

The logo for the National Transport Research Organisation (NTRO) is displayed in the top left corner. It consists of the letters 'NTRO' in a large, bold, white, sans-serif font. The background of the entire page is a photograph of a paved road curving through a green landscape under a blue sky with white clouds. A large, semi-transparent white circle is overlaid on the center of the page, containing the main title and subtitle.

# NTRO

NATIONAL TRANSPORT  
RESEARCH ORGANISATION

# Submission

## The future of Local Government review, Tasmania

Department of Premier and Cabinet

June 2023

1 INTRODUCTION

2 MEASUREMENT

3 MAINTENANCE

4 MATERIALS

5 METHODOLOGY

### 1.0 Introduction

The NTRO commend the Tasmanian Government for their insightful and timely review into the future of Local Government in Tasmania. Thank you for the opportunity to make a submission to the Department of Premier and Cabinet on this most important issue.

As the National Transport Research Organisation and formerly the Australian Road Research Board, and the Australasian Centre for Rail Innovation, providing trusted transport infrastructure advice to our stakeholders including the Tasmanian Government, Local Government and industry for over 60 years, the NTRO will limit our submission to matters within our remit and expertise which we trust will be of benefit to your deliberations.

The fiscal and resource burden on Local Government in the funding, measurement and management of transport infrastructure is only going to increase in an ever-changing climate and with increased community expectations. There are proven efficiencies and outcomes to be gained in greater cooperation between Local Governments in the funding, measurement and management of their transport infrastructure, a cohesive cross-border strategic approach in addressing current and future transport infrastructure challenges.

Climate scientists are telling us we need to expect more extreme weather events more often in Australia. For our Australian road systems which are predominantly granular pavements with very thin bituminous surfacings there are direct and significant impacts of more extreme climate events. Our roads are highly susceptible to water inundation and moisture damage, this means a step change is required in the way in which we design, build, maintain and use the road system, a step change that reflects increased risk. A step change that has a focus on resilience and importantly, a step change that is sympathetic to the geographic, environmental, strategic, and fiscal challenges in an Australian context.

From low volume rural unsealed roads to high volume sealed strategic corridors, substantial resilience and efficiency gains can be achieved by greater Local Government cooperation, reimagining how, and how often we measure our asset condition, moving towards predictive, proactive, and informed asset maintenance of the current network. The utilisation of appropriate materials and methodologies including recycled and innovative materials that improve water resistance enabling timely asset recovery as we build and maintain the existing and new road network.

We must also transfer the new knowledge developed in the delivery of new infrastructure to enable practitioners to adopt best practice so we can prevent a repeat of this infrastructure emergency conditions into the future.

Your National Transport Research Organisation is here to assist and are delighted to be afforded the opportunity to provide a submission for your kind consideration.

### 2.0 Measurement

The old adage that if don't measure it you can't manage it, is true for the road network we all use every day. Your NTRO collects the data for all State and Territory Transport Agencies on a regular basis and has step changed the data sets that are available to these transport agencies to better maintain their networks. The data that has been collected provides a deep understanding of:

- Road strength
- Road condition, cracking, rutting and profile
- Full photogrammetry that is then analysed for lane widths and AusRAP/ANRAM safety assessments

Your NTRO is a global leader in the use of the world leading Intelligent Pavement Assessment Vehicle (iPAVE) technology which collects these data sets at 80kmph on our road system in a continuous and seamless fashion.

There are a number of innovative, products, recycled materials and methodologies that will achieve greater network resilience however, we must first understand our asset condition and impacting environmental conditions to ascertain the correct solution for the problem at hand.

