|  |  |
| --- | --- |
| **Recycled products and materials**  **Overview of recycled aggregate for drainage and bedding for pipes** |  |
| Final version prepared by Encycle Consulting  In collaboration with ArcBlue, Sustainability Victoria and external parties  February 2022 |  |

## **Document overview**

The purpose of this information sheet is to provide an overview including attributes, benefits and key considerations of recycled aggregate (construction and demolition materials) to councils considering this product for use in drainage and bedding projects.

**Document overview**

This document includes:

* **Product overview:** information about the product.
* **Product details:** applications, specifications, standards, benefits and limitations, maintenance and durability.
* **Product photos**
* **Questions to ask suppliers for new and existing products on the market**: to assist in the decision-making process when procuring products and evaluating new products.

*This information sheet has been created based on the maturity of the market at the end of 2021. Some suppliers have been referenced in this document, however, there a number of suppliers in Victoria and Australia providing recycled aggregate.*

*If your Council is looking to use recycled aggregate, ensure that adequate research is undertaken and an informed assessment is made based on the products and/or suppliers available at the time of procurement.*

*To find suppliers visit the* [*Buy Recycled Directory*](https://directories.sustainability.vic.gov.au/buy-recycled) *and for more information on buying recycled, please refer to* [*Sustainability Victoria’s Procurement Toolkit*](https://www.sustainability.vic.gov.au/recycling-and-reducing-waste/for-councils-and-other-waste-recycling-operators/buy-recycled-service/procurement-toolkit)*.*

## **Product overview**

Recycled aggregate is a recycled granular material processed from construction and/or demolition concrete, brick, masonry, rock, gravel and sand. Recycled aggregates are a versatile material suitable for use in drainage and bedding projects. The following information sheet is based on information obtained from 2 suppliers located in Victoria and market knowledge.1, 2,3,4.

*Suggested questions to ask existing and new product suppliers about product performance are available at the end of this document.*

## **Recycled aggregate**

*This table includes general guidance information on recycled aggregate and some information related to specific products. Refer to references.*

