BORAL™

Boral NSW and ACT
Pre-mix Concrete EPD

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804

EPD Registration Number S-P-02336
Issued 15th October 2021 | Valid until 1st April 2026
Geographical Scope: NSW/ACT - Sydney, Newcastle, Wollongong, Canberra.

Contents

BORAL™

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 (e.g. ENVISIA® and Envirocrete®) 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.

Declaration Owner		
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EPD Program Operator		
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Program information and verification

EPD Version:	1.1
	Description of the changes: We have updated the EPD in line with our new branding. The content has not changed.
Reference year for data:	2018-01-01/2018-12-31

CEN standard EN 15804 served as the core PCR	
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: Massimo Marino. 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

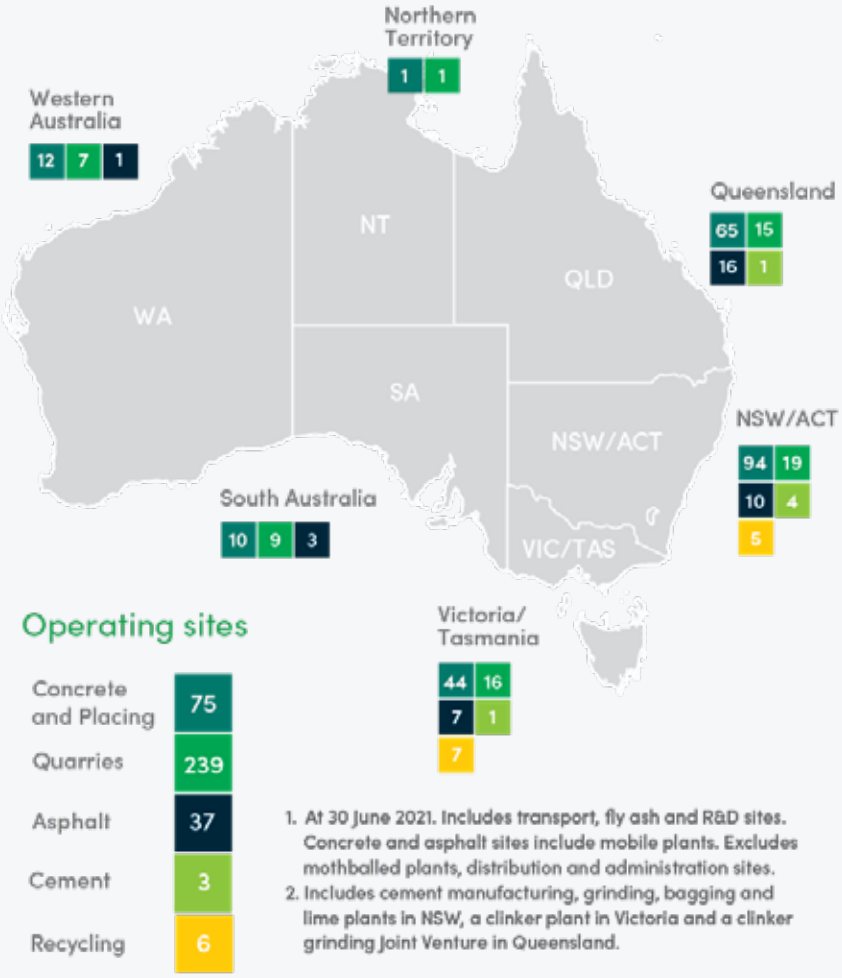
About Boral

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 230 pre-mix concrete plants around Australia producing a wide range of concrete mixes in metropolitan and country areas.

In Western Australia, 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 Perth.



1. At 30 June 2021. Includes transport, fly ash and R&D sites. Concrete and asphalt sites include mobile plants. Excludes mothballed plants, distribution and administration sites.
2. Includes cement manufacturing, grinding, bagging and lime plants in NSW, a clinker plant in Victoria and a clinker grinding Joint Venture in Queensland.

How we work

At Boral, we have a culture of 'working together' with a focus on Zero Harm Today. This ensures all of 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.

Innovation and technical capability

The Innovation Factory is Boral's in-house centre of excellence responsible for developing advanced cement and concrete solutions for our customers. Through consultation with our customers, the Innovation Factory is central to enabling transformation through innovative products at Boral.

Our focus on engagement and action is backed by intensive research and development through our dedicated and talented team who work in collaboration with many sections of the company to create a world of future generations will be proud of.

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 specialised testing as well as extensive quality control testing 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 quality managers 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 are we the only Australian construction materials company to maintain a full-service construction materials laboratory in Australia, **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; and
- Allow for continuous improvement.

Boral laboratory facilities have a quality management system that meets international standards and they 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.

About Boral

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, and
- Be a socially responsible member of the communities in which we operate.

In recent years, we have substantially reshaped our business to respond and adapt to changing commercial, technological, and environmental factors. We have invested in growing our lower carbon concrete products.

We are increasing our investment in innovation to enable us to expand our products and solutions that have a lower carbon footprint and thereby positively contribute to an effective transition to a lower carbon economy.

Boral's ENVISIA® and Envirocrete®/Plus products underpin this improved sustainable concrete range. We monitor and report on our sustainability performance to drive progress and continuous improvement and are responding to increasing expectations of our customers on the disclosure of our sustainability risks and opportunities.

About Boral

Our commitment

Our overarching goal is to deliver Zero Harm Today. This means we target zero injuries to our people and seek to eliminate adverse environmental impacts. Where elimination is not possible, we seek to minimise any harmful effects from our operations. At an absolute minimum, this means complying with environmental legislation, regulations, standards and codes of practice.

- Reducing greenhouse gas emissions from our processes, operations and facilities.
- Reducing waste in all forms including through the efficient use of energy, conservation of water, minimising 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.

Crown Sydney, NSW

Geographical scope

NSW/ACT (Overall Region)

The concrete plants considered for this Environmental Product Declaration comprise those in the state of New South Wales and the Australian Capital Territory, comprising four sub-regions in the greater Newcastle, Sydney, Wollongong and Canberra areas. Individual plants were assessed for life cycle assessment, and local surrounding similar raw material sources were included in the datasets. These sub regions, and modelled plants, including geographically nearby plants are listed in the following location maps.

- Boral Concrete St Peters – Sydney NSW
- Boral Concrete Port Kembla – Wollongong/South Coast/Illawarra NSW
- Boral Concrete Jesmond – Newcastle/Hunter NSW
- Boral Concrete Mitchell – Canberra ACT

Red pins = plants that are being modelled in NSW/ACT EPD

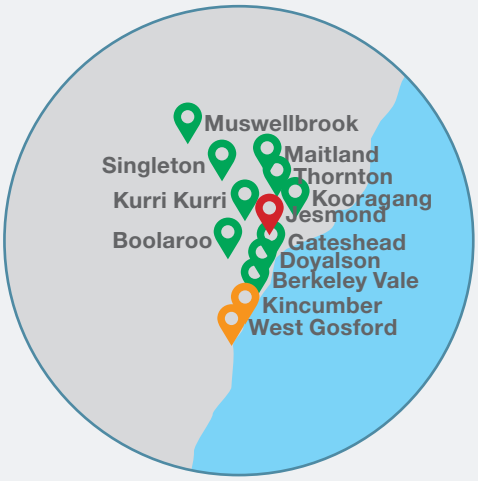
Green pins = surrounding plants covered in NSW/ACT EPD scope

Orange pins = out of scope for the NSW/ACT EPD

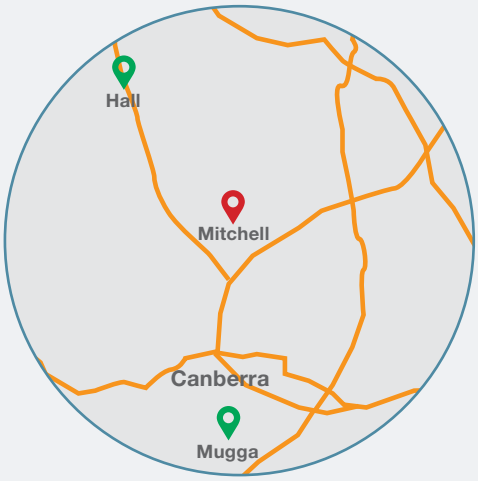
Geographical scope

Boral Concrete St Peters – Sydney NSW

Boral Concrete Port Kembla – Wollongong/South Coast/Illawarra NSW



Boral Concrete Jesmond – Newcastle/Hunter NSW



Boral Concrete Mitchell - Canberra ACT

Red pins = plants that are being modelled in NSW/ACT EPD

Green pins = surrounding plants covered in NSW/ACT EPD scope

Orange pins = out of scope for the NSW/ACT EPD

Declared products

Products considered for the NSW/ACT 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). The normal class concrete products have been grouped according to the cement blend they contain as follows.

Normal Class concrete category	Cementitious type
Normal Class GP blend	General Purpose (GP) cement
Normal Class GP/FA blend	General Purpose (GP) cement and fly ash (FA)
Normal Class GP/GGBFS blend	General Purpose (GP) cement and ground granulated blast furnace slag (GGBFS)
Normal Class GP/GGBFS/FA blend	General Purpose (GP), ground granulated blast furnace slag (GGBFS) and fly ash (FA)

2) Lower Carbon Concrete Products

Lower carbon concrete products have been designed to have low portland cement contents and low embodied carbon contents. The lower carbon concrete products have been further categorised according to their portland cement reduction and their performance, as per the sub categories below.

Lower Carbon Concrete Product	Portland cement reduction*	Typical properties
Envirocrete® 30%	≥30%	• Complies with AS 1379
Envirocrete® 40%	≥40%	• Complies with AS 1379
Envirocrete® Plus	≥45%	• Complies with AS 1379 • Improved early age strength and drying shrinkage compared to the Envirocrete® products
ENVISIA®	≥50%	• Complies with AS 1379 • Improved early age strength and drying shrinkage compared to the Envirocrete® and Envirocrete® Plus products

* The percentages indicate the typical portland cement reduction against default concrete mixes as defined in the Green Star and IS Rating tools by the Green Building Council of Australia (GBCA) and Infrastructure Sustainability Council of Australia (ISCA) respectively.

Declared products

Envirocrete® Concrete

Boral's Envirocrete® concrete is a lower carbon concrete product which complies with AS 1379. It contains supplementary cementitious materials to reduce the portland cement content. Envirocrete® has a minimum portland cement reduction of 40% compared to the GBCA and ISCA reference case. Envirocrete® is ideal for general applications where high-performance concrete is not required.

Envirocrete® Plus Concrete

Boral's Envirocrete® Plus concrete is a lower carbon concrete product which complies with AS 1379. It contains supplementary cementitious materials to reduce the portland cement and the minimum reduction in portland cement compared to the GBCA and ISCA reference case is 45%. Envirocrete® Plus also has enhanced engineering properties compared to the Envirocrete® range. The early age strength and drying shrinkage are superior to Envirocrete®.

Declared products

ENVISIA® Concrete

Boral's ENVISIA® concrete is a lower carbon concrete product which complies with AS 1379 and has excellent engineering properties. It has a low portland cement content and a high supplementary cementitious content which results in reduced greenhouse gas emissions. 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 compliance with the Green Building Council of Australia (GBCA) or the Infrastructure Sustainability Council of Australia (ISCA).

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. The low shrinkage of ENVISIA® will allow for more engineering options such as the design of larger slabs with fewer joints.

Superior Durability

- ENVISIA® provides improved durability, through greater protection to steel reinforcement againstchloride 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 colour oxides.

Special concrete products

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.

Declared products

Products covered by this environmental product declaration

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.

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
- Normal CLASS GP/FA BLEND 20 MPA
- Normal CLASS GP/FA BLEND 25 MPA
- Normal CLASS GP/FA BLEND 32 MPA
- Normal CLASS GP/FA BLEND 40 MPA
- Normal CLASS GP/FA BLEND 50 MPA
- Normal CLASS GP/GGBFS BLEND 20 MPA
- Normal CLASS GP/GGBFS BLEND 25 MPA
- Normal CLASS GP/GGBFS BLEND 32 MPA
- Normal CLASS GP/GGBFS BLEND 40 MPA
- Normal CLASS GP/GGBFS BLEND 50 MPA
- Normal CLASS GP/GGBFS/FA BLEND 20 MPA
- Normal CLASS GP/GGBFS/FA BLEND 25 MPA
- Normal CLASS GP/GGBFS/FA BLEND 32 MPA
- Normal CLASS GP/GGBFS/FA BLEND 40 MPA
- Normal CLASS GP/GGBFS/FA BLEND 50 MPA

Lower Carbon Concrete Products

- ENVIROCRETE® 30% 20 MPA
- ENVIROCRETE® 30% 25 MPA
- ENVIROCRETE® 30% 32 MPA
- ENVIROCRETE® 30% 40 MPA
- ENVIROCRETE® 30% 50 MPA
- ENVIROCRETE® 40% 20 MPA
- ENVIROCRETE® 40% 25 MPA
- ENVIROCRETE® 40% 32 MPA
- ENVIROCRETE® 40% 40 MPA
- ENVIROCRETE® 40% 50 MPA
- ENVIROCRETE® PLUS 20 MPA
- ENVIROCRETE® PLUS 25 MPA
- ENVIROCRETE® PLUS 32 MPA
- ENVIROCRETE® PLUS 40 MPA
- ENVIROCRETE® PLUS 50 MPA
- ENVISIA® 20 MPA
- ENVISIA® 25 MPA
- ENVISIA® 32 MPA
- ENVISIA® 40 MPA
- ENVISIA® 50 MPA
- ENVISIA® 65 MPA
- ENVISIA® 80 MPA

Concrete for Special Applications

- POST TENSIONED 40 MPA 22@3
- POST TENSIONED 40 MPA 22@4
- POST TENSIONED 40 MPA 22@5
- HIGH SLUMP 50 MPA
- HIGH SLUMP 65 MPA
- HIGH SLUMP 80 MPA
- TREMIE 40 MPA
- TREMIE 50 MPA
- TREMIE 65 MPA
- SHOTCRETE 40 MPA
- KERB MACHINE 25 MPA
- KERB MACHINE 32 MPA
- NO FINES 6:1
- STABILISED SAND 14:1
- STABILISED SAND 4:1
- STABILISED SAND 8:1
- TfNSW B80 40 MPA 20MM PUMP B1 EXPOSURE
- TfNSW B80 40 MPA 20MM PUMP B2 EXPOSURE
- TfNSW B80 40 MPA 20MM TREMIE B2 EXPOSURE
- TfNSW B80 50 MPA 10MM TREMIE CFA C1 EXPOSURE
- TfNSW B80 50 MPA 20MM PUMP B2 EXPOSURE
- TfNSW B80 50 MPA 20MM TREMIE B2 EXPOSURE
- TfNSW R82 5 MPA 20MM HAND/ MACHINE PLACED
- TfNSW R83 35 MPA 20MM HAND/ MACHINE PLACED

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.

A batching plant stores the ingredients in cement silos, aggregate bins and admixture tanks.

The plants use calibrated weigh scales and flow meters to accurately weigh the ingredients which are then mixed in a mixer compliant with item C3 of AS 1379. Most concrete plants mix the concrete in a transit mixer (concrete truck) which then delivers the concrete to the project. However, some plants use a stationary mixer before discharging the mixed concrete into a concrete truck which then delivers the concrete 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.

Residential apartments one-central-park - NSW.

ENVISIA® case study

BORAL™

Case Study
ENVISIA® Concrete

Overview

Customer
Lend Lease Building Pty Ltd

Project name
Crown-Barangaroo

Segment
Commercial

Location
Sydney CBD, New South Wales

Concret/Volume
ENVISIA® (Flatwork and Infills)

Crown Sydney - Barangaroo

Project

Crown Sydney is a major highlight of the 22-hectare Barangaroo project, which is an innovative redevelopment transforming a former container terminal alongside Sydney Harbour into a multi-faceted space. Crown Sydney will feature a casino, luxury apartments and the city's first six star hotel.

Concrete was supplied from a bespoke onsite batch plant that pumped into four separate lines to cover the entire site. Boral's project involvement also extends to concrete placement through De Martin and Gasparini.

What was the customer looking for:

- Offer a Boral concrete solution to assist the client to meet its ambitious sustainability goal - a 20% reduction in embodied carbon across the entire site versus standard methods of construction.
- Tailored concrete mix designs to optimise results under demanding pumping conditions, continuous high volume pours and within a congested Sydney Harbour site layout.
- Boral built a tailored onsite batch plant to substantially reduce traffic movements – in line with the project's safety and sustainability goals.
- Boral developed a centralised pumping system to substantially reduce the need for agitators on site.

What could Boral offer:

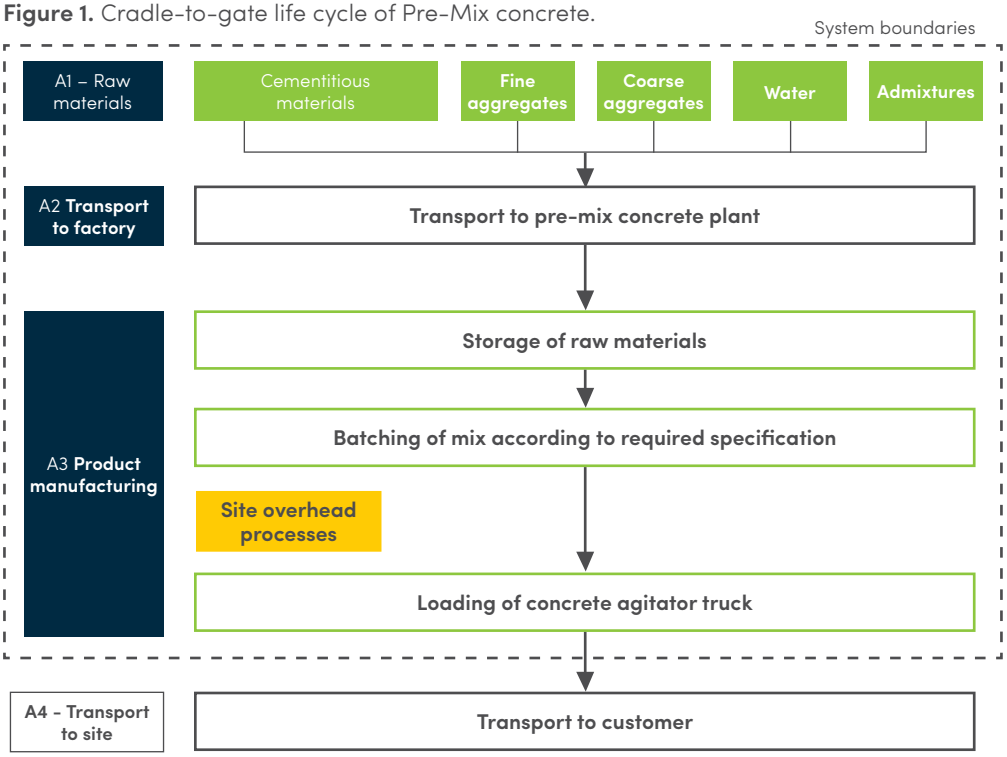
- 383,000m^3 Total concrete volume across Barangaroo South.
- Boral supplied ENVISIA® lower carbon concrete[1] and Green Star 3[2] customised concrete mixes to support world leading sustainable targets.
- Boral's purpose built onsite concrete batch plant -
  - substantially reduces traffic movements to site and on site;
  - is designed for a demanding pumping environment;
  - supplies directly into four concrete pumps, sending concrete up to 300 lineal metres before pumping up the towers.
- Unique long line concrete mix options to solve difficult pumping environment of long distances plus high towers.
- Australian first for Boral in commercial/residential construction - Agitators not needed for majority of pours.
- Elimination of testing cylinders, for early age strength, through temperature cylinders.

For more information please visit www.boral.com.au/envisia

Cradle-to-gate life cycle

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) & AS 1379 Specification and Supply of Concrete (SA 2007/R2017):

- AS/NZS 3972: General purpose and blended cements (SA 2010)
- AS 3582.1 Supplementary cementitious materials Part 1: Fly Ash (SA 2016)
- AS 3582.2 Supplementary cementitious materials Part 2: Slag - Ground granulated blast furnace (SA 2016)
- AS 2758.1 Aggregates and rock for engineering purposes Part 1: Concrete Aggregates (SA 2014)
- AS 1478.1 Chemical admixtures for concrete, mortar and grout (SA 2000)

Cradle-to-gate life cycle

Transportation Stage A2

Raw materials are typically transported to our sites via articulated trucks or by train. Coarse aggregates, manufactured sands and natural sands are sourced from our network of quarries. Shrinkage Ltd Cement (GP), Enviroment® slag cement and ZEP® slag cement is supplied by Boral Cement from their facilities in Berrima and Maldon. Fly ash is sourced from the power stations at Eraring, Mount Piper and Bayswater.

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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			Scenario		Scenario							Scenario				
✔	✔	✔	**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.

Punchbowl Mosque NSW.

Cradle-to-gate life cycle

Manufacturing Stage A3

The typical 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) cycle, of the boundary conditions for concrete life cycle inventory.

Gold leaf Punchbowl Mosque NSW.

