BORAL

Building something great

Pre-mix concrete EPD

Environmental Product Declaration

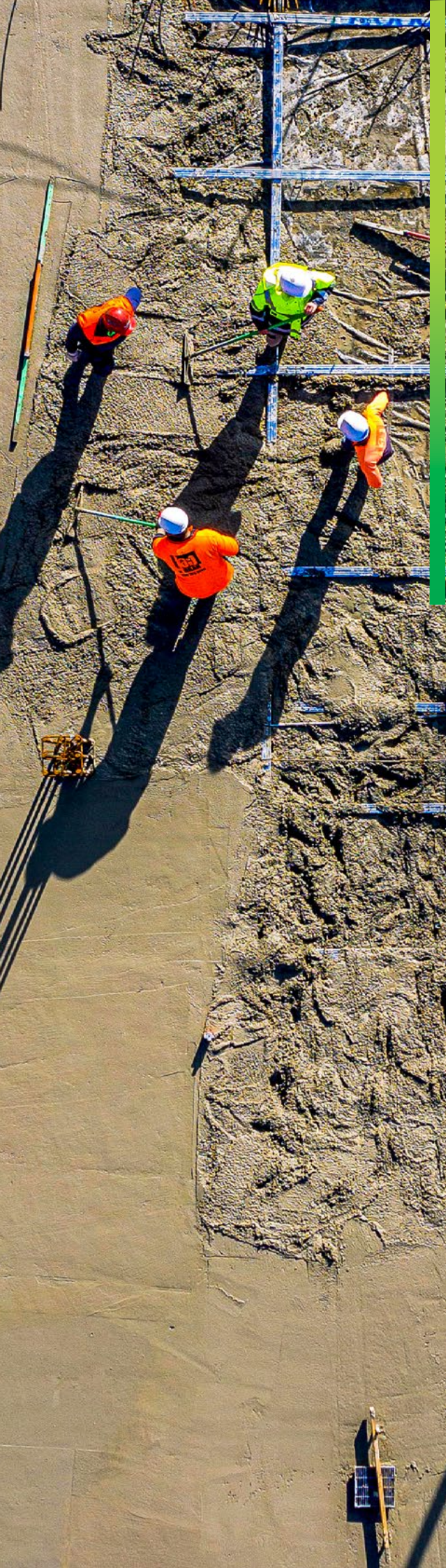
Tasmania (TAS) region

In accordance with ISO 14025:2006 and EN 15804:2012

An EPD should provide current information and may be updated if conditions change.
The stated validity is therefore subject to the continued registration and publication at *epd-australasia.com*

EPD Registration Number EPD-IES-0002337:002

Publication date: 1 May 2021 | **Revised:** 3 December 2024 | **Valid until:** 1 May 2026
Geographical Scope: Tasmania (Tas) – Launceston and Hobart



Contents

Program information and verification

An Environmental Product Declaration (EPD) is a standardised way of quantifying the potential environmental impacts of a product or system. EPDs are produced according to a consistent set of rules — Product Category Rules (PCR)—that define the requirements within a given product category.

These rules are a key part of ISO 14025, ISO 14040 and ISO 14044 as they enable transparency and comparability between EPDs. This EPD provides cradle-to-gate environmental indicators for a range of normal class pre-mix concrete products, lower-carbon concrete ENVISIA® and concrete for special applications manufactured by Boral.

This EPD is verified to be compliant with EN 15804. EPDs of construction products may not be comparable if they do not comply with EN 15804. EPDs within the same product category but from different programs or utilising different PCRs may not be comparable. Boral, as the EPD owner, has the sole ownership, liability and responsibility for the EPD.

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Program information and verification

EPD version:	Description of the changes
Version 2	The following edits were made as part of the first annual review. • Formatting and branding updated • Registration number unchanged but format updated to new naming convention • Cement supply chain update - cement now sourced from Geelong. Previously sourced from Railton.

CEN standard EN 15804 served as the core PCR	
Reference year for data:	2018-01-01/2018-12-31
PCR	PCR 2012:01 Construction Products and Construction Services, Version 2.33, 2020-09-18 PCR 2012:01-SUB-PCR-G Concrete and concrete elements, 2020-09-18
PCR review was conducted by	The Technical Committee of the International EPD® System. Chair: Claudia A. Peña. Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025	☐ EPD process certification (Internal) ☒ EPD verification (External)
Procedure for follow-up of data during EPD validity involved third-party verifier	☐ No ☒ Yes

About Boral

Boral is the largest integrated construction materials company in Australia, with a leading position underpinned by strategically located quarry reserves and an extensive network of operating sites. We also manufacture and supply a range of building products.

Boral Concrete has over 200 pre-mix concrete plants around Australia producing a wide range of concrete mixes in metropolitan and country areas.

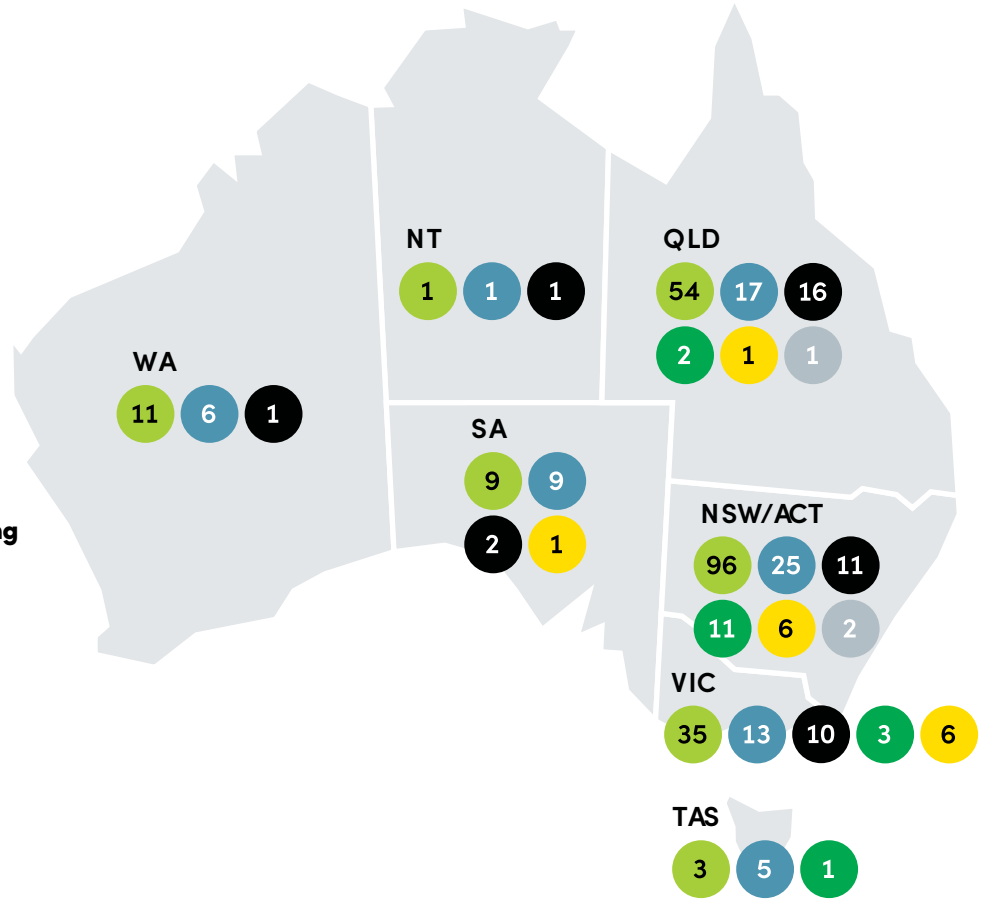
In Tasmania, Boral Concrete supplies pre-mix concrete to all segments of the construction industry including infrastructure, social, commercial, and residential construction.

