roadstone
A CRH COMPANY

Belgard Aggregate

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2010 and EN 15804:2012+A2:2019 for:

Aggregates & Granular Fill (Belgard Quarry)

from

Roadstone

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

Programme:
The International EPD® System,
www.environdec.com

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EPD International AB

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2028-03-28

Geographical Scope:
Europe

One Click LCA

ECO PLATFORM EPD VERIFIED

EPD® ENVIRONMENTAL PRODUCT DECLARATION

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer: Roadstone
Address: Fortunestown, Tallaght, Dublin 24, Ireland
Contact Details: info@roadstone.ie
Website: www.roadstone.ie

PRODUCT IDENTIFICATION

Product Name: Aggregates & Granular Fill
Place(s) of Production: Belgard, Ireland
CPC Code: 1532
Declared Unit: 1 Tonne of Crushed Limestone Aggregate and Granular Fill

EPD INFORMATION

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. For further information about comparability, see EN 15804 and ISO 14025.

EPD Program Operator:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

The CEN standard EN 15804+A2 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction products, Version 1.11, 2021-02-05
PCR review was conducted by: The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. Chair of the PCR review: Claudia A. Peña. The review panel may be contacted via info@environdec.com.
Independent verification of this EPD and data, according to ISO 14025:2006: ☐ Internal certification ☑ External verification
Third Party Verifier: Barbara M. Civit Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☑ No

PRODUCT INFORMATION

PRODUCT DESCRIPTION

This environmental product declaration is for 1 tonne of Limestone Aggregate & Granular Fill materials produced by Roadstone and sourced from Belgard Quarry. The Aggregate & Granular Fill products are available in a range of types and sizes.

Roadstone Limestone Aggregates & Granular Fill materials are produced from a naturally occurring sedimentary rock body quarry, sourced by means of blasting, crushing and in most cases screening into the required sizes.

Production is managed under our ISO 9001 Quality Management scheme with all aggregate producing locations having System 2+ level of attestation of conformity.

PRODUCT APPLICATION

Aggregates are used in the downstream production of Roadstones various end products such as Ready-Mix Concrete, Concrete blocks, Masonry and Mortars and Asphalt. Granular fills have a wide range of applications including drainage and pipe bedding, sub-base and fill for under concrete floors and footpaths.

TECHNICAL SPECIFICATIONS & PRODUCT STANDARDS

The specification used for Aggregates & Granular Fills can vary depending on the end use of the product. Specifications used include:

- EN 13285 Unbound Mixtures Specification
- EN 12620 Aggregates for Concrete (S.R.16)
- EN 13043 Aggregates for Bituminous Materials (S.R. 17)
- EN 13139 Aggregates for Mortars (S.R.18)
- EN 13242 Aggregates for Unbound and Hydraulically Bound Materials (S.R. 21)
- EN 13450 Aggregates for Railway Ballast
- TII Specification for Road Works

PHYSICAL PROPERTIES OF THE PRODUCT

Materials may vary in maximum size and particle size distribution (grading) to suit the required applications and comply with the relevant specification. When producing these materials, the aim is to always to have a finished product which is clean, hard and durable and capable of performing as required in an engineering environment.

The most commonly produced aggregate sizes include Crushed Rock Fines (0-4mm), 2/6.3mm Aggregate (6mm), 4/10mm Aggregate (10mm), 6.3/14mm Aggregate (14mm), 10/20mm Aggregate (20mm), 20/31.5mm Aggregate (28mm) and 20/40mm Aggregate (40mm).

The most commonly produced granular fill sizes include: 25 – 0 mm Crushed Rock (1″ down), 50 – 0 mm Crushed Rock (2″ down), 75 – 0 mm Crushed Rock (3″ Down), 100 – 0 mm Crushed Rock (4″ down), 150 – 0 mm Crushed Rock (6″ down), 40 – 63 mm Crushed Rock (2″ clean), 65 – 85 mm Crushed Rock (3″ clean), 90 -110 mm Crushed Rock (4″clean), 120 – 180 mm Crushed Rock (6″ clean), CL 804 Granular Material, CL 808 Granular Material, SR 21 Annex E T.0 Structural (0/125mm), SR 21 Annex E T.1 Structural (0/31.5mm), SR 21 Annex E T.2 Permeable (4/40mm) and SR 21 Annex E, T.3 Blinding (0/4mm).

