roadstone
A CRH COMPANY

ENVIRONMENTAL PRODUCT DECLARATION

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

Paving and Walling Products

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

Programme Operator:
EPD International AB

EPD Registration Number:
S-P-04962

Publication Date:
29th June 2022

Valid Until:
27th June 2027

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: Paving and Walling Products
Place(s) of Production: Gooig, Ireland
CPC Code: 37540
Declared Unit: 1m^2 of Paving Product

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 2019:14-c-PCR-003 Concrete and concrete elements (version date 20.12.2019) PCR 2019:14-c-PCR-001 Cement and building lime (version date 20.12.2019)
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: Ugo Pretato (Studio Fieschi & Sochi Srl) Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☑ No

PRODUCT DESCRIPTION

The declared product, paving and walling products, is an unreinforced lightweight precast concrete slab with UN CPC classification 37540- Tiles, flagstones, bricks and similar articles, of cement, concrete or artificial stone.

The Paving product is available in two size classes, 60mm and 80mm. Walling products are also available in two size classes, 90mm and 300mm.

The values presented in this EPD are declared as average environmental performance for a number of products within each product category.

Product Name	Place of Production	CPC Code
60mm Paving Products	Gooig, Ireland	37540- Tiles, flagstones, bricks and similar articles, of cement, concrete or artificial stone
80mm Paving Products	Gooig, Ireland	37540- Tiles, flagstones, bricks and similar articles, of cement, concrete or artificial stone
Bordeaux Walling Products (300mm)	Gooig, Ireland	37540- Tiles, flagstones, bricks and similar articles, of cement, concrete or artificial stone
Keltstone Walling Products (90mm)	Gooig, Ireland	37540- Tiles, flagstones, bricks and similar articles, of cement, concrete or artificial stone

Explanatory information can be found on the company website, www.roadstone.ie including specific product sheets which contains further information on the safe and effective use and disposal of the paving and walling products.

PRODUCT APPLICATION

Precast concrete paving products are used in a variety of paving applications.

TECHNICAL SPECIFICATIONS & STANDARDS

Roadstone paving products are produced to I.S. EN 1338:2003 and the declared performance of the products are presented in the subsequent table.

Characteristic	Declared Performance	Harmonised Technical Specification
Breaking Strength	≥3.6MPa	I.S. EN 1338:2003 Annex F
Slip/Skid Resistance (USRV)	Varies by Product: 40 to 75, ≥75, >75 Potential for Slip Varies by Product: Extremely Low, Low	I.S. EN 1338:2003 Annex I (BS EN 1338 Table NA.2)
Durability: Freeze Thaw	Class 3 (D)	I.S. EN 1338:2003 Annex D
Durability: Abrasion Resistance	Varies by Product: Class 3 (H) ≤23mm, Class 4 (I) ≤20mm	I.S. EN 1338:2003 Annex G
Reaction To Fire	Class A1	Based on Commission Decision 200/605 EC amending 96/603 EC
External Fire Performance	Deemed To Satisfy	Declaration
Emission Of Asbestos (Dangerous Substances)	No Content	Declaration
Expected Service Life time	30+ Years	Estimate

PRODUCT RAW MATERIAL CONSUMPTION

The raw materials used to manufacture paving and walling products are: cement, aggregates, admixtures (if needed), aluminum slag (if needed), and water. The manufacturing process involves mixing of raw materials followed by curing in moulds. The distribution of the composition is given in the subsequent table.

Product Components	60mm Paving Products (% by Weight)	80mm Paving Products (% by Weight)	Bordeaux Walling Products (300mm) (% by Weight)	Keltstone Walling Products (90mm) (% by Weight)
Cement	11.1% - 15.3%	11.5% - 14.8%	12.1% - 12.4%	11.3% - 11.9%
Aggregates	80.9% - 85.8%	81.9% - 85.6%	86.1% - 86.6%	84.7% - 85.3%
Water	2.4% - 3.6%	2.3% - 3.3%	0.7%	2.7% - 2.8%
Aluminium Slag	0% - 1.7%	0% - 1.0%	0%	0%
Admixtures	0.2% - 0.8%	0.2% - 0.8%	0.6% - 0.8%	0.7% - 0.8%
Packaging Material				
Plastic, Strapping etc.	<1%	<1%	<1%	<1%

SUBSTANCES, REACH - VERY HIGH CONCERN

Roadstone paving products contain no substances that are part of the European Chemical Agency

List for Substances of Very High Concern for Authorisation.

