Allied Concrete

READY-MIX CONCRETE PRODUCTS EPD

Of multiple products based on the average result of the product group

ecrete™

Te Unua Museum of Southland

Invercargill 40MPa 19mm 402 (rev2036)

Managed By: Allied Concrete Ltd

EPD Process Certificate No: 1017

Verified Accreditation Body: Epsten Group Inc

EPD registration number: EPD-IES-0018220

UN CPC: 375

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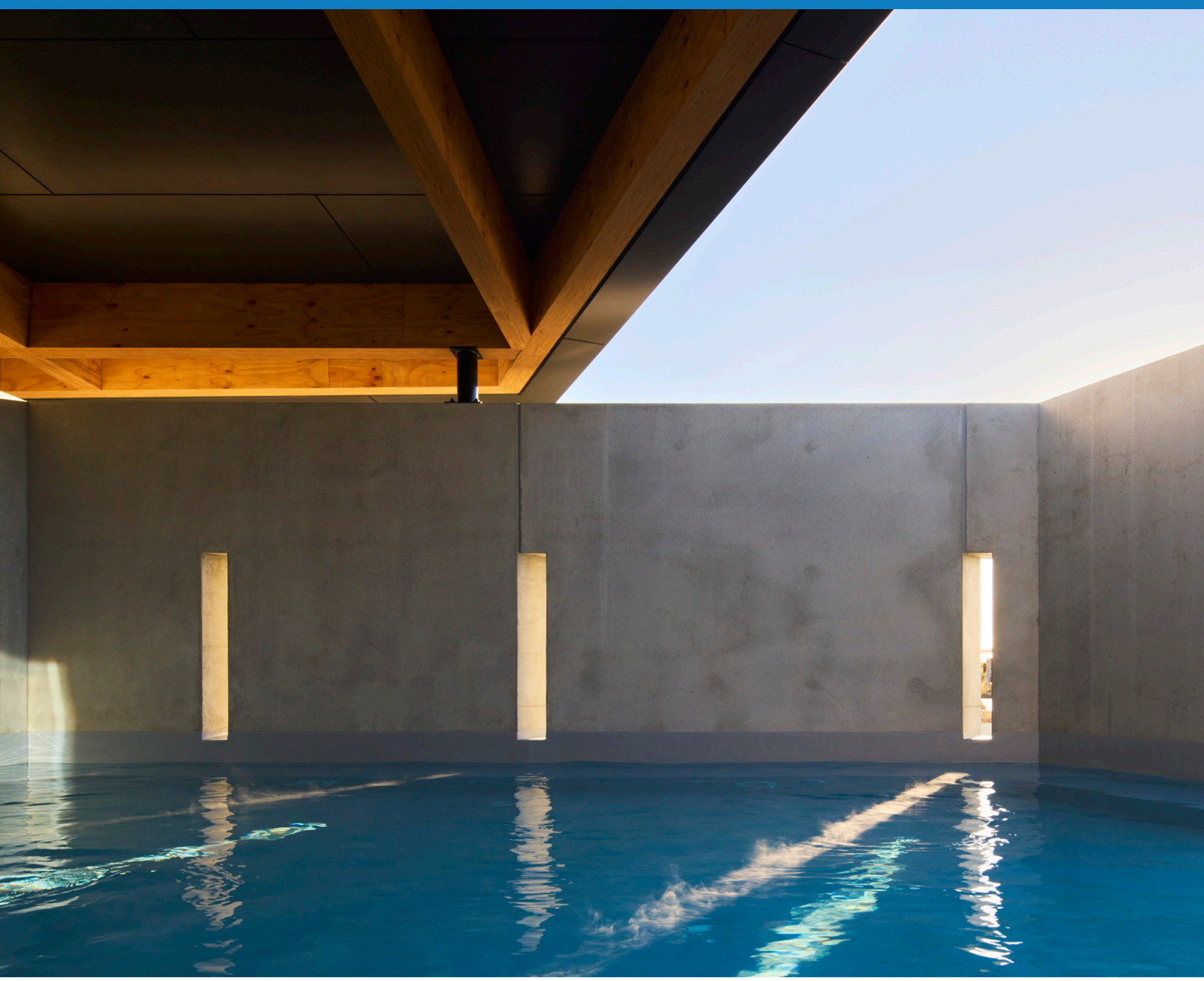
Geographical scope: New Zealand



AUSTRALASIA EPD® ENVIRONMENTAL PRODUCT DECLARATION

EPD® THE INTERNATIONAL EPD SYSTEM

ECO PLATFORM EPD VERIFIED


Whangarei
Silverdale
Penrose
Hautapu
Nelson
Blenheim
Greymouth
Christchurch
Ashburton
Timaru
Wanaka
Queenstown
Cromwell
Alexandra
Dunedin
Mosgiel
Gore
Invercargill

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Introduction

At Allied Concrete, we understand that the construction industry stands at the forefront of shaping a sustainable future. Our commitment is embedded firmly in the belief that we must operate today with a vigilant eye on tomorrow's legacy. We are proud to have received Australasia's first Environmental Product Declaration (EPD) in 2014, and we've been pioneering in our strides towards sustainability ever since.