Life Cycle Assessment (LCA) Methodology

Background Data

Boral has supplied primary data from key quarries, cement production facilities and concrete production sites. Four concrete production sites (St. Peters, ACT/Mitchell, Port Kembla and Jesmond) provided primary data. The LCA shows that these sites are representative for key regions in NSW/ACT. Data for admixtures have been sourced from EPDs published in December 2015 by EFCA (European Federation of Concrete Admixtures Associations) (EFCA 2015a-e). Background data (e.g. for energy and transport processes, blast furnace slag and fly ash) have predominantly been sourced from AusLCI and the AusLCI shadow database.

The NSW quarry data, cement production 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 96 concrete plants in New South Wales and the Australian Capital Territory. This EPD covers a sub-section of our concrete plants located in four key regions:

- Jesmond for Newcastle/Hunter Valley/Central Coast (NSW)
- St. Peters for Sydney (NSW)
- Port Kembla for Wollongong/Illawarra/South Coast/Southern Highlands (NSW)
- Mitchell for Canberra (ACT)

Our background LCA report shows that a single plant is representative for surrounding plants that have similar supply chains and mix designs.

Plants that are being modelled in NSW/ACT premix EPD

Life Cycle Assessment (LCA) Methodology

Allocation

The key material production processes that require allocation are:

- **Pre-mix concrete:** Boral manufactures a range of pre-mix concrete products at its sites. At each manufacturing site, energy use for concrete production has been allocated to the products based on a volume basis (total m3 of pre-mix concrete products).
- **Cementitious binders:** Boral produces clinker in Berrima and various types of cementitious products in Berrima and Maldon. Raw materials have been modelled based on product compositions. Energy use and process emissions for clinker production have been attributed to clinker and off-white clinker based on their mass. Energy use for cementitious material production has been attributed to all co-products based on their mass.
- **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.
- **BFS:** blast furnace slag (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. As drying and grinding of BFS occurs at our Maldon site, we have used Boral's energy data for these processes, rather than the default AusLCI data.
- **Fly ash:** fly ash is a by-product from coal-fired power plants. We have used the AusLCI data for fly ash, in which all environmental impacts of the power plant are allocated to the main product: electricity. Fly ash has only received the burdens of transport to our sites.

The allocation assumptions were checked using sensitivity analysis, which showed that the allocation of fly ash can have an impact on the LCA results if impacts of electricity production are assigned to fly ash.

Cut-off Criteria

- The contribution of capital goods (production equipment and infrastructure) and personnel is outside the scope of the LCA, in line with the PCR (Environdec 2020a).
- The amount of packaging used for admixtures is well below the materiality cut-off. Nonetheless, packaging materials and quantities are included in the admixture EPD data.

Key Assumptions

- Admixture data are based on generic EPDs that are valid for a range of different chemicals, including the admixtures used by Boral. No EPD has been published for Viscosity Modifying Admixtures (VMA); we have used an average of the five admixture EPDs published by EFCA as a proxy.
- Fly ash is considered a by-product of electricity generation that comes without prior environmental impacts. This allocation decision can have a significant effect on the environmental profile of products that use fly ash.
- Blast furnace slag receives some environmental impacts from pig iron production. This allocation decision has an effect on the environmental profile of products that use ZEP®, Enviroment® cement or ground-granulated blast furnace slag (GGBFS).
- Water consumption is not measured consistently across quarries. We have used AusLCI water consumption data per tonne of coarse and fine aggregates instead.

Product Composition

Content declaration

Table 2. NSW/ACT Region product compositions

Constituent (% by weight)	Normal Class GP blend	Normal Class GP/FA	Normal Class GP/GGBFS blend	Normal Class GP/GGBFS/FA Blend	Envirocrete®
General Purpose cement	11–22%	8–20%	7–13%	5–17%	7–18%
Ground granulated blast furnace slag	–	–	4–9%	2–5%	0–4%
Fly ash	–	3–4%	–	3–5%	2–5%
Silica fume	–	–	–	–	–
Coarse aggregate	38–50%	38–50%	38–50%	38–50%	38–50%
Manufactured sand	0–28%	0–28%	0–28%	0–28%	0–28%
Natural sand	5–37%	5–37%	5–37%	5–37%	5–37%
Admixtures	<0.15%	<0.15%	<0.15%	<0.15%	<0.15%
Water	6–9%	6–9%	6–9%	6–9%	6–9%

Table 3. NSW/ACT Region product composition (Continued).

Components (% m/m)	Envirocrete® Plus*	ENVISIA®*	TfNSW	Special
General Purpose cement	7–14%	5–17%	3–20%	1–24%
Ground granulated blast furnace slag	3–6%	8–12%	0–8%	0–10%
Fly ash	0–3%	0–3%	2–7%	0–6%
Silica fume	–	–	–	<1%
Coarse aggregate	38–50%	36–50%	30–50%	0–67%
Manufactured sand	0–28%	0–30%	0–30%	0–64%
Natural sand	5–37%	6–35%	5–37%	0–65%
Admixtures	<0.3%	<0.6%	<0.3%	<0.4%
Water	6–9%	6–9%	6–9%	3–9%

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). *May include Zep® technology

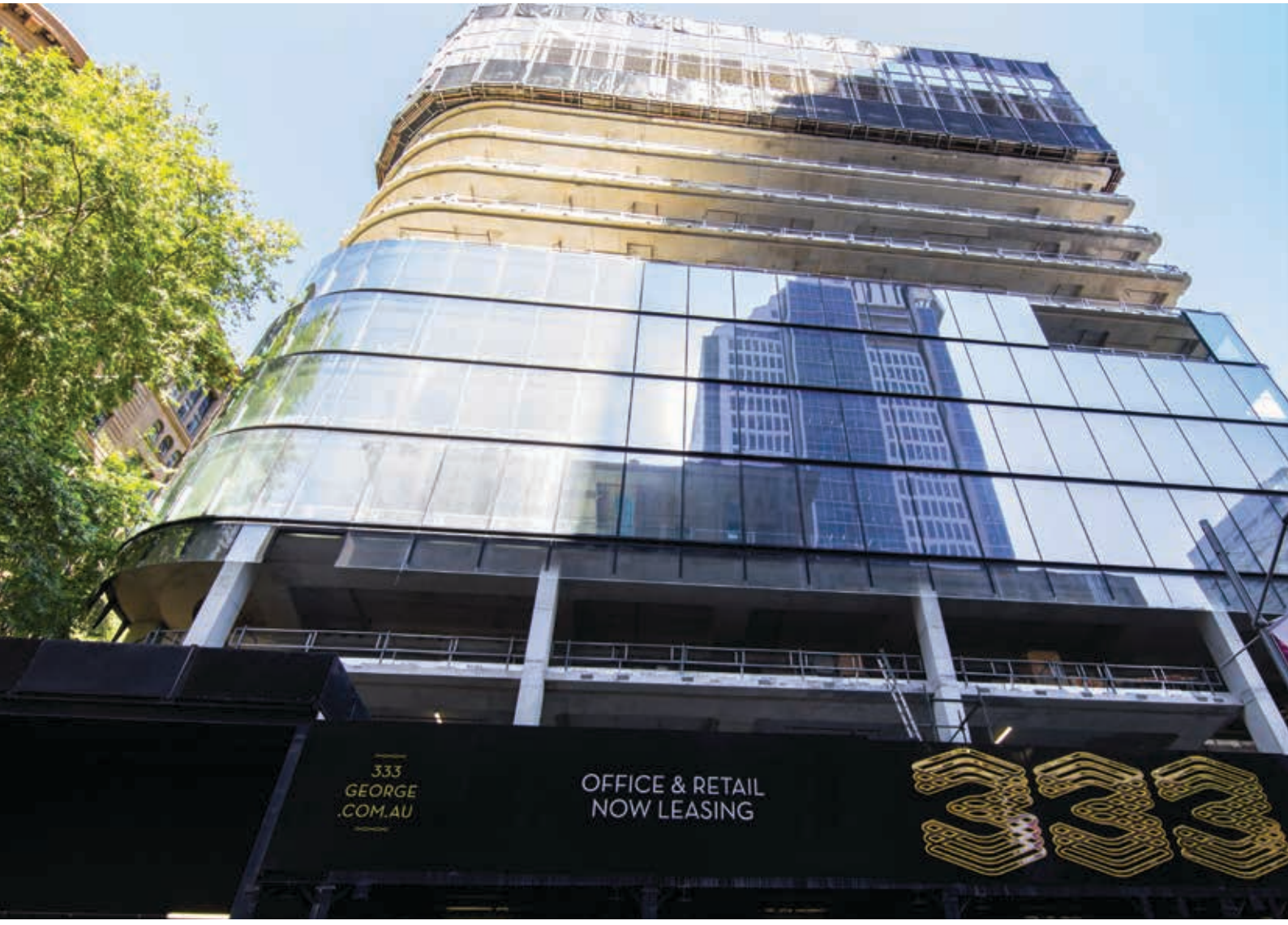
Declared Unit

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 (CEN 2013).

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: 1 cubic metre (m3) 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 and cover the A1-A3 life cycle stages (cradle-to-gate).

The product code for pre-mix concrete is UN CPC 375 (Articles of concrete, cement and plaster) and ANZSIC 20330 (Concrete – ready mixed – except dry mix).



333 George Street Sydney - NSW.

Environmental indicators

Table 4. Impact categories 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

Table 5: 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

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).

Changes from the previous EPD

The results for the Sydney region in this EPD can vary from the results in our previously published Sydney NSW Pre-mix Concrete EPD (S-P-02048). These changes are due to changes in our mix designs from the time of providing Sydney Pre-mix Concrete EPD mix designs until the current EPD, the content of many of the mixes has changes (in particular the portland cement in the Envisia products has been reduced).

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

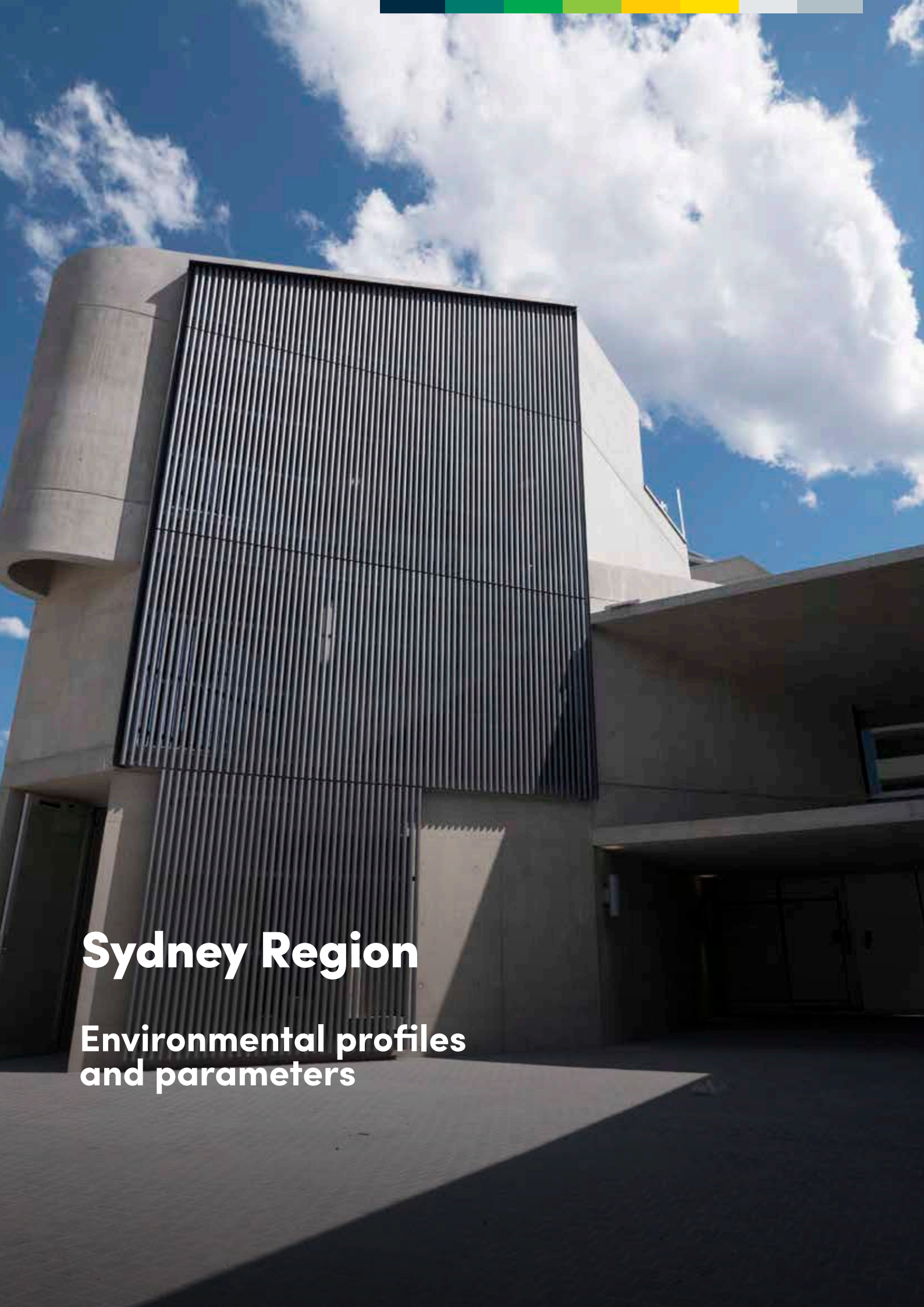
The results of the Sydney (NSW) EPD clearly showed that the GHG emissions of the Sydney (NSW) concrete products are not materially different between the manufacturing sites, with variations generally being less than ±1%. The largest variation (4%) is found in stabilised sand 14:1, as this is the product with the smallest footprint. start2see has analysed the variation for the other mandatory indicators, and can confirm that the variation stays well within the ±10% range as required by the PCR (Environdec 2020a) for most indicators.

The variations in the Sydney (NSW) results are larger than ±10% for ozone layer depletion (ODP) and photochemical oxidant creation (POCP), which is caused by minor differences in aggregate transport.

Aggregates from Peppertree quarry are transported by rail directly to the St. Peters concrete plant. For other concrete plants, aggregates require an additional 20 km (approximately) transport by truck from the receiving rail depot to the concrete plant. We have added an additional truck transport process (30 km per m^3 of concrete) to ensure the St Peters results are representative for the wider Sydney region.

Without this additional transport leg, the St. Peters results for ODP and POCP would be up to 30% lower. The fact that relatively minor changes in the supply chain have such an impact on these indicators, suggests that the emissions are coming from a low (absolute) base.

We believe it is reasonable to use a single plant per region as representative for the wider region.



Sydney Region

Environmental profiles and parameters

Product table list

Normal Class Concrete Products

Table No. 1 and 2

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

Table No. 3 and 4

NORMAL CLASS GP/FA BLEND 20 MPA
NORMAL CLASS GP/FA BLEND 25 MPA
NORMAL CLASS GP/FA BLEND 32 MPA
NORMAL CLASS GP/FA BLEND 40 MPA
NORMAL CLASS GP/FA BLEND 50 MPA

Table No. 5 and 6

NORMAL CLASS GP/GGBFS BLEND 20 MPa
NORMAL CLASS GP/GGBFS BLEND 25 MPa
NORMAL CLASS GP/GGBFS BLEND 32 MPa
NORMAL CLASS GP/GGBFS BLEND 40 MPa
NORMAL CLASS GP/GGBFS BLEND 50 MPa

Table No. 7 and 8

NORMAL CLASS GP/GGBFS/FA BLEND 20 MPa
NORMAL CLASS GP/GGBFS/FA BLEND 25 MPa
NORMAL CLASS GP/GGBFS/FA BLEND 32 MPa
NORMAL CLASS GP/GGBFS/FA BLEND 40 MPa
NORMAL CLASS GP/GGBFS/FA BLEND 50 MPa

Lower Carbon Concrete Products

Table No. 9 and 10

ENVIROCRETE® 30% 20 MPa
ENVIROCRETE® 30% 25 MPa
ENVIROCRETE® 30% 32 MPa
ENVIROCRETE® 30% 40 MPa
ENVIROCRETE® 30% 50 MPa

Table No. 11 and 12

ENVIROCRETE® 40% 20 MPa
ENVIROCRETE® 40% 25 MPa
ENVIROCRETE® 40% 32 MPa
ENVIROCRETE® 40% 40 MPa
ENVIROCRETE® 40% 50 MPa

Table No. 13 and 14

ENVIROCRETE® PLUS 20 MPa
ENVIROCRETE® PLUS 25 MPa
ENVIROCRETE® PLUS 32 MPa
ENVIROCRETE® PLUS 40 MPa
ENVIROCRETE® PLUS 50 MPa

Table No. 15 and 16

ENVISIA® 20 MPa
ENVISIA® 25 MPa
ENVISIA® 32 MPa
ENVISIA® 40 MPa
ENVISIA® 50 MPa
ENVISIA® 65 MPa
ENVISIA® 80 MPa

Concrete for Special Applications

Table No. 17 and 18

POST TENSIONED 40MPA 22@3
POST TENSIONED 40MPA 22@4
POST TENSIONED 40MPA 22@5
HIGH SLUMP 50MPA
HIGH SLUMP 65MPA
HIGH SLUMP 80MPA

Table No. 19 and 20

TREMIE 40MPA
TREMIE 50MPA
TREMIE 65MPA
SHOTCRETE 40MPA
KERB MACHINE 25MPA
KERB MACHINE 32MPA

Table No. 21 and 22

NO FINES 6:1
STABILISED SAND 14:1
STABILISED SAND 8:1
STABILISED SAND 4:1

Table No. 23 and 24

TfNSW B80 40MPA 20MM PUMP B1 EXPOSURE
TfNSW B80 40MPA 20MM PUMP B2 EXPOSURE
TfNSW B80 40MPA 20MM TREMIE B2 EXPOSURE
TfNSW B80 50MPA 10MM TREMIE CFA C1 EXPOSURE

Table No. 25 and 26

TfNSW B80 50MPA 20MM PUMP B2 EXPOSURE
TfNSW B80 50MPA 20MM TREMIE B2 EXPOSURE
TfNSW R82 5MPA 20MM HAND/MACHINE PLACED
TfNSW R83 35MPA 20MM HAND/MACHINE PLACED

Sydney Region

Table 1. Environmental profiles (A1–A3), normal class concrete, Sydney (NSW), per m^3

Indicator	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**	**271**	**288**	**314**	**357**	**454**
ODP	kg CFC11 eq	2.51E-06	2.55E-06	2.59E-06	2.68E-06	2.91E-06
AP	kg SO_2 eq	0.417	0.436	0.465	0.515	0.635
EP	kg PO_4^{3-} eq	0.102	0.106	0.114	0.126	0.155
POCP	kg C_2H_4 eq	0.0297	0.0307	0.0321	0.0346	0.0409
ADPE	kg Sb eq	2.34E-06	2.48E-06	2.77E-06	3.15E-06	8.00E-06
ADPF	MJ_{NCV}	1630	1720	1860	2080	2620

Table 2. Environmental parameters (A1–A3), normal class concrete, Sydney (NSW), 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}	4.02E+01	4.25E+01	4.59E+01	5.15E+01	6.61E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.02E+01	4.25E+01	4.59E+01	5.15E+01	6.61E+01
PENRE	MJ_{NCV}	1.66E+03	1.76E+03	1.89E+03	2.12E+03	2.66E+03
PENRM	MJ_{NCV}	6.23E+00	6.72E+00	7.76E+00	9.07E+00	1.51E+01
PENRT	MJ_{NCV}	1.67E+03	1.76E+03	1.90E+03	2.13E+03	2.67E+03
SM	kg	9.04E+00	9.69E+00	1.07E+01	1.23E+01	1.58E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.22E+00	3.19E+00	3.12E+00	3.07E+00	3.02E+00
HWD	kg	6.68E-06	7.21E-06	8.32E-06	9.73E-06	1.93E-05
NHWD	kg	4.29E-01	4.50E-01	4.83E-01	5.37E-01	1.60E+00
RWD	kg	1.16E-03	1.25E-03	1.45E-03	1.69E-03	3.54E-03
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

Sydney Region

Table 3. Environmental profiles (A1–A3), normal class concrete, Sydney (NSW), per m^3

Indicator	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
GWP	**kg CO_2 eq**	**209**	**230**	**260**	**333**	**421**
ODP	kg CFC11 eq	2.57E-06	2.59E-06	2.64E-06	2.81E-06	3.02E-06
AP	kg SO_2 eq	0.349	0.373	0.407	0.492	0.602
EP	kg PO_4^{3-} eq	0.0844	0.0904	0.0990	0.120	0.147
POCP	kg C_2H_4 eq	0.0278	0.0288	0.0305	0.0348	0.0405
ADPE	kg Sb eq	2.20E-06	2.36E-06	2.65E-06	3.10E-06	7.93E-06
ADPF	MJ_{NCV}	1320	1430	1590	1970	2460

Table 4. Environmental parameters (A1–A3), normal class concrete, Sydney (NSW), per m^3

