looper

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Scottish Whinstone kerbs, setts, and paving from Tradstocks

TRADSTOCKS
Scottish Stone

Programme Information

Product Category Rules (PCR): 2019:14 Version 1.0. 2019-12-20. EN 15804

LCA conducted by: Dr Shashwat Ganguly, Looper Tech Ltd

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Company information

Owner of the EPD:
Tradstocks Ltd
Dunaverig
Thornhill
Stirling
FK8 3QW

Contact:
Peter Stewart

Description of the organisation:
Tradstocks was established in 1992 supplying a range of new and reclaimed natural stone materials for building and landscaping projects. The company has grown and evolved into one of the UK's largest specialist processors and suppliers of dimensional stone.

Currently providing skilled jobs for 65 people across two processing plants. Tradstocks have full in-house capabilities from procurement of raw materials, through production to delivery to project locations using purpose-built vehicles.

Tradstocks have focused on pioneering the processing of Scottish Whinstone, effectively restarting an historic industry working this robust, durable and attractive material into a range of products for streetscapes throughout the UK. Tradstocks have achieved this by investing heavily in modern facilities and equipment in order to offer a range of high-quality products for the hard landscaping sector.

Name and location of production site(s):
Site 1:
Dunaverig
Thornhill
Stirling
FK8 3QW

Site 2:
Five Sisters Business Park
Westwood
West Calder
EH55 8PN

Site 3 (Quarry):
Bonnington Quarry, Ratho
Northfield Quarry, Denny
Blackridge

Product Information

Product name:

- Tradstocks Scottish Whinstone Kerbstone
- Tradstocks Scottish Whinstone Sett Paving
- Tradstocks Scottish Whinstone Slab Paving

Product identification:

- BS EN 1341 Slabs of natural stone for external paving
- BS EN 1342 Setts of natural stone for external paving
- BS EN 1343 Kerbs of natural stone for external paving

Product description:

Whinstone is a classic dark grey stone that has been used in Scotland for many centuries. The rock was formed during the Carboniferous period, around 300 million years ago. It consists of Plagioclase Feldspar, Biotite and Clinopyroxene.

Essential characteristics	Performance
Apparent density	2910 kg/m3
Compressive strength	145.0 Mpa
Flexural strength: 3point	26.5 Mpa
Reaction to fire:	NA
Open porosity:	0.50
Water absorption by capillarity:	0.25
Shear bond strength	NA
Frost Resistance Identification. Max 56 cycles	Pass
Thermal Conductivity	NA
Acid Immersion Test	NA
Slip Resistance	71 (wet) 89 (dry)

Typical Usage:
Quarried from Central Scotland, between Edinburgh and Glasgow, its strength and durability make it most popular for kerbs setts and paving. It is often used for other purposes such as benches, bollards, planters and memorials

Bulk Density:
2910 K/m3

Block Size:
Generally, in large boulders from 5-15 tonnes weight

Geological Type:
Quartz Dolerite – see product description

Geographical scope:
Central Belt, Scotland

LCA Information

Declared Unit	1 tonne of whinstone products
Time Representativeness	2023
Database(s) and LCA Software Used	Ecoinvent 3.10, Looper
Description of system boundaries	Cradle to gate (A1-A3) + End of life modules (C1-C4) + Module D

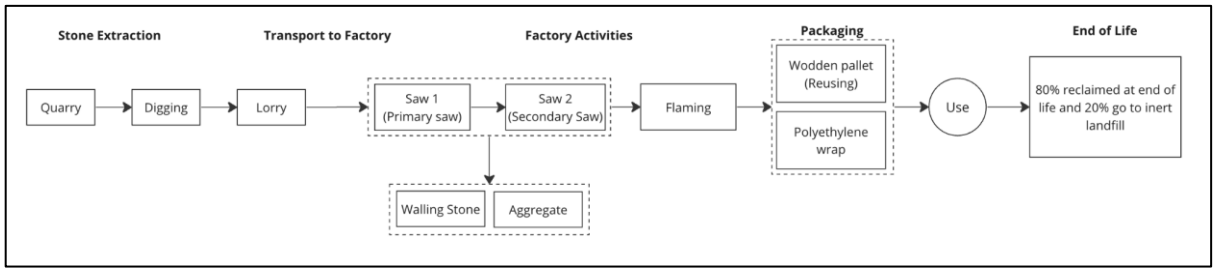

Figure 1: Process map of whinstone setts and kerbs production over the lifetime of the products

A1: Raw Material Supply

Raw material, in the form of large boulders or quarry blocks are sourced on a campaign basis from several established quarries within the central belt (midland valley) of Scotland. Using the combination of a large excavator (with hydraulic hammer attachment if necessary), articulated dump truck and wheeled loader, individual stones for processing

are selected by size and shape then inspected for quality prior to being loaded for transportation to Tradstocks processing facilities.

