

Statement of Verification

BREG EN EPD No.: 000387

Issue 01

This is to verify that the
Environmental Product Declaration
provided by:
GCP Applied Technologies



is in accordance with the requirements of:
EN 15804:2012+A1:2013

and
BRE Global Scheme Document SD207

This declaration is for:
**1m² of Bituthene® 3000 and Bituthene® 3000 Low Temp
Waterproofing Membrane**

Company Address

487/488 Ipswich Road
Slough
Berkshire
SL1 4EP



gcp applied technologies



Signed for BRE Global Ltd

Emma Baker
Operator

05 November 2021
Date of this Issue

05 November 2021
Date of First Issue

04 November 2026
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: 000387

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
GCP Applied Technologies 487/488 Ipswich Road Slough Berkshire SL1 4EP	Andrew Dutfield/BRE LINA v2.0
Declared Unit	Applicability/Coverage
1m ² (1.8 kg/m ² manufactured weight) of Bituthene® 3000 and Bituthene® 3000 Low Temp waterproofing membrane products installed over a 60 year period.	Product Average.
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 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> 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
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Note: Ticks indicate the Information Modules declared.

Manufacturing site

350 Magnolia Drive
Mt. Pleasant, Tennessee 38474
USA

Construction Product

Product Description

Bituthene® is a flexible waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. Bituthene® is used to waterproof the exterior structures under siding materials. This EPD covers the products Bituthene® 3000 and Bituthene® 3000 Low Temp waterproofing membranes and is calculated from a production weighted average of both products.

<https://gcpat.uk/en-gb/solutions/products/bituthene-post-applied-waterproofing#products-amp-accessories>

Technical Information

Property	Value, Unit
Visible defects (EN1850-2)	None
Straightness (EN1848-2)	Pass
Length (EN1848-2)	20.15 m ± 0.15
Thickness (EN1849-2)	1.52 mm ± 0.08
Width Carrier Sheet (EN1848-2)	0.987 mm ± 0.007
Width Overall (roll) (EN1848-2)	1.000 m ± 0.005
Mass per unit area net of release paper (EN1849-2)	1.5 kg/m ² ± 90 max
Water tightness to liquid water (at 60 kPa) (EN1928)	Pass
Resistance to impact (AI board) (EN12691)	≥ 150 mm
Resistance to tearing (Nail Shank)- unreinforced sheets (EN12310-1)	≥ 120 N
Joint strength (EN12317-2)	≥ 150 N/50mm

Property	Value, Unit
Water vapour transmission (EN1931)	110.000 μ (= sD/d) \pm 30%
Durability of water tightness against ageing/degradation (at 60 kPa) (EN1296 / EN1928 Method B)	Pass
Durability of water tightness against chemicals (at 60 kPa) (EN 1847 Method B / EN 1928 Method B)	Pass
Durability of tensile properties against chemicals (EN13967 Annex C)	Pass
Compatibility with bitumen (EN1548)	Pass
Resistance to static loading (EN12730)	\geq 20 - Pass
Tensile properties – unreinforced sheets (EN 12311-2 Method A)	Longitudinal \geq 200 N/50mm Transversal \geq 240 N/50mm
Tensile properties – unreinforced sheets - elongation (%) (EN 12311-2 Method A)	Longitudinal \geq 270% Transversal \geq 220%
Reaction to fire (Class; test conditions) (EN 13501-1)	E



