MAWSONS®

Concrete & Quarries

Environmental Product Declaration

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

L40PR14H193 concrete manufactured at **Hay**
for Project EnergyConnect

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An EPD should provide current information and may be updated if conditions change.
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Contents

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EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Programme 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 as they enable transparency and comparability between EPDs. This EPD is a "cradle-to-gate plus modules C1-C4, D" declaration covering production and end-of-life life cycle stages.
This EPD is verified to be compliant with EN 15804+A2. EPDs of construction products may not be comparable if they do not comply with EN15804. EPDs within the same product category but from different programs or utilising different standards or PCRs may not be comparable. E.B. Mawson and Sons Pty. Ltd. (Mawsons) as the EPD owner, has the sole ownership, liability, and responsibility for the EPD.

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Procedure for follow-up of data during EPD validity involves third-party verifier:	☐ Yes ☒ No

About Mawsons

E.B. Mawsons & Sons Pty Ltd is a leading supplier of quality concrete and quarry products across northern Victoria and southern New South Wales. Since 1912, the family-run company has been respectful of the natural environment and the regional communities in which it operates. People are at the heart of the business and the development, empowerment and integrity of its staff underpins its success. Mawsons strive to work safely and provide products and services in a sustainable manner.

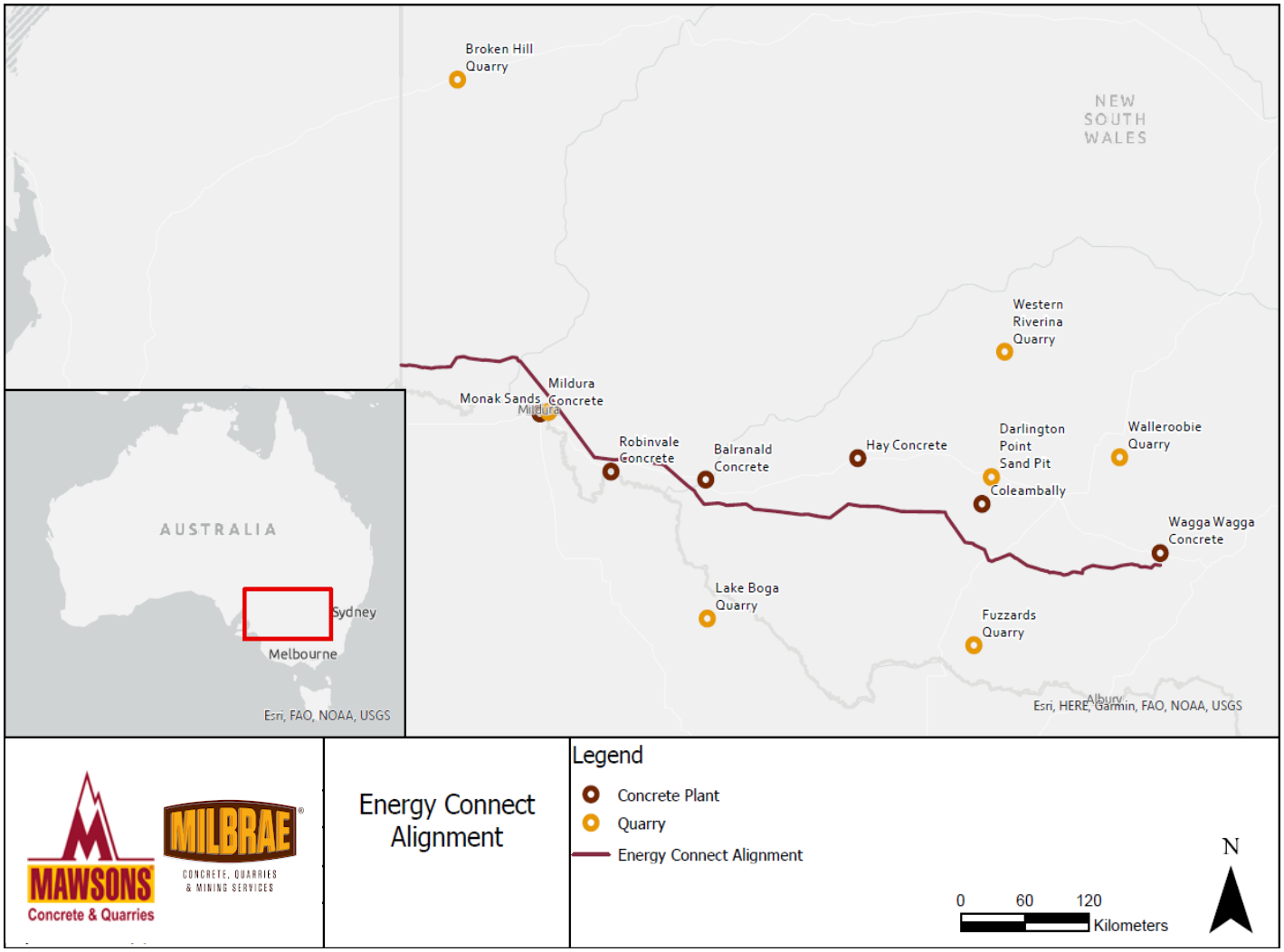
Mawsons have become leaders in sustainability and environment protection. In September 2020 Mawsons switched to 100% renewable electricity across workshops, offices, quarries and concrete plants. This move has reduced Mawsons' overall carbon emissions*. In addition to the use of renewable electricity, Mawsons recycle concrete, quarry products, sand and water. Mawsons maintain significant areas of native bush for habitat and off-set any land which is temporarily cleared for quarrying. Quarry pit rehabilitation begins before the resource is exhausted with tree planting and erosion control. All quarried land is rehabilitated according to government regulations.

