



Building
something
great

Circular Materials Solution and recycling

Edition 2.0 | 2023



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Circular Materials Solution

By leveraging Boral's network of recycling facilities, along with our laboratory facilities, and our proven range of lower carbon products, **Boral is leading an industry transition to a more circular economy.**

Boral's Circular Materials Solution (CMS) is an end-to-end service that delivers practical and genuinely sustainable solutions in the processing and production of both recycled and reclaimed construction materials.



We want to make sustainable developments easier to achieve and strive towards our goal of building something that future generations can be proud of.



What is a Circular Materials Solution (CMS)?

A Circular Materials Solution aims to reduce waste, by recirculating previously used products and materials, through a reclamation and recycling service. This service aims to extend the lifespan of those materials by diverting them, where possible, away from landfill and into the production of new more sustainable construction materials.

Boral's Circular Materials Solution goes beyond the 'last mile' of only supplying products for our customer's projects. Boral is currently leveraging its recycling assets to manage construction waste, to create a full circular (economy) solution.

How does Boral's Circular Materials Solution (CMS) work?

Where possible, Boral is actively engaging with our customers projects early, in order to manage construction waste material and reintroduce that recycled and reclaimed material, as new more sustainable products at the construction phase of projects.

- **Construction waste material** that is derived from the demolition and excavation phase of projects is transported to a local recycling centre, thus diverting that waste away from landfill and saving waste disposal costs for the project.
- **At the recycling centre**, the customers construction waste material is sorted, separated, and processed for re-use within Boral products.
- **By actively engaging Boral's technical and sales teams from the outset**, customers are able to identify alternative materials that are more sustainable for their project from our recycled, reclaimed and lower carbon product range.
- **In addition, when supplying our lower carbon products to a project site**, Boral uses a proven supply, pump, and place delivery method, and in the case of concrete for example, any concrete that is oversupplied or not required, that material is returned back to a Boral site for recycling.

Boral's commitment to a sustainable future is underpinned by our proven chain of responsibility at all stages of the CMS service. Customers have the confidence in knowing their construction and building waste material will be handled by a reputable organisation that is disposing of, reclaiming, or recycling their waste in an ethical way. Boral also works with customers to ensure any lower embodied carbon solution options identified are fit-for-purpose and will either meet or exceed the customers specifications and requirements.

Boral Recycling Team

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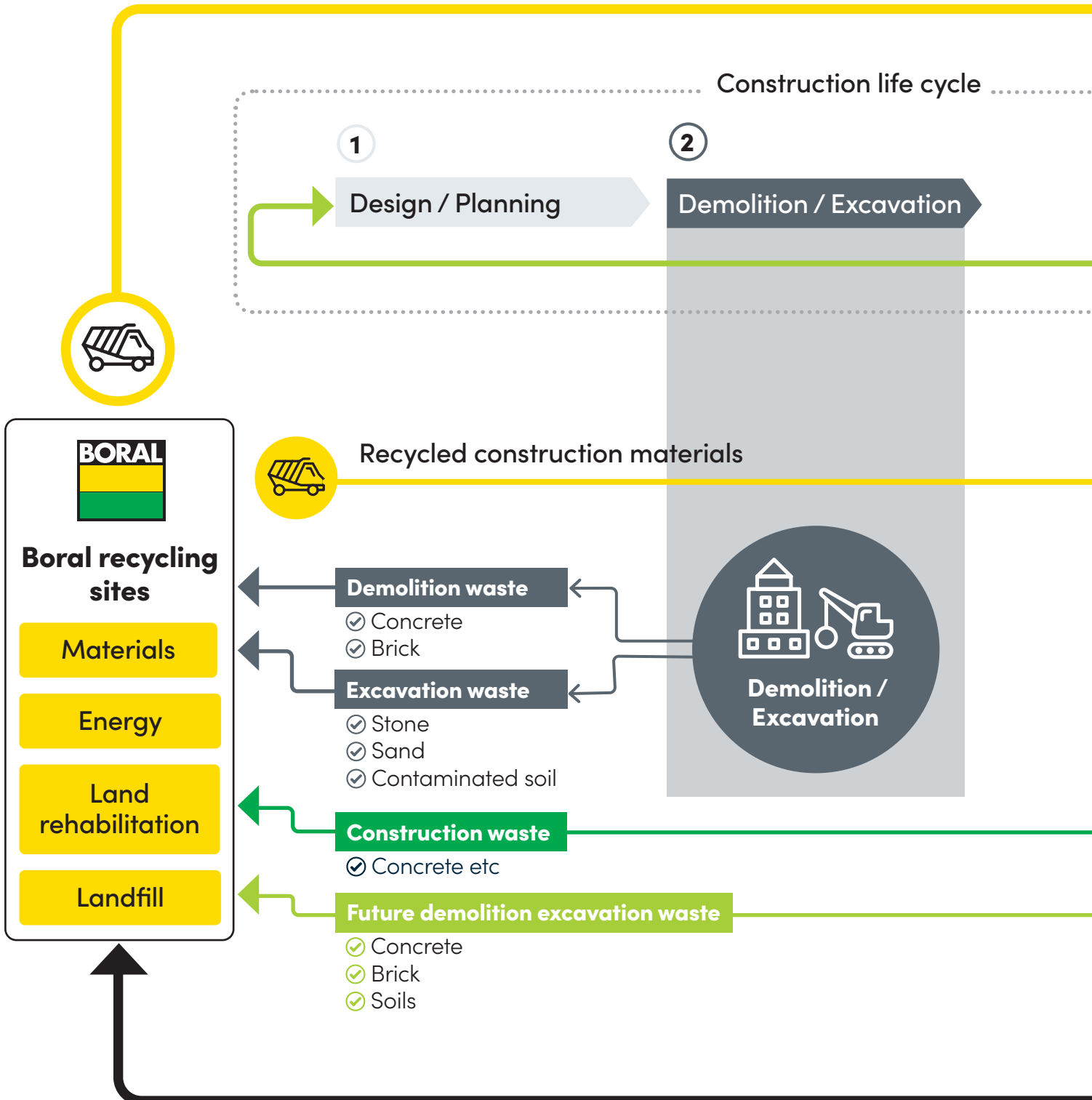
E. recycling@boral.com.au



