

RECLAIMED ASPHALT PAVEMENT



WHAT IS RECLAIMED ASPHALT PAVEMENT (RAP)?

RAP is obtained from excavating road pavements or from milling existing asphalt surfaces once they reach end-of-life and require maintenance or rehabilitation. RAP usually has a high moisture content and comprises high-quality and well-graded aggregates coated in bitumen. Asphalt pavements are considered fully recyclable as RAP.

WHAT ARE THE BENEFITS OF USING RAP?

The benefits of using RAP in road infrastructure are as follows:

- **Environmental benefits**
 - Reduced virgin aggregate use, bitumen use, greenhouse gas emissions and materials to landfill.
- **Performance benefits when used in asphalt**
 - Comparable performance, with the addition of 15-20% RAP into asphalt having little impact on properties such as ravelling, fatigue cracking, rutting and weathering.
- **Cost reduction**
 - The use of RAP can lower costs, reducing the need for virgin aggregates and bitumen and reducing landfill requirements.

WHERE IS IT USED?

RAP is mainly used in asphalt but can also be used in unbound granular layers (including subbase and base), asphalt pavement patching or in shoulder surfacing.

HOW MUCH CAN BE USED?

Various specifications outline the requirements for use of RAP across Australia. SA allows for the highest rates of incorporation of RAP in asphalt (up to 50%), followed closely by QLD, VIC, TAS and NSW (up to 40%). NT and WA allow only up to 15% and 10% respectively, depending on the application and layer.

Some states limit the use in certain types of pavements, such as Stone Mastic Asphalt (SMA) or Open Grade Asphalt (OGA), or in pavements with Polymer Modified Binder (PMB).

The material is typically used in higher volumes in lower pavement layers, such as base layer.

In unbound granular layers, VIC and TAS allow up to 50% by mass, QLD up to 45% by mass, NSW allows up to 40% by mass, SA up to 20% by mass, and WA up to 15% by mass. NT does not provide any specifications of this use.

WHAT OPPORTUNITIES ARE THERE FOR IMPROVING ADOPTION?

Using RAP in asphalt is an efficient and cost-effective use of resources, with the potential to divert nearly 100% of waste asphalt from landfill. Research suggests that up to 100% RAP could be used in the making of fresh asphalt, so jurisdictions could look to increase their allowable RAP limits while maintaining performance outcomes. It is critical, however, to consider the local availability of RAP as encouraging the use of more than is readily available could lead to undesirable outcomes, such as pavement inconsistencies across the network or the long-distance haulage of materials.

Additionally, further work could explore the potential for reusing RAP that is already modified with other recycled materials. For example, research work in Western Australia has indicated that crumb rubber modified asphalt can be reused as RAP, and this work could be built upon.



RECLAIMED ASPHALT PAVEMENT (RAP) WITH CRUMB RUBBER: WA



The Western Australian Road Research and Innovation Program (WARRIP) undertook an investigative project in 2019 that looked at the potential recyclability of asphalt containing crumb rubber. WARRIP is a joint initiative between Main Roads Western Australia and the Australian Road Research Board (ARRB). This research addressed a key circular economy concern around using recycled materials in pavement: what happens when pavements containing recycled materials reach their end of life? A practicality study was undertaken, to ensure the typical steps of collecting, processing and reusing the RAP was not hindered by the presence of recycled crumb rubber. The project aimed to enable an increase of recycled materials in asphalt and an increased opportunities for RAP use.

Two trials were undertaken during the project, in partnership with Fulton Hogan and Downer, whereby crumb rubber asphalt was laid and then subsequently reclaimed using standard practices. The first trial, in 2019, engaged 10% crumb rubber modified RAP (CRM-RAP). No issues were encountered with reclaiming the CRM-RAP, compared to conventional RAP. The second, in 2020, used 25% rubber modified CRM-RAP. Some minor issues were encountered during reclamation, such as stickiness, indicating that some issues may arise with high rubber content.

Overall, the findings were that the rubber did not affect the typical processing steps for reclaiming and using RAP, and that conventional equipment could be used without modification, though reclamation may be slightly less efficient in highly modified pavements.

- [The Use of Reclaimed Asphalt Pavement from Crumb Rubber Modified Asphalt](#)
- [Investigation of the use of Reclaimed Asphalt Pavement from Crumb Rubber Modified Asphalt](#)
- [Stage to: Investigation of the use of Reclaimed Asphalt Pavement from Crumb Rubber Modified Asphalt](#)



LOCATIONS

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