Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

Western Suburbs Concrete

HE451032@2 I Pre-mix concrete

Programme: The International EPD System www.environdec.com
Programme operator: EPD International AB
Licensee: EPD Australasia www.epd-australasia.com
EPD Registration no. EPD-IES-0034454:001
Version date 2026-09-21 | Valid until 2031-09-20
Geographical scope: Australia
EPD of a single concrete product from a manufacturer (from one location)
An EPD may be updated or depublished if conditions change.
To find the latest version of the EPD and to confirm its validity, see www.environdec.com

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Disclaimer

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

General information

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 as they enable transparency and comparability between EPDs. This EPD provides environmental indicators for selected concrete products, manufactured at Western Suburbs Concrete's North Penrith facility in New South Wales (NSW).

This EPD is a "cradle-to-gate with modules C1-C4, D" declaration covering production and end-of-life life cycle stages. This EPD is verified to be compliant with EN 15804.

Western Suburbs Concrete (WSC) Pty Ltd, as the EPD owner, has the sole ownership, liability, and responsibility for the EPD.

EPD Program Operator (Licensee)	**EPD Program Operator** **EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: support@environdec.com	**Licensee** **EPD Australasia Limited** Address: 6 Cube Court Richmond 7020, New Zealand Web: www.epd-australasia.com Email: info@epd-australasia.com	EPD INTERNATIONAL EPD SYSTEM EPD AUSTRALASIA INTERNATIONAL EPD SYSTEM
EPD registration number:	EPD-IES-0034454:001		
Version date:	2026-09-21	**Valid until:**	2031-09-20 (5 years)
Reference year for data:	2022-01-01 – 2022-12-31 (mix design is current in 2026)		

Product Category Rules (PCR)	**CEN standard EN 15804 served as the core Product Category Rules (PCR)**
PCR:	PCR 2019:14 Construction Products, Version 2.0.1, 2025-06-05 (valid until 2030-04-07)
PCR review was conducted by:	The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Rob Rouwette | start2see (chair), Noa Meron | thinkstep-anz (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact.
c-PCR:	c-PCR-003 (to 2019:14) Concrete and concrete elements, version 2025-04-08

Third-party verification:	Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ Individual EPD verification without a pre-verified LCA/EPD tool
Third party verifier: Approved by EPD Australasia	Angela Schindler, Umweltberatung Web: www.schindler-umwelt.de Email: angela@schindler-umwelt.de Phone: +49 07553 919 9456
Procedure for follow-up of data during EPD validity involves third-party verifier:	☐ Yes ☒ No

Information about the EPD owner

"Western Suburbs Concrete (WSC) has been operating since 1987, supplying premixed concrete from Western Sydney"

Declaration Owner	**Western Suburbs Concrete (WSC) Pty Ltd** 1A Coombes Drive Penrith NSW 2750, Australia Web: www.wsc.com.au Phone: +61 02 4761 6161
LCA Accountability:	**start2see Pty Ltd** Unit 8 / 2-4 Kensington Rd, South Yarra, VIC 3141, Australia Web: www.start2see.com.au Email: Rob.Rouwette@start2see.com.au Phone: +61 403 834 470

WSC manufactures a wide range of concrete products, operating out of a large purpose-built premise in North Penrith, with our own transport fleet.

This EPD covers a single concrete mix, manufactured at our North Penrith site.

Product information

WSC specialises in manufacturing pre-mix concrete, ranging in strength grade as per client and application requirements. Our pre-mix concrete consists of a mixture of cementitious binder, supplementary cementitious materials (fly ash, slag), coarse aggregates, natural sand, water and admixtures.
Applications include beams, bedding screed, driveways, infrastructure, footings and foundations.

The product included in this EPD and its strength grade is shown below.

