Environmental Product Declaration

For Ready Mixed Concrete

Ready Mixed Concrete from Bridgeman Concrete and MixUp Concrete

In accordance with ISO 14025 and EN 15804+A1

Programme: The International EPD® System
EPD registration number: S-P-04652
Programme operator: EPD Australasia Limited
website: www.epd-australasia.com
Geographical scope of EPD: New Zealand
Publication date: 2021|11|30
Valid until: 2026|11|29

This Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of our product based on a consistent set of rules known as a PCR (Product Category Rules).

Bridgeman and MixUp Concrete have the ownership, liability, and responsibility for this EPD. EPD's within the same product category but from different programmes may not be comparable. EPD's of construction products may not be comparable if they do not comply with EN 15804.

Environmental Product Declaration
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An Introduction to Bridgeman Concrete

Bridgeman Concrete was started in Hawkes Bay in 1967 by local builder John Bridgeman. From one plant in Hastings, there are now seven plants across New Zealand and we look to continue this growth into the future.

A Family Company, with Family Values

Bridgeman Concrete has always been a family company with family values, and these permeate throughout the company. Over 25% of our staff have been on board for over 5 years, which is a testament to this culture.

In the last few years, Bridgeman Concrete has been actively involved in helping over 10 offenders back into the workplace through a Department of Corrections programme to provide employment opportunities.

Bridgeman Concrete supports a number of community groups both local and national, from KidsCan to local sports clubs.

Today the business is still family owned with Patrick Bridgeman ensuring the family passion for quality concrete and service continues. Patrick ardently believes in leading the company toward an environmentally conscious future.

The combination of durability, longevity, adaptability and cost effectiveness will ensure that concrete will remain an essential part of construction, and Bridgeman Concrete will be able to ensure the concrete used has the least environmental impact possible.

An Introduction to MixUp Concrete

In the late 1980's Bridgeman Concrete became involved with Bryce Ready Mix in Greerton, Tauranga and bought out the plant. Two trucks were sent up from the Hastings plant to add to the fleet that was already in Tauranga.

MixUp Concrete was established in 2018 when the Bridgeman Concrete Tauranga plant welcomed some new local partners.

A brand new state of the art plant was immediately planned and this opened in Tauriko in 2020 to service the fast growing needs of the Tauranga market.

Concrete Plant Locations Included in this EPD

BRIDGEMAN CONCRETE ESTABLISHED 1967

Hawkes Bay
- 1 Hastings
- 2 Napier

Central
- 3 Hamilton
- 4 Rotorua

Auckland
- 5 Papakura
- 6 East Tamaki
- 7 City West

MIXUP CONCRETE

Bay of Plenty
- 8 Tauranga

Innovation and Technical Ability

Over the years Bridgeman Concrete has been innovating and refining continually, culminating recently in being the first company In NZ to trial cement substitution with local pumice, and to install truck mounted admixture dosing.

Bridgeman Concrete and MixUp Concrete share the same technical team and so both companies are able to provide their customers the same strong and proactive technical support.

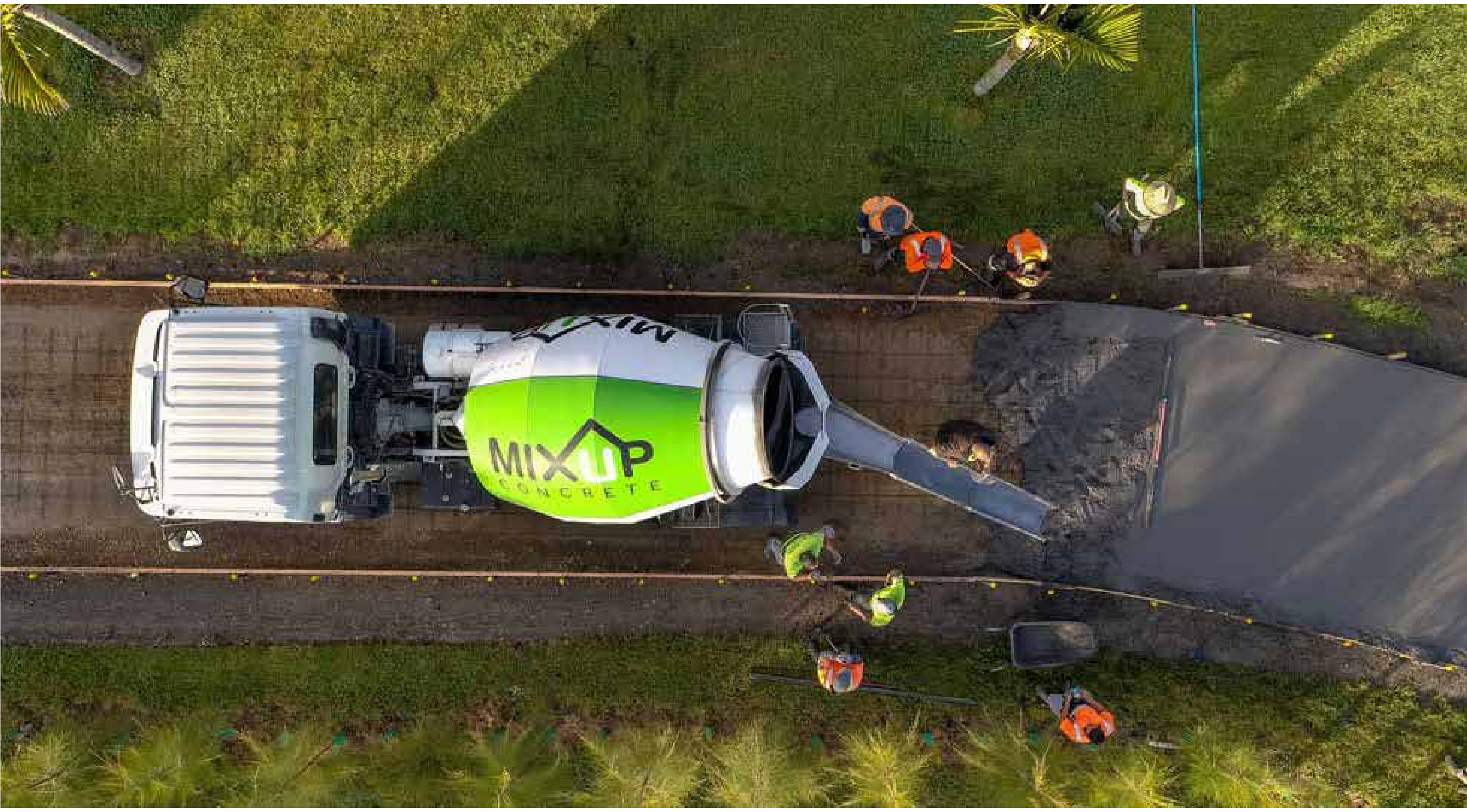
We listen, and then act, for mutual benefit.