A2: Transportation

Transportation involves loading between 2 and 4 of previously selected large stones onto purpose built, steel bodied tipping trailers for the short journey to the processing site.
44 tonne gross weight articulated vehicles are used to maximise the payload of 25 tonne and minimise the number of road journeys required.

A3: Manufacturing

Processing the stone involves cutting it into dimensioned/rectangular units with six sawn sides. Industrial diamond tipped blades and/or wire is used to slice through the stone producing a smooth cut face. The faces that will be visible or trafficked then receive a textured finish by means of blistering with a high temperature flame gun or mechanical method.

It as a relatively low energy use process as the stone itself was formed many millions of years ago. All the factory is doing is cutting stones down to size and creating a finish to the surface.

Scottish government policy is to maximise renewable power supply. Tradstocks don't have control over the source, but monitor how the power to the factory is generated. From current information it is understood that approximately 40% of the energy consumed for production comes from renewables.

C1: Deconstruction and Demolition

There is no energy use during deconstruction, it is performed with manual work.

C2: Transport

Average distance from the demolition site to the final disposal site is assumed to be 100 km. A >32 tonne truck was assumed to transport the stone.

C3: Waste Processing

Material at the end of life is expected to be reclaimed and used again in construction projects in the future. There is no waste processing as 80% of the stone products are assumed to be directly reclaimed on-site.

C4: Recycle - Disposal

We have assumed that 20% of the products cannot be reclaimed/reused and but can be easily recycled into aggregate. There should be no requirement to landfill.

D: Resource Recovery Stage

Because of the large durability of the rock, blocks are assumed to be reclaimed at the end of the first use to be used in other construction projects. We have assumed that 80% of the blocks can be reclaimed, substituting new stone blocks. The system is credited with the avoided burden of extracting new rock.

More information:

Economic allocation was used to distribute the impacts of mining between whinstone products, walling products and aggregate products.
The stages excluded from the calculations are A4 (transport to construction site), A5 (construction activities), the use stages, B1-B7.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Resource Recovery Stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	UK, EU	UK, EU	UK, EU, Glo	-	-	-	-	-	-	-	-	-	EU, Glo-	EU, Glo	EU, Glo	EU, Glo	EU, Glo
Specific data used	40 - 60%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	1 product			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	1 factory, 1 quarry			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Environmental Impact		Production				End of Life				
Impact Categories	**Unit**	**A1**	**A2**	**A3**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Climate change - Total	kg CO2 eq	4.62E+01	1.34E+01	4.98E+01	1.09E+02	0.00E+00	6.34E-03	0.00E+00	1.93E-04	-6.04E-04
Climate change - Biogenic	kg CO2 eq	4.38E-03	8.83E-03	-1.52E+01	-1.52E+01	0.00E+00	4.17E-06	0.00E+00	1.37E-08	1.40E-06
Climate change – Fossil	kg CO2 eq	4.62E+01	1.34E+01	6.50E+01	1.25E+02	0.00E+00	6.33E-03	0.00E+00	1.93E-04	-6.05E-04
Climate change – Land Use and Land Use Change	kg CO2 eq	4.82E-03	4.46E-03	8.62E-02	9.55E-02	0.00E+00	2.11E-06	0.00E+00	1.90E-08	-1.61E-07
Acidification	mol H+ eq	1.56E-01	2.80E-02	1.86E-01	3.70E-01	0.00E+00	1.32E-05	0.00E+00	1.69E-06	-1.38E-05
Ozone depletion	kg CFC11 eq	6.95E-07	2.67E-07	3.24E-06	4.20E-06	0.00E+00	1.26E-10	0.00E+00	2.79E-12	-8.21E-12
Eutrophication, freshwater	kg P eq	1.51E-03	9.09E-04	8.21E-03	1.06E-02	0.00E+00	4.29E-07	0.00E+00	9.43E-09	-4.45E-08
Eutrophication, marine	kg N eq	6.33E-02	6.71E-03	5.09E-02	1.21E-01	0.00E+00	3.17E-06	0.00E+00	7.61E-07	-4.89E-06
Eutrophication, terrestrial	mol N eq	6.93E-01	7.24E-02	5.65E-01	1.33E+00	0.00E+00	3.42E-05	0.00E+00	8.32E-06	-6.91E-05
Photochemical ozone formation	kg NMVOC eq	2.46E-01	4.65E-02	1.92E-01	4.84E-01	0.00E+00	2.19E-05	0.00E+00	2.52E-06	-1.51E-05
Resource use, minerals and metals	kg Sb eq	1.96E-05	4.47E-05	2.08E-04	2.73E-04	0.00E+00	2.11E-08	0.00E+00	7.08E-11	-1.44E-09
Resource use, fossils	MJ	5.97E+02	1.89E+02	1.86E+03	2.65E+03	0.00E+00	8.91E-02	0.00E+00	2.46E-03	-7.38E-03
Water deprivation potential	m3 depriv.	1.71E+00	9.23E-01	1.88E+01	2.15E+01	0.00E+00	4.36E-04	0.00E+00	6.26E-06	-3.02E-04

