



Registration Number: DAP 003:2022

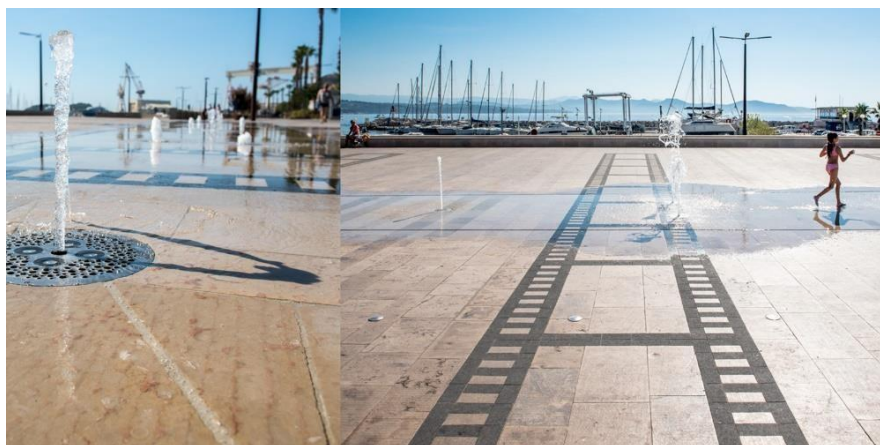


## Setts, cobblestone, slabs and kerbs for external paving and edging in natural limestone

ISSUE DATE: 17/01/2022

VALID UNTIL: 16/01/2027

**SOLANCIS — SOCIEDADE EXPLORADORA DE PEDREIRAS, S.A.**



VERSION 1.1. EDITION JULY 2015



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## GENERAL INFORMATION


### 1.1. The DAPHabitat System

<b>Program operator:</b>	Associação Plataforma para a Construção Sustentável <a href="http://www.centrohabitat.net">www.centrohabitat.net</a> <a href="mailto:centrohabitat@centrohabitat.net">centrohabitat@centrohabitat.net</a>	
<b>Address:</b>	Departamento Engenharia Civil Universidade de Aveiro 3810-193 Aveiro	
<b>Email address:</b>	<a href="mailto:deptechnico@centrohabitat.net">deptechnico@centrohabitat.net</a>	
<b>Telephone number:</b>	(+351) 234 401 576	
<b>Website:</b>	<a href="http://www.daphabitat.pt">www.daphabitat.pt</a>	
<b>Logo:</b>		



### 1.2. EPD owner

<b>Name of the owner:</b>	SOLANCIS — Sociedade Exploradora de Pedreiras, S.A.
<b>Production site:</b>	Rua da Sindocal, 22, Casal do Carvalho, 2475-016 – Benedita- Portugal
<b>Address (head office):</b>	Rua da Sindocal, 22, Casal do Carvalho, 2475-016 – Benedita- Portugal
<b>Telephone:</b>	Eng.º Marco Aniceto: +351 262 925 080
<b>E-mail:</b>	<a href="mailto:marco.aniceto@solancis.com">marco.aniceto@solancis.com</a>
<b>Website:</b>	<a href="http://www.solancis.com">http://www.solancis.com</a>
<b>Logo:</b>	
<b>Information concerning the applicable management Systems:</b>	SOLANCIS has an integrated quality, environment, health and safety management system implemented, following the ISO 9001:2015, EN ISO 14001:2015 and ISO 45001:2018 standards. This management system meets the requirements of the StonePT (Premium) and StonePT – Green specifications for the Extraction + Primary Transformation + Secondary Transformation activities. All its products thus benefit from the procedures associated with the quality and environment control system.
<b>Specific aspects regarding the production:</b>	SIC Code 23701 – Manufacture of marble, and of similar stones, articles
<b>Organization’s environmental policy:</b>	