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at www.roadstone.ie.

PRODUCT RAW MATERIAL CONSUMPTION

Product and Packaging Material	Weight (kg)	Post-Consumer (%)	Renewable (%)	Country Region of Origin
Limestone	1000	-	-	IE

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw Material Category	Amount, Mass (%)	Material Origin
Metals	-	-
Minerals	100	IE
Fossil Materials	-	-
Bio-Based Materials	-	-

SUBSTANCES, REACH - VERY HIGH CONCERN

Roadstone Belgard Aggregate & Granular Fill materials contain no substances that are part of the European Chemical Agency List.

List for Substances of Very High Concern for Authorisation.

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The manufacturing of limestone aggregates commences with the drilling of the sedimentary rock mass and then the use of explosives to blast and release tens of thousands of tonnes of rock at a time. This rock is loaded and transported to the primary crusher, via dumpers, where it is reduced in size and then transported by conveyor to the secondary and tertiary crushers for further crushing and screening to produce various sized graded aggregates and granular fills.

Aggregates to be used onsite for ready-mix concrete, concrete blocks and asphalt are transported via conveyors to the appropriate downstream process, and aggregates and granular fill materials to be delivered to customers is loaded onto trucks and transported via road.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover the construction phase.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

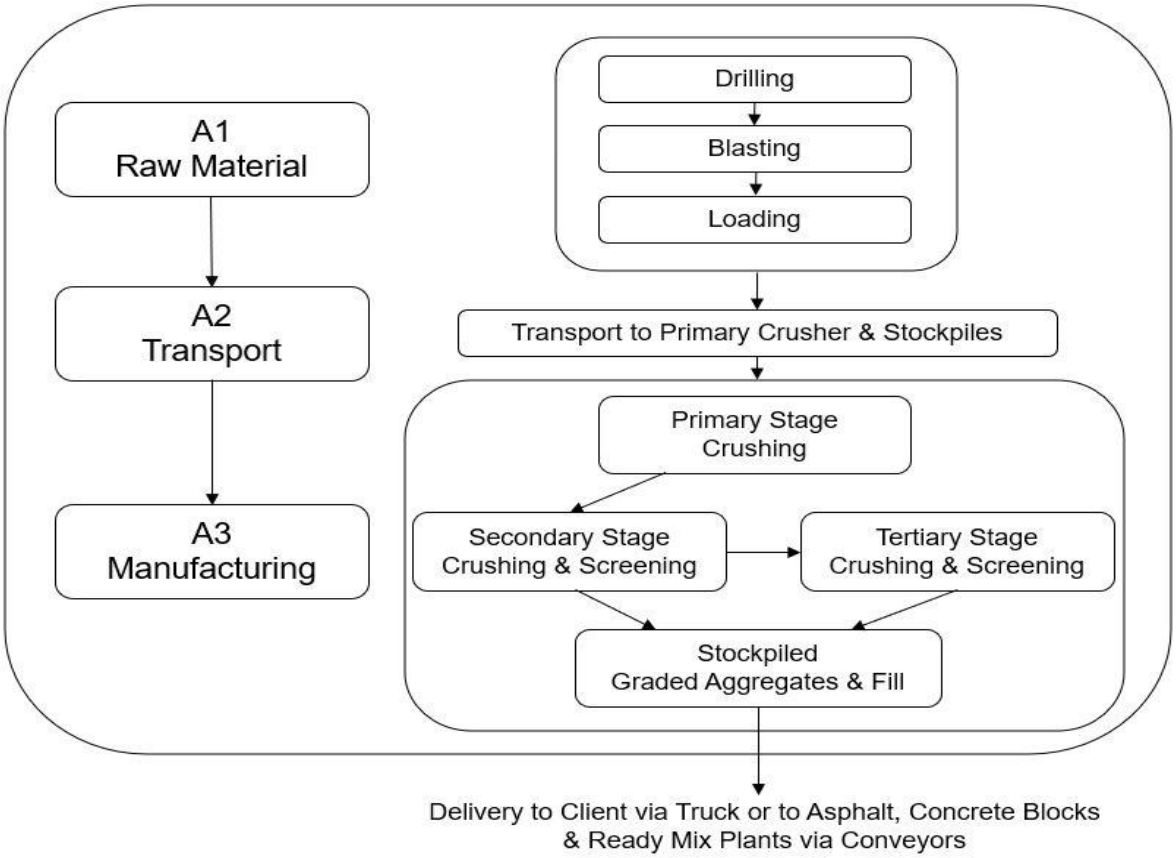
PRODUCT END OF LIFE (C1-C4, D)

