Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

WA Premix Concrete
Ready-Mix Concrete Products

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Programme information

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CEN standard EN 15804 served as the core PCR	
Product category rules (PCR)	*PCR 2012:01* (2020a) *Construction Products and Construction Services, Version 2.33, 2020-09-18* *PCR 2012:01-SUB-PCR-G (2020b) 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 third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A1:2013 (EN 2013).

Company information

WA Premix is a leading supplier of concrete, aggregates and decorative concrete and aggregate solutions across the Perth metropolitan area.

We are a supplier to residential, commercial and industrial building projects, and combine state-of-the-art technology, unique expertise and locally-sourced raw materials to meet the requirements of our clients.

A proudly West Australian business that has been operating for more than 30 years, WA Premix have four concrete plants strategically located across Perth, more than 40 concrete agitator trucks, and a mobile concrete plant[1] that is used to service clients in regional and remote areas.

Name and location of production sites included in the EPD

- Bayswater, 277 Collier Rd, Bayswater, Western Australia
- Bibra Lake, 57 Howson Way, Bibra Lake, Western Australia
- Neerabup, 15 Turnbull Rd, Neerabup, Western Australia
- Mandurah, 1 Cumberland St, Greenfields, Western Australia

The Bayswater plant was selected as the most representative plant for WA Premix EPD results as the environmental impact category results from this plant have the lowest variation from all other plants.

Product information

The WA Premix concrete EPD includes ten (10) normal-class ready-mix concrete products and 59 special-class ready-mix concrete products. The typical product applications and strength (MPa) are also provided below.

All WA Premix ready-mix concrete products comply with the Australian Standard AS 1379: (2007) – Specification and supply of concrete.

Normal Class Ready-mix Products:

- Balconies (50 MPa)
- Columns (40 MPa)
- Driveways (40 MPa)
- Footpaths (40 MPa)
- High impact slabs (40 MPa)
- House slabs (20 MPa)
- Retaining walls (25 MPa)
- Suspended slabs (25 MPa)
- Tilt-up Panels (32 MPa)
- Wall Cavities (32 MPa)

[1] Please note that the mobile concrete plant is currently excluded from the EPD

Special Class Ready-mix Products:

Products are named according to the application, strength (MPa), and blend.

- Abutment walls (40 MPa, AH6395)
- Abutment walls (40 MPa, AH6415)
- Abutment walls (40 MPa, AH6416)
- Abutment walls (40 MPa, BH6395)
- Barrier Kerb (32 MPa, AQ1339)
- Barrier Kerb (32 MPa, AQ1340)
- Barrier Kerb (32 MPa, AQ2339)
- Barrier Kerb (32 MPa, AQ2340)
- Bridge deck (50 MPa, AH1440)
- Bridge deck (50 MPa, AH1450)
- Bridge deck (50 MPa, BH1450)
- Capping Beam (50 MPa, AH6444)
- Capping Beam (50 MPa, AH6476)
- Cavity walls (40 MPa, CH1420)
- Cavity walls (40 MPa, CH6422)
- Columns (65 MPa, AH6484)
- Corefill (Prescribed MPa, PB4400)
- Embankment foundation (50 MPa, AH6445)
- Embankment foundation (50 MPa, AH6450)
- Flowable fill (Prescribed MPa, SN1200)
- Flowable fill (Prescribed MPa, SN6206)
- Flowable fill (Prescribed MPa, SN6306)
- Grout slurry (Prescribed MPa, EV1113)
- Grout slurry (Prescribed MPa, EV1115)
- Grout slurry (Prescribed MPa, EV6113)
- Grout slurry (Prescribed MPa, EV6115)
- Mortar Mix (Prescribed MPa, SS1257)
- Mortar Mix (Prescribed MPa, SS1425)
- Mortar Mix (Prescribed MPa, SS7257)
- Mortar Mix (Prescribed MPa, SS7425)
- Pier protection (65 MPa, AH1465)
- Piling (40 MPa, BP6418)
- Piling (40 MPa, BP8418)
- Piling (50 MPa, BP6450)
- Piling (50 MPa, BP8450)
- Piling (65 MPa, BP6500)
- Piling (65 MPa, BP8500)
- Precast elements (40 MPa, AH1395)
- Precast elements (40 MPa, AH1404)
- Precast elements (40 MPa, BH1395)
- Precast elements (50 MPa, AH1446)
- Precast elements (50 MPa, AH1448)
- Precast elements (50 MPa, AH9450)
- Precast elements (50 MPa, BH1446)
- Precast elements (50 MPa, BH1447)
- Precast elements (50 MPa, BH3500)
- Shotcrete spray (50 MPa, CK9419)
- Shotcrete spray (40 MPa, BKA410)
- Shotcrete spray (40 MPa, CK9439)
- Stabilised Sand (Prescribed MPa, SS1100)
- Stabilised Sand (Prescribed MPa, SS1150)
- Stabilised Sand (Prescribed MPa, SS1250)
- Stabilised Sand (Prescribed MPa, SS1300)
- Stabilised Sand (Prescribed MPa, SS2065)
- Stabilised Sand (Prescribed MPa, SS2110)
- Stabilised Sand (Prescribed MPa, SS2150)
- Stabilised Sand (Prescribed MPa, SS2250)
- Stabilised Sand (Prescribed MPa, SS2300)
- Thin sections (40 MPa, CC1421)

Description of the ready-mix concrete manufacturing process

Several raw materials are used in the manufacturing of the ready-mix concrete including:

- Coarse and fine aggregate sourced from the WA Bluemetal quarry at Whitby, Western Australia.
- Concrete sand from the WA Limestone quarry in Baldivis, Western Australia.
- Fine coarse sand from Hanson's quarry in Lennard Brook, Western Australia.
- General Purpose (GP) bulk cement and Ground Granulated Blast Furnace Slag are provided by Cockburn Cement in Munster, Western Australia.
- Amorphous silica is sourced from SIMCOA in Kemerton, Western Australia.

A range of concrete admixtures are also used in small quantities to achieve the required performance characteristics.