A Partnership in a Sustainable Future

The sister company of Bridgeman Concrete and MixUp Concrete is HR Cement, owned in partnership with another family. HR Cement is also working very hard to bring low carbon solutions to market.

A Culture of Environmental Responsibility

- All waste concrete is reused, either for precast products, or broken down into it's constituents and re-purposed.
- All water on site is collected, stored and used in the concrete - none goes to trade waste.
- The dispatch system utilises a modern suite of sensors and indicators to minimise distance travelled and waste.
- Admixture technology is utilised to optimise cement contents and performance, and Bridgeman Concrete are the first company in New Zealand to install truck mounted systems.
- Materials optimised to reduce cement contents and hence embodied CO_2, controlled and maintained by a rigid testing program.
- Drivers trained for fuel efficient driving.
- Site staff trained to maximise water efficiency.
- Trucks maintained to ensure fuel optimisation.



Product Information

Products covered by EPD

All concrete from Bridgeman Concrete and MixUp Concrete is produced and tested in accordance with NZ 3104 to ensure nominal strengths can be guaranteed. This EPD covers the standard grades of ready-mixed concrete produced by Bridgeman Concrete that meet this standard.

All environmental data in this EPD is reported as an average of each of Bridgeman Concrete's seven sites around New Zealand as well as MixUp in Tauranga, measured by the weights of the concrete produced.

Raw Materials

Concrete mixes covered by this EPD are manufactured with a combination of cement, coarse and fine aggregate, secondary materials, water and admixtures. All Aggregates are sourced locally to the production plant and conform with NZS 3121.

Cement is supplied from the HR Cement plant in Mt Maunganui.

Raw material proportions are computer controlled and loaded into the delivery trucks, mixed, and taken to site in the freshly mixed/plastic/unhardened state.

Applications

The products covered by the EPD can be used in all structures and building elements commonly found in NZ, including house-floors, commercial buildings, industrial facilities, domestic driveways and infrastructure.

Concrete is such a commonly used material because it has benefits that suit a host of applications including fire resistance, noise attenuation, low maintenance and thermal mass.

Table 1: Industry classification for Bridgeman and MixUp Concrete

Category	Classification	Code
Non-refractory mortars and concretes	UN CPC v2.1	37510
Ready-mixed concrete	ANZSIC 2006	203300

Declared Unit

The declared unit for the EPD is $1m^3$ of standard grades of ready-mixed concrete at 17.5MPa, 20MPa, 25MPa, 30MPa, 35MPa, 40MPa, 45MPa and 50MPa at the batching plant gate.

Content Declaration

Table 2: Bridgeman and MixUp Concrete - Materials/Chemical Substances % by mass

Materials/Chemical Substances	% (by mass)
Cement	10 - 25
Course Aggregate	25 - 55
Fine Aggregate	30 - 60
Water	5 - 15
Admixtures	0.05 - 1

The concrete products included in this EPD are non-hazardous. They do not contain - or release during use - any of the hazardous materials identified in the 'Candidate List of Substances of Very High Concern' (SVHC) (European Chemical Agency, 2020) at a concentration of greater than 0.1% of the mass.

Hardened concrete in the use phase is not hazardous. However, health effects may result due to release of dust when cutting, chasing, drilling, sanding and grinding hardened concrete. For more information, including safe handling, view our Material Safety Data Sheet (scan the QR code).

Green Star

This EPD meets the criteria of the Green Star rating system from NZ Green Building Council being "a product-specific, third-party EPD" issued in accordance with ISO 14025 and EN 15804.

System boundaries

As shown in the table below, this EPD is of the 'cradle-to-gate' type. This EPD includes the environmental impacts associated with raw materials extraction and processing of inputs (cement, aggregates, additives, and water), transport to, between and within the manufacturing site, and the manufacturing of the product up to the exit gate of the manufacturing site.

