`Statement of Verification

BREG EN EPD No.: 000472 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Spanish Slate Quarries UK Ltd

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

Riverstone Slate

Company Address

Spanish Slate Quarries UK Ltd
301 Elveden Road
London
NW10 7SS
United Kingdom

EXCLUSIVELY **NATURAL SLATE**

Signed for BRE Global Ltd	Emma Baker Operator	27 January 2023 Date of this Issue
27 January 2023 Date of First Issue		26 January 2028 Expiry Date

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Environmental Product Declaration

EPD Number: 000472

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Spanish Slate Quarries UK Ltd 301 Elveden Road London NW10 7SS United Kingdom	LCA consultant: Flavie Lowres Tool: BRE LINA v2.0
Declared Unit	**Applicability/Coverage**
1 wooden crate containing 1,223 kg of slates (or 800 approximately slates per crates). On average, 21 slates are required per m2 of roof.	Product specific
EPD Type	**Background database**
Cradle to Gate with options	ecoinvent v3.2

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Pat Hermon
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☐	☑	☑	☑	☐	☐	☐	☑	☐	☐	☑		☐

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Spanish Slate Quarries UK Ltd
Ruta 7 Km. 781.5
Juana Koslay
San Luis
Republic of Argentina

Construction Product

Product Description

Phyllite is a type of metamorphic rock, that forms when shale is subjected to incredible heat and pressure for hundreds of millions of years underground. And that is what makes it one of the hardest, toughest, longest-lasting roofing materials in the world. The resulting material is a natural stone that is perfectly suited to roofing, flooring and cladding.

Effective designs of a slate roof must consider several interrelated factors including site exposure, the pitch of the roof, the type of slate selected and the slate lap. Riverstone slate used with low- pitch system would be able to accommodate as low as 17.5 degree pitch roof depending on a case.

Riverstone Phyllite is a particularly high-density rock, meaning its hardwearing surface will not take on general atmospheric dirt or scar and pit as a result of acid rain in more polluted environments. It is often used internally where its rich colours create a striking effect and where its riven texture provides a floor with a natural non-slip finish. It can be used effectively for many other internal functions, including wall and swimming pool cladding, window sills and work tops.

Riverstone is also a good natural paving material and is ideal for external flooring and hard landscaping in both residential and commercial environments. The hard minerals offer good resistance to abrasion and ensure hardly any maintenance problems when used for landscaping. Supplied in a variety of thicknesses, Riverstone is suitable for patios, driveways and sidewalks.

Riverstone can be produced in a variety of different shapes, sizes and thicknesses suitable for interior and exterior wall applications. Rustic walling is often a by-product of the main production process. The varied colours and rustic nature of these stones recreate the appearance of the quarry in its original form.

Technical Information

Property	Value, Unit			
Format	Rectangular			
Deviation from declared length	0%			
Deviation from declared width	0%			
Deviation from rectangularity	≤ +/- 0.1 %			
Deviation from straightness of edges	0.1%			
Deviation from flatness	0.04%			
Nominal thickness and variation	5.3 mm, +/- 12%			
Characteristic Module of Rupture (MPa)	Parallel	51.67 MPa	Perpendicular	27.21 MPa
Mean MoR	Parallel	65.85 MPa	Perpendicular	37.40 MPa
Water absorption	W1 (0.32%)			
Thermal cycle test	T1			
Carbonate content	0.0%			
Sulfur dioxide exposure tests (20% carbonate)	S1			
Non-carbonate carbon content	0.1%			
External fire performance	Deemed to satisfy			
Reaction to fire	Deemed to satisfy class A1			
Release of dangerous substances	None in conditions of use as roofing or external cladding			

Main Product Contents

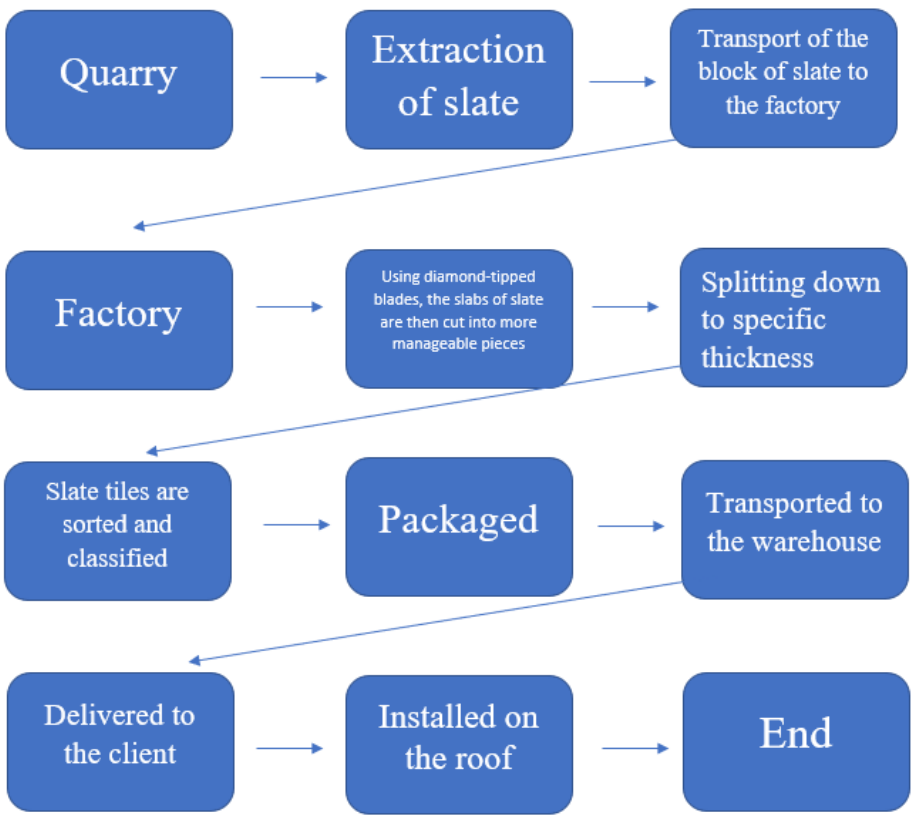
Material/Chemical Input	%
Natural slate	100

