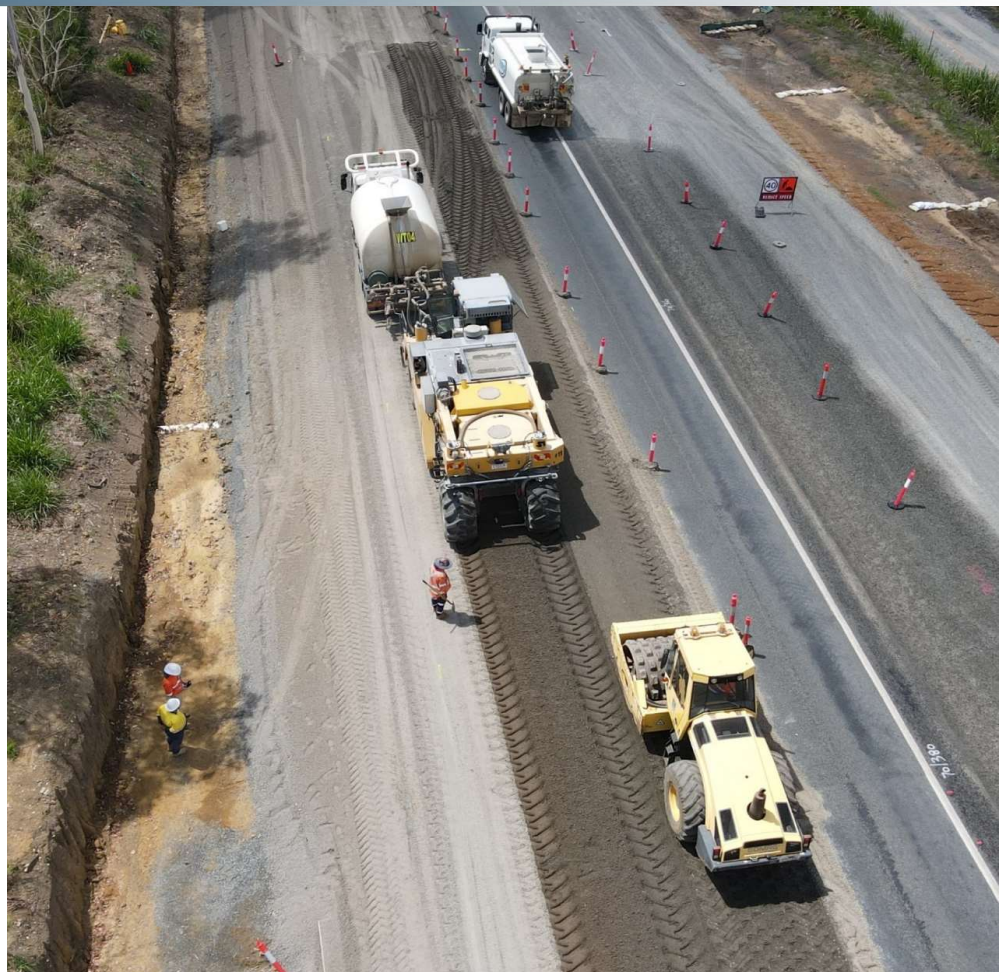
Foamed bitumen and cementitious stabilisation

Laboratory testing and field trials underway

Using chemical admixtures to extend working time

NACOE research findings:

- Concrete chemical admixtures can extend working time for cement stabilised pavement
- Optimum chemical admixture type and dosage are mix specific
- Thorough mixing and accurate dosing is essential



