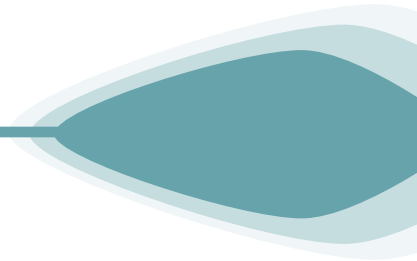


Waste Authority Position Statement
Construction and Demolition (C&D) Waste
June 2016





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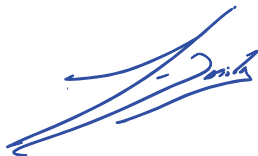
The use of recycled construction and demolition (C&D) products in a range of applications is critical to the achievement of the State's targets for landfill diversion, as set out in the State Government's Waste Strategy. We waste about two million tonnes of C&D material in landfills each year instead of recycling it for beneficial purposes. Western Australia can no longer afford to ignore the opportunities and benefits of using recycled C&D products.

There is widespread international and national precedent for using recycled C&D products in roadbuilding and other applications.

The use of recycled products for road base in WA should be an entirely unremarkable activity and the norm rather than the exception. Source separation and mixed C&D sorting facilities provide feedstock for crushing facilities and offer excellent opportunities for high-quality recycled products to be manufactured. The Position Statement on Construction and Demolition Waste, June 2016, aims at providing the policy basis for the Waste Authority's support of the use of recycled C&D products. It also lays out the need for using recycled C&D products in a range of civil construction applications. It underpins further research into the performance of recycled C&D road base, building on already available data and industry reports. It also provides the basis of the Authority's funding programs to increase the use of recycled C&D products in civil construction projects.

I am confident that, in the future, recycled C&D products will be a preferred option in terms of price, performance and proximity to building projects.

Achieving the outcomes and the targets for C&D waste in the Waste Strategy will rely on acceptance and market opportunities for the use of recycled C&D products. This is predicated on well-informed and deliberate participation by the waste sector, State and local government participation and procurement practices, and community demand for effective environmental and economic alternatives to creating waste.



Marcus Geisler
Chairman
June 2016



C&D recovery is critical to achieving Western Australia's Waste Strategy targets by 2020. The Western Australian Government is committed to reducing waste and increasing resource recovery.

Waste Generation in Western Australia

Waste generation in Western Australia continues to grow, largely as a result of increasing population and economic growth. In 2013–14 an estimated 6.7 million tonnes of solid waste (2.66 tonnes per capita) was generated in Western Australia (ASK 2015).

About 3.2 million tonnes of construction and demolition waste was generated in 2013–14, representing almost half of the total solid waste stream generated in Western Australia, and half of the waste stream sent to landfill.

C&D recovery is critical to achieving Western Australia's Waste Strategy targets by 2020.

Legislation and Policy

The Western Australian Government is committed to reducing waste and increasing resource recovery. The *Waste Avoidance and Resource Recovery Act 2007* (WARR Act) and the [Waste Strategy: Creating the right environment](#) are the key legislative and policy documents that support this commitment.

The WARR Act establishes the Waste Authority and its functions, including a requirement for the Waste Authority to prepare a waste strategy for Western Australia. The Waste Strategy aims to move Western Australia to a low waste society.

The Strategy contains landfill diversion targets for the three main waste streams:

- Municipal solid waste: 65% diversion of metropolitan waste and 50% diversion of waste from major regional centres from landfill by 2020.
- Commercial and industrial waste: 70% diversion from landfill by 2020.
- Construction and demolition waste: 75% diversion from landfill by 2020.

The *Environmental Protection Act 1986* (the EP Act) prevents, controls and abates pollution and environmental harm. Part V Division 3 of the EP Act contains provisions for the regulation of emissions and discharges through works approvals and licences. Premises that produce materials from construction and demolition waste may require approvals and further information should be sought from the Department of Environment Regulation.

The Waste Hierarchy and Source Separation

The waste hierarchy is set out in section 5 of the WARR Act and ranks waste management options in order of their desirability. The Waste Authority produced a position statement, [Communication on the Waste Hierarchy](#) (2013), explaining the waste hierarchy and how it will be applied by the Waste Authority in its decision making to support the Waste Strategy.

The Waste Authority has also produced a position statement on [Source Separation of Waste](#) (2014).

The statement explains the benefits of separating waste streams wherever technically, environmentally and economically practicable. Separating waste at the source is consistent with waste hierarchy principles.

C&D Waste and Materials

The Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009) (DEC 2009) defines construction and demolition waste as:

Materials in the waste stream which arise from construction, refurbishment or demolition activities.

C&D waste materials include concrete, brick, rubble, asphalt, metals (ferrous and non-ferrous), timber, wallboard, glass, plastics, asbestos, soil, and other building materials and products.



C&D Waste-Derived Products

The majority of products derived from the C&D waste stream are aggregates and include:

- road base
- drainage aggregate
- clean fill
- sand
- reclaimed asphalt pavement.