Parameter	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
PERE	MJ_{NCV}	3.23E+01	3.50E+01	3.90E+01	4.83E+01	6.19E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.23E+01	3.50E+01	3.90E+01	4.83E+01	6.19E+01
PENRE	MJ_{NCV}	1.35E+03	1.46E+03	1.62E+03	2.01E+03	2.50E+03
PENRM	MJ_{NCV}	6.23E+00	6.72E+00	7.76E+00	9.07E+00	1.51E+01
PENRT	MJ_{NCV}	1.36E+03	1.47E+03	1.63E+03	2.02E+03	2.52E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	9.45E+01	9.77E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.19E+00	3.17E+00	3.10E+00	3.06E+00	3.01E+00
HWD	kg	6.68E-06	7.21E-06	8.32E-06	9.73E-06	1.93E-05
NHWD	kg	3.56E-01	3.82E-01	4.20E-01	5.08E-01	1.56E+00
RWD	kg	1.16E-03	1.25E-03	1.45E-03	1.69E-03	3.54E-03
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

Sydney Region

Table 5. Environmental profiles (A1–A3), normal class concrete, Sydney (NSW), per m3

Indicator	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
GWP	**kg CO_2 eq**	**192**	**204**	**221**	**250**	**316**
ODP	kg CFC11 eq	2.57E-06	2.61E-06	2.66E-06	2.75E-06	3.00E-06
AP	kg SO_2 eq	0.337	0.351	0.371	0.407	0.495
EP	kg PO_4^{3-} eq	0.0805	0.0839	0.0890	0.0977	0.118
POCP	kg C_2H_4 eq	0.0277	0.0286	0.0298	0.0319	0.0374
ADPE	kg Sb eq	2.25E-06	2.38E-06	2.66E-06	3.03E-06	7.84E-06
ADPF	MJ_{NCV}	1330	1400	1500	1670	2090

Table 6. Environmental parameters (A1–A3), normal class concrete, Sydney (NSW), per m3

Parameter	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
PERE	MJ_{NCV}	3.30E+01	3.47E+01	3.73E+01	4.17E+01	5.35E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.30E+01	3.47E+01	3.73E+01	4.17E+01	5.35E+01
PENRE	MJ_{NCV}	1.36E+03	1.43E+03	1.53E+03	1.70E+03	2.12E+03
PENRM	MJ_{NCV}	6.23E+00	6.72E+00	7.76E+00	9.07E+00	1.51E+01
PENRT	MJ_{NCV}	1.36E+03	1.43E+03	1.54E+03	1.71E+03	2.14E+03
SM	kg	2.29E+02	2.45E+02	2.70E+02	3.11E+02	4.01E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.21E+00	3.19E+00	3.12E+00	3.07E+00	3.02E+00
HWD	kg	6.68E-06	7.21E-06	8.32E-06	9.73E-06	1.93E-05
NHWD	kg	4.43E-01	4.65E-01	5.00E-01	5.56E-01	1.62E+00
RWD	kg	1.16E-03	1.25E-03	1.45E-03	1.69E-03	3.54E-03
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

Sydney Region

Table 7. Environmental profiles (A1-A3), normal class concrete, Sydney (NSW), per m3

Indicator	Unit	Normal Class GP/GGBFS/FA blend 20 MPa	Normal Class GP/GGBFS/FA blend 25 MPa	Normal Class GP/GGBFS/FA blend 32 MPa	Normal Class GP/GGBFS /FA blend 40 MPa	Normal Class GP/GGBFS/FA blend 50 MPa
GWP	**kg CO_2 eq**	**159**	**175**	**207**	**246**	**378**
ODP	kg CFC11 eq	2.60E-06	2.65E-06	2.74E-06	2.87E-06	2.99E-06
AP	kg SO_2 eq	0.298	0.317	0.356	0.403	0.556
EP	kg PO_4^{3-} eq	0.0712	0.0758	0.0854	0.0970	0.135
POCP	kg C_2H_4 eq	0.0265	0.0275	0.0297	0.0324	0.0389
ADPE	kg Sb eq	2.14E-06	2.28E-06	2.59E-06	2.98E-06	7.86E-06
ADPF	MJ_{NCV}	1130	1210	1400	1620	2280

Table 8. Environmental parameters (A1-A3), normal class concrete, Sydney (NSW), per m3

Parameter	Unit	Normal Class GP/GGBFS/FA blend 20 MPa	Normal Class GP/GGBFS/FA blend 25 MPa	Normal Class GP/GGBFS/FA blend 32 MPa	Normal Class GP/GGBFS/FA blend 40 MPa	Normal Class GP/GGBFS/FA blend 50 MPa
PERE	MJ_{NCV}	2.75E+01	2.97E+01	3.43E+01	3.98E+01	5.76E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.75E+01	2.97E+01	3.43E+01	3.98E+01	5.76E+01
PENRE	MJ_{NCV}	1.15E+03	1.24E+03	1.43E+03	1.65E+03	2.32E+03
PENRM	MJ_{NCV}	6.23E+00	6.72E+00	7.76E+00	9.07E+00	1.51E+01
PENRT	MJ_{NCV}	1.16E+03	1.25E+03	1.44E+03	1.66E+03	2.33E+03
SM	kg	2.26E+02	2.41E+02	2.72E+02	3.09E+02	1.78E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.18E+00	3.16E+00	3.10E+00	3.06E+00	3.01E+00
HWD	kg	6.68E-06	7.21E-06	8.32E-06	9.73E-06	1.93E-05
NHWD	kg	3.55E-01	3.81E-01	4.35E-01	5.01E-01	1.55E+00
RWD	kg	1.16E-03	1.25E-03	1.45E-03	1.69E-03	3.54E-03
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

Sydney Region

Table 9. Environmental profiles (A1-A3), lower carbon concrete, Sydney (NSW), per m3

Indicator	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
GWP	**kg CO_2 eq**	**209**	**230**	**260**	**312**	**393**
ODP	kg CFC11 eq	2.57E-06	2.59E-06	2.64E-06	2.83E-06	3.04E-06
AP	kg SO_2 eq	0.349	0.373	0.407	0.471	0.573
EP	kg PO_4^{3-} eq	0.0844	0.0904	0.0990	0.115	0.139
POCP	kg C_2H_4 eq	0.0278	0.0288	0.0305	0.0342	0.0398
ADPE	kg Sb eq	2.20E-06	2.36E-06	2.65E-06	3.08E-06	7.89E-06
ADPF	MJ_{NCV}	1320	1430	1590	1890	2350

Table 10. Environmental parameters (A1-A3), lower carbon concrete, Sydney (NSW), per m3

Parameter	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
PERE	MJ_{NCV}	3.23E+01	3.50E+01	3.90E+01	4.64E+01	5.93E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.23E+01	3.50E+01	3.90E+01	4.64E+01	5.93E+01
PENRE	MJ_{NCV}	1.35E+03	1.46E+03	1.62E+03	1.92E+03	2.39E+03
PENRM	MJ_{NCV}	6.23E+00	6.72E+00	7.76E+00	9.07E+00	1.51E+01
PENRT	MJ_{NCV}	1.36E+03	1.47E+03	1.63E+03	1.93E+03	2.41E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	1.53E+02	1.76E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.19E+00	3.17E+00	3.10E+00	3.06E+00	3.01E+00
HWD	kg	6.68E-06	7.21E-06	8.32E-06	9.73E-06	1.93E-05
NHWD	kg	3.56E-01	3.82E-01	4.20E-01	5.12E-01	1.57E+00
RWD	kg	1.16E-03	1.25E-03	1.45E-03	1.69E-03	3.54E-03
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

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Table 11. Environmental profiles (A1–A3), lower carbon concrete, Sydney (NSW), per m^3

Indicator	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
GWP	**kg CO_2 eq**	**191**	**209**	**238**	**282**	**348**
ODP	kg CFC11 eq	2.57E-06	2.60E-06	2.69E-06	2.83E-06	3.00E-06
AP	kg SO_2 eq	0.334	0.354	0.391	0.445	0.525
EP	kg PO_4^{3-} eq	0.0797	0.0846	0.0937	0.107	0.127
POCP	kg C_2H_4 eq	0.0275	0.0285	0.0305	0.0335	0.0381
ADPE	kg Sb eq	4.13E-06	4.38E-06	4.91E-06	5.78E-06	8.19E-06
ADPF	MJ_{NCV}	1270	1360	1530	1780	2170

Table 12. Environmental parameters (A1–A3), lower carbon concrete, Sydney (NSW), per m^3

Parameter	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
PERE	MJ_{NCV}	3.16E+01	3.39E+01	3.81E+01	4.43E+01	5.49E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.16E+01	3.39E+01	3.81E+01	4.43E+01	5.49E+01
PENRE	MJ_{NCV}	1.30E+03	1.39E+03	1.56E+03	1.81E+03	2.20E+03
PENRM	MJ_{NCV}	6.31E+00	6.73E+00	7.57E+00	9.05E+00	1.57E+01
PENRT	MJ_{NCV}	1.31E+03	1.40E+03	1.57E+03	1.82E+03	2.22E+03
SM	kg	1.69E+02	1.69E+02	1.80E+02	2.12E+02	2.74E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.13E+00	3.11E+00	3.16E+00	3.09E+00	2.94E+00
HWD	kg	8.57E-06	9.15E-06	1.03E-05	1.23E-05	2.01E-05
NHWD	kg	9.16E-01	9.73E-01	1.09E+00	1.28E+00	1.63E+00
RWD	kg	1.60E-03	1.71E-03	1.92E-03	2.30E-03	3.70E-03
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

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Table 13. Environmental profiles (A1-A3), lower carbon concrete, Sydney (NSW), per m^3

Indicator	Unit	ENVIROCRETE PLUS 20MPa	ENVIROCRETE PLUS 25MPa	ENVIROCRETE PLUS 32MPa	ENVIROCRETE PLUS 40MPa	ENVIROCRETE PLUS 50MPa
GWP	**kg CO_2 eq**	**186**	**202**	**229**	**272**	**337**
ODP	kg CFC11 eq	2.55E-06	2.58E-06	2.67E-06	2.77E-06	2.99E-06
AP	kg SO_2 eq	0.342	0.361	0.396	0.448	0.538
EP	kg PO_4^{3-} eq	0.0789	0.0834	0.0916	0.104	0.124
POCP	kg C_2H_4 eq	0.0278	0.0287	0.0307	0.0334	0.0387
ADPE	kg Sb eq	4.18E-06	4.44E-06	4.95E-06	5.83E-06	8.28E-06
ADPF	MJ_{NCV}	1290	1370	1520	1760	2170

Table 14. Environmental parameters (A1-A3), lower carbon concrete, Sydney (NSW), per m^3

Parameter	Unit	ENVIROCRETE PLUS 20MPa	ENVIROCRETE PLUS 25MPa	ENVIROCRETE PLUS 32MPa	ENVIROCRETE PLUS 40MPa	ENVIROCRETE PLUS 50MPa
PERE	MJ_{NCV}	3.28E+01	3.50E+01	3.88E+01	4.49E+01	5.64E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.28E+01	3.50E+01	3.88E+01	4.49E+01	5.64E+01
PENRE	MJ_{NCV}	1.31E+03	1.40E+03	1.55E+03	1.79E+03	2.21E+03
PENRM	MJ_{NCV}	6.31E+00	6.73E+00	7.57E+00	9.05E+00	1.57E+01
PENRT	MJ_{NCV}	1.32E+03	1.41E+03	1.56E+03	1.80E+03	2.22E+03
SM	kg	1.26E+02	1.32E+02	1.38E+02	1.49E+02	2.06E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.22E+00	3.15E+00	3.20E+00	3.14E+00	3.02E+00
HWD	kg	8.57E-06	9.15E-06	1.03E-05	1.23E-05	2.01E-05
NHWD	kg	9.46E-01	1.01E+00	1.12E+00	1.31E+00	1.67E+00
RWD	kg	1.60E-03	1.71E-03	1.92E-03	2.30E-03	3.70E-03
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

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Table 15. Environmental profiles (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Indicator	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
GWP	**kg CO_2 eq**	**176**	**184**	**198**	**249**	**324**	**343**	**422**
ODP	kg CFC11 eq	2.68E-06	2.71E-06	2.77E-06	2.93E-06	3.02E-06	3.15E-06	3.25E-06
AP	kg SO_2 eq	0.360	0.379	0.402	0.462	0.546	0.582	0.666
EP	kg PO_4^{3-} eq	0.0786	0.0813	0.0857	0.101	0.123	0.131	0.154
POCP	kg C_2H_4 eq	0.0297	0.0309	0.0324	0.0361	0.0401	0.0436	0.0479
ADPE	kg Sb eq	2.72E-06	7.25E-06	8.14E-06	1.17E-05	1.49E-05	2.48E-05	3.10E-05
ADPF	MJ_{NCV}	1360	1440	1540	1840	2240	2460	2880

Table 16. Environmental parameters (A1-A3), lower carbon concrete, Sydney (NSW), per m^3

Parameter	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
PERE	MJ_{NCV}	3.58E+01	3.89E+01	4.20E+01	5.08E+01	6.16E+01	7.20E+01	8.74E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	2.89E-02	3.85E-02	7.93E-02	1.97E-01
PERT	MJ_{NCV}	3.58E+01	3.89E+01	4.20E+01	5.08E+01	6.17E+01	7.21E+01	8.76E+01
PENRE	MJ_{NCV}	1.39E+03	1.46E+03	1.57E+03	1.87E+03	2.26E+03	2.48E+03	2.90E+03
PENRM	MJ_{NCV}	7.82E+00	9.03E+00	1.07E+01	1.53E+01	2.10E+01	3.85E+01	5.42E+01
PENRT	MJ_{NCV}	1.40E+03	1.47E+03	1.58E+03	1.89E+03	2.28E+03	2.52E+03	2.96E+03
SM	kg	1.92E+02	2.07E+02	2.32E+02	3.04E+02	2.87E+02	3.82E+02	3.51E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.39E+00	3.35E+00	3.32E+00	3.25E+00	3.10E+00	3.11E+00	3.14E+00
HWD	kg	8.39E-06	1.37E-05	1.59E-05	2.59E-05	3.45E-05	6.28E-05	9.33E-05
NHWD	kg	5.20E-01	1.74E+00	1.92E+00	2.62E+00	3.18E+00	4.88E+00	5.38E+00
RWD	kg	1.46E-03	2.62E-03	3.04E-03	4.37E-03	5.79E-03	1.03E-02	1.35E-02
CRU	kg	0.00E+00	0.00E+00	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	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00

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Table 17. Environmental profiles (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Indicator	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
GWP	**kg CO_2 eq**	**342**	**335**	**325**	**328**	**379**	**385**
ODP	kg CFC11 eq	2.78E-06	2.73E-06	2.74E-06	2.95E-06	3.10E-06	3.17E-06
AP	kg SO_2 eq	0.511	0.503	0.491	0.505	0.571	0.581
EP	kg PO_4^{3-} eq	0.123	0.121	0.118	0.120	0.136	0.140
POCP	kg C_2H_4 eq	0.0353	0.0350	0.0343	0.0370	0.0413	0.0425
ADPE	kg Sb eq	8.12E-06	1.01E-05	7.91E-06	1.10E-05	1.63E-05	1.69E-05
ADPF	MJ_{NCV}	1980	1950	1890	1980	2320	2410

Table 18. Environmental parameters (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Parameter	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
PERE	MJ_{NCV}	5.12E+01	5.14E+01	4.90E+01	5.22E+01	6.36E+01	6.79E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	3.85E-02	5.58E-02	9.76E-02
PERT	MJ_{NCV}	5.12E+01	5.14E+01	4.90E+01	5.22E+01	6.37E+01	6.80E+01
PENRE	MJ_{NCV}	2.07E+03	2.04E+03	1.98E+03	2.07E+03	2.41E+03	2.49E+03
PENRM	MJ_{NCV}	8.41E+00	1.28E+01	8.21E+00	7.66E+00	2.27E+01	3.26E+01
PENRT	MJ_{NCV}	2.08E+03	2.05E+03	1.99E+03	2.08E+03	2.43E+03	2.53E+03
SM	kg	5.32E+01	5.29E+01	5.15E+01	2.69E+02	3.16E+02	3.30E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.14E+00	3.15E+00	3.18E+00	2.99E+00	2.89E+00	3.10E+00
HWD	kg	1.38E-05	1.95E-05	1.35E-05	1.96E-05	3.91E-05	5.21E-05
NHWD	kg	1.97E+00	2.27E+00	1.91E+00	2.78E+00	3.39E+00	2.85E+00
RWD	kg	2.70E-03	3.74E-03	2.63E-03	3.16E-03	6.33E-03	7.72E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 19. Environmental profiles (A1–A3), concrete for special applications, Sydney (NSW), per m^3

Indicator	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
GWP	kg CO_2 eq	**258**	**335**	**379**	**309**	**252**	**287**
ODP	kg CFC11 eq	2.87E-06	3.02E-06	3.13E-06	2.84E-06	2.64E-06	2.69E-06
AP	kg SO_2 eq	0.447	0.534	0.587	0.477	0.398	0.440
EP	kg PO_4^{3-} eq	0.101	0.123	0.136	0.115	0.096	0.106
POCP	kg C_2H_4 eq	0.0354	0.0395	0.0423	0.0353	0.0299	0.0321
ADPE	kg Sb eq	2.49E-05	2.41E-05	2.58E-05	1.18E-05	1.79E-06	2.35E-06
ADPF	MJ_{NCV}	1700	2090	2330	1860	1460	1650

Table 20. Environmental parameters (A1–A3), concrete for special applications, Sydney (NSW), per m^3

Parameter	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
PERE	MJ_{NCV}	5.05E+01	6.02E+01	6.60E+01	4.98E+01	3.59E+01	4.14E+01
PERM	MJ_{NCV}	9.62E-02	1.11E-01	1.01E-01	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	5.06E+01	6.03E+01	6.61E+01	4.98E+01	3.59E+01	4.14E+01
PENRE	MJ_{NCV}	1.79E+03	2.18E+03	2.42E+03	1.94E+03	1.55E+03	1.75E+03
PENRM	MJ_{NCV}	1.26E+01	1.39E+01	1.40E+01	1.97E+01	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	1.80E+03	2.20E+03	2.44E+03	1.96E+03	1.55E+03	1.75E+03
SM	kg	3.15E+02	2.99E+02	3.16E+02	1.51E+02	1.02E+02	8.25E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.10E+00	3.01E+00	2.91E+00	3.02E+00	3.11E+00	3.11E+00
HWD	kg	4.26E-05	4.42E-05	4.49E-05	2.71E-05	9.03E-07	4.07E-06
NHWD	kg	6.24E+00	5.94E+00	6.43E+00	2.34E+00	6.38E-01	7.05E-01
RWD	kg	6.82E-03	6.76E-03	7.13E-03	5.08E-03	2.11E-04	6.83E-04
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 21. Environmental profiles (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Indicator	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
GWP	**kg CO_2 eq**	**250**	**60**	**94**	**172**
ODP	kg CFC11 eq	2.31E-06	1.64E-06	1.84E-06	2.32E-06
AP	kg SO_2 eq	0.381	0.144	0.190	0.297
EP	kg PO_4^{3-} eq	0.092	0.033	0.044	0.069
POCP	kg C_2H_4 eq	0.0271	0.0152	0.0185	0.0259
ADPE	kg Sb eq	8.66E-07	1.55E-07	2.58E-07	4.98E-07
ADPF	MJ_{NCV}	1430	440	650	1160

Table 22. Environmental parameters (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Parameter	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
PERE	MJ_{NCV}	3.57E+01	1.05E+01	1.57E+01	2.79E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.57E+01	1.05E+01	1.57E+01	2.79E+01
PENRE	MJ_{NCV}	1.52E+03	5.10E+02	7.32E+02	1.25E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	1.52E+03	5.10E+02	7.32E+02	1.25E+03
SM	kg	8.40E+00	1.25E+02	2.18E+02	4.36E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.67E+00	2.48E+00	2.50E+00	2.55E+00
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	3.71E-01	1.53E-01	2.34E-01	4.22E-01
RWD	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

Sydney Region

Table 23. Environmental profiles (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Indicator	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
GWP	**kg CO_2 eq**	**313**	**231**	**235**	**248**
ODP	kg CFC11 eq	2.85E-06	2.95E-06	2.94E-06	3.00E-06
AP	kg SO_2 eq	0.480	0.396	0.411	0.434
EP	kg PO_4^{3-} eq	0.116	0.094	0.096	0.100
POCP	kg C_2H_4 eq	0.0349	0.0332	0.0343	0.0362
ADPE	kg Sb eq	8.17E-06	6.34E-06	1.50E-05	2.17E-05
ADPF	MJ_{NCV}	1840	1540	1610	1720