The materials are transported by truck to the concrete batch plants where they are stored before being weighed and mixed according to specific mix designs for each product. The materials are mixed using twin shaft wet mixers before being discharged into the agitator trucks for delivery to customers.

Product category definition

The product codes for ready-mix concrete are:

- UN CPC 375 articles of concrete, cement and plaster (United Nations Statistical Commission 2008), and
- ANZSIC Class 2033 Ready-Mixed Concrete Manufacturing (ABS and Statistics New Zealand 2006).

Geographical scope

The geographic scope of the EPD includes four of WA Premix concrete plants located within the Perth metropolitan area, Western Australia.

LCA information

Declared unit

The declared unit is:

- “one cubic metre (m3) of ready-mix concrete, at the plant gate” as ordered by the client. Note this includes allowance to account for concrete waste sent to recycling.

Time representativeness

Manufacturing data has been collected for the 12-month period 1 January 2020 to 31 December 2020 (2020 calendar year).

Database(s) and LCA software used

The EPD is based on background life cycle data taken from the AusLCI database (2021), version 36 and the LCA modelling has been performed using Simapro (PRé Sustainability B.V. 2020). Background data used are less than 10 years old – for further details for each dataset please refer to Table 1 in the data quality section.

System diagram

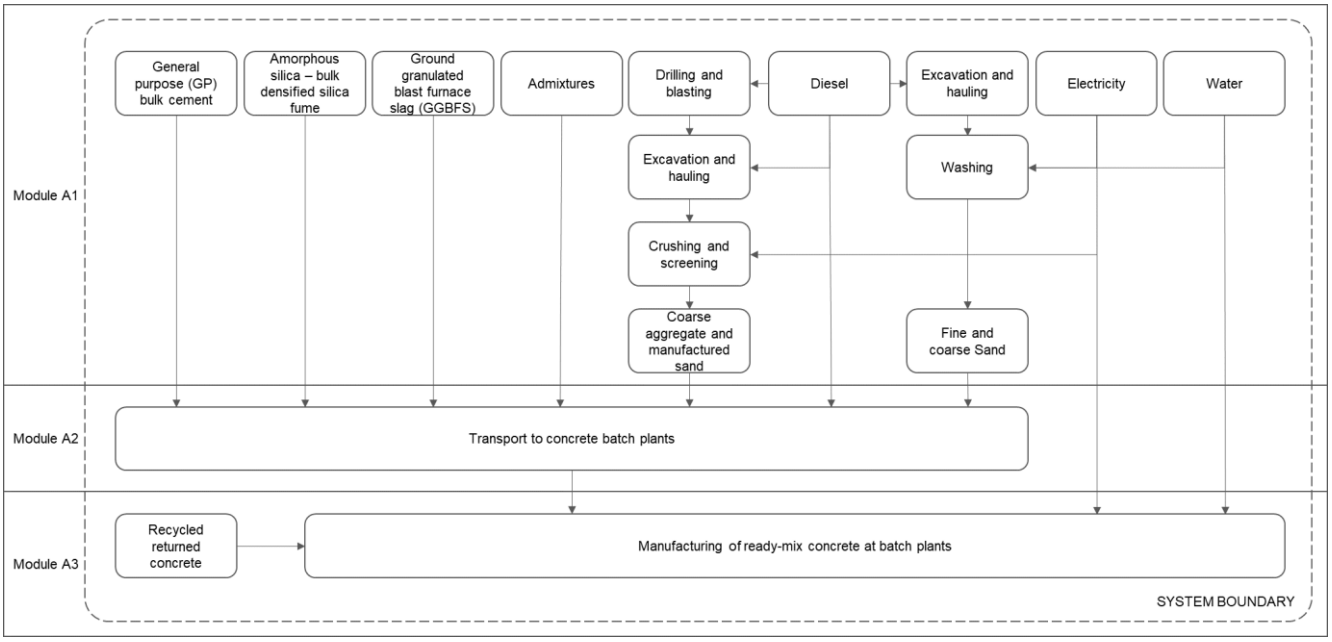

Figure 1 System diagram

Description of system boundaries

The scope of the EPD is “cradle-to-gate” and includes raw material extraction, transport to the concrete plant and manufacturing.

Production stage			Construction stage		Use stage							End-of-life stage				Benefits beyond system boundary
Raw material Supply	Transport	Manufacturing	Construction transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction/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
✓	✓	✓	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Figure 2 Life cycle stages and modules included in the EPD according to EN 15804+A1 (2013) (modules included: ✓, modules not declared: MND)

Excluded lifecycle stages

The scope of the EPD excludes downstream life cycle stages from the concrete plant: construction, use and end-of-life stage as these are best modelled using data for the specific application.

Cut-off rules

Following the PCR requirements; life cycle inventory (LCI) data for a minimum of 95% of total inflows to the core module has been included (IEPDS 2020a). Capital equipment and other minor flows (e.g., conveyor belts, greases and lubricants) have been excluded from the study. Admixtures have been included despite the small quantities used (<0.2%) due to their contribution to the environmental indicators.

Key assumptions

- Primary data was collected from WA Premix records for coarse aggregates and concrete sand through the subsidiaries WA Bluemetal and WA Limestone
- Inventory data for coarse sand was based on WA Limestone inventory data for concrete sand. Given that both quarries are located within sandplains of the Swan Coastal Plain and undergo the same processing stages differences are expected to be negligible.

- Inventory data for cementitious materials (cement, GGBFS and silica fume) are based on background data from AusLCI (2021).
- Ground Granulated Blast Furnace Slag (GGBFS) and silica fume are included in the use of resource indicators results as secondary materials.

Data quality

The sources of activity data and background life cycle data are provided in Table 1 below.