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Production starts by transporting the binders, aggregates and additives to the manufacturing facility and storing them in silos and containers. Hoppers discharge the correct weight of each material for the selected recipe for mixing. After mixing the concrete is placed into casting moulds and pressed into the required shape. The concrete is cured after which it is stored three units high in sheltered conditions. Eventually, the products are moved out and dispatched to the construction site.

Non-conforming products are crushed and used as input material for future products of the same type, therefore no waste leaves the site.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover the construction phase.

PRODUCT USE AND MAINTENANCE (B1-B7)

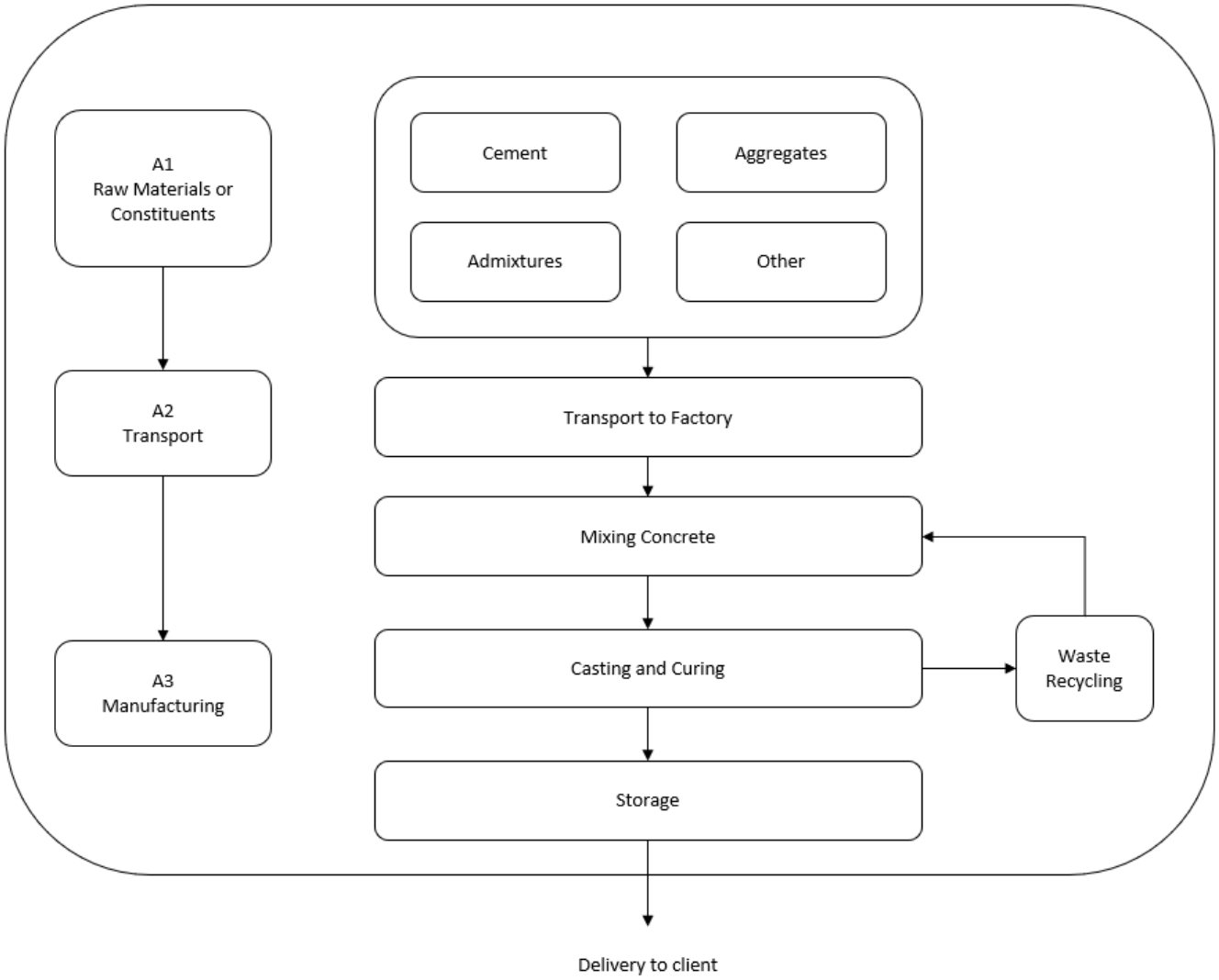
This EPD does not cover the use phase.

PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, the EPD utilised assumes 2.67L of diesel is consumed during the demolition process per m^3 of precast concrete. In addition, the average transport distance in the EPD tool for end-of-life is set at 50km. It is assumed 100% of the waste is recycled.

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 2020.

DECLARED AND FUNCTIONAL UNIT

The declared unit is 1m^2 of manufactured paving/walling product. Conversion factors for each product from the functional unit (m^2) to kg is detailed below.

Product Name	kg/m^2
60mm Paving Products	132
80mm Paving Products	176
Bordeaux Walling Products (300mm)	666
Keltstone Walling Products (90mm)	172

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.

SYSTEM BOUNDARY

The scope of this EPD, in accordance with IS EN 15804:2012+A2:2019 is cradle-to-gate with modules C1-C4 and D (A1-A3, + C + D). The modules that are declared are detailed below.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BEYOND THE SYSTEM BOUNDAR-IES
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	ND	ND	ND	ND	ND	ND	ND	ND	ND	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																
60mm paving: -28%/+21% 80mm paving: -9%/+21% Bordeaux Walling: -5%/+8% Keltstone Walling: -4%/+10%																
Variation - sites																
Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X *= Module declared.* ***ND*** *= 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.

Processes that have been excluded from the LCA:

- Manufacture of moulds (considered to be part of capital equipment)
- Pallets and pallet straps (less than 1% of total mass)
- Forklift fuel (less than 1% of primary energy usage)
- Fuel for office heating (less than 1% of primary energy usage).

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.

Paving/walling is manufactured at Roadstone's facility at Gooig in Ireland. Data selection for the life cycle modelling of concrete in this EPD uses both specific data from Roadstone for materials, processes, fuels and transport; data for cement from CEMBUREAU; and in some cases, generic background data (for upstream processes)[1].

For life cycle modelling of the considered products, the verified GCCA online tool for EPDs of concrete and cement is used, version 3.1 (which includes the use of ecoinvent data v3.5).

The life cycle assessment in the tool has been implemented in compliance with EN 15804:2012+A2:2019, the General Programme Instructions for the International EPD® System, the product category rules PCR 2019:14 (version 1.1 date 05.02.2021) "Construction products" and PCR 2019:14- c-PCR-001 (version date 20.12.2019) "Cement and building limes (EN 16908:2017)" and PCR 2019:14-c-PCR-003 (version date 20.12.2019) "Concrete and concrete elements" (EN 16757:2017).

Onsite Storage

The following conditions were inputted to the tool to allow the recarbonation due to storage onsite during the production stage (A3) to be calculated:

- Storage duration of 1 month.
- Units stacked three high.
- Sheltered conditions.

Waste Produced

In the Gooig paving plant, a very small amount of non-conforming products is inevitably produced. These are crushed and used as input material for future products of the same type, therefore no waste leaves the site. As the products included in the EPD are the only products produced at the Gooig facility, rejects are recycled back into paving/walling products only, rather than generic products.

End of Life Assumptions

As the Demolition of the building structure (module C1) goes beyond the visibility of the producer, the data is imposed and not modifiable. The GCCA tool V3.1 calculation is based on the volume of concrete per declared unit and the concrete density provided in the 'Product description'.

As the transport of the demolished precast element from the demolition site to the waste processing site (module C2) goes beyond the visibility of the producer, the data is imposed and not modifiable. The average transport distance is set to 50. The GCCA tool V3.1 calculation is based on the volume of concrete per declared unit and the concrete density provided in the 'Product description'.