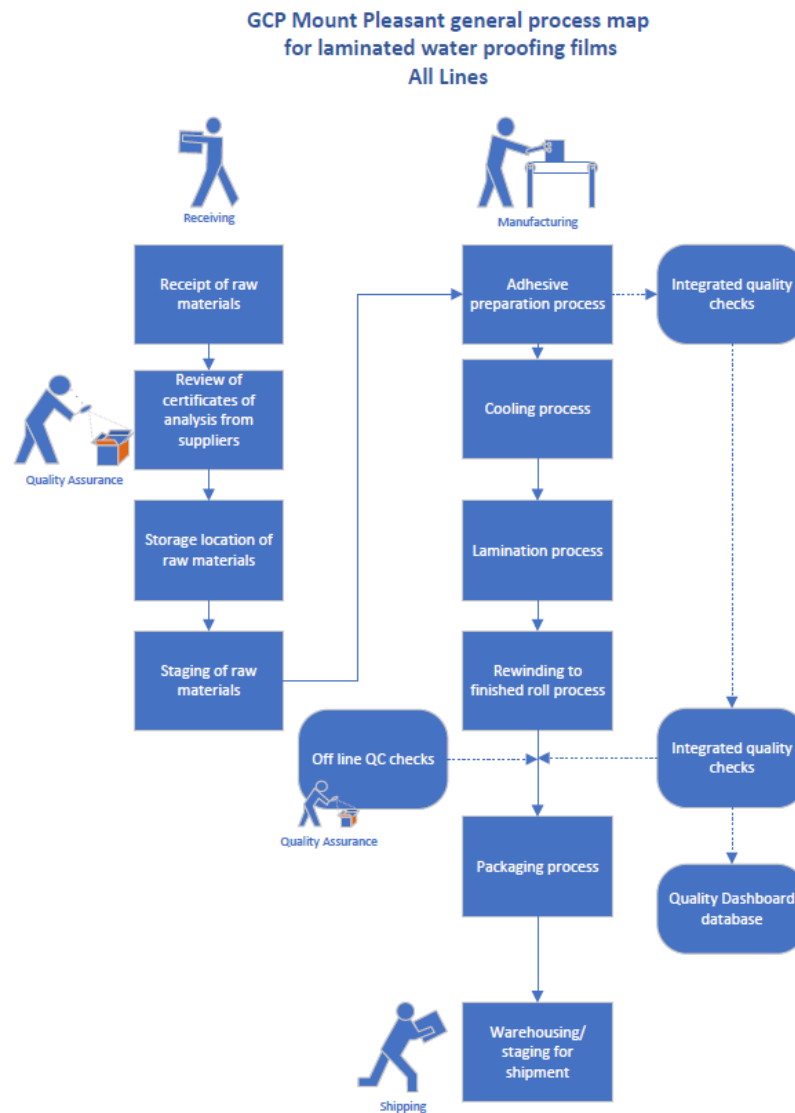
Main Product Contents

Bituthene® Material/Chemical Input	%
Paving asphalt	42-59
SBS Rubber	11-13
Polyethylene and proprietary polymers and additives	23-38
Release paper	7
Total	100

Manufacturing Process

Heated adhesive is coated onto a release liner. A film is laminated and the product is cut to length, rolled and boxed for shipment.

Process flow diagram



Construction Installation

Prior to beginning application of Bituthene® membranes, all surfaces must be inspected to assure that they are free of frost, or condensation. Internal and external corners, penetrations and other “special” areas need to be fully detailed in accordance with GCP drawings and specifications with Bituthene® S2 primer in advance of placement of Bituthene® membranes. After completion of the surface preparation and detailing, Bituthene® membranes shall be laid by peeling back the protective release paper and applying the adhesive face onto the prepared surface.

Adjacent rolls are aligned using printed lines and overlapped 50 mm minimum at side and ends and well rolled with a firm pressure, using a lap roller to ensure complete adhesion and continuity between the layers. On high walls it may be necessary to batten fix the membrane to prevent slippage. Once the membrane is

applied, cover with a protection board as soon as possible. On “green” concrete or damp surfaces, cover the membrane immediately.

Use Information

Bituthene® membrane is a flexible waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. The membrane, installed on the wall's surface, bonds with the structure and protects it from the below ground water. If the Bituthene® system is properly and correctly installed as per GCP instructions, no maintenance, repair or replacement is required during the service life of the structure. The highly durable, robust and extremely reliable feature of the Bituthene® system will limit any repair work to a minimum, if membrane damage occurs. The fully bonded membrane will prevent any water migration and between membrane and the concrete structure in the event of puncturing or damaging the membrane. Thus no scenario for repair work is defined.

End of Life

When a building is demolished at the end of its service life, the Bituthene® membrane system bonded to the concrete cannot be separated and remains part of the construction rubble. This is in general taken to landfill. Bituthene® membrane is only a minor part of the whole volume during demolition of the concrete structure. Therefore no other steps are considered as necessary with the exception for a transportation to a landfill. If the client and wrecking contractor are required according to local regulations to separate the demolished concrete from steel reinforcement and other embedded items, the Bituthene® will remain bonded to the concrete, which can be grinded to smaller concrete particles and used as backfilling material or substrate in other construction work.