Potential environmental impact – additional mandatory and voluntary indicators

Environmental Impact		Production				End of Life				
Impact Categories	**Unit**	**A1**	**A2**	**A3**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP - GHG	kg CO2 eq	4.62E+01	1.34E+01	6.51E+01	1.25E+02	0.00E+00	6.34E-03	0.00E+00	1.93E-04	-6.06E-04

Resource Use

Resource use		Production				End of Life				
Impact Categories	**Unit**	**A1**	**A2**	**A3**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4.11E+00	3.24E+00	5.15E+02	5.22E+02	0.00E+00	1.53E-03	0.00E+00	2.13E-05	-1.43E-04
PERM	MJ	0.00E+00	0.00E+00	1.15E+02	1.15E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.11E+00	3.24E+00	6.30E+02	6.37E+02	0.00E+00	1.53E-03	0.00E+00	2.13E-05	-1.43E-04
PENRE	MJ	5.97E+02	1.89E+02	1.69E+03	2.48E+03	0.00E+00	8.91E-02	0.00E+00	2.46E-03	-7.39E-03
PENRM	MJ	0.00E+00	0.00E+00	1.73E+02	1.73E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.97E+02	1.89E+02	1.86E+03	2.65E+03	0.00E+00	8.91E-02	0.00E+00	2.46E-03	-7.39E-03
SM	MJ	3.14E-01	8.76E-02	3.00E-01	7.02E-01	0.00E+00	4.13E-05	0.00E+00	9.94E-07	-3.27E-06
RSF	MJ	7.44E-04	1.11E-03	2.68E-02	2.87E-02	0.00E+00	5.23E-07	0.00E+00	2.70E-09	-1.36E-07
NRSF*	MJ									
FW	m^3	4.29E-02	2.54E-02	4.60E-01	5.29E-01	0.00E+00	1.20E-05	0.00E+00	1.65E-07	-7.09E-06

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 (excluded from the study due to background data unavailability); FW = Use of net fresh water

Waste Flows

Waste flows		Production				End of Life				
Impact Categories	**Unit**	**A1**	**A2**	**A3**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	8.44E-01	2.75E-01	2.58E+00	3.70E+00	0.00E+00	1.30E-04	0.00E+00	3.54E-06	-1.90E-05
Non-hazardous waste disposed	kg	1.09E+01	5.82E+00	6.00E+01	7.67E+01	0.00E+00	2.74E-03	0.00E+00	5.61E-05	-3.01E-04
Radioactive waste disposed	kg	6.97E-05	6.09E-05	1.26E-02	1.27E-02	0.00E+00	2.87E-08	0.00E+00	2.90E-10	-1.32E-09

Output Flows

Output flows		Production				End of Life				
Impact Categories	**Unit**	**A1**	**A2**	**A3**	**A1 – A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use*	kg									
Material for recycling	kg	1.30E-05	1.22E-05	3.39E-05	5.91E-05	0.00E+00	5.74E-09	0.00E+00	3.83E-11	-3.21E-10
Materials for energy recovery	kg	1.73E-03	1.43E-03	7.69E-02	8.01E-02	0.00E+00	6.77E-07	0.00E+00	7.58E-09	-1.02E-07
Exported energy, electricity	MJ	2.86E-02	3.25E-02	9.67E+00	9.73E+00	0.00E+00	1.53E-05	0.00E+00	1.17E-07	-5.02E-07
Exported energy, thermal	MJ	1.70E-02	4.70E-02	1.52E-01	2.16E-01	0.00E+00	2.22E-05	0.00E+00	6.36E-08	-4.82E-07

*Components for re-use data is excluded from the study due to background data unavailability

References

General Programme Instructions of the International EPD System. Version 3.0

EN ISO 9001/ Quality Management Systems - Requirements

EN ISO 14001/ Environmental Management Systems - Requirements

ISO 45001/ Occupational Health & Safety Management System - Requirements

ISO 14020:2000/ Environmental Labels and Declarations - General principles

EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

ISO 14025/ DIN EN ISO 14 0 25:20 09 -11: Environmental labels and declarations - Type Ill environmental declarations - Principles and procedures

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Tra, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limtra AB, SS AB, The International EPD System, 2019:14 Version 1.1 DATE 2019-12-20

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