Table 1 Details of life cycle inventory data and background data for raw material supply

Material	Source of activity data	LCA dataset details
General Purpose (GP) bulk cement	Specific data, WA Premix records	General purpose cement, at plant/Australian average, AusLCI (2021), reference year 2012-2013.
Ground Granulated Blast Furnace Slag (GGBFS)	Specific data, WA Premix records	Ground granulated blast furnace slag, at cement plant/Australia, AusLCI (2021).
Amorphous silica – bulk densified silica fume	Specific data, WA Premix records	Silicon, metallurgical grade, Ecoinvent (Wernet et al. 2016), reference year 2009 with economic allocation.
Coarse Aggregate (10-20mm Granite)	Specific data, WA Premix records	Specific data from WA Bluemetal for explosives, diesel and electricity for 2020. Tractor engine operation, per litre of diesel consumed/AU U AusLCI (2021); Electricity, low voltage, Western Australia, AusLCI (2021); Ammonium nitrate, at regional storehouse/kg/RER, AusLCI (2021).
Fine - Concrete Sand	Specific data, WA Premix records	Specific data from WA Limestone for diesel and electricity for 2020. Tractor engine operation, per litre of diesel consumed/AU U AusLCI (2021); Electricity, low voltage, Western Australia, AusLCI (2021);
Fine - Coarse Sand	Specific data, WA Premix records	Proxy data from WA Limestone for diesel and electricity for 2020.
Admixtures	Specific data, WA Premix records	Generic data from The European Federation of Concrete Admixtures Associations (EFCA 2015)[2] Industry average EPDs.
Electricity	Specific data, WA Premix records	Electricity, low voltage, Western Australia, AusLCI (2021).
Water	Specific data, WA Premix records	Tap water, at user, Western Australia/AU U, AusLCI (2021).
Concrete waste	Specific data, WA Premix records	Cut-off, Materials sent to recycling. Transport to recycling included.

[2] Although these EPDs are outside of their validity period they are considered to be the most representative data sources available for admixtures.

Allocation

Allocation has been conducted in accordance with the principles of EN15804+A1:(2013) as described below.

The environmental impacts associated with the operation of the concrete batch plants were allocated to the products on a mass basis. Allocation of the general purpose (GP) bulk cement manufacturing is based on mass as documented in AusLCI (2021). Allocation for Ground Granulated Blast Furnace Slag (GGBFS) is on an economic basis as documented in AusLCI (2021). Blast furnace slag is a valuable co-product it is allocated part of the impacts associated with the steel production. Amorphous silica fume is a valuable co-product that is allocated part of the impacts associated with silicon production on an economic basis. Coarse aggregate and manufactured sand are allocated by mass, based on material consumption and production records from WA Bluemetal. Fine - Concrete Sand and coarse sand are allocated by mass, based on material consumption and production records from WA Limestone. Electricity for the washing plant has all been allocated to the concrete sand (and coarse sand) as other sand products are not processed by the washing plant.

Variability of the LCIA results between concrete plants

LCIA results were calculated for each product at each of the four concrete plants. These results were used to calculate the variability of environmental impact category results from the selected representative plant (Bayswater).

The results for Stabilised Sand (Prescribed MPa, SS2065) have the largest variability between concrete plants. The variation in results for each plant from the representative plant (Bayswater) ranges between -9.7% to +7.1% for all indicators (except ODP). Given that the results for this product represent the highest variation between plants it demonstrates that the results between different plants are less than 10% as required by EN15804+A1:(2013).

Content declaration

The content declaration for the ready-mix concrete products is listed in Table 2.

WA Premix concrete products do not contain any Substances of Very High Concern (SVHC) in quantities that exceed the European Chemicals Agency limits for registration (European Chemicals Agency 2022).

Table 2 Content declaration for normal and special class ready-mix concrete products

Ready-mix Concrete Product Class	GP Cement	GGBFS	Silica Fume	Aggregate - Coarse	Aggregate - Fine	Admixtures	Mixing Water
Normal Class	8% - 18%	0% - 5%	0%	43% - 46%	29% - 40%	< 0.2%	6%
Special Class	2% - 69%	0% - 45%	< 2%	0% - 46%	0% - 86%	< 0.2%	5% - 31%

Packaging

WA Premix ready-mix concrete is delivered as a bulk product with no packaging.

Environmental performance

The parameters from the life cycle modelling presented in the study are tabled below as per EN 15804:2012+A1:(2013).

Table 3 Summary of environmental impact categories

Impact category		Acronym	Description, unit and source
	Global Warming Potential	GWP	Emissions that contribute to climate change (also known as the greenhouse effect). It is measured in kg of CO_2e equivalents over 100 years (IPCC 2007).
	Acidification Potential of land and water	AP	Emissions which increase the acidity of the environment. It is measured in kg of SO_2 equivalents (Huijbregts 1999).
	Eutrophication Potential	EP	The addition of nutrients to water bodies reduces the oxygen levels available to support aquatic life. It is measured in kg of PO_4^{3-} equivalents (Heijungs et al. 1992).
	Photochemical Ozone Creation Potential	POCP	Contribution to air pollution in the form of smog. It is measured in kg of C_2H_4 equivalents (Jenkin and Hayman 1999; Derwent et al. 1998).
	Ozone Depletion Potential	ODP	The potential impact of emissions of synthetic gases on the ozone layer. It is measured in kg of CFC-11 equivalents (WMO 2003).
	Abiotic Depletion Potential for non-fossil resources	ADPE	The potential impact of consuming non-renewable elements and mineral resources. It is measured in kg of Antimony (Sb) equivalents (van Oers et al. 2002).
	Abiotic Depletion Potential for fossil resources	ADPF	The potential impact of consuming non-renewable fossil fuel resources. It is measured in MJ net calorific value (van Oers et al. 2002).

Table 4 Use of resource indicators

Parameter	Acronym	Parameter unit expressed per functional/declared unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ, net calorific value
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value

Parameter	Acronym	Parameter unit expressed per functional/declared unit
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ, net calorific value
Use of non- renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ, net calorific value
Use of non- renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value
Total use of non- renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ, net calorific value
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ, net calorific value
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value
Use of net fresh water	FW	m^3

Table 5 Waste category and output flow indicators

Parameter	Acronym	Parameter unit expressed per functional/declared unit
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RW	kg
Components for re-use	CRE	kg
Materials for recycling	MRE	kg
Materials for energy recovery (not being waste incineration)	MER	kg
Exported energy	EE	MJ for each energy carrier

The environmental performance parameters for WA Premix concrete are presented in Table 6 to Table 17 for potential environmental impacts, use of resources, and waste production and output flows in accordance with EN 15804:2012+A1:(2013).