This EPD covers the majority of the concrete products supplied from Boral plants in Tasmania.

Construction materials
Leading integrated network

360
Operating sites*

- 209 **Concrete**
- 76 **Quarries**
- 41 **Asphalt**
- 17 **Cement**
- 14 **Recycling**
- 3 **Concrete Placing**



* Includes transport, fly ash and research and development sites.

About Boral

Boral is the largest integrated construction materials company in Australia, with a leading position underpinned by strategic locations and an extensive network of operating sites, across Australia.

For over 75 years we've been building something great in Australia - rarely a day goes by that you wouldn't pass one of our sites or trucks, enter a building, use a road, bridge, tunnel, footpath or other critical infrastructure that our people and products have helped enable.

Boral is committed to a culture of Zero Harm Today. This ensures all our employees, contractors, partners and communities in which we operate are free from harm, injury and illnesses. Boral has a team of full-time Health, Safety, Environment and Quality specialists who operate across our integrated business, offering a single interface for safety communications and innovation across raw materials, logistics, operations and placement.

Sustainability at Boral

We recognise that our commitment and progress in managing sustainability outcomes is vital to our business and meeting the expectations of our customers. We strive to:

- Deliver innovative, superior performing and more sustainable products and solutions that respond to a changing world and better meet our customers' needs
- Drive safety performance towards world's best practice and invest in our people to enable them to deliver on our strategy
- Reduce our environmental footprint and build our resilience to climate impacts
- Reduce greenhouse gas emissions from our processes, operations and facilities, in-line with our ambition to achieve net-zero emissions by 2050.
- Reducing waste in all forms including through the efficient use of energy, conservation of water, minimizing and recycling waste materials and energy, prevention of pollution, and effective use of virgin and recovered resources and supplemental materials.
- Protecting biodiversity values at and around our facilities.
- Openly and constructively engaging with communities surrounding our operations

At Boral, we strive to create products that are as sustainable as possible across all our product streams, without any compromise to the technical integrity, quality and consistency of the end product. This needs to be done with a long-term lens, ensuring that all constituents included in mix designs (whether concrete, asphalt, quarried or recycled) are able to be recycled for continual re-use.

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About Boral

Technical services

As one of Australia's largest construction materials companies, Boral is committed to excellence, providing customers with quality products and reliable service.

Our aim is to provide products backed up by specialized testing as well as extensive quality control procedures and technical support. To ensure we remain at the forefront, we constantly improve, develop and refine our products to maintain the high standards customers have come to expect.

Our production, technical and our customers are committed to quality excellence in our manufacturing process.

We have committed additional resources to research, and we strive to develop whole-of-life solutions that offer a sustainable future.

Our innovative products are designed in collaboration with our clients. Not only is Boral one of the only Australian construction materials company to maintain a full-service construction materials laboratory, Boral Materials Technical Services is also the largest facility of its kind in the country, providing special and standard testing and product development services to Boral and our customers.

Boral maintains an ISO 9001-certified Quality System to ensure we conduct a regular regime of physical properties testing on all materials to certify they:

- Meet Australian Standards in the civil and structural construction industry
- Comply with applicable legislation, regulations and industry standards
- Meet project specifications
- Allow for continuous improvement.

Boral laboratory facilities are NATA-accredited for construction materials testing and chemical testing. These customer-focused services have earned Boral the reputation of a market leader in its approach.

Geographical scope

Tasmania (TAS) overall region

The concrete plants considered for this Environmental Product Declaration comprise those in the state of Tasmania. Individual plants were assessed for life cycle assessment, and local surrounding similar raw material sources were included in the datasets. These modelled plants, including geographically nearby plants are listed in the following location map.

Modelled plants

- Boral Concrete Hobart (Derwent Park)
- Boral Concrete Launceston (Invermay)

Legend

Plants that are being modelled in the Tasmania premix EPD.

Surrounding plants covered in the Tasmania premix EPD scope.

Declared products

Products considered for the Tasmania (TAS) region Environmental Product Declaration

The products considered for the EPD fall into three broad categories: normal class products, lower carbon concrete products and special concrete products.

A brief description of each category is given below, followed by a full list of the products.

1) Normal Class Concrete Products

Normal class concrete products are suitable for general applications and designed to meet the requirements of AS 1379 (Specification and supply of concrete).

2) Lower Carbon Concrete Products

Boral's ENVISIA® concrete is a lower carbon concrete product which complies with AS 1379 and has excellent engineering properties. It contains supplementary cementitious materials to reduce the portland cement content. ENVISIA® combines a proprietary cement technology (ZEP®) which gives it good early age strength, low shrinkage characteristics and excellent durability characteristics. An overview of the sustainability, durability, engineering and architectural properties are given below.

Lower carbon

- ENVISIA® has a low portland cement content and is suitable for projects seeking to maximise the number of green star points from concrete.
- ENVISIA® has a lower carbon content and is suitable for projects seeking a rating with the Green Building Council of Australia (GBCA) or the Infrastructure Sustainability Council (ISC).

Workability

- ENVISIA® can be placed, pumped and finished like conventional concrete.

Superior engineering properties

- ENVISIA® will achieve early-age strength equivalent to conventional concrete mixes with higher portland cement content (e.g. post-tensioned and precast concrete).
- ENVISIA® has 20 percent greater flexural strength compared to conventional concrete of the same grade.
- ENVISIA® achieves up to 50 percent reduction in shrinkage when compared to conventional sustainable concrete mixes.

Superior durability

- ENVISIA® provides improved durability, through greater protection to steel reinforcement against chloride induced corrosion.
- ENVISIA® has improved sulphate and acid resistance properties.
- ENVISIA® mitigates the potential expansion due to alkali aggregate reactivity.

Architectural presence

- ENVISIA® can achieve a range of architectural benefits because of its off-form finish and lighter colour.
- ENVISIA®'s lighter colour will enhance the use of coloured oxides.

Declared products

3) Concrete products for special applications

Boral's special concrete products have been designed to meet specific project requirements in addition to the requirements of AS 1379. They include products that have been designed for infrastructure projects, multi-residential buildings, commercial buildings and civil works.