Emerging applications for materials recovered from the C&D waste stream include:

- energy recovery from wood waste or plastics
- glass as an additive in brickmaking
- glass as a partial substitute for aggregate and sand in asphalt applications.

BENEFITS OF C&D RECYCLING

Environmental

The use of recycled C&D waste offers environmental benefits by reducing greenhouse gas emissions and through avoided landfill and use of virgin raw materials (and consequential environmental impacts from extraction). *A life cycle assessment on waste management options in Perth* (Grant 2010) indicates the greatest environmental benefits are achieved from:

- recycling metals (such as steel, aluminium and copper) and metals-bearing aggregate (such as reinforced concrete)
- recovery of organic material (such as timber), due to reduced greenhouse gas emissions and low likelihood of gas capture at inert landfills
- brick recovery back to brick makers
- recovery of polymer films.

The environmental benefit generated by recycling low-value materials (such as aggregates and sands) is significantly impacted by the distance between waste generation sites and waste management facilities (landfills and recyclers). The distance between extraction sites and the final end use also affects the overall environmental impact of virgin materials. It is noted that the cost of virgin materials commonly does not include the associated environmental impacts from their extraction and transport.

Cost

Costs for the use of aggregates for road construction, drainage and fill purposes are generally comprised of the price of materials at the gate (in this case either the quarry or the recycling facility) and the cost to transport the material to the site on which works are taking place. For low cost materials like limestone, it is common for the transport cost to comprise up to half or more of the total delivered cost.

Materials

The inert landfill levy rate is increasing from \$12 per cubic metre (2014 rate) to \$105 per cubic metre from 1 July 2018. This increase is expected to make recycled C&D products more cost competitive as landfilling becomes comparatively more expensive than recycling.

Transport

C&D recyclers are located across Western Australia's Perth and Peel regions. The alternative source of material (virgin raw materials) is from quarries, which are generally located around or beyond the urban fringe. Recycled materials are likely to be available closer to where they are needed in the future, resulting in sustained lower transport costs and lower environmental impacts.

Product Quality

Research conducted in Western Australia indicates that, for some applications, the performance of C&D derived aggregates may be superior to virgin raw materials (Curtin Pavement Research Group 2013). The Waste Authority supports further research to identify suitable applications for C&D derived products.

Waste Strategy Targets

Increased use of recycled C&D materials has the potential to contribute very significantly to Waste Strategy landfill diversion targets as it makes up half the waste sent to landfill at present.

● Great Eastern Highway Upgrade ●

The City East Alliance* on behalf of Main Roads WA upgraded a 4.2 kilometre section of the Great Eastern Highway in 2011–12. The Alliance developed product specifications for the project, which were met by local suppliers of recycled C&D waste. The project used recycled sand for fill material and crushed recycled concrete for sub base in the upgraded road sections. Recycled asphalt was also used in some sections of the project.

Much of the waste material generated in the construction process was recycled and used in the upgraded sections, which avoided a significant amount of waste being sent to landfill. Demolition waste was sent to a recycling facility and sold back to the Alliance.

The construction crews preferred the recycled material over the naturally occurring material as it was easier to work with. Typically, the recycled material required less water for compaction and dried back much quicker, providing a trafficable surface. This reduced the need to construct on-site haul roads and increased the rate of construction.

Cost savings were realised through lower material and haulage costs, and efficiencies in the construction process. The project also avoided significant costs in sending waste to landfill.

(Russel Clayton, GHD Geotechnics, [pers.com.](#), 9 September 2015)

CASE STUDIES

● The City of Rockingham ●

The City of Rockingham has used C&D waste derived materials from its own operations for about a decade. The City stores its C&D waste prior to it being processed at a separate industry run facility.

The processed product is returned to the City for use in local road maintenance.

The City has saved hundreds of thousands of dollars in reduced landfill costs and reduced material costs for road construction. The City is also experiencing superior performance from using recycled materials.

(Stuart McCarthy, Manager Engineering Operations, City of Rockingham, [pers.com.](#), 31 August 2015)

● City of Canning, Welshpool Road Project ●

In 2008, the City of Canning trialled different types of recycled C&D waste as road base on a section of Welshpool Road. Around 3000 tonnes of C&D waste materials were used in the project. The costs of using C&D waste material was about 33 per cent lower than the costs of using of using conventional materials, due to a lower price per tonne and lower overall transport costs for the project.

Ongoing testing has demonstrated improved physical performance of the recycled material, which is expected to result in lower road maintenance costs. Further tests will be conducted on this section of Welshpool Road as part of the City's performance evaluation of materials used on the project.

The City will continue to use recycled products as road base in most road applications for cost savings, improved performance and due to its commitment to sustainability.

(Colin Leek, Project Engineer, City of Canning, [pers.com.](#), 3 September 2015)


Recycling Rates

In 2013–14, 3.2 million tonnes of C&D waste was generated and 1.2 million tonnes, or about 38 per cent, was recycled.

About 85 per cent of recovered C&D waste consisted of concrete, bricks, asphalt, and sand, clean fill and rubble. About 13 per cent of recovered C&D waste materials were metals and the remainder were small fractions of organics, paper, cardboard and rubber (ASK 2015).