As aggregates are usually used as a raw material in the manufacture of other construction materials like asphalt and concrete, it becomes inseparable at the end of life. In such cases, C1-C4, D may be omitted from the declaration as per section 5.2 of EN 15804+A2:2019. However, a scenario for the Aggregates & Granular Fill contained in this EPD for end of life has been established.

The end use split between aggregates and granular fill for Belgard Quarry products is 50%. By using default values for construction waste streams in Ireland based on data by the epa it is assumed the recovery rate for granular fills is 75% and for concrete, concrete blocks, asphalt and similar is 100%. Therefore, for every 1 tonne of material produced 87.5% can be reused, recovered and/or recycled, with the remainder sent to landfill. The amount of energy used by machines in demolition is assumed to be 10kWh/T of material. A transportation distance of 50km is used for the demolition site to waste processing.

MANUFACTURING PROCESS

The following flow diagram gives an overview of the processes involved in the Product Stage.



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

The specific production dataset chosen for this EPD is the production data for the calendar year 2021.

DECLARED AND FUNCTIONAL UNIT

The declared unit is 1 Tonne of Crushed Limestone Aggregate and Granular Fill.

The reference service life will be equal to the lifetime of the individual structure in which the aggregate or granular fill is used.

BIOGENIC CARBON CONTENT

No transfers, emissions or removal of biogenic carbon occur throughout the manufacturing process. Packaging materials containing biogenic carbon are not used in products covered under this EPD.

Biogenic carbon content in product, kg C	Biogenic carbon content in packaging, kg C
-	-

SYSTEM BOUNDARY

This EPD covers the cradle to gate with modules scope with the following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing) as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included. The modules that are declared are detailed below.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BEYOND THE SYSTEM BOUNDARIES
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse – Recovery – Recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography, by two letter ISO country code or regions																
EU	EU	EU	-	-	-	-	-	-	-	-	-	IE	IE	IE	IE	IE
Specific data used																
>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products																
Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites																
Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X *= Module declared.* ***MND*** *= Module not declared*

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

All industrial processes from raw material acquisition and pre-processing, production and end-of-life management are included. For easier modelling and because of lack of accuracy in available modelling resources many constituents under 0,1% of product mass are excluded. These include ancillary materials in very small amounts and have no serious impact on the emissions of the product. Further, water used for cleaning and maintenance of the equipment, transportation and waste streams of the packaging materials used for delivering the raw materials to the factory are omitted since the quantified mass contribution is less than 0.1%.

The production of capital equipment is included. Construction activities, and infrastructure, personnel-related activities, energy and water use related to company management and sales activities are excluded.

LCA RULES, ALLOCATION, ESTIMATES AND ASSUMPTIONS

The life cycle stages covered in this EPD are the information modules cradle to gate with modules C1–C4 and module D (A1–A3, + C + D), i.e.

- A1, raw material extraction and processing, processing of secondary material input (e.g. recycling, processes),
- A2, transport to the manufacturer,
- A3, manufacturing including provision of all materials, products and energy, as well as waste processing up to the end-of waste state or disposal of final residues during the product stage.
- C1, de-construction, demolition.
- C2, transport to waste processing.
- C3, waste processing for reuse, recovery and/or recycling.
- C4, disposal;
- D, reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

In this study allocation could not be avoided for raw materials, ancillary material, energy consumption and waste production as the information was only measured on factory or production process level. The inputs were allocated to studied product based on annual production volume (mass allocation).