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Declared products

Products covered by this Environmental Product Declaration (EPD)

The products covered in the EPD are listed below. The environmental impacts of products not referenced in the EPD can be provided on request. Boral is developing an environmental impact calculator allowing us to provide environmental profiles for virtually any mix design from any of our concrete plants in Australia. We intend to have the calculator independently verified in line with the same standards this EPD is based on, so that the results are of similar standing.

1) Normal class concrete products

- NORMAL CLASS GP BLEND 20 MPa
- NORMAL CLASS GP BLEND 25 MPa
- NORMAL CLASS GP BLEND 32 MPa
- NORMAL CLASS GP BLEND 40 MPa
- NORMAL CLASS GP BLEND 50 MPa

2) Lower carbon concrete products

- ENVISIA® 25 MPa
- ENVISIA® 32 MPa
- ENVISIA® 40 MPa
- ENVISIA® 50 MPa

3) Concrete products for special applications

- HIGH STRENGTH 50 MPa
- HIGH STRENGTH 65 MPa
- VICROADS VR400 40 MPa 20MM PUMP B1 EXPOSURE
- VICROADS VR450 50 MPa 20 mm TREMIE B2/CFA C1 EXPOSURE

Pre-mix concrete production

Concrete production is the process of combining water, aggregates, cementitious binders and additives. These different 'ingredients' are mixed at a specialised facility known as a 'batching' plant.

The batching plant stores the ingredients in cement silos, aggregate bins and admixture tanks and uses calibrated weigh scales and flow meters to accurately weigh the ingredients. The ingredients are then mixed in a transit mixer compliant with item C3 of AS 1379 to produce concrete which is delivered to the project.

Depending on the proposed application of the final product, the concrete may contain other ingredients such as colour oxides and fibres and the production process may include heaters or chillers. Concrete production is time-sensitive, once the ingredients are mixed, workers must put the concrete in place before it loses workability.

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ENVISIA® Case study

BORAL Building something great

Case study
ENVISIA® Concrete

University of Tasmania

Project

The University of Tasmania's Northern Transformation is a $300 million project that will see new campuses built at West Park in Burnie and Inveresk in Launceston in a partnership between the University and local, state and Australian governments.

Stage 1 of the Northern Transformation project includes construction of a Library and Student Experience building at the UTAS Inveresk Campus in Launceston.

Overview

Customer
VOS Construction

Project name
UOT– Inveresk Campus Upgrade

Location
Launceston, Tasmania

Concrete offered
ENVISIA®

What was the customer looking for

- Head client (UTAS) was keen to see **lower embodied carbon across the project** and encouraged the use of lower carbon construction materials.
- Our offering to the bidding contractors highlighted the **engineering properties of ENVISIA®** (low shrinkage, high early strength) as well as the lower embodied carbon.
- **Workability at an increased slump** was viewed favourably by the concrete placers / finishers.
- **Set times** were comparable to GP mixes.
- **Off-form finish** was an improvement on the incumbent mixes.

Key facts

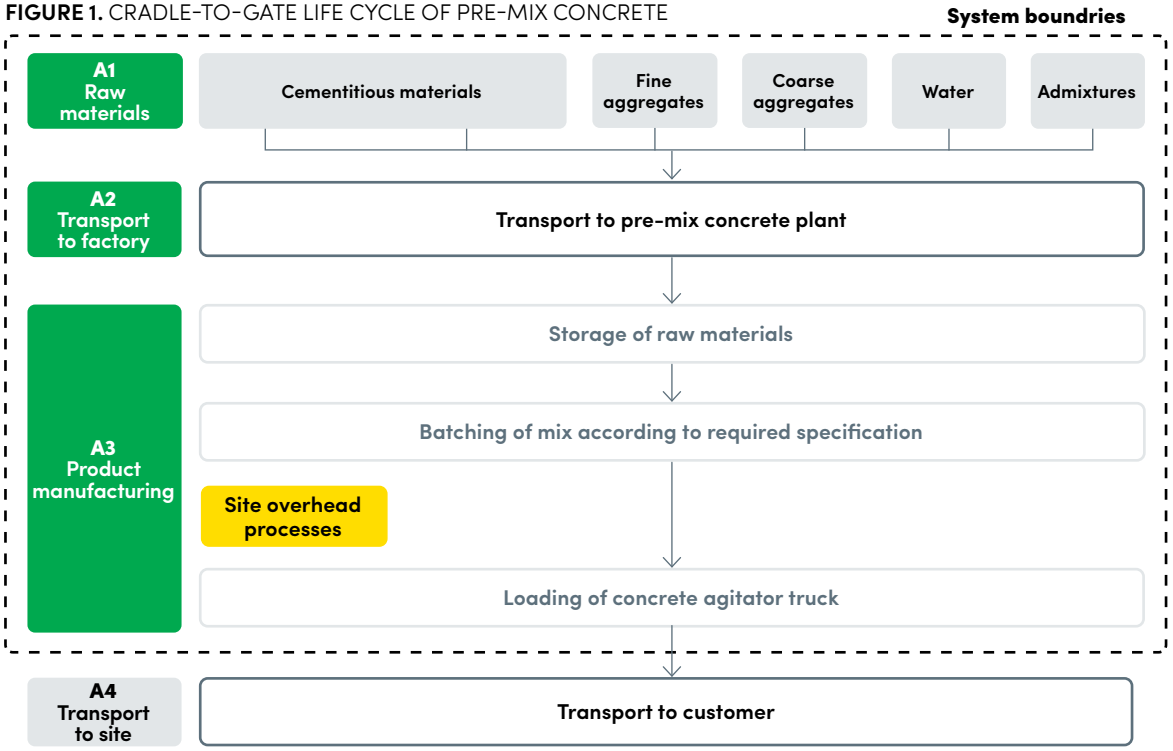
- The **low shrinkage** and **lower risk of cracking** was a major benefit to the customer.
- **Lower embodied carbon number** was a high priority for VOS.
- Customer was very happy with the **useability and workability** of the mix stating that it was comparable to GP mixes.
- The first customer to use **Envisia®** in Tasmania.
- **Early age strength**.
- **Great off-form finish**.
- **Lower embodied carbon**.

For more information please visit boral.com.au/lcc

Life cycle stages covered by the Life Cycle Assessment (LCA)

This EPD covers the cradle-to-gate life cycle stages (A1-A3), as per diagram below.
Downstream stages have not been included.

FIGURE 1. CRADLE-TO-GATE LIFE CYCLE OF PRE-MIX CONCRETE



Raw material stage (A1)

All raw materials used in the production of Boral's normal class concrete, lower carbon concrete and special concrete products comply with the following standards as required by AS 3600 Concrete Structures (SA 2018) and AS 1379 Specification and Supply of Concrete (SA 2007/R2017):

- **AS 3972:** General purpose and blended cements
- **AS 3582.1** Supplementary cementitious materials Part 1: Fly Ash
- **AS 3582.2** Supplementary cementitious materials Part 2: Slag—Ground granulated blast furnace
- **AS 2758.1** Aggregates and rock for engineering purposes Part 1: Concrete Aggregates
- **AS 1478.1** Chemical admixtures for concrete, mortar and grout

Life cycle stages covered by the Life Cycle Assessment (LCA)

Transportation stage (A2)

Coarse aggregates, manufactured sands and natural sands are sourced from our network of quarries and transported to our sites via articulated trucks. General purpose cement is supplied by Boral Cement works at Geelong and is transported to our sites by articulated truck, train and ship. ZEP® slag cement is supplied by Boral Cement from their facility Maldon and is transported to our sites by articulated truck, train and ship. Admixtures are transported to our sites by truck and ship.