Table 24. Environmental parameters (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Parameter	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
PERE	MJ_{NCV}	4.77E+01	4.02E+01	4.64E+01	5.34E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	8.46E-02	2.02E-01
PERT	MJ_{NCV}	4.77E+01	4.02E+01	4.65E+01	5.36E+01
PENRE	MJ_{NCV}	1.93E+03	1.63E+03	1.69E+03	1.80E+03
PENRM	MJ_{NCV}	1.11E+01	1.10E+01	1.81E+01	2.28E+01
PENRT	MJ_{NCV}	1.94E+03	1.64E+03	1.71E+03	1.82E+03
SM	kg	1.25E+02	4.06E+02	3.85E+02	4.21E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.16E+00	3.07E+00	3.17E+00	3.14E+00
HWD	kg	1.63E-05	1.45E-05	3.69E-05	5.86E-05
NHWD	kg	1.81E+00	1.36E+00	3.14E+00	4.46E+00
RWD	kg	3.10E-03	2.70E-03	5.40E-03	7.31E-03
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

Sydney Region

Table 25. Environmental profiles (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Indicator	Unit	TfNSW B80 50MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED	TfNSW R83 35MPa 20MM HAND/ MACHINE PLACED
GWP	**kg CO_2 eq**	**239**	**233**	**116**	**289**
ODP	kg CFC11 eq	2.99E-06	2.95E-06	2.55E-06	2.79E-06
AP	kg SO_2 eq	0.408	0.403	0.247	0.447
EP	kg PO_4^{3-} eq	0.096	0.095	0.058	0.108
POCP	kg C_2H_4 eq	0.0341	0.0340	0.0238	0.0328
ADPE	kg Sb eq	8.74E-06	1.26E-05	1.76E-06	4.00E-06
ADPF	MJ_{NCV}	1590	1580	790	1670

Table 26. Environmental parameters (A1-A3), concrete for special applications, Sydney (NSW), per m^3

Parameter	Unit	TfNSW B80 50MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED	TfNSW R83 35MPa 20MM HAND/ MACHINE PLACED
PERE	MJ_{NCV}	4.20E+01	4.39E+01	2.00E+01	4.18E+01
PERM	MJ_{NCV}	0.00E+00	2.40E-02	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.20E+01	4.40E+01	2.00E+01	4.18E+01
PENRE	MJ_{NCV}	1.68E+03	1.66E+03	8.73E+02	1.77E+03
PENRM	MJ_{NCV}	1.37E+01	2.05E+01	2.19E+00	2.19E+00
PENRT	MJ_{NCV}	1.69E+03	1.68E+03	8.75E+02	1.77E+03
SM	kg	4.13E+02	3.87E+02	1.69E+02	1.14E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.00E+00	3.06E+00	3.26E+00	3.20E+00
HWD	kg	1.92E-05	3.10E-05	2.95E-06	4.75E-06
NHWD	kg	1.87E+00	2.49E+00	4.17E-01	1.15E+00
RWD	kg	3.60E-03	5.34E-03	5.49E-04	9.72E-04
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

Newcastle Region

Environmental profiles and parameters

Product table list

Normal Class Concrete Products

Table No. 1 and 2

- 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

Table No. 3 and 4

- NORMAL CLASS GP/FA BLEND 20MPA
- NORMAL CLASS GP/FA BLEND 25MPA
- NORMAL CLASS GP/FA BLEND 32MPA
- NORMAL CLASS GP/FA BLEND 40MPA
- NORMAL CLASS GP/FA BLEND 50MPA

Table No. 5 and 6

- NORMAL CLASS GP/GGBFS BLEND 20MPA
- NORMAL CLASS GP/GGBFS BLEND 25MPA
- NORMAL CLASS GP/GGBFS BLEND 32MPA
- NORMAL CLASS GP/GGBFS BLEND 40MPA
- NORMAL CLASS GP/GGBFS BLEND 50MPA

Lower Carbon Concrete Products

Table No. 7 and 8

- ENVIROCRETE® 30% 20MPA
- ENVIROCRETE® 30% 25MPA
- ENVIROCRETE® 30% 32MPA
- ENVIROCRETE® 30% 40MPA
- ENVIROCRETE® 30% 50MPA

Table No. 9 and 10

- ENVIROCRETE® 40% 20MPA
- ENVIROCRETE® 40% 25MPA
- ENVIROCRETE® 40% 32MPA
- ENVIROCRETE® 40% 40MPA
- ENVIROCRETE® 40% 50MPA

Table No. 11 and 12

- ENVIROCRETE® PLUS 20MPA
- ENVIROCRETE® PLUS 25MPA
- ENVIROCRETE® PLUS 32MPA
- ENVIROCRETE® PLUS 40MPA
- ENVIROCRETE® PLUS 50MPA

Table No. 13 and 14

- ENVISIA® 20MPA
- ENVISIA® 25MPA
- ENVISIA® 32MPA
- ENVISIA® 40MPA
- ENVISIA® 50MPA
- ENVISIA® 65MPA
- ENVISIA® 80MPA

Concrete for Special Applications

Table No. 15 and 16

- POST TENSIONED 40MPA 22@3
- POST TENSIONED 40MPA 22@4
- POST TENSIONED 40MPA 22@5
- HIGH SLUMP 50MPA
- HIGH SLUMP 65MPA
- HIGH SLUMP 80MPA

Table No. 17 and 18

- TREMIE 40MPA
- TREMIE 50MPA
- TREMIE 65MPA
- SHOTCRETE 40MPA
- KERB MACHINE 25MPA
- KERB MACHINE 32MPA

Table No. 19 and 20

- NO FINES 6:1
- STABILISED SAND 14:1
- STABILISED SAND 8:1
- STABILISED SAND 4:1

Table No. 21 and 22

- TfNSW B80 40MPA 20MM PUMP B1 EXPOSURE
- TfNSW B80 40MPA 20MM PUMP B2 EXPOSURE
- TfNSW B80 40MPA 20MM TREMIE B2 EXPOSURE
- TfNSW B80 50MPA 10MM TREMIE CFA C1 EXPOSURE

Table No. 23 and 24

- TfNSW B80 50MPA 20MM TREMIE B2 EXPOSURE
- TfNSW R82 5MPA 20MM HAND/ MACHINE PLACED
- TfNSW R83 35MPA 20MM HAND/ MACHINE PLACED

Newcastle Region

Table 1. Environmental profiles (A1-A3), normal class concrete, Newcastle (NSW), per m^3

Indicator	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**	**263**	**280**	**306**	**349**	**444**
ODP	kg CFC11 eq	2.36E-06	2.41E-06	2.46E-06	2.55E-06	2.79E-06
AP	kg SO_2 eq	0.383	0.404	0.435	0.488	0.603
EP	kg PO_4^{3-} eq	0.0929	0.0980	0.106	0.119	0.147
POCP	kg C_2H_4 eq	0.0290	0.0300	0.0315	0.0340	0.0397
ADPE	kg Sb eq	3.45E-06	3.57E-06	3.93E-06	4.69E-06	5.88E-06
ADPF	MJ_{NCV}	1540	1630	1770	2000	2500

Table 2. Environmental parameters (A1-A3), normal class concrete, Newcastle (NSW), 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}	3.61E+01	3.83E+01	4.18E+01	4.77E+01	6.04E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.61E+01	3.83E+01	4.18E+01	4.77E+01	6.04E+01
PENRE	MJ_{NCV}	1.57E+03	1.66E+03	1.80E+03	2.03E+03	2.54E+03
PENRM	MJ_{NCV}	5.35E+00	5.53E+00	6.14E+00	7.60E+00	1.00E+01
PENRT	MJ_{NCV}	1.58E+03	1.67E+03	1.81E+03	2.04E+03	2.55E+03
SM	kg	9.04E+00	9.69E+00	1.07E+01	1.23E+01	1.58E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.00E+00	3.00E+00	2.97E+00	2.90E+00	2.87E+00
HWD	kg	7.05E-06	7.28E-06	8.09E-06	9.98E-06	1.30E-05
NHWD	kg	7.57E-01	7.89E-01	8.68E-01	1.02E+00	1.26E+00
RWD	kg	1.31E-03	1.35E-03	1.50E-03	1.85E-03	2.40E-03
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

Newcastle Region

Table 3. Environmental profiles (A1–A3), normal class concrete, Newcastle (NSW), per m^3

Indicator	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
GWP	**kg CO_2 eq**	**199**	**220**	**250**	**324**	**410**
ODP	kg CFC11 eq	2.23E-06	2.28E-06	2.35E-06	2.52E-06	2.74E-06
AP	kg SO_2 eq	0.307	0.333	0.369	0.458	0.563
EP	kg PO_4^{3-} eq	0.0739	0.0803	0.0893	0.111	0.137
POCP	kg C_2H_4 eq	0.0255	0.0267	0.0285	0.0328	0.0380
ADPE	kg Sb eq	3.31E-06	3.44E-06	3.81E-06	4.64E-06	5.81E-06
ADPF	MJ_{NCV}	1210	1320	1480	1870	2330

Table 4. Environmental parameters (A1–A3), normal class concrete, Newcastle (NSW), per m^3

Parameter	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
PERE	MJ_{NCV}	2.80E+01	3.08E+01	3.48E+01	4.45E+01	5.61E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.80E+01	3.08E+01	3.48E+01	4.45E+01	5.61E+01
PENRE	MJ_{NCV}	1.24E+03	1.35E+03	1.51E+03	1.90E+03	2.37E+03
PENRM	MJ_{NCV}	5.35E+00	5.53E+00	6.14E+00	7.60E+00	1.00E+01
PENRT	MJ_{NCV}	1.24E+03	1.36E+03	1.52E+03	1.91E+03	2.38E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	9.45E+01	9.77E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.97E+00	2.97E+00	2.94E+00	2.90E+00	2.85E+00
HWD	kg	7.05E-06	7.28E-06	8.09E-06	9.98E-06	1.30E-05
NHWD	kg	6.83E-01	7.21E-01	8.05E-01	9.92E-01	1.23E+00
RWD	kg	1.31E-03	1.35E-03	1.50E-03	1.85E-03	2.40E-03
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

Newcastle Region

Table 5. Environmental profiles (A1–A3), normal class concrete, Newcastle (NSW), per m^3

Indicator	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
GWP	**kg CO_2 eq**	**188**	**200**	**218**	**247**	**313**
ODP	kg CFC11 eq	3.10E-06	3.20E-06	3.33E-06	3.55E-06	4.08E-06
AP	kg SO_2 eq	0.462	0.489	0.528	0.594	0.741
EP	kg PO_4^{3-} eq	0.0838	0.0883	0.0950	0.106	0.132
POCP	kg C_2H_4 eq	0.0344	0.0358	0.0379	0.0413	0.0492
ADPE	kg Sb eq	3.36E-06	3.47E-06	3.81E-06	4.56E-06	5.72E-06
ADPF	MJ_{NCV}	1340	1410	1530	1720	2150

Table 6. Environmental parameters (A1–A3), normal class concrete, Newcastle (NSW), per m^3

Parameter	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
PERE	MJ_{NCV}	2.89E+01	3.06E+01	3.33E+01	3.80E+01	4.79E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.89E+01	3.06E+01	3.33E+01	3.80E+01	4.79E+01
PENRE	MJ_{NCV}	1.37E+03	1.45E+03	1.56E+03	1.76E+03	2.19E+03
PENRM	MJ_{NCV}	5.35E+00	5.53E+00	6.14E+00	7.60E+00	1.00E+01
PENRT	MJ_{NCV}	1.38E+03	1.45E+03	1.57E+03	1.77E+03	2.20E+03
SM	kg	1.22E+02	1.31E+02	1.44E+02	1.65E+02	2.13E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.01E+00	3.01E+00	2.98E+00	2.92E+00	2.88E+00
HWD	kg	7.05E-06	7.28E-06	8.09E-06	9.98E-06	1.30E-05
NHWD	kg	6.84E-01	7.11E-01	7.82E-01	9.22E-01	1.14E+00
RWD	kg	1.31E-03	1.35E-03	1.50E-03	1.85E-03	2.40E-03
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

Newcastle Region

Table 7. Environmental profiles (A1–A3), lower carbon concrete, Newcastle (NSW), per m^3

Indicator	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
GWP	**kg CO_2 eq**	**199**	**220**	**250**	**304**	**385**
ODP	kg CFC11 eq	2.23E-06	2.28E-06	2.35E-06	2.68E-06	2.95E-06
AP	kg SO_2 eq	0.307	0.333	0.369	0.448	0.549
EP	kg PO_4^{3-} eq	0.0739	0.0803	0.0893	0.107	0.132
POCP	kg C_2H_4 eq	0.0255	0.0267	0.0285	0.0337	0.0392
ADPE	kg Sb eq	3.31E-06	3.44E-06	3.81E-06	4.63E-06	5.80E-06
ADPF	MJ_{NCV}	1210	1320	1480	1810	2250

Table 8. Environmental parameters (A1–A3), lower carbon concrete, Newcastle (NSW), per m^3

Parameter	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
PERE	MJ_{NCV}	2.80E+01	3.08E+01	3.48E+01	4.30E+01	5.42E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.80E+01	3.08E+01	3.48E+01	4.30E+01	5.42E+01
PENRE	MJ_{NCV}	1.24E+03	1.35E+03	1.51E+03	1.85E+03	2.29E+03
PENRM	MJ_{NCV}	5.35E+00	5.53E+00	6.14E+00	7.60E+00	1.00E+01
PENRT	MJ_{NCV}	1.24E+03	1.36E+03	1.52E+03	1.85E+03	2.30E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	1.23E+02	1.36E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.97E+00	2.97E+00	2.94E+00	2.91E+00	2.88E+00
HWD	kg	7.05E-06	7.28E-06	8.09E-06	9.98E-06	1.30E-05
NHWD	kg	6.83E-01	7.21E-01	8.05E-01	9.99E-01	1.24E+00
RWD	kg	1.31E-03	1.35E-03	1.50E-03	1.85E-03	2.40E-03
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

Newcastle Region

Table 9. Environmental profiles (A1-A3), lower carbon concrete, Newcastle (NSW), per m^3

Indicator	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
GWP	**kg CO_2 eq**	**183**	**200**	**232**	**276**	**345**
ODP	kg CFC11 eq	2.46E-06	2.49E-06	2.82E-06	2.80E-06	3.12E-06
AP	kg SO_2 eq	0.305	0.326	0.376	0.429	0.527
EP	kg PO_4^{3-} eq	0.0708	0.0758	0.0876	0.0999	0.122
POCP	kg C_2H_4 eq	0.0271	0.0280	0.0320	0.0342	0.0404
ADPE	kg Sb eq	3.14E-06	3.29E-06	3.85E-06	7.09E-06	1.13E-05
ADPF	MJ_{NCV}	1170	1260	2130	1710	2130

Table 10. Environmental parameters (A1-A3), lower carbon concrete, Newcastle (NSW), per m^3

Parameter	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
PERE	MJ_{NCV}	2.66E+01	2.88E+01	3.35E+01	4.15E+01	5.43E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	3.61E-02	8.11E-02
PERT	MJ_{NCV}	2.66E+01	2.88E+01	3.35E+01	4.16E+01	5.44E+01
PENRE	MJ_{NCV}	1.20E+03	1.29E+03	1.50E+03	1.74E+03	2.17E+03
PENRM	MJ_{NCV}	2.01E+00	2.01E+00	2.21E+00	5.31E+00	1.07E+01
PENRT	MJ_{NCV}	1.20E+03	1.29E+03	1.50E+03	1.75E+03	2.18E+03
SM	kg	1.28E+02	1.29E+02	1.30E+02	1.52E+02	1.83E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.97E+00	2.95E+00	3.06E+00	2.88E+00	2.80E+00
HWD	kg	4.00E-06	4.11E-06	4.66E-06	1.38E-05	2.66E-05
NHWD	kg	8.49E-01	9.03E-01	1.06E+00	1.73E+00	2.55E+00
RWD	kg	8.06E-04	8.33E-04	9.48E-04	2.01E-03	3.55E-03
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

Newcastle Region

Table 11. Environmental profiles (A1–A3), lower carbon concrete, Newcastle (NSW), per m^3

Indicator	Unit	ENVIROCRETE PLUS 40% 20 MPa	ENVIROCRETE PLUS 40% 25 MPa	ENVIROCRETE PLUS 40% 32 MPa	ENVIROCRETE PLUS 40% 40 MPa	ENVIROCRETE PLUS 40% 50 MPa
GWP	**kg CO_2 eq**	**179**	**194**	**220**	**265**	**333**
ODP	kg CFC11 eq	2.72E-06	2.71E-06	2.79E-06	2.96E-06	3.40E-06
AP	kg SO_2 eq	0.316	0.334	0.367	0.428	0.531
EP	kg PO_4^{3-} eq	0.0717	0.0759	0.0839	0.0981	0.121
POCP	kg C_2H_4 eq	0.0294	0.0300	0.0318	0.0354	0.0427
ADPE	kg Sb eq	3.18E-06	3.33E-06	3.79E-06	7.10E-06	1.14E-05
ADPF	MJ_{NCV}	1200	1280	1430	1690	2140

Table 12. Environmental parameters (A1–A3), lower carbon concrete, Newcastle (NSW), per m^3

Parameter	Unit	ENVIROCRETE PLUS 40% 20 MPa	ENVIROCRETE PLUS 40% 25 MPa	ENVIROCRETE PLUS 40% 32 MPa	ENVIROCRETE PLUS 40% 40 MPa	ENVIROCRETE PLUS 40% 50 MPa
PERE	MJ_{NCV}	2.72E+01	2.93E+01	3.29E+01	4.12E+01	5.43E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	3.61E-02	8.11E-02
PERT	MJ_{NCV}	2.72E+01	2.93E+01	3.29E+01	4.12E+01	5.44E+01
PENRE	MJ_{NCV}	1.23E+03	1.32E+03	1.46E+03	1.73E+03	2.18E+03
PENRM	MJ_{NCV}	2.01E+00	2.01E+00	2.21E+00	5.31E+00	1.07E+01
PENRT	MJ_{NCV}	1.24E+03	1.32E+03	1.46E+03	1.73E+03	2.19E+03
SM	kg	1.26E+02	1.32E+02	1.38E+02	1.49E+02	2.06E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.11E+00	2.98E+00	2.95E+00	2.90E+00	2.83E+00
HWD	kg	4.00E-06	4.11E-06	4.66E-06	1.38E-05	2.66E-05
NHWD	kg	8.75E-01	9.31E-01	1.07E+00	1.75E+00	2.58E+00
RWD	kg	8.06E-04	8.33E-04	9.48E-04	2.01E-03	3.55E-03
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

Newcastle Region

Table 13. Environmental profiles (A1-A3), lower carbon concrete, Newcastle (NSW), per m^3

Indicator	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
GWP	**kg CO_2 eq**	**176**	**184**	**198**	**249**	**324**	**343**	**422**
ODP	kg CFC11 eq	2.68E-06	2.71E-06	2.77E-06	2.93E-06	3.02E-06	3.15E-06	3.25E-06
AP	kg SO_2 eq	0.360	0.379	0.402	0.462	0.546	0.582	0.666
EP	kg PO_4^{3-} eq	0.0786	0.0813	0.0857	0.101	0.123	0.131	0.154
POCP	kg C_2H_4 eq	0.0297	0.0309	0.0324	0.0361	0.0401	0.0436	0.0479
ADPE	kg Sb eq	2.72E-06	7.25E-06	8.14E-06	1.17E-05	1.49E-05	2.48E-05	3.10E-05
ADPF	MJ_{NCV}	1360	1440	1540	1840	2240	2460	2880

Table 14. Environmental parameters (A1-A3), lower carbon concrete, Newcastle (NSW), per m^3

Parameter	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
PERE	MJ_{NCV}	3.09E+01	3.24E+01	3.52E+01	4.51E+01	5.74E+01	5.19E+01	8.41E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.56E-02	0.00E+00	1.85E-01
PERT	MJ_{NCV}	3.09E+01	3.24E+01	3.52E+01	4.51E+01	5.75E+01	5.19E+01	8.43E+01
PENRE	MJ_{NCV}	1.40E+03	1.46E+03	1.57E+03	1.91E+03	2.29E+03	2.33E+03	2.98E+03
PENRM	MJ_{NCV}	5.61E+00	5.97E+00	6.67E+00	1.16E+01	1.40E+01	0.00E+00	4.94E+01
PENRT	MJ_{NCV}	1.40E+03	1.47E+03	1.58E+03	1.92E+03	2.30E+03	2.33E+03	3.03E+03
SM	kg	1.92E+02	2.07E+02	2.32E+02	2.53E+02	2.37E+02	2.81E+02	2.40E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.16E+00	3.15E+00	3.11E+00	2.96E+00	2.94E+00	3.00E+00	3.08E+00
HWD	kg	6.02E-06	6.40E-06	7.15E-06	1.62E-05	3.08E-05	0.00E+00	8.59E-05
NHWD	kg	4.49E-01	4.74E-01	5.18E-01	1.76E+00	2.74E+00	6.85E-01	5.03E+00
RWD	kg	1.05E-03	1.11E-03	1.24E-03	3.05E-03	4.22E-03	0.00E+00	1.24E-02
CRU	kg	0.00E+00	0.00E+00	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	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00