Scan QR Code

Overview

Recycled materials input to Boral materials production

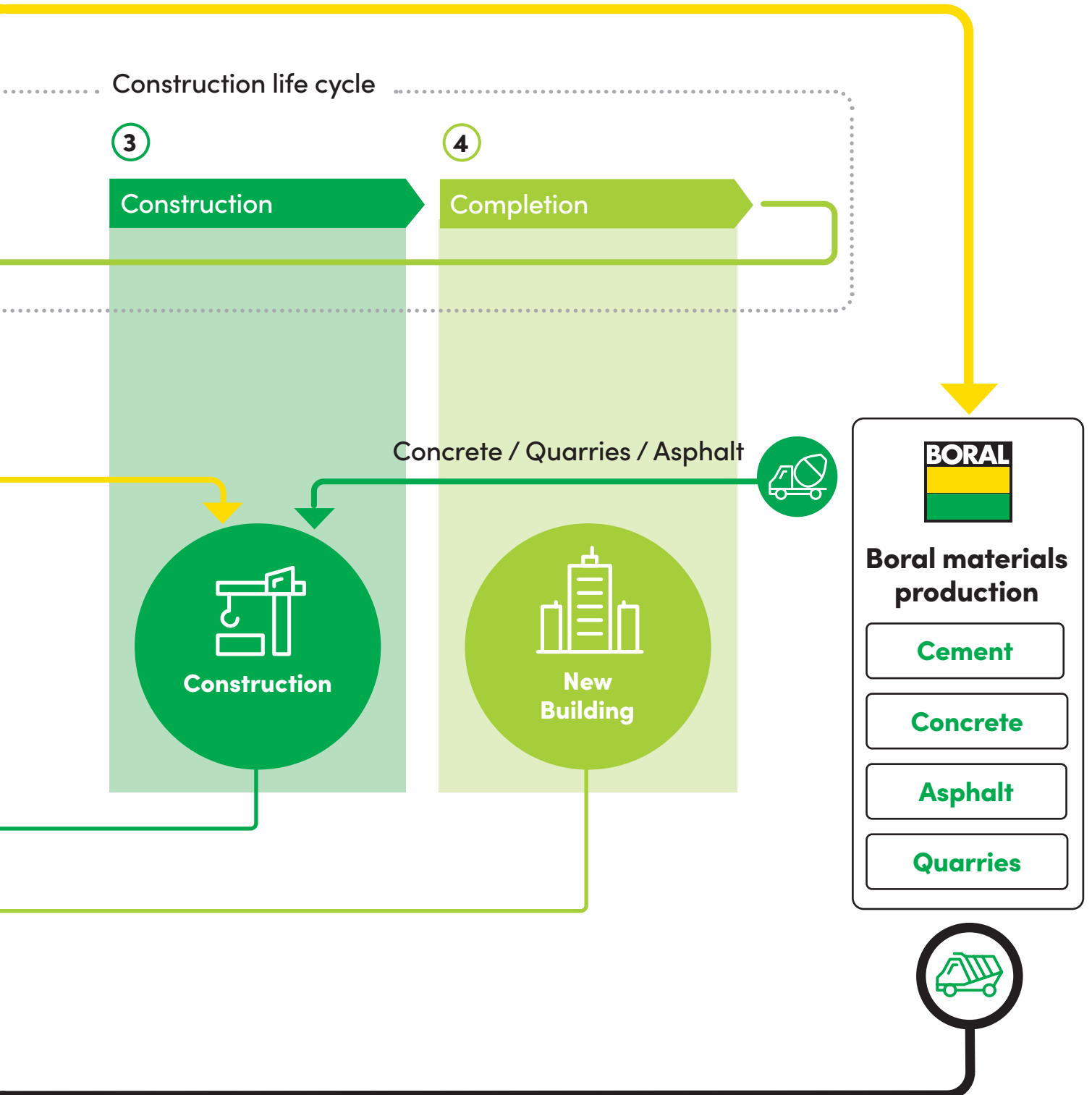


Boral waste and by-products input to Boral recycling



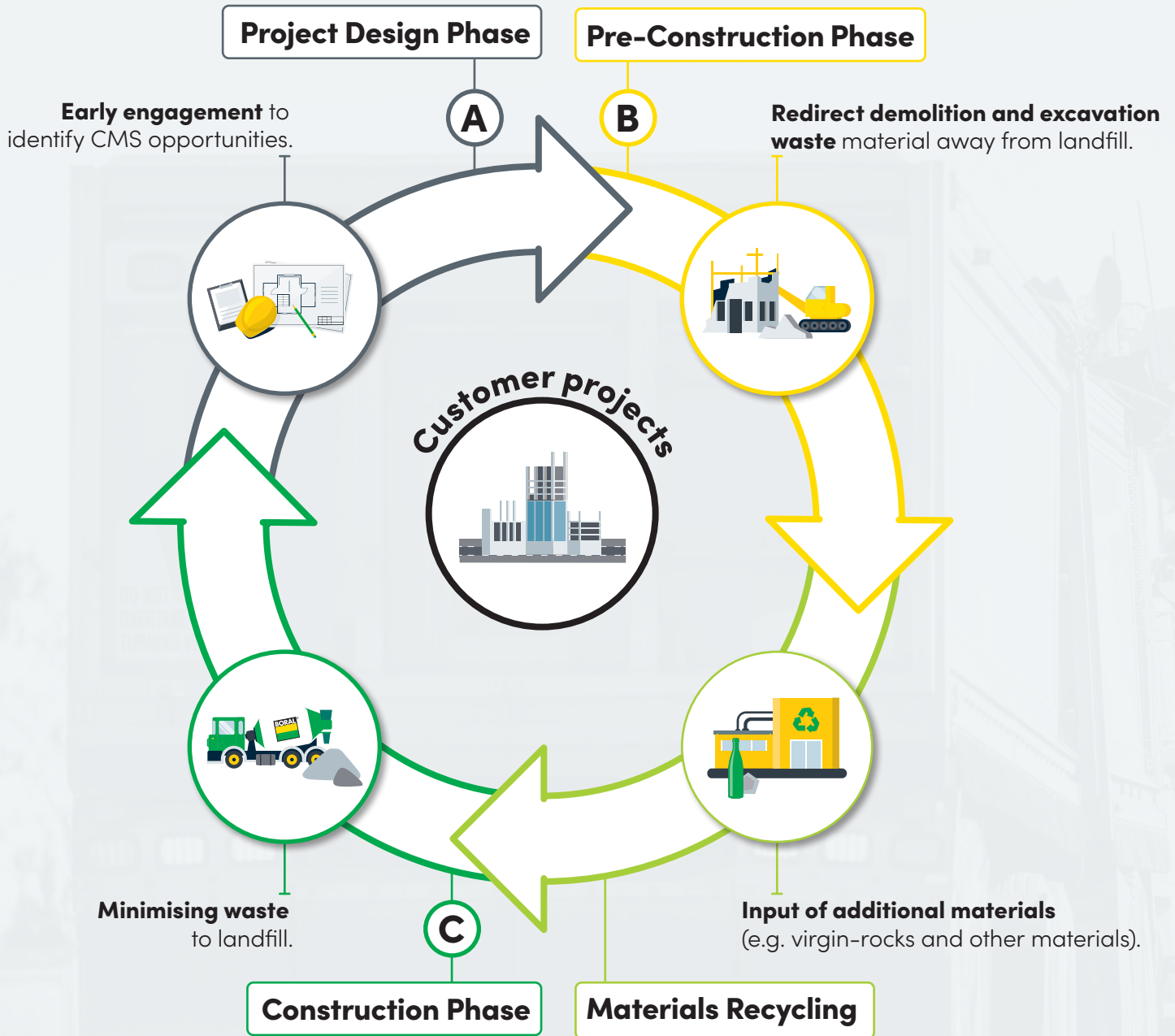
Overview

Recycled materials input to Boral materials production



Boral waste and by-products input to Boral recycling

Overview



Overview



A

Project Design Phase

Customer engagement and design

Early engagement with customers during the design phase enables:

- Identification of materials that can **be recycled at recycling facilities.**
- Identification of materials that can be used as part of **Boral's land rehabilitation / earth exchange programs.**
- Specification of **more sustainable products for future use** in the project.