Results are presented based on the declared unit of “one cubic metre (m3) of ready-mix concrete at the plant gate” as ordered by the client. Results are also presented as the total impacts of life cycle modules A1 – A3 from cradle-to-gate.

Table 6 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Balconies (50 MPa, GP)	Columns (40 MPa, GP)	Driveways (40 MPa, Blend)	Footpaths (40 MPa, Blend)	High impact slabs (40 MPa, Blend)	House slabs (20 MPa, GP)
GWP	kg CO_2-eq.	5.05E+02	4.34E+02	2.39E+02	2.62E+02	4.09E+02	2.98E+02
ODP	kg CFC11-eq.	8.21E-06	7.30E-06	5.29E-06	5.61E-06	7.75E-06	5.64E-06
AP	kg SO_2-eq.	1.98E+00	1.70E+00	9.97E-01	1.09E+00	1.72E+00	1.16E+00
EP	kg $(PO_4)^{3-}$-eq.	2.89E-01	2.49E-01	1.45E-01	1.58E-01	2.43E-01	1.73E-01
POCP	kg C_2H_4 eq	5.72E-02	4.92E-02	3.03E-02	3.31E-02	5.20E-02	3.40E-02
ADPE	kg Sb-eq.	2.87E-05	2.45E-05	1.25E-05	1.39E-05	2.21E-05	1.65E-05
ADPF	MJ $_{(NCV)}$	3.17E+03	2.74E+03	1.70E+03	1.84E+03	2.80E+03	1.94E+03
PERE	MJ	3.73E+01	3.25E+01	2.20E+01	2.37E+01	3.50E+01	2.38E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.73E+01	3.25E+01	2.20E+01	2.37E+01	3.50E+01	2.38E+01
PENRE	MJ	3.24E+03	2.81E+03	1.73E+03	1.88E+03	2.85E+03	1.98E+03
PENRM	MJ	6.83E+00	5.82E+00	3.88E+00	4.27E+00	7.07E+00	3.88E+00
PENRT	MJ	3.25E+03	2.81E+03	1.73E+03	1.88E+03	2.86E+03	1.99E+03
SM	kg	0.00E+00	0.00E+00	6.98E+01	7.52E+01	1.34E+02	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.05E+00	1.85E+00	1.33E+00	1.39E+00	1.75E+00	1.50E+00
HWD	kg	7.33E-06	6.25E-06	5.23E-06	5.64E-06	7.58E-06	5.23E-06
NHWD	kg	3.63E-02	3.09E-02	2.90E-02	3.11E-02	3.75E-02	2.90E-02
RWD	kg	2.26E-03	1.93E-03	1.30E-03	1.41E-03	2.06E-03	1.44E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.79E+02	1.77E+02	1.73E+02	1.74E+02	1.78E+02	1.75E+02
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

Table 7 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Retaining walls (25 MPa, GP)	Suspended slabs (25 MPa, Blend)	Tilt-up Panels (32 MPa, GP)	Wall Cavities (32 MPa, Blend)	Abutment walls (40 MPa, AH6395)	Abutment walls (40 MPa, AH6415)
GWP	kg CO_2-eq.	3.25E+02	2.92E+02	3.63E+02	3.49E+02	2.15E+02	2.37E+02
ODP	kg CFC11-eq.	5.98E-06	6.10E-06	6.47E-06	6.86E-06	6.20E-06	6.48E-06
AP	kg SO_2-eq.	1.27E+00	1.23E+00	1.42E+00	1.46E+00	1.10E+00	1.19E+00
EP	kg $(PO_4)^{3-}$-eq.	1.89E-01	1.76E-01	2.10E-01	2.08E-01	1.45E-01	1.57E-01
POCP	kg C_2H_4 eq	3.71E-02	3.71E-02	4.13E-02	4.42E-02	3.71E-02	3.96E-02
ADPE	kg Sb-eq.	1.81E-05	1.54E-05	2.03E-05	1.87E-05	1.16E-05	1.30E-05
ADPF	MJ $_{(NCV)}$	2.10E+03	2.04E+03	2.33E+03	2.40E+03	1.93E+03	2.06E+03
PERE	MJ	2.56E+01	2.60E+01	2.80E+01	3.01E+01	2.97E+01	3.14E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.56E+01	2.60E+01	2.80E+01	3.01E+01	2.97E+01	3.14E+01
PENRE	MJ	2.15E+03	2.08E+03	2.38E+03	2.45E+03	1.94E+03	2.08E+03
PENRM	MJ	4.27E+00	4.89E+00	4.81E+00	5.90E+00	1.58E+01	1.66E+01
PENRT	MJ	2.16E+03	2.09E+03	2.39E+03	2.45E+03	1.96E+03	2.09E+03
SM	kg	0.00E+00	9.13E+01	0.00E+00	1.07E+02	2.90E+02	2.90E+02
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.58E+00	1.47E+00	1.68E+00	1.60E+00	1.21E+00	1.27E+00
HWD	kg	5.64E-06	5.25E-06	5.69E-06	6.33E-06	1.70E-05	1.79E-05
NHWD	kg	3.11E-02	2.60E-02	2.98E-02	3.13E-02	8.42E-02	8.84E-02
RWD	kg	1.57E-03	1.43E-03	1.67E-03	1.73E-03	3.24E-03	3.43E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.75E+02	1.76E+02	1.76E+02	1.77E+02	1.78E+02	1.79E+02
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

