

# Recycled Materials for Road Pavements

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## INTRODUCTION

The State Strategic Plan contains a vision of taking action to achieve environmental sustainability. It includes the following targets: target 67 to reduce waste to landfill by 35% by 2020 and 25% by 2014, target 59 reduce greenhouse emissions and target 75 sustainable water use. These are reflected in the Department for Planning, Transport and Infrastructure's (DPTI) [Green Plan](#) which provides a framework to support the commitment to reduce the impact of the department's operations on the environment and reduce the department's ecological footprint.

The department contributes to the reduction of waste and greenhouse emissions through the recovery, recycling and re-use of materials generated by transport construction / maintenance activities and the purchase of recycled materials for incorporation into construction and maintenance projects. This is achieved by implementing best practice methodologies for waste minimisation and considering the 'waste management hierarchy' for waste materials. The waste management hierarchy in order of preference is:

1. avoidance
2. re-use
3. recycling
4. recovery of energy
5. repository storage
6. treatment
7. containment; and
8. disposal

## ROAD MAKING MATERIAL SUPPLIERS

Currently, there are approximately 33 DPTI prequalified quarries that supply a range of virgin natural products from crushed rock to sand. In general, the hard rock quarry sources within the Metropolitan Region typically comprise a range of sedimentary materials with low grade metamorphic influences.



Figure 1: Natural Quarried Materials

17 of the quarries are prequalified to supply high quality aggregates for use in sealing and/or asphalt products. One quarry is registered to supply recycled construction and demolition (C&D) products to DPTI on a project and material source basis. Additionally, there are 2 specialist recycled material suppliers located in the Adelaide Metropolitan area that are prequalified to supply recycled construction and demolition waste to DPTI.

## RECYCLED MATERIALS

DPTI Master Specification [Part 215, "Supply of Pavement Materials"](#) allows for the provision of recycled pavement materials in a number of ways. These products range from crushed recycled pavement material, such as blends of quarried material and/ or crushed concrete, with or without supplementary source materials such as brick, tile and asphalt. These products may be used in structural pavement layers. In addition the specification allows for up to 20% recycled asphalt planings (RAP) in pavement and structural asphalt layers; and the use of crumbed rubber in bituminous surfacings as an alternative to polymer binders, utilised to improve the life of pavements wearing course.

## Crumbed Rubber

Crumbed rubber is produced from the processing of used vehicle tyres. The steel belt component is removed and the scrap rubber is either shredded or ripped to produce a fine grain, see Figure 2.



Figure 2: Crumbed Rubber

When combined with bitumen, the rubber particles disperse improving elastic properties. DPTI allows for



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the addition of crumbed rubber up to 18% by mass to C170 bitumen to improve its sprayed seal performance. The crumb rubber seal reduces surfacing thermal susceptibility and increases its cracking and aging resistance, extending the life of the pavement and reducing overall maintenance costs and resource use.

### Construction and Demolition (C&D) Waste

Typically, C&D material when used is confined to working platforms within the road reserve and as general fill material. There are allowances for recycled pavement materials in the department's Master Specification Part 215 and their use is determined on a job by job basis. Projects that have used recycled C&D waste in structural pavement layers include the Port River Expressway where approximately 90% of 620,000 tonnes of fill used in Stage 1 was recycled material. The City West Bypass utilized cement stabilised crushed concrete curbing in basecourse layers.



Figure 3: C&D Waste Port River Expressway

### Rail Ballast

The Rail Revitalisation Project has replaced rail ballast on the Metropolitan passenger rail network. Waste ballast is classified for contaminant levels and is used on other projects; 70,000 cubic metres on the Northern Expressway and it is also planned to be used in the Southern Expressway Duplication project. Recycling of rail ballast reduces the use of virgin natural materials. The ballast can be used in structural pavement layers, embankments and general earthworks.



Figure 4: Reclaimed Rail Ballast

### Recycled Asphalt Planings (RAP)

The department's specification allows for up to 20% of Recycled Asphalt Planings in asphalt. In 2011/2012, the department has stipulated that 75% of all asphalt supplied to the Metropolitan Pavement Rehabilitation program must contain 15% RAP with the intention of increasing this percentage in future years. On the Northern Expressway project 12,000 tonnes of RAP plus 5,000 tonnes of waste asphalt were re-used in the asphalt laid on site. A 'best practice' guide is being developed by Austroads.



Figure 5: RAP Stockpile

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