

Statement of Verification

BREG EN EPD No.: 000729

Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Thompson Recycling and Landfill Ltd



is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

One tonne of recycled sand/aggregate or silt/clay

Company Address

Thompson Recycling and Landfill Limited
Birch Road
Dumbarton
G82 2RN
SCOTLAND



Signed for BRE Global Ltd

Hayley Thomson

Operator

29 September 2025

Date of this Issue

29 September 2025

Date of First Issue

28 September 2030

Expiry Date



This Statement of Verification is issued subject to terms and conditions (for details visit www.greenbooklive.com/terms).

To check the validity of this statement of verification please, visit www.greenbooklive.com/check or contact us.

BRE Global Ltd., Garston, Watford WD25 9XX.

T: +44 (0)333 321 8811 F: +44 (0)1923 664603 E: Enquiries@breglobal.com



Environmental Product Declaration

EPD Number: **000729**

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.1, 2023.
Commissioner of LCA study	LCA consultant/Tool
Thompson Recycling and Landfill Limited Birch Road Dumbarton G82 2RN SCOTLAND	LCA Consultant: EcoReview Ireland LCA tool: Ecochain
Declared/Functional Unit	Applicability/Coverage
One tonne of recycled sand/aggregate or silt/clay	Product Specific.
EPD Type	Background database
Cradle to gate with options	Ecoinvent 3.9.1
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 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External	
(Where appropriate ^b)Third party verifier: Roger Connick	
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+A2:2019. 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+A2:2019 for further guidance	

Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	Related to the building fabric				Related to the building			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
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Thompson Recycling and Landfill Limited
 Birch Road
 Dumbarton
 G82 2RN
 SCOTLAND

Construction Product:

Product Description

The Recycled Materials are manufactured at the Thompson Recycling & Landfill Ltd (TRL) plant in Dumbarton, West Dunbartonshire, Scotland. The input materials are Inert or Non-Hazardous construction and demolition wastes such as soil, stone, rubble, utility arisings and skip waste. The materials produced include bulk fill material, sub-base, washed aggregates, sands and soils. End uses include domestic, commercial and industrial construction, civil engineering projects and readymix concrete production.

Products arising from the recycling are:

- Recycled Type 1
- Recycled 6F5
- Recycled 75mm Crusher Run
- Recycled Class 6C
- Recycled 63-10mm Aggregate
- Recycled 40-20mm Aggregate
- Recycled 20-10mm Aggregate
- Recycled 10-5mm Aggregate
- Recycled 6mm Grit
- Sand (Fine Aggregates – For Concrete & Mortar)
- Recycled 0/4mm Washed Concrete Sand
- Recycled 0/2mm Fine Sand
- Recycled Class 2A

Technical Information

Property	Value, Unit
Properties of recycled sands and aggregates will vary according to type of material, particle size and particle shape.	N/A
Properties of recycled silt/clay will vary according to type of material, particle size and particle shape.	N/A

The recycled aggregates are manufactured to comply with BS EN 12620 'Aggregates for Concrete' and Specification for Highway Works, Series 500, 600 and 800, and BS EN 13242 Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction.

The Reference Service Life Is assumed to be equal to the lifetime of the structure in which the aggregate is used. The service life is expected to be greater than 60 years, and reasonably expected to be up to 100 years. Silt/clays used are considered to be returned to the soil system upon use, and therefore they are considered to have an indefinite service life, with no discernible end of life.



Construction Installation

There are zero impacts in the installation phase.

Use Information

The use phase is not considered in this LCA.

End of Life

For the recycled sands and aggregates, in the end-of-life phase, it is assumed that 100% of the material is recycled, and zero material goes to landfill. For the recycled silt/clay, it is assumed that silt/clays are neither recycled nor landfilled at the end of life, as once used, they form an intrinsic part of the natural soil system, permanently.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

One tonne of recycled sand, aggregate or silt/clay.

System boundary

This cradle-to-gate with options EPD has been assessed in accordance with the modular approach as defined in EN15804:2012+A2:2019 and BRE 2023 Product Category Rules (PN 514 Rev 3.1) which includes the processes covered in the manufacturing site i.e., product stage A1 to A3, construction installation A4- A5, end of life stages C1-C4 and Module D.

Data sources, quality and allocation

Specific primary data has been taken from the Thompson Recycling facility at Dumbarton, Scotland. In accordance with EN 15804 +A2, data from the most recent full calendar year has been used, being 2023.

The background dataset is taken from Ecoinvent v 3.9.1 (2022). These datasets are complete within the context used and conform to the system boundary and criteria for the exclusion of inputs and outputs according to the requirements of EN 15804 +2.