Table 8 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Abutment walls (40 MPa, AH6416)	Abutment walls (40 MPa, BH6395)	Barrier Kerb (32 MPa, AQ1339)	Barrier Kerb (32 MPa, AQ1340)	Barrier Kerb (32 MPa, AQ2339)	Barrier Kerb (32 MPa, AQ2340)
GWP	kg CO_2-eq.	2.38E+02	2.15E+02	3.99E+02	3.99E+02	3.17E+02	3.18E+02
ODP	kg CFC11-eq.	6.49E-06	6.19E-06	6.91E-06	6.89E-06	6.45E-06	6.43E-06
AP	kg SO_2-eq.	1.19E+00	1.10E+00	1.57E+00	1.57E+00	1.34E+00	1.34E+00
EP	kg $(PO_4)^{3-}$-eq.	1.58E-01	1.45E-01	2.30E-01	2.30E-01	1.90E-01	1.90E-01
POCP	kg C_2H_4 eq	3.97E-02	3.72E-02	4.64E-02	4.65E-02	4.13E-02	4.14E-02
ADPE	kg Sb-eq.	1.30E-05	1.19E-05	3.31E-05	3.32E-05	2.77E-05	2.78E-05
ADPF	MJ $_{(NCV)}$	2.06E+03	1.93E+03	2.58E+03	2.58E+03	2.25E+03	2.25E+03
PERE	MJ	3.14E+01	3.00E+01	3.45E+01	3.45E+01	3.21E+01	3.20E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.14E+01	3.00E+01	3.45E+01	3.45E+01	3.21E+01	3.20E+01
PENRE	MJ	2.08E+03	1.94E+03	2.65E+03	2.65E+03	2.29E+03	2.30E+03
PENRM	MJ	1.67E+01	1.69E+01	5.26E+00	5.28E+00	5.26E+00	5.28E+00
PENRT	MJ	2.10E+03	1.96E+03	2.65E+03	2.65E+03	2.30E+03	2.30E+03
SM	kg	2.91E+02	2.90E+02	0.00E+00	0.00E+00	9.67E+01	9.67E+01
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.27E+00	1.20E+00	1.78E+00	1.76E+00	1.54E+00	1.53E+00
HWD	kg	1.79E-05	1.81E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05
NHWD	kg	8.86E-02	8.96E-02	3.07E+00	3.08E+00	3.07E+00	3.08E+00
RWD	kg	3.44E-03	3.43E-03	4.40E-03	4.42E-03	4.20E-03	4.22E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.79E+02	1.78E+02	1.72E+02	1.72E+02	1.72E+02	1.72E+02
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

Table 9 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Bridge deck (50 MPa, AH1440)	Bridge deck (50 MPa, AH1450)	Bridge deck (50 MPa, BH1450)	Capping Beam (50 MPa, AH6444)	Capping Beam (50 MPa, AH6476)	Cavity walls (40 MPa, CH1420)
GWP	kg CO_2-eq.	5.10E+02	5.17E+02	5.23E+02	2.51E+02	2.75E+02	4.83E+02
ODP	kg CFC11-eq.	8.23E-06	8.36E-06	8.36E-06	6.76E-06	7.11E-06	7.91E-06
AP	kg SO_2-eq.	1.98E+00	2.02E+00	2.04E+00	1.26E+00	1.37E+00	1.89E+00
EP	kg $(PO_4)^{3-}$-eq.	2.91E-01	2.95E-01	2.98E-01	1.66E-01	1.81E-01	2.76E-01
POCP	kg C_2H_4 eq	5.79E-02	5.84E-02	5.99E-02	4.21E-02	4.53E-02	5.47E-02
ADPE	kg Sb-eq.	3.12E-05	2.94E-05	3.70E-05	1.39E-05	1.54E-05	2.74E-05
ADPF	MJ $_{(NCV)}$	3.23E+03	3.23E+03	3.34E+03	2.18E+03	2.34E+03	3.03E+03
PERE	MJ	4.07E+01	3.80E+01	4.41E+01	3.32E+01	3.54E+01	3.58E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.07E+01	3.80E+01	4.41E+01	3.32E+01	3.54E+01	3.58E+01
PENRE	MJ	3.30E+03	3.31E+03	3.41E+03	2.19E+03	2.36E+03	3.10E+03
PENRM	MJ	1.77E+01	6.99E+00	2.15E+01	1.78E+01	1.91E+01	6.52E+00
PENRT	MJ	3.32E+03	3.32E+03	3.43E+03	2.21E+03	2.38E+03	3.11E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	3.11E+02	3.24E+02	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.06E+00	2.08E+00	2.10E+00	1.30E+00	1.35E+00	1.98E+00
HWD	kg	1.89E-05	7.50E-06	2.71E-05	1.91E-05	2.05E-05	7.00E-06
NHWD	kg	9.38E-02	3.71E-02	1.32E+00	9.46E-02	1.01E-01	3.46E-02
RWD	kg	4.28E-03	2.31E-03	5.96E-03	3.67E-03	3.95E-03	2.16E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.81E+02	1.81E+02	1.81E+02	1.79E+02	1.77E+02	1.77E+02
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

Table 10 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Cavity walls (40 MPa, CH6422)	Columns (65 MPa, AH6484)	Corefill (Prescribed MPa, PB4400)	Embankment foundation (50 MPa, AH6445)	Embankment foundation (50 MPa, AH6450)	Flowable fill (Prescribed MPa, SN1200)
GWP	kg CO_2-eq.	2.40E+02	2.74E+02	2.82E+02	2.52E+02	2.55E+02	2.35E+02
ODP	kg CFC11-eq.	6.51E-06	7.16E-06	6.28E-06	6.78E-06	6.83E-06	4.25E-06
AP	kg SO_2-eq.	1.20E+00	1.37E+00	1.29E+00	1.27E+00	1.28E+00	9.14E-01
EP	kg $(PO_4)^{3-}$-eq.	1.59E-01	1.81E-01	1.75E-01	1.67E-01	1.69E-01	1.34E-01
POCP	kg C_2H_4 eq	4.03E-02	4.59E-02	4.16E-02	4.22E-02	4.27E-02	2.71E-02
ADPE	kg Sb-eq.	1.39E-05	1.61E-05	1.71E-05	1.40E-05	1.41E-05	1.34E-05
ADPF	MJ $_{(NCV)}$	2.10E+03	2.37E+03	2.20E+03	2.18E+03	2.21E+03	1.52E+03
PERE	MJ	3.27E+01	3.69E+01	3.27E+01	3.33E+01	3.36E+01	1.87E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.27E+01	3.69E+01	3.27E+01	3.33E+01	3.36E+01	1.87E+01
PENRE	MJ	2.11E+03	2.39E+03	2.22E+03	2.20E+03	2.22E+03	1.56E+03
PENRM	MJ	2.02E+01	2.32E+01	1.92E+01	1.79E+01	1.81E+01	3.11E+00
PENRT	MJ	2.13E+03	2.41E+03	2.24E+03	2.22E+03	2.24E+03	1.56E+03
SM	kg	2.97E+02	3.38E+02	2.15E+02	3.11E+02	3.15E+02	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.27E+00	1.35E+00	1.33E+00	1.30E+00	1.31E+00	1.17E+00
HWD	kg	2.17E-05	2.49E-05	2.19E-05	1.91E-05	1.94E-05	5.45E-06
NHWD	kg	1.07E-01	1.23E-01	1.12E-01	9.48E-02	9.59E-02	3.33E-02
RWD	kg	4.10E-03	4.71E-03	4.22E-03	3.68E-03	3.72E-03	1.34E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.77E+02	1.78E+02	1.65E+02	1.79E+02	1.79E+02	1.56E+02
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