TABLE 1. SCOPE OF EPD

	Product stage			Construction stage		Use stage							End-of-life stage				Benefits beyond system boundary
	RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT	CONSTRUCTION-INSTALLATION PROCESS	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DECONSTRUCTION DEMOLITION	TRANSPORT	WASTE PROCESSING	DISPOSAL	REUSE, RECOVERY, RECYCLING POTENTIAL
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
				Scenario		**Scenario**							**Scenario**				
Modules declared	✔	✔	✔	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**

✔ = module is included in this study MND = module is not declared*

* When a module is not accounted for, the stage is marked with "MND" (Module Not Declared).
MND is used when we cannot define a typical scenario.

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Life cycle stages covered by the Life Cycle Assessment (LCA)

Manufacturing stage (A3)

The manufacturing process of Boral's normal class concrete, lower carbon concrete and special concrete products is by mixing concrete constituents comprising of cement and supplementary cementitious materials (SCM) (AS 3972/AS 3582.1,2), and fine/coarse aggregates (AS 2758.1), plus admixtures/additives (AS 1478.1) and water (AS 1379) directly in the truck referred to as the dry batch method, or in selected locations pre-mixing in a wet mix fashion, before delivery by agitator truck.

The entire process is covered under AS 1379 Specification and Supply of concrete and verified by third party under ISO9001. This manufacturing stage (A3) includes activities associated with sourcing and delivery of individual concrete constituents, up to the point of mixing at the batch plant, but not including delivery and placement of concrete at the project location. This is typically described as the Cradle (A1) to Gate (A3) life cycle.

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Life Cycle Assessment (LCA) methodology

Background data

Boral has supplied primary data from key quarries and concrete production sites. Two concrete production sites Launceston (Invermay) and Hobart (Derwent Park) provided primary data. The LCA shows that these sites are representative for the Launceston and Hobart regions. Data for admixtures have been sourced from EPDs published in December 2015 by EFCA (European Federation of Concrete Admixtures Associations Ltd.) (EFCA 2015a–e). Background data (e.g. for energy and transport processes, cement and blast furnace slag) have predominantly been sourced from AusLCI and the AusLCI shadow database.

The Tasmanian quarry data and concrete production data have been collected for calendar year 2018. The vast majority of the environmental profiles of our products are based on life cycle data that are less than five years old. Background data used is less than 10 years old.

Methodological choices have been applied in line with EN 15804 (CEN 2013); deviations have been recorded.

Representative plants in each region

Boral operates three concrete plants in Tasmania. This EPD covers a sub-section of our concrete plants located in two key regions:

- **Boral Concrete Launceston**
- **Boral Concrete Hobart**

Legend

- Plants that are being modelled in the Tasmania premix EPD.
- Surrounding plants covered in the Tasmania premix EPD scope.

Life Cycle Assessment (LCA) methodology

Allocation

The key material production processes that require allocation are:

Cement

Boral manufactures concrete using GP cement from Boral's Geelong cement plant, inclusive of limestone mineral addition.

Pre-mix concrete

Boral manufactures a range of pre-mix concrete products at its sites. Energy use for concrete production has been allocated to the products based on a volume basis (total m^3 of pre-mix concrete products).

Aggregates

Aggregates are produced through crushing of rock, which is graded in different sizes. The energy required for the crushing and screening does not differentiate between products. Therefore, aggregate production (including manufactured sand) has been allocated based on the mass of product.

Blast Furnace Slag (BFS)

BFS Is a by-product from steel-making. We have used the AusLCI data for BFS ('Blast Furnace Slag allocation, at steel plant/AU U'), which contain impacts from pig iron production allocated to blast furnace slag using economic allocation. As drying and grinding of BFS occurs at our Maldon site, we have used Boral's energy data for these processess rather than the default AusLCI data.

Cut-off criteria

The contribution of capital goods (production equipment and infrastructure) and personnel is excluded, as these processes are non-attributable and they contribute less than 10% to GWP-GHG.

The amount of packaging used for admixtures is well below the materiality cut-off and these materials have been excluded.

Key assumptions

Admixture data

Are based on generic AusLCI data for organic and inorganic chemicals.

Water consumption

Is not measured consistently across quarries. We have used AusLCI water consumption data per tonne of coarse and fine aggregates instead.

Blast Furnace Slag (BFS)

Receives some environmental impacts from pig iron production. This allocation decision has an effect on the environmental profile of products that use Ground-Granulated Blast Furnace Slag (GGBFS).

Product composition

Content declaration (% by weight)

TABLE 2. TASMANIA PRODUCT COMPOSITIONS

Constituent (% by weight)	NORMAL CLASS GP BLEND	HIGH STRENGTH	VICROADS	ENVISIA®*
General purpose cement	10–21%	19–25%	16–21%	8–13%
Ground granulated blast furnace slag	–	–	–	3–9%
Coarse aggregate	34–43%	40–43%	38–45%	36–41%
Manufactured sand	11–23%	8–18%	8–10%	9–17%
Natural sand	15–30%	15–21%	19–39%	19–28%
Admixtures	<0.12%	<0.15%	<0.18%	<0.3%
Water	7–8%	7–10%	7–9%	7–9%

*May include Zep® technology.