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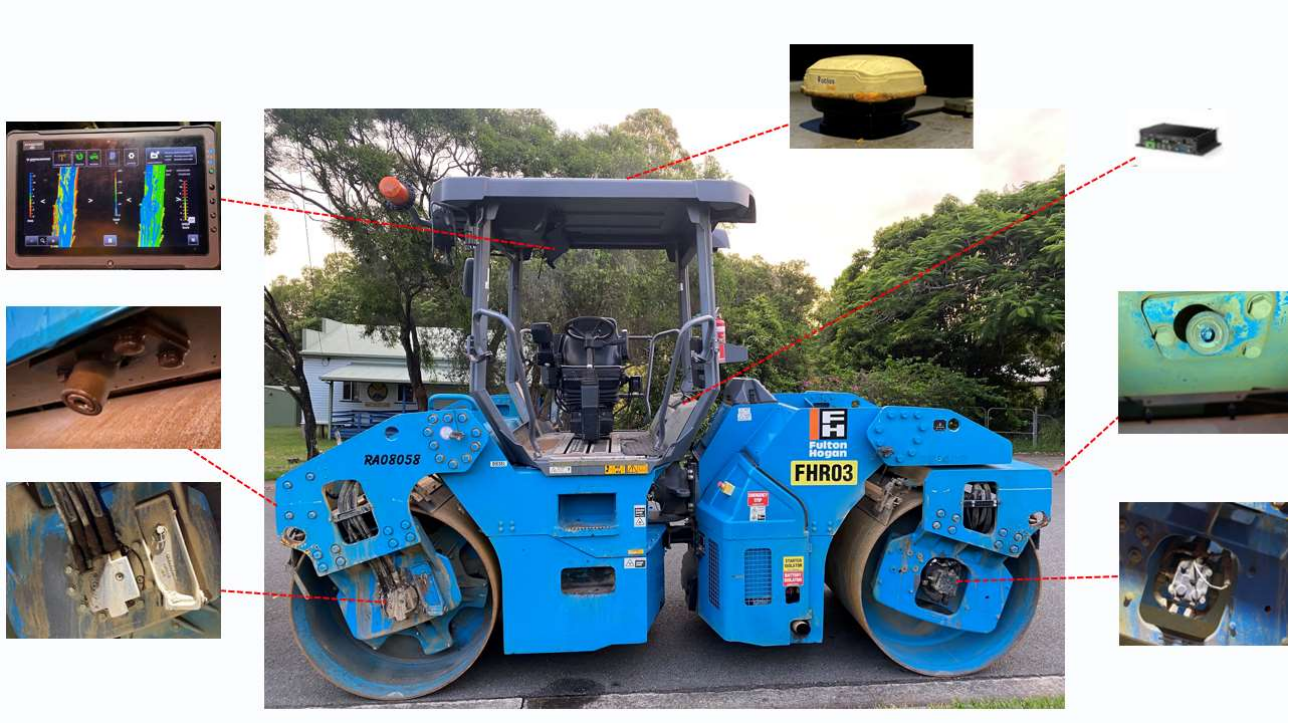
Intelligent construction

Intelligent compaction



- Equipped with GPS, accelerometers, temperature sensors (asphalt works) and display screen.
- Achieving compaction is complex and a common issue.
- Improves rolling consistency and efficiency.