In 2021, Mawsons, along with their joint venture partner Adbri, purchased Milbrae's concrete, quarry, mobile crushing and mining services businesses. Mawsons now operate more than 30 quarries and sandpits and 50 concrete plants across Victoria and New South Wales.

** Note: Due to the strict requirements of the EPD Program regarding the use of renewable electricity in the model, we have not yet implemented this in the underlying LCA, leading to a conservative outcome for the carbon footprint of our concrete products. We will continue working on improving our records and the LCA model to reflect this in future updates.*

About Project EnergyConnect - PEC

Project EnergyConnect is a major infrastructure initiative that will establish Australia's first new electricity interconnector between states in 15 years. This interconnector will enable power to be shared between regions within the National Electricity Market (NEM), improving access to a broader range of electricity sources. Such interconnections are widely used worldwide, including in Australia, to enhance energy supply, increase market competition, and improve grid stability.



Project EnergyConnect will involve building an overhead transmission line stretching about 900 km, capable of transferring around 800MW of electricity. It will establish a connection between South Australia (SA) and New South Wales (NSW), with an additional link to northwest Victoria. Project EnergyConnect is a collaborative effort between ElectraNet in South Australia (SA) and TransGrid in New South Wales (NSW).

Mawsons Concrete played a key role in Project EnergyConnect by supplying concrete for critical infrastructure including:

- Overhead transmission tower foundations Line 1, Line 2, Line 4 and Line 5
- Buronga substation
- Dinawan Substation

Work involved managing complex logistics, such as coordinating multiple concrete trucks for large-scale pours, often conducted overnight and under varying weather conditions. This collaboration provided the supported needed to deliver this large-scale project.

Concrete Products included the replacement of Ordinary General Purpose (GP) Portland cement with Flyash and Ground Granulated Blast Furnace Slag (GGBFS). The inclusion of manufactured sand also offered concrete products with lower embodied carbon values.

Photo above: (Buronga Substation – Large Synchon pour, 850m^3)

Product description

Mawsons' concrete solutions played a crucial role in enhancing the strength, efficiency and environmental sustainability of Project EnergyConnect.

Mawsons supplied specialized ready-mix concrete products including:

- Stabilised Sand Products
- Deep Pile Foundations
- Self-Compacting Concrete for Deep Pile Foundations
- Heavy Industrial Pavements
- High-Strength Structural Mixes
- Low Heat of Hydration Concrete Mixes
- Long Lead & Haul time Concrete Mixes
- Concrete Mixes incorporating Chilled Water, for concrete temperature reduction

This EPD covers L40PR14H193 manufactured at Hay in New South Wales

Product code	Strength grade	Density
L40PR14H193	40 MPa	2 432 kg/m^3

The product composition is presented in Table 1. For reasons of confidentiality, a range is provided.