We have a firm commitment to contributing to New Zealand's net-zero emission goal by 2050. We are dedicated to advancing progress with our specially engineered, low-carbon concrete that supports the integrity and resilience of our local architecture and infrastructure. We are already looking ahead at other ways to reduce our carbon footprint, such as reducing our heavy transport emissions, using hydrogen. Allied Concrete doesn't just provide materials; we deliver environmentally conscious solutions without compromising on the quality and performance that our clients have come to trust.

Our comprehensive suite of concrete solutions is backed by cutting-edge research and development, reflecting our dedication to sustainability and innovation. With our strategically located ready-mix plants and team of specialists, we ensure that each project is met with a tailored approach, considering the environment, budget, and technical requirements.

Join Allied Concrete on our journey as we pave the way to a greener industry and a more resilient New Zealand.

About Allied Concrete

At Allied Concrete, we've been setting the foundation for excellence since Bill Richardson founded our company in 1976. As a proud member of the HWR family a Southland-based collective with a rich history in the building industry we've grown from local plants in Invercargill and Gore to a nationwide leader in ready-mixed concrete, transport, and construction services.

Our journey has been marked by a commitment to technical innovation, recognised through numerous awards for our high-quality, consistent mixes. Leading the charge toward a greener future, we introduced Ecrete™, our low carbon, high-strength concrete in 2022, and were the first in Australasia to receive an Environmental Product Declaration in 2014.

With a network of plants across New Zealand and mobile units for major projects, Allied Concrete is at the forefront of delivering customised concrete solutions. Our dedicated team, the heartbeat of our operations, embodies our ethos providing a safe, supportive workplace is paramount in delivering the superior service we're known for.

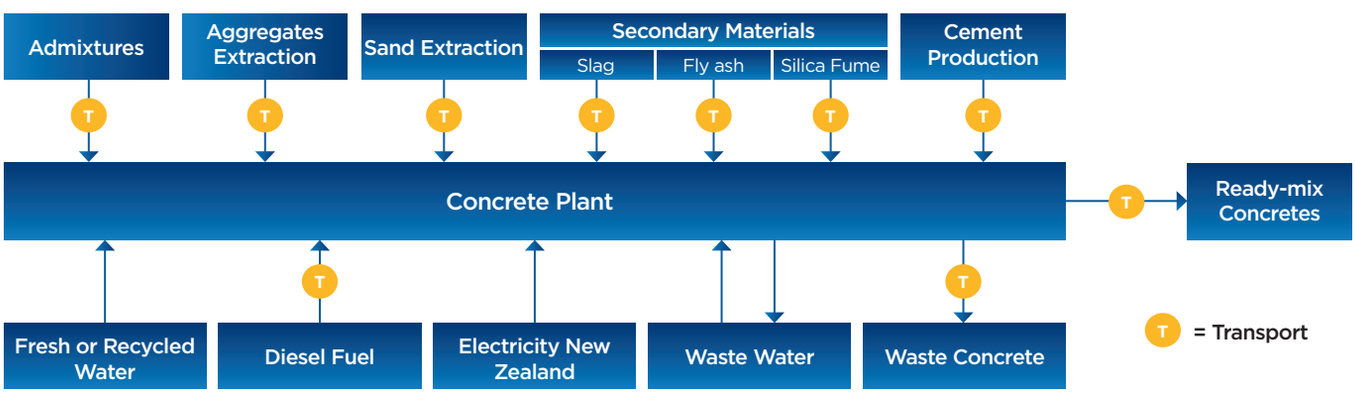
Embracing sustainability, we're paving the path for industry, ensuring today's construction doesn't compromise tomorrow's world. With Allied Concrete, you're choosing a partner that not only understands your needs but also shares your vision for a sustainable legacy.

Ready-Mix Concrete

Ready-mix concrete is produced at batching plants where controlled operations allow precise mix designs resulting in a product that is delivered to construction sites in a freshly mixed, plastic, or unhardened state.

Concretes categorised as Normal and Special are defined and made in accordance with NZS 3104:2021, to ensure that nominal strengths are achieved. This Standard covers the requirements for materials manufacture, testing and control of fresh concrete. NZS 3104:2021 ensures that the concrete produced is of a certain standard, which in turn ensures compliance with other related standards. This interconnectedness of standards helps maintain the integrity and safety of the construction industry in New Zealand.

Figure 1. Manufacturing Process



Normal Concrete

Concrete specified by 28-compressive strength with strength grades 17.5MPa to 50MPa and maximum aggregate size of 37.5mm.

Special Concrete

Concrete where additional requirements to those of normal concrete, such as mix design parameters (including cementitious content and the cementitious to water ratio or air content) at ages other than 28 days or outside the range of 17.5 MPa and 50MPa. Special concrete is typically specified in accordance with the technical parameters and performance requirements, which can include high strength/high-performances concrete, high durability, or marine application, post tensioned, high-pumpability, super workable, piling concrete, architectural off-form finishes and other decorative applications.