RoadTek – Leading the way with IC



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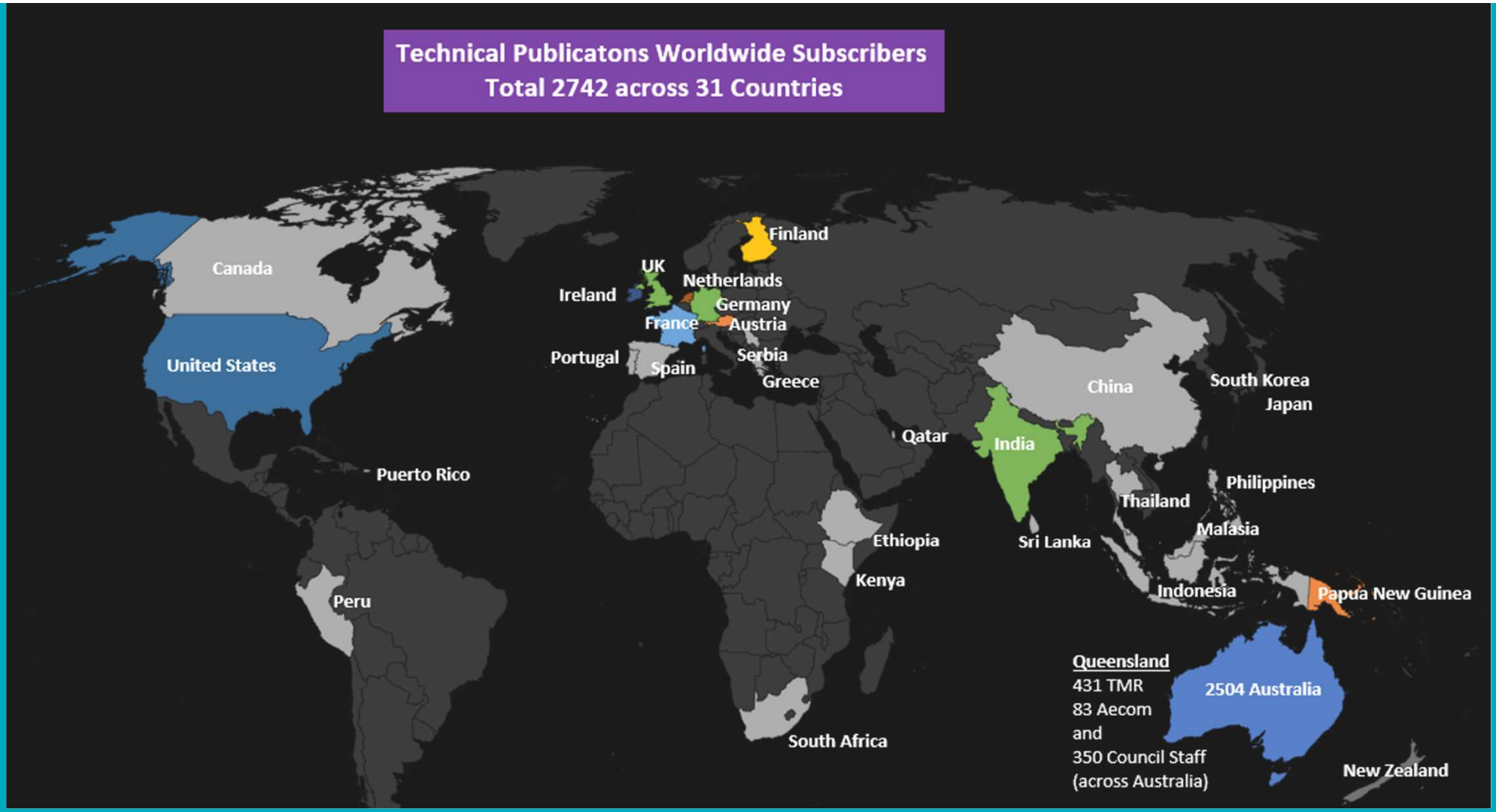
Stabiliser with level control system

- Precision and accuracy
- Optimum material usage
- Improved Quality Assurance
- Minimised operator intervention



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Decarbonision in TMR

We are undertaking work that facilitates Queensland's transition to Net Zero in the transport and transport infrastructure space.

We are doing this through a hierarchy of reductions, which is to:

- Reduce demand
- Switch modes
- Efficient vehicles
- Embodied energy

This hierarchy guides transport emissions reduction and works together with Queensland Government objectives.

Queensland Clean Economy Jobs Act 2024:

- 75% emissions reduction below 2005 levels by 2035
- TMR targets expected in transport sector plan

Closing thoughts

- I'm proud of TMR and AustStab's longstanding collaboration. Our key goals are aligned, and I want to reiterate my commitment to working together to deliver road infrastructure that meets the needs of users, communities and stakeholders.

- However, we find ourselves at a point where rising demand for infrastructure and increased demand for safety and sustainability are creating significant challenges across industry.

- By pooling our expertise, resources, and ideas, TMR and AustStab are well positioned to shape the future of road pavements in Queensland. I look forward to working with you as we navigate this future together.