The values for 1 tonne of aggregates and fills are calculated by considering the total product weight per annual production. In the factory, several kinds of products are produced; since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation. According to this, the total energy consumption and product-based waste are divided by the total annual production. Since the formulation of each product is certain, base materials do not need to be allocated. Subsequently, the product output is fixed to 1000 kg and the corresponding amount of product is used in the calculations.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs. Allocation used in Ecoinvent 3.6 environmental data sources follow the methodology ‘allocation, cut-off by classification’. This methodology is in line with the requirements of the EN 15804-standard.

All estimations and assumptions are given below.

- Module A2: A transport distance of 15km was assumed for ancillary materials such as rubber, metals and lubricating oils.
- Module A2: A transport distance of 100km was assumed for capital equipment such as vehicles and machinery where exact distances were not known.
- Module C2: For removal of materials from site to landfill or breaking/sorting sites a distance of 50km was used based on default values for Ireland.
- Module C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as the role of transportation emission in total results is small and so the variety in load assumed to be negligible. Empty returns are not considered as it is assumed that return trip is used by transportation companies to serve the needs of other clients.

Processes used in Ecoinvent 3.6 environmental data sources follows the methodology ‘allocation, cut-off by classification’. This methodology is in line with the requirements of the EN 15804 -standard.

AVERAGES AND VARABILITY

100% of the Aggregates & Granular Fills produced at the Belgard production site in the period are covered by this EPD, so no co-product allocation of total site energy use, water, waste and emissions was required since the data was collected at factory level specific to the aggregates & granular fills only.

ENVIRONMENTAL IMPACT DATA

A comparison of EPD data is only possible if all the data sets to be compared were created according to EN 15804:2012+A2:2019 and the building context, i.e. the product-specific characteristics of performance, are taken into account. EPD of construction products may not be comparable if they do not comply with EN 15804.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	8.46E-01	1.85E+00	4.19E+00	6.89E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.30E+00	8.34E+00	8.61E+00	6.60E-01	-7.45E+00
GWP-fos	kg $CO_{2\ eq.}$	8.45E-01	1.85E+00	4.18E+00	6.87E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.30E+00	8.33E+00	8.61E+00	6.58E-01	-7.34E+00
GWP-bio	kg $CO_{2\ eq.}$	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.17E-04	4.45E-03	-6.32E-04	1.31E-03	-9.28E-02
GWP-luc	kg $CO_{2\ eq.}$	8.26E-04	1.76E-03	1.14E-02	1.40E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.79E-04	2.96E-03	7.23E-03	1.95E-04	-9.65E-03
ODP	kg $CFC_{11\ eq.}$	4.67E-08	3.12E-07	3.20E-07	6.78E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	7.12E-07	1.89E-06	1.54E-06	2.71E-07	-6.65E-07
AP	mol H+ eq.	7.40E-02	1.57E-02	2.38E-02	1.13E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.45E-02	3.40E-02	6.98E-02	6.25E-03	-4.79E-02
EP-fw*	kg $P_{eq.}$	1.80E-05	3.17E-05	1.80E-04	2.30E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.33E-05	6.97E-05	1.93E-04	7.95E-06	-4.76E-04
EP-mar	kg $N_{eq.}$	2.27E-02	5.76E-03	4.50E-03	3.30E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.52E-02	1.01E-02	2.56E-02	2.15E-03	-1.01E-02
EP-ter	mol $N_{eq.}$	3.73E-01	6.34E-02	5.08E-02	4.88E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.67E-01	1.12E-01	2.82E-01	2.37E-02	-1.33E-01
POCP	kg $NMVOC_{eq.}$	6.66E-02	1.77E-02	1.76E-02	1.02E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.59E-02	3.42E-02	7.81E-02	6.88E-03	-3.35E-02
ADPE**	kg $Sb_{eq.}$	1.42E-05	8.86E-05	3.88E-04	4.91E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.03E-06	2.25E-04	5.32E-05	6.02E-06	-7.98E-04
ADPF**	MJ	5.70E+00	2.39E+01	5.13E+01	8.09E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.54E+01	1.26E+02	1.30E+02	1.84E+01	-1.06E+02
WDP	m^3 eq.	2.43E-01	1.73E-01	9.59E-01	1.37E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.46E-02	4.05E-01	2.06E+00	8.51E-01	-1.30E+01