LCA Information

Declared Unit	1 m^3 of ready-mix concrete
Manufacturing Location	Invercargill 41 Basstian Street, Invercargill, 9810
Time Representativeness	The plant data for the LCA is based on 2022 calendar year production data. The mix data for the LCA is based on 2025 calendar year production data.
Databases and Software Used	The software used was SimaPro® LCA software (v 9.6). The inventory data for the processes are entered in the LCA software and linked to the pre-existing background data for upstream feedstocks and services. Inventory data was selected per the standards, in the following order of preference: • Ecoinvent 3.10 database was used as the primary source for inventory data (Ecoinvent v3.10, 2023). At the time of this report, this Ecoinvent database version is less than 1 year old. • The Australian Life Cycle Inventory (AusLCI) v1.42 was compiled by the Australian Life Cycle Assessment Society (ALCAS) – this data will comply with the AusLCI Data Guidelines (Australian Life Cycle Inventory Database Initiative (AusLCI), 2023). At the time of this report, this AusLCI database version is less than 2 years old. • The Environmental Footprint (EF) database v3.1 is facilitated by the European Commission and developed by Ecoinvent, Sphera, Blonk, CEPE, and Pré Sustainability (Developer Environmental Footprint (EF), 2022). At the time of this report, this EF database version is around 2 years old. The following impact categories were calculated manually for the foreground data: • Use of renewable primary energy resources used as raw materials (PERM) • Use of non-renewable primary energy resources used as raw materials (PENRM) • Materials for recycling • Non-hazardous waste disposed.
Allocation	Allocation was carried out based on physical relationships - annual production amount, by volume in m^3. It's assumed that all kinds of ready-mix concrete products consume the same amount of resource and energy during production. One exception is the fuel consumption for mixing and loading in manufacturing plants. Allied Concrete performed a fuel burn diagnostic report on a typical mixing truck they owned. The fuel consumption for mixing and loading or loading only (for some plants) for 1 m^3 product was diagnosed, calculated, and directly used without any allocation since it's measured per declared unit covered in this EPD.

Cut-off Criteria	It is common practice in LCA/LCI protocols to propose exclusion limits for inputs and outputs that fall below a threshold % of the total, but with the exception that where the input/output has a "significant" impact it should be included. According to the PCR 2019:14, life cycle inventory data shall according to EN 15804+A2 include a minimum of 95% of total inflows (mass and energy) per module. It should also include a minimum of 99% of renewable and non-renewable primary energy use as well as the total mass input of that unit process. Inflows not included in the LCA shall be documented in the EPD. Data gaps in included stages in the downstream modules shall be reported in the EPD, including an evaluation of their significance. In accordance with the PCR 2019:14, the following system boundaries are applied to manufacturing equipment and employees: • Environmental impact from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in the LCI. Capital equipment and buildings typically account for less than a few percent of nearly all LCIs and this is usually smaller than the error in the inventory data itself. For this project, it is assumed that capital equipment makes a negligible contribution to the impacts as per Frischknecht et al. with no further investigation (Frischknecht, 2007). • Personnel-related impacts, such as transportation to and from work, are also not accounted for in the LCI. The impacts of employees are also excluded from inventory impacts on the basis that if they were not employed for this production or service function, they would be employed for another. It is very hard to decide what proportion of the impacts from their whole lives should count towards their employment. For this project, the impacts of employees are excluded. Based on this guidance, no energy or mass flows, except packaging of raw materials were excluded.

Address and contact information

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Upstream Processes

The upstream processes include those involved in Module A1 – Raw material supply. This module includes:

- Extraction, transport, and manufacturing of raw materials.
- Generation of electricity from primary and secondary energy resources, also including their extraction, refining and transport for Modules A1.

Core Processes

The core processes include those involved in Module A2 and Module A3, including:

- External transportation of materials to the core processes and internal transport. It's assumed there is no loss during the transportation of materials.
- Manufacturing of concrete.
- Transportation of materials for recycling and landfilling externally
- Treatment of waste and wastewater generated from the manufacturing processes.

Downstream Processes

The downstream processes include those involved in Modules, C1-C4. These modules include:

- Distribution of concrete mixes. The transport distance from manufacturing to site.
- For distribution impact, the return trip is modelled as empty.
- Disposal at the end of the product's life. There is no carbonation at the end of life.

No CO_2 uptake has taken place in any module declared.

Data Quality

Foreground data on raw material requirements, manufacture and distribution was provided as primary source by Allied Concrete for the year January 2022 – December 2022. Schemes for data quality assessment of generic and specific data from EN 15804+A2 (table E.1) are used to perform this data quality assessment activity, as shown in Table 1.