Other life cycle stages (Modules A4-A5, B1-B7, C1-C4, and D) are dependent on particular scenarios and best modelled at the building level.

Table 3: Modules included in the scope of the EPD

Product Stage	Raw Material Supply	A1	X
	Transport of raw materials	A2	X
	Manufacturing	A3	X
Construction Process Stage	Transport to customer	A4	MND
	Construction / Installation	A5	MND
Use Stage	Use	B1	MND
	Maintenance	B2	MND
	Repair	B3	MND
	Replacement	B4	MND
	Refurbishment	B5	MND
	Operational energy use	B6	MND
	Operational water use	B7	MND
End-of-Life stage	Deconstruction / demolition	C1	MND
	Transport to waste processing	C2	MND
	Waste processing	C3	MND
	Disposal	C4	MND
Benefits & loads beyond the system boundary	Reuse, Recovery, Recycling Potential	D	MND

X = included in the EPD; MND = Module Not Declared (such a declaration shall not be regarded as an indicator result of zero)

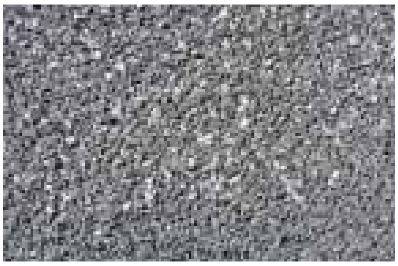
Raw Material (A1) and Transportation (A2)

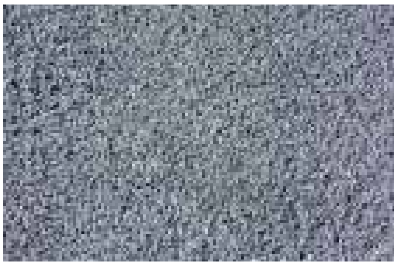
Cement

HR Cement supply all concrete plants from their manufacturing facility in Mount Maunganui. At this plant, imported clinker is milled with limestone and gypsum to produce cement. This is regularly tested to ensure the final product meets the strict standards of NZS 3122 for GP Cement.

This cement is a key reason for the fast setting concrete for which both Bridgeman Concrete and MixUp Concrete are known, providing for efficiencies at site and potential for time and other resource savings.

The finished cement is then transported via bulk pneumatic tanker to the concrete batching plants. For more information on this process, please see the EPD for HR Cement Limted (EPD registration number: S-P-04653).





Aggregates

Fine and coarse aggregates are sourced from local quarries where they go through an extraction, crushing and screening process and are then transported to the storage bins at the concrete batching plant.

Water

Water is collected from all hardstand areas from both weather events and washing, and stored until required. There is enough storage to cope with storm events. If the supply of recycled water is exhausted, external fresh water is used, such as town supply or bore.

Admixtures

Concrete admixtures are used to reduce the cement required and improve the wet and dry properties of the concrete.

Admixtures are imported either direct to site or through a holding warehouse in Auckland.

These meet either:
- NZS 3113:1979 or
- AS 1478:2005.

Manufacture (A3)

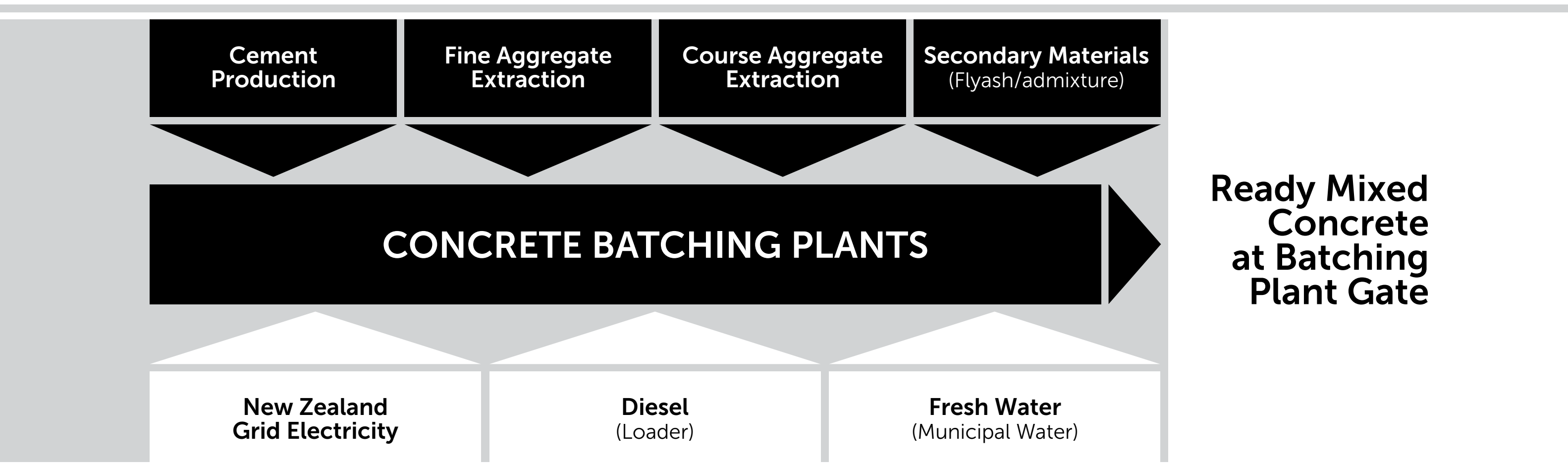
The batching plant stores the raw materials in cement silos, aggregate bins and admixture tanks. Calibrated weigh scales and flow meters are used to accurately weigh these using the latest computer controlled technology which ensures consistency of product. Mix designs are regularly reviewed to ensure they optimise material efficiencies.