Table 11 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Flowable fill (Prescribed MPa, SN6206)	Flowable fill (Prescribed MPa, SN6306)	Grout slurry (Prescribed MPa, EV1113)	Grout slurry (Prescribed MPa, EV1115)	Grout slurry (Prescribed MPa, EV6113)	Grout slurry (Prescribed MPa, EV6115)
GWP	kg CO_2-eq.	1.22E+02	1.73E+02	1.24E+03	1.27E+03	5.79E+02	5.87E+02
ODP	kg CFC11-eq.	3.79E-06	4.88E-06	1.63E-05	1.66E-05	1.25E-05	1.27E-05
AP	kg SO_2-eq.	6.09E-01	8.73E-01	4.87E+00	4.96E+00	3.02E+00	3.07E+00
EP	kg $(PO_4)^{3-}$-eq.	8.17E-02	1.14E-01	6.94E-01	7.06E-01	3.73E-01	3.79E-01
POCP	kg C_2H_4 eq	2.05E-02	2.92E-02	1.39E-01	1.42E-01	9.90E-02	1.01E-01
ADPE	kg Sb-eq.	5.64E-06	8.16E-06	7.18E-05	7.31E-05	3.60E-05	3.65E-05
ADPF	MJ $_{(NCV)}$	1.09E+03	1.50E+03	7.38E+03	7.51E+03	4.68E+03	4.76E+03
PERE	MJ	1.61E+01	2.18E+01	8.15E+01	8.29E+01	6.46E+01	6.57E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.61E+01	2.18E+01	8.15E+01	8.29E+01	6.46E+01	6.57E+01
PENRE	MJ	1.10E+03	1.51E+03	7.59E+03	7.72E+03	4.76E+03	4.83E+03
PENRM	MJ	3.20E+00	4.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.10E+03	1.52E+03	7.59E+03	7.72E+03	4.76E+03	4.83E+03
SM	kg	1.44E+02	2.15E+02	0.00E+00	0.00E+00	7.89E+02	8.06E+02
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	9.13E-01	1.05E+00	4.08E+00	4.14E+00	2.13E+00	2.15E+00
HWD	kg	5.55E-06	7.22E-06	3.10E-06	3.15E-06	1.14E-05	1.15E-05
NHWD	kg	3.37E-02	4.20E-02	5.45E-01	5.61E-01	3.03E+00	3.09E+00
RWD	kg	1.07E-03	1.44E-03	3.14E-03	3.19E-03	3.43E-03	3.48E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.49E+02	1.57E+02	1.21E+02	1.23E+02	1.21E+02	1.23E+02
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

Table 12 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Mortar Mix (Prescribed MPa, SS1257)	Mortar Mix (Prescribed MPa, SS1425)	Mortar Mix (Prescribed MPa, SS7257)	Mortar Mix (Prescribed MPa, SS7425)	Pier protection (65 MPa, AH1465)	Piling (40 MPa, BP6418)
GWP	kg CO_2-eq.	2.96E+02	4.81E+02	2.96E+02	4.81E+02	5.39E+02	2.42E+02
ODP	kg CFC11-eq.	4.91E-06	7.22E-06	4.91E-06	7.22E-06	8.53E-06	6.62E-06
AP	kg SO_2-eq.	1.15E+00	1.88E+00	1.15E+00	1.88E+00	2.09E+00	1.21E+00
EP	kg $(PO_4)^{3-}$-eq.	1.68E-01	2.71E-01	1.68E-01	2.71E-01	3.07E-01	1.61E-01
POCP	kg C_2H_4 eq	3.38E-02	5.45E-02	3.38E-02	5.45E-02	6.12E-02	4.06E-02
ADPE	kg Sb-eq.	1.70E-05	2.79E-05	1.70E-05	2.79E-05	3.38E-05	1.43E-05
ADPF	MJ $_{(NCV)}$	1.87E+03	2.97E+03	1.87E+03	2.97E+03	3.42E+03	2.12E+03
PERE	MJ	2.25E+01	3.49E+01	2.25E+01	3.49E+01	4.38E+01	3.38E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.25E+01	3.49E+01	2.25E+01	3.49E+01	4.38E+01	3.38E+01
PENRE	MJ	1.92E+03	3.04E+03	1.92E+03	3.04E+03	3.49E+03	2.14E+03
PENRM	MJ	3.99E+00	6.60E+00	3.99E+00	6.60E+00	2.23E+01	2.00E+01
PENRT	MJ	1.92E+03	3.05E+03	1.92E+03	3.05E+03	3.51E+03	2.16E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E+02
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.31E+00	1.81E+00	1.31E+00	1.81E+00	2.13E+00	1.33E+00
HWD	kg	5.61E-06	8.41E-06	5.61E-06	8.41E-06	2.39E-05	2.41E-05
NHWD	kg	3.17E-02	4.55E-02	3.17E-02	4.55E-02	1.18E-01	1.27E-01
RWD	kg	1.52E-03	2.38E-03	1.52E-03	2.38E-03	5.20E-03	4.46E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.46E+02	1.48E+02	1.46E+02	1.48E+02	1.78E+02	1.81E+02
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