Table 1. Data quality assessment

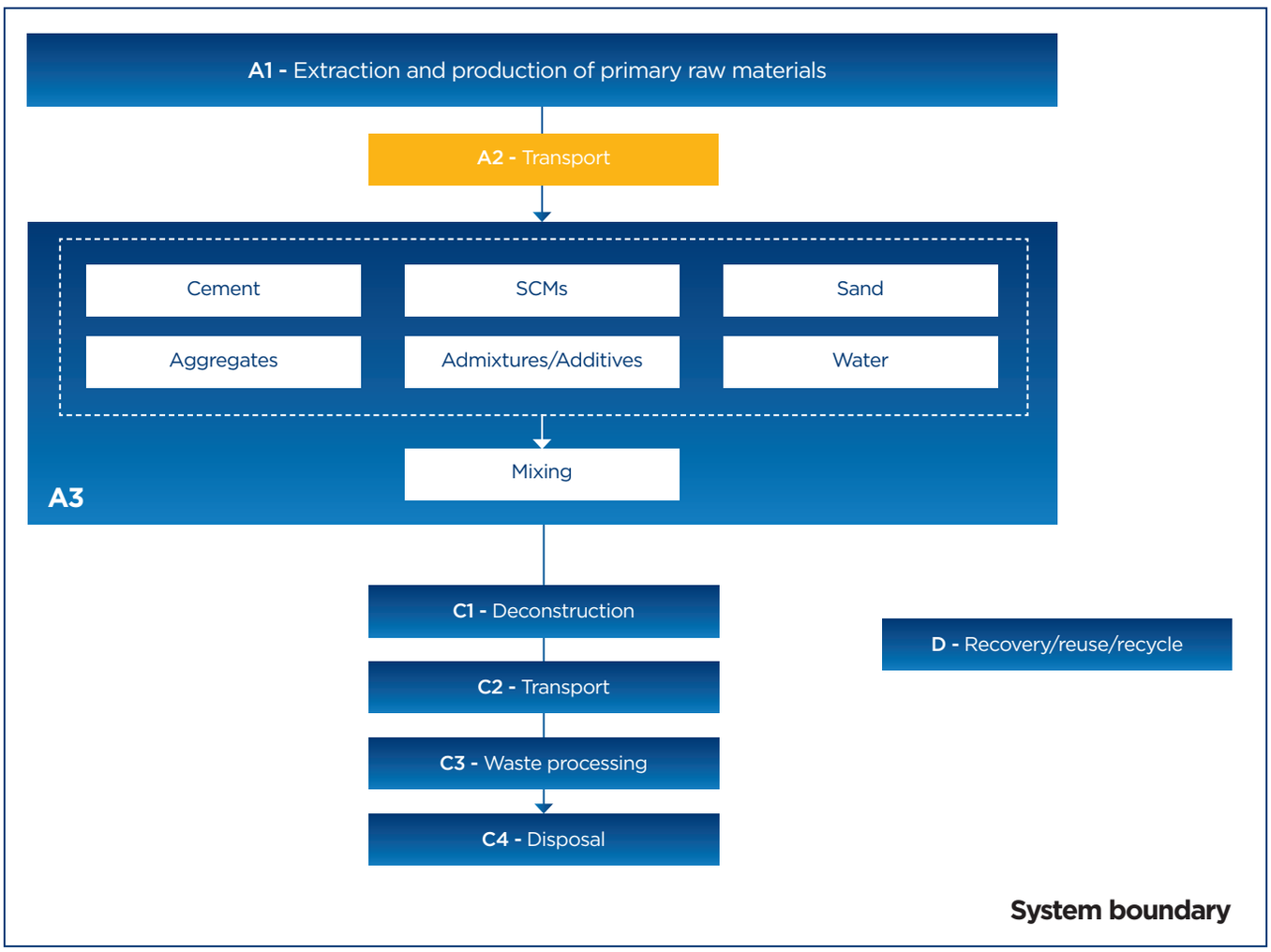
Module	Life Cycle Stage	Collected Foreground Data	Data Source and Year	Data Quality
A1	Raw material	Raw material types and characterizations	Supplied by Allied Concrete, 2022	Primary source data, very good
A2	Raw material transport from suppliers	Location of material suppliers Transport mode, truck information, and distances	Supplied by Allied Concrete, 2022	Primary and secondary source data, good
A3	Manufacturing	Energy and water inputs. Estimated waste outputs. Annual production volumes	Supplied by Allied Concrete, 2022	Primary source data, good
C1	Deconstruction and demolition	Inputs for deconstruction & demolition	Assumptions for deconstruction energy	Secondary source data, fair
C2	Transport to waste processing	Distance to end-of-life destination	General assumption	Secondary source data, fair
C4	Disposal	End of life destination	Waste to landfill rate based on New Zealand national GHG report from Ministry for the Environment	Secondary source data, fair

Background data sources were also assessed with respect to their timeliness, with all data sources being updated within the 10 years required under PCR 2019:14.

System Diagram

The processes included in the LCA are presented in a process diagram in Figure 2 below.

Figure 2. System Boundary



System Boundaries

The scope of LCA for this EPD is cradle-to-gate with modules C1-C4 and module D. Emissions from construction installation (A5) was excluded as Allied Concrete does not have operational control over the installation of products at the construction site. In addition, the following life cycle stages were also excluded: distribution (A4) and use stages (B1-B7).