At all plants, our concrete is manufactured by adding the raw materials to the delivery truck where it is mixed, slumped, tested if required, and then dispatched.

New Zealand has some of the tightest standards for concrete production in the world and Bridgeman plants conform to NZS 3104 Concrete Production Standard.

Manufacturing Process

Bridgeman and MixUp Ready Mixed Concrete Production (A1-A3)



Life Cycle Assessment (LCA) Data

This study has been conducted according to EN 15804:2012 + A1:2013 (CEN, 2013), PCR 2012-01 Construction products and construction services (v2.33) of the International EPD® System (2020-09-18) (EPD International, 2020), and PCR 2012:01-SUB-PCR-G Concrete and concrete elements (EN 16757:2017) (v2.34) of the International EPD® System (2021-11-08).

Data for core processes

Upstream data:
Data for cement input is taken from HR Cement Xtra-Cem cement EPD (HR Cement, 2021 - EPD registration number: S-P-04653).

Primary data:
Data for Bridgeman Concrete was for April 2019 - March 2020.
Data for MixUp was for April 2020-March 2021.

Background data:
All data in the background system were from the GaBi Life Cycle Inventory Database 2021 (Sphera, 2021). Most datasets have a reference year between 2017 and 2020 and all fall within the 10-year limit allowable for generic data under EN 15804.

Assumptions

Electricity

The Emission Factor used was for medium-voltage NZ electricity at an industrial consumer.

Solid Waste

Waste data has been modelled as clean-fill and includes unneeded concrete and sediment from washing down trucks, equipment and plant.

Water

Both Bridgeman Concrete and MixUp Concrete use a combination of captured rainwater that falls on the production hardstand areas and municipal water. Averaged purchased water data was applied for the sites, and regional average rainfall data from Auckland Council GIS was used in conjunction with the hardstand areas to estimate both total diverted rainfall and rainwater used in the production process itself.

Methodology

Cut off criteria

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary as per the PCR (EPD International 2020, section 7.5.4). Packaging of raw materials, such as packaging for admixtures, has been excluded from the LCA. All other reported data were incorporated and modelled using the best available life cycle inventory data.

Allocation

Where subdivision of processes was not possible, allocation rules listed in PCR chapter 7.7 have been applied. Specifically, the data reflects volume allocation, specific to concrete production. No secondary materials are used in cement production processes. Allocation for input materials that contain secondary material occurs in the upstream datasets.

Assessment Indicators

The results tables describe the different environmental indicators for each product per declared unit, for the declared modules A1-A3. The declared indicators are outlined from Table 4 to Table 6. Table 4 contains the environmental impact indicators, describing the potential environmental impacts of the product. Table 5 outlines the resource indicators, describing the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water. Indicators pertaining to waste and other outputs are shown in Table 6.

Table 4: Indicators for life cycle impact assessment

Abbreviation	Unit	Indicator
GWP	kg CO_2-eq.	Global Warming Potential
ODP	kg CFC 11-eq.	Ozone Depletion Potential
AP	kg SO_2-eq.	Acidification Potential
EP	kg PO_4^{3-}eq.	Eutrophication Potential
POCP	kg C_2H_4-eq.	Photochemical Ozone Creation Potential
ADPE	kg Sb-eq.	Abiotic Depletion Potential for Non-Fossil Resources
ADPF	MJ	Abiotic Depletion Potential for Fossil Resources

Table 5: Life cycle inventory indicators on use of resources

Abbreviation	Unit	Indicator
PERE	MJ, net calorific value	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	MJ, net calorific value	Use of renewable primary energy resources used as raw materials
PERT	MJ, net calorific value	Total use of renewable primary energy resources
PENRE	MJ, net calorific value	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	MJ, net calorific value	Use of non-renewable primary energy resources used as raw materials
PENRT	MJ, net calorific value	Total use of non-renewable primary energy resources
SM	kg	Use of secondary material
RSF	MJ, net calorific value	Use of renewable secondary fuels
NRSF	MJ, net calorific value	Use of non-renewable secondary fuels
FWT	m^3	Total use of net fresh water

Table 6: Life cycle inventory indicators on waste categories and output flows

Abbreviation	Unit	Indicator
HWD	kg	Hazardous waste disposed
NHWD	kg	Non-hazardous waste disposed
RWD	kg	Radioactive waste disposed
CRU	kg	Components for reuse
MER	kg	Materials for energy recovery
MFR	kg	Materials for recycling
EEE	MJ	Exported electrical energy
EET	MJ	Exported thermal energy