Table 13 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Piling (40 MPa, BP8418)	Piling (50 MPa, BP6450)	Piling (50 MPa, BP8450)	Piling (65 MPa, BP6500)	Piling (65 MPa, BP8500)	Precast elements (40 MPa, AH1395)
GWP	kg CO_2-eq.	2.54E+02	2.59E+02	2.71E+02	2.85E+02	2.98E+02	4.60E+02
ODP	kg CFC11-eq.	6.52E-06	6.95E-06	6.83E-06	7.46E-06	7.32E-06	7.56E-06
AP	kg SO_2-eq.	1.20E+00	1.29E+00	1.29E+00	1.42E+00	1.42E+00	1.79E+00
EP	kg $(PO_4)^{3-}$-eq.	1.66E-01	1.71E-01	1.76E-01	1.88E-01	1.94E-01	2.63E-01
POCP	kg C_2H_4 eq	5.89E-02	4.34E-02	6.33E-02	4.78E-02	6.99E-02	5.22E-02
ADPE	kg Sb-eq.	1.37E-05	1.53E-05	1.47E-05	1.70E-05	1.63E-05	2.80E-05
ADPF	MJ $_{(NCV)}$	2.39E+03	2.26E+03	2.55E+03	2.47E+03	2.80E+03	2.93E+03
PERE	MJ	1.55E+02	3.59E+01	1.68E+02	3.92E+01	1.86E+02	3.70E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.55E+02	3.59E+01	1.68E+02	3.92E+01	1.86E+02	3.70E+01
PENRE	MJ	2.41E+03	2.28E+03	2.57E+03	2.49E+03	2.81E+03	2.99E+03
PENRM	MJ	2.00E+01	2.15E+01	2.15E+01	2.39E+01	2.39E+01	1.58E+01
PENRT	MJ	2.43E+03	2.30E+03	2.59E+03	2.52E+03	2.84E+03	3.01E+03
SM	kg	3.04E+02	3.15E+02	3.28E+02	3.49E+02	3.64E+02	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.41E+00	1.36E+00	1.46E+00	1.43E+00	1.53E+00	1.91E+00
HWD	kg	2.41E-05	2.58E-05	2.58E-05	2.83E-05	2.83E-05	1.70E-05
NHWD	kg	1.27E-01	1.35E-01	1.35E-01	1.48E-01	1.48E-01	8.42E-02
RWD	kg	4.43E-03	4.77E-03	4.74E-03	5.26E-03	5.23E-03	3.84E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.81E+02	1.81E+02	1.81E+02	1.81E+02	1.81E+02	1.76E+02
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

Table 14 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Precast elements (40 MPa, AH1404)	Precast elements (40 MPa, BH1395)	Precast elements (50 MPa, AH1446)	Precast elements (50 MPa, AH1448)	Precast elements (50 MPa, AH9450)	Precast elements (50 MPa, BH1446)
GWP	kg CO_2-eq.	4.70E+02	4.60E+02	5.17E+02	5.21E+02	5.14E+02	5.18E+02
ODP	kg CFC11-eq.	7.68E-06	7.58E-06	8.27E-06	8.32E-06	8.10E-06	8.30E-06
AP	kg SO_2-eq.	1.83E+00	1.79E+00	2.01E+00	2.02E+00	1.96E+00	2.01E+00
EP	kg $(PO_4)^{3-}$-eq.	2.69E-01	2.63E-01	2.95E-01	2.97E-01	2.93E-01	2.96E-01
POCP	kg C_2H_4 eq	5.34E-02	5.23E-02	5.88E-02	5.92E-02	7.80E-02	5.89E-02
ADPE	kg Sb-eq.	2.86E-05	2.82E-05	3.24E-05	3.31E-05	3.10E-05	3.24E-05
ADPF	MJ $_{(NCV)}$	2.99E+03	2.94E+03	3.29E+03	3.32E+03	3.53E+03	3.29E+03
PERE	MJ	3.77E+01	3.73E+01	4.22E+01	4.31E+01	1.74E+02	4.23E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.77E+01	3.73E+01	4.22E+01	4.31E+01	1.74E+02	4.23E+01
PENRE	MJ	3.05E+03	3.00E+03	3.36E+03	3.39E+03	3.60E+03	3.36E+03
PENRM	MJ	1.62E+01	1.69E+01	2.14E+01	2.38E+01	2.33E+01	2.14E+01
PENRT	MJ	3.07E+03	3.02E+03	3.38E+03	3.41E+03	3.62E+03	3.38E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E+01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.94E+00	1.92E+00	2.08E+00	2.09E+00	2.12E+00	2.08E+00
HWD	kg	1.74E-05	1.81E-05	2.29E-05	2.55E-05	2.50E-05	2.29E-05
NHWD	kg	8.61E-02	8.96E-02	1.13E-01	1.26E-01	1.24E-01	1.13E-01
RWD	kg	3.93E-03	4.03E-03	4.98E-03	5.44E-03	5.27E-03	4.98E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.76E+02	1.78E+02	1.78E+02	1.80E+02	1.80E+02	1.80E+02
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