|  |  |
| --- | --- |
| **Applications and use** | Recycled aggregate replaces mined virgin aggregate in drainage / bedding applications of:   * drainage material * filter material * backfill.1, 2, 3, 4 |
| **Features and benefits** | * Recycled aggregate has limited/no clay fines, allowing it to better handle damp conditions5 * Recycled aggregates can be a single sized material or a graded aggregate consisting of a blend of single sized aggregates1 * Example aggregate sizes below: 1, 2, 3, 4.   **7/4 mm recycled aggregate**   * Suitable for backfill, pipe bedding, drainage and landscaping.   **10 mm recycled aggregate**   * Suitable for drainage and bedding material, and pipe laying where water is present   **20 mm recycled aggregate**   * Used as a base or subbase material for hardstand areas and access roads, pipe bedding, walkways and under concrete pads * Suitable for drainage material, backfill for retaining walls and decorative applications * Ideal for creating temporary footings for light excavation equipment during wet weather conditions * Easy to spread and compact   **40 mm recycled aggregate**   * Used as a base or subbase material for hardstand areas and access roads, pipe bedding, walkways and under concrete pads * Suitable for shakedown material for worksites, backfill for retaining walls and open drain or swale lining * Can be used for a temporary access track on to building sites during wet weather conditions   **50/20 mm recycled aggregate**   * Suitable for access tracks, backfill, pipe bedding, drainage and landscaping   **75 – 100 mm recycled aggregate**   * Suitable for shakedown material for worksites, backfill for retaining walls and open drain or swale lining. |
| **Limitations** | * Supply of significant volumes needs to be scheduled in with recyclers to ensure availability. |
| **Cost considerations** | * Costs of recycled aggregate differ from one supplier to another5 * Consider the following when comparing price:   + the type of supply (bulk)   + volume required   + gate fees   + demand for products/availability of products   + origin of materials (virgin aggregate is often quarried overseas, recycled material is sourced locally)   + manufacture and delivery location (more localised recycling can reduce transport costs), and   + circular economy approach to manage product end of life. |
| **Distribution** | * Delivered in bulk quantities1,4 |
| **Environmental benefits** | * Recycled aggregate provides a 100% replacement of virgin quarried rock for drainage and bedding materials4 * Purchasing recycled products reduces the amount of construction and demolition waste sent to landfill4 * Recycled crushed concrete has a carbon footprint of 65% less than the equivalent quarried rock8 |
| **Product specifications and standards** | * VicRoads specifications [820](http://webapps.vicroads.vic.gov.au/VRNE/csdspeci.nsf/webscdocs/F8A5CBF7F2DA525ACA257584001B5DA3?Opendocument) and [821](http://webapps.vicroads.vic.gov.au/VRNE/csdspeci.nsf/webscdocs/C34C7AED37D3F664CA257F1500199699?OpenDocument) * Australian Standards ([AS 1141](https://www.standards.org.au/standards-catalogue/sa-snz/manufacturing/ce-012/as--1141-dot-54-colon-2018) Methods for sampling and testing aggregates) |
| **Circular economy** | * Use of recycled aggregate displaces use of virgin material and extraction of virgin resources from the ground (such as, avoids consumption) * Aggregate is potentially recyclable back into a new aggregate product at end-of-life pending product application, planned construction / demolition activities, and planned renovation / upgrade activities. The potential to recycle would be assessed on a case-by-case project basis. |
| **Maintenance** | * Comparable maintenance requirements to virgin quarried product4 |
| **Product supply** | * Costs of recycled aggregate differ from one supplier to another.5 * Construction and demolition recycling facilities are generally located in proximity to construction / demolition of buildings and infrastructure; where waste will be generated.6 * Quarries are located where naturally occurring resources are found.7 * Consequently, quarries may be some distance from markets, and potentially overseas. Recycled aggregate can therefore be more reliable and less expensive than virgin aggregate, due to proximity of markets. * To find product suppliers, search ‘aggregate’ in SV’s [Buy Recycled Directory](https://directories.sustainability.vic.gov.au/buy-recycled/search?q=aggregate) |
| **Durability** | * Comparable performance to virgin quarried product4 |
| **Where to find product in use** | * Widely used as a drainage and bedding material * Has been in use since construction and demolition recyclers have been in operation, circa the 1980’s |

|  |  |  |  |
| --- | --- | --- | --- |
| **What are you buying?** 2  |  |  | | --- | --- | | Coarse, dark grey aggregate. | Blend of fine aggregate with black, white, grey and orange colouring. | |  |

**WHAT TO CONSIDER?**

*The availability of recycled aggregate can vary based on site location, demand for product, and availability of materials suitable for recycling. However, as it is sourced locally, supply of recycled aggregates can be more reliable than for virgin aggregates which are often sourced overseas.4*

## **Questions to ask suppliers when comparing product performance**

The following questions can be used to assist in the decision-making process when procuring products. They can also be used to assess any new products or manufacturers that come onto the market.

|  |  |
| --- | --- |
| **Product specifications and standards** | * What safety standards has the product been developed to? * Has the particle size and bulk density been measured and tested to Australian Standards ([AS 1141](https://www.standards.org.au/standards-catalogue/sa-snz/manufacturing/ce-012/as--1141-dot-54-colon-2018) Methods for sampling and testing aggregates-Sampling - Aggregates)? * Has the product been developed to Vic Roads specifications (820 and 821)? * What environmental standards has the product been developed to? |
| **Processing description** | * Where are the recycled materials sourced from (location of source and what type of materials are included)? * Where is the product manufactured? * Has the product been screened during processing to separate out unsuitable materials? * Has the raw material and product been tested for contaminants during manufacture? * Has the product been crushed as mixed loads or made from source separated streams? * Is the stockpiled product sampled and tested to ensure compliance with specifications and standards? |
| **Environmental benefit** | * Is the carbon footprint of the product comparably lower than for a virgin product? * Does the manufacturer have ISO 14001 accreditation? |
| **Circular economy approach to manage end of life** | * What happens to the product at end of life, can it be reused? * Where are the materials recycled? * Who is responsible for recycling and are there costs associated with transporting it to a recycler? |
| **Replacement for natural / virgin products** | * What is the percentage of recycled content replacing traditional aggregate product? * How consistent is the supply of the recycled aggregate? * Are there applications for which recycled aggregate is better suited than traditional aggregate? |
| **Installation** | * Can Council contractors lay this material or does the manufacturer supply and lay? * Do operatives require training or product specific knowledge for effective use? |
| **Supply** | * Does the manufacturer supply this product to Council contractors? * Is the manufacturer part of any joint tender panels? |
| **General pricing** | * Is there a discount for bulk purchase? * What are the delivery fees? |
| **Proven performance in market uses** | * Is the recycled product already being procured by councils? * Can you obtain a ‘track record’ of use by market and how did the product perform? * Is the supplier able to provide information on durability and long-term use? |