As the waste processing (module C3) go beyond the producer's visibility, the data is imposed and not modifiable. Table 3 of the Irish Green Building Council (IGBC) report on Product Category Rules : Part A Implementation and use of I.S. EN 15804 and CEN TR 16970:2016 in Ireland – Draft Version 2.0 Date - 01/07/2020 states that the proportion of concrete, bricks, tiles and similar products recovered or recycled

[1] All generic background data was provided by GCCA EPD tool v3.1, except for the electricity mix, which was taken from www.seai.ie

is 100%. This value is based on statistics for Ireland for 2017 collected by the EPA. Therefore, the recycling rate utilised for all products was 100%.

The GCCA Tool V3.1 calculations for Disposal (module C4) is based on the recycling rate defined in C3 and on the quantities of the respective materials. As these processes go beyond the producer's visibility, the data is imposed and not modifiable. For landfill recarbonation the 'Default value' approach, which is based on default choices and is applicable when no information is available about concrete disposal was utilised.

Benefits and Loads

The quantity of recycled concrete is based on the volume of concrete per declared unit and the concrete density provided in the 'Product description' within the GCCA Tool V3.1.

AVERAGES AND VARABILITY

Primary data represents the manufacturing of products within each of the four product groups outlined. The data was used to calculate average impacts for the products within each product group. The primary data was averaged by calculating a weighed average of the products consumption of raw materials, energy and production of wastes. The production amount mass shares per each product was used in the weighting.

ENVIRONMENTAL IMPACT DATA

60mm PAVING PRODUCTS

CORE ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	1.56E+01	5.40E-01	4.96E-01	3.22E-01	0.00E+00	0.00E+00
GWP-fos	kg $CO_{2\ eq.}$	1.56E+01	5.39E-01	4.95E-01	3.20E-01	0.00E+00	-1.02E+00
GWP-bio	kg $CO_{2\ eq.}$	5.44E-03	9.63E-05	3.64E-04	1.39E-03	0.00E+00	-1.01E+00
GWP-luc	kg $CO_{2\ eq.}$	1.90E-03	6.80E-05	2.95E-04	1.06E-03	0.00E+00	-4.08E-03
ODP	kg $CFC_{11\ eq.}$	5.99E-07	9.74E-08	8.56E-08	2.68E-08	0.00E+00	-1.77E-03
AP	mol H+ eq.	5.02E-02	5.65E-03	2.32E-03	2.84E-03	0.00E+00	-6.92E-08
EP-fw	kg $PO_{4\ eq.}$	3.02E-03	7.40E-05	2.08E-04	6.77E-04	0.00E+00	-7.18E-03
EP-fw*	kg P eq.	9.84E-04	2.41E-05	6.80E-05	2.21E-04	0.00E+00	-1.30E-03
EP-mar	kg $N_{eq.}$	6.42E-03	2.00E-06	5.03E-06	1.53E-05	0.00E+00	-4.25E-04
EP-ter	mol $N_{eq.}$	1.43E-01	2.67E-02	6.46E-03	5.30E-03	0.00E+00	-2.75E-05
POCP	kg $NMVOC_{eq.}$	4.77E-02	7.33E-03	2.13E-03	1.49E-03	0.00E+00	-1.79E-02
ADPE*	kg $Sb_{eq.}$	8.50E-06	1.60E-07	8.98E-07	3.31E-07	0.00E+00	-4.54E-03
ADPF*	MJ	1.01E+02	7.72E+00	7.32E+00	4.64E+00	0.00E+00	-1.16E-05
WDP	m^3 eq.	5.11E+00	4.60E-02	6.58E-02	7.73E-02	0.00E+00	-1.03E+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: 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-A3	C1	C2	C3	C4	D
PERE	MJ	1.11E+01	4.55E-02	1.90E-01	6.03E-01	0.00E+00	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-9.53E-01
PERT	MJ	1.11E+01	4.55E-02	1.90E-01	6.03E-01	0.00E+00	0.00E+00
PENRE	MJ	1.08E+02	8.27E+00	8.05E+00	5.87E+00	0.00E+00	-9.53E-01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.24E+01
PENRT	MJ	1.08E+02	8.27E+00	8.05E+00	5.87E+00	0.00E+00	0.00E+00
SM	kg	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.24E+01
RSF	MJ	8.27E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	1.12E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW	m^3	2.09E-01	1.20E-03	2.03E-03	3.14E-03	0.00E+00	0.00E+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-A3	C1	C2	C3	C4	D
HWD	kg	4.23E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	2.63E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	1.13E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ENVIRONMNETAL INFORMATION DESCRIBING OUTPUT FLOWS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	1.33E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	4.14E-07	1.47E-07	4.43E-08	2.54E-08	0.00E+00	0.00E+00
IRP	kBq U235 eq.	2.56E+02	3.65E+01	4.35E+01	5.92E+01	0.00E+00	-8.43E-08
GWP-GHG	kg CO2 eq.	1.56E+01	5.40E-01	4.96E-01	3.22E-01	0.00E+00	0.00E+00