100% of the sands, aggregates and silt/clay produced at the Thompson Recycling production site are covered by this EPD.

Allocation of impacts to products are made on a mass basis, per tonne of product.

The dataset is representative for the production processes used in 2023, in the country of production, United Kingdom. The data Quality Level, according to Table E.1 of EN 15804 +A2, Annex E, is as follows:

Geographical representativeness: Very Good.

Technical representativeness: Very Good.

Time representativeness: Very Good.

Cut-off criteria

All relevant inputs and outputs – such as emissions, energy and materials - have been taken into account in this LCA. And in accordance with EN15804+A2:2019. The study covers at least 95% of the materials and energy per module and at least 99% of the total use of materials and energy of each unit process. Long term emissions have been excluded from the study.

End-of-Waste Criteria - The end of waste criteria for recycled aggregates from inert waste, as defined by the Scottish EPA, is applied. This at the point where the material is “dispatched from the site for a certain use”. The general cut-off criteria used are 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process. The total of neglected input flows per module, are a maximum of 5 % of energy usage and mass.

LCA Results

One tonne of recycled sand/aggregate

Parameters describing environmental impacts – sands/aggregates			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO ₂ eq	kg CFC11 eq	mol H ⁺ eq	kg (PO ₄) ³⁻ eq			
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	1.96E+00	1.96E+00	1.05E-03	6.98E-04	4.46E-07	5.63E-03	1.57E-05
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	3.64E+00	3.64E+00	3.61E-03	1.77E-03	7.72E-08	7.75E-03	2.88E-05
	Waste processing	C3	1.07E+01	1.06E+01	3.33E-02	1.14E-02	1.56E-07	7.62E-02	1.98E-04
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

GWP-total = Global warming potential, total;
 GWP-fossil = Global warming potential, fossil;
 GWP-biogenic = Global warming potential, biogenic;
 GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
 AP = Acidification potential, accumulated exceedance; and
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

One tonne of recycled sand/aggregate

Parameters describing environmental impacts – sands/aggregates			EP-marine	EP-terrestrial	POCP	ADP-mineral & metal	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m ³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	1.11E-03	1.25E-02	4.78E-03	5.41E-05	2.96E+01	8.39E-02	1.25E-07
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	1.91E-03	1.99E-02	1.20E-02	1.16E-05	5.04E+01	2.08E-01	2.63E-07
	Waste processing	C3	2.95E-02	3.21E-01	9.80E-02	2.47E-05	1.50E+02	2.17E+00	9.15E-06
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
 EP-terrestrial = Eutrophication potential, accumulated exceedance;
 POCP = Formation potential of tropospheric ozone;
 ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;

ADP-fossil = Depletion potential of the stratospheric ozone layer;
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
 PM = Particulate matter.

LCA Results (continued)

One tonne of recycled sand/aggregate

			Parameters describing environmental impacts – sands/aggregates				
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U ²³⁵ eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	0.00E+00	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	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	1.30E-01	2.39E+01	6.65E-10	2.52E-08	2.07E+01
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	2.55E-02	4.91E+01	1.62E-09	4.55E-08	3.06E+01
	Waste processing	C3	1.89E-01	1.70E+02	4.48E-09	1.09E-07	1.22E+02
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

IRP = Potential human exposure efficiency relative to U235;
 ETP-fw = Potential comparative toxic unit for ecosystems;
 HTP-c = Potential comparative toxic unit for humans;

HTP-nc = Potential comparative toxic unit for humans; and
 SQP = Potential soil quality index.

LCA Results (continued)

One tonne of recycled sand/aggregate

Parameters describing resource use, primary energy – sands/aggregates			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	4.24E-01	0.00E+00	4.24E-01	3.15E+01	0.00E+00	3.15E+01
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	7.92E-01	0.00E+00	7.92E-01	5.36E+01	0.00E+00	5.36E+01
	Waste processing	C3	6.20E+00	0.00E+00	6.20E+00	1.60E+02	0.00E+00	1.60E+02
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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)

One tonne of recycled sand/aggregate

Parameters describing resource use, secondary materials and fuels, use of water – sands/aggregates

			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	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 (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	3.17E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	6.76E-03
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	5.68E-02
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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)

One tonne of recycled sand/aggregate

			Other environmental information describing waste categories – sands/aggregates		
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	7.76E-05	1.44E+00	2.02E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	3.21E-04	2.50E+00	1.66E-05
	Waste processing	C3	7.68E-04	1.39E+02	1.19E-04
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00

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

LCA Results (continued)