Product Stage			Construction Stage		Use Stage							End of Life Stage				Resource Recovery Stage
Raw Material Supply	Transport	Manufacturing	Transport to Site	On Site Processes	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction & Demolition	Transport	Waste Processing	Disposal	Reuse / Recovery / Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	✓	✓	✓	✓	✓
NZ	NZ	NZ										NZ	NZ	NZ	NZ	NZ
Specific data used: 70-80%																
Variation - products: 0%																
Variation - sites:																

ND: Module not declared

End Product Description & Use

Product Description

The 40MPa 19mm 402 (rev2036) covered by this EPD can be used in all structures and building elements that comprise the built environment, from residential and light commercial applications to commercial high rise and infrastructural uses, including landscaping applications.

Allied's ready mix concrete is made in accordance with NZS 3104:2021 to ensure that the production and testing regimes achieve target strengths. Table 2 lists all products covered by this EPD.

Table 2. Ready-Mix Concretes covered by this EPD

Product Name	Strength	Manufacturing Plant	Region
402	40MPa	Invercargill	Southland

Content Declaration

Table 3 provides a summary of the materials included in Allied's ready mix concrete and their relative composition by weight. The gross weight of this declared material makes up a minimum of 99% of the product covered by this EPD. The weighted average composition by mass of ready mixed concretes in this EPD are as follows:

Table 3. Material Content

Material Composition	Percent Composition for 1m3 of [Ready-Mix Product 1]	Post-consumer recycled content (%)	Biogenic material (%)	Biogenic material (kg C/m3 of product)
Cement	10% - 25%	0	0	0
SCM*	10% - 70%	0	0	0
Aggregates	30% - 60%	0	0	0
Water (Recycled or Fresh)	5% - 15%	0	0	0
Admixtures	0.1% - 0.4%	0	0	0

*SCM: Supplementary Cementitious Materials.

The gross weight of the declared material is 2446 kg per cubic meter, accounting for a minimum of 99% of the products covered by this EPD.

Deconstruction and end of life (C)w

Deconstruction has been modelled as the physical process of drilling and removing concrete. The distance for waste collecting from construction site to landfill plant is assumed 50km. There are no activities under C3, therefore C3 result is 0 for all impact categories. All products are modelled as 100% landfilled based on the information from New Zealand's Greenhouse Gas Inventory (1990-2021)".

Hazardous Content

None of the products in this EPD contain any materials included on the Candidate List of substances of very high concern under the European Reach Regulation (EC 1907/2006) at a concentration greater than 0.1% weight/weight.

Packaging

Allied Concrete ready-mix concrete is delivered in bulk without packaging.

Recycled Materials

There is no recycled materials used in producing the products

Cradle to Gate (Modules A1-A3)

Allied Concrete uses cement, supplementary cementitious materials (SCMs), aggregates, admixtures, and other additives to manufacture concrete products. All the materials used for concrete mixes were transported via either truck or mix of truck and barge depending on the sources of raw materials. Allied Bulk transport all aggregates to the concrete plants on both the North and South islands. Additives and admixtures are transported via various external courier companies. Concrete manufacturing is undertaken at Allied Concrete branded concrete batching plants. All plants have the same or similar site resource use profile, management systems and operating systems. The process of manufacturing concrete involves the careful proportioning and mixing of cement, SCMs, aggregates, water, chemical admixtures and additives including colour oxides in some instances. These raw materials are mixed in batching plants according to the specific concrete mix designs.

Data for site resource use at Allied Concrete's concrete batching plants for fiscal year 2022 was provided separately. Processes for concrete site resource use in each state were created and include:

- Site electricity use data is from the contract management and energy information service company.

- Site fuel use (diesel, gasoline, propane) information is from individual plant fuel data collection system. For plants (Queenstown and Gore) that don't have fuel data for 2022 due to different accounting systems, a monthly average estimated amount is provided by plant manager and supervisor based on experience.

- Site water use data is from invoices. Where invoices were unavailable, pro rate values were applied.

- Site waste is gathered through questionnaire filled out by plant staff or through waste management invoices.

Electricity used in the manufacturing process is modelled based on the electricity mix published by the Ministry of Business, Innovation and Employment, with primary source from hydro (60%), geothermal (18%), wind (6.5%), gas (9.9%), and coal (2.88%). The electricity emission (GWP-GHG) is 0.0742 kg CO2e/kWh.

Deconstruction and End of Life (Modules C1-C4)

Deconstruction has been modelled as the physical process of drilling and removing the concrete. Hydraulic excavator is assumed as the operating tool for deconstruction.

100% of the products (2446 kg) are assumed to be separately collected during deconstruction. The distance for waste collecting from construction site to landfill plant is assumed 50km.

There are no activities under C3, therefore C3 result is 0 for all impact categories.

All products are modelled as 100% landfilled based on the information from New Zealand's Greenhouse Gas Inventory (1990-2021), indicating all solid waste from household, industrial and commercial is disposed of almost exclusively to landfill.

No waste materials generated are listed in the "Candidate List of Substances of Very High Concern for authorisation" and no specialized waste treatment procedures are required. There is no carbonation at the end of life.