***PM** = potential incidence of disease due to pm emissions; **IRP** = potential human exposure efficiency relative to U235; **GWP-GHG** = The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP-TOT indicator.*

80mm PAVING PRODUCTS

CORE ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	2.04E+01	7.20E-01	6.57E-01	4.24E-01	0.00E+00	0.00E+00
GWP-fos	kg $CO_{2\ eq.}$	2.03E+01	7.19E-01	6.56E-01	4.21E-01	0.00E+00	-1.35E+00
GWP-bio	kg $CO_{2\ eq.}$	7.07E-03	1.28E-04	4.81E-04	1.84E-03	0.00E+00	-1.34E+00
GWP-luc	kg $CO_{2\ eq.}$	2.21E-03	9.07E-05	3.91E-04	1.41E-03	0.00E+00	-5.40E-03
ODP	kg $CFC_{11\ eq.}$	7.19E-07	1.30E-07	1.13E-07	3.55E-08	0.00E+00	-2.34E-03
AP	mol H+ eq.	6.47E-02	7.54E-03	3.07E-03	3.76E-03	0.00E+00	-9.16E-08
EP-fw	kg $PO_{4\ eq.}$	3.49E-03	9.87E-05	2.76E-04	8.97E-04	0.00E+00	-9.51E-03
EP-fw*	kg P eq.	1.14E-03	3.22E-05	9.00E-05	2.93E-04	0.00E+00	-1.72E-03
EP-mar	kg $N_{eq.}$	9.20E-03	2.67E-06	6.66E-06	2.03E-05	0.00E+00	-5.63E-04
EP-ter	mol $N_{eq.}$	1.88E-01	3.56E-02	8.56E-03	7.02E-03	0.00E+00	-3.64E-05
POCP	kg $NMVOC_{eq.}$	6.37E-02	9.78E-03	2.83E-03	1.98E-03	0.00E+00	-2.37E-02
ADPE*	kg $Sb_{eq.}$	1.00E-05	2.13E-07	1.19E-06	4.38E-07	0.00E+00	-6.01E-03
ADPF*	MJ	1.31E+02	1.03E+01	9.70E+00	6.14E+00	0.00E+00	-1.53E-05
WDP	m^3 eq.	5.85E+00	6.13E-02	8.71E-02	1.02E-01	0.00E+00	-1.37E+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: 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-A3	C1	C2	C3	C4	D
PERE	MJ	1.51E+01	6.07E-02	2.52E-01	7.98E-01	0.00E+00	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.26E+00
PERT	MJ	1.51E+01	6.07E-02	2.52E-01	7.98E-01	0.00E+00	0.00E+00
PENRE	MJ	1.40E+02	1.10E+01	1.07E+01	7.78E+00	0.00E+00	-1.26E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.64E+01
PENRT	MJ	1.40E+02	1.10E+01	1.07E+01	7.78E+00	0.00E+00	0.00E+00
SM	kg	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.64E+01
RSF	MJ	1.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	1.46E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW	m^3	2.64E-01	1.59E-03	2.69E-03	4.15E-03	0.00E+00	0.00E+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-A3	C1	C2	C3	C4	D
HWD	kg	6.09E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	3.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	1.62E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ENVIRONMNETAL INFORMATION DESCRIBING OUTPUT FLOWS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	1.76E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	5.20E-07	1.96E-07	5.87E-08	3.36E-08	0.00E+00	0.00E+00
IRP	kBq U235 eq.	2.82E+02	4.86E+01	5.76E+01	7.84E+01	0.00E+00	-1.12E-07
GWP-GHG	kg CO2 eq.	2.04E+01	7.20E-01	6.57E-01	4.24E-01	0.00E+00	0.00E+00