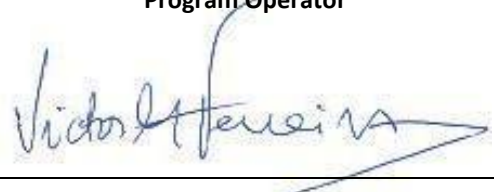
### 1.3. Information concerning the EPD

<b>Authors:</b>	CERIS - Civil Engineering Research and Innovation for Sustainability, José Dinis Silvestre	 <p>CERIS : Civil Engineering Research and Innovation for Sustainability</p>
<b>Contact of the authors:</b>	Av. Rovisco Pais   1049-001 Lisboa Phone contact: +351 218 419 709; E-mail: jose.silvestre@tecnico.ulisboa.pt	
<b>Emission date:</b>	17/01/2022	
<b>Registration date:</b>	08/03/2022	
<b>Registration number:</b>	DAP 003:2022	
<b>Valid until:</b>	16/01/2027	
<b>Representativity of the EPD (location, manufacturer, group of manufacturers):</b>	This is the cradle-to-gate EPD of all types of setts, cobblestone, slabs and kerbs for external paving and edging produced in one (1) industrial unit belonging to a single producer (SOLANCIS — Sociedade Exploradora de Pedreiras, S.A.).	
<b>Where to consult explanatory material:</b>	www.solancis.com	
<b>Type of EPD:</b>		

### 1.4. Demonstration of the verification

External independent verification, accordingly with the standard ISO 14025:2009 and EN 15804:2012+A1:2013	
<b>Certification Body</b>	<b>Verifier (s)</b>
	
(CERTIF – Associação para a Certificação)	(Marisa Almeida)


### 1.5. EPD Registration

<b>Program Operator</b>

(Plataforma para a Construção Sustentável)

## 1.6. PCR of reference

<b>Name:</b>	<ol style="list-style-type: none"> <li>1. PCR: Basic module for construction products and services</li> <li>2. PCR: Floor coverings</li> </ol>
<b>Emission date:</b>	<ol style="list-style-type: none"> <li>1. November 2020</li> <li>2. November 2020</li> </ol>
<b>Number of registration on the data base:</b>	<ol style="list-style-type: none"> <li>1. RCP-mb001</li> <li>2. RCP001:2014</li> </ol>
<b>Version:</b>	<ol style="list-style-type: none"> <li>1. Version 2.1</li> <li>2. Version 1.1</li> </ol>
<b>Identification and contact of the coordinator (s):</b>	<ol style="list-style-type: none"> <li>1. PCR: basic module for construction products and services <ul style="list-style-type: none"> <li>• Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a></li> <li>• Luís Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a></li> <li>• José Silvestre   <a href="mailto:jds@civil.ist.utl.pt">jds@civil.ist.utl.pt</a></li> </ul> </li> <li>2. PCR: Floor coverings <ul style="list-style-type: none"> <li>• Luís Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a></li> <li>• Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a></li> </ul> </li> </ol>
<b>Identification and contact of the authors:</b>	<ol style="list-style-type: none"> <li>1. PCR: basic module for construction products and services <ul style="list-style-type: none"> <li>• Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a></li> <li>• Luis Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a></li> <li>• José Silvestre   <a href="mailto:jds@civil.ist.utl.pt">jds@civil.ist.utl.pt</a></li> <li>• Fausto Freire</li> <li>• Cristina Rocha</li> <li>• Ana Paula Duarte</li> <li>• Ana Cláudia Dias</li> <li>• Helena Gervásio</li> <li>• Victor Ferreira</li> <li>• Ricardo Mateus</li> <li>• António Baio Dias</li> </ul> </li> <li>2. PCR: Floor coverings <ul style="list-style-type: none"> <li>• Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a></li> <li>• Luís Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a></li> <li>• Ana Cláudia Dias   <a href="mailto:acdias@ua.pt">acdias@ua.pt</a></li> </ul> </li> </ol>
<b>Composition of the Sector Panel:</b>	<ol style="list-style-type: none"> <li>2. RCP: Floor coverings <ul style="list-style-type: none"> <li>• RMC - Revestimentos de Mármore Compactos, S.A.</li> <li>• Dominó – Indústrias Cerâmicas, S.A.</li> <li>• MAS – Manuel Amorim da Silva, Lda.</li> <li>• Sonae Indústria, SGPS, S.A.</li> <li>• APICER – Associação Portuguesa da Indústria de Cerâmica</li> </ul> </li> </ol>
<b>Consultation period:</b>	<ol style="list-style-type: none"> <li>1. 18/11/2015 - 18/01/2016</li> <li>2. 01/08/2013 - 30/11/2013</li> </ol>
<b>Valid until:</b>	<ol style="list-style-type: none"> <li>1. December of 2022</li> <li>2. January of 2022</li> </ol>