B

Pre-Construction Phase

Project pre-construction – demolition and excavation

As civil contractors undertake demolition and excavation phases of the project, the **'waste'** materials are identified, e.g. concrete, brick and soils etc ...

Boral can play an active management role, ensuring these materials are sent for recycling at our recycling locations; providing full visibility of materials flow maximising recycling rates, ensuring circular product development and detailed reporting of sustainable outcomes.



C

Construction Phase

Supply of recycled materials

Boral supplies sustainable product mixes with higher recycled content including:

roadbase, aggregates, pipe bedding, sand, asphalt, concrete, and other recycled materials.

Boral also provides customers with detailed reporting on recycling rates, carbon content, materials flows, and green credits or certifications.

Any waste generated through Boral's materials supply can be **brought back to Boral recycling sites** ensuring full circular outcomes for customers.



Materials Recycling







Materials sent to Boral's recycling sites are:

- Reprocessed into **construction materials.**
- Blended with Boral's virgin materials for **development of new products.**
- Blended with externally sourced materials (e.g. glass, plastic and rubber) to **develop new products.**

CUSTOMER PROJECTS

Value overview

Enabled by **early project engagement** it delivers **value in sustainability outcomes, product performance** and **project costs**.

| |  Boral offerings |  Customer Value to customer |  Value Pricing approach overview |
|--|--|--|--|
| A Project Design Phase  | <p>Products</p> <ul style="list-style-type: none"> • Co-development of product specs to meet performance and sustainability outcomes. <p>Services</p> <ul style="list-style-type: none"> • Identification of material streams from demolition and excavation which can be recycled within Boral's sites. | <p>Early understanding of offers enabling optimisation on:</p> <ul style="list-style-type: none"> • Quality and performance. • Sustainability targets (products and services). • Operational efficiencies. | <p>No cost to customers.</p> <ul style="list-style-type: none"> • Boral's engagement aims to assist with product specification and 'Circular Materials Solution' approach to a project. |
| B Pre-Construction Phase  | <ul style="list-style-type: none"> • Collection, transport and recycling of material streams from demolition and excavation. • Provision of reports, with clarity on material flows, recycling rates and products developed with the 'waste' materials from the project. | <p>Improved sustainability outcomes and materials flow visibility:</p> <ul style="list-style-type: none"> • Higher recycling rates. • Diversion from landfill. • Stronger ability to report on improved outcomes. | <ul style="list-style-type: none"> • \$ / tonne fee for transport of material from project to recycling facility. • \$ / tonne fee for tipping of material – varying per material type. • All reporting is included. |
| C Construction Phase  | <ul style="list-style-type: none"> • Supply of sustainable product mixes – lower carbon and recycled products. • Collection, transport and recycling of concrete waste from concrete supply activity – along with materials management reporting. | <p>Maximise use of available sustainable products and services:</p> <ul style="list-style-type: none"> • Higher use of recycled content. • Lower CO₂ emissions. • Improved circular economy outcomes with reduced concrete waste. | <ul style="list-style-type: none"> • \$ / tonne fee to collect and transport concrete waste from project to recycling site plus tipping fee. • \$ / tonne fee and / or \$m³ where materials are supplied to the project. |



Value overview

Early project engagement to qualify the Circular Materials Solution (CMS) value of a project.



A Project Design Phase

> Pre-Construction

Boral Recycling Solutions

Primarily driven by Boral Recycling mapping the type and volume of 'waste materials' generated through demolition and excavation phases of the project. Identifying the Boral sites suitable material can be diverted to an the offer / value of that material.

Boral Product Solutions

Supported by Boral Product Solutions aiming to 'value add' the reclaimed 'waste' materials through the inclusion into new products.

> Construction

Boral Recycling Solutions

Supported by Boral Recycling by applying a CMS, collecting and recycling waste, from concrete supply, pump and place, all within Boral's recycling sites.

Boral Product Solutions

Boral Product Solutions, through consultation, understanding a customers requirements (both sustainability and product specifications) to develop an optimum plan and outcome.

Maximising recycling through ethical and transparent management of 'waste' materials.