One tonne of recycled sand/aggregate

			Other environmental information describing output flows – at end of life – sands/aggregates					
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	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

LCA Results

One tonne of recycled silt/clay

Parameters describing environmental impacts – silt/clays			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO ₂ eq	kg CFC11 eq	mol H ⁺ eq	kg (PO ₄) ³⁻ eq			
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	1.96E+00	1.96E+00	1.05E-03	6.98E-04	4.46E-07	5.63E-03	1.57E-05
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

GWP-total = Global warming potential, total;
 GWP-fossil = Global warming potential, fossil;
 GWP-biogenic = Global warming potential, biogenic;
 GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
 AP = Acidification potential, accumulated exceedance; and
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

One tonne of recycled silt/clay

Parameters describing environmental impacts – silt/clays			EP-marine	EP-terrestrial	POCP	ADP-mineral & metal	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m ³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	1.11E-03	1.25E-02	4.78E-03	5.41E-05	2.96E+01	8.39E-02	1.25E-07
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
 EP-terrestrial = Eutrophication potential, accumulated exceedance;
 POCP = Formation potential of tropospheric ozone;
 ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;

ADP-fossil = Depletion potential of the stratospheric ozone layer;
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
 PM = Particulate matter.

LCA Results (continued)

One tonne of recycled silt/clay

			Parameters describing environmental impacts – silt/clays				
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U ²³⁵ eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	0.00E+00	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	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	1.30E-01	2.39E+01	6.65E-10	2.52E-08	2.07E+01
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

IRP = Potential human exposure efficiency relative to U235;
 ETP-fw = Potential comparative toxic unit for ecosystems;
 HTP-c = Potential comparative toxic unit for humans;

HTP-nc = Potential comparative toxic unit for humans; and
 SQP = Potential soil quality index.

LCA Results (continued)

One tonne of recycled silt/clay

Parameters describing resource use, primary energy – silt/clays			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	4.24E-01	0.00E+00	4.24E-01	3.15E+01	0.00E+00	3.15E+01
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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)

One tonne of recycled silt/clay

Parameters describing resource use, secondary materials and fuels, use of water – silt/clays			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	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 (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	3.17E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	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	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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)

One tonne of recycled silt/clay

Other environmental information describing waste categories – silt/clays			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	7.76E-05	1.44E+00	2.02E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00

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

LCA Results (continued)

One tonne of recycled silt/clay

			Other environmental information describing output flows – at end of life – silt/clays					
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	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 – sands and aggregates			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Transport of recycled sand, aggregate from recycling plant to construction site		
	Fuel type / Vehicle type	Litres of diesel per km	0.1 litre
	Distance:	km	19.2
	Capacity utilisation (incl. empty returns)	%	100
	Bulk density of transported products	kg/m ³	1,500
A5 – Installation in the building	Placement of recycled sands and aggregates on the construction site. Construction/installation on site assumes no ancillary materials or additional energy is required, and there are no material installation losses.		
C1 to C4 End of life	It is assumed that for the recycled sands and aggregates, 100% are recycled, and 0% go to landfill.		
	C1	tonne	0
	C2, transport to recycling or landfill	km	19.2
	C3, wate processing	tonne	1.0
	C4, landfill	tonne	0
Module D	As the raw material in this LCA is 100% recycled already, to avoid attributing the benefit of recycling twice (i.e. double counting), an environmental load is applied in module D in this LCA to represent the loss of recycled material to landfill disposal.		

Scenarios and additional technical information – silts/clays			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Transport of recycled sand, aggregate from recycling plant to construction site		
	Fuel type / Vehicle type	Litres of diesel per km	0.1 litre
	Distance:	km	19.2
	Capacity utilisation (incl. empty returns)	%	100
	Bulk density of transported products	kg/m ³	1,500
A5 – Installation in the building	Placement of recycled sands and aggregates on the construction site. Construction/installation on site assumes no ancillary materials or additional energy is required, and there are no material installation losses.		
C1 to C4 End of life	It is assumed that silts/clays are neither recycled nor landfilled at the end of life, as once used, they form an intrinsic part of the natural soil system, permanently.		
	C1	tonne	0
	C2, transport to recycling or landfill	km	0
	C3, wate processing	tonne	0
	C4, landfill	tonne	0
Module D	It is assumed that the silts/clays are neither recycled nor landfilled at the end of life, as once used, they form an intrinsic part of the natural soil system, permanently. Thus, there are no loads nor benefits beyond the system boundary for silts/clays.		

Interpretation

In this section the environmental impact across the full life cycle of one tonne of the aggregates and silt/clay are presented in terms of their Global Warming Potential.