GWP-tot *= global warming potential, total;* ***GWP-fos*** *= global warming potential, fossil fuels;* ***GWP-bio*** *= global warming potential, biogenic;* ***GWP-luc*** *= global warming potential, land use and land use change;* ***ODP*** *= ozone depletion potential;* ***AP*** *= (acidification potential;* ***EP-fw*** *= eutrophication potential, freshwater;* ***EP-mar*** *= eutrophication potential, marine;* ***EP-ter*** *= eutrophication potential, accumulated exceedance;* ***POCP*** *= formation potential of tropospheric ozone;* ***ADPE*** *= abiotic depletion potential for non-fossil resources;* ***ADPF*** *= abiotic depletion for fossil resources potential;* ***WDP*** *= water deprivation potential.*

**Disclaimer: Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.*

***Disclaimer: 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 experienced with the indicator.*

PARAMETERS DESCRIBING RESOURCES USE

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	5.64E-01	2.31E+00	5.14E+00	8.01E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.45E-01	1.77E+00	4.99E+00	1.49E-01	-9.24E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	5.64E-01	2.31E+00	5.14E+00	8.01E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.45E-01	1.77E+00	4.99E+00	1.49E-01	-9.24E+00
PENRE	MJ	5.70E+00	2.39E+01	5.13E+01	8.09E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.54E+01	1.26E+02	1.30E+02	1.84E+01	-1.06E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.70E+00	2.39E+01	5.13E+01	8.09E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.54E+01	1.26E+02	1.30E+02	1.84E+01	-1.06E+02
SM	kg	1.32E-01	0.00E+00	5.56E-03	1.38E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW	m^3	4.53E-03	5.43E-03	2.56E-02	3.56E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.01E-03	2.15E-02	5.22E-02	2.01E-02	-1.03E+00

***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 resources; **SM** = use of secondary material; **RSF** = use of renewable secondary fuels; **NRSF** = use of non-renewable secondary fuels; **NFW** = net use of fresh water.*

INFORMATION DESCRIBING WASTE CATEOGORIES

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	5.13E-02	8.95E-02	4.06E-01	5.47E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.88E-02	1.28E-01	0.00E+00	1.72E-02	-5.49E-01
NHWD	kg	7.25E-01	1.70E+00	8.10E+00	1.05E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.22E-01	8.76E+00	0.00E+00	1.25E+02	-2.27E+01
RWD	kg	1.71E-05	1.40E-04	9.51E-05	2.52E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.18E-04	8.61E-04	0.00E+00	1.22E-04	-4.93E-04

***HWD** = hazardous waste disposed; **NHWD** = non-hazardous waste disposed; **RWD** = radioactive waste disposed.*

ENVIRONMNETAL INFORMATION DESCRIBING OUTPUT FLOWS

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	4.80E-04	4.80E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	8.75E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	5.30E-03	5.30E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

***CRU** = components for re-use; **MFR** = materials for recycling; **MER** = materials for energy recovery; **EE** = exported energy.*

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	5.42E-07	6.59E-08	2.02E-07	8.10E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.14E-07	5.81E-07	4.91E-06	1.21E-07	-5.54E-07
IRP	kBq U235 eq.	1.35E-02	9.16E-02	9.10E-02	1.96E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.94E-01	5.49E-01	5.48E-01	7.55E-02	-6.79E-01
ETP-fw*	CTU_e	4.65E+03	3.02E+01	1.17E+02	4.80E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.66E+01	9.70E+01	1.15E+02	1.16E+01	-1.28E+02
HTP-c*	CTU_e	4.96E-10	1.43E-09	1.03E-08	1.22E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.53E-10	2.82E-09	3.35E-09	2.75E-10	-6.53E-09
HTP-nc*	CTU_e	2.61E-08	6.35E-08	1.72E-07	2.62E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.35E-08	1.10E-07	8.62E-08	8.48E-09	-1.55E-07
SQP*	-	1.18E+00	1.48E+01	6.40E+00	2.24E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.16E+00	1.05E+02	1.27E+02	3.13E+01	-7.18E+01
GWP-GHG	kg CO_2e	8.45E-01	1.85E+00	4.18E+00	6.87E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.30E+00	8.33E+00	8.61E+00	6.58E-01	-7.34E+00