B Pre-Construction Phase

> Demolition

Boral Recycling

- ✓ Manage waste and logistics from a customers site to a Boral site.
- ✓ Recycling.
- ✓ Developing new products.
- ✗ Demolition.
- ✗ On-site sorting.

Materials in-scope included but not limited to:

- Concrete
- Brick
- Steel
- Reclaimed asphalt
- Tunnel spoil

> Excavation

Boral Recycling

- ✓ Manage waste and logistics from a customers site to a Boral site.
- ✓ Recycling.
- ✓ Developing new products.
- ✗ Excavating.
- ✗ Classifying on-site.

Materials in-scope included but not limited to:

- Sandstone
- Excavation sand
- Clean fill
- PASS

B✓ Positives

- ✓ Transparency on materials, flow visibility.
- ✓ Maximising recycling rates (90%+).
- ✓ Circular product development.
- ✓ Safety, compliance and reliability.

Ensuring concrete is managed sustainability through its full life-cycle.



C Construction Phase

> Supply

Boral Concrete

- ✓ Quality.
- ✓ Performance.
- ✓ Low carbon options.

> Pumping / Placement

Boral – DMG

- ✓ Quality.
- ✓ Performance.
- ✓ Low carbon options.

C✓ Positives

- ✓ Boral's proven supply, pump and place model.
- ✓ Materials quality, performance and sustainability, combined with 'Pump and Place' service reliability.

> Concrete Waste Management

Boral Concrete

- ✓ Materials flow visibility.
- ✓ Recycling rate max and CO₂ reduction.
- ✓ Circular product development.

C✓ Positives

- ✓ Boral's Circular Materials Solution.
- ✓ Replaces traditional costly waste management model.
- ✓ Reporting on all the above.



Customer success stories

Enabled through **early project engagement** with demonstrated **value in sustainability, performance** and **benefits**.



> **Boral's demonstrated value to customer**



A Project Design Phase



Mirvac, 55 Pitt Street

- Boral peer reviewed **demolition materials** management approach.
- Closure of identified gaps within offerings and materials for **recycling optimisation**.
- Customer was able to **reduce demolition costs**, with clarification of rates per material.



B Pre-Construction Phase



Meriton, Pagewood

- Boral directly managed the collection, **transportation and recycling** of excavated sand from the project (200kt+).
- Customer received **lower integrated costs** and full recycling outcomes.
- Boral brought materials to its **Emu Plains** site and **upcycled** materials into concrete.



C Construction Phase



Mirvac, Green Square

- The **direct management of concrete supply waste** was managed by using Boral on-site — placing skip bins and transporting these bins to our Widemere recycling facility (over 300 tonnes of concrete waste recycled).
- Customer benefited from **lower costs** to manage such waste as well as increased recycling rates and full visibility of materials flow and end-use.

LAING O'ROURKE

Laing O'Rourke, IMR5

- Boral reviewed **bill of materials** coming from demolition and excavation.
- Boral presented **integrated offer** to customer managing construction 'waste' volumes from project for recycling and supplying sustainable concrete, quarry materials and asphalt.
- Customer / project benefited from circular economy **outcomes** and project management **efficiencies**.



CPB / John Holland, WCX3B

- Boral used its Dunmore site to accept **PASS vols** from project (90kt+).
- Customer benefited from the full visibility of **materials flow and end-use**, as well as the **cost savings** raised by diverting away from landfill.
- Boral managed **safe material end-use**.

Melbourne Excavation Stone

- Boral solved the customers' problem by **accepting large volumes of excavation stone** at our Deer Park facility (150kt+).
- Civil contractors' excavation stone was recycled into high value aggregates.