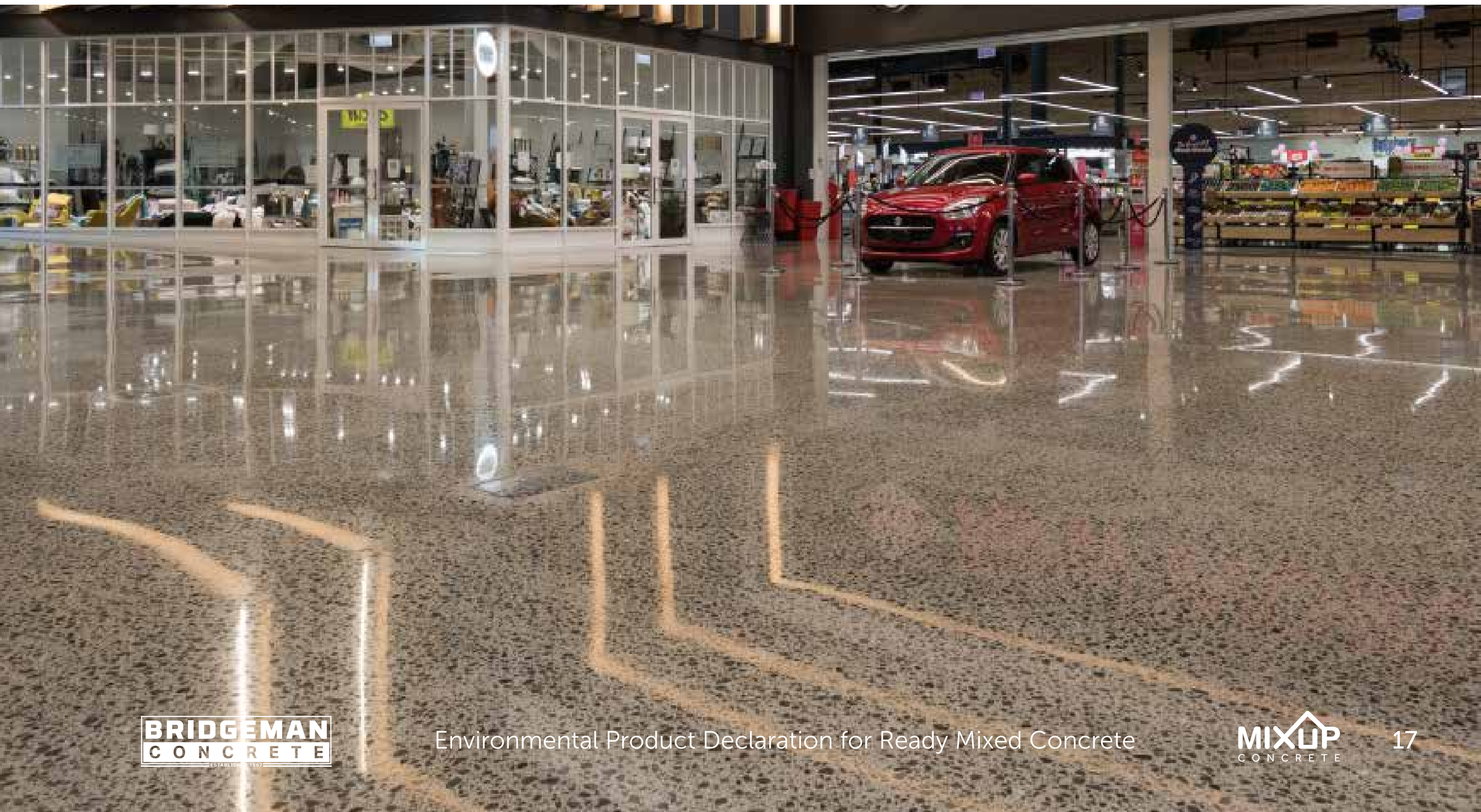
For concrete, the following indicators are not relevant, hence result in zero values:

• Components for re-use (CRU)

• Materials for energy recovery (MER)

• Exported electrical energy (EEE)

• Exported thermal energy (EET)



Results of Assessment

The following pages outline the results for potential environmental impact, use of resources and waste production of 1m³ of ready-mixed concrete at various strengths for each Bridgeman and MixUp batching plant.