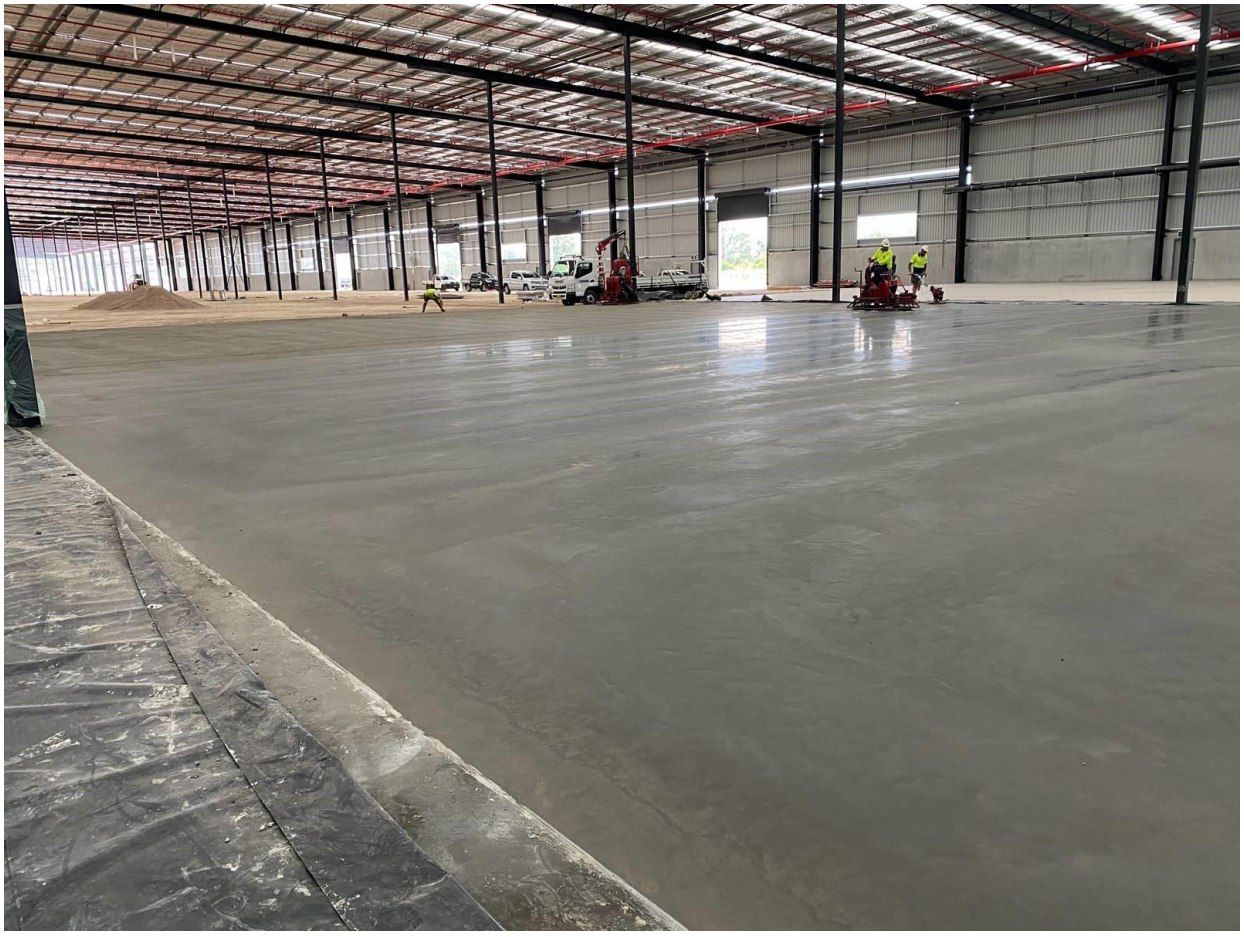
Product	Strength grade
HE451032@2	45 MPa

Technical Compliance

WSC concrete products comply with relevant technical specifications as per AS 1379:2007 Specification and supply of concrete.

Geographical scope

The processes in modules A1-A3 have been modelled to represent concrete production in North Penrith, Sydney, Australia. The raw materials are sourced from within Australia, and the end-of-life (module C) of the product has been modelled to represent Australia as well (based on the default scenario).



Content declaration

The product composition per declared unit (1 m^3 of concrete) is presented in Table 1. For reasons of confidentiality, a range is provided. The product is supplied in bulk (i.e. packaging is irrelevant).

Table 1: Product content

Ingredient	Mass (kg/m^3)	Post-consumer recycled material, mass (%)	Biogenic material, mass (%)	Biogenic material, kg C / m^3
General Purpose Cement ¤	450-550	0%	0%	0
Coarse aggregates †	900-1 050	0%	0%	0
Manufactured sand †	0	0%	0%	0
Natural sand †	550-750	0%	0%	0
Water	170-210	0%	0%	0
Fly Ash ‡	0	0%	0%	0
Slag (GGBFS) ‡	0	0%	0%	0
Admixtures	0-4	0%	0%	0
Total	**2 328 kg/m^3**	**0%**	**0%**	**0**

¤ Cement in concrete contains traces of Chromium VI (hexavalent).
† Crystalline-silica (quartz) may be a constituent of sand, crushed stone, gravel, blast furnace slag and fly ash used in any particular concrete mix.
‡ Cementitious additives may contain traces of metals.

In this LCA, both fly ash and slag are considered secondary materials.

The product, as supplied, is 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) (ECHA 2025). Dust from this product is classified as Hazardous according to the Approved Criteria for Classifying Hazardous Substances 3rd Edition (NOHSC 2004). Concrete products are classified as non-dangerous goods according to the Australian Code for the Transport of Dangerous Goods by Road and Rail. When concrete products are cut, sawn, abraded or crushed, dust is created which contains crystalline silica, some of which may be respirable (particles small enough to go into the deep parts of the lung when breathed in), and which is hazardous. Exposure through inhalation should be avoided.

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).

** Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals.*

LCA information

Declared unit

"1 cubic metre (m^3) of pre-mix concrete, as ordered by our clients"

The conversion factor to mass is equal to the density of the concrete: 2 328 kg/m^3.

Scope of the Environmental Product Declaration

This EPD covers life cycle stages A1-A3, C1-C4 and D. This EPD covers the processes that occur in as many of the product's life cycle stages as could be effectively modelled. Stages A4, A5 and B1-7 have not been included as these are better defined at building or structure level.

The modules declared, geographical scope, share of primary data (in GWP-GHG indicator) and data variation are shown in Table 2.

Table 2: Scope of EPD

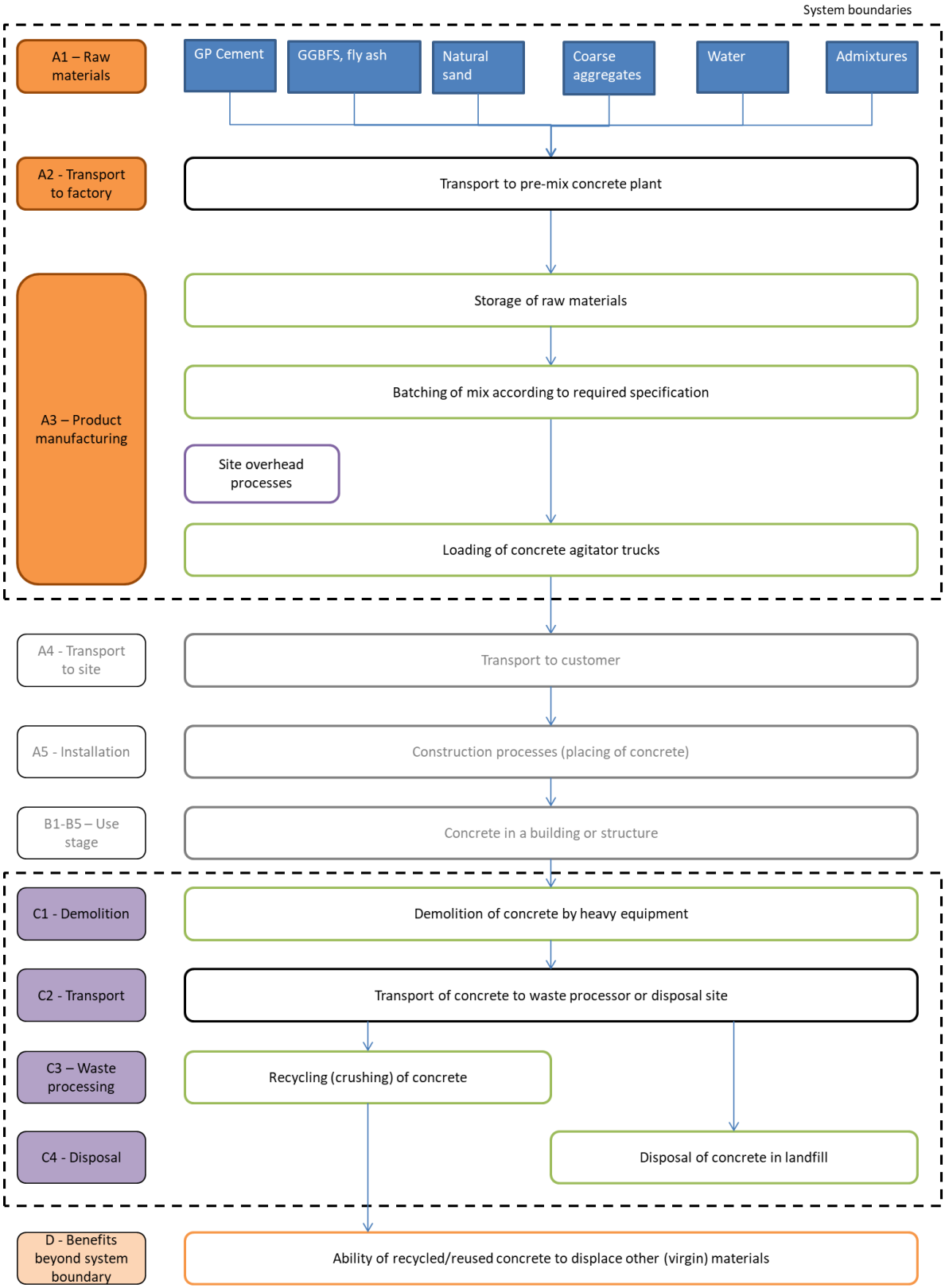
Stages	Product Stage			Construction Stage		Use Stage							End-of-life Stage				Benefits beyond system boundary
	Raw Materials	Transport	Production	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste Processing	Disposal	Reuse, recovery, recycling potential
Modules	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
				Scenario		Scenario							Scenario				Scenario
Modules Declared	✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	✓	✓	✓	✓	✓
Geography	AU	AU	AU										AU	AU	AU	AU	AU
Share of primary data	87%																
Variation products	0% (n/a)																
Variation sites	0% (n/a)																

✓ = module is included in this study

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

We have used specific data from our cement supplier, which increases the percentage of specific data.