Table 1: Product composition

Constituent	Concrete	Post-consumer material, weight %	Renewable material, weight %
Cement	2-15%	0%	0%
Ground granulated blast furnace slag	0-15%	0%	0%
Fly ash	1-8%	0%	0%
Aggregates	0-47%	0%	0%
Natural sand	17-61%	0%	0%
Manufactured sand	0-28%	0%	0%
Admixtures	0.00-0.55%	0%	0%
Water	7-10%	0%	0%
Plastic fibres	n/a	0%	0%
TOTAL	2 432 kg/m^3	0%	0%

** Mawsons uses cement in their mixes. Cement contains traces of Chromium VI (hexavalent).*

† Crystalline-silica (quartz) may be a constituent of sand, crushed stone, gravel, silica fume, blast furnace slag and fly ash used in any particular concrete mix.

 # Although admixtures are below the mass cut-off, they have been considered in this LCA as they may exceed the environmental cut-off.

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

The product, as supplied, is non-hazardous. The product included in this EPD does not contain any substances of very high concern as defined by European REACH[1] regulation in concentrations >0.1% (m/m). 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 Premixed concrete is UN CPC 375 (Articles of concrete, cement and plaster) and ANZSIC 20330 (Concrete – ready mixed – except dry mix).

Technical Compliance

Mawsons ensures its products meet strict Australian Standards (AS) to maintain quality, durability, and performance across construction applications.

- Cement – Complies with AS 3972 (General Purpose and Blended Cements)
- Concrete Supply – Adheres to AS 1379 (Specification and supply of concrete)
- Aggregates – Complies with AS 2758.1 (Aggregates for concrete)
- Fly Ash – Complies with AS 3582.1 (Supplementary cementitious materials – Fly ash)
- Slag – Complies with AS 3582.2 (Supplementary cementitious materials – Ground granulated blast furnace slag GGBFS)
- Silica Fume – Complies with AS 3582.3 (Supplementary cementitious materials – Silica fume)
- Admixtures – Meets AS 1478.1 (Chemical admixtures for concrete, mortar, and grout)

Declared unit

1 cubic metre (m^3) of Premixed concrete with a given strength grade and identifying characteristics.

The declared unit is defined as the quantity ordered by the client.

[1] * 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.

Scope of the Environmental Product Declaration

This EPD covers the cradle-to-gate plus end-of-life life cycle stages (modules A1-A3, C1-C4, D).

Construction and use stages have not been included as we cannot define a typical scenario for the range of Premixed concrete products. These impacts are best determined at project level.