***PM** = potential incidence of disease due to pm emissions; **IRP** = potential human exposure efficiency relative to U235; **GWP-GHG** = The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP-TOT indicator.*

BORDEUAX WALLING PRODUCTS (300mm)

CORE ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	7.87E+01	2.70E+00	2.53E+00	1.65E+00	0.00E+00	0.00E+00
GWP-fos	kg $CO_{2\ eq.}$	7.87E+01	2.70E+00	2.53E+00	1.64E+00	0.00E+00	-5.19E+00
GWP-bio	kg $CO_{2\ eq.}$	2.77E-02	4.81E-04	1.85E-03	7.11E-03	0.00E+00	-5.16E+00
GWP-luc	kg $CO_{2\ eq.}$	1.06E-02	3.40E-04	1.51E-03	5.41E-03	0.00E+00	-2.08E-02
ODP	kg $CFC_{11\ eq.}$	2.95E-06	4.87E-07	4.37E-07	1.37E-07	0.00E+00	-9.03E-03
AP	mol H+ eq.	2.58E-01	2.83E-02	1.18E-02	1.45E-02	0.00E+00	-3.53E-07
EP-fw	kg $PO_{4\ eq.}$	1.74E-02	3.70E-04	1.06E-03	3.46E-03	0.00E+00	-3.66E-02
EP-fw*	kg P eq.	5.68E-03	1.21E-04	3.47E-04	1.13E-03	0.00E+00	-6.64E-03
EP-mar	kg $N_{eq.}$	2.94E-02	1.00E-05	2.56E-05	7.81E-05	0.00E+00	-2.17E-03
EP-ter	mol $N_{eq.}$	7.18E-01	1.33E-01	3.30E-02	2.71E-02	0.00E+00	-1.40E-04
POCP	kg $NMVOC_{eq.}$	2.35E-01	3.67E-02	1.09E-02	7.63E-03	0.00E+00	-9.14E-02
ADPE*	kg $Sb_{eq.}$	4.57E-05	7.98E-07	4.58E-06	1.69E-06	0.00E+00	-2.31E-02
ADPF*	MJ	4.94E+02	3.86E+01	3.74E+01	2.36E+01	0.00E+00	-5.91E-05
WDP	m^3 eq.	3.25E+01	2.30E-01	3.36E-01	3.95E-01	0.00E+00	-5.28E+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: 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-A3	C1	C2	C3	C4	D
PERE	MJ	5.41E+01	2.28E-01	9.70E-01	3.08E+00	0.00E+00	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.86E+00
PERT	MJ	5.41E+01	2.28E-01	9.70E-01	3.08E+00	0.00E+00	0.00E+00
PENRE	MJ	5.32E+02	4.13E+01	4.11E+01	3.00E+01	0.00E+00	-4.86E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.32E+01
PENRT	MJ	5.32E+02	4.13E+01	4.11E+01	3.00E+01	0.00E+00	0.00E+00
SM	kg	5.65E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.32E+01
RSF	MJ	4.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	5.83E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW	m^3	1.17E+00	5.98E-03	1.04E-02	1.60E-02	0.00E+00	0.00E+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-A3	C1	C2	C3	C4	D
HWD	kg	1.93E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	1.21E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	5.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ENVIRONMNETAL INFORMATION DESCRIBING OUTPUT FLOWS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	6.78E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	2.08E-06	7.34E-07	2.26E-07	1.30E-07	0.00E+00	0.00E+00
IRP	kBq U235 eq.	1.42E+03	1.82E+02	2.22E+02	3.02E+02	0.00E+00	-4.30E-07
GWP-GHG	kg CO2 eq.	7.87E+01	2.70E+00	2.53E+00	1.65E+00	0.00E+00	0.00E+00