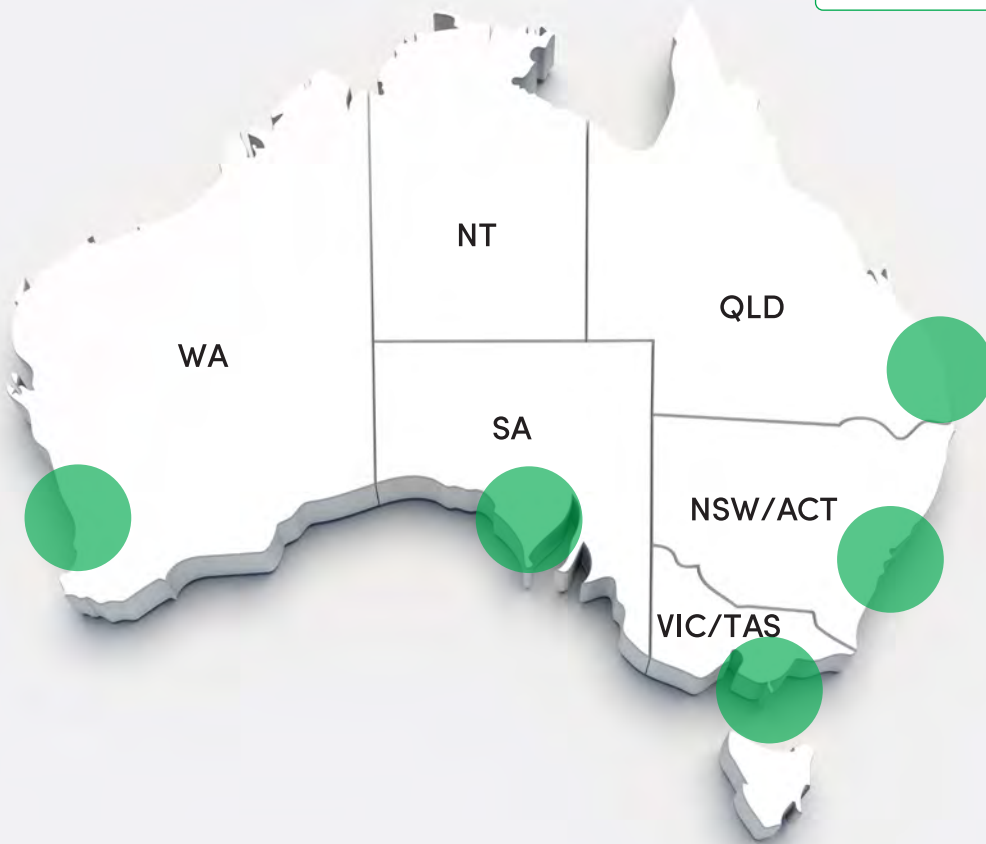
Multiplex, W. Sydney Airport and Mirvac, Waverley

- Boral Will Directly **manage the concrete supply waste** from the estimated 10km³ of concrete needed for the project, realising lower costs to manage such waste with full visibility of materials flow and end-use.

Recycling operations

LEGEND

- Boral owned and operated sites.
- Boral owned sites with recycling not currently operational (from a recycling perspective).
- ▲ Boral owned sites with operations shared with Delta Group.
- ◆ Delta Group owned site with operations shared with Boral.



South East Queensland

- **Stapylton**
New Stapylton site approved in 2023 / 2024.

New South Wales

- **Dunmore**
VENM and PASS inbound.
- **Emu Plains**
Excavation sand and sandstone focus.

Western Australia

Position to be established ahead of market / industry shift towards recycled products, e.g. co-location at Orange Grove.

South Australia

Existing C&D recycling operations co-located at quarry sites, e.g. Salisbury (to be assessed for further growth).

- **Salisbury**
C&D and glass recycling.

Victoria

- ▲ **Deer Park**
Boral excavation stone and C&D.
- ▲ **Coldstream**
Boral quarry site shared with Delta.
- ▲ **Lysterfield**
Boral quarry site shared with Delta.
- ◆ **Sunshine**
Delta site shared with Boral.
- ▲ **Waurin Ponds**
Boral quarry site shared with Delta.
- ▲ **Wollert**
Boral quarry site shared with Delta.

- **Eraring**
ROS and bottom ash position.
- **Kooragang**
C&D recycling.
- **Mugga**
Quarry co-located position, non-operational and to be re-established.
- **St Peters**
Sydney CBD position recently closed – to be replaced.
- **Widemere**
Largest C&D recycling position – 1m / tonnes p.a. capacity.