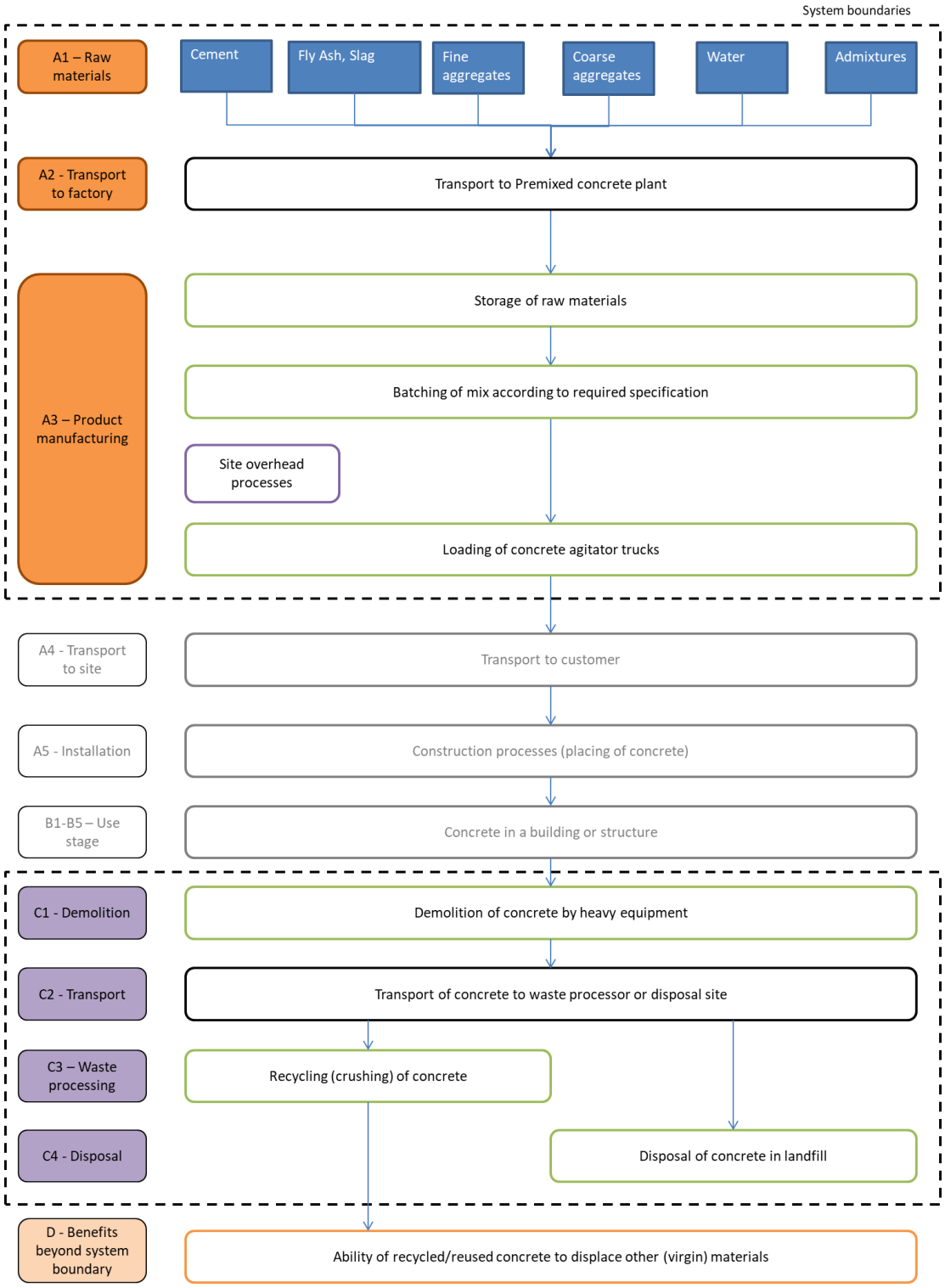
The modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are shown in Table 2.

Table 2: Scope of the 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	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	AU	AU	AU	-	-	-	-	-	-	-	-	-	AU	AU	AU	AU	AU
Share of specific data	>90%																
Variation products	0%																
Variation sites	0%																

X = 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.

Figure 1: System Boundary Diagram of Premixed concrete Products



Description of Life cycle stages

Raw Material Supply (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 clinker (made from limestone) and gypsum.
- Aggregates, manufactured sand and natural sand are extracted from quarries.
- Supplementary Cementitious Materials (SCM): Fly ash and GGBFS (ground granulated blast furnace slag) are rest products from electricity generation, steel production, and (ferro)silicon production, respectively.
- Admixtures are specialised chemical formulations that are typically produced by blending selected ingredients.

Transport (A2)

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

Manufacturing (A3)

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

Construction (A4-A5) / Use (B1-B7)

The "**Construction process stage**" and "**Use stage**" have been excluded from the life cycle assessment, as the concrete products 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 (C1-C4)

The end-of-life modules for Premixed concrete products are based on generic scenarios. 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. We have used the end-of-life scenario representative for Australian average building & demolition materials products based on the National Waste Report 2022 (NWR 2022). This scenario implies that 80% of the concrete is recycled and the remaining 20% 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 2 432 kg/m^3, see Table 3.

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

Table 3: End-of-life scenario parameters

Processes	Quantity per m^3 of concrete	Unit
Collection process specified by type	2 432 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 1 946 0	kg for re-use kg for recycling kg for energy recovery
Disposal to landfill	486	kg product or material for final deposition
Assumptions for scenario development	149 74 7.8	MJ of diesel for the demolition process (C1) MJ of diesel for the crushing process (C3) + MJ of electricity for the crushing process (C3)

Loads and Benefits Beyond the System Boundaries (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 1 946 kg of crushed aggregates.
The net flow calculation is not affected by SCMs.