Figure 1 – Flow diagram of main pre-mix concrete production processes, life cycle stages and visualisation of system boundaries



Product Stage (A1-A3)

Raw Materials – Module A1

Extraction and processing of raw materials results in environmental impacts from the use of energy and resources, as well as from process emissions and waste. Cement is produced from limestone and gypsum, aggregates and natural sand are extracted from quarries, fly ash and ground granulated blast furnace slag (GGBFS) are rest products from electricity generation and steel production, admixtures are specialised chemical formulations that are typically produced by blending selected ingredients.

Transportation – Module A2

Raw materials are typically transported from suppliers to our site via (articulated) trucks. Transport of raw materials have been included in the LCA based upon actual transport modes and distances relevant to our site in Penrith.

Manufacturing – Module A3

Pre-mix concrete products are manufactured by mixing the raw materials in selected quantities for each mix design.

The "**Construction process stage**" and "**Use stage**" have been excluded from the life cycle assessment, as the pre-mix concrete can be used for a range of different applications for which the use scenarios are unknown. The impacts of these stages are best determined at project level.

End of life stage (C1-C4)

The end-of-life modules for pre-mix concrete are based on generic scenarios, in line with our existing EPDs (i.e. they differ from the default data in the PCR). The scenarios included are currently in use and are representative for one of the most probable alternatives.

Module C1 covers demolition of the concrete at the end of its service life. For concrete produced in Penrith, we have used the end-of-life scenario representative for NSW building & demolition materials products based on the National Waste Report 2022 (NWR 2022). This scenario implies that 79.6% of the concrete is recycled and the remaining 20.4% of the concrete is sent to landfill.

Module C2 comprises the transport from the demolition site to a recycling centre or landfill site (50km). Module C3 encompasses the recycling process (i.e. crushing of concrete), while Module C4 represents disposal of concrete in a landfill site.

The concrete collected for recycling reaches end-of-waste status when it is crushed and stockpiled as "recycled crushed concrete" (RCC) aggregates. Crushed concrete is assumed to substitute primary (quarried) material without needing further processing.

The end-of-life results are based on the above scenario for concrete with a density of 2 328 kg/m^3.

Due to high uncertainty in the parameters and lack of data, CO_2-uptake (carbonation) has not been included at end-of-life.

Resource recovery stage (D)

Module D includes any benefits and loads from net flows leaving the product system (that have passed the end-of-waste state). For this EPD, any material collected for recycling and processed in Module C3, is considered to go through to Module D. We have assumed that Recycled Crushed Concrete aggregates (the output of module C3) replace virgin aggregates (crushed rocks) in module D.

Per cubic metre of concrete, module D credits the avoided impacts for 1.85 tonnes of crushed aggregates. The net flow calculation is not affected by SCMs.

Table 3: End-of-life scenario parameters

Processes	Quantity per m^3 of concrete	Unit
Collection process specified by type	2 328 0	kg collected separately kg collected with mixed construction waste
Transport from demolition site to recovery / disposal sites	50	km transport
Recovery system specified by type	0 1 853 0	kg for re-use kg for recycling kg for energy recovery
Disposal to landfill	475	kg product or material for final deposition
Assumptions for scenario development	144 70 7.4	MJ of diesel for the demolition process (C1) MJ of diesel for the crushing process (C3) + MJ of electricity for the crushing process (C3)

Background data

Primary data covers the 2022 calendar year and has been sourced from Western Suburbs Concrete. The mix designs are current (2026). Background data is predominantly sourced from EPDs, AusLCI (v1.42) and the AusLCI shadow database. Data for cement has been sourced from our supplier's EPD (registration number S-P-07449) (Cement Australia 2023). Data for admixtures has been sourced from EPDs published by EFCA (EFCA 2021a, 2021b, 2021c). As a result, the vast majority of the environmental profile of our products is based on life cycle data less than three years old. Background data used is less than 10 years old.

Methodological choices have been applied in line with EN 15804:2012+A2:2019; deviations have been recorded.

Allocation

The key processes that require allocation are:

- Production of concrete mixes: All shared processes are attributed to concrete products based on their volume.
- Fly ash: As around half of all the fly ash generated in Australia is not used but stored in ponds, economic allocation was applied with zero value assigned to the fly ash. In effect, all environmental impacts of the power plant have been allocated to the main product: electricity. Fly ash has only received the burdens of the transport to our site.
- Blast Furnace Slag (BFS): BFS is a by-product from steelmaking. We have used the AusLCI data for BFS ('Blast Furnace Slag allocation, at steel plant / AU U'), which contain impacts from pig iron production allocated to blast furnace slag using economic allocation. One tonne of slag equals the environmental impact of 0.0127 tonnes of pig iron. Drying of slag (using 769 MJ of natural gas per tonne) and milling of slag (using 50 kWh/t electricity) is included.