#### Recommendations:

- 2.1 Consider a structure of Local Government groupings for the most efficient and timely application of transport infrastructure initiatives.
- 2.2 Undertake a State-wide Asset Condition Assessment of the entire road network utilising Intelligent Pavement Assessment Vehicles (iPAVE), National Survey Vehicle (NSV) or similar technologies that can assess ride quality, deflection, roughness, texture, rutting, digital imagery for visual rating and ACD cracking at traffic speed in a single pass.
- 2.3 As road safety is also compromised by severe weather impacts, and technologies such as (iPAVE/NSV) can also collect safety data it would be prudent to incorporate a network safety assessment as an integral part of a network Road Asset Condition Assessment.
- 2.4 Enable proactive and strategic planning - Provide Local Government Road Condition Assessment incorporating asset condition measurement and driving resilience outcomes.
- 2.5 Provide support to collaborative organisations of councils (neighbouring Local Government Groups) to maximise measurement efficiencies whilst reducing establishment costs.
- 2.6 Knowledge Transfer - Engage your National Transport Research Organisation (NTRO) to expand the Local Government Best Practice Guides to incorporate Asset Measurement and Resilience.

A step change and focus on condition assessment frequency and the technologies utilised should form the backbone of our strive for greater asset resilience. A resilience that should start at a holistic network level and then translated for use by practitioners at a project level.

### 3.0 Maintenance

We need to expect more extreme weather events more often in Australia. For our roads, this means the maintenance schedules need to be modified to reflect the increased risk. It also means the standards that we use for the construction of our road systems need to change to have a resilient focus.

Right now, we are doing the same level of maintenance for the network that we have always undertaken, when we should be building and maintaining our roads for what we can expect in the future. Your NTRO are here to assist in delivering resilient solutions that also deliver safer roads for all users.

#### Recommendations:

- 3.1 Provide support to Local Government to transition from scheduled forms of maintenance to predictive, through an in-depth understanding of asset condition (see section 2.0 Measurement), rendering significant fiscal savings across the life of the asset and enhanced performance outcomes.
- 3.2 Encourage maintenance frequency, repair, and mitigation through the application of minimum longevity expectations for remediation solutions.
- 3.3 Encourage alternative treatment options that preserve and protect rather than patch and replace.
- 3.4 Encourage the application of Assurance Systems over Asset Management Practices to 'assure' required performance outcomes.
- 3.5 Knowledge Transfer - Engage your National Transport Research Organisation (NTRO) to expand the Local Government Best Practice Guides to incorporate Asset Maintenance and Resilience.
- 3.6 Provide funding assistance to Local Governments in Maintenance Best Practices to bridge the current knowledge gap.
- 3.7 Review and amend standards to incorporate innovative materials, recycled materials and methodologies that enhance the resilience of the asset.

It could be argued that too often maintenance is undertaken with a view to expediency rather than best practice or resilience. It would seem prudent that minimum performance outcomes be rigorously applied to even minor pavement repairs to avoid rapid deterioration towards a major repair and the associated increased fiscal burden, reduced ride quality and safety.

Flowing from the collection of a comprehensive data set on road condition are the maintenance strategies that can be developed to meet the challenges that the condition of the network exposes. A new regime of predictive maintenance to deal with the rapidly evolving set of environmental conditions that are being experienced on the network is now required.

- More resilient solutions
- Better use of local materials and marginal materials that are fit for purpose
- More frequent and more skilled intervention
- Different treatment options that preserve and protect rather than patch and replace

### 4.0 Materials

We enjoy some of the smartest road technology and materials science in the world right here in Australia. Our extensive research confirms that many recyclables – including tyre rubber – are not only eco-friendly but will create more durable and resilient road surfaces. By using appropriate recycled materials that have better resistance to cracking hence reduce the incidence of moisture ingress in roads, we can ensure that fewer potholes and road failures occur.

This will also improve the durability of our roads and reduce the materials we send to landfill which will result in much better environmental outcomes. ARRB/NTRO recently released a major report which provides an independent, expert review on how to sustainably and successfully increase the use of recycled materials in road and rail infrastructure whilst improving resilience.