Table 4. End of life assumptions per 1 m3 of concrete in use

Module	Parameter	Value	Unit
C1 - Deconstruction	Diesel	2.674	L
C2 - Transportation	Distance to landfill	50	km
C4 - Waste Disposal	Inert waste landfill	100	%

Deconstruction and End of Life (Modules C1-C4)

100% of the product goes to landfill, therefore no activities are included in Module D. Module D result is 0.

Environmental Performance

The potential environmental impacts, use of resources and waste categories included in this EPD were calculated using the SimaPro v9.6 tool and are listed in Table 4 below. They are aligned to and adopted from Environmental Footprint 3.1. Impact indicators for Green Star and IS are listed in Table 5. All tables from this point will contain abbreviations only. The potential environmental performance is calculated based on the input data and the emission factors from Ecoinvent v3.10. The LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds and safety margins or risks.

Long-term storage (>100 years) is not taken into consideration in the impact estimate.

The results generated by module A1-A3 should not be used in isolation. It is strongly advised that the outcomes produced by modules A1-A3 are considered alongside the results derived from module C to ensure comprehensiveness and accurate analysis.

Continued on the next page.

Table 5. Life Cycle Impact, Resource and waste Assessment Categories, Measurements and Methods

Impact Category	Abbreviation	Measurement Unit	Assessment Method and Implementation
Potential Environmental Impacts			
Global warming potential (fossil)	GWP-fossil	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Global warming potential (biogenic)	GWP-biogenic	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Global warming potential (Land use/ land transformation)	GWP-luluc	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Total global warming potential	GWP-total	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021
Acidification potential	AP	mol H^+ eq.	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008
Eutrophication – aquatic freshwater	EP - freshwater	kg P equivalent	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe
Eutrophication – aquatic marine	EP - marine	kg N equivalent	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe
Eutrophication – terrestrial	EP – terrestrial	mol N equivalent	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.
Photochemical ozone creation potential	POCP	kg NMVOC equivalents	LOTOS-EUROS, Van Zelm et al., 2008, as applied in ReCiPe
Abiotic depletion potential (elements)*	ADPE	kg Sb equivalents	CML (v4.8)
Abiotic depletion potential (fossil fuels)*	ADPF	MJ net calorific value	CML (v4.8)
Ozone depletion potential	ODP	kg CFC 11 equivalents	Steady-state ODPs, WMO 2014
Water Depletion Potential*	WDP	m^3 equivalent deprived	Available Water Remaining (AWARE) Boulay et al., 2016 (includes Australia flows calculated using 36 Australian catchments)

Impact Category	Abbreviation	Measurement Unit	Assessment Method and Implementation
Resource Use			
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ, net calorific value	Manual for direct inputs[1]
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value	Manual for direct inputs[2]
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ, net calorific value	ecoinvent version 3.8 and expanded by PRé Consultants[3]
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ, net calorific value	Manual for direct inputs[4]
Use of non- renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value	Manual for direct inputs[5]
Total use of non- renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ, net calorific value	ecoinvent version 3.8 and expanded by PRé Consultants[6]
Use of secondary material	SM	kg	Manual for direct inputs
Use of renewable secondary fuels	RSF	MJ, net calorific value	Manual for direct inputs
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value	Manual for direct inputs
Use of net fresh water	FW	m^3	ReCiPe 2016

Impact Category	Abbreviation	Measurement Unit	Assessment Method and Implementation
Waste Categories and Output Flows			
Hazardous waste disposed	HWD	kg	EDIP 2003 (v1.05)
Non-hazardous waste disposed	NHWD	kg	EDIP 2003 (v1.05)[7]
Radioactive waste disposed/stored	RWD	kg	EDIP 2003 (v1.05)
Components for re-use	CRU	kg	Manual for direct inputs
Material for recycling	MFR	kg	Manual for direct inputs
Materials for energy recovery	MERE	kg	Manual for direct inputs
Exported energy, electricity	EE - e	MJ per energy carrier	Manual for direct inputs
Exported energy, thermal	EE - t	MJ per energy carrier	Manual for direct inputs
Additional Environmental Impact Indicators			
Global warming potential, excluding biogenic uptake, emissions and storage	GWP-GHG	kg CO_2 equivalents (GWP100)	Baseline model of 100 years of the IPCC based on IPCC 2021[8]
Particulate matter	Potential incidence of disease due to PM emissions (PM)	Disease incidence	SETAC-UNEP, Fantke et al. 2016
Ionising radiation - human health**	Potential Human exposure efficiency relative to U235 (IRP)	kBq U-235 eq.	Human Health Effect model
Eco-toxicity (freshwater)*	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	USEtox
Human toxicity potential - cancer effects*	Potential Comparative Toxic Unit for humans (HTP-c)	CTUh	USEtox
Human toxicity potential - non cancer effects*	Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh	USEtox
Soil quality*	Potential soil quality index (SQP)	dimensionless	Soil quality index (LANCA®)

[1] PERE = PERT - PERM

[2] Calculated based on the lower heating value (LHV) of renewable raw materials. LHV is taken from https://phyllis.nl/, as recommended by SimaPro in compliance with EN15804+A2: https://support.simapro.com/s/article/How-to-calculate-EN-15804-A2-indicators-in-desktop-SimaPro

[3] Calculated as sum of renewable, biomass, renewable, wind, solar, and geothermal, and renewable water.