Allocation approaches may have a material effect on concrete products containing fly ash and/or ground granulated blast furnace slag.

Cut-off criteria

- The cut-off criteria applied are 1% of renewable and non-renewable primary energy usage, 1% of the total mass input of a process and 1% of environmental impacts.
- The contribution of capital goods (production equipment and infrastructure) and personnel is excluded, as these processes are non-attributable and they contribute less than 10% to GWP-GHG.

Key assumptions

- The concrete composition of each product is provided by WSC and has been accepted as is.
- Cement data are taken from a supplier specific EPD covering the EN 15804+A2 indicators (based on gross emissions). We modelled cement's EN 15804+A1 results using AusLCI data, with GWP adjusted to match the supplier EPD result.
- The GCCA-tool that underpins the cement data does not deliver sufficient information for the indicators HWD, NHWD and RWD as defined in EN 15804+A2, but only refer to the foreground system. This results in underreporting of these indicators.
- Admixture data are taken from generic EPDs. Additional environmental impact indicators are not declared in the admixture EPDs, which results in underreporting of these indicators.
- Electricity has been modelled for core processes using adjusted AusLCI data to represent the estimated residual electricity grid mix in NSW, Australia. This is done by removing renewables from the Australian Energy Statistics 2024 data (Table O.2). The GWP-GHG of the electricity is 0.89 kg CO_2e / kWh. The proxy residual grid mix is made up of black coal (94.0%), natural gas (5.2%), and oil products (0.8%). Given the low contribution of electricity consumption to the GWP-GHG emissions, the selection of the electricity grid mix does not have a material impact on the climate change results.
- The end-of-life scenario is based on landfill and recycling rates for building and demolition materials in New South Wales, as per the National Waste Report 2022 (NWR 2022), table 37.

Data Quality Assessment to EN 15941

Table 4: Data quality assessment

Process	Source type	Source	Reference year	Data category	Share of primary data (GWP-GHG; A1-A3)
Manufacturing of concrete	Collected data	EPD owner	2022	Primary data	<1%
Generation of electricity used in manufacturing of concrete	Database	AusLCI v1.42	2023	Primary data	<1%
Transport of raw materials to manufacturing site	Database	EPD owner	2023	Primary data	3%
Production of GP cement	EPD	Supplier EPD**	2023	Primary data, Secondary data	84%
Production of GGBFS and fly ash	Database	AusLCI v1.42	2023	Secondary data	0%
Production of aggregates	Database	AusLCI v1.42	2023	Secondary data	0%
Admixtures	EPD	EFCA EPDs	2021	Proxy data	0%
Other	Database	AusLCI v1.42	2023	Secondary data	0%
Total share of primary data*, of GWP-GHG results for A1-A3					**87%**

** The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.*

*** The reported share of primary data is associated with uncertainty, as an EPD used as data source lacks information on the share of primary data*

The EPD covers pre-mixed concrete from one plant, which provided energy and waste data for the concrete plant for the 2022 calendar year. The mix designs, raw materials, and supply chain details are current (September 2026). The ingredients are mixed in the batching plant and sent to the customer as wet concrete. The EPD covers end-of-life in Australia, based on a generic scenario (see Table 3). Background data was sourced from EPDs and the AusLCI v1.42 database. Data quality was assessed according to EN 15804:2012+A2:2019, Annex E (Table E.1 - UN Environment Global Guidance on LCA database development). The use of very poor and poor data is disclosed in Table 5, together with fair data with more than 30% of impact on any core indicator.

Table 5: Data quality information

Data set	Criteria	Data quality level	Reason for level	Reason for using	Relevance
Production of natural sand	Geographical	Fair	Generic background data	Best available data	15-25% of WDP 0-5% of other core impact indicators
	Technical	Fair			
Production of admixtures	Geographical	Fair	Proxy or Generic background data	Best available data	0-10% of all core impact indicators
	Technical	Very poor			

Life Cycle Assessment (LCA) indicators

An LCA serves as the foundation for this EPD. An LCA analyses the production systems of a product. It provides comprehensive evaluations of all upstream and downstream energy inputs and outputs. The results are provided in a form which covers a range of environmental impact categories.