A1-A3 Concrete Results ENVIRONMENTAL IMPACT

EN 15804 +A1 indicators	CONCRETE for 1m³ of	PLANTS							
		City West	East Tamaki	Papakura	Hamilton	Rotorua	Hastings	Napier	MixUp
Global Warming Potential - Cradle to Gate Carbon Footprint • Abbreviation: (GWP) • Unit: kg CO_2-eq	17.5 MPa	236	235	235	255	273	228	229	253
	20 MPa	249	246	245	286	276	228	236	280
	25 MPa	281	279	278	306	316	269	269	307
	30 MPa	304	301	300	325	336	285	290	329
	35 MPa	332	331	331	361	358	314	313	350
	40 MPa	361	358	363	385	393	348	349	378
	45 MPa	395	393	392	407	426	385	335	401
	50 MPa	441	439	438	445	458	433	424	434
Depletion Potential of the Stratospheric Ozone Layer • Abbreviation: (ODP) • Unit: kg CFC11-eq.	17.5 MPa	4.18E-13	4.18E-13	4.17E-13	3.90E-13	3.98E-13	3.93E-13	3.90E-13	3.85E-13
	20 MPa	3.98E-13	3.96E-13	3.96E-13	4.07E-13	4.07E-13	3.93E-13	4.00E-13	4.11E-13
	25 MPa	4.12E-13	4.11E-13	4.10E-13	4.16E-13	4.31E-13	4.15E-13	4.11E-13	4.29E-13
	30 MPa	4.42E-13	4.41E-13	4.40E-13	4.39E-13	4.53E-13	4.24E-13	4.24E-13	4.34E-13
	35 MPa	4.52E-13	4.53E-13	4.52E-13	4.62E-13	4.72E-13	4.47E-13	4.43E-13	4.55E-13
	40 MPa	4.74E-13	4.72E-13	4.75E-13	4.76E-13	4.85E-13	4.51E-13	4.48E-13	4.66E-13
	45 MPa	4.92E-13	4.91E-13	4.90E-13	4.90E-13	5.07E-13	4.82E-13	4.51E-13	4.85E-13
	50 MPa	5.13E-13	5.12E-13	5.12E-13	5.20E-13	5.23E-13	5.27E-13	5.19E-13	5.13E-13
Acidification Potential of Land and Water • Abbreviation: (AP) • Unit: kg SO_2-eq.	17.5 MPa	1.15	1.15	1.15	1.26	1.36	1.09	1.09	1.24
	20 MPa	1.25	1.24	1.23	1.43	1.38	1.09	1.12	1.40
	25 MPa	1.43	1.42	1.42	1.54	1.60	1.31	1.31	1.54
	30 MPa	1.55	1.53	1.53	1.64	1.70	1.40	1.43	1.67
	35 MPa	1.69	1.70	1.69	1.84	1.82	1.57	1.56	1.78
	40 MPa	1.86	1.84	1.87	1.97	2.01	1.76	1.76	1.93
	45 MPa	2.04	2.03	2.03	2.09	2.20	1.96	1.70	2.05
	50 MPa	2.29	2.28	2.28	2.29	2.37	2.22	2.17	2.26
Eutrophication Potential • Abbreviation: (EP) • Unit: kg PO_4^{3-}-eq	17.5 MPa	0.147	0.146	0.145	0.160	0.173	0.138	0.139	0.160
	20 MPa	0.158	0.156	0.155	0.181	0.175	0.138	0.143	0.179
	25 MPa	0.180	0.178	0.178	0.194	0.202	0.165	0.166	0.196
	30 MPa	0.195	0.192	0.192	0.207	0.215	0.176	0.180	0.212
	35 MPa	0.213	0.212	0.212	0.230	0.230	0.197	0.197	0.225
	40 MPa	0.233	0.230	0.233	0.247	0.253	0.220	0.221	0.244
	45 MPa	0.256	0.253	0.253	0.262	0.275	0.246	0.213	0.259
	50 MPa	0.287	0.284	0.284	0.287	0.296	0.278	0.272	0.277
Photochemical Ozone Creation Potential • Abbreviation: (POCP) • Unit: kg C_2H_4-eq.	17.5 MPa	0.065	0.066	0.065	0.072	0.077	0.063	0.063	0.070
	20 MPa	0.071	0.071	0.070	0.082	0.079	0.065	0.065	0.079
	25 MPa	0.081	0.081	0.081	0.088	0.091	0.076	0.075	0.087
	30 MPa	0.088	0.088	0.088	0.094	0.097	0.081	0.082	0.094
	35 MPa	0.097	0.097	0.097	0.105	0.104	0.090	0.090	0.101
	40 MPa	0.106	0.106	0.107	0.113	0.115	0.101	0.101	0.110
	45 MPa	0.117	0.117	0.117	0.120	0.126	0.113	0.097	0.117
	50 MPa	0.131	0.131	0.131	0.132	0.136	0.128	0.125	0.132

A1-A3 Concrete Results **ENVIRONMENTAL IMPACT**

EN 15804 +A1 indicators	CONCRETE for 1m³ of	PLANTS							
		City West	East Tamaki	Papakura	Hamilton	Rotorua	Hastings	Napier	MixUp
Abiotic Depletion Potential – Elements • Abbreviation: (ADPE) • Unit: kg Sb-eq.	17.5 MPa	6.90E-06	6.85E-06	6.83E-06	6.64E-06	6.90E-06	6.84E-06	6.79E-06	6.60E-06
	20 MPa	6.58E-06	6.51E-06	6.49E-06	7.01E-06	6.99E-06	6.84E-06	6.98E-06	7.07E-06
	25 MPa	6.89E-06	6.82E-06	6.81E-06	7.25E-06	7.52E-06	7.30E-06	7.25E-06	7.47E-06
	30 MPa	7.46E-06	7.39E-06	7.36E-06	7.65E-06	7.89E-06	7.54E-06	7.54E-06	7.59E-06
	35 MPa	7.74E-06	7.70E-06	7.69E-06	8.14E-06	8.29E-06	7.88E-06	7.80E-06	7.98E-06
	40 MPa	8.16E-06	8.08E-06	8.13E-06	8.45E-06	8.61E-06	8.07E-06	8.02E-06	8.25E-06
	45 MPa	8.58E-06	8.52E-06	8.50E-06	8.74E-06	9.07E-06	8.59E-06	7.92E-06	8.63E-06
	50 MPa	9.06E-06	8.99E-06	8.97E-06	9.37E-06	9.47E-06	9.49E-06	9.32E-06	9.01E-06
Abiotic Depletion Potential – Fossil Fuels • Abbreviation: (ADPF) • Unit: MJ	17.5 MPa	1,612	1,584	1,592	1,681	1,814	1,618	1,630	1,712
	20 MPa	1,620	1,580	1,585	1,840	1,827	1,618	1,678	1,864
	25 MPa	1,774	1,737	1,744	1,948	2,036	1,825	1,836	2,013
	30 MPa	1,930	1,890	1,892	2,061	2,152	1,919	1,955	2,107
	35 MPa	2,072	2,047	2,052	2,255	2,282	2,051	2,052	2,228
	40 MPa	2,230	2,186	2,219	2,385	2,449	2,209	2,223	2,362
	45 MPa	2,411	2,373	2,377	2,501	2,627	2,396	2,140	2,492
	50 MPa	2,643	2,604	2,607	2,718	2,798	2,688	2,647	2,542