1. Global warming potential

As the raw material is burden free, and the processing activities occur before the End of Waste state is reached, the impacts in the cradle to gate stage, i.e. A1-A3, are zero.

Extending the analysis to cover impacts beyond the gate is illustrated below in Figures 1 and 2.

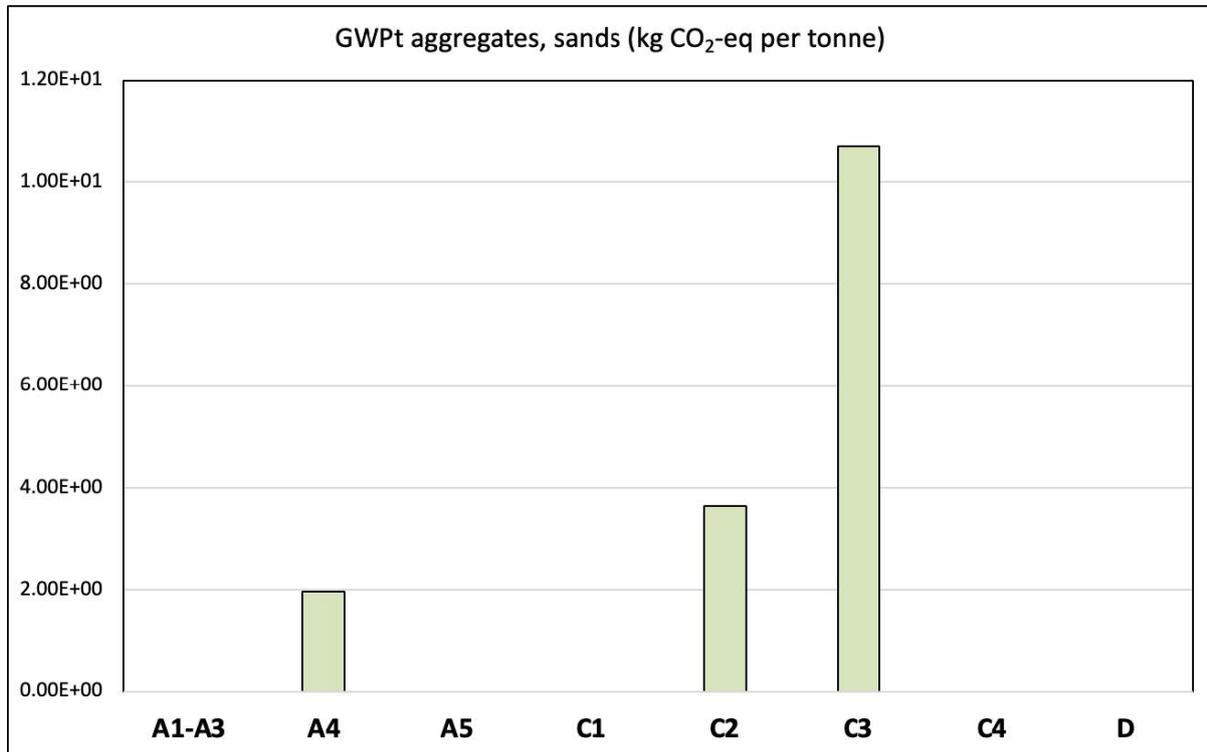


Figure 1: GWP impacts across the full life-cycle, for 1 tonne of aggregates/sand, covering the Product (A1-A3), Construction (A4-A5), End of Life (C1-C4) and Benefits Beyond the System Stages (D).

Over the life cycle of the sands and aggregates, the largest impact is the waste processing/sorting (C3) at end-of-life. Transport to site (A4) and to reprocessing (C2) are the next largest impacts.

Module D benefits or loads are not applied to products that have a 100% pre-existing recycled content, so although the Thompson Recycling & Landfill products are recycled at the end of their life, this is not designated as a benefit/loss beyond the system boundary.