Table 4: Module D scenario parameters

Parameter	Effect
$M_{MR\ out}$ = 80%	amount of concrete exiting the system that will be recycled in a subsequent system
$M_{MR\ in}$ = 0%	amount of recycled input material (aggregates) in concrete Note: The secondary material input of fly-ash and slag is not included in the net flow calculation.[2]
Y = 100%	the material yield, between point of end-of-waste (M-EoW) in modules A4-C4 and point of substitution (M-DoS) in module D (when the material has been upgraded).
$E_{MR\ after\ EoW\ out}$ = 0 (n/a)	specific emissions and resources consumed per unit of analysis arising from material recovery processes of a subsequent system after the end-of-waste state
$E_{VMSub\ out}$ = coarse aggregates	specific emissions and resources consumed per unit of analysis arising from acquisition and pre-processing of the primary material, or average input material if primary material is not used, from the cradle to the point of functional equivalence where it would substitute secondary material that would be used in a subsequent system. Process: *unweighted average Mawsons quarry product*
$Q_{R\ out}$	quality of the outgoing recovered material
Q_{Sub}	quality of the substituted material
$Q_{R\ out} / Q_{Sub}$ = 1	quality ratio between outgoing recovered material and the substituted material is assumed to be 1 (equal quality)

[2] EN 15804, section 6.4.3.3: "The amount of secondary material output, which is for all practical purposes able to replace one to one the input of secondary material as closed loop is allocated to the product system under study and not to module D". Since the crushed concrete aggregate generated at end-of-life (module C3) is not able to replace fly-ash or slag used in concrete, the fly-ash and slag need to be excluded from the net flow.

Life Cycle Assessment (LCA) Methodology

Background Data

Primary data covers the 2024 financial year (1 July 2023 – 30 June 2024) and has been sourced from Mawsons. This includes concrete manufacturing data, as well as quarry data for our key aggregate supplies. Background data is predominantly sourced from EPDs, AusLCI and the AusLCI shadow database. Data for cement has been sourced from our suppliers (based on their EPDs). All cement data are based on gross emissions. Data for admixtures has been sourced from EPDs published by EFCA (EFCA 2021a, 2021b, 2023). 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.

Key assumptions

- The concrete composition of each product is provided by Mawsons and has been accepted as is.
- Cement and admixture data are taken from supplier-specific and generic EPDs. This is expected to greatly improve the accuracy of Mawsons' EPD results.
- There is a possible misalignment between the cement EPD used as an input into the model, which is likely based on EF 3.0, and the EF 3.1 characterisation factors used for this EPD. This may lead to somewhat conservative results for affected indicators.
-
- Additional environmental impact indicators are not declared in the admixture EPDs, which results in underreporting of these indicators.
- Allocation approaches may have a material effect on concrete products containing fly ash and/or ground granulated blast furnace slag.
- The end-of-life scenario is based on average landfill and recycling rates for building and demolition materials in Australia, as per the National Waste Report 2022 (NWR 2022), table 37.

Electricity

Electricity has been modelled for core processes using adjusted AusLCI data to represent the estimated residual electricity grid mix in 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.

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.

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: 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.
- Aggregates: Coarse aggregates and manufactured sand are produced through crushing of rock, which is graded in different sizes. The energy required for the crushing and screening does not differentiate from products. Therefore, impacts are allocated to products, based on the mass. In effect, all aggregates have the same environmental profile.

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

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 5: 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[1]	ADP minerals & metals	kg Sb equivalent
Abiotic depletion potential – fossil fuels[1]	ADP fossil	MJ, net calorific value
Water use[1]	WDP	m^3 world equivalent deprived
Additional indicators	**Acronym**	**Unit**
Global Warming Potential – Greenhouse gases	GWP-GHG	kg CO_2 equivalent
Particulate matter emissions	PM	disease incidence
Ionising radiation, human health[2]	IRP	kBq U235 equivalent
Ecotoxicity (freshwater)[1]	ETP-fw	CTUe
Human toxicity, cancer effects[1]	HTP-c	CTUh
Human toxicity, non-cancer effects[1]	HTP-nc	CTUh
Land use related impacts / soil quality[1]	SQP	- (dimensionless)
Additional GHG indicator	**Acronym**	**Unit**
Carbon footprint in line with IPCC AR5[3]	**GWP-GHG (IPCC AR5)**	**kg CO_2 eq**

[1] 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.
[2] 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.
[3] **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 v1.3.4 differs from the GWP-GHG in earlier (pre v1.3) PCR 2019:14 versions. The IPCC AR 5 (IPCC 2013) 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 6: 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 7: 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}

Results: Environmental profiles

The following section presents the results for each Life Cycle Assessment module. The results have been calculated (based on the EFv3.1 set of characterisation factors) with SimaPro software v9.6.0.1. 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 use of the results of modules A1-A3 (A1-A5 for services) without considering the results of module C is discouraged".