[4] PENRE = PENRT - PENRM

[5] Calculated based on the lower heating value (LHV) of non-renewable raw materials. LHV is taken from https://phyllis.nl/, as recommended by SimaPro in compliance with EN15804+A2: https://support.simapro.com/s/article/How-to-calculate-EN-15804-A2-indicators-in-desktop-SimaPro

[6] Calculated as sum of non-renewable, fossil and non-renewable, nuclear.

[7] Calculated as sum of Bulk waste and Slags/ash.

[8] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero; calculated as the sum of GWP-luluc and GWP-fossil in the LCA model.

**Disclaimer - The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.*

***Disclaimer - 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 from some construction materials is also not measured by this indicator.*

Table 6. Life cycle impact, measurement, and methods for Green Star and IS

Impact Indicators	Measurement Unit	Assessment Method and Implementation
Green Star		
Human toxicity cancer	CTUh	USEtox – cancer effect
Human toxicity non-cancer	CTUh	USEtox – non-cancer effect
Land use	kg C deficit eq.	Soil Organic Matter method
Resource depletion – water	m^3	Water Stress Indicator
Ionising radiation	kBq U-235 eq.	Human Health Effect model
Particulate matter	kg PM2.5 eq.	RiskPoll
IS Rating		
Global Warming Potential	kg CO_2 eq.	CML (v4.02) based on IPCC AR4
Ozone Depletion Potential	kg CFC-11 eq.	CML (v4.02) based on WMO 1999
Acidification Potential	kg SO_2 eq.	CML (v4.02)
Eutrophication Potential	kg PO_4^{3-} eq.	CML (v4.02)
Photochemical Ozone Creation Potential	kg C_2H_4 eq.	CML (v4.2)
Abiotic Depletion Potential (Elements)	kg Sb eq.	CML (v4.2)
Abiotic Depletion Potential (Fossil Fuels)	MJ net calorific value	CML (v4.2)

Environmental Information

for 1m³ Invercargill 40MPa 19mm 402 (rev2036)

The interpretation of results is presented in the following sections. Note that the use of results of modules A1-A3 or A1-A5, without considering the results of module C may mislead the communication and decision-making. 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.

Potential environmental impact – mandatory indicators according to EN 15804+A2

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	2.89E+02	8.99E+00	1.89E+01	0.00E+00	2.44E+01	0.00E+00
GWP-biogenic	kg CO_2 eq.	5.34E-02	3.87E-04	8.48E-04	0.00E+00	1.67E-01	0.00E+00
GWP-luluc	kg CO_2 eq.	7.66E-03	3.09E-04	5.52E-04	0.00E+00	1.16E-02	0.00E+00
GWP-total	kg CO_2 eq.	2.89E+02	8.99E+00	1.89E+01	0.00E+00	2.46E+01	0.00E+00
ODP	kg CFC 11 eq.	7.55E-07	1.41E-07	2.53E-07	0.00E+00	6.48E-07	0.00E+00
AP	mol H^+ eq.	1.87E+00	8.40E-02	5.13E-02	0.00E+00	2.78E-01	0.00E+00
EP-freshwater	kg P eq.	2.84E-02	7.34E-05	3.84E-04	0.00E+00	4.17E-02	0.00E+00
EP-marine	kg N eq.	4.48E-01	3.95E-02	1.87E-02	0.00E+00	6.98E-02	0.00E+00
EP-terrestrial	mol N eq.	4.94E+00	4.33E-01	2.04E-01	0.00E+00	7.49E-01	0.00E+00
POCP	kg NMVOC eq.	1.30E+00	1.29E-01	7.64E-02	0.00E+00	2.63E-01	0.00E+00
ADP-minerals & metals*	kg Sb eq.	5.19E-06	3.76E-07	1.12E-06	0.00E+00	9.38E-06	0.00E+00
ADP-fossil*	MJ	1.18E+03	1.18E+02	2.52E+02	0.00E+00	5.64E+02	0.00E+00
WDP*	m^3 equivalent deprived	6.90E+01	9.42E-02	2.34E-01	0.00E+00	-3.91E+02	0.00E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Potential environmental impact – additional mandatory and voluntary indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	2.89E+02	8.99E+00	1.89E+01	0.00E+00	2.46E+01	0.00E+00

Resource Use Indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	7.69E+01	2.65E-01	4.11E-01	0.00E+00	5.16E+00	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.69E+01	2.65E-01	4.11E-01	0.00E+00	5.16E+00	0.00E+00
PENRE	MJ	1.18E+03	1.18E+02	2.52E+02	0.00E+00	5.64E+02	0.00E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.18E+03	1.18E+02	2.52E+02	0.00E+00	5.64E+02	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.83E+00	3.71E-03	8.47E-03	0.00E+00	-9.08E+00	0.00E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Waste Production