#### Recommendations:

- 4.1 Incentivise the introduction of mobile mix/processing plant availability to the regions to overcome the tyranny of distance and expand serviceability area of recycled materials. (eg Crumb Rubber, crushed glass)
- 4.2 Improved awareness and education of how materials are used, supported by policy and procurement drivers, new and improved specifications and more modern recycling facilities with increased capacity.
- 4.3 Knowledge Transfer - Engage your National Transport Research Organisation (NTRO) to expand the Local Government Best Practice Guides to incorporate Resilience and Recycled Materials.
- 4.4 With an emphasis on Local Government Groupings, support Local Governments through training/advisory programs in the application of materials including recycled to improve adoption, resilience and promote best practice and performance outcomes.

It is imperative that our roads do not become the dumping ground for inappropriate waste material, helping to assuage environmental consciousness but degrading asset performance outcomes. Your NTRO has undertaken extensive research that has identified a number of recycled materials and treatments that when combined with or replacing conventional materials at optimal ratios, not only provide environmental benefit but also enhanced performance, sustainability and resilience outcomes.

The next generation of materials available for the road sector are already here. Delivering higher levels of resilience and better protection from the threats of the environmental extremes and vehicle use.

### **The Materials**

*In terms of performance, cost and sustainability impact, the following high-level findings can be inferred from the research undertaken:*

- *Crushed Concrete and Brick: the use of crushed concrete and brick as a supplementary material for virgin crushed rock is a well-established practice. Certain applications can enable use of up to 100% recycled crushed concrete, dependent on material properties and performance requirements. It is estimated that 8,000 tonnes of construction and demolition waste would be diverted from landfill per kilometre of road construction.*
- *Recycled Crushed Glass (RCG): recycled crushed glass can be employed in the construction of embankments, structural and non-structural fill, retaining wall backfill and drainage, with several specifications in place to support its use. The use of glass in road pavements and as a replacement for virgin sand in some rail applications are several of the emerging opportunities.*
- *Reclaimed Asphalt Pavement (RAP): reclaimed asphalt pavement, once milled from end-of-life pavements, can be recycled into new pavements or utilised as a granular material for unbound granular pavement. Up to 100% RAP can be used or supported through the incorporation of rejuvenators. The use of RAP is widely accepted across Australia, with several standards, guidelines and specifications outlining requirements for successful and beneficial use. This results in an efficient and cost-effective use of resources.*
- *Crumb Rubber: crumb rubber has been used in sprayed seal applications for decades, in small volumes. Additionally, there are several applications in asphalt pavements, with a variety of standards and specifications developed nationwide. Less prominent applications include the potential for use in rail ballast, or as tyre-derived aggregates. Performance-wise, crumb rubber has been found to positively affect pavements, including through reduced noise and risk of cracking. Crumb rubber is a relatively mature market, with over 20 recyclers and over 1,500 accredited retailers, and there is sufficient supply of end-of-life tyres to support more use of the material in road and rail.*
- *Ground Granulated Blast Furnace Slag (GGBFS): GGBFS is typically used as a supplementary cementitious material or as a Portland cement replacement, offering a durability and strength increase compared to using Portland cement. This application is relatively mature, emerging in the 1960s. There is only one operational producer of the material in Australia, with some supplies imported.*
- *Fly Ash: some applications include fly ash as a supplementary cementitious material, a Portland cement replacement, or a filler in asphalt, with strong comparable performance to non-recycled materials. Several standards and specifications are in place for fly ash use across Australia. Recovery rates for generated fly ash are variable, with WA at 72% compared to Qld at 18% and NSW at 10%.*
- *Bottom Ash: bottom ash, a by-product from coal combustion or Waste to Energy plants, can be employed as a bound or unbound aggregate. Bottom ash from Waste to Energy plants is confidently used by industry globally, predominantly in Europe. There is no current market in Australia but given Waste to Energy is an emerging waste management practice in Australia and the abundance of coal-based plants, the material has potential to be commercially available in the near future.*