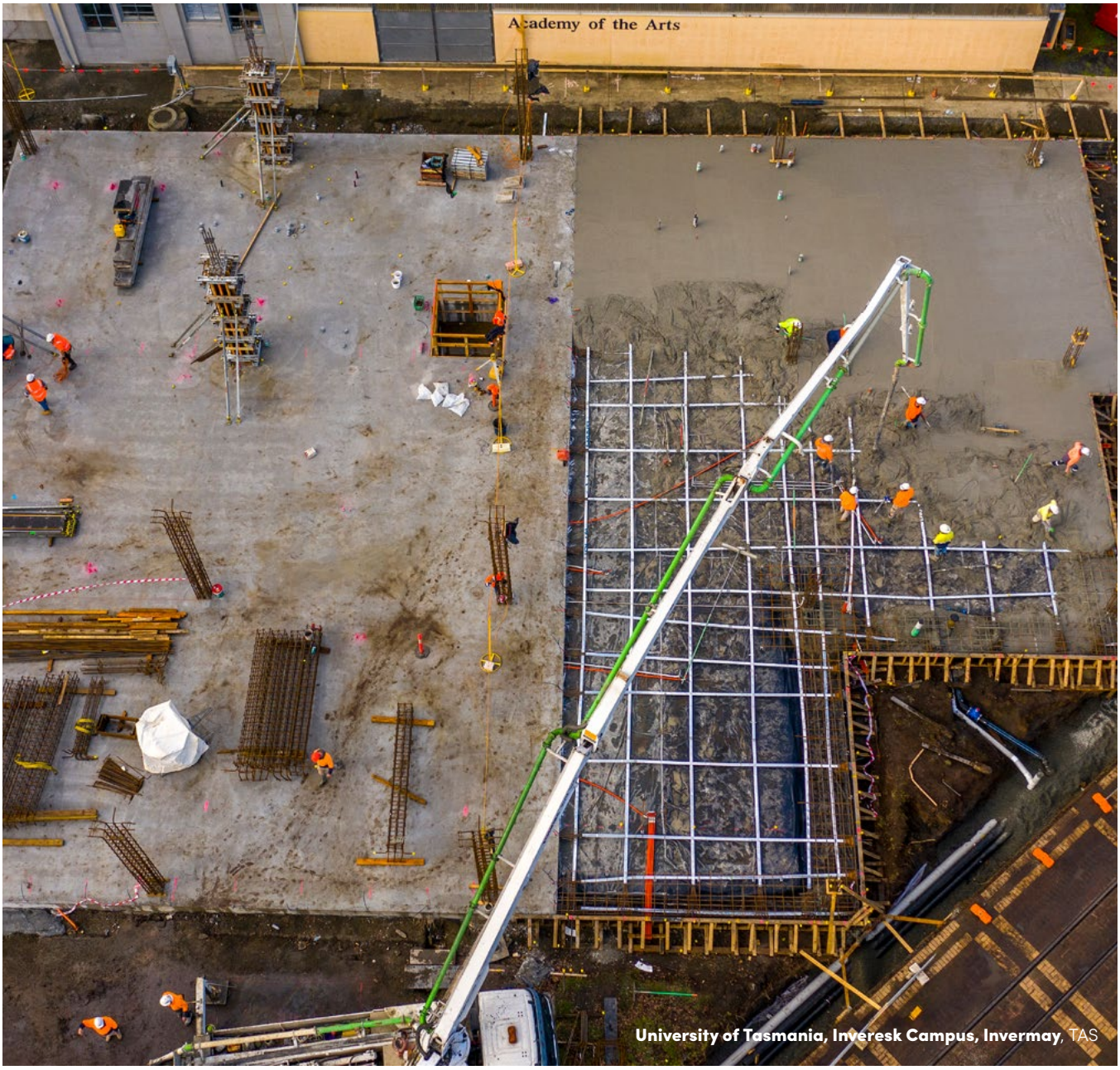
The products as supplied are non-hazardous. The products included in this EPD do not contain any substances of very high concern as defined by European REACH regulation in concentrations >0.1% (m/m).

Declared unit

The background LCA serves as the foundation for this EPD. An LCA analyses the environmental processes in the value chain of a product. It provides a comprehensive evaluation of all upstream (and sometimes downstream) material and energy inputs and outputs. The results are provided for a range of environmental impact categories, in line with EN 15804.

Pre-mix concrete is available in various strength grades and with characteristics that are specifically designed for each application. The declared unit that covers all of the products is: **One cubic metre (m^3) of pre-mix concrete (as ordered by client) with a given strength grade and identifying characteristics.** This declared unit has been adapted from the sub-PCR (Environdec 2020b).

All results are presented per declared unit.



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Environmental indicators

TABLE 3. PARAMETERS DESCRIBING RESOURCE USE, WASTE AND OUTPUT FLOWS

Resource use	Acronym	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	**PERE**	MJ_{NCV}
Use of renewable primary energy resources used as raw materials	**PERM**	MJ_{NCV}
Total use of renewable primary energy resources	**PERT**	MJ_{NCV}
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	**PENRE**	MJ_{NCV}
Use of non-renewable primary energy resources used as raw materials	**PENRM**	MJ_{NCV}
Total use of non-renewable primary energy resources	**PENRT**	MJ_{NCV}
Use of secondary material	**SM**	kg
Use of renewable secondary fuels	**RSF**	MJ_{NCV}
Use of non-renewable secondary fuels	**NRSF**	MJ_{NCV}
Use of net fresh water	**FW**	m^3
Waste categories		
Hazardous waste disposed	**HWD**	kg
Non-hazardous waste disposed	**NHWD**	kg
Radioactive waste disposed	**RWD**	kg
Output flows		
Components for re-use	**CRU**	kg
Materials for recycling	**MFR**	kg
Materials for energy recovery	**MER**	kg
Exported energy	**EE**	MJ

TABLE 4. IMPACT INCLUDED IN THIS ASSESSMENT

Impact category	Acronym	Unit
Global Warming Potential	**GWP**	kg CO_2 equivalents
Ozone Depletion Potential	**ODP**	kg CFC-11 equivalents
Acidification Potential of Soil and Water	**AP**	kg SO_2 equivalents
Eutrophication Potential	**EP**	kg PO_4^{3-} equivalents
Photochemical Ozone Creation Potential	**POCP**	kg C_2H_4 equivalents
Abiotic Depletion Potential for Mineral Elements	**ADPE**	kg Sb equivalents
Abiotic Depletion Potential for Fossil Fuels	**ADPF**	MJ

Environmental profiles

The cradle-to-gate (module A1-A3) environmental profiles and environmental parameters of each product group are expressed per m³ of pre-mix concrete (volume as ordered by the client).

Limitations

The results of this study and the EPD are valid for Boral products only. Products from other manufacturers will likely have different impacts due to differences in mix designs, supply chains and manufacturing processes. The main limitations of the LCA results are found in the parameter results, which are highly dependent on background data.

The environmental parameters are based on the life cycle inventory.
There is some ambiguity around their presentation, and issues to note include:

- **Hazardous waste disposal (HWD)** is derived from background LCI data.
- **Non-hazardous waste disposal (NHWD)** is derived from background LCI data.
- **Radioactive waste disposal (RWD)** is derived from background LCI data. Radioactive waste is only coming through the EPD data for admixtures, unless the life cycle contains clinker manufactured overseas. .

Variation (A1-A3) per impact category

Derwent Park and Bridgewater plants being on like mix designs and materials means that the results for our Derwent Park site in Hobart are also valid for our Bridgewater site in Hobart.

Hobart region

Environmental profiles and parameters

Product table list

Hobart region

In each region, we start with presenting a summary of the cradle-to-gate carbon footprint (GWP summary) of our concrete mixes.

