Roads to Reuse pilot project

A case study

November 2020

Main Roads WA (MRWA), in partnership with the Waste Authority and the Department of Water and Environmental Regulation (the department), committed to a Roads to Reuse (RtR) pilot project – using up to 25,000 tonnes of recycled construction and demolition (C&D) products in MRWA projects.

Over 30,000 tonnes of recycled C&D products were used in three MRWA contracts as part of the Kwinana Freeway Northbound Widening Project:

- Kwinana Freeway Northbound Widening Russell Road to Roe Highway
- Kwinana Freeway/Roe Highway interchange
- Karel Avenue/Roe Highway interchange

Under the program, material supplied had to meet the RtR product specification: recycled road base and recycled drainage rock (RtR product specification) – ensuring the protection of human health and the environment. C&D recyclers were required to undertake rigorous sampling and testing to demonstrate that the material met the RtR product specification.

Independent audits of C&D recyclers' processes and products provided additional assurance to purchasers and users of the product.

Engineering considerations

MRWA was identified as a key agency to utilise recycled C&D products based on the volume of material used by the organisation each year, its engineering expertise and its leadership role in road construction and maintenance. MRWA has found recycled C&D products to be a high strength and durable material.

Risks

A risk analysis was completed prior to the pilot project being undertaken. It identified risks, which were mitigated by MRWA and the department. All risks were considered manageable by producing the product under an appropriate management regime (that is the RtR framework, comprising the RtR product specification and a series of independent audits), as well as using the product in suitable applications.

Table 2: MRWA risk analysis

Risk	Cause	Mitigation measure
Cracking	Reactivation of cement	• Use as sub-base under full depth asphalt • Do not use as basecourse under heavy traffic • Apply geofabric seal if used as basecourse
Popping	Expansive contaminants (aluminium, gypsum and so on)	• None identified (steel is removed) • Remove and replace if occurs
Hazardous contaminants	Asbestos and other hazardous materials not removed during demolition	• Roads to Reuse product specification • Robust management systems • Supplier product testing • The department's independent audit testing
pH	Reactivation of cement	• Do not use near surface water/groundwater

Benefits

Expected benefits of using recycled C&D products instead of virgin quarry materials includes:

- lower transport costs (due to suppliers of recycled product being located closer to construction sites, compared to suppliers of virgin materials)
- lower emissions from reduced transport
- reduced disturbance of the natural environment associated with quarrying activities
- increased use of recycled products, resulting in less material going to landfill.

Other benefits observed as a result of pilot project activities include:

- Recycled C&D product strength: Self-cementing properties can provide benefits for certain applications in road construction. Used as a sub-base, it provides a stiff underlying layer that will help extend the life of various road pavements.
- Additional cost reductions over time: Base course under local roads (ideally with geotextile seals) presents initial costs, but these costs are offset by the longer life of recycled material.
- Time and labour savings: Less mixing is required because the material is more consistent than traditional limestone.
- Water savings: Recycled material may use less compaction moisture than virgin material.
- Durability: Recycled material functions similarly to conventional granular materials. It is durable and can withstand moderate traffic from construction vehicles without further material breakdown. Conventional materials are more likely to breakdown under the same traffic volume.

Engagement

Engagement with the Waste and Recycling Industry Association of Western Australia (WRIWA) was important to the development and acceptance of the program. WRIWA engaged with industry to ensure that suppliers were both aware of the requirements and ready to supply once the pilot project began. Through WRIWA, training was provided to industry on the use of and adaption to the specification.

Outcomes

MRWA observed the following outcomes from the pilot project:

- The scheme worked well.
- The amount of product being used exceeded the original commitment (over 30,000 tonnes was used).
- The product was good to work with and delivered more benefits than expected, including:
  - reduced risk of delamination
  - used less compaction moisture
  - appeared to retain moisture (impacts dry-back) – should be trimmed within a day of placement
  - used 6–13 per cent less water during the construction process.
- The audit process worked – ensuring the supply of good quality product and delivering confidence in the process.
- Recyclers consistently met the requirements of the program.

Ongoing commitments

MRWA has ongoing commitments in the Waste avoidance and resource recovery strategy 2030 and will use increasing amounts of recycled C&D products.

Where recycled C&D products are used, MRWA insists they must meet the RtR product specification. With a heavy forward program of capital works in road infrastructure, RtR represents a sound opportunity going forward for the use of recycled C&D products.