## 1.7. Information concerning the product/product class

<p><b>Identification of the product:</b></p>	<p>Setts, cobblestone, slabs and kerbs for external paving and edging, in natural limestone, including the following references: <i>beige pacífico, pérola and sonato; semi-rijo salgueira; estremadura creme, azul and amazona; azul primavera, creme champanhe, vale amazona and líoz; Beige classico, azul clássico, amazona clássico and branco clássico.</i></p>																																												
<p><b>Illustration of the product:</b></p>																																													
<p><b>Brief description of the product:</b></p>	<p>The product corresponds to setts, cobblestone, slabs and kerbs for external paving and edging, in natural limestone. This limestone has light beige, white to light beige, brownish beige, or cream to bluish grey colour, depending on the reference of the product. The production of these materials is made at the Solancis industrial plant, in Benedita.</p> <p>The setts, cobblestone, slabs and kerbs are available in many dimensions depending on the reference of the product.</p> <p>The production process is the same for all these construction materials produced at the Solancis plant, for every dimension, and those have an average density of 2,680 kg/m<sup>3</sup>.</p>																																												
<p><b>Main technical characteristics of the product:</b></p>	<p>The main physical and technical characteristics of the product are presented in Table 2 (average values – these characteristics should be confirmed on the most recent technical sheet of the manufacturer for each application and geometry of the product).</p> <p style="text-align: center;"><b>Table 2: Physical and technical characteristics of the product</b></p> <table border="1"> <thead> <tr> <th style="text-align: center;">Essential characteristic</th> <th colspan="2" style="text-align: center;">Performance in accordance with EN 12058</th> <th style="text-align: center;">Harmonized technical standard</th> </tr> </thead> <tbody> <tr> <td>Petrographic description</td> <td colspan="2" style="text-align: center;">Pelmicrítico Limestone</td> <td style="text-align: center;">EN 12407</td> </tr> <tr> <td rowspan="2">Flexural strength after 56 freeze/thaw cycles – Normal conditions*</td> <td style="text-align: center;">Mean value before</td> <td style="text-align: center;">16.0 MPa</td> <td rowspan="2" style="text-align: center;">EN 12371</td> </tr> <tr> <td style="text-align: center;">Mean value after</td> <td style="text-align: center;">13.1 MPa</td> </tr> <tr> <td>Resistance to freeze/thaw in the presence of de-icing salts*</td> <td colspan="2" style="text-align: center;">Undetermined performance</td> <td style="text-align: center;">-</td> </tr> <tr> <td rowspan="2">Ultimate strength – Flexural resistance</td> <td style="text-align: center;">Mean value</td> <td style="text-align: center;">16.0 MPa</td> <td rowspan="2" style="text-align: center;">EN 12372</td> </tr> <tr> <td style="text-align: center;">Minimum expected value</td> <td style="text-align: center;">11.9 MPa</td> </tr> <tr> <td rowspan="2">Wear resistance*</td> <td style="text-align: center;">Mean value</td> <td style="text-align: center;">18.0 mm</td> <td rowspan="2" style="text-align: center;">EN 14157</td> </tr> <tr> <td style="text-align: center;">Maximum expected value</td> <td style="text-align: center;">19.2 mm</td> </tr> <tr> <td rowspan="2">Slip resistance* (Finish: flamed)</td> <td style="text-align: center;">Mean value</td> <td style="text-align: center;">88 SRV</td> <td rowspan="2" style="text-align: center;">EN 14231</td> </tr> <tr> <td style="text-align: center;">Mean value</td> <td style="text-align: center;">60 SRV</td> </tr> <tr> <td>Skid resistance*</td> <td colspan="2" style="text-align: center;">Undetermined performance</td> <td style="text-align: center;">-</td> </tr> <tr> <td>Durability of slip and skip resistance *</td> <td colspan="2" style="text-align: center;">Undetermined performance</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>	Essential characteristic	Performance in accordance with EN 12058		Harmonized technical standard	Petrographic description	Pelmicrítico Limestone		EN 12407	Flexural strength after 56 freeze/thaw cycles – Normal conditions*	Mean value before	16.0 MPa	EN 12371	Mean value after	13.1 MPa	Resistance to freeze/thaw in the presence of de-icing salts*	Undetermined performance		-	Ultimate strength – Flexural resistance	Mean value	16.0 MPa	EN 12372	Minimum expected value	11.9 MPa	Wear resistance*	Mean value	18.0 mm	EN 14157	Maximum expected value	19.2 mm	Slip resistance* (Finish: flamed)	Mean value	88 SRV	EN 14231	Mean value	60 SRV	Skid resistance*	Undetermined performance		-	Durability of slip and skip resistance *	Undetermined performance		-
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Open porosity	Mean – 0.9 %	EN 1936													
Water absorption at atmospheric pressure*	Mean value	0.3 %													
	Maximum expected value	0.34 %													
Release of hazardous substances*	Undetermined performance	-													
<b>Description of the products' application:</b>	The main application of these setts, cobblestone, slabs and kerbs is in the execution of external paving and edging.														
<b>Reference service life:</b>	Not specified														
<b>Placing on the market / Rules of application in the market / Technical rules of the product:</b>	<ul style="list-style-type: none"> <li>• Decision No. 768/2008 / EC of the European Parliament and of the Council of 9 July 2008</li> <li>• Regulation (EC) No 764/2008 of the European Parliament and of the Council of 9 July 2008</li> <li>• Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008</li> <li>• Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 and its amendments.</li> <li>• Technical Product Standards: <ul style="list-style-type: none"> <li>– EN 1341:2012: Slabs of natural stone for external paving –Requirements and test methods.</li> <li>– EN 1342:2012: Setts of natural stone external paving –Requirements and test methods.</li> <li>– EN 1343:2012 : Kerbs of natural stone for external paving – Requirements and test methods.</li> <li>– EN 12058:2004: Natural stone products – Slabs for floors and stairs - Requirements.</li> </ul> </li> </ul>														
<b>Quality control:</b>	Quality control assured in accordance with the integrated quality management system and with the technical standards of the product.														
<b>Special delivery conditions:</b>	Not applicable														
<b>Components and substances to declare:</b>	Not applicable														
<b>History of the LCA studies:</b>	-														