Table 6: Environmental indicators legend (EN 15804+A2)

Core indicators	Acronym	Unit
Climate change – total	GWP-total	kg CO_2 equivalent
Climate change – fossil	GWP-fossil	kg CO_2 equivalent
Climate change – biogenic	GWP-biogenic	kg CO_2 equivalent
Climate change – land use and land use change	GWP-luluc	kg CO_2 equivalent
Ozone layer depletion	ODP	kg CFC-11 equivalent
Acidification	AP	mol H^+ equivalent
Eutrophication aquatic freshwater	EP-freshwater	kg P equivalent
Eutrophication aquatic marine	EP-marine	kg N equivalent
Eutrophication terrestrial	EP-terrestrial	mol N equivalent
Photochemical ozone formation	POCP	kg NMVOC equivalent
Abiotic depletion potential - elements[2]	ADP minerals & metals	kg Sb equivalent
Abiotic depletion potential – fossil fuels[2]	ADP fossil	MJ, net calorific value
Water use[2]	WDP	m^3 world equivalent deprived
Additional indicators	**Acronym**	**Unit**
Global Warming Potential – Greenhouse gases	GWP-GHG	kg CO_2 eq
Particulate matter emissions	PM	disease incidence
Ionising radiation, human health[1]	IRP	kBq U235 equivalent
Ecotoxicity (freshwater)[2]	ETP-fw	CTUe
Human toxicity, cancer effects[2]	HTP-c	CTUh
Human toxicity, non-cancer effects[2]	HTP-nc	CTUh
Land use related impacts / soil quality[2]	SQP	- (dimensionless)
Additional GHG indicator	**Acronym**	**Unit**
Carbon footprint in line with IPCC AR5	**GWP-GHG (IPCC AR5)**	**kg CO_2 eq**

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator.

[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Note regarding various GWP indicators:

GWP-total is calculated using the European Union's Joint Research Centre's characterisation factors (CFs) based on the "EF 3.1 package" for CFs to be used in the EU's Product Environmental Footprint (PEF) framework. CFs listed by JRC include indirect radiative forcing, which results in higher numerical Global Warming Potential (GWP) values than the CFs in the internationally accepted (IPCC 2013).

The GWP-GHG indicator is identical to GWP-total except that the CFs for biogenic CO_2 are set to zero. The GWP-GHG indicator in PCR 2019:14 v2.0.1 differs from the GWP-GHG in PCR 2019:14 version 1.2.5 and earlier.

The "GWP-GHG (IPCC AR 5)" indicator is determined using the IPCC AR5 Global Warming Potentials (GWP) with a 100-year time horizon. This indicator is aligned with Australia's greenhouse gas reporting frameworks.

Table 7: Legend for parameters describing resource use, waste and output flows

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

Table 8: Legend for EN 15804+A1 indicators

Indicator	Acronym	Unit
Global warming potential	GWP	kg CO_2 equivalent
Ozone layer depletion potential	ODP	kg CFC-11 equivalent
Acidification potential	AP	kg SO_2 equivalent
Eutrophication potential	EP	kg PO_4^{3-} equivalent
Photochemical oxidation (Photochemical ozone creation) potential	POCP	kg ethylene equivalent
Abiotic depletion potential - elements	ADPE	kg Sb equivalent
Abiotic depletion potential – fossil fuels	ADPF	MJ_{NCV}

Environmental performance

The following section presents the results for each Life Cycle Assessment module. The results have been calculated with SimaPro software v9.6.0.1 using characterisation factors based on the "EF 3.1 package" for characterisation factors to be used in the EU's Product Environmental Footprint (PEF) framework.

Water flows have been disaggregated using the 36 ALCAS water catchments for which characterisation factors are available for both Pfister WSI and the AWARE method.

To separate the use of primary energy into energy used as raw material and energy used as energy carrier, Option B from Annex 3 of PCR 2019:14 has been applied.

Please consider the following mandatory statements when interpreting the results:

"The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks."

"The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3)."

HE451032@2

The environmental indicators are expressed per m^3 of concrete.

Table 9: **Environmental indicators EN 15804+A2, HE451032@2 pre-mix concrete, per m^3**