Normal class concrete products

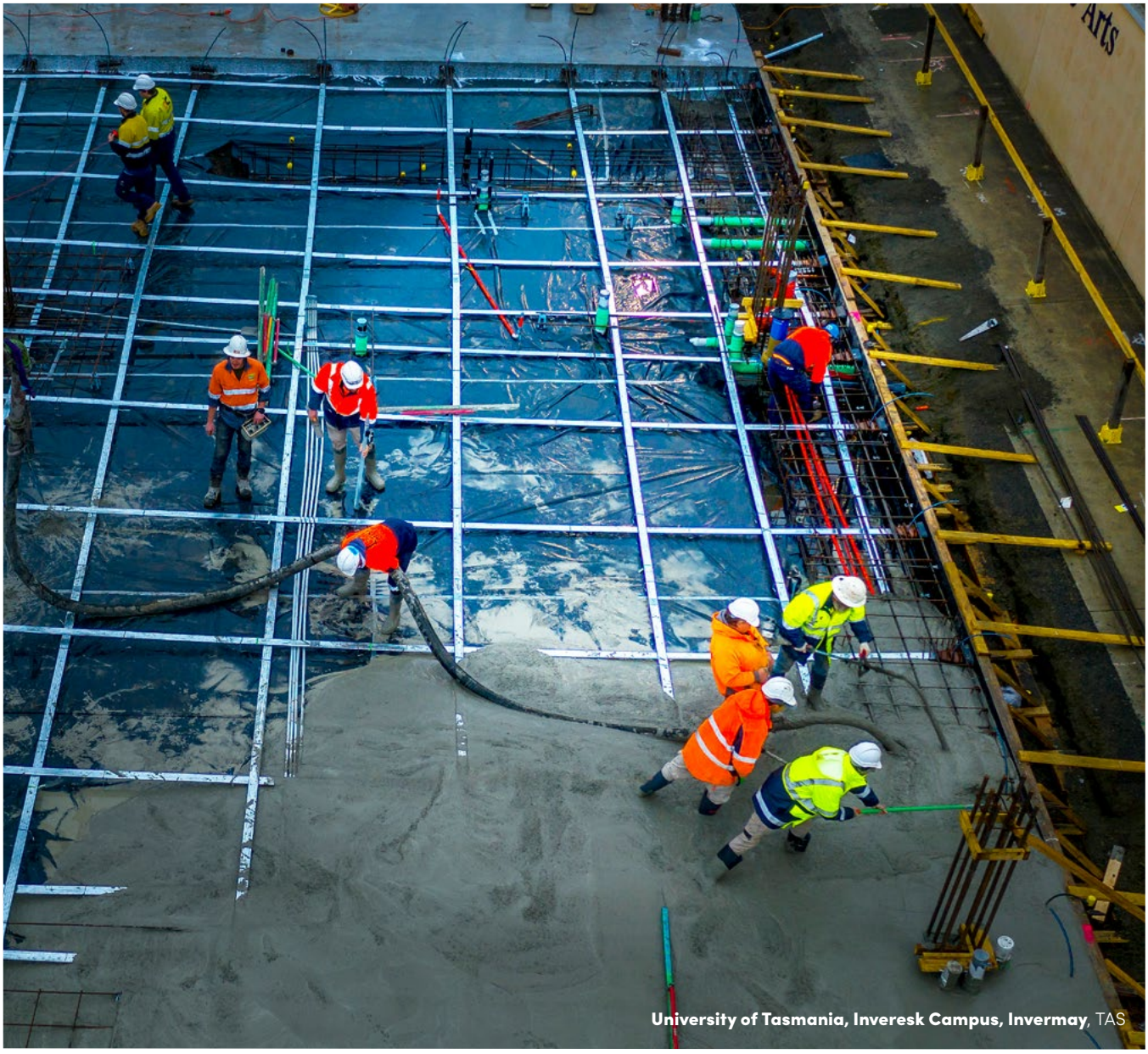
- NORMAL CLASS GP BLEND 20 MPa
- NORMAL CLASS GP BLEND 25 MPa
- NORMAL CLASS GP BLEND 32 MPa
- NORMAL CLASS GP BLEND 40 MPa
- NORMAL CLASS GP BLEND 50 MPa

Lower carbon concrete products

- ENVISIA® 25 MPa
- ENVISIA® 32 MPa
- ENVISIA® 40 MPa
- ENVISIA® 50 MPa

Concrete for special applications

- HIGH STRENGTH 50 MPa
- HIGH STRENGTH 65 MPa
- VICROADS VR400 40 MPa 20 mm PUMP B1 EXPOSURE
- VICROADS VR450 50 MPa 20 mm TREMIE B2 / CFA C1 EXPOSURE



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Cradle-to-gate GWP-GHG summary (kg CO_2 eq/m^3)

Hobart region

NORMAL CLASS GP BLEND 20MPa	NORMAL CLASS GP BLEND 25MPa	NORMAL CLASS GP BLEND 32MPa	NORMAL CLASS GP BLEND 40MPa	NORMAL CLASS GP BLEND 50MPa
291	308	340	422	552
ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	
280	300	371	432	
HIGH STRENGTH 50 MPa	HIGH STRENGTH 65 MPa	Vicroads VR400 40 MPa 20mm PUMP B1 EXPOSURE	VICROADS VR450 50 MPA 20MM TREMIE B2 EXPOSURE / CFA C1 EXPOSURE	
552	675	504	569	

Hobart region

TABLE 1. ENVIRONMENTAL PROFILES (A1-A3), NORMAL CLASS CONCRETE, HOBART (TAS), PER M^3

Impact category	Unit	NORMAL CLASS GP BLEND 20MPA	NORMAL CLASS GP BLEND 25MPA	NORMAL CLASS GP BLEND 32MPA	NORMAL CLASS GP BLEND 40MPA	NORMAL CLASS GP BLEND 50MPA
GWP	**kg CO_2 eq**	**291**	**308**	**340**	**422**	**552**
ODP	kg CFC-11 eq	6.05E-06	6.29E-06	6.76E-06	8.02E-06	9.97E-06
AP	kg SO_2 eq	0.927	0.978	1.077	1.330	1.73
EP	kg PO_4^{3-} eq	0.145	0.152	0.167	0.205	0.265
POCP	kg C_2H_2 eq	0.0434	0.0455	0.0497	0.0605	0.0775
ADPE	kg Sb eq	2.09E-06	2.20E-06	2.43E-06	2.94E-06	3.70E-06
ADPF	MJ	2030	2140	2350	2860	3680

TABLE 2. ENVIRONMENTAL PARAMETERS (A1-A3), NORMAL CLASS CONCRETE, HOBART (TAS), PER M^3

Parameter	Unit	NORMAL CLASS GP BLEND 20MPA	NORMAL CLASS GP BLEND 25MPA	NORMAL CLASS GP BLEND 32MPA	NORMAL CLASS GP BLEND 40MPA	NORMAL CLASS GP BLEND 50MPA
PERE	MJ_{NCV}	2.83E+01	2.94E+01	3.14E+01	3.62E+01	4.36E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.83E+01	2.94E+01	3.14E+01	3.62E+01	4.36E+01
PENRE	MJ_{NCV}	2.03E+03	2.14E+03	2.34E+03	2.86E+03	3.68E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	2.03E+03	2.14E+03	2.34E+03	2.86E+03	3.68E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	1.34E+01	1.43E+01	1.59E+01	2.00E+01	2.66E+01
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.41E+00	4.49E+00	4.63E+00	4.97E+00	5.41E+00
HW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	kg	5.29E-02	5.54E-02	6.06E-02	7.29E-02	9.19E-02
RW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Hobart region