## 2. ENVIRONMENTAL PERFORMANCE OF THE PRODUCT

### 2.1. Calculation rules of the LCA

<b>Declared unit:</b>	One tonne (1 ton) of setts, cobblestone, slabs and kerbs, with a density of 2,680 kg/m <sup>3</sup> , packaging included.
<b>Functional unit:</b>	-
<b>System boundaries:</b>	EPD from cradle-to-gate
<b>Criteria for the exclusion:</b>	<p>The following processes were not considered in this study, since they meet the cut-off criteria of 1% use of renewable and non-renewable primary energy and 1% of the total input mass of the unit process where they occur, with a maximum of 5% energy and mass use in the considered stages (A1-A3):</p> <ul style="list-style-type: none"> <li>• Construction of industrial infrastructures, manufacture and exchange of equipment and machinery;</li> <li>• Impacts of infrastructure (vehicle manufacturing, road maintenance) associated with the transport of pre-products and raw materials;</li> <li>• Transport of small consumables to the industrial unit;</li> <li>• Other negligible flows, considering their contribution below the cut-off criteria.</li> </ul>
<b>Assumption and limitations:</b>	This EPD represents all types of setts, cobblestone, slabs and kerbs that are produced in one (1) manufacturing unit and may have different thicknesses and finishing.
<b>Quality and other characteristics about the information used in the LCA:</b>	<p>Production data was collected for the year of 2018, from internal and official records of the production plant and is according to with the reality.</p> <p>Generic data used belongs to Ecoinvent, ELCD and Simapro industrial database (Industry data 2.0), and meets the quality criteria (age, geographical and technology coverage, plausibility, etc.) for generic data.</p>
<b>Allocation rules:</b>	<p>In the blocks extraction stage from all quarries, the specific consumption of electricity and oil in 2018 was considered, making a mass allocation between the blocks transported to the plant and the material not used for block and used as raw material for the lime industry or sold for other uses.</p> <p>The manufacturing plant where these setts, cobblestone, slabs and kerbs in natural stone are produced also produces other products, namely slabs for cladding and flooring. Taking it into account, an allocation methodology was used to define which input and output flows associated only to the production of the setts, cobblestone, slabs and kerbs in natural stone being studied.</p> <p>Since the production is the same for all the setts, cobblestone, slabs and kerbs in natural stone produced at the Solancis plant, regardless of the origin, a mass allocation was made between all the total inflows and outflows related to the production of the setts, cobblestone, slabs and kerbs in natural stone in study and the weight of all the setts, cobblestone, slabs and kerbs produced in 2018, in order to calculate average data.</p>
<b>Comparability of EPD for construction products:</b>	The EPD of construction products and services cannot be comparable in case they are not produced according to EN 15804 and EN 15942 and according to the comparability conditions determined by ISO 14025.