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
Core Indicators							
GWP-total	kg CO_2-eq.	5.18E+02	1.23E+01	1.49E+01	7.61E+00	1.13E+00	-1.63E+01
GWP-fossil	kg CO_2-eq.	5.17E+02	1.23E+01	1.49E+01	7.60E+00	1.13E+00	-1.63E+01
GWP-biogenic	kg CO_2-eq.	1.85E-01	8.18E-04	9.21E-04	7.25E-03	9.09E-05	-3.21E-02
GWP-luluc	kg CO_2-eq.	5.86E-02	5.91E-06	7.04E-06	3.52E-06	5.46E-07	-2.51E-06
ODP	kg CFC11-eq.	1.23E-05	1.97E-06	2.35E-06	9.61E-07	1.84E-07	-5.57E-07
AP	mol H+ eq.	2.80E+00	1.35E-01	1.31E-01	2.09E-02	2.69E-03	-5.96E-02
EP-freshwater	kg P eq.	1.13E-01	1.64E-06	8.96E-07	5.64E-06	1.54E-07	-1.17E-05
EP-marine	kg N eq.	4.80E-02	5.90E-02	4.12E-02	3.72E-03	4.84E-04	-9.98E-03
EP-terrestrial	mol N eq.	5.27E+00	6.47E-01	4.52E-01	4.06E-02	5.30E-03	-1.08E-01
POCP	kg NMVOC eq.	1.32E+00	1.73E-01	1.10E-01	1.09E-02	1.42E-03	-2.83E-02
ADP minerals & metals[2]	kg Sb eq.	1.15E-04	1.45E-08	1.73E-08	1.89E-06	1.32E-09	-2.39E-06
ADP fossil[2]	MJ (NCV)	3.49E+03	1.72E+02	2.05E+02	1.09E+02	1.60E+01	-2.34E+02
WDP[2]	m^3 world eq. deprived	1.74E+02	1.09E+00	1.29E+00	1.11E+00	1.01E-01	-1.09E+02
Additional indicators							
GWP-GHG	kg CO_2-eq.	5.18E+02	1.23E+01	1.49E+01	7.61E+00	1.13E+00	-1.63E+01
PM	Disease incidence	1.62E-05	3.59E-06	7.37E-07	1.39E-07	1.42E-08	-4.99E-07
IRP[1]	kBq U235 eq.	5.32E+03	2.51E-04	2.99E-04	1.53E-03	2.33E-05	-1.48E-03
ETP-fw[2]	CTUe	1.27E+02	3.81E+01	4.52E+01	1.87E+01	3.49E+00	-1.12E+01
HTP-c[2]	CTUh	1.18E-06	4.77E-10	6.39E-11	1.59E-10	8.90E-12	-7.09E-10
HTP-nc[2]	CTUh	3.17E-05	2.54E-09	1.22E-09	1.04E-09	1.08E-10	-4.48E-09
SQP[2]	-	1.34E+03	8.26E-01	9.19E-01	2.56E+01	2.65E+01	-3.35E+02
Carbon footprint							
GWP-GHG (IPCC AR5)	**kg CO_2 eq**	**518**	**12.3**	**14.9**	**7.61**	**1.13**	**-16.3**

Footnotes (to Table 9 and Table 12):

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator.

[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Table 10: **EN 15804+A2 parameters, HE451032@2 pre-mix concrete, per m^3**

Parameter	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
PERE	MJ_{NCV}	1.18E+02	2.66E-01	2.94E-01	1.88E+00	3.14E-02	-1.33E+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}	1.18E+02	2.66E-01	2.94E-01	1.88E+00	3.14E-02	-1.33E+01
PENRE	MJ_{NCV}	3.62E+03	1.72E+02	2.05E+02	1.09E+02	1.60E+01	-2.34E+02
PENRM	MJ_{NCV}	1.06E+01	0.00E+00	0.00E+00	-8.45E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	3.63E+03	1.72E+02	2.05E+02	1.00E+02	1.60E+01	-2.34E+02
SM	kg	5.53E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	6.09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	8.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.96E+00	2.49E-02	2.97E-02	3.86E-02	2.32E-03	-2.56E+00
HWD	kg	2.97E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	2.17E-01	7.88E-04	8.69E-04	5.30E-03	4.75E+02	-3.93E-02
RWD	kg	1.53E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	8.14E+01	0.00E+00	0.00E+00	1.85E+03	0.00E+00	0.00E+00
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: **EN 15804+A1 indicators, HE451032@2 pre-mix concrete, per m^3**

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
GWP	kg CO_2 eq	5.15E+02	1.23E+01	1.49E+01	7.59E+00	1.12E+00	-1.63E+01
ODP	kg CFC11 eq	8.89E-06	1.56E-06	1.86E-06	7.59E-07	1.45E-07	-4.40E-07
AP	kg SO_2 eq	2.28E+00	9.63E-02	7.25E-02	1.32E-02	2.16E-03	-1.88E-02
EP	kg PO_4^{3-} eq	2.99E-01	1.98E-02	1.39E-02	1.30E-03	1.67E-04	-3.47E-03
POCP	kg C_2H_4 eq	6.81E-02	9.44E-03	4.69E-03	7.38E-04	1.08E-04	-1.29E-03
ADPE	kg Sb eq	4.52E-05	1.47E-08	1.75E-08	1.89E-06	1.35E-09	-2.40E-06
ADPF	MJ_{NCV}	3.71E+03	1.72E+02	2.05E+02	1.09E+02	1.60E+01	-2.34E+02

**Note: the indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., the results of the "A1 indicators" shall not be claimed to be compliant with EN 15804:2012+A1:2013*

Additional scenarios

Table 12: Environmental indicators EN 15804+A2, 100% end-of-life scenarios, HE451032@2 pre-mix concrete, per m^3