A1-A3 Concrete Results **RESOURCE USE**

EN 15804 +A1 indicators	CONCRETE for 1m³ of	PLANTS City West	East Tamaki	Papakura	Hamilton	Rotorua	Hastings	Napier	MixUp
Renewable Primary Energy as Energy Carrier • Abbreviation: (PERE) • Unit: MJ	17.5 MPa	193	188	181	180	197	186	171	177
	20 MPa	193	187	180	194	200	186	175	192
	25 MPa	206	201	194	202	218	204	189	205
	30 MPa	221	215	208	214	230	212	198	213
	35 MPa	232	227	220	231	241	227	210	225
	40 MPa	246	240	236	242	255	238	223	236
	45 MPa	261	256	249	252	271	258	220	248
	50 MPa	281	275	268	271	285	284	264	261
Renewable Primary Energy Resources as Material Utilization • Abbreviation: (PERM) • Unit: MJ	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Total Use of Renewable Primary Energy Resources • Abbreviation: (PERT) • Unit: MJ	17.5 MPa	193	188	181	180	197	186	171	177
	20 MPa	193	187	180	194	200	186	175	192
	25 MPa	206	201	194	202	218	204	189	205
	30 MPa	221	215	208	214	230	212	198	213
	35 MPa	232	227	220	231	241	227	210	225
	40 MPa	246	240	236	242	255	238	223	236
	45 MPa	261	256	249	252	271	258	220	248
	50 MPa	281	275	268	271	285	284	264	261
Non-Renewable Primary Energy as Energy Carrier • Abbreviation: (PENRE) • Unit: MJ	17.5 MPa	1,692	1,664	1,671	1,754	1,887	1,693	1,705	1,784
	20 MPa	1,694	1,654	1,659	1,916	1,902	1,693	1,755	1,941
	25 MPa	1,850	1,813	1,820	2,024	2,115	1,903	1,914	2,092
	30 MPa	2,011	1,971	1,974	2,141	2,234	1,998	2,034	2,186
	35 MPa	2,155	2,129	2,134	2,339	2,368	2,134	2,135	2,311
	40 MPa	2,316	2,271	2,305	2,470	2,536	2,291	2,305	2,446
	45 MPa	2,499	2,461	2,465	2,588	2,716	2,482	2,223	2,579
	50 MPa	2,733	2,695	2,697	2,810	2,890	2,781	2,740	2,633
Non-Renewable Primary Energy as Material Utilization • Abbreviation: (PENRM) • Unit: MJ	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0

A1-A3 Concrete Results RESOURCE USE

EN 15804 +A1 indicators	CONCRETE for 1m³ of	City West	East Tamaki	Papakura	Hamilton	Rotorua	Hastings	Napier	MixUp
Total Use of Non- Renewable Primary Energy Resources • Abbreviation: (PENRT) • Unit: MJ	17.5 MPa	1,692	1,664	1,671	1,754	1,887	1,693	1,705	1,784
	20 MPa	1,694	1,654	1,659	1,916	1,902	1,693	1,755	1,941
	25 MPa	1,850	1,813	1,820	2,024	2,115	1,903	1,914	2,092
	30 MPa	2,011	1,971	1,974	2,141	2,234	1,998	2,034	2,186
	35 MPa	2,155	2,129	2,134	2,339	2,368	2,134	2,135	2,311
	40 MPa	2,316	2,271	2,305	2,470	2,536	2,291	2,305	2,446
	45 MPa	2,499	2,461	2,465	2,588	2,716	2,482	2,223	2,579
	50 MPa	2,733	2,695	2,697	2,810	2,890	2,781	2,740	2,633
Use of Secondary Material • Abbreviation: (SM) • Unit: kg	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Use of Renewable Secondary Fuels • Abbreviation: (RSF) • Unit: MJ	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Use of Non-Renewable Secondary Fuels • Abbreviation: (NRSF) • Unit: MJ	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Use of Net Fresh Water • Abbreviation: (FW) • Unit: m³	17.5 MPa	0.783	0.858	0.993	0.965	1.132	1.470	0.845	0.870
	20 MPa	0.790	0.862	0.997	1.005	1.143	1.480	0.856	0.917
	25 MPa	0.831	0.904	1.040	1.007	1.199	1.523	0.898	0.955
	30 MPa	0.872	0.944	1.080	1.065	1.232	1.546	0.928	0.978
	35 MPa	0.910	0.985	1.121	1.119	1.268	1.601	0.974	1.017
	40 MPa	0.954	1.025	1.168	1.154	1.313	1.616	0.992	1.050
	45 MPa	0.999	1.072	1.209	1.185	1.363	1.696	1.004	1.086
	50 MPa	1.046	1.119	1.256	1.246	1.408	1.767	1.130	1.151