## 2.1.1. Flow diagram of input and output of the processes

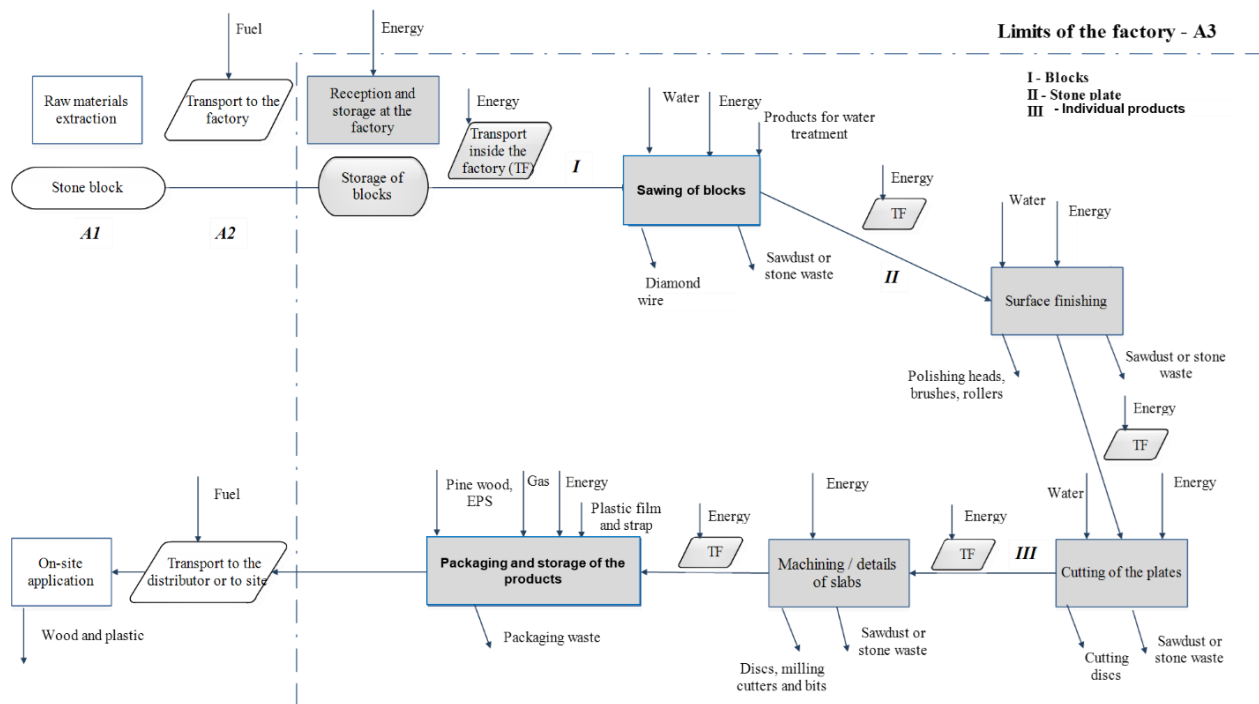


Figure 1. Life cycle stages of setts, cobblestone, slabs and kerbs in natural stone from Solancis

The following paragraphs describe the life cycle stages studied for the development of this EPD.

Upon arrival at the factory, limestone blocks are stored. The setts, cobblestone, slabs and kerbs' production process starts with the sawing of the blocks to the required thickness, resulting in several stone plates.

After measuring the thickness of the plates, they are introduced in the polisher. The stone receives here, through friction, the desired finishes (polished, sawn, hammered, sandblasted, aged or flamed – consuming gas and oxygen in this last case, which are not represented in Figure 1). Next is the cutting process, which turns them into individual setts, cobblestone, slabs and kerbs.

Following labelling and inspections, these construction materials are finally packed in wooden structures (wrapped in plastic film and wrapped in a plastic strap, with expanded polystyrene – EPS as protection elements of the setts, cobblestone, slabs and kerbs) and stored according to the placement plans, the form of transport and the destination.

Transport to the construction site or the distributor and the application on site are outside of the boundaries of this EPD.


## 2.1.2. Description of the system boundaries

(✓ = included; ✗ = module not declared)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport	Construction installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-constructions, demolition	Transport	Waste processing	Disposal	Re-use, recovery, recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

## 2.2. Parameters describing environmental impacts


		Global warming potential; GWP kg CO <sub>2</sub> equiv.	Depletion potential of the stratospheric ozone layer; ODP kg CFC 11 equiv.	Acidification potential of soil and water, AP kg SO <sub>2</sub> equiv.	Eutrophication potential, EP kg (PO <sub>4</sub> ) <sup>3-</sup> equiv.	Formation potential of tropospheric ozone, POCP kg C <sub>2</sub> H <sub>4</sub> equiv.	Abiotic depletion potential for non-fossil resources kg Sb equiv.	Abiotic depletion potential for fossil resources MJ, P.C.I.
Raw material supply	A1	1.60E+01	2.62E-06	1.25E-01	2.51E-02	2.85E-03	6.38E-06	2.19E+02
Transport	A2	1.36E+00	2.74E-09	6.11E-03	1.40E-03	4.35E-04	5.39E-08	1.90E+01
Manufacturing	A3	9.16E+01	7.21E-06	6.06E-01	5.76E-02	3.09E-02	1.28E-04	1.22E+03
<b>Total</b>	<b>Total</b>	1.09E+02	9.84E-06	7.37E-01	8.41E-02	3.42E-02	1.35E-04	1.46E+03

LEGEND:  
 Product stage

NOTES: P.C.I. – Low Heating Value (LHV).  
 Units expressed per declared unit (1 ton).