Newcastle Region

Table 15. Environmental profiles (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Indicator	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
GWP	**kg CO_2 eq**	**335**	**323**	**315**	**427**	**472**	**485**
ODP	kg CFC11 eq	2.78E-06	2.52E-06	2.52E-06	2.71E-06	2.81E-06	3.70E-06
AP	kg SO_2 eq	0.485	0.454	0.445	0.581	0.646	0.700
EP	kg PO_4^{3-} eq	0.117	0.111	0.109	0.142	0.155	0.164
POCP	kg C_2H_4 eq	0.0355	0.0325	0.0321	0.0389	0.0425	0.0505
ADPE	kg Sb eq	7.66E-06	2.55E-06	2.51E-06	5.87E-06	1.35E-05	1.16E-05
ADPF	MJ_{NCV}	1960	1860	1810	2420	2690	2880

Table 16. Environmental parameters (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Parameter	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
PERE	MJ_{NCV}	4.68E+01	4.36E+01	4.25E+01	5.91E+01	6.75E+01	9.64E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.68E+01	4.36E+01	4.25E+01	5.91E+01	6.75E+01	9.64E+01
PENRE	MJ_{NCV}	1.99E+03	1.89E+03	1.85E+03	2.46E+03	2.73E+03	2.90E+03
PENRM	MJ_{NCV}	7.72E+00	7.02E+00	6.84E+00	9.47E+00	9.83E+00	2.16E+01
PENRT	MJ_{NCV}	2.00E+03	1.90E+03	1.85E+03	2.47E+03	2.74E+03	2.92E+03
SM	kg	5.32E+01	5.29E+01	5.78E+01	8.80E+01	5.84E+01	7.92E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.36E+00	2.96E+00	2.96E+00	2.80E+00	2.84E+00	-5.65E+01
HWD	kg	1.29E-05	7.53E-06	7.34E-06	1.60E-05	2.49E-05	2.31E-05
NHWD	kg	1.84E+00	4.38E-01	4.28E-01	1.16E+00	3.27E+00	6.79E-01
RWD	kg	2.51E-03	1.31E-03	1.28E-03	2.80E-03	4.71E-03	4.02E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 17. Environmental profiles (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Indicator	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
GWP	kg CO_2 eq	**258**	**335**	**379**	**309**	**252**	**287**
ODP	kg CFC11 eq	2.87E-06	3.02E-06	3.13E-06	2.84E-06	2.64E-06	2.69E-06
AP	kg SO_2 eq	0.447	0.534	0.587	0.477	0.398	0.440
EP	kg PO_4^{3-} eq	0.101	0.123	0.136	0.115	0.096	0.106
POCP	kg C_2H_4 eq	0.0354	0.0395	0.0423	0.0353	0.0299	0.0321
ADPE	kg Sb eq	2.49E-05	2.41E-05	2.58E-05	1.18E-05	1.79E-06	2.35E-06
ADPF	MJ_{NCV}	1700	2090	2330	1860	1460	1650

Table 18. Environmental parameters (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Parameter	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM	KERB MACHINE 32MPa 10MM
PERE	MJ_{NCV}	4.42E+01	5.54E+01	7.32E+01	4.71E+01	3.35E+01	3.82E+01
PERM	MJ_{NCV}	9.01E-02	9.01E-02	1.71E-01	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.43E+01	5.55E+01	7.34E+01	4.71E+01	3.35E+01	3.82E+01
PENRE	MJ_{NCV}	1.78E+03	2.18E+03	2.71E+03	2.01E+03	1.48E+03	1.65E+03
PENRM	MJ_{NCV}	6.38E+00	1.39E+01	2.27E+01	8.74E+00	6.49E+00	8.34E+00
PENRT	MJ_{NCV}	1.79E+03	2.20E+03	2.74E+03	2.02E+03	1.48E+03	1.66E+03
SM	kg	1.35E+02	1.53E+02	9.94E+01	1.27E+02	1.02E+02	8.25E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.00E+00	2.86E+00	2.88E+00	2.71E+00	3.10E+00	2.98E+00
HWD	kg	2.17E-05	3.03E-05	5.50E-05	9.38E-06	7.22E-06	9.20E-06
NHWD	kg	2.01E+00	2.30E+00	4.47E+00	4.72E-01	3.44E-01	3.90E-01
RWD	kg	2.46E-03	4.00E-03	7.23E-03	1.63E-03	1.25E-03	1.59E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

Newcastle Region

Table 19. Environmental profiles (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Indicator	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
GWP	**kg CO_2 eq**	**193**	**70.9**	**123**	**210**
ODP	kg CFC11 eq	2.07E-06	1.17E-06	1.33E-06	1.53E-06
AP	kg SO_2 eq	0.294	0.121	0.184	0.290
EP	kg PO_4^{3-} eq	0.0712	0.0286	0.0443	0.0710
POCP	kg C_2H_4 eq	0.0237	0.0120	0.0153	0.0206
ADPE	kg Sb eq	1.69E-06	1.79E-07	2.90E-07	1.79E-06
ADPF	MJ_{NCV}	1160	450	720	1200

Table 20. Environmental parameters (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Parameter	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
PERE	MJ_{NCV}	2.69E+01	9.42E+00	1.59E+01	2.84E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.69E+01	9.42E+00	1.59E+01	2.84E+01
PENRE	MJ_{NCV}	1.19E+03	4.67E+02	7.41E+02	1.22E+03
PENRM	MJ_{NCV}	4.21E+00	0.00E+00	0.00E+00	5.79E+00
PENRT	MJ_{NCV}	1.19E+03	4.67E+02	7.41E+02	1.23E+03
SM	kg	4.81E+01	4.39E+01	6.66E+01	1.11E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.39E+00	2.44E+00	2.47E+00	2.32E+00
HWD	kg	4.52E-06	2.57E-07	2.57E-07	6.47E-06
NHWD	kg	2.81E-01	9.84E-02	1.57E-01	2.86E-01
RWD	kg	7.86E-04	3.83E-05	3.83E-05	1.12E-03
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

Newcastle Region

Table 21. Environmental profiles (A1-A3), concrete for special applications, Newcaslte (NSW), per m^3

Indicator	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
GWP	**kg CO_2 eq**	**308**	**314**	**322**	**341**
ODP	kg CFC11 eq	2.52E-06	2.63E-06	2.70E-06	2.71E-06
AP	kg SO_2 eq	0.442	0.453	0.475	0.503
EP	kg PO_4^{3-} eq	0.107	0.110	0.114	0.119
POCP	kg C_2H_4 eq	0.0323	0.0334	0.0353	0.0368
ADPE	kg Sb eq	5.72E-06	6.09E-06	1.41E-05	2.02E-05
ADPF	MJ_{NCV}	1790	1840	1940	2060

Table 22. Environmental parameters (A1-A3), concrete for special applications, Newcaslte (NSW), per m^3

Parameter	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
PERE	MJ_{NCV}	4.30E+01	4.43E+01	5.07E+01	5.80E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	7.93E-02	1.89E-01
PERT	MJ_{NCV}	4.30E+01	4.43E+01	5.08E+01	5.82E+01
PENRE	MJ_{NCV}	1.83E+03	1.87E+03	1.97E+03	2.09E+03
PENRM	MJ_{NCV}	8.65E+00	1.01E+01	1.64E+01	2.06E+01
PENRT	MJ_{NCV}	1.84E+03	1.88E+03	1.98E+03	2.11E+03
SM	kg	1.25E+02	1.30E+02	1.20E+02	1.36E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.93E+00	2.95E+00	3.04E+00	3.03E+00
HWD	kg	1.19E-05	1.34E-05	3.40E-05	5.40E-05
NHWD	kg	1.23E+00	1.24E+00	2.90E+00	4.10E+00
RWD	kg	2.23E-03	2.50E-03	4.97E-03	6.67E-03
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

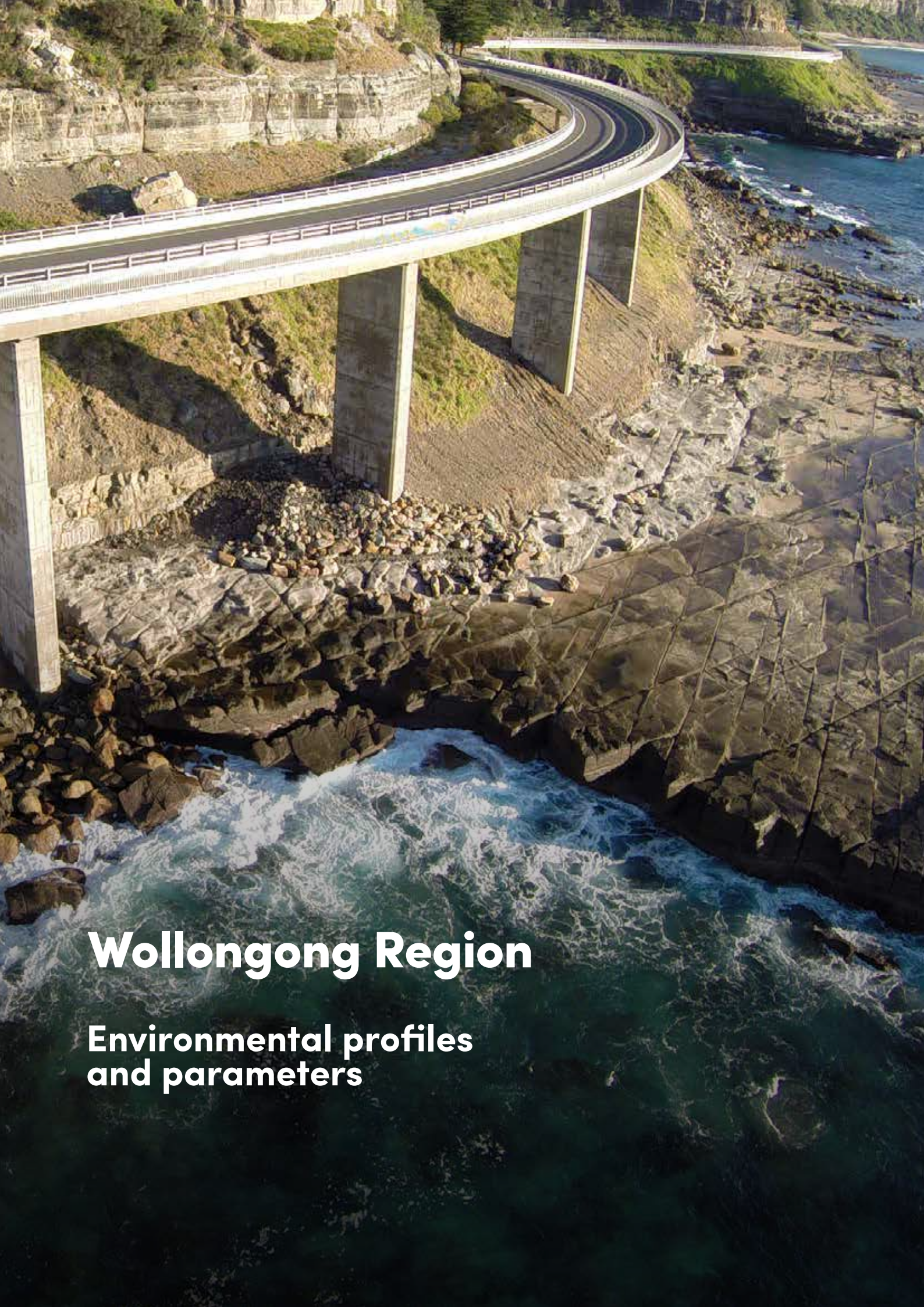
Newcastle Region

Table 23. Environmental profiles (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Indicator	Unit	TfNSW B80 50MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED
GWP	**kg CO_2 eq**	**426**	**101**	**281**
ODP	kg CFC11 eq	2.74E-06	2.05E-06	2.49E-06
AP	kg SO_2 eq	0.578	0.192	0.406
EP	kg PO_4^{3-} eq	0.143	0.0450	0.0990
POCP	kg C_2H_4 eq	0.0388	0.0203	0.0306
ADPE	kg Sb eq	5.52E-06	3.29E-06	2.37E-06
ADPF	MJ_{NCV}	2440	700	1640

Table 24. Environmental parameters (A1-A3), concrete for special applications, Newcastle (NSW), per m^3

Parameter	Unit	TfNSW B80 50MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED
PERE	MJ_{NCV}	5.97E+01	1.56E+01	3.83E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	5.97E+01	1.56E+01	3.83E+01
PENRE	MJ_{NCV}	2.47E+03	7.25E+02	1.67E+03
PENRM	MJ_{NCV}	1.91E+01	4.30E+00	6.32E+00
PENRT	MJ_{NCV}	2.49E+03	7.29E+02	1.68E+03
SM	kg	9.82E+01	1.64E+02	7.21E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.77E+00	2.99E+00	2.97E+00
HWD	kg	2.05E-05	6.30E-06	6.97E-06
NHWD	kg	6.14E-01	6.80E-01	3.91E-01
RWD	kg	3.56E-03	1.20E-03	1.21E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00



Wollongong Region

Environmental profiles and parameters

Product table list

Normal Class Concrete Products

Table No. 1 and 2

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

Table No. 3 and 4

NORMAL CLASS GP/FA BLEND 20MPA
NORMAL CLASS GP/FA BLEND 25MPA
NORMAL CLASS GP/FA BLEND 32MPA
NORMAL CLASS GP/FA BLEND 40MPA
NORMAL CLASS GP/FA BLEND 50MPA

Table No. 5 and 6

NORMAL CLASS GP/GGBFS BLEND 20MPA
NORMAL CLASS GP/GGBFS BLEND 25MPA
NORMAL CLASS GP/GGBFS BLEND 32MPA
NORMAL CLASS GP/GGBFS BLEND 40MPA
NORMAL CLASS GP/GGBFS BLEND 50MPA

Table No. 7 and 8

NORMAL CLASS GP/GGBFS/FA BLEND 20MPA
NORMAL CLASS GP/GGBFS/FA BLEND 25MPA
NORMAL CLASS GP/GGBFS/FA BLEND 32MPA
NORMAL CLASS GP/GGBFS/FA BLEND 40MPA
NORMAL CLASS GP/GGBFS/FA BLEND 50MPA

Lower Carbon Concrete Products

Table No. 9 and 10

ENVIROCRETE® 30% 20MPA
ENVIROCRETE® 30% 25MPA
ENVIROCRETE® 30% 32MPA
ENVIROCRETE® 30% 40MPA
ENVIROCRETE® 30% 50MPA

Table No. 11 and 12

ENVIROCRETE® 40% 20MPA
ENVIROCRETE® 40% 25MPA
ENVIROCRETE® 40% 32MPA
ENVIROCRETE® 40% 40MPA
ENVIROCRETE® 40% 50MPA

Table No. 13 and 14

ENVIROCRETE® PLUS 20MPA
ENVIROCRETE® PLUS 25MPA
ENVIROCRETE® PLUS 32MPA
ENVIROCRETE® PLUS 40MPA
ENVIROCRETE® PLUS 50MPA

Lower Carbon Concrete Products (Continued)

Table No. 15 and 16

ENVISIA® 20MPA
ENVISIA® 25MPA
ENVISIA® 32MPA
ENVISIA® 40MPA
ENVISIA® 50MPA
ENVISIA® 65MPA
ENVISIA® 80MPA
ENVISIA® 50MPA
ENVISIA® 65MPA
ENVISIA® 80MPA

Concrete for Special Applications

Table No. 17 and 18

POST TENSIONED 40MPA 22@3
POST TENSIONED 40MPA 22@4
POST TENSIONED 40MPA 22@5
HIGH SLUMP 50MPA
HIGH SLUMP 65MPA
HIGH SLUMP 80MPA

Table No. 19 and 20

TREMIE 40MPA
TREMIE 50MPA
TREMIE 65MPA
SHOTCRETE 40MPA
KERB MACHINE 25MPA
KERB MACHINE 32MPA

Table No. 21 and 22

NO FINES 6:1
STABILISED SAND 14:1
STABILISED SAND 8:1
STABILISED SAND 4:1

Table No. 23 and 24

TfNSW B80 40MPA 20MM PUMP B1 EXPOSURE
TfNSW B80 40MPA 20MM PUMP B2 EXPOSURE
TfNSW B80 40MPA 20MM TREMIE B2 EXPOSURE
TfNSW B80 50MPA 10MM TREMIE CFA C1 EXPOSURE

Table No. 25 and 26

TfNSW B80 50MPA 20MM TREMIE B2 EXPOSURE
TfNSW R82 5MPA 20MM HAND/ MACHINE PLACED
TfNSW R83 35MPA 20MM HAND/ MACHINE PLACED

Wollongong Region

Table 1. Environmental profiles (A1-A3), normal class concrete, Wollongong (NSW), per m^3

Indicator	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**	**268**	**285**	**310**	**354**	**449**
ODP	kg CFC11 eq	2.96E-06	3.01E-06	3.08E-06	3.21E-06	3.56E-06
AP	kg SO_2 eq	0.409	0.429	0.460	0.511	0.626
EP	kg PO_4^{3-} eq	0.0987	0.104	0.111	0.124	0.153
POCP	kg C_2H_4 eq	0.0335	0.0346	0.0363	0.0391	0.0458
ADPE	kg Sb eq	2.27E-06	2.40E-06	2.62E-06	2.99E-06	3.61E-06
ADPF	MJ_{NCV}	1600	1690	1830	2060	2570

Table 2. Environmental Environmental parameters (A1-A3), normal class concrete, Wollongong (NSW), 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}	3.58E+01	3.80E+01	4.13E+01	4.70E+01	5.91E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.58E+01	3.80E+01	4.13E+01	4.70E+01	5.91E+01
PENRE	MJ_{NCV}	1.64E+03	1.73E+03	1.87E+03	2.10E+03	2.62E+03
PENRM	MJ_{NCV}	5.84E+00	6.31E+00	7.08E+00	8.32E+00	1.02E+01
PENRT	MJ_{NCV}	1.65E+03	1.74E+03	1.88E+03	2.11E+03	2.63E+03
SM	kg	9.04E+00	9.69E+00	1.07E+01	1.23E+01	1.58E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.03E+00	3.00E+00	2.95E+00	2.89E+00	2.85E+00
HWD	kg	6.26E-06	6.77E-06	7.59E-06	8.93E-06	1.10E-05
NHWD	kg	3.69E-01	3.89E-01	4.20E-01	4.74E-01	5.88E-01
RWD	kg	1.09E-03	1.18E-03	1.32E-03	1.55E-03	1.91E-03
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

Wollongong Region

Table 3. Environmental profiles (A1–A3), normal class concrete, Wollongong (NSW), per m^3

Indicator	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
GWP	**kg CO_2 eq**	**205**	**227**	**257**	**330**	**417**
ODP	kg CFC11 eq	3.04E-06	3.07E-06	3.17E-06	3.42E-06	3.73E-06
AP	kg SO_2 eq	0.343	0.367	0.403	0.491	0.596
EP	kg PO_4^{3-} eq	0.0820	0.0881	0.0969	0.119	0.145
POCP	kg C_2H_4 eq	0.0318	0.0329	0.0349	0.0399	0.0460
ADPE	kg Sb eq	2.13E-06	2.28E-06	2.51E-06	2.94E-06	3.54E-06
ADPF	MJ_{NCV}	1300	1410	1570	1960	2420

Table 4. Environmental parameters (A1–A3), normal class concrete, Wollongong (NSW), per m^3

Parameter	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
PERE	MJ_{NCV}	2.79E+01	3.06E+01	3.45E+01	4.38E+01	5.49E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.79E+01	3.06E+01	3.45E+01	4.38E+01	5.49E+01
PENRE	MJ_{NCV}	1.33E+03	1.44E+03	1.60E+03	2.00E+03	2.47E+03
PENRM	MJ_{NCV}	5.84E+00	6.31E+00	7.08E+00	8.32E+00	1.02E+01
PENRT	MJ_{NCV}	1.34E+03	1.45E+03	1.61E+03	2.01E+03	2.48E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	9.45E+01	9.77E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.01E+00	2.98E+00	2.93E+00	2.89E+00	2.84E+00
HWD	kg	6.26E-06	6.77E-06	7.59E-06	8.93E-06	1.10E-05
NHWD	kg	2.96E-01	3.22E-01	3.57E-01	4.46E-01	5.49E-01
RWD	kg	1.09E-03	1.18E-03	1.32E-03	1.55E-03	1.91E-03
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

Wollongong Region

Table 5. Environmental profiles (A1–A3), normal class concrete, Wollongong (NSW), per m^3

Indicator	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
GWP	**kg CO_2 eq**	**188**	**199**	**216**	**245**	**309**
ODP	kg CFC11 eq	2.90E-06	2.95E-06	3.02E-06	3.14E-06	3.47E-06
AP	kg SO_2 eq	0.326	0.340	0.362	0.398	0.481
EP	kg PO_4^{3-} eq	0.0770	0.0805	0.0858	0.0947	0.115
POCP	kg C_2H_4 eq	0.0306	0.0315	0.0328	0.0351	0.0407
ADPE	kg Sb eq	2.17E-06	2.30E-06	2.51E-06	2.86E-06	3.45E-06
ADPF	MJ_{NCV}	1290	1360	1460	1630	2020