TABLE 3. ENVIRONMENTAL PROFILES (A1-A3), LOWER CARBON CONCRETE, HOBART (TAS), PER M^3

Impact category	Unit	ENVISIA 25MPA	ENVISIA 32MPA	ENVISIA 40MPA	ENVISIA 50MPA
GWP	**kg CO_2 eq**	**280**	**300**	**371**	**432**
ODP	kg CFC-11 eq	8.16E-06	8.65E-06	1.04E-05	1.29E-05
AP	kg SO_2 eq	0.936	1.000	1.230	1.45
EP	kg PO_4^{3-} eq	0.149	0.159	0.194	0.230
POCP	kg C_2H_2 eq	0.0461	0.0491	0.0595	0.0704
ADPE	kg Sb eq	3.39E-06	3.67E-06	4.51E-06	4.62E-06
ADPF	MJ	2280	2440	2980	3550

TABLE 4. ENVIRONMENTAL PARAMETERS (A1-A3), LOWER CARBON CONCRETE, HOBART (TAS), PER M^3

Parameter	Unit	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa
PERE	MJ_{NCV}	3.64E+01	3.86E+01	4.53E+01	5.54E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.64E+01	3.86E+01	4.53E+01	5.54E+01
PENRE	MJ_{NCV}	2.28E+03	2.44E+03	2.98E+03	3.55E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	2.28E+03	2.44E+03	2.98E+03	3.55E+03
SM	kg	8.89E+01	9.39E+01	1.19E+02	2.07E+02
RSF	MJ_{NCV}	1.10E+01	1.18E+01	1.48E+01	1.64E+01
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.32E+00	4.64E+00	4.93E+00	4.98E+00
HW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	kg	1.46E-01	1.55E-01	1.92E-01	2.91E-01
RW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Hobart region

TABLE 5. ENVIRONMENTAL PROFILES (A1-A3), CONCRETE FOR SPECIAL APPLICATIONS, HOBART (TAS), PER M^3

Impact category	Unit	HIGH STRENGTH 50 MPA	HIGH STRENGTH 65 MPA	VICROADS VR400 40 MPA 20MM PUMP B1 EXPOSURE	VICROADS VR450 50 MPA 20MM TREMIE B2 EXPOSURE / CFA C1 EXPOSURE
GWP	**kg CO_2 eq**	**552**	**675**	**504**	**569**
ODP	kg CFC-11 eq	9.97E-06	1.19E-05	9.35E-06	1.03E-05
AP	kg SO_2 eq	1.73	2.12	1.59	1.79
EP	kg PO_4^{3-} eq	0.265	0.322	0.243	0.273
POCP	kg C_2H_2 eq	0.0775	0.0938	0.0715	0.0800
ADPE	kg Sb eq	3.70E-06	4.43E-06	3.58E-06	3.99E-06
ADPF	MJ	3680	4470	3400	3810

TABLE 6. ENVIRONMENTAL PARAMETERS (A1-A3), CONCRETE FOR SPECIAL APPLICATIONS, HOBART (TAS), PER M^3

Parameter	Unit	HIGH STRENGTH 50 MPa	HIGH STRENGTH 65 MPa	Vicroads VR400 40 MPa 20mm PUMP B1 EXPOSURE	Vicroads VR450 50 MPa 20mm TREMIE B2 EXPOSURE / CFA C1 EXPOSURE
PERE	MJ_{NCV}	4.36E+01	5.04E+01	4.08E+01	4.46E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.36E+01	5.04E+01	4.08E+01	4.46E+01
PENRE	MJ_{NCV}	3.68E+03	4.46E+03	3.39E+03	3.81E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	3.68E+03	4.46E+03	3.39E+03	3.81E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	2.66E+01	3.29E+01	2.41E+01	2.74E+01
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	5.41E+00	5.74E+00	5.20E+00	5.42E+00
HW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	kg	9.19E-02	1.10E-01	8.50E-02	9.47E-02
RW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Launceston region

Environmental profiles and parameters

Product table list

Launceston region

In each region, we start with presenting a summary of the cradle-to-gate carbon footprint (GWP summary) of our concrete mixes.

Normal class concrete products

Lower carbon concrete products

Concrete for special applications

University of Tasmania, Inveresk Campus, Invermay, TAS

Cradle-to-gate GWP-GHG summary (kg CO_2 eq/m^3)

Launceston region

NORMAL CLASS GP BLEND 20MPa	NORMAL CLASS GP BLEND 25MPa	NORMAL CLASS GP BLEND 32MPa	NORMAL CLASS GP BLEND 40MPa	NORMAL CLASS GP BLEND 50MPa
290	305	337	410	541
ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	
273	292	359	417	
HIGH STRENGTH 50 MPa	HIGH STRENGTH 65 MPa	Vicroads VR400 40 MPa 20mm PUMP B1 EXPOSURE	VICROADS VR450 50 MPA 20MM TREMIE B2 EXPOSURE / CFA C1 EXPOSURE	
541	655	448	522	

Launceston region

TABLE 1. ENVIRONMENTAL PROFILES (A1-A3), NORMAL CLASS CONCRETE, LAUNCESTON (TAS), PER M^3

Impact category	Unit	NORMAL CLASS GP BLEND 20MPA	NORMAL CLASS GP BLEND 25MPA	NORMAL CLASS GP BLEND 32MPA	NORMAL CLASS GP BLEND 40MPA	NORMAL CLASS GP BLEND 50MPA
GWP	**kg CO_2 eq**	**290**	**305**	**337**	**410**	**541**
ODP	kg CFC-11 eq	5.70E-06	5.80E-06	6.17E-06	6.97E-06	8.44E-06
AP	kg SO_2 eq	0.931	0.976	1.073	1.293	1.69
EP	kg PO_4^{3-} eq	0.145	0.151	0.165	0.198	0.256
POCP	kg C_2H_2 eq	0.0438	0.0455	0.0496	0.0586	0.0749
ADPE	kg Sb eq	2.11E-06	2.22E-06	2.55E-06	2.90E-06	3.70E-06
ADPF	MJ	1980	2070	2270	2700	3500

TABLE 2. ENVIRONMENTAL PARAMETERS (A1-A3), NORMAL CLASS CONCRETE, LAUNCESTON (TAS), PER M^3

Parameter	Unit	NORMAL CLASS GP BLEND 20MPA	NORMAL CLASS GP BLEND 25MPA	NORMAL CLASS GP BLEND 32MPA	NORMAL CLASS GP BLEND 40MPA	NORMAL CLASS GP BLEND 50MPA
PERE	MJ_{NCV}	3.53E+01	3.63E+01	3.84E+01	4.25E+01	5.02E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.53E+01	3.63E+01	3.84E+01	4.25E+01	5.02E+01
PENRE	MJ_{NCV}	1.98E+03	2.07E+03	2.27E+03	2.70E+03	3.50E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	1.98E+03	2.07E+03	2.27E+03	2.70E+03	3.50E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	1.37E+01	1.45E+01	1.62E+01	2.00E+01	2.69E+01
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.32E+00	4.38E+00	4.53E+00	4.79E+00	5.27E+00
HW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	kg	4.92E-02	5.16E-02	5.69E-02	6.76E-02	8.74E-02
RW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Launceston region