Table 15 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Precast elements (50 MPa, BH1447)	Precast elements (50 MPa, BH3500)	Shotcrete spray (50 MPa, CK9419)	Shotcrete spray (40 MPa, BKA410)	Shotcrete spray (40 MPa, CK9439)	Stabilised Sand (Prescribed MPa, SS1100)
GWP	kg CO_2-eq.	5.19E+02	4.21E+02	4.78E+02	3.67E+02	4.99E+02	1.24E+02
ODP	kg CFC11-eq.	8.31E-06	8.09E-06	7.72E-06	7.08E-06	7.99E-06	2.82E-06
AP	kg SO_2-eq.	2.01E+00	1.80E+00	1.85E+00	1.55E+00	1.94E+00	4.83E-01
EP	kg $(PO_4)^{3-}$-eq.	2.96E-01	2.53E-01	2.73E-01	2.19E-01	2.85E-01	7.24E-02
POCP	kg C_2H_4 eq	5.90E-02	5.60E-02	6.55E-02	4.71E-02	6.90E-02	1.48E-02
ADPE	kg Sb-eq.	3.25E-05	2.69E-05	2.98E-05	2.32E-05	3.11E-05	6.85E-06
ADPF	MJ $_{(NCV)}$	3.30E+03	3.03E+03	3.16E+03	2.54E+03	3.30E+03	8.63E+02
PERE	MJ	4.24E+01	4.36E+01	1.10E+02	3.33E+01	1.19E+02	1.12E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.24E+01	4.36E+01	1.10E+02	3.33E+01	1.19E+02	1.12E+01
PENRE	MJ	3.37E+03	3.07E+03	3.23E+03	2.59E+03	3.38E+03	8.80E+02
PENRM	MJ	2.14E+01	2.91E+01	6.51E+00	6.27E+00	6.82E+00	1.55E+00
PENRT	MJ	3.39E+03	3.10E+03	3.24E+03	2.60E+03	3.38E+03	8.82E+02
SM	kg	0.00E+00	1.88E+02	2.15E+01	1.18E+02	2.36E+01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.09E+00	1.77E+00	1.98E+00	1.63E+00	2.04E+00	8.58E-01
HWD	kg	2.30E-05	3.12E-05	1.21E-05	1.17E-05	1.25E-05	3.79E-06
NHWD	kg	1.14E-01	1.55E-01	9.84E-01	9.49E-01	1.03E+00	2.50E-02
RWD	kg	5.00E-03	6.16E-03	3.13E-03	2.82E-03	3.26E-03	8.30E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.80E+02	1.78E+02	1.70E+02	1.70E+02	1.72E+02	1.49E+02
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

Table 16 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Stabilised Sand (Prescribed MPa, SS1150)	Stabilised Sand (Prescribed MPa, SS1250)	Stabilised Sand (Prescribed MPa, SS1300)	Stabilised Sand (Prescribed MPa, SS2065)	Stabilised Sand (Prescribed MPa, SS2110)	Stabilised Sand (Prescribed MPa, SS2150)
GWP	kg CO_2-eq.	1.79E+02	2.89E+02	3.44E+02	6.78E+01	1.08E+02	1.38E+02
ODP	kg CFC11-eq.	3.44E-06	4.89E-06	5.50E-06	2.21E-06	2.77E-06	3.21E-06
AP	kg SO_2-eq.	6.95E-01	1.13E+00	1.34E+00	2.81E-01	4.49E-01	5.81E-01
EP	kg $(PO_4)^{3-}$-eq.	1.03E-01	1.64E-01	1.94E-01	4.21E-02	6.52E-02	8.28E-02
POCP	kg C_2H_4 eq	2.08E-02	3.32E-02	3.92E-02	9.30E-03	1.43E-02	1.83E-02
ADPE	kg Sb-eq.	1.01E-05	1.66E-05	1.99E-05	3.35E-06	5.68E-06	7.38E-06
ADPF	MJ $_{(NCV)}$	1.18E+03	1.84E+03	2.16E+03	5.58E+02	8.12E+02	1.01E+03
PERE	MJ	1.48E+01	2.23E+01	2.59E+01	8.06E+00	1.11E+01	1.36E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.48E+01	2.23E+01	2.59E+01	8.06E+00	1.11E+01	1.36E+01
PENRE	MJ	1.21E+03	1.88E+03	2.21E+03	5.66E+02	8.26E+02	1.03E+03
PENRM	MJ	2.33E+00	3.88E+00	4.66E+00	1.01E+00	1.71E+00	2.33E+00
PENRT	MJ	1.21E+03	1.89E+03	2.21E+03	5.67E+02	8.28E+02	1.03E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	2.15E+01	3.22E+01	4.83E+01
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	9.93E-01	1.31E+00	1.44E+00	6.96E-01	8.01E-01	8.73E-01
HWD	kg	4.62E-06	6.29E-06	7.12E-06	3.20E-06	3.95E-06	4.62E-06
NHWD	kg	2.91E-02	3.74E-02	4.15E-02	2.21E-02	2.58E-02	2.91E-02
RWD	kg	1.09E-03	1.60E-03	1.86E-03	6.05E-04	8.14E-04	9.86E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.43E+02	1.52E+02	1.45E+02	1.46E+02	1.46E+02	1.43E+02
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

Table 17 Environmental performance parameters for WA Premix concrete products (per 1m^3 of ready-mix concrete, total for modules A1-A3)

Parameter	Unit	Stabilised Sand (Prescribed MPa, SS2250)	Stabilised Sand (Prescribed MPa, SS2300)	Thin sections (40 MPa, CC1421)
GWP	kg CO_2-eq.	2.21E+02	2.67E+02	4.85E+02
ODP	kg CFC11-eq.	4.42E-06	5.06E-06	7.90E-06
AP	kg SO_2-eq.	9.34E-01	1.12E+00	1.89E+00
EP	kg $(PO_4)^{3-}$-eq.	1.31E-01	1.57E-01	2.77E-01
POCP	kg C_2H_4 eq	2.89E-02	3.45E-02	5.51E-02
ADPE	kg Sb-eq.	1.21E-05	1.47E-05	2.79E-05
ADPF	MJ $_{(NCV)}$	1.55E+03	1.84E+03	3.05E+03
PERE	MJ	2.02E+01	2.36E+01	3.67E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.02E+01	2.36E+01	3.67E+01
PENRE	MJ	1.58E+03	1.88E+03	3.12E+03
PENRM	MJ	3.88E+00	4.66E+00	6.54E+00
PENRT	MJ	1.58E+03	1.88E+03	3.13E+03
SM	kg	8.06E+01	9.13E+01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.09E+00	1.21E+00	1.98E+00
HWD	kg	6.29E-06	7.12E-06	9.67E-06
NHWD	kg	3.74E-02	4.15E-02	5.57E-02
RWD	kg	1.43E-03	1.67E-03	2.56E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.44E+02	1.45E+02	1.77E+02
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

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