Table 6. Environmental parameters (A1–A3), normal class concrete, Wollongong (NSW), per m^3

Parameter	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
PERE	MJ_{NCV}	2.86E+01	3.03E+01	3.29E+01	3.72E+01	4.65E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.86E+01	3.03E+01	3.29E+01	3.72E+01	4.65E+01
PENRE	MJ_{NCV}	1.32E+03	1.39E+03	1.49E+03	1.67E+03	2.06E+03
PENRM	MJ_{NCV}	5.84E+00	6.31E+00	7.08E+00	8.32E+00	1.02E+01
PENRT	MJ_{NCV}	1.33E+03	1.40E+03	1.50E+03	1.68E+03	2.07E+03
SM	kg	2.29E+02	2.45E+02	2.70E+02	3.11E+02	4.01E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.03E+00	3.00E+00	2.95E+00	2.89E+00	2.85E+00
HWD	kg	6.26E-06	6.77E-06	7.59E-06	8.93E-06	1.10E-05
NHWD	kg	3.83E-01	4.05E-01	4.37E-01	4.94E-01	6.13E-01
RWD	kg	1.09E-03	1.18E-03	1.32E-03	1.55E-03	1.91E-03
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

Wollongong Region

Table 7. Environmental profiles (A1–A3), normal class concrete, Wollongong (NSW), per m^3

Indicator	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
GWP	**kg CO_2 eq**	**148**	**162**	**185**	**256**	**376**
ODP	kg CFC11 eq	3.05E-06	3.11E-06	3.21E-06	3.40E-06	3.65E-06
AP	kg SO_2 eq	0.287	0.306	0.336	0.418	0.557
EP	kg PO_4^{3-} eq	0.0666	0.0711	0.0782	0.0987	0.134
POCP	kg C_2H_4 eq	0.0303	0.0315	0.0333	0.0377	0.0445
ADPE	kg Sb eq	4.01E-06	4.32E-06	4.80E-06	5.63E-06	7.86E-06
ADPF	MJ_{NCV}	1080	1170	1310	1670	2280

Table 8. Environmental parameters (A1–A3), normal class concrete, Wollongong (NSW), per m^3

Parameter	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
PERE	MJ_{NCV}	2.33E+01	2.55E+01	2.89E+01	3.78E+01	5.33E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.33E+01	2.55E+01	2.89E+01	3.78E+01	5.33E+01
PENRE	MJ_{NCV}	1.11E+03	1.20E+03	1.34E+03	1.71E+03	2.32E+03
PENRM	MJ_{NCV}	5.83E+00	6.31E+00	7.08E+00	8.32E+00	1.51E+01
PENRT	MJ_{NCV}	1.12E+03	1.21E+03	1.35E+03	1.71E+03	2.33E+03
SM	kg	2.72E+02	2.92E+02	3.25E+02	3.00E+02	1.78E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.01E+00	2.98E+00	2.93E+00	2.89E+00	2.87E+00
HWD	kg	8.09E-06	8.75E-06	9.82E-06	1.15E-05	1.93E-05
NHWD	kg	8.60E-01	9.32E-01	1.05E+00	1.24E+00	1.49E+00
RWD	kg	1.52E-03	1.64E-03	1.84E-03	2.17E-03	3.54E-03
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

Wollongong Region

Table 9. Environmental profiles (A1–A3), lower carbon concrete, Wollongong (NSW), per m^3

Indicator	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
GWP	**kg CO_2 eq**	**205**	**227**	**257**	**310**	**388**
ODP	kg CFC11 eq	3.04E-06	3.07E-06	3.17E-06	3.49E-06	3.71E-06
AP	kg SO_2 eq	0.343	0.367	0.403	0.474	0.567
EP	kg PO_4^{3-} eq	0.0820	0.0881	0.0969	0.114	0.137
POCP	kg C_2H_4 eq	0.0318	0.0329	0.0349	0.0399	0.0449
ADPE	kg Sb eq	2.13E-06	2.28E-06	2.51E-06	2.93E-06	3.51E-06
ADPF	MJ_{NCV}	1300	1410	1570	1890	2310

Table 10. Environmental parameters (A1–A3), lower carbon concrete, Wollongong (NSW), per m^3

Parameter	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
PERE	MJ_{NCV}	2.79E+01	3.06E+01	3.45E+01	4.21E+01	5.23E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.79E+01	3.06E+01	3.45E+01	4.21E+01	5.23E+01
PENRE	MJ_{NCV}	1.33E+03	1.44E+03	1.60E+03	1.93E+03	2.35E+03
PENRM	MJ_{NCV}	5.84E+00	6.31E+00	7.08E+00	8.32E+00	1.02E+01
PENRT	MJ_{NCV}	1.34E+03	1.45E+03	1.61E+03	1.94E+03	2.36E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	1.53E+02	1.76E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.01E+00	2.98E+00	2.93E+00	3.02E+00	2.84E+00
HWD	kg	6.26E-06	6.77E-06	7.59E-06	8.93E-06	1.10E-05
NHWD	kg	2.96E-01	3.22E-01	3.57E-01	4.52E-01	5.54E-01
RWD	kg	1.09E-03	1.18E-03	1.32E-03	1.55E-03	1.91E-03
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

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Table 11. Environmental profiles (A1-A3), lower carbon concrete, Wollongong (NSW), per m^3

Indicator	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
GWP	**kg CO_2 eq**	**186**	**203**	**233**	**278**	**345**
ODP	kg CFC11 eq	3.02E-06	3.08E-06	3.20E-06	3.36E-06	3.61E-06
AP	kg SO_2 eq	0.326	0.347	0.385	0.443	0.530
EP	kg PO_4^{3-} eq	0.0764	0.0815	0.0907	0.104	0.125
POCP	kg C_2H_4 eq	0.0311	0.0323	0.0346	0.0381	0.0436
ADPE	kg Sb eq	3.33E-06	3.49E-06	4.00E-06	7.55E-06	1.21E-05
ADPF	MJ_{NCV}	1220	1310	1480	1740	2150

Table 12. Environmental parameters (A1-A3), lower carbon concrete, Wollongong (NSW), per m^3

Parameter	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
PERE	MJ_{NCV}	2.58E+01	2.79E+01	3.24E+01	4.02E+01	5.26E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	3.85E-02	8.66E-02
PERT	MJ_{NCV}	2.58E+01	2.79E+01	3.24E+01	4.03E+01	5.27E+01
PENRE	MJ_{NCV}	1.25E+03	1.34E+03	1.52E+03	1.78E+03	2.19E+03
PENRM	MJ_{NCV}	2.19E+00	2.19E+00	2.40E+00	5.86E+00	1.18E+01
PENRT	MJ_{NCV}	1.25E+03	1.35E+03	1.52E+03	1.79E+03	2.20E+03
SM	kg	1.69E+02	1.69E+02	1.80E+02	2.12E+02	2.74E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.92E+00	2.90E+00	3.01E+00	2.82E+00	2.72E+00
HWD	kg	4.28E-06	4.40E-06	4.99E-06	1.49E-05	2.88E-05
NHWD	kg	8.70E-01	9.25E-01	1.08E+00	1.80E+00	2.67E+00
RWD	kg	8.62E-04	8.90E-04	1.01E-03	2.18E-03	3.87E-03
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

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Table 13. Environmental profiles (A1–A3), lower carbon concrete, Wollongong (NSW), per m^3

Indicator	Unit	ENVIROCRETE PLUS 20MPa	ENVIROCRETE PLUS 25MPa	ENVIROCRETE PLUS 32MPa	ENVIROCRETE PLUS 40MPa	ENVIROCRETE PLUS 50MPa
GWP	**kg CO_2 eq**	**181**	**198**	**224**	**268**	**334**
ODP	kg CFC11 eq	3.07E-06	3.13E-06	3.23E-06	3.39E-06	3.69E-06
AP	kg SO_2 eq	0.337	0.358	0.390	0.450	0.545
EP	kg PO_4^{3-} eq	0.0762	0.0810	0.0888	0.103	0.123
POCP	kg C_2H_4 eq	0.0319	0.0331	0.0351	0.0387	0.0450
ADPE	kg Sb eq	3.40E-06	3.56E-06	4.04E-06	7.62E-06	1.22E-05
ADPF	MJ_{NCV}	1240	1330	1470	1740	2160

Table 14. Environmental parameters (A1–A3), lower carbon concrete, Wollongong (NSW), per m^3

Parameter	Unit	ENVIROCRETE PLUS 20MPa	ENVIROCRETE PLUS 25MPa	ENVIROCRETE PLUS 32MPa	ENVIROCRETE PLUS 40MPa	ENVIROCRETE PLUS 50MPa
PERE	MJ_{NCV}	2.70E+01	2.92E+01	3.28E+01	4.11E+01	5.41E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	3.85E-02	8.66E-02
PERT	MJ_{NCV}	2.70E+01	2.92E+01	3.28E+01	4.11E+01	5.42E+01
PENRE	MJ_{NCV}	1.27E+03	1.37E+03	1.51E+03	1.78E+03	2.20E+03
PENRM	MJ_{NCV}	2.19E+00	2.19E+00	2.40E+00	5.86E+00	1.18E+01
PENRT	MJ_{NCV}	1.28E+03	1.37E+03	1.51E+03	1.78E+03	2.22E+03
SM	kg	1.26E+02	1.32E+02	1.38E+02	1.49E+02	2.06E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.07E+00	3.05E+00	3.02E+00	2.96E+00	2.80E+00
HWD	kg	4.28E-06	4.40E-06	4.99E-06	1.49E-05	2.88E-05
NHWD	kg	9.02E-01	9.61E-01	1.10E+00	1.83E+00	2.72E+00
RWD	kg	8.62E-04	8.90E-04	1.01E-03	2.18E-03	3.87E-03
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

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Table 15. Environmental profiles (A1-A3), lower carbon concrete, Wollongong (NSW), per m^3

Indicator	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
GWP	**kg CO_2 eq**	**173**	**180**	**193**	**247**	**321**	**327**	**426**
ODP	kg CFC11 eq	3.19E-06	3.26E-06	3.35E-06	3.63E-06	3.72E-06	3.92E-06	4.10E-06
AP	kg SO_2 eq	0.355	0.368	0.390	0.471	0.554	0.562	0.698
EP	kg PO_4^{3-} eq	0.0761	0.0786	0.0830	0.101	0.121	0.123	0.157
POCP	kg C_2H_4 eq	0.0340	0.0350	0.0366	0.0420	0.0460	0.0467	0.0560
ADPE	kg Sb eq	2.36E-06	2.47E-06	2.70E-06	8.30E-06	1.34E-05	1.36E-06	3.11E-05
ADPF	MJ_{NCV}	1330	1390	1490	1830	2210	2210	2950

Table 16. Environmental parameters (A1-A3), lower carbon concrete, Wollongong (NSW), per m^3

Parameter	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
PERE	MJ_{NCV}	3.08E+01	3.23E+01	3.49E+01	4.51E+01	5.73E+01	5.11E+01	8.55E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.14E-02	0.00E+00	1.97E-01
PERT	MJ_{NCV}	3.08E+01	3.23E+01	3.49E+01	4.51E+01	5.74E+01	5.11E+01	8.57E+01
PENRE	MJ_{NCV}	1.36E+03	1.42E+03	1.52E+03	1.87E+03	2.25E+03	2.26E+03	2.97E+03
PENRM	MJ_{NCV}	6.12E+00	6.50E+00	7.27E+00	1.26E+01	1.54E+01	0.00E+00	5.42E+01
PENRT	MJ_{NCV}	1.37E+03	1.43E+03	1.53E+03	1.88E+03	2.27E+03	2.26E+03	3.03E+03
SM	kg	1.92E+02	2.07E+02	2.32E+02	2.53E+02	2.37E+02	2.81E+02	2.40E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.11E+00	3.10E+00	3.06E+00	3.11E+00	2.90E+00	2.95E+00	3.05E+00
HWD	kg	6.56E-06	6.97E-06	7.79E-06	1.76E-05	3.34E-05	0.00E+00	9.33E-05
NHWD	kg	4.50E-01	4.74E-01	5.17E-01	1.82E+00	2.88E+00	6.77E-01	5.35E+00
RWD	kg	1.14E-03	1.21E-03	1.36E-03	3.29E-03	4.60E-03	0.00E+00	1.35E-02
CRU	kg	0.00E+00	0.00E+00	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	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00

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Table 17. Environmental profiles (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Indicator	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
GWP	**kg CO_2 eq**	**339**	**330**	**321**	**429**	**499**	**529**
ODP	kg CFC11 eq	3.35E-06	3.30E-06	3.26E-06	3.72E-06	3.93E-06	4.08E-06
AP	kg SO_2 eq	0.503	0.488	0.477	0.614	0.700	0.758
EP	kg PO_4^{3-} eq	0.121	0.118	0.115	0.149	0.170	0.181
POCP	kg C_2H_4 eq	0.0399	0.0390	0.0384	0.0471	0.0517	0.0563
ADPE	kg Sb eq	5.22E-06	3.04E-06	3.04E-06	9.02E-06	1.05E-05	2.67E-05
ADPF	MJ_{NCV}	2000	1950	1900	2520	2900	3180

Table 18. Environmental parameters (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Parameter	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
PERE	MJ_{NCV}	4.56E+01	4.42E+01	4.31E+01	6.14E+01	7.11E+01	8.73E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	8.66E-02	9.62E-02	2.89E-01
PERT	MJ_{NCV}	4.56E+01	4.42E+01	4.31E+01	6.15E+01	7.12E+01	8.76E+01
PENRE	MJ_{NCV}	2.04E+03	1.99E+03	1.94E+03	2.56E+03	2.95E+03	3.23E+03
PENRM	MJ_{NCV}	7.37E+00	8.03E+00	8.13E+00	1.64E+01	2.04E+01	3.36E+01
PENRT	MJ_{NCV}	2.05E+03	2.00E+03	1.95E+03	2.58E+03	2.97E+03	3.26E+03
SM	kg	5.22E+01	5.50E+01	5.57E+01	9.81E+01	5.90E+01	1.40E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.99E+00	2.94E+00	2.92E+00	2.86E+00	2.93E+00	2.90E+00
HWD	kg	1.02E-05	9.70E-06	9.82E-06	2.97E-05	3.54E-05	8.04E-05
NHWD	kg	1.15E+00	4.54E-01	4.44E-01	1.50E+00	1.70E+00	5.00E+00
RWD	kg	1.92E-03	1.66E-03	1.68E-03	3.78E-03	4.62E-03	9.60E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 19. Environmental profiles (A1–A3), concrete for special applications, Wollongong (NSW), per m^3

Indicator	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
GWP	kg CO_2 eq	**309**	**378**	**471**	**374**	**254**	**288**
ODP	kg CFC11 eq	3.52E-06	3.71E-06	3.94E-06	3.49E-06	3.29E-06	3.34E-06
AP	kg SO_2 eq	0.496	0.576	0.690	0.541	0.406	0.445
EP	kg PO_4^{3-} eq	0.114	0.134	0.163	0.131	0.0974	0.107
POCP	kg C_2H_4 eq	0.0417	0.0461	0.0528	0.0423	0.0359	0.0377
ADPE	kg Sb eq	1.99E-05	2.03E-05	2.77E-05	3.58E-06	2.79E-06	2.99E-06
ADPF	MJ_{NCV}	1910	2270	2830	2190	1570	1750

Table 20. Environmental parameters (A1–A3), concrete for special applications, Wollongong (NSW), per m^3

Parameter	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
PERE	MJ_{NCV}	4.82E+01	5.75E+01	7.59E+01	5.00E+01	3.45E+01	3.89E+01
PERM	MJ_{NCV}	9.62E-02	1.20E-01	1.92E-01	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.83E+01	5.77E+01	7.60E+01	5.00E+01	3.45E+01	3.89E+01
PENRE	MJ_{NCV}	1.95E+03	2.32E+03	2.87E+03	2.23E+03	1.61E+03	1.79E+03
PENRM	MJ_{NCV}	7.13E+00	8.91E+00	2.57E+01	1.08E+01	8.03E+00	8.49E+00
PENRT	MJ_{NCV}	1.96E+03	2.33E+03	2.90E+03	2.24E+03	1.61E+03	1.79E+03
SM	kg	1.35E+02	1.48E+02	1.41E+02	8.57E+01	1.02E+02	8.25E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.98E+00	2.83E+00	2.73E+00	2.83E+00	3.04E+00	3.04E+00
HWD	kg	3.32E-05	3.73E-05	6.54E-05	1.16E-05	9.00E-06	9.63E-06
NHWD	kg	5.04E+00	5.02E+00	5.95E+00	5.08E-01	3.63E-01	4.05E-01
RWD	kg	4.95E-03	5.21E-03	8.95E-03	2.01E-03	1.56E-03	1.66E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 21. Environmental profiles (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Indicator	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
GWP	**kg CO_2 eq**	**235**	**64**	**185**	**314**
ODP	kg CFC11 eq	2.63E-06	1.90E-06	2.16E-06	2.65E-06
AP	kg SO_2 eq	0.361	0.151	0.286	0.442
EP	kg PO_4^{3-} eq	0.0867	0.0346	0.0687	0.107
POCP	kg C_2H_4 eq	0.0295	0.0173	0.0239	0.0329
ADPE	kg Sb eq	7.94E-07	4.80E-07	7.20E-07	9.80E-07
ADPF	MJ_{NCV}	1380	540	1120	1800

Table 22. Environmental parameters (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Parameter	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
PERE	MJ_{NCV}	2.95E+01	1.08E+01	2.50E+01	4.07E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.95E+01	1.08E+01	2.50E+01	4.07E+01
PENRE	MJ_{NCV}	1.42E+03	5.55E+02	1.15E+03	1.83E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	1.42E+03	5.55E+02	1.15E+03	1.83E+03
SM	kg	8.08E+00	1.25E+02	6.14E+00	1.10E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.47E+00	2.34E+00	2.42E+00	2.37E+00
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	2.88E-01	1.68E-01	2.61E-01	4.03E-01
RWD	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

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Table 23. Environmental profiles (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Indicator	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
GWP	**kg CO_2 eq**	**313**	**320**	**329**	**349**
ODP	kg CFC11 eq	3.45E-06	3.55E-06	3.56E-06	3.65E-06
AP	kg SO_2 eq	0.480	0.490	0.510	0.542
EP	kg PO_4^{3-} eq	0.115	0.117	0.121	0.127
POCP	kg C_2H_4 eq	0.0402	0.0410	0.0425	0.0449
ADPE	kg Sb eq	8.24E-06	6.47E-06	1.51E-05	2.19E-05
ADPF	MJ_{NCV}	1910	1930	2030	2180

Table 24. Environmental parameters (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Parameter	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
PERE	MJ_{NCV}	4.45E+01	4.39E+01	5.11E+01	5.90E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	8.46E-02	2.02E-01
PERT	MJ_{NCV}	4.45E+01	4.39E+01	5.11E+01	5.92E+01
PENRE	MJ_{NCV}	1.95E+03	1.98E+03	2.07E+03	2.21E+03
PENRM	MJ_{NCV}	1.11E+01	1.10E+01	1.81E+01	2.28E+01
PENRT	MJ_{NCV}	1.96E+03	1.99E+03	2.09E+03	2.24E+03
SM	kg	1.25E+02	1.30E+02	1.20E+02	1.36E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.02E+00	2.92E+00	3.03E+00	3.01E+00
HWD	kg	1.63E-05	1.45E-05	3.69E-05	5.86E-05
NHWD	kg	1.77E+00	1.28E+00	3.07E+00	4.39E+00
RWD	kg	3.10E-03	2.70E-03	5.40E-03	7.31E-03
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