## 2.3. Parameters describing resource use


		Primary energy						Secondary materials and fuels, and use of water			
		EPR	RR	TRR	EPNR	RNR	TRNR	MS	CSR	CSNR	Net use of fresh water
		MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	MJ, P.C.I.	kg	MJ, P.C.I.	MJ, P.C.I.	m <sup>3</sup>
Raw material supply	A1	4.82E+01	0.00E+00	4.82E+01	2.53E+02	0.00E+00	2.53E+02	0.00E+00	0.00E+00	0.00E+00	5.03E-02
Transport	A2	9.60E-02	0.00E+00	9.60E-02	2.03E+01	0.00E+00	2.03E+01	0.00E+00	0.00E+00	0.00E+00	1.21E-04
Manufacturing	A3	2.53E+02	8.18E-02	2.53E+02	1.35E+03	6.70E+01	1.42E+03	0.00E+00	0.00E+00	0.00E+00	4.51E+00
<b>Total</b>	<b>Total</b>	3.02E+02	8.18E-02	3.02E+02	1.63E+03	6.70E+01	1.69E+03	0.00E+00	0.00E+00	0.00E+00	4.56E+00

LEGEND:  
 Product stage

EPR = use of renewable primary energy excluding renewable primary energy resources used as raw materials;  
 RR = use of renewable primary energy resources used as raw materials;  
 TRR = total use of renewable primary energy resources (EPR + RR);  
 EPNR = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;  
 RNR = use of non-renewable primary energy resources used as raw materials;  
 TRNR = total use of non-renewable primary energy resources (EPNR + RNR);  
 MS = use of secondary material;  
 CSR = use of renewable secondary fuels;  
 CSNR = use of non-renewable secondary fuels.  
 Net use of fresh water = net use of fresh water.  
 NOTE: Units expressed per declared unit (1 ton).

## 2.4. Other environmental information describing different waste categories

		Hazardous waste disposed kg	Non-hazardous waste disposed kg	Radioactive waste disposed kg
Raw material supply	A1	5.21E-04	2.46E-02	1.47E-03
Transport	A2	0.00E+00	1.68E-06	0.00E+00
Manufacturing	A3	9.30E-04	3.85E+02	4.06E-03
<b>Total</b>	<b>Total</b>	1.45E-03	3.85E+02	5.53E-03

LEGEND:  
 Product stage

NOTE: Units expressed per declared unit (1 ton).

## 2.5. Other environmental information describing output flows

Parameters	Units*	Results
Components for re-use	kg	0.00E+00
Materials for recycling	kg	1.24E+01
Radioactive waste disposed	kg	0.00E+00
Materials for energy recovery	kg	1.31E-02
Exported energy	MJ by energy carrier	0.00E+00

\* expressed per declared unit (1 ton)

### 3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

This EPD evaluates only the production stage of the setts, cobblestone, slabs and kerbs in natural stone from Solancis, integrating stages A1 to A3. Thus, the following scenarios of the construction stage (modules A4 and A5), stage of use (B1 to B7) and end of life stage (C1 to C4), are not applicable.

#### 3.1. Additional environmental information about the release of dangerous substances

No tests related to the release of dangerous substances or equivalent were carried out. There are no known toxic effects of this product. Due to its properties, no danger to the environment is expected. The setts, cobblestone, slabs and kerbs in natural stone are considered an inert product, non-biodegradable.

#### 3.2. Certifications

*SOLANCIS — Sociedade Exploradora de Pedreiras, S.A.* has a management system that meets the requirements of the StonePT (Premium) specification for the Extraction + Primary Transformation + Secondary Transformation activities, as audited and verified by APCER (Certificate of Conformity n.º 11/2020 valid until 15/03/2023) and that meets the requirements of the StonePT– Green specification for the Extraction + Primary Transformation + Secondary Transformation activities, as audited and verified by APCER (Certificate of Conformity n.º 11/2026V valid until 15/03/2023).

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