Photo above: (Mawsons Echuca Concrete Plant)

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

Table 8: **Environmental indicators EN 15804+A2, L40PR14H193, 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.	3.08E+02	1.24E+01	1.56E+01	7.99E+00	1.15E+00	-1.59E+01
GWP-fossil	kg CO_2-eq.	3.07E+02	1.24E+01	1.56E+01	7.98E+00	1.15E+00	-1.59E+01
GWP-biogenic	kg CO_2-eq.	3.23E-01	8.54E-04	9.62E-04	7.61E-03	9.31E-05	-6.40E-03
GWP-luluc	kg CO_2-eq.	1.08E-03	6.17E-06	7.35E-06	3.70E-06	5.59E-07	-8.63E-06
ODP	kg CFC11-eq.	9.07E-06	2.06E-06	2.45E-06	1.01E-06	1.89E-07	-2.12E-06
AP	mol H+ eq.	8.53E-01	1.41E-01	1.37E-01	2.20E-02	2.75E-03	-1.59E-01
EP-freshwater	kg P eq.	7.03E-05	1.71E-06	9.36E-07	5.92E-06	1.57E-07	-9.66E-06
EP-marine	kg N eq.	3.08E-01	6.16E-02	4.31E-02	3.91E-03	4.96E-04	-6.33E-02
EP-terrestrial	mol N eq.	3.31E+00	6.76E-01	4.72E-01	4.27E-02	5.43E-03	-7.05E-01
POCP	kg NMVOC eq.	8.08E-01	1.80E-01	1.15E-01	1.14E-02	1.46E-03	-1.84E-01
ADP minerals & metals[1]	kg Sb eq.	1.19E-06	1.52E-08	1.81E-08	1.98E-06	1.35E-09	-6.19E-07
ADP fossil[1]	MJ (NCV)	2.10E+03	1.80E+02	2.14E+02	1.14E+02	1.64E+01	-2.10E+02
WDP[1]	m^3 world eq. deprived	1.04E+02	1.14E+00	1.35E+00	1.17E+00	1.04E-01	-1.86E+00
Additional indicators							
GWP-GHG	kg CO_2-eq.	3.07E+02	1.24E+01	1.56E+01	7.99E+00	1.15E+00	-1.59E+01
PM	Disease incidence	7.88E-06	3.75E-06	7.70E-07	1.46E-07	1.46E-08	-3.85E-06
IRP[2]	kBq U235 eq.	1.72E-02	2.63E-04	3.12E-04	1.61E-03	2.39E-05	-3.80E-04
ETP-fw[1]	CTUe	1.96E+02	3.98E+01	4.72E+01	1.97E+01	3.58E+00	-4.18E+01
HTP-c[1]	CTUh	8.47E-09	4.98E-10	6.68E-11	1.67E-10	9.12E-12	-5.52E-10
HTP-nc[1]	CTUh	4.95E-07	2.66E-09	1.27E-09	1.09E-09	1.10E-10	-3.99E-09
SQP[1]	-	4.48E+02	8.63E-01	9.60E-01	2.69E+01	2.71E+01	-9.90E+02
Carbon footprint							
GWP-GHG (IPCC AR5)	**kg CO_2 eq**	308	12.4	15.6	7.99	1.15	-15.91

Footnotes:

[1] 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.

[2] 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.