Manufacturing Process

Riverstone phyllite slabs are extracted from the mountain using large quarrying machinery. The slabs of stone are transported to the factory where they are sawn into blocks, a little larger than the intended final size. These blocks are then split into the thinnest possible sheets. Each sheet is then trimmed to the size required, has all four edges dressed and two nail holes drilled at the required headlap. Finally, the slates are inspected, counted and stacked into pallets.

Riverstone phyllite is manufactured by skilled factory and quarry operatives, supervised by a Factory and Quarry Manager respectively. Both facilities uphold The United Nations Universal Declaration of Human Rights, which include the right to life, liberty and security; equal rights to men and women; the right to protection under the law and against discrimination. No child labour of any kind is involved in the manufacturing process.

Process flow diagram



Life Cycle Assessment Calculation Rules

Declared unit description

1 wooden crate containing 1,223 kg of slates (or 800 approximately slates per crates). On average, 21 slates are required per m2 of roof.

System boundary

This is a cradle-to-gate with options EPD, reporting all production life cycle stages (modules A1 to A3, A4-A5, B2-B4, C1 and C4) in accordance with EN 15804:2012+A1:2013.

Data sources, quality and allocation

Specific primary data derived from the Riverstone natural slate production process and quarry in San Luis, Republic of Argentina, have been modelled using BRE LINA v2.0 and the BRE LINA database v2.0.89..In accordance with the requirements of EN 15804, the most current available data has been used. The manufacturer-specific data from Spanish Slate Quarries UK Ltd covers a period of one year (01/01/19 – 31/12/19). Secondary data has been obtained for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e. raw material production) from the ecoinvent 3.2 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN 15804. Riverstone is the only product processed at the San Luis factory, so 100% of the inputs are allocated to the product.

Quality Level	Geographical representativeness	Technical representativeness	Time representativeness
Very Good	Data from area under study.	Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e. identical technology).	n/a
Fair	n/a	n/a	There is approximately 6-7 years between the ecoinvent LCI reference year, and the time period for which the LCA was undertaken.

The quality level of geographical and technical representativeness is therefore Very Good. The quality level of time representativeness is Fair as the background LCI datasets are based on ecoinvent v3.2 which was compiled in 2015. Therefore, there is approximately 6-7 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

Specific Argentinian datasets have been selected from the ecoinvent LCI for this LCA. For gird electricity, the following dataset was used: “electricity, Argentina (kWh) (Ecoinvent 3.6). Primary quantity data for all processes from both the quarry and the factory were obtained.

Cut-off criteria

All raw materials, ancillary materials, packaging materials, transportation, process energy, general energy, water use/discharge and production waste have been included where appropriate. Only direct emissions to air, water and soil, which are not measured, have been excluded.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	2.75E+02	5.04E-05	2.10E+00	5.26E-01	3.62E-01	9.72E-05	3.96E+03
	Transport	A2	1.02E+02	1.88E-05	3.41E-01	9.01E-02	5.95E-02	2.69E-04	1.54E+03
	Manufacturing	A3	1.91E+02	4.53E-05	1.43E+00	3.90E-01	2.20E-01	4.64E-04	4.76E+03
	Total (of product stage)	A1-3	5.68E+02	1.15E-04	3.87E+00	1.01E+00	6.42E-01	8.30E-04	1.03E+04
Installation stage	Transport to site	A4	2.32E+02	3.86E-05	4.19E+00	4.80E-01	3.05E-01	1.67E-04	3.34E+03
	Installation	A5	1.74E+02	1.20E-04	7.23E+00	4.63E+00	4.24E-01	3.11E-02	2.72E+03
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	1.89E+01	2.68E-06	1.10E-01	3.10E-02	2.06E-02	1.14E-04	5.35E+02
	Repair	B3	1.30E+00	3.44E-07	9.11E-03	2.99E-03	1.52E-03	1.84E-06	3.20E+01
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	MND	MND	MND	MND	MND	MND	MND
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	3.80E+00	1.00E-06	2.66E-02	8.73E-03	4.42E-03	5.39E-06	9.33E+01

