

Paving the Way (Rubber) Factsheet

What is <i>"Paving the Way?</i> "	SSROC's Paving the Way program is an ongoing collaboration between local government engineers and the civil works industry, developing an evidence base for recycled content used in road aggregates, pavements and seals, once products are well specified, tested and trialled.
	The initiative is driven by the councils' 2018 mutual <i>Procure</i> <i>Recycled MOU</i> in which they agreed to preference recycled products in procurement. SSROC and the 12 participating councils have worked together with the NSW Government, universities, engineering networks and product stewardship associations to determine specifications for crushed glass in asphalt.
	Under the existing Sustainable Pavements contract, Paving the Way incorporated Recycled Crushed Glass (RCG) in roads as a substitute for natural sand. Using only glass that is unsuitable for recycling new glass containers is used, the initiative stimulated regional infrastructural investment and created a local market for the equivalent of about 38 million glass bottles per year.
	In this latest initiative, 12 participating councils have demonstration sites using rubber-modified bitumen in asphalt on a section of road in each of their LGAs. The sites have a range of different characteristics such as heavy and low traffic, heavy vehicle use, and bus use.
	 The aims of Paving the Way are to: drive significant and scalable environmental and economic benefits.
	• stimulate investment in and grow end markets for recycled content instead of virgin materials in civil construction projects.
What is being done with recycled rubber?	Crumb rubber has been used for over 50 years in asphalt applications, including by Transport for NSW. In road making, rubber is chemically modified to blend effectively with the bitumen during the manufacturing process.
	Paving the Way councils are demonstrating how rubber recovered from end-of-life car tyres can be used to modify the polymers in bitumen, as truck tyres already are.
	 The purposes of the project are to: develop specifications for specified blends of rubber in asphalt for a range of applications; demonstrate the value of recycled rubber in civil construction projects; and identify and resolve any supply chain barriers to the overall process.



The product in the demonstration projects ranges from 6% to 15% recycled rubber.

Crumbed rubbed asphalt used in the trials uses an established technology to mix and chemically bind recycled rubber with the bitumen.

Frequently Asked Questions

How is it being monitored?	 The demonstration sites are being monitored by Infrastructure Management Group (IMG) and Australian Flexible Pavement Association (AFPA) experts. Tyre Stewardship Australia (TSA) has provided funding for a demonstration project, monitoring and analysis. Councils have funded and delivered the on-ground works. RMIT University studied the environmental impacts of incorporating rubber from end-of-life tyres into bitumen for asphalt pavement construction. The life cycle assessment (LCA) found that incorporating rubber into asphalt mixes through a wet method can: Reduce environmental impacts during the production and construction phase compared to conventional asphalt. Lead to up to 30% reduction in environmental impacts as a result of fewer maintenance interventions during the service life of road asset. Result in indirect environmental benefits that lead to reduced greenhouse emission, such as diverting waste tyres from landfills and recovering steel from end-of-life tyres during crumb rubber production. By the end of 2024, monitoring testing across 12 demonstration sites will assess: <i>Roughness</i> – rideability and identification of defects, depressions, ruts and potholes, delamination and stripping using international standards <i>Macro-texture</i> – skid resistance and water trapping within the pavement and tyre interface.
How is it	Crumb rubber derived from recovered tyres must comply with
compliant?	the NSW resource recovery <u>order</u> and <u>exemption</u> . This means that the use of the recovered waste must be "genuine, fit-for-purpose, and cause no harm to the environment or human health" ¹ .
	The order and exemption apply to the materials for use in the project. SSROC ensures that all products used through Paving the Way meet the standards.



What environmental risks are associated with rubber applications?Tyre wear occurs when friction between vehicle tyres and the ro surface causes loss of very small particles of rubber dust.Vehicle tyre friction also wears down the road surface and over t this will result in the release of small amounts of rubber particle It is a known global issue that tyre wear particles can be toxic in environment and are a source of microplastics in oceans. There no regulations or processes to address this issue.	ad time s. the are
 Runoff from crumb rubber asphalt surfaces is <u>well within the standard</u>² for diffusion-controlled leaching and is <u>below the US E standard for drinking water</u>³. Analysis of data has shown that asphalt rubber is no more likely emit toxic chemicals than standard bitumen⁴. Demonstration site trials have shown that rubber modified aspha preferable for the workers applying the mix to the roads⁵. 	to alt is
 What are the performance benefits of asphalt that contains crumbed rubber? Higher resistance to deformation and reduced rutting Improved adhesion and bonding with bitumen wet-laying' technique, Resists heavy vehicular traffic and high impacts Improved skid resistance and better road grip Improved durability, increased elasticity and resilience at tempratures⁶ and reduced thermal sensitivity, and ability resist cracking⁷ Cost effective binder relative to other polymers. Lower maintenance cost⁸ Longer road life and less maintenance required due to improved pavement durability and performance⁹ Reduction in environmental impacts as a result of fewer maintenance interventions during the service life of road asset¹⁰ 	high to
What happens when reclaiming asphalt that contains rubber?Reclaimed Asphalt Pavement (RAP) is the material profiled from existing pavement and then recycled to produce new asphalt. Reclaimed-Asphalt modified with recovered rubber can be reuse when the RAP is blended into new asphalt.	n ed

¹ NSW EPA Factsheet Resource recovery orders and exemptions, available: <u>https://www.epa.nsw.gov.au/publications/wasteregulation/150107-order-exemptions-factsheet</u>



² Leaching of PAHs from rubber modified asphalt pavements. Science of the Total Environment, Fathollahi et al. 20 June 2022.

³. Leaching Assessment of Eco-Friendly Rubberized Chip Seal Pavement. Journal of the Transportation Research Board, Gheni et al 17 April 2018.

⁴ Chlebnikovas A. et al Research on air pollutants and odour emissions from paving hot-mix asphalt with end-of-life tyre rubber. Environment International, Vol 181, November 2023

⁵ Monitoring of demonstration rubber modified asphalt in participating 12 councils in Sydney, led by Infrastructure Management Group for Southern Sydney Regional Organisation of Councils (SSROC)

⁶ Presti D.L. Recycled Tyre Rubber Modified Bitumens for road asphalt mixtures: A literature review. Construction and Building Materials. Vol. 49. 2013, pp. 863-881

⁷ California Department of Transportation 2003, Asphalt rubber usage guide, Caltrans, Sacramento, California

⁸ Kaloush J., Way G. Life Cycle analysis. Conventional versus asphalt rubber pavements. S.I Rubber Pavements Association 2002, 2003

⁹ Presti D.L. Recycled Tyre Rubber Modified Bitumens for road asphalt mixtures: A literature review. Construction and Building Materials. Vol. 49. 2013 pp. 863-881

¹⁰ Giustozzi F., Tushar Q. SSROC - Life Cycle Assessment and Potential Environmental Benefits of Crumb Rubber Asphalt using Field Data. Final Report. RMIT University. February 2024.