A1-A3 Concrete Results WASTE CATEGORIES AND OUTPUT FLOWS

EN 15804 +A1 indicators	CONCRETE for 1m³ of	PLANTS							
		City West	East Tamaki	Papakura	Hamilton	Rotorua	Hastings	Napier	MixUp
Hazardous Waste Disposed • Abbreviation: (HWD) • Unit: kg	17.5 MPa	5.04E-05	5.07E-05	5.05E-05	5.56E-05	6.00E-05	4.78E-05	4.77E-05	5.39E-05
	20 MPa	5.51E-05	5.49E-05	5.47E-05	6.35E-05	6.09E-05	4.78E-05	4.92E-05	6.08E-05
	25 MPa	6.32E-05	6.32E-05	6.32E-05	6.86E-05	7.08E-05	5.81E-05	5.80E-05	6.75E-05
	30 MPa	6.85E-05	6.84E-05	6.82E-05	7.30E-05	7.56E-05	6.22E-05	6.32E-05	7.34E-05
	35 MPa	7.54E-05	7.59E-05	7.59E-05	8.20E-05	8.10E-05	6.98E-05	6.92E-05	7.84E-05
	40 MPa	8.29E-05	8.25E-05	8.39E-05	8.82E-05	9.00E-05	7.86E-05	7.87E-05	8.56E-05
	45 MPa	9.13E-05	9.13E-05	9.13E-05	9.37E-05	9.83E-05	8.80E-05	7.55E-05	9.13E-05
	50 MPa	1.03E-04	1.03E-04	1.03E-04	1.03E-04	1.07E-04	9.96E-05	9.72E-05	1.03E-04
Non Hazardous Waste Disposed • Abbreviation: (NHWD) • Unit: kg	17.5 MPa	0.614	0.635	0.663	0.671	0.681	0.839	0.671	0.629
	20 MPa	0.614	0.632	0.660	0.714	0.704	0.839	0.693	0.694
	25 MPa	0.647	0.666	0.695	0.744	0.764	0.889	0.721	0.754
	30 MPa	0.727	0.745	0.773	0.783	0.795	0.926	0.764	0.739
	35 MPa	0.750	0.772	0.800	0.844	0.859	0.970	0.801	0.795
	40 MPa	0.810	0.828	0.863	0.882	0.888	0.963	0.797	0.824
	45 MPa	0.866	0.885	0.914	0.916	0.962	1.04	0.816	0.871
	50 MPa	0.896	0.915	0.944	1.02	1.01	1.17	0.992	0.886
Radioactive Waste Disposed • Abbreviation: (RWD) • Unit: kg	17.5 MPa	0.0287	0.0288	0.0287	0.0259	0.0260	0.0268	0.0267	0.0257
	20 MPa	0.0266	0.0265	0.0265	0.0265	0.0266	0.0268	0.0274	0.0270
	25 MPa	0.0268	0.0269	0.0269	0.0267	0.0276	0.0275	0.0274	0.0277
	30 MPa	0.0287	0.0287	0.0287	0.0281	0.0288	0.0278	0.0278	0.0276
	35 MPa	0.0288	0.0289	0.0289	0.0290	0.0298	0.0289	0.0288	0.0288
	40 MPa	0.0298	0.0298	0.0299	0.0295	0.0299	0.0283	0.0283	0.0289
	45 MPa	0.0303	0.0303	0.0303	0.0301	0.0308	0.0298	0.0287	0.0298
	50 MPa	0.0309	0.0309	0.0309	0.0315	0.0313	0.0322	0.0320	0.0312
Components for Re-Use • Abbreviation: (CRU) • Unit: kg	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Materials for Recycling • Abbreviation: (MFR) • Unit: kg	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0

WASTE CATEGORIES AND OUTPUT FLOWS

EN 15804 +A1 indicators	CONCRETE for 1m³ of	PLANTS							
		City West	East Tamaki	Papakura	Hamilton	Rotorua	Hastings	Napier	MixUp
Materials for Energy Recovery • Abbreviation: (MER) • Unit: kg	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Exported Electrical Energy • Abbreviation: (EEE) • Unit: MJ	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0
Exported Thermal Energy • Abbreviation: (EET) • Unit: MJ	17.5 MPa	0	0	0	0	0	0	0	0
	20 MPa	0	0	0	0	0	0	0	0
	25 MPa	0	0	0	0	0	0	0	0
	30 MPa	0	0	0	0	0	0	0	0
	35 MPa	0	0	0	0	0	0	0	0
	40 MPa	0	0	0	0	0	0	0	0
	45 MPa	0	0	0	0	0	0	0	0
	50 MPa	0	0	0	0	0	0	0	0

Glossary

Life Cycle Inventory (LCI)
Phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product throughout its life cycle (ISO 14040:2006, section 3.3).

Allocation
Partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems (ISO 14040:2006, section 3.17).

Cradle to Gate
Scope of study extends from mining of natural resources to the completed product ready for shipping from the manufacturing dispatch "gate", known as Modules A1-A3.

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CEN standard EN 15804+A1 served as the core PCR

PCR:

PCR 2012:01 Construction Products and Construction Services,
Version 2.33, 2020-09-16

PCR 2012:01-Sub-PCR-G Concrete and concrete elements,
Version 2.34, 2021-11-08

PCR review was conducted by:

The Technical Committee of the International EPD® System

Chair:

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Independent verification of the declaration and data, according to ISO 14025:

☐ EPD process certification (Internal)

☑ EPD verification (External)

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Procedure for follow-up of data during EPD validity involved third-party verifier

☐ Yes

☑ No


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