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	3.03E+01	5.56E-05	3.03E+01	3.91E+03	0.00E+00	3.91E+03
	Transport	A2	2.06E+01	7.62E-05	2.06E+01	1.53E+03	0.00E+00	1.53E+03
	Manufacturing	A3	9.88E+02	9.46E-01	9.89E+02	4.88E+03	0.00E+00	4.88E+03
	Total (of product stage)	A1-3	1.04E+03	9.46E-01	1.04E+03	1.03E+04	0.00E+00	1.03E+04
Installation stage	Transport to site	A4	7.63E+01	9.95E-05	7.63E+01	3.40E+03	0.00E+00	3.40E+03
	Installation	A5	4.14E+02	9.59E-02	4.14E+02	2.99E+03	0.00E+00	2.99E+03
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	1.25E+01	1.25E-04	1.25E+01	5.38E+02	0.00E+00	5.38E+02
	Repair	B3	9.76E-01	2.66E-06	9.76E-01	3.22E+01	0.00E+00	3.22E+01
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	MND	MND	MND	MND	MND	MND
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	2.85E+00	7.79E-06	2.85E+00	9.38E+01	0.00E+00	9.38E+01

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	7.00E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	3.34E-01
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	6.27E+00
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	7.30E+00
Installation stage	Transport to site	A4	0.00E+00	0.00E+00	0.00E+00	8.00E-01
	Installation	A5	0.00E+00	0.00E+00	0.00E+00	4.49E+00
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	2.20E-01
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	3.60E-02
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	MND	MND	MND	MND
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	1.05E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	2.52E+00	2.68E+00	2.84E-02
	Transport	A2	6.46E-01	7.18E+01	1.06E-02
	Manufacturing	A3	2.61E+00	1.09E+04	2.10E-02
	Total (of product stage)	A1-3	5.78E+00	1.10E+04	6.00E-02
Installation stage	Transport to site	A4	1.41E+00	3.08E+01	2.28E-02
	Installation	A5	3.03E+01	6.21E+02	1.06E-02
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	4.09E-01	3.42E+00	1.00E-03
	Repair	B3	2.40E-02	1.27E+02	1.98E-04
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	MND	MND	MND
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	7.02E-02	3.68E+02	5.77E-04

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation stage	Transport to site	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Installation	A5	2.50E+01	0.00E+00	0.00E+00	0.00E+00
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	2.02E+01	0.00E+00	0.00E+00
	Transport	C2	MND	MND	MND	MND
	Waste processing	C3	8.56E+02	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – transport to site	The average distance travelled by the product to a point of use is 13,890 km by boat (from Argentina to the UK) and then 200 km by road		
	Fuel transoceanic freight ship	Litres	1.3
	Distance	km	13,890
	Capacity utilisation (incl empty returns)	%	50
	Bulk density of transported product	Kg/m2	17.1
A5 – Installation	Installation is done with the use of coper nails. The slates are fixed to the roof with hammer. In practice there are many ways in which slate breaks these include mineralogical veins, natural faults, over-blasting in the quarry, damage due to delivery, handling on site and walking on the slates after installation. For any of these reasons there has been an industry set allowance for natural wastage, this is 5%		
	Wastage rate	%	5
	Nails for installation	kg	20.25 kg
B2 – Maintenance	Slate roofs supplied by Spanish Slate Quarries UK Ltd. and fixed in accordance with BS 5534 are maintenance free, however the following guidance is given for cleaning: Algae or moss may be removed by either water based algicidal or herbicidal products used in accordance with manufacturer's instructions. Mortar staining can be removed using proprietary brick cleaners etc. After each of the above cleaning procedures we recommend thorough rinsing		
	Use of water for cleaning 1 functional unit	litres	31.75
	Use of detergent for cleaning 1 functional unit	litres	6.35
B3 – Repair	Slate roofs supplied by Spanish Slate Quarries UK Ltd. and fixed in accordance with BS 5534 however, slates may get damaged when other work is done on the roof. It was therefore assumed that 1% of the roof slates were replaced every 10 years		
	repair every 10 years	%	1
B4 – Replacement	No replacement is required during the study period of 100 years		
	No replacement	N/A	0
C1 – Deconstruction	the process for deconstruction is manual and there is no need for energy of water. the only waste is the disposal of the nails		
	Amount of nails disposed and recycled	Kg	20.25
C3 – Waste processing	it has been assumed that 70% of the slates are reused		
	Slates to reuse	%	70
C4 – Disposal	it has been assumed that 30% of the slates are landfilled		
	Slates to landfill	%	30
Reference service life	100 years		

Additional information

Interpretation

The bulk of the environmental impacts and primary energy demand are attributed to the extraction process of the slate at the quarry, covered by information modules A1-A3 of EN15804:2012+A1:2013.

References

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