Life Cycle Assessment Calculation Rules

Declared unit description

1m² (1.8 kg/m² manufactured weight) of Bituthene® 3000 and Bituthene® 3000 Low Temp waterproofing membrane products installed over a 60 year period.

System boundary

This is a cradle to gate with options LCA of GCP's Bituthene® 3000 and Bituthene® 3000 Low Temp waterproofing membrane products, manufactured by GCP in the United States. It follows the modular design defined in EN 15804:2012+A1:2013. Cradle to gate modules, A1 to A3 and optional modules A4 to C4, are reported but not module D.

Data sources, quality and allocation

Manufacturer-specific data from GCP covering a production period from 1st January to 30th April 2021 has been used for this EPD. Figures for input materials and packaging were uplifted to account for production waste.

GCP manufacture other products at the Mt. Pleasant site. Allocation by mass has been used to calculate the input energy flows (electricity and natural gas), emissions to air and water and waste flows per selected products according to the provisions of the BRE PCR PN514 and EN 15804. Product formulations including ancillary and packaging data were combined with allocated manufacturing data to calculate the cradle to gate LCA profiles for the Bituthene® products. Since both products have the same weight per square metre, a production weighted average has been calculated for all entries. Bituthene® products form 10.7% of total production at the site. The difference in weight between manufactured and installed weights is due to the release paper being removed during installation.

All data for modules A4 to C4 has been supplied by GCP. The waste created at installation is assumed to go to landfill. The Bituthene® products at end of life are assumed to go to landfill. The scenario of transport to a

landfill site in South London from an installation in the centre of London has been assumed for both installation and end of life phases. Bituthene® S2 primer is used for the installation of the membrane.

Secondary data have been drawn from the BRE LINA database v2.0.82 and the background LCI datasets are based on ecoinvent v3.2 (2015).

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	Less than 10 years of difference between the reference year according to the documentation, and the time period for which data are representative

The quality level of geographical and technical representativeness is 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 and so there is less than 10 years between the reference year according to the documentation, and the time period for which data are representative.

Cut-off criteria

No inputs or outputs have been excluded. All raw materials and packaging inputs, plus their transport, process and general energy and water use, production and non-production waste, and direct emissions to air have been included. Direct emissions to water and soil have not been included as these are not measured.

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 ₂ H ₄ equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.13E+00	1.01E-06	1.86E-02	1.12E-02	3.82E-03	3.88E-05	1.17E+02
Construction process stage	Transport	A4	4.39E-01	7.79E-08	3.86E-03	5.80E-04	3.74E-04	8.44E-07	6.51E+00
	Construction	A5	1.21E+00	9.09E-08	5.52E-03	2.54E-03	7.73E-04	6.42E-06	2.56E+01
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	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	2.11E-03	3.88E-10	7.04E-06	1.86E-06	1.23E-06	5.55E-09	3.18E-02
	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	1.58E-01	5.03E-09	1.46E-04	1.33E-02	4.83E-05	2.81E-08	4.60E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND	MND

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	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.04E+01	2.42E-05	2.04E+01	1.19E+02	5.55E+01	1.74E+02
Construction process stage	Transport	A4	1.09E-01	2.76E-07	1.09E-01	6.52E+00	0.00E+00	6.52E+00
	Construction	A5	1.72E+00	8.88E-06	1.72E+00	2.65E+01	0.00E+00	2.65E+01
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	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	4.22E-04	1.57E-09	4.22E-04	3.16E-02	0.00E+00	3.16E-02
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	1.68E-02	4.38E-08	1.68E-02	4.74E-01	0.00E+00	4.74E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND

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	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	5.50E-02
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	1.46E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	3.18E-02
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	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	6.90E-06
	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	5.27E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

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	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	6.30E-02	3.64E-01	6.10E-04
Construction process stage	Transport	A4	2.74E-03	2.16E-01	4.47E-05
	Construction	A5	1.86E-02	2.80E-01	6.08E-05
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	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	1.33E-05	1.48E-03	2.19E-07
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	3.54E-04	1.80E+00	3.01E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND

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

LCA Results (continued)

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	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	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	0.00E+00
	Construction	A5	0.00E+00	1.58E-01	0.00E+00	0.00E+00
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	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	MND	MND	MND	MND