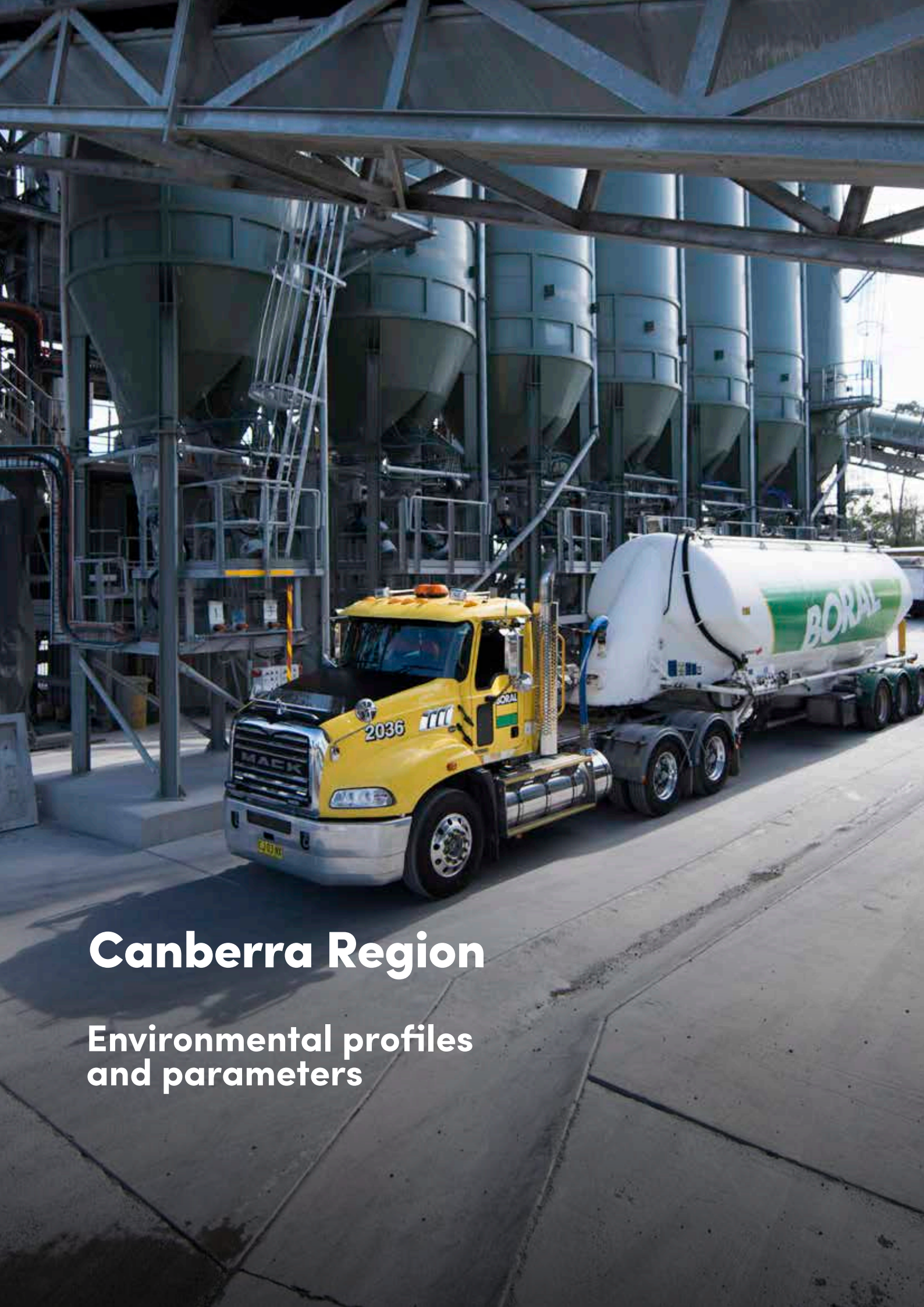
Wollongong Region

Table 25. Environmental profiles (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Indicator	Unit	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED	TfNSW R83 35MPa 20MM HAND/ MACHINE PLACED
GWP	**kg CO_2 eq**	**408**	**110**	**287**
ODP	kg CFC11 eq	3.86E-06	2.88E-06	3.45E-06
AP	kg SO_2 eq	0.601	0.235	0.449
EP	kg PO_4^{3-} eq	0.144	0.054	0.107
POCP	kg C_2H_4 eq	0.0480	0.0273	0.0384
ADPE	kg Sb eq	1.30E-05	3.55E-06	4.03E-06
ADPF	MJ_{NCV}	2460	830	1730

Table 26. Environmental parameters (A1-A3), concrete for special applications, Wollongong (NSW), per m^3

Parameter	Unit	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED	TfNSW R83 35MPa 20MM HAND/ MACHINE PLACED
PERE	MJ_{NCV}	5.97E+01	1.77E+01	3.76E+01
PERM	MJ_{NCV}	2.40E-02	0.00E+00	0.00E+00
PERT	MJ_{NCV}	5.98E+01	1.77E+01	3.76E+01
PENRE	MJ_{NCV}	2.50E+03	8.59E+02	1.77E+03
PENRM	MJ_{NCV}	2.05E+01	4.10E+00	2.19E+00
PENRT	MJ_{NCV}	2.52E+03	8.63E+02	1.77E+03
SM	kg	1.70E+02	1.69E+02	1.14E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.89E+00	3.10E+00	3.06E+00
HWD	kg	3.10E-05	8.49E-06	4.75E-06
NHWD	kg	2.54E+00	6.68E-01	1.09E+00
RWD	kg	5.34E-03	1.50E-03	9.72E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00



Canberra Region

Environmental profiles and parameters

Product table list

Normal Class Concrete Products

Table No. 1 and 2

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

Table No. 3 and 4

NORMAL CLASS GP/FA BLEND 20MPA
NORMAL CLASS GP/FA BLEND 25MPA
NORMAL CLASS GP/FA BLEND 32MPA
NORMAL CLASS GP/FA BLEND 40MPA
NORMAL CLASS GP/FA BLEND 50MPA

Table No. 5 and 6

NORMAL CLASS GP/GGBFS BLEND 20MPA
NORMAL CLASS GP/GGBFS BLEND 25MPA
NORMAL CLASS GP/GGBFS BLEND 32MPA
NORMAL CLASS GP/GGBFS BLEND 40MPA
NORMAL CLASS GP/GGBFS BLEND 50MPA

Lower Carbon Concrete Products

Table No. 7 and 8

ENVIROCRETE® 30% 20MPA
ENVIROCRETE® 30% 25MPA
ENVIROCRETE® 30% 32MPA
ENVIROCRETE® 30% 40MPA
ENVIROCRETE® 30% 50MPA

Table No. 9 and 10

ENVIROCRETE® 40% 20MPA
ENVIROCRETE® 40% 25MPA
ENVIROCRETE® 40% 32MPA
ENVIROCRETE® 40% 40MPA
ENVIROCRETE® 40% 50MPA

Table No. 11 and 12

ENVIROCRETE® PLUS 20MPA
ENVIROCRETE® PLUS 25MPA
ENVIROCRETE® PLUS 32MPA
ENVIROCRETE® PLUS 40MPA
ENVIROCRETE® PLUS 50MPA

Table No. 13 and 14

ENVISIA® 20MPA
ENVISIA® 25MPA
ENVISIA® 32MPA
ENVISIA® 40MPA
ENVISIA® 50MPA
ENVISIA® 65MPA
ENVISIA® 80MPA

Concrete for Special Applications

Table No. 15 and 16

POST TENSIONED 40MPA 22@3
POST TENSIONED 40MPA 22@4
POST TENSIONED 40MPA 22@5
HIGH SLUMP 50MPA
HIGH SLUMP 65MPA
HIGH SLUMP 80MPA

Table No. 17 and 18

TREMIE 40MPA
TREMIE 50MPA
TREMIE 65MPA
SHOTCRETE 40MPA
KERB MACHINE 25MPA
KERB MACHINE 32MPA

Table No. 19 and 20

NO FINES 6:1
STABILISED SAND 14:1
STABILISED SAND 8:1
STABILISED SAND 4:1

Table No. 21 and 22

TfNSW B80 40MPA 20MM PUMP B1 EXPOSURE
TfNSW B80 40MPA 20MM PUMP B2 EXPOSURE
TfNSW B80 40MPA 20MM TREMIE B2 EXPOSURE
TfNSW B80 50MPA 10MM TREMIE CFA C1 EXPOSURE

Table No. 23 and 24

TfNSW B80 50MPA 20MM TREMIE B2 EXPOSURE
TfNSW R82 5MPA 20MM HAND/ MACHINE PLACED
TfNSW R83 35MPA 20MM HAND/ MACHINE PLACED

Canberra Region

Table 1. Environmental profiles (A1-A3), normal class concrete, Canberra (ACT), per m^3

Indicator	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**	**270**	**288**	**314**	**358**	**454**
ODP	kg CFC11 eq	3.35E-06	3.45E-06	3.48E-06	3.68E-06	4.15E-06
AP	kg SO_2 eq	0.419	0.442	0.471	0.525	0.646
EP	kg PO_4^{3-} eq	0.101	0.106	0.114	0.127	0.157
POCP	kg C_2H_4 eq	0.0369	0.0384	0.0398	0.0432	0.0509
ADPE	kg Sb eq	2.14E-06	2.23E-06	2.74E-06	3.10E-06	3.78E-06
ADPF	MJ_{NCV}	1640	1730	1870	2110	2630

Table 2. Environmental parameters (A1-A3), normal class concrete, Canberra (ACT), 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}	3.51E+01	3.73E+01	4.10E+01	4.66E+01	5.89E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.51E+01	3.73E+01	4.10E+01	4.66E+01	5.89E+01
PENRE	MJ_{NCV}	1.68E+03	1.78E+03	1.91E+03	2.16E+03	2.69E+03
PENRM	MJ_{NCV}	3.98E+00	4.17E+00	6.18E+00	7.50E+00	9.56E+00
PENRT	MJ_{NCV}	1.68E+03	1.78E+03	1.92E+03	2.16E+03	2.70E+03
SM	kg	9.04E+00	9.69E+00	1.07E+01	1.23E+01	1.58E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.09E+00	3.10E+00	2.99E+00	2.96E+00	2.93E+00
HWD	kg	4.53E-06	4.74E-06	6.84E-06	8.04E-06	1.03E-05
NHWD	kg	3.40E-01	3.61E-01	4.00E-01	4.54E-01	5.71E-01
RWD	kg	7.81E-04	8.18E-04	1.18E-03	1.40E-03	1.79E-03
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

Canberra Region

Table 3. Environmental profiles (A1–A3), normal class concrete, Canberra (ACT), per m^3

Indicator	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
GWP	**kg CO_2 eq**	**210**	**231**	**262**	**336**	**424**
ODP	kg CFC11 eq	3.68E-06	3.73E-06	3.78E-06	4.16E-06	4.58E-06
AP	kg SO_2 eq	0.363	0.388	0.423	0.516	0.625
EP	kg PO_4^{3-} eq	0.0861	0.0923	0.101	0.124	0.151
POCP	kg C_2H_4 eq	0.0373	0.0385	0.0403	0.0463	0.0533
ADPE	kg Sb eq	2.01E-06	2.10E-06	2.62E-06	3.05E-06	3.71E-06
ADPF	MJ_{NCV}	1360	1470	1630	2030	2510

Table 4. Environmental parameters (A1–A3), normal class concrete, Canberra (ACT), per m^3

Parameter	Unit	Normal Class GP/FA blend 20 MPa	Normal Class GP/FA blend 25 MPa	Normal Class GP/FA blend 32 MPa	Normal Class GP/FA blend 40 MPa	Normal Class GP/FA blend 50 MPa
PERE	MJ_{NCV}	2.72E+01	2.99E+01	3.41E+01	4.35E+01	5.47E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.72E+01	2.99E+01	3.41E+01	4.35E+01	5.47E+01
PENRE	MJ_{NCV}	1.40E+03	1.51E+03	1.67E+03	2.08E+03	2.57E+03
PENRM	MJ_{NCV}	3.98E+00	4.17E+00	6.18E+00	7.50E+00	9.56E+00
PENRT	MJ_{NCV}	1.40E+03	1.52E+03	1.68E+03	2.09E+03	2.58E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	9.45E+01	9.77E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.08E+00	3.08E+00	2.97E+00	2.97E+00	2.93E+00
HWD	kg	4.53E-06	4.74E-06	6.84E-06	8.04E-06	1.03E-05
NHWD	kg	2.68E-01	2.93E-01	3.37E-01	4.25E-01	5.33E-01
RWD	kg	7.81E-04	8.18E-04	1.18E-03	1.40E-03	1.79E-03
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

Canberra Region

Table 5. Environmental profiles (A1–A3), normal class concrete, Canberra (ACT), per m^3

Indicator	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
GWP	**kg CO_2 eq**	**194**	**206**	**224**	**254**	**321**
ODP	kg CFC11 eq	3.39E-06	3.49E-06	3.52E-06	3.73E-06	4.22E-06
AP	kg SO_2 eq	0.361	0.380	0.402	0.447	0.544
EP	kg PO_4^{3-} eq	0.0811	0.0852	0.0905	0.1005	0.1225
POCP	kg C_2H_4 eq	0.0356	0.0370	0.0382	0.0414	0.0486
ADPE	kg Sb eq	2.12E-06	2.20E-06	2.71E-06	3.07E-06	3.75E-06
ADPF	MJ_{NCV}	1370	1450	1560	1750	2170

Table 6. Environmental parameters (A1–A3), normal class concrete, Canberra (ACT), per m^3

Parameter	Unit	Normal Class GP/GGBFS blend 20 MPa	Normal Class GP/GGBFS blend 25 MPa	Normal Class GP/GGBFS blend 32 MPa	Normal Class GP/GGBFS blend 40 MPa	Normal Class GP/GGBFS blend 50 MPa
PERE	MJ_{NCV}	2.98E+01	3.16E+01	3.47E+01	3.94E+01	4.96E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.98E+01	3.16E+01	3.47E+01	3.94E+01	4.96E+01
PENRE	MJ_{NCV}	1.41E+03	1.49E+03	1.59E+03	1.79E+03	2.21E+03
PENRM	MJ_{NCV}	3.98E+00	4.17E+00	6.18E+00	7.50E+00	9.56E+00
PENRT	MJ_{NCV}	1.41E+03	1.49E+03	1.60E+03	1.80E+03	2.22E+03
SM	kg	1.16E+02	1.24E+02	1.37E+02	1.58E+02	2.03E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.15E+00	3.16E+00	3.05E+00	3.04E+00	3.04E+00
HWD	kg	4.53E-06	4.74E-06	6.84E-06	8.04E-06	1.03E-05
NHWD	kg	3.68E-01	3.91E-01	4.33E-01	4.92E-01	6.21E-01
RWD	kg	7.81E-04	8.18E-04	1.18E-03	1.40E-03	1.79E-03
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

Canberra Region

Table 7. Environmental profiles (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Indicator	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
GWP	**kg CO_2 eq**	**210**	**231**	**262**	**316**	**397**
ODP	kg CFC11 eq	3.68E-06	3.73E-06	3.78E-06	4.17E-06	4.59E-06
AP	kg SO_2 eq	0.363	0.388	0.423	0.501	0.605
EP	kg PO_4^{3-} eq	0.0861	0.0923	0.101	0.119	0.144
POCP	kg C_2H_4 eq	0.0373	0.0385	0.0403	0.0460	0.0528
ADPE	kg Sb eq	2.01E-06	2.10E-06	2.62E-06	3.08E-06	3.71E-06
ADPF	MJ_{NCV}	1360	1470	1630	1960	2410

Table 8. Environmental parameters (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Parameter	Unit	ENVIROCRETE 30% 20 MPa	ENVIROCRETE 30% 25 MPa	ENVIROCRETE 30% 32 MPa	ENVIROCRETE 30% 40 MPa	ENVIROCRETE 30% 50 MPa
PERE	MJ_{NCV}	2.72E+01	2.99E+01	3.41E+01	4.21E+01	5.28E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	2.72E+01	2.99E+01	3.41E+01	4.21E+01	5.28E+01
PENRE	MJ_{NCV}	1.40E+03	1.51E+03	1.67E+03	2.01E+03	2.47E+03
PENRM	MJ_{NCV}	3.98E+00	4.17E+00	6.18E+00	7.50E+00	9.56E+00
PENRT	MJ_{NCV}	1.40E+03	1.52E+03	1.68E+03	2.02E+03	2.48E+03
SM	kg	1.00E+02	9.06E+01	9.18E+01	1.23E+02	1.36E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.08E+00	3.08E+00	2.97E+00	2.98E+00	2.95E+00
HWD	kg	4.53E-06	4.74E-06	6.84E-06	8.25E-06	1.03E-05
NHWD	kg	2.68E-01	2.93E-01	3.37E-01	4.34E-01	5.43E-01
RWD	kg	7.81E-04	8.18E-04	1.18E-03	1.43E-03	1.79E-03
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

Canberra Region

Table 9. Environmental profiles (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Indicator	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
GWP	**kg CO_2 eq**	**193**	**210**	**240**	**286**	**355**
ODP	kg CFC11 eq	3.64E-06	3.67E-06	3.86E-06	4.05E-06	4.44E-06
AP	kg SO_2 eq	0.355	0.374	0.416	0.478	0.576
EP	kg PO_4^{3-} eq	0.0814	0.0861	0.0960	0.110	0.132
POCP	kg C_2H_4 eq	0.0369	0.0378	0.0407	0.0447	0.0516
ADPE	kg Sb eq	3.66E-06	3.82E-06	4.34E-06	7.93E-06	1.25E-05
ADPF	MJ_{NCV}	1310	1390	1570	1850	2280

Table 10. Environmental parameters (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Parameter	Unit	ENVIROCRETE 40% 20 MPa	ENVIROCRETE 40% 25 MPa	ENVIROCRETE 40% 32 MPa	ENVIROCRETE 40% 40 MPa	ENVIROCRETE 40% 50 MPa
PERE	MJ_{NCV}	2.67E+01	2.88E+01	3.31E+01	4.16E+01	5.45E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	3.85E-02	8.66E-02
PERT	MJ_{NCV}	2.67E+01	2.88E+01	3.31E+01	4.16E+01	5.46E+01
PENRE	MJ_{NCV}	1.35E+03	1.43E+03	1.62E+03	1.89E+03	2.33E+03
PENRM	MJ_{NCV}	2.19E+00	2.19E+00	2.40E+00	5.86E+00	1.18E+01
PENRT	MJ_{NCV}	1.35E+03	1.44E+03	1.62E+03	1.90E+03	2.34E+03
SM	kg	1.28E+02	1.29E+02	1.30E+02	1.52E+02	1.83E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.07E+00	2.99E+00	3.11E+00	2.92E+00	2.84E+00
HWD	kg	4.28E-06	4.40E-06	4.99E-06	1.49E-05	2.88E-05
NHWD	kg	8.63E-01	9.19E-01	1.07E+00	1.80E+00	2.68E+00
RWD	kg	8.62E-04	8.90E-04	1.01E-03	2.18E-03	3.87E-03
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

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Table 11. Environmental profiles (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Indicator	Unit	ENVIROCRETE PLUS 20MPa	ENVIROCRETE PLUS 25MPa	ENVIROCRETE PLUS 32MPa	ENVIROCRETE PLUS 40MPa	ENVIROCRETE PLUS 50MPa
GWP	**kg CO_2 eq**	**186**	**202**	**228**	**271**	**341**
ODP	kg CFC11 eq	3.54E-06	3.63E-06	3.72E-06	3.87E-06	4.39E-06
AP	kg SO_2 eq	0.351	0.373	0.405	0.460	0.569
EP	kg PO_4^{3-} eq	0.0793	0.0844	0.0920	0.105	0.129
POCP	kg C_2H_4 eq	0.0361	0.0376	0.0395	0.0427	0.0512
ADPE	kg Sb eq	3.70E-06	3.85E-06	4.34E-06	5.49E-06	1.26E-05
ADPF	MJ_{NCV}	1300	1390	1530	1770	2250

Table 12. Environmental parameters (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Parameter	Unit	ENVIROCRETE PLUS 20MPa	ENVIROCRETE PLUS 25MPa	ENVIROCRETE PLUS 32MPa	ENVIROCRETE PLUS 40MPa	ENVIROCRETE PLUS 50MPa
PERE	MJ_{NCV}	2.71E+01	2.93E+01	3.28E+01	3.89E+01	5.45E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.66E-02
PERT	MJ_{NCV}	2.71E+01	2.93E+01	3.28E+01	3.89E+01	5.45E+01
PENRE	MJ_{NCV}	1.34E+03	1.43E+03	1.57E+03	1.82E+03	2.30E+03
PENRM	MJ_{NCV}	2.19E+00	2.19E+00	2.40E+00	3.01E+00	1.18E+01
PENRT	MJ_{NCV}	1.34E+03	1.43E+03	1.58E+03	1.82E+03	2.31E+03
SM	kg	1.26E+02	1.32E+02	1.38E+02	1.49E+02	2.06E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.14E+00	3.11E+00	3.04E+00	2.92E+00	2.87E+00
HWD	kg	4.28E-06	4.40E-06	4.99E-06	6.48E-06	2.88E-05
NHWD	kg	8.88E-01	9.47E-01	1.09E+00	1.40E+00	2.71E+00
RWD	kg	8.62E-04	8.90E-04	1.01E-03	1.32E-03	3.87E-03
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

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Table 13. Environmental profiles (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Indicator	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
GWP	**kg CO_2 eq**	**177**	**184**	**197**	**251**	**327**	**333**	**433**
ODP	kg CFC11 eq	3.58E-06	3.66E-06	3.78E-06	3.99E-06	4.27E-06	4.59E-06	4.96E-06
AP	kg SO_2 eq	0.366	0.379	0.403	0.479	0.572	0.584	0.728
EP	kg PO_4^{3-} eq	0.0785	0.0812	0.0858	0.103	0.126	0.128	0.163
POCP	kg C_2H_4 eq	0.0375	0.0387	0.0405	0.0453	0.0509	0.0526	0.0635
ADPE	kg Sb eq	2.65E-06	2.77E-06	3.00E-06	8.61E-06	1.38E-05	1.67E-06	3.14E-05
ADPF	MJ_{NCV}	1380	1440	1540	1880	2280	2290	3040

Table 14. Environmental parameters (A1-A3), lower carbon concrete, Canberra (ACT), per m^3