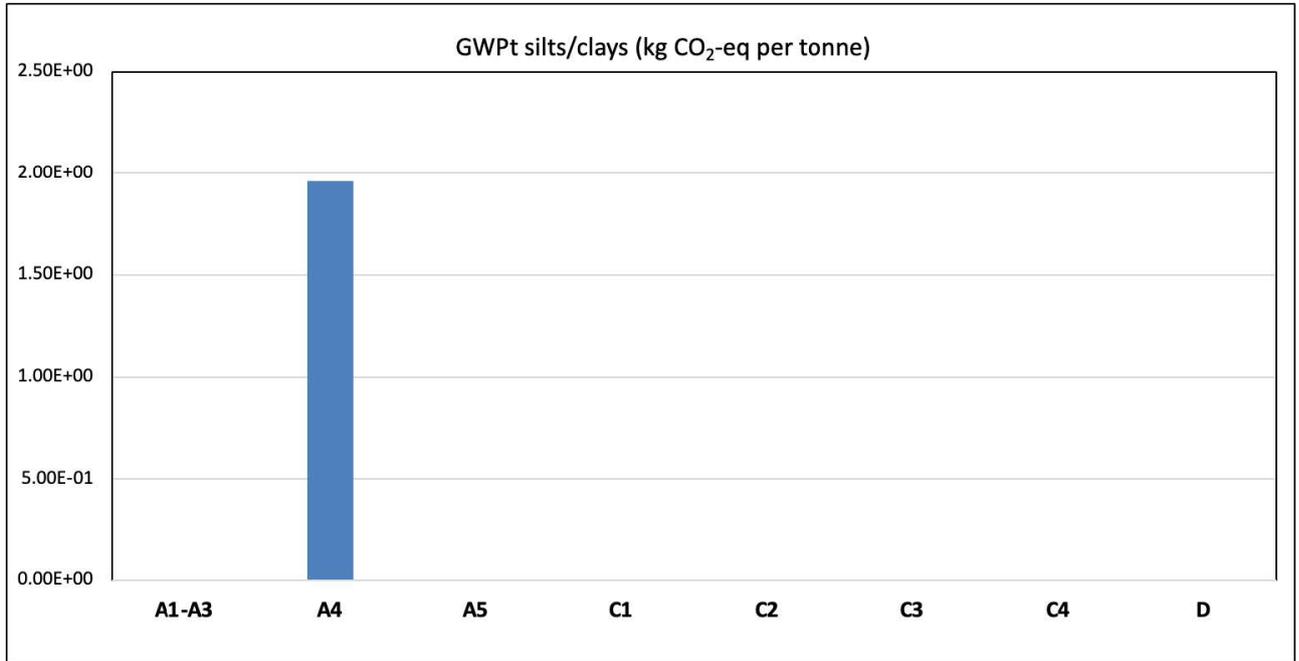


Figure 2: GWP impacts across the full life-cycle, for 1 tonne of silt/clay, covering Product (A1-A3), Construction (A4-A5), End of Life (C1-C4) and Benefits Beyond the System Stages (D).

Over the life cycle of the silt/clay, the transport to site (A4) is the only impact. This LCA assumes that the silt/clay is returned to the natural soil system, and remains there permanently, so there is no discernible end-of-life scenario for the silt/clay.

Module D benefits are not applied to products that have a 100% pre-existing recycled content, so although the sands/aggregates and silts/clays are recycled at the end of their life, this is not designated as a benefit/loss beyond the system boundary.

2. Biogenic Carbon

Product/Material	Biogenic Carbon (kg C/tonne)
All sands/aggregate	0.00
Silt/Clay	0.00
Packaging	0.00

References

- BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A1:2013. London, BSI, 2013.
- BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.
- BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.
- BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006. London, BSI, 2006.
- SEPA Guidance: Recycled Aggregates from Inert Waste (<https://www.sepa.org.uk/media/162893/production-of-recycled-aggregates.pdf>)
- Delivering Scotland's circular economy. A Route Map to 2025 and beyond. May 2022. Scottish Government (p. 59) <https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2022/05/consultation-delivering-scotlands-circular-economy-route-map-2025-beyond/documents/delivering-scotlands-circular-economy-route-map-2025-beyond/delivering-scotlands-circular-economy-route-map-2025-beyond/govscot%3Adocument/delivering-scotlands-circular-economy-route-map-2025-beyond.pdf>
- BRE Global Product Category Rules (PCR) For Type III EPD of Construction Products to EN 15804+A2, PN 514 Rev 3.1, Feb 2023.
- BSI. Aggregates for Concrete. BS EN 12620:2013. London, BSI, 2013.
- BSI. Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction. BS EN 13242:2013. London, BSI, 2013.
- Manual of Contract Documents for Highway Works (MCHW) Specification for Highway Works, Series 500: Drainage and Service Ducts. Birmingham, MCHW, 2020.
- Manual of Contract Documents for Highway Works (MCHW) Specification for Highway Works, Series 600: Earthworks. Birmingham, MCHW, 2022.
- Manual of Contract Documents for Highway Works (MCHW) Specification for Highway Works, Series 800: Road Pavements – Unbound, Cement and Other Hydraulically Bound Mixtures. Birmingham, MCHW, 2023.