TABLE 3. ENVIRONMENTAL PROFILES (A1-A3), LOWER CARBON CONCRETE, LAUNCESTON (TAS), PER M^3

Impact category	Unit	ENVISIA 25MPA	ENVISIA 32MPA	ENVISIA 40MPA	ENVISIA 50MPA
GWP	**kg CO_2 eq**	**273**	**292**	**359**	**417**
ODP	kg CFC-11 eq	7.54E-06	7.90E-06	9.26E-06	1.13E-05
AP	kg SO_2 eq	0.915	0.975	1.191	1.39
EP	kg PO_4^{3-} eq	0.145	0.154	0.187	0.219
POCP	kg C_2H_2 eq	0.0451	0.0480	0.0575	0.067
ADPE	kg Sb eq	3.40E-06	3.69E-06	4.53E-06	4.62E-06
ADPF	MJ	2180	2320	2820	3330

TABLE 4. ENVIRONMENTAL PARAMETERS (A1-A3), LOWER CARBON CONCRETE, LAUNCESTON (TAS), PER M^3

Parameter	Unit	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa
PERE	MJ_{NCV}	4.35E+01	4.54E+01	5.20E+01	6.20E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.35E+01	4.54E+01	5.20E+01	6.20E+01
PENRE	MJ_{NCV}	2.19E+03	2.32E+03	2.83E+03	3.34E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	2.19E+03	2.32E+03	2.83E+03	3.34E+03
SM	kg	8.89E+01	9.39E+01	1.19E+02	2.07E+02
RSF	MJ_{NCV}	1.10E+01	1.18E+01	1.48E+01	1.64E+01
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.25E+00	4.56E+00	4.85E+00	4.88E+00
HW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	kg	1.42E-01	1.51E-01	1.88E-01	2.86E-01
RW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Launceston region

TABLE 5. ENVIRONMENTAL PROFILES (A1-A3), CONCRETE FOR SPECIAL APPLICATIONS, LAUNCESTON (TAS), PER M^3

Impact category	Unit	HIGH STRENGTH 50 MPA	HIGH STRENGTH 65 MPA	VICROADS VR400 40 MPA 20MM PUMP B1 EXPOSURE	VICROADS VR450 50 MPA 20MM TREMIE B2 EXPOSURE / CFA C1 EXPOSURE
GWP	**kg CO_2 eq**	**541**	**655**	**448**	**522**
ODP	kg CFC-11 eq	8.44E-06	9.63E-06	7.40E-06	8.23E-06
AP	kg SO_2 eq	1.69	2.03	1.411	1.63
EP	kg PO4- eq	0.256	0.306	0.215	0.247
POCP	kg C_2H_2 eq	0.0749	0.0888	0.0635	0.0726
ADPE	kg Sb eq	3.70E-06	4.44E-06	3.87E-06	4.33E-06
ADPF	MJ	3500	4180	2980	3420

TABLE 6. ENVIRONMENTAL PARAMETERS (A1-A3), CONCRETE FOR SPECIAL APPLICATIONS, LAUNCESTON (TAS), PER M^3

Parameter	Unit	HIGH STRENGTH 50 MPa	HIGH STRENGTH 65 MPa	Vicroads VR400 40 MPa 20mm PUMP B1 EXPOSURE	Vicroads VR450 50 MPa 20mm TREMIE B2 EXPOSURE / CFA C1 EXPOSURE
PERE	MJ_{NCV}	5.02E+01	5.70E+01	4.61E+01	5.04E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	5.02E+01	5.70E+01	4.61E+01	5.04E+01
PENRE	MJ_{NCV}	3.50E+03	4.18E+03	2.98E+03	3.42E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	3.50E+03	4.18E+03	2.98E+03	3.42E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	2.69E+01	3.29E+01	2.19E+01	2.58E+01
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	5.27E+00	5.61E+00	5.06E+00	5.30E+00
HW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	kg	8.74E-02	1.05E-01	7.62E-02	8.73E-02
RW	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

References

AS 3972
General purpose and blended cements.

AS 3582.1
Supplementary cementitious materials
Part 1: Fly Ash.

AS 3582.2
Supplementary cementitious materials
Part 2: Slag – Ground granulated blast furnace.

AS 2758.1
Aggregates and rock for engineering purposes
Part 1: Concrete Aggregates.

AS 1478.1
Chemical admixtures for concrete, mortar and grout
Part 1: Admixtures for concrete.

ACLCA 2019
American Center for Life Cycle Assessment (ACLCA), *ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017*, PCR Committee, May 2019.

CEN 2013
EN 15804:2012+A1:2013, S*ustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*, European Committee for Standardization (CEN), Brussels, November 2013.

CEN 2017
EN 16757:2017, *Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements,* European Committee for Standardization (CEN), Brussels, November 2017.

EFCA 2015a
EPD of Plasticizer and superplasticizer, IBU EPD Declaration number EPD-EFC-20150091-IAG1-EN, issued 14-09-2015, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA – European Federation of Concrete Admixtures Associations.

EFCA 2015b
EPD of Retarders, IBU EPD Declaration number EPD-EFC-20150088-IAG1-EN, issued 14-09-2015, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA – European Federation of Concrete Admixtures Associations.

EFCA 2015c
EPD of Air entrainers, IBU EPD Declaration number EPD-EFC-20150086-IAG1-EN, issued 14-09-2015, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA – European Federation of Concrete Admixtures Associations.

Environdec 2020a
PCR2012:01 (version 2.33), Product category rules according to ISO 14025 and EN 15804, *Combined PCR and PCR Basic Module for Construction products and Construction services*, registration number 2012:01, published on 18 September 2020.

Environdec 2020b
PCR 2012:01-Sub-PCR-G, *Product category rules Concrete and concrete element*s, 18 September 2020.

ISO 2006a
ISO 14040:2006 Environmental management – *Life cycle assessment – Principles and framework,* International Organization for Standardization, Geneva, Switzerland, 2006.

ISO 2006b
ISO14044:2006, *Environmental management – Life cycle assessment – Requirements and guidelines,* International Organization for Standardization, Geneva, Switzerland, 2006.

ISO 2006c
ISO14025:2006, E*nvironmental labels and declarations – Type III environmental declarations – Principles and procedures,* International Organization for Standardization, Geneva, Switzerland, 2006.

Main Roads Specification 820
Bridge Major Structures, Concrete for Structures.

SA 2007
AS 1379:2007 Specification and supply of concrete, prepared by Committee BD-049 Manufacture of Concrete, published on 20 September 2007 (and reconfirmed in 2017) by Standards Australia, Sydney.

Timm et al. 2019
JFG Timm et al 2019, *Sensitivity Analysis of Life Cycle Impacts Distribution Methods Choice Applied to Silica Fume Production*, IOP Conf, Ser.: Earth Environ, Sci 323 012131.

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