Parameter	Unit	ENVISIA 20MPa	ENVISIA 25MPa	ENVISIA 32MPa	ENVISIA 40MPa	ENVISIA 50MPa	ENVISIA 65MPa	ENVISIA 80MPa
PERE	MJ_{NCV}	3.09E+01	3.24E+01	3.51E+01	4.51E+01	5.76E+01	5.13E+01	8.55E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.14E-02	0.00E+00	1.97E-01
PERT	MJ_{NCV}	3.09E+01	3.24E+01	3.51E+01	4.51E+01	5.77E+01	5.13E+01	8.57E+01
PENRE	MJ_{NCV}	1.42E+03	1.48E+03	1.58E+03	1.92E+03	2.33E+03	2.35E+03	3.08E+03
PENRM	MJ_{NCV}	6.12E+00	6.50E+00	7.27E+00	1.26E+01	1.54E+01	0.00E+00	5.42E+01
PENRT	MJ_{NCV}	1.42E+03	1.48E+03	1.59E+03	1.93E+03	2.34E+03	2.35E+03	3.13E+03
SM	kg	1.92E+02	2.07E+02	2.32E+02	2.53E+02	2.37E+02	2.81E+02	2.40E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.19E+00	3.18E+00	3.13E+00	2.98E+00	2.96E+00	3.02E+00	3.12E+00
HWD	kg	6.56E-06	6.97E-06	7.79E-06	1.76E-05	3.34E-05	0.00E+00	9.33E-05
NHWD	kg	4.37E-01	4.62E-01	5.06E-01	1.81E+00	2.87E+00	6.66E-01	5.33E+00
RWD	kg	1.14E-03	1.21E-03	1.36E-03	3.29E-03	4.60E-03	0.00E+00	1.35E-02
CRU	kg	0.00E+00	0.00E+00	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	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00

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Table 15. Environmental profiles (A1-A3), concrete for special applications, Canberra, per m^3

Indicator	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
GWP	**kg CO_2 eq**	**373**	**371**	**372**	**436**	**492**	**520**
ODP	kg CFC11 eq	3.85E-06	3.75E-06	3.79E-06	4.70E-06	4.86E-06	4.93E-06
AP	kg SO_2 eq	0.555	0.542	0.546	0.648	0.725	0.770
EP	kg PO_4^{3-} eq	0.134	0.131	0.132	0.156	0.173	0.183
POCP	kg C_2H_4 eq	0.0459	0.0443	0.0449	0.0556	0.0602	0.0629
ADPE	kg Sb eq	9.10E-06	3.14E-06	4.68E-06	9.24E-06	1.88E-05	2.29E-05
ADPF	MJ_{NCV}	2260	2180	2200	2620	2960	3190

Table 16. Environmental parameters (A1-A3), concrete for special applications, Canberra, per m^3

Parameter	Unit	POST TENSIONED 40MPa 22@3	POST TENSIONED 40MPa 22@4	POST TENSIONED 40MPa 22@5	HIGH SLUMP 50MPa	HIGH SLUMP 65MPa	HIGH SLUMP 80MPa
PERE	MJ_{NCV}	5.47E+01	4.82E+01	4.97E+01	6.09E+01	7.39E+01	8.44E+01
PERM	MJ_{NCV}	9.38E-02	0.00E+00	2.40E-02	8.66E-02	1.68E-01	2.89E-01
PERT	MJ_{NCV}	5.48E+01	4.82E+01	4.97E+01	6.10E+01	7.40E+01	8.47E+01
PENRE	MJ_{NCV}	2.30E+03	2.23E+03	2.25E+03	2.67E+03	3.02E+03	3.24E+03
PENRM	MJ_{NCV}	1.44E+01	7.56E+00	9.34E+00	1.64E+01	2.40E+01	3.32E+01
PENRT	MJ_{NCV}	2.32E+03	2.23E+03	2.26E+03	2.69E+03	3.04E+03	3.27E+03
SM	kg	1.26E+01	1.28E+01	1.28E+01	9.81E+01	1.00E+02	9.86E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.21E+00	2.97E+00	3.02E+00	2.94E+00	2.85E+00	3.04E+00
HWD	kg	2.86E-05	8.11E-06	1.34E-05	2.97E-05	5.29E-05	7.61E-05
NHWD	kg	1.50E+00	4.68E-01	7.30E-01	1.48E+00	3.52E+00	3.81E+00
RWD	kg	3.48E-03	1.41E-03	1.95E-03	3.78E-03	6.73E-03	8.62E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 17. Environmental profiles (A1-A3), concrete for special applications, Canberra, per m^3

Indicator	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
GWP	**kg CO_2 eq**	**314**	**387**	**477**	**363**	**259**	**295**
ODP	kg CFC11 eq	4.42E-06	4.77E-06	4.82E-06	4.35E-06	3.99E-06	4.06E-06
AP	kg SO_2 eq	0.509	0.602	0.715	0.550	0.427	0.469
EP	kg PO_4^{3-} eq	0.120	0.143	0.169	0.132	0.102	0.112
POCP	kg C_2H_4 eq	0.0483	0.0545	0.0598	0.0491	0.0419	0.0440
ADPE	kg Sb eq	9.96E-06	1.26E-05	2.36E-05	3.21E-06	2.56E-06	3.48E-06
ADPF	MJ_{NCV}	1960	2390	2900	2180	1640	1830

Table 18. Environmental parameters (A1-A3), concrete for special applications, Canberra, per m^3

Parameter	Unit	TREMIE 40MPa	TREMIE 50MPa	TREMIE 65MPa	SHOTCRETE 40MPa 10MM	KERB MACHINE 25MPa 10MM	KERB MACHINE 32MPa 10MM
PERE	MJ_{NCV}	4.46E+01	5.58E+01	7.40E+01	4.68E+01	3.38E+01	3.92E+01
PERM	MJ_{NCV}	9.62E-02	9.62E-02	1.83E-01	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	4.47E+01	5.59E+01	7.42E+01	4.68E+01	3.38E+01	3.92E+01
PENRE	MJ_{NCV}	2.01E+03	2.44E+03	2.95E+03	2.24E+03	1.68E+03	1.88E+03
PENRM	MJ_{NCV}	7.13E+00	1.53E+01	2.50E+01	8.80E+00	5.74E+00	9.37E+00
PENRT	MJ_{NCV}	2.02E+03	2.45E+03	2.98E+03	2.25E+03	1.69E+03	1.89E+03
SM	kg	1.35E+02	1.53E+02	9.94E+01	9.55E+01	1.02E+02	8.25E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.05E+00	2.92E+00	2.93E+00	2.85E+00	3.07E+00	3.11E+00
HWD	kg	2.35E-05	3.29E-05	5.97E-05	9.44E-06	6.93E-06	1.10E-05
NHWD	kg	2.12E+00	2.43E+00	4.75E+00	4.53E-01	3.34E-01	3.93E-01
RWD	kg	2.70E-03	4.37E-03	7.89E-03	1.64E-03	1.19E-03	1.89E-03
CRU	kg	0.00E+00	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	9.60E+01
MER	kg	0.00E+00	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	0.00E+00

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Table 19. Environmental profiles (A1–A3), concrete for special applications, Canberra, per m^3

Indicator	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
GWP	**kg CO_2 eq**	**237**	**117**	**188**	**318**
ODP	kg CFC11 eq	2.55E-06	2.53E-06	2.92E-06	3.57E-06
AP	kg SO_2 eq	0.355	0.221	0.310	0.473
EP	kg PO_4^{3-} eq	0.086	0.051	0.073	0.113
POCP	kg C_2H_4 eq	0.0289	0.0244	0.0304	0.0408
ADPE	kg Sb eq	1.41E-06	3.33E-07	4.81E-07	7.54E-07
ADPF	MJ_{NCV}	1390	800	1180	1870

Table 20. Environmental parameters (A1–A3), concrete for special applications, Canberra, per m^3

Parameter	Unit	NO FINES 6:1	STABILISED SAND 14:1	STABILISED SAND 8:1	STABILISED SAND 4:1
PERE	MJ_{NCV}	3.02E+01	1.48E+01	2.33E+01	3.91E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.02E+01	1.48E+01	2.33E+01	3.91E+01
PENRE	MJ_{NCV}	1.42E+03	8.25E+02	1.21E+03	1.92E+03
PENRM	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	1.42E+03	8.25E+02	1.21E+03	1.92E+03
SM	kg	8.08E+00	3.55E+00	6.14E+00	1.10E+01
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.51E+00	2.47E+00	2.50E+00	2.46E+00
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	2.96E-01	1.30E-01	2.08E-01	3.53E-01
RWD	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

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Table 21. Environmental profiles (A1-A3), concrete for special applications, Canberra, per m^3

Indicator	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
GWP	**kg CO_2 eq**	**320**	**327**	**336**	**358**
ODP	kg CFC11 eq	4.37E-06	4.35E-06	4.43E-06	4.66E-06
AP	kg SO_2 eq	0.513	0.517	0.540	0.578
EP	kg PO_4^{3-} eq	0.122	0.123	0.127	0.135
POCP	kg C_2H_4 eq	0.0481	0.0480	0.0501	0.0536
ADPE	kg Sb eq	8.54E-06	6.83E-06	1.54E-05	2.21E-05
ADPF	MJ_{NCV}	2000	2030	2130	2280

Table 22. Environmental parameters (A1-A3), concrete for special applications, Canberra, per m^3

Parameter	Unit	TfNSW B80 40MPa 20MM PUMP B1 EXPOSURE	TfNSW B80 40MPa 20MM PUMP B2 EXPOSURE	TfNSW B80 40MPa 20MM TREMIE B2 EXPOSURE	TfNSW B80 50MPa 20MM TREMIE CFA C1 EXPOSURE
PERE	MJ_{NCV}	4.37E+01	4.41E+01	5.09E+01	5.88E+01
PERM	MJ_{NCV}	0.00E+00	0.00E+00	8.46E-02	2.02E-01
PERT	MJ_{NCV}	4.37E+01	4.41E+01	5.10E+01	5.90E+01
PENRE	MJ_{NCV}	2.05E+03	2.07E+03	2.17E+03	2.33E+03
PENRM	MJ_{NCV}	1.11E+01	1.10E+01	1.81E+01	2.28E+01
PENRT	MJ_{NCV}	2.06E+03	2.09E+03	2.19E+03	2.35E+03
SM	kg	1.25E+02	1.30E+02	1.20E+02	1.36E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.10E+00	3.00E+00	3.10E+00	3.09E+00
HWD	kg	1.63E-05	1.45E-05	3.69E-05	5.86E-05
NHWD	kg	1.75E+00	1.27E+00	3.05E+00	4.37E+00
RWD	kg	3.10E-03	2.70E-03	5.40E-03	7.31E-03
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

Canberra Region

Table 23. Environmental profiles (A1-A3), concrete for special applications, Canberra, per m^3

Indicator	Unit	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED	TfNSW R83 35MPa 20MM HAND/ MACHINE PLACED
GWP	**kg CO_2 eq**	**415**	**118**	**294**
ODP	kg CFC11 eq	4.86E-06	3.76E-06	4.19E-06
AP	kg SO_2 eq	0.637	0.266	0.474
EP	kg PO_4^{3-} eq	0.152	0.061	0.112
POCP	kg C_2H_4 eq	0.0565	0.0343	0.0449
ADPE	kg Sb eq	1.33E-05	2.09E-06	4.37E-06
ADPF	MJ_{NCV}	2550	900	1810

Table 24. Environmental parameters (A1-A3), concrete for special applications, Canberra, per m^3

Parameter	Unit	TfNSW B80 50MPa 20MM TREMIE B2 EXPOSURE	TfNSW R82 5MPa 20MM HAND/ MACHINE PLACED	TfNSW R83 35MPa 20MM HAND/ MACHINE PLACED
PERE	MJ_{NCV}	5.90E+01	1.54E+01	3.76E+01
PERM	MJ_{NCV}	2.40E-02	0.00E+00	0.00E+00
PERT	MJ_{NCV}	5.90E+01	1.54E+01	3.76E+01
PENRE	MJ_{NCV}	2.61E+03	9.38E+02	1.86E+03
PENRM	MJ_{NCV}	2.05E+01	2.19E+00	2.19E+00
PENRT	MJ_{NCV}	2.63E+03	9.40E+02	1.86E+03
SM	kg	1.39E+02	1.69E+02	1.14E+02
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.01E+00	3.19E+00	3.13E+00
HWD	kg	3.10E-05	2.95E-06	4.75E-06
NHWD	kg	2.51E+00	3.35E-01	1.08E+00
RWD	kg	5.34E-03	5.49E-04	9.72E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.60E+01	9.60E+01	9.60E+01
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

Other environmental information

Water management

Water is a valuable resource and good quality fresh water is essential to our concrete, construction material and plasterboard operations. We use water in manufacturing, and for dust suppression, cleaning and sanitation. Our quarry and asphalt operations are able to use recycled, brackish and/or process water.

At our larger sites, including quarries, we also capture rainfall or stream flow that is largely used for dust control purposes. We are developing systems that will enable us to collect data on captured rainfall and are developing plans that will underpin an overall improvement in water efficiency.

When developing or purchasing new facilities, our due diligence assessment includes scenario analysis of the quantity and quality of water, assessment of the risks of potential water discharges, and, where relevant, river catchment assessments to ensure sufficient water availability and supply.

Waste and recycling

Throughout Boral's operations, some materials commonly re-used back into our production processes, including concrete washout. This beneficially uses materials that would otherwise require disposal. A large proportion of Boral's recycled and lower carbon products revenue, totalling nine per cent of Boral Limited revenue, is derived from external waste products.

This includes our fly ash and recycling businesses. Opportunities for the re-use of production by-products or waste material continues to grow and are actively being pursued.

Biodiversity management

Protecting the diversity of plant and animal species at and around our operational sites is a core component of our land management efforts. Some examples of the many initiatives to protect biodiversity at our own sites include:

- Collaborating with the Royal Botanic Garden Sydney NSW in research on the endangered Illawarra Socketwood population at our Dunmore Quarry in New South Wales
- Partnering with Sleepy Burrows Wombat Sanctuary to capture and relocate wombats found at our Peppertree Quarry in New South Wales
- Maintaining koala fodder plantations at Narangba and Petrie quarries in Queensland.
- Conservation work to provide habitat for the threatened legless lizard and spiny rice-flower at Deer Park Quarry in Victoria
- Construction of a bird island habitat as part of our rehabilitation of wetlands at our Dunmore Quarry in New South Wales.

Through our community partnership with Conservation Volunteers Australia, we support conservation and education initiatives in our local communities, including native vegetation initiatives in local reserves and schools.

Our approach to climate related risks

Our approach

Boral recognises that climate related physical risks and a global transition to a lower-carbon future are expected to impact our operations, customers and suppliers.

We support the Paris Agreement and mechanisms to achieve its objective of limiting future average global temperature rises to well below 2°C, as well as Australia's 2030 target of a 26–28% reduction in carbon emissions below 2005 levels.

Looking at how Boral's carbon emissions are tracking relative to 2005 levels, in Australia we have reduced emissions by around 40% since FY2005. We achieved about half of this decrease largely by realigning our portfolio away from emissions-intensive businesses. The remainder of the decrease is due to reducing clinker manufacturing in Australia in favour of importing it from more efficient and larger scale operations in Asia. Including Boral North America, our Scope 1 and 2 emissions decreased by 43% since FY2005.

We continue to progressively adopt the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). In FY2019, we enhanced our climate-related governance and risk management, completed scenario analysis of Boral Cement's business and continued to strengthen our resilience to a 2°C scenario. We also broadened our reporting of physical climate-related risks and Scope 3 emissions.

We completed a Group-wide review of our climate-related risks and opportunities using the TCFD framework. This review informed a two-year roadmap to undertake further scenario analysis of key climate related business risks. We transparently and constructively engaged with Climate Action 100+ investor representatives and other stakeholders during the year, sharing our progress in aligning our efforts with the TCFD recommendations and building greater resilience to climate-related impacts.

Our approach to climate related risks

Energy and climate policy

Boral has not identified any major positions on energy and climate policy held by our industry associations that are materially inconsistent with Boral's position.

We support:

- A national approach to climate and energy policy to ensure that least-cost carbon emissions abatement is targeted while ensuring reliable and competitive energy can be delivered.
- Climate and energy policies that do not unduly erode the competitiveness of domestic-based businesses.

Through our community partnership with Conservation Volunteers Australia, we support conservation and education initiatives in our local communities, including native vegetation initiatives in local reserves and schools.

In Australia, we are a member of the Cement Industry Federation (CIF). The CIF policy is to support the Federal Government's national target to reduce emissions by 26–28 per cent by 2030, and the CIF has been working with the World Business Council for Sustainable Development and its current roadmap to reduce emissions.

Boral acknowledges the Paris Agreement and supports mechanisms to achieve its objectives, including a national approach to climate and energy policy. Boral's major industry associations are:

- Green Building Council of Australia (GBCA)
- Infrastructure Sustainability Council of Australia (ISCA)
- Concrete Institute of Australia (CIA)
- Australian Pozzolan Association (APozA)
- Business Council of Australia
- Cement Industry Federation
- Cement, Concrete & Aggregates Australia
- Australian Mines and Metals Association's Australian Resources and Energy Group
- American Coal Ash Association.

For more information visit boral.com/industry associations

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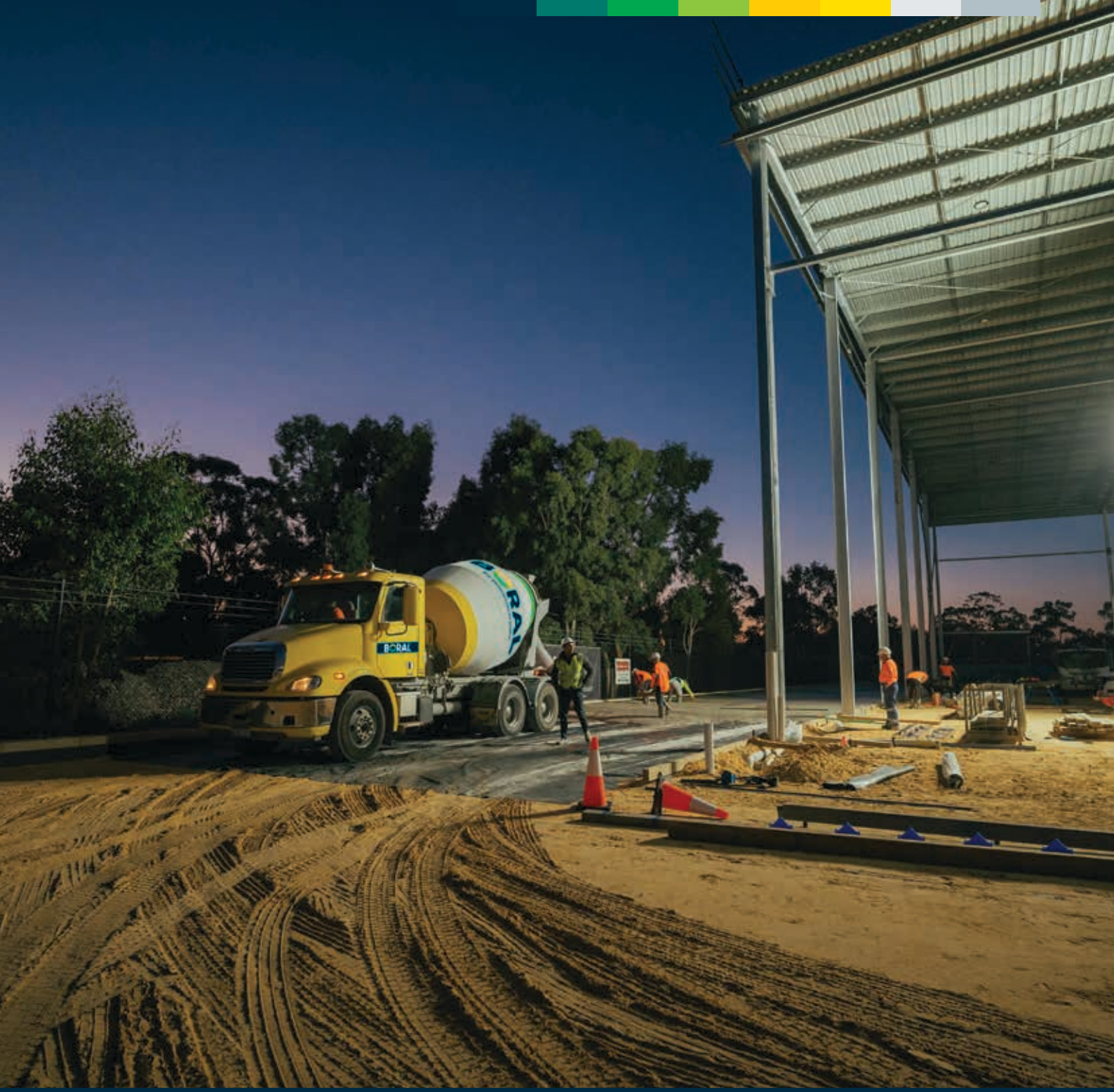

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