- *Solid Organics: solid organics, sourced from plant or animal waste, may be used in several applications within the transport industry, predominantly landscaping; erosion control; and biorientation and biofiltration. Around 50% of solid organic waste presently enters landfill, with large stockpiles nationwide, indicating a real potential for the material to be recycled into higher value uses.*
- *Ballast: in-situ cleaning of rail ballast is a current practice across Australia and there is potential to increase the practice. Additionally, removal and ex-situ cleaning of ballast is an emerging practice with keen industry interest, however very few facilities possess the right processing capacity.*
- *Recycled Plastics: recycled plastics have the potential to be employed in a number of road and rail applications, including in asphalt, railway sleepers, pipes, bollards, supplementary aggregate material, noise walls and bike paths. Australia's recovery rate of recycled plastics is around 10%, indicating a significant available supply, yet the market maturity of recycled plastics applications in infrastructure is relatively low. Notably, however, there are many emerging initiatives to increase recycling programs nationally. Key challenges include environmental factors such as risk of microplastics and leachates, as well as validating performance to increase industry confidence.*

*Although the report is believed to be correct at the time of publication, the Australian Road Research Board, to the extent lawful, excludes all liability for loss (whether arising under contract, tort, statute or otherwise) arising from the contents of the report or from its use. Where such liability cannot be excluded, it is reduced to the full extent lawful. Without limiting the foregoing, people should apply their own skill and judgement when using the information contained in the report.*

To encourage the uptake of resilience building practices in rural and regional areas we must overcome the tyranny of distance, material affordability and availability. Local Government cross-border collaboration will deliver efficiencies and accelerate our journey towards a resilience and material initiatives.

It is important to note that the “pavement” can be viewed as an engineered interface to a larger natural structure. If failures from severe weather are impacting the larger formation the pavement can fail irrespective of high standard of design and construction. We must understand the condition of our assets and contributing factors in the first instance.



### 5.0 Methodology

To achieve greater asset resilience we believe that a step change is required to our approach to standards, specifications, profiles, materials and practices with a strong focus on drainage and mitigating moisture ingress.

We must also transfer the new knowledge developed in the delivery of new infrastructure to enable practitioners to adopt best practice so we can prevent a repeat of this infrastructure emergency conditions into the future.

At its core we must develop and apply fit for purpose, value for money solutions that reflect the condition of the network and meet the functional requirements needed by the community. Not only delivering greater resilience but improving road safety, journey quality, asset life fiscal efficiency and circular economy outcomes.

#### Recommendations:

- 5.1 Adopt a review of existing pavement profiles and drainage towards more resilient architecture and performance outcomes.
- 5.2 Address the disproportionate burdens towards best practice adoption faced by regional, rural and remote communities.
- 5.3 Undertake a review and adoption of standards and specification of materials and construction best practices with a focus on not only resilience but also road safety, journey quality, fiscal efficiency and importantly, practicality.
- 5.4 Adopt Assurance Systems to augment road design and construction activities to assure required performance outcomes.
- 5.5 Incentivise the proliferation of innovative assessment tools such as your NTRO developed NetRisk 2.0, ROAM, InfraCalc, National Road Crash Database etc. to assist State and Local Governments and practitioners to identify optimal solutions.
- 5.6 Knowledge Transfer - Engage your National Transport Research Organisation (NTRO) to expand the Local Government Best Practice Guides to incorporate Resilient approaches to Road asset construction and maintenance practices.
- 5.7 Address capability shortage through seamless recognition of National Skills Certification and the reflection of these core competencies in tender and contract documents.
- 5.8 Adopt a National TILES/CERTIFICATION approval process for the assessment and recognition of new and innovative materials, processes and products. Your NTRO are proud to be an active participant in the reimagining process supported by TfNSW.
- 5.9 Support Local Governments through training/advisory programs in the application of materials including recycled to improve adoption, resilience and promote best practice methodologies and performance outcomes.