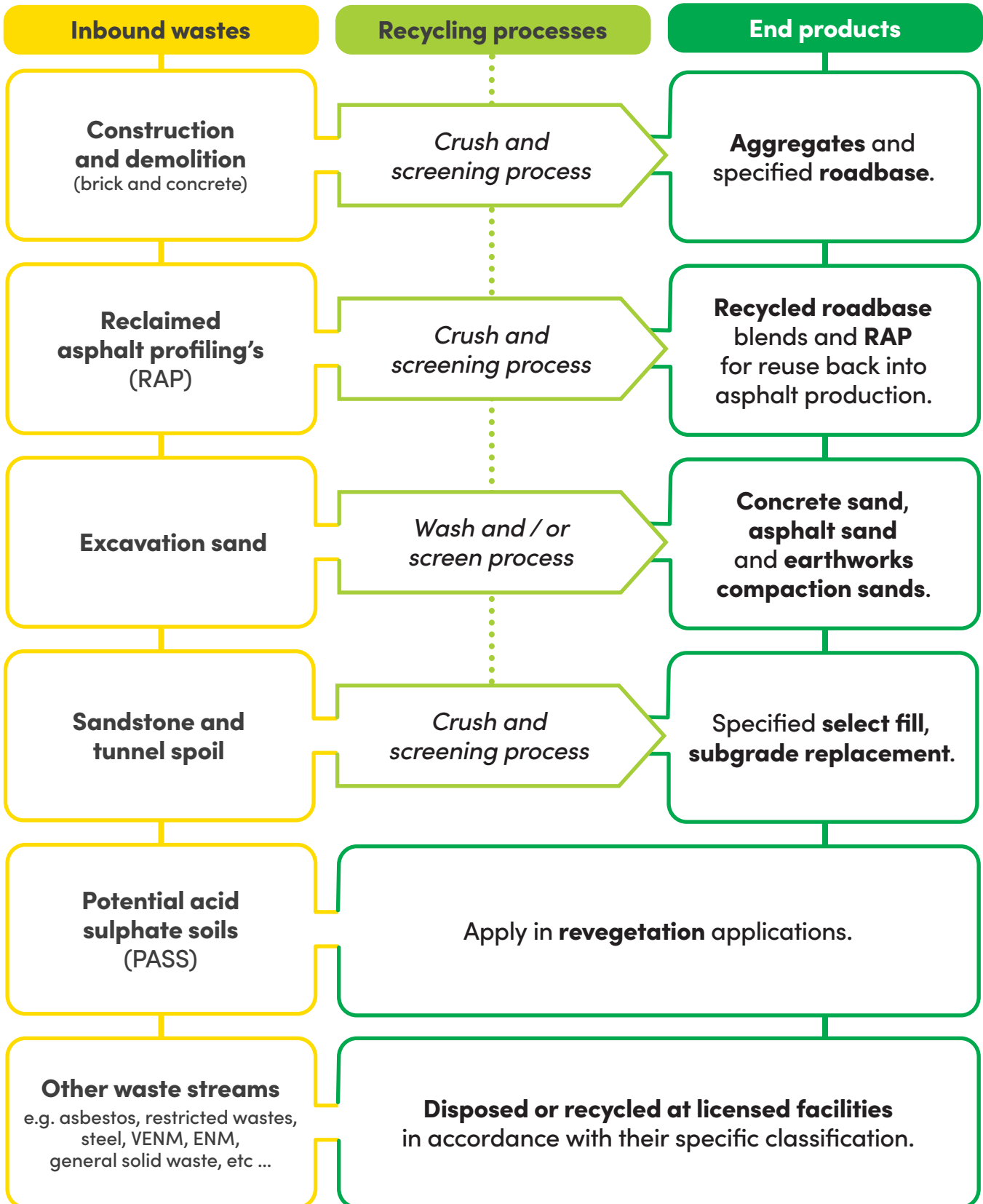
Tasmania

- **Launceston**
C&D co-located with Quarry.



Circular Materials Solution

– Materials in scope



Circular Materials Solution

– Materials in scope

Inbound and outbound materials in scope

| | Sydney | Melbourne | Newcastle | Canberra | Brisbane | Adelaide | Perth | Hobart |
|-------------------------------|--------|-----------|-----------|----------|----------|----------|-------|--------|
| Inbound materials | | | | | | | | |
| Concrete / masonry | ● | ● | ● | ● | ○ | ● | ○ | ● |
| Brick / tiles | ● | ● | ● | ● | ○ | ● | ○ | ● |
| Asphalt | ● | ● | ● | ● | ● | ● | ○ | ● |
| Contaminated soils | ● CT1 | ○ | ● CT1 | | | | | |
| Sandstone | ● | ● | ● | ● | ○ | | | ● |
| Excavation sand | ● | ● | ● | ● | ○ | | | ● |
| Excavation stone | ● | ● | ● | ● | ○ | | | ● |
| Potential acid sulphate soils | ● | ○ | ○ | | ○ | | | |
| Tunnel spoil | ● | ● | | | | | | |
| Earth exchange | ● | ● | | | ● | ● | | |
| Glass | ● | | | | ● | ● | | |

Outbound materials (recycled products)

| | | | | | | | | |
|--|---|---|---|---|---|---|---|---|
| Specified recycled roadbase | ● | ● | ● | | ● | ● | ○ | ● |
| Unspecified recycled roadbase | ● | ● | ● | ● | ● | ● | ○ | ● |
| Recycled sub-base | ● | ● | ● | ○ | ● | ● | ○ | ● |
| Recycled general and select fill | ● | ○ | ● | ○ | ● | ● | | ● |
| Recycled non-spec aggregates | ● | ● | ● | | ○ | ● | | ○ |
| Recycled sand / pipe bedding | ● | ● | ● | | ○ | ● | | ○ |
| Stabilised recycled roadbase | ● | ● | ○ | | | | | |
| Stabilised recycled sand / pipe bedding | ● | | | | | | | |
| Recycled glass sand | ● | ○ | ● | ● | ● | ● | | |
| Recycled content inclusion in concrete and asphalt mixes | ● | ● | ● | ● | ● | ● | ● | ● |
| Recycled glass sand | ● | ○ | ● | ● | ● | ● | | |