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 the building site	Distances from US plant to UK distribution		
	Diesel/ 16-32 t lorry	Kg/vkm	0.3
	Distance:	km	1012.3
	Lorry capacity utilisation (incl. empty returns)	%	24
	Ship distance by sea	km	6614.4
	Ship capacity utilisation (incl. empty returns)	%	65
	Weight of transported products	Kg per roll	36
A5 – Installation in the building	<p>Prior to beginning application of Bituthene® membranes, all surfaces must be inspected to assure that they are free of frost, or condensation. Internal and external corners, penetrations and other “special” areas need to be fully detailed in accordance with GCP drawings and specifications with Bituthene® LM (E) in advance of placement of Bituthene® membranes. After completion of the surface preparation and detailing, Bituthene® membranes shall be laid by peeling back the protective release paper and applying the adhesive face onto the prepared surface.</p> <p>Adjacent rolls are aligned using printed lines and overlapped 50 mm minimum at side and ends and well rolled with a firm pressure, using a lap roller to ensure complete adhesion and continuity between the layers. On high walls it may be necessary to batten fix the membrane to prevent slippage. Once the membrane is applied, cover with a protection board as soon as possible. On “green” concrete or damp surfaces, cover the membrane immediately.</p>		
	Bituthene® Primer S2	kg	0.26
	Transport of Bituthene® Primer S2 to installation	km	1480
	Transport to installation: Diesel/ 16-32 t lorry	kg/vkm	0.3
	Capacity utilisation (incl. empty returns)	%	26
	Bituthene® waterproofing membrane waste at installation (2.5%)	kg	0.045
	Transport of installation waste to landfill: Diesel/ 16-32 t lorry	kg/vkm	0.3
	Distance	km	7
Capacity utilisation (incl. empty returns)	%	24	

Scenarios and additional technical information

Scenario	Parameter	Units	Results
B1 - Use B2 – Maintenance B3 – Repair B4 – Replacement B5 – Refurbishment	Bituthene® membrane is a flexible waterproof membrane combining a high performance cross laminated, HDPE carrier film with a unique super sticky self-adhesive rubber bitumen compound. The membrane, installed on the wall's surface, bonds with the structure and protects it from the below ground water. If the Bituthene® system is properly and correctly installed as per GCP instructions, no maintenance, repair or replacement is required during the service life of the structure. The highly durable, robust and extremely reliable feature of the Bituthene® system will limit any repair work to a minimum, if membrane damage occurs. The fully bonded membrane will prevent any water migration and between membrane and the concrete structure in the event of puncturing or damaging the membrane. Thus no scenario for repair work is defined.		
Reference service life	According to the BBA Agreement Certificate 97/3325 the service life for the Bituthene® system is stated for the lifetime of the structure. Bituthene® is based on a highly durable HDPE carrier film with life time expectations > 100 years in service. Therefore, at least a 60 year building service life can be assumed.		
C1 to C4 End of life,	When a building is demolished at the end of its service life, the Bituthene® membrane system bonded to the concrete cannot be separated and remains part of the construction rubble. This is in general taken to landfill. Bituthene® membrane is only a minor part of the whole volume during demolition of the concrete structure. Therefore no other steps are considered as necessary with the exception for a transportation to a landfill. Distance assumed is to a middle-sized landfill in South London and from the location of installations in the centre of London.		
	Diesel/ 16-32 t lorry	kg/vkm	0.3
	Distance	km	7
	Capacity utilisation (incl. empty returns)	%	26
	Weight of transported products to landfill	kg/unit	1.8

Interpretation

Analysis of the results shows that the following raw materials have the highest and second highest impacts for the selected indicators:

Indicator	Highest impact	2nd highest impact
GWP	ERNP copolymer (31.5%)	Paving asphalt (24.4%)
ODP	Paving asphalt (75.7%)	Node (9.8%)
AP	Paving asphalt (31.7%)	Node (25.8%)
EP	Node (61.1%)	Paving asphalt (12.2%)
POCP	Node (31.9%)	Paving asphalt (25.4%)
ADPE	ERNP copolymer (62.4%)	SBS rubber 411 (16.0%)
ADPF	Paving asphalt (49.7%)	ERNP copolymer (16.5%)

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.