Environmental Indicator	Unit	Module C3	Module C4	Module D	Module C3	Module C4	Module D
Core Indicators		**100% recycling**			**100% landfill**		
GWP-total	kg CO_2-eq.	9.56E+00	0	-2.05E+01	0	5.52E+00	0
GWP-fossil	kg CO_2-eq.	9.55E+00	0	-2.05E+01	0	5.52E+00	0
GWP-biogenic	kg CO_2-eq.	9.10E-03	0	-4.03E-02	0	4.45E-04	0
GWP-luluc	kg CO_2-eq.	4.43E-06	0	-3.16E-06	0	2.68E-06	0
ODP	kg CFC11-eq.	1.21E-06	0	-7.00E-07	0	9.02E-07	0
AP	mol H+ eq.	2.63E-02	0	-7.49E-02	0	1.32E-02	0
EP-freshwater	kg P eq.	7.09E-06	0	-1.48E-05	0	7.53E-07	0
EP-marine	kg N eq.	4.68E-03	0	-1.25E-02	0	2.37E-03	0
EP-terrestrial	mol N eq.	5.10E-02	0	-1.36E-01	0	2.60E-02	0
POCP	kg NMVOC eq.	1.36E-02	0	-3.56E-02	0	6.98E-03	0
ADP minerals & metals[2]	kg Sb eq.	2.37E-06	0	-3.01E-06	0	6.48E-09	0
ADP fossil[2]	MJ (NCV)	1.36E+02	0	-2.94E+02	0	7.85E+01	0
WDP[2]	m^3 world eq. deprived	1.40E+00	0	-1.37E+02	0	4.96E-01	0
Additional indicators		**100% recycling**			**100% landfill**		
GWP-GHG	kg CO_2-eq.	9.56E+00	0	-2.05E+01	0	5.52E+00	0
PM	Disease incidence	1.75E-07	0	-6.27E-07	0	6.97E-08	0
IRP[1]	kBq U235 eq.	1.93E-03	0	-1.86E-03	0	1.14E-04	0
ETP-fw[2]	CTUe	2.35E+01	0	-1.41E+01	0	1.71E+01	0
HTP-c[2]	CTUh	2.00E-10	0	-8.91E-10	0	4.36E-11	0
HTP-nc[2]	CTUh	1.31E-09	0	-5.63E-09	0	5.27E-10	0
SQP[2]	-	3.22E+01	0	-4.21E+02	0	1.30E+02	0
Carbon footprint		**100% recycling**			**100% landfill**		
GWP-GHG (IPCC AR5)	**kg CO_2 eq**	**9.6**	**0**	**-20.5**	**0**	**5.5**	**0**

Table 13: EN 15804+A2 parameters, 100% end-of-life scenarios, HE451032@2 pre-mix concrete, per m^3

Parameter	Unit	Module C3	Module C4	Module D	Module C3	Module C4	Module D
		100% recycling			100% landfill		
PERE	MJ_{NCV}	2.36E+00	0	-1.67E+01	0	1.54E-01	0
PERM	MJ_{NCV}	0.00E+00	0	0.00E+00	0	0.00E+00	0
PERT	MJ_{NCV}	2.36E+00	0	-1.67E+01	0	1.54E-01	0
PENRE	MJ_{NCV}	1.36E+02	0	-2.94E+02	0	7.85E+01	0
PENRM	MJ_{NCV}	-1.06E+01	0	0.00E+00	0	0.00E+00	0
PENRT	MJ_{NCV}	1.26E+02	0	-2.94E+02	0	7.85E+01	0
SM	kg	0.00E+00	0	0.00E+00	0	0.00E+00	0
RSF	MJ_{NCV}	0.00E+00	0	0.00E+00	0	0.00E+00	0
NRSF	MJ_{NCV}	0.00E+00	0	0.00E+00	0	0.00E+00	0
FW	m^3	4.85E-02	0	-3.21E+00	0	1.14E-02	0
HWD	kg	0.00E+00	0	0.00E+00	0	0.00E+00	0
NHWD	kg	6.66E-03	0	-4.94E-02	0	2.33E+03	0
RWD	kg	0.00E+00	0	0.00E+00	0	0.00E+00	0
CRU	kg	0.00E+00	0	0.00E+00	0	0.00E+00	0
MFR	kg	2.33E+03	0	0.00E+00	0	0.00E+00	0
MER	kg	0.00E+00	0	0.00E+00	0	0.00E+00	0
EE	MJ	0.00E+00	0	0.00E+00	0	0.00E+00	0

Abbreviations

Abbreviation	Definition
AusLCI	Australian Life Cycle Inventory (database)
BFS / GGBFS	blast furnace slag / ground granulated blast furnace slag
CEN	European Committee for Standardization
CPC	Central Product Classification
EF	Environmental Footprint
EFCA	European Federation of Concrete Admixtures Associations
EN	European Norm (Standard)
EPD	Environmental Product Declaration
GPI	General Programme Instructions
ISO	International Organization for Standardization
kg	kilogram
km	kilometre
kWh	kilo Watt hour
LCA	Life Cycle Assessment
m^3	cubic metre
ND	Not Declared
NWR	National Waste Report
OHS	Operational Health and Safety
PCR / c-PCR	Product Category Rules / complimentary Product Category Rules
SCM	Supplementary Cementitious Materials
SVHC	Substances of Very High Concern
t	tonne
UN	United Nations

Version history

Version	Notes
1	Original version of the EPD, published 2026-09-21

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