● Current capability ○ Capability in development



Summary of customer value proposition – sustainability + performance + availability

| Quarry products | Customer value | | |
|----------------------------|---|--|-----------------|
| | Sustainability features | Performance features | Availability |
| Road base | Up to 100% recycled C&D – diversion of volumes from landfill. | Equivalent to virgin materials with lower density, where specifications allow use. | QLD / NSW / VIC |
| Pipe bedding | Up to 100% recycled C&D – diversion of volumes from landfill. | Equivalent to virgin materials with lower density, where specifications allow use. | QLD / NSW / VIC |
| Drainage aggregates | Up to 100% recycled C&D – diversion of volumes from landfill. | Equivalent to virgin materials with lower density, where specifications allow use. | QLD / NSW / VIC |
| High grade compaction sand | 100% recycled, including glass, sandstone and excavation sand. | Meets specification for natural sand, e.g. Sydney Water spec. | NSW |
| Glass sand | Diversion of glass fines from landfill. | Partially replaces natural sand in concrete and asphalt. | NSW / SA / QLD |
| Excavation sand | 100% repurposed excavation material. | Partially replaces natural sand in concrete. | NSW |
| Sandstone select fill | 100% repurposed excavation. | Equivalent to virgin materials. | NSW |
| Excavation stone | Natural stone repurposed from civil construction. | Equivalent to virgin materials. | VIC |
| ROS ash | 100% recycled ash, partially replacing cement in concrete (lower carbon). | Maintains concrete performance meeting specs. | NSW |
| Bottom ash sand | 100% recycled ash. | Light weight sand and aggregate. | NSW |



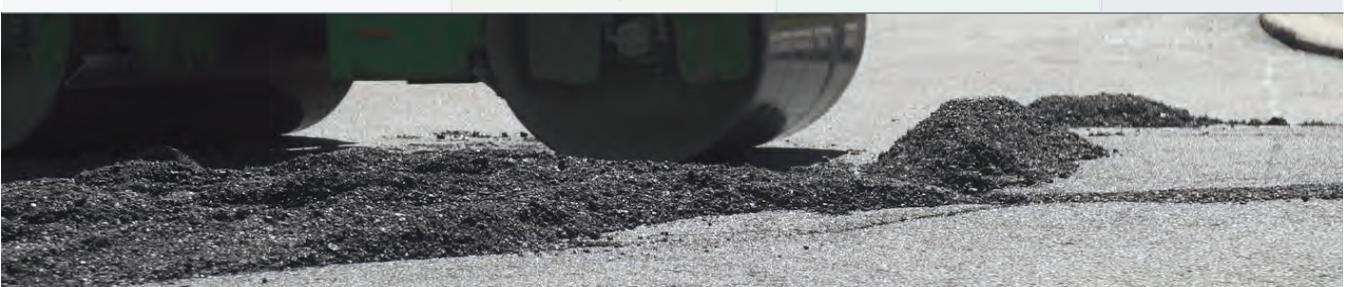
Summary of customer value proposition – sustainability + performance + availability

| Concrete products | Customer value | | |
|-------------------|--|--|--------------|
| | Sustainability features | Performance features | Availability |
| ENVISIA® | Lower carbon due to higher inclusion of slag and fly ash in product mix, e.g. up to 50kg carbon offset per m ³ of concrete. | Special shrinkage (S) infrastructure (I) and aesthetic (A) properties meets early age strength needs for construction higher durability. | National |
| ENVIROCRETE® PLUS | Lower carbon due to higher inclusion of slag and fly ash in product mix – up to 80kg / m ³ of carbon offset. | Matches standard concrete. | National |
| ENVIROCRETE® | Lower carbon due to higher inclusion of slag and fly ash in product mix – up to 100kg / m ³ of carbon offset. | Non-valued added attributes removed to reduce carbon and costs. | National |



Asphalt products

| | | | |
|---------|--|---|--|
| INNOVO™ | Circular economy benefits through inclusion of multiple alternative materials to the product mix, e.g. RAP, slag, glass, rubber and plastic. | Matches traditional product mixes and in some cases improves for particular uses. | National *specific availability to be confirmed case by case. |
|---------|--|---|--|





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For further information
on Boral products go to:



boral.com.au

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