***PM** = potential incidence of disease due to pm emissions; **IRP** = potential human exposure efficiency relative to U235; **ETP-fw** = Potential Comparative Toxic Unit for ecosystems; **HTP-c** = Potential Comparative Toxic Unit for humans; **HTP-nc** = Potential Comparative Toxic Unit for humans; **SQP** = Potential soil quality index; **GWP-GHG** = This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013) This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.*

**Disclaimer: 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 experienced with the indicator.*

Additional information on release of dangerous substances to indoor air, soil and water during the use stage

This EPD does not provide this information as the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonized test methods according to the provisions of the respective technical committees for European product standards are not yet available.

SCENARIO DOCUMENTATION & CONTRIBUTORS

MANUFACTURING ENERGY SCENARIO DOCUMENTATION

Scenario Parameter	Value
Electricity data source and quality	Electricity, Ireland, residual mix, AIB, year: 2019
Electricity CO_2e/kWh	0.66

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Roadstone Ltd
EPD Author	William Wilson, Roadstone Ltd
EPD Verifier	Barbara M. Civit
EPD Program Operator	The International EPD System
Background Data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA Software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Aggregates & Stone Products.

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1. ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.
2. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
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5. EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
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7. General Programme Instructions of the International EPD® system. Version 4.0
8. IGBC, 2022. PRODUCT CATEGORY RULES: PART A Implementation and use of EN 15804:2012+A1:2013, EN 15804:2012+A2:2019 and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations – Version 2.1
9. Aggregates & Granular Fill (Belgard Quarry) LCA background report 12.01.2023

ABOUNT THE MANUFACTURER

Roadstone manufactures and supplies a range of integrated building materials, products and innovative solutions which can be found throughout the built environment, from major public infrastructure projects to commercial buildings and residential structures.

Roadstone Ireland has established management systems in place in accordance with ISO 50001:2018 Energy Management, ISO 9001:2015 Quality Management and ISO 14001:2015 Environmental Management.

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

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VERIFICATION OVERVIEW

Author & Tool & Verification	Answer
EPD author	William Wilson
EPD author training completion	2022-09-28
EPD Generator module	Aggregates & Stone Products
Independent software verifier	Ugo Pretato, Studio Fieschi & soci Srl
Software verification date	2021-05-11

EPD Verification Information	Answer
Independent EPD verifier	Barbara M. Civit
EPD verification started on	26.02.2023
EPD verification completed on	04.04.2023
Approver of the EPD verifier	The International EPD System

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Signature … 

ANNEX 1: ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	8.30E-01	1.82E+00	4.06E+00	6.71E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.27E+00	8.26E+00	8.46E+00	6.46E-01	-7.19E+00
Ozone depletion Pot.	kg CFC-$_{11}$e	3.87E-08	2.49E-07	2.75E-07	5.63E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.63E-07	1.51E-06	1.24E-06	2.15E-07	-6.10E-07
Acidification	kg SO_2e	3.69E-03	1.15E-02	1.92E-02	3.44E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.87E-03	1.67E-02	1.08E-01	2.60E-03	-2.97E-02
Eutrophication	kg PO_4^3e	9.27E-04	3.27E-03	7.54E-03	1.17E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.57E-04	3.43E-03	8.86E-03	5.04E-04	-1.60E-02
POCP (“smog”)	kg C_2H_4e	4.80E-04	4.77E-04	1.45E-03	2.40E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.01E-04	1.10E-03	1.50E-03	1.91E-04	-2.40E-03
ADP-elements	kg Sbe	1.42E-05	8.86E-05	3.88E-04	4.91E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.03E-06	2.25E-04	5.32E-05	6.02E-06	-7.98E-04
ADP-fossil	MJ	5.70E+00	2.39E+01	5.13E+01	8.09E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.54E+01	1.26E+02	1.30E+02	1.84E+01	-1.06E+02