## **Glossary**

**Carbon footprint**: the amount of total greenhouse gases released into the atmosphere as a result of a particular activity, service, product or organisation; expressed as carbon dioxide equivalent, usually in tonnes.

**Circular economy**: circular economy is the opposite of a linear ‘throw away’ society model, which depletes the resources of our planet and our economy. In a circular economy, nothing is wasted, rather it gets reused or transformed. At the broadest level, circular economy policies aim to change patterns of natural resource use in the economy (make, use, dispose) in order to achieve sustainable growth by slowing, narrowing and closing material loops (maintaining the value of resources for as long as possible). Taken from [WRAP and the circular economy](http://www.wrap.org.uk/)9

**Recycled**: recycled material is a proportion by mass of recycled material in goods or packaging. Recycled material can be either pre-consumer materials, diverted from waste during the manufacturing process, or post-consumer material, generated by households, commercially, or industrial and institutional facilities. As defined in AS 14021:2018, Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling).9

**Reused**: the transfer of a product to another user, with no major dismantling or processing required. The term “reuse” can also be applied in circumstances where an otherwise disposable item is replaced by a more durable item hence avoiding the creation of waste (e.g. using a ceramic coffee mug in place of disposable cups).

**Virgin / traditional products**: products made using material that has never been subjected to any processing other than for its production.

## **References**

The information sheet has been based on market knowledge from Encycle Consulting and information from two suppliers of recycled aggregate located in Victoria with readily available information:

* [Boral](https://www.boral.com.au/products/quarry-materials/recycled/recycled-aggregates)
* [RepurposeIt](https://www.repurposeit.com.au/)

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Reference** | **Published by** | **Year** |
| 1 | [Boral - Recycled aggregates website](https://www.boral.com.au/products/quarry-materials/recycled/recycled-aggregates) | Boral | 2021 |
| 2 | [Construction materials](https://www.repurposeit.com.au/product-category/construction-materials/) | RepurposeIt | 2021 |
| 3 | Technical data sheet, washed aggregates | RepurposeIt | 2021 |
| 4 | Encycle Consulting, market knowledge |  | 2021 |
| 5 | [Comparing recycled concrete aggregate prices with quarry aggregates](https://moretonbayrecycling.com.au/comparing-recycled-concrete-aggregate-prices-with-quarry-aggregates/) | Moreton Bay Recycling | 2019 |
| 6 | [Economics of Materials Availability and Recycling](https://austroads.com.au/publications/asset-management/ap-t278-14) | Austroads | 2014 |
| 7 | [Boral quarries](https://www.boral.com.au/community/boral-quarries) | Boral | 2021 |
| 8 | [Market summary – recycled brick, stone and concrete](https://assets.sustainability.vic.gov.au/susvic/Report-Market-Analysis-Bricks-Stone-Concrete-Sept-2014-PDF.pdf) | Sustainability Victoria | 2014 |
| 9 | [Buy Recycled Procurement Toolkit](https://assets.sustainability.vic.gov.au/susvic/Document-Buy-Recycled-Procurement-Toolkit.pdf) | Sustainability Victoria | 2021 |