



Investigating the suitability of WA Mine Waste for Infrastructure Related Projects

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To align with federal and state policies promoting a sustainable, low waste, circular economy, Main Roads investigated the use of mine waste and industry by-products as alternative materials for use in road infrastructure construction and maintenance that reduces the reliance on natural rock. Considering relevant research, specifications, and industry standards have informed the development of a framework to rigorously scrutinise the suitability of mine waste materials for use in road infrastructure applications and provide administrative agencies with a deeper understanding of the associated risks and benefits.

Background

With a change in attitudes and a global shift to sustainable development, economies now view mine waste and industry by-products as an underutilised resource of the mining industry. In WA, the commitment to using recycled materials and strengthening the circular economy is being promoted through various initiatives. As the state's road agency, Main Roads have supported these initiatives through the use of recycled materials in road infrastructure with:

- a commitment to and achievement of using 50% crumb rubber in open graded asphalt in metropolitan road projects in 2020/21 and 2021/22,
- using 100% crumb rubber in open graded asphalt in metropolitan road projects in 2022/23,
- commitment to use over 1,200 tonnes of crumb rubber by 2021 (achieved early), since > 2,000 tonnes of crumb rubber used per annum,
- an increase to the percentage of reclaimed asphalt pavement to regularly be between 15 – 25% in an asphalt mix design, and
- an increase in the use of crushed recycled concrete on the network, having already used 117,000 tonnes since 2019.

Circular Economy

The circular economy is a closed-loop system that aims to minimise resource inputs, waste, pollution and carbon emissions; while improving the longevity of products, materials, equipment and infrastructure. Materials deemed as

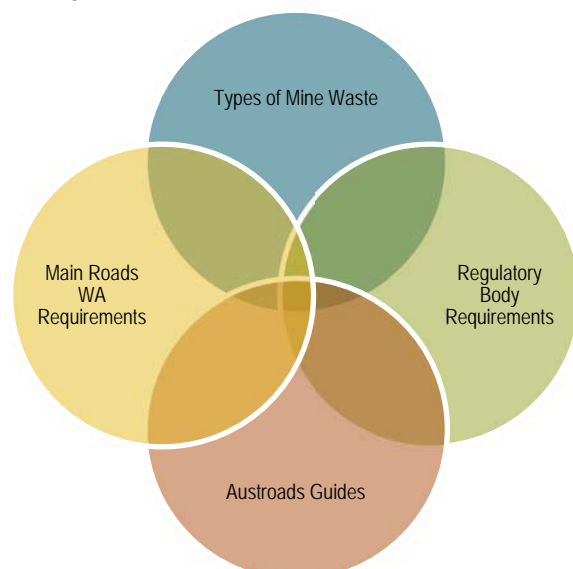
waste should be considered inputs for other processes through waste valorisation.

Designing products, materials, equipment and infrastructure with reusability at end of life will support the circular economy.

Sustainable Policies

Agencies across all government levels are updating their policies and guidance for the use and procurement of recycled materials to respond to significant shifts in domestic and international waste policies to support the circular economy.

What needs to be considered when developing a framework to assess mine waste materials for use in road infrastructure projects?



How can we support sustainability principles and promote the circular economy?



Identify potential recyclable material



Check material meets applicable state regulations

- Department of Transport (DOT)
- Department of Jobs, Tourism, Science and Innovation (JTSI)
- Department of Mines, Industry, Regulations and Safety (DMIRS)
- Department of Water and Environmental Regulation (DWER)



Determine potential road applications to focus feasibility determination

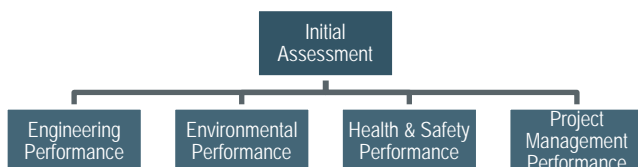


Determine feasibility of material via alignment with Main Roads WA policies, specifications & guidelines

- Sustainability Policy
- Specification series for chosen application
- Engineering Road Notes for chosen application



Assess the material for use in road infrastructure (Austroads Guides)



Submit for approval

Findings

Waste materials encompass a diverse range of products. When considering processed wastes, specifically tailings and industry by-products, these

materials will vary in chemical and engineering characteristics as a result of the ore body and what processing was involved to extract them.

These materials will need to be assessed on a case-by-case basis and extra chemical testing may be required. Furthermore, collaboration with the mining regulatory bodies will likely be required in the initial phases or until these materials have been demonstrated to pose no threat to the intended project, environment, person or other.

Super Pit Kalgoorlie Western Australia



Source: Shutterstock.



Mine waste, particularly unprocessed materials, has been successfully use in road infrastructure applications.



Austroads Guide to Pavement Technology Part 4E: Recycled Materials (2021)
Landfill Waste Classification and Waste Definitions 1996 (as amended 2019) (DWER 2019)



Provide the framework to industry to assess materials identified for potential road applications.

How do we get mine waste and industry by-products recycled into roads?

Follow the process outlined in this project summary and detailed in the project report to identify and assess each waste material, this will provide Main Roads WA with the supporting documentation they require to assess and approve proposed applications of your materials.