***PM** = potential incidence of disease due to pm emissions; **IRP** = potential human exposure efficiency relative to U235; **GWP-GHG** = The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP-TOT indicator.*

KELTSTONE WALLING PRODUCTS (90mm)

CORE ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	1.96E+01	8.09E-01	6.45E-01	4.25E-01	0.00E+00	0.00E+00
GWP-fos	kg $CO_{2\ eq.}$	1.96E+01	8.09E-01	6.44E-01	4.22E-01	0.00E+00	-1.32E+00
GWP-bio	kg $CO_{2\ eq.}$	7.02E-03	1.44E-04	4.73E-04	1.81E-03	0.00E+00	-1.31E+00
GWP-luc	kg $CO_{2\ eq.}$	2.64E-03	1.02E-04	3.84E-04	1.38E-03	0.00E+00	-5.31E-03
ODP	kg $CFC_{11\ eq.}$	7.40E-07	1.46E-07	1.11E-07	3.49E-08	0.00E+00	-2.30E-03
AP	mol H+ eq.	6.39E-02	8.48E-03	3.01E-03	3.69E-03	0.00E+00	-9.00E-08
EP-fw	kg $PO_{4\ eq.}$	4.07E-03	1.11E-04	2.71E-04	8.81E-04	0.00E+00	-9.34E-03
EP-fw*	kg P eq.	1.33E-03	3.62E-05	8.84E-05	2.87E-04	0.00E+00	-1.69E-03
EP-mar	kg $N_{eq.}$	7.99E-03	3.00E-06	6.53E-06	1.99E-05	0.00E+00	-5.52E-04
EP-ter	mol $N_{eq.}$	1.79E-01	4.00E-02	8.41E-03	6.89E-03	0.00E+00	-3.58E-05
POCP	kg $NMVOC_{eq.}$	5.99E-02	1.10E-02	2.77E-03	1.94E-03	0.00E+00	-2.33E-02
ADPE*	kg $Sb_{eq.}$	1.15E-05	2.39E-07	1.17E-06	4.30E-07	0.00E+00	-5.90E-03
ADPF*	MJ	1.27E+02	1.16E+01	9.52E+00	6.03E+00	0.00E+00	-1.51E-05
WDP	m^3 eq.	8.15E+00	6.90E-02	8.55E-02	1.01E-01	0.00E+00	-1.34E+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: 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-A3	C1	C2	C3	C4	D
PERE	MJ	1.42E+01	6.83E-02	2.47E-01	7.84E-01	0.00E+00	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.24E+00
PERT	MJ	1.42E+01	6.83E-02	2.47E-01	7.84E-01	0.00E+00	0.00E+00
PENRE	MJ	1.36E+02	1.24E+01	1.05E+01	7.64E+00	0.00E+00	-1.24E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.61E+01
PENRT	MJ	1.36E+02	1.24E+01	1.05E+01	7.64E+00	0.00E+00	0.00E+00
SM	kg	1.16E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.61E+01
RSF	MJ	1.04E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	1.40E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW	m^3	3.02E-01	1.79E-03	2.64E-03	4.08E-03	0.00E+00	0.00E+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-A3	C1	C2	C3	C4	D
HWD	kg	5.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	3.27E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	1.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ENVIRONMNETAL INFORMATION DESCRIBING OUTPUT FLOWS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	1.73E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	5.04E-07	2.20E-07	5.76E-08	3.30E-08	0.00E+00	0.00E+00
IRP	kBq U235 eq.	3.26E+02	5.47E+01	5.66E+01	7.70E+01	0.00E+00	-1.10E-07
GWP-GHG	kg CO2 eq.	1.96E+01	8.09E-01	6.45E-01	4.25E-01	0.00E+00	0.00E+00

***PM** = potential incidence of disease due to pm emissions; **IRP** = potential human exposure efficiency relative to U235; **GWP-GHG** = The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP-TOT indicator.*

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.

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 harmonised test methods according to the provisions of the respective technical committees for European product standards are not yet available.

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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