Recycling Activity

Most C&D recycling in the Perth metropolitan and Peel regions is carried out at several larger recycling facilities, with a greater number of smaller operations carrying out the remaining C&D recycling around Perth and Peel.



The larger operations undertake various levels of sorting, crushing and screening. The smaller operations carry out activities including transport, salvage and smaller scale sorting of C&D waste. Smaller operations also recover concrete, bricks, rubble, steel, glass, timber and reusable items such as doors, windows, bricks and tiles.

Standards and Guidelines

Current standards and guidelines for recycled C&D material relate to environmental and public health requirements or specifications for construction applications.

[*The Guidelines for managing asbestos at construction and demolition waste recycling facilities*](#) (DEC 2012) provide a standard for recycled C&D material in relation to asbestos contamination, to manage risks to public health and the environment. The Guidelines include information on sampling and analysis methods that should be used when assessing asbestos contamination levels (including AS4964-2004). The document was reviewed and supported by the Department of Health and WorkSafe Western Australia.

The [*Recycled Construction Products Program Appendix 1 – Product Specification*](#) (Waste Authority 2016) document sets product specifications for the use of waste derived materials in recycled road base and recycled drainage rock. This encourages the use of waste-derived materials to divert waste from landfill. It also reduces the demand for raw materials where their use does not cause an unacceptable risk to the environment or public health.

The Main Roads Specification 501 (Pavements) contains a clause* relating to the use of crushed recycled concrete, which has been withdrawn while it is under review.

The Institute of Public Works Engineering Australasia Western Australia Incorporated (IPWEA WA) in conjunction with the Western Australia Local Government Association (WALGA), has developed the *IPWEA/WALGA Specification for the supply of recycled road base*. The specification is available at www.ipwea.asn.au.

* Clause 501.92 [Crushed Recycled Concrete Sub-Base Supplied by the Contractor]

C&D RECYCLING IN OTHER JURISDICTIONS

Recycling Rates

Recycled C&D material is used extensively in other states. The following information is from the National Waste Report (2013)*.

- Victoria—C&D generation was 4.5 million tonnes with a resource recovery rate of 69 per cent (three percentage points above the Australian average).
- New South Wales—C&D waste generation was about 6.9 million tonnes with a resource recovery rate of 75 per cent (nine percentage points above the Australian average).
- South Australia—C&D waste generation was around 1.7 million tonnes with a resource recovery rate of 75 per cent (nine percentage points above the Australian average).

* <http://www.environment.gov.au/resource/national-waste-reporting-downloads>

Guidance

All other mainland Australian states have specifications for recycled content in one or more road building applications (CCAA 2013, p. 4).

VicRoads has specifications for *Crushed Concrete for Pavement Sub-base and Light Duty Base*** . The VicRoads specifications for *Source Rock for the Production of Crushed Rock and Aggregates* (Section 802) and *Crushed Rock for Pavement Base and Subbase* (Section 812) specify the approach to the use of recycled content in these applications (CCAA 2013).

VicRoads has also published a technical note on *Recycled Materials Used in Road Construction* as further guidance (CCAA 2013, p. 4).

New South Wales, Roads and Maritime Services has provided specifications for *Granular Base and Sub-base Materials for Surfaced Road Pavement* (RMS 3051), which sets out the requirements for use of recycled content in these applications (CCAA 2013).

Some specifications have been updated to support the suitable use of recycled materials in various applications. For example, in 2010 the then NSW Department of Environment, Climate Change & Water released a *Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage*, which replaced a 2003 *Specification for Supply of Recycled Materials for Roads, Drainage and Fill* (IPWEA NSW 2010).

These specifications and guidance documents are provided to ensure fit for purpose recycled content can be used effectively and appropriately in road building applications in these states.

** (Section 820) (CCAA 2013)

WASTE AUTHORITY POSITION ON C&D RECYCLING

The Waste Authority has released position statements on the waste hierarchy and the benefits of source separation as a way of supporting the application of the waste hierarchy. This position statement complements existing Waste Authority position statements to support Waste Strategy targets.

Construction and demolition waste makes up about 48 per cent of waste sent to landfill. C&D waste recovery is critical to achieving Western Australia's Waste Strategy targets by 2020.

The Waste Authority strongly supports the use of recycled C&D materials that meet environmental standards and regulatory requirements wherever economically practicable.

The benefits of using recycled materials include:

- environmental—including reduced greenhouse gas emissions, avoided landfill, and avoided impacts to native vegetation and landforms from extraction;
- cost—C&D materials are becoming increasingly cost competitive with virgin raw materials because of increasing supply and lower transport costs;
- performance—products manufactured from recycled C&D wastes can perform better than virgin product alternatives in certain circumstances; the Authority supports ongoing work to identify these opportunities; and
- Waste Strategy targets—C&D waste makes up the largest proportion of the waste stream. C&D recycling will make a substantial contribution to achieving the Waste Strategy's landfill diversion targets.

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