Table 9: EN 15804+A2 parameters, L40PR14H193, per m^3

Parameter	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
PERE	MJ_{NCV}	5.25E+01	2.78E-01	3.07E-01	1.97E+00	3.21E-02	-6.73E-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}	5.25E+01	2.78E-01	3.07E-01	1.97E+00	3.21E-02	-6.73E-01
PENRE	MJ_{NCV}	2.08E+03	1.80E+02	2.14E+02	1.14E+02	1.64E+01	-2.10E+02
PENRM	MJ_{NCV}	1.08E+01	0.00E+00	0.00E+00	-8.66E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	2.09E+03	1.80E+02	2.14E+02	1.05E+02	1.64E+01	-2.10E+02
SM	kg	1.73E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	2.86E+00	2.60E-02	3.10E-02	4.05E-02	2.38E-03	-5.70E-01
HWD	kg	3.03E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	4.83E+01	8.23E-04	9.08E-04	5.57E-03	4.86E+02	-1.25E-02
RWD	kg	1.56E-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	0.00E+00	0.00E+00	0.00E+00	1.95E+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 10: **EN 15804+A1 indicators*, L40PR14H193, per m^3**

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
GWP	kg CO_2 eq	3.08E+02	1.24E+01	1.55E+01	7.97E+00	1.15E+00	-1.60E+01
ODP	kg CFC11 eq	7.17E-06	1.63E-06	1.94E-06	7.97E-07	1.49E-07	-1.67E-06
AP	kg SO_2 eq	4.82E-01	1.01E-01	7.58E-02	1.39E-02	2.21E-03	-1.06E-01
EP	kg PO_4^{3-} eq	1.06E-01	2.07E-02	1.45E-02	1.36E-03	1.71E-04	-2.30E-02
POCP	kg C_2H_4 eq	2.58E-02	9.87E-03	4.89E-03	7.75E-04	1.10E-04	-9.87E-03
ADPE	kg Sb eq	3.58E-06	1.54E-08	1.83E-08	1.98E-06	1.38E-09	-6.19E-07
ADPF	MJ_{NCV}	2.10E+03	1.80E+02	2.14E+02	1.14E+02	1.64E+01	-2.10E+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

References

AS 1379	Specification and supply of concrete, prepared by Committee BD-049 Manufacture of Concrete, published on 20 September 2007 by Standards Australia, Sydney
AusLCI 2023	Australian Life Cycle Inventory database v1.42 published by the Australian Life Cycle Assessment Society, 2023
ECHA 2024	European Chemicals Association, Candidate List of substances of very high concern for Authorisation, published in accordance with Article 59(10) of the REACH Regulation, Helsinki Accessed on 1 December 2024 from: https://echa.europa.eu/candidate-list-table
Environdec 2021	International EPD System, General Programme Instructions for the International EPD System, Version 4.0, 29 March 2021
EN 15804+A2	EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, European Committee for Standardization (CEN), Brussels, August 2021
EN 15804+A1	Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, European Committee for Standardization (CEN), Brussels, November 2013
ISO 14025	Environmental labels and declarations - Type III environmental declarations - Principles and procedures. International Organization for Standardization, Geneva, Switzerland, 2006
ISO 14040	Environmental management - Life cycle assessment - Principles and framework. International Organization for Standardization, Geneva, Switzerland, 2006
ISO 14044	Environmental management - Life cycle assessment - Requirements and guidelines. International Organization for Standardization, Geneva, Switzerland, 2006
NWR 2022	Blue Environment, National Waste Report 2022, prepared for The Department of Climate Change, Energy, the Environment and Water, Final version 1.2, 16 December 2022 (updated 10 February 2023)
PCR 2019:14	Product category rules for Construction products (EN 15804:2012+A2:2019), registration number 2019:14, version 1.3.4, published on 30 April 2024
Environdec 2024	c-PCR-003 Concrete and concrete elements (EN 16757:2022), Product category rules for concrete and concrete elements, version 2024-04-30
EFCA 2021a	EPD of Retarders, IBU EPD Declaration number EPD-EFC-20210195-IBG1-EN, issued 2021-12-16, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA - European Federation of Concrete Admixtures Associations
EFCA 2021b	EPD of Air Entrainers, IBU EPD Declaration number EPD-EFC-20210193-IBG1-EN, issued 2021-12-16, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA - European Federation of Concrete Admixtures Associations
EFCA 2023	EPD of Plasticizer and superplasticizer, IBU EPD Declaration number EPD-EFC-20210198-IBG2-EN, issued 2023-08-14, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA - European Federation of Concrete Admixtures Associations

Photo above: (Cherry Tree Windfarm - 550m^3)

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