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3.04E-03	8.12E-04	1.73E-03	0.00E+00	3.69E-03	0.00E+00
Non-hazardous waste disposed	kg	7.80E-01	3.46E-03	1.08E-02	0.00E+00	2.45E+03	0.00E+00
Radioactive waste disposed	kg	1.30E-04	6.05E-06	9.07E-06	0.00E+00	8.97E-05	0.00E+00

Output Flows

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	5.88E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional Environmental Impact Indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	7.55E-06	2.41E-06	1.26E-06	0.00E+00	4.16E-06	0.00E+00
Ionising radiation - human health**	kBq U-235 eq.	5.56E-01	2.52E-02	3.83E-02	0.00E+00	3.70E-01	0.00E+00
Eco-toxicity (fresh-water)*	CTUe	1.99E+02	4.09E+00	1.66E+01	0.00E+00	5.81E+02	0.00E+00
Human toxicity potential - cancer effects*	CTUh	6.32E-08	6.27E-10	1.58E-09	0.00E+00	3.33E-08	0.00E+00
Human toxicity potential - non cancer effects*	CTUh	1.71E-06	8.92E-09	1.24E-07	0.00E+00	7.27E-07	0.00E+00
Soil quality*	Dimensionless	2.26E+03	2.51E-01	1.03E+00	0.00E+00	1.34E+03	0.00E+00

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

***Disclaimer – 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.*

Results are in accordance with Green Star v1.3

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Human toxicity cancer	CTUh	1.04E-08	6.27E-11	7.23E-10	0.00E+00	1.65E-09	0.00E+00
Human toxicity non-cancer	CTUh	1.13E-10	3.36E-12	1.63E-11	0.00E+00	3.00E-10	0.00E+00
Land use	kg C deficit eq.	1.43E+03	1.08E-01	5.10E-01	0.00E+00	3.12E+02	0.00E+00
Resource depletion – water	m^3	2.41E+00	4.69E-03	1.23E-02	0.00E+00	-1.26E+01	0.00E+00
Ionising radiation	kBq U-235 eq.	5.83E-01	2.52E-02	3.84E-02	0.00E+00	3.71E-01	0.00E+00
Particulate matter	kg PM2.5 eq.	2.71E-01	2.29E-02	1.16E-02	0.00E+00	4.95E-02	0.00E+00

Results are in accordance with EN15804+A1:2013 (IS Rating Scheme)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	kg CO_2 eq.	2.89E+02	8.99E+00	1.89E+01	0.00E+00	2.46E+01	0.00E+00
Ozone Depletion Potential	kg CFC-11 eq.	6.09E-07	1.12E-07	2.00E-07	0.00E+00	5.14E-07	0.00E+00
Acidification Potential	kg SO_2 eq.	1.48E+00	5.89E-02	3.84E-02	0.00E+00	2.23E-01	0.00E+00
Eutrophication Potential	kg PO_4^{3-} eq.	2.42E-01	1.35E-02	7.72E-03	0.00E+00	1.50E-01	0.00E+00
Photochemical Ozone Creation Potential	kg C_2H_4 eq.	4.64E-02	1.50E-03	2.27E-03	0.00E+00	9.37E-03	0.00E+00
Abiotic Depletion Potential (Elements)	kg Sb eq.	5.22E-06	3.77E-07	1.12E-06	0.00E+00	9.42E-06	0.00E+00
Abiotic Depletion Potential (Fossil Fuels)	MJ net calorific value	9.73E+02	1.38E+00	9.49E+00	0.00E+00	4.39E+01	0.00E+00

Previous Version

Not applicable

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Programme Information

Declaration Owner	**Allied Concrete Limited** 25 Esk Street Invercargill	www.alliedconcrete.co.nz
Programme Operator: EPD International	EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden	www.environdec.com
Regional Programme: EPD Australasia	**EPD Australasia** 315a Hardy Street Nelson 7010 New Zealand	www.epd-australasia.com
Life Cycle Assessment (LCA)	**Edge Environment Pty Ltd** Greenhouse, Level 3, 180 George Street, Sydney NSW 2000 Australia	www.edgeimpact.global
PEPD Process Certified by	**Epsten Group** 101 Marietta St. NW, Suite 2600, Atlanta, Georgia 30303, USA	www.epstengroup.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)Product Category Rules

Product Category Rules	Product Category Rules (PCR) 2019:14 Construction products (EN 15804+A2), Version 1.3.4 c-PCR-003 Concrete and concrete elements (EN 16757:2022)
PCR Review conducted by	PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile. www.environdec.com/contact-us
Independent verification of the declaration and data, according to ISO 14025:2006:	☒ EPD process certification ☐ EPD verification
EPD Process Verified by	Epsten Group, Inc. 101 Marietta St. NW, Suite 2600, Atlanta, Georgia 30303, USA www.epstengroup.com Accredited by: A2LA, Certificate #3142.03
Procedure for follow-up of data during EPD validity involves third-party verifier:	☒ Yes ☐ No

Programme-related Information and Verification

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

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.

Allied Concrete Environmental Product Declaration.

Revision Date: 2025-02-07

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Allied Concrete

Consult your Allied Concrete representative
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