ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN15804+A2

Polymer Modified Mastic Asphalt

Owner of the declaration:
Tarstone Road Maintenance Ltd

Product:
Polymer Modified Mastic Asphalt

Declared unit:
1 tonne

This declaration is based on Product Category Rules:
EN 15804:2012+A2:2019, EPD Ireland PCR Part A, Version 2.1, 2022
Complementary Product Category Rules for Bituminous Mixtures (c-PCR Bituminous Mixtures) DN-PAV-03077 January 2024

Program operator:
EPD Ireland - Irish Green Building Council

Declaration number:
EPDIE-24-200

Issue date:
27.02.2025

Valid to:
26.02.2030

General information

Product

Polymer Modified Mastic Asphalt

Owner of the declaration:

Tarstone Road Maintenance Ltd
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Program operator:

EPD Ireland - Irish Green Building Council
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web: https://www.igbc.ie/epd-home/

Manufacturer:

Tarstone Road Maintenance Ltd

Declaration number:

EPDIE-24-200

Place of production:

Tarstone Road Maintenance Ltd
Dean Hill, Hayestown, Co Meath
C15 P9X9 Navan, Ireland

This declaration is based on Product Category Rules:

EN 15804:2012+A2:2019, EPD Ireland PCR Part A, Version 2.1, 2022 Complementary Product Category Rules for Bituminous Mixtures (c-PCR Bituminous Mixtures) DN-PAV-03077 January 2024

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. The EPD Program operator shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Type of EPD

Specific product EPD

Issue date:

27.02.2025

Declared unit:

1 tonne Polymer Modified Mastic Asphalt

Valid to:

26.02.2030

Scope of the EPD:

A1,A2,A3,A4,A5,C1,C2,C3,C4,D

Year of study:

Functional unit:

1 tonne of polymer modified mastic asphalt

Comparability:

Environmental Product Declarations from different programmes may not be directly 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

LCA consultant or person responsible for LCA:
EcoReview, Peter Seymour

Verification:

Independent verification of the declaration and data, according to ISO14025:2010

Third party verifier:
Stephen Forson

Approved:

SIGNATURE OF PROGRAMME OPERATOR

Pat Barry, CEO - Irish Green Building Council

Product

Product description:

Tarstone's polymer-modified mastic asphalt is a high-quality material designed for use on roads, airfields, and other trafficked areas. It incorporates a high-grade bitumen, which enhances durability and flexibility. The production process involves precise heating, mixing, and curing to ensure a homogeneous and robust product. The asphalt is applied at temperatures between 140-150°C for optimal performance. It is NSAI certified, meeting stringent quality standards. The site application process includes loading the mastic into a chamber, heating, and mixing it on-site, ensuring a consistent and durable surface suitable for heavy-duty use.

Product specification:

The polymer modified mastic asphalt is NSAI certified, ensuring compliance with I.S. EN 13108-6:2008 standards, and undergoes regular sampling and testing for quality control.

Technical data:

The PMMA comprises PMB 26/56-60 grade bitumen which binds together with a fine limestone filler and coarse aggregate. Per tonne the PMMA comprises in the order 50 to 150 kg of bitumen, 500 to 600 kg limestone filler and 300 - 400 kg of 6 mm chips.

Market/Geographical Area:

The polymer modified mastic asphalt is currently being supplied to projects throughout the island of Ireland.

Reference service life, product

Not applicable.

Reference service life, building or construction works

LCA: Calculation rules

Declared unit:

1 tonne Polymer Modified Mastic Asphalt

kg per Declared unit 1000

Cut-off criteria:

All relevant inputs and outputs - like 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.

Allocation:

The measurement of environmental impacts in this EPD uses the LCIA methodologies recommended for PEF 3.1. In this EPD, the waste processes are allocated in the relevant module. In the case of the use of secondary materials or energy recovered from secondary fuels, the system boundary between the system under study and the previous system (providing the secondary materials) is set where outputs of the previous system, e.g. materials, products, building elements or energy, reach the end-of-waste state. The modularity and the polluter payer principles have been followed.

Data quality:

In this LCA the data relating to the manufacturing of the PMMA, and the background processes for environmental impacts are less than 3 -6 years prior to 2023. Production was in 2023. The Ecoinvent version 3.9.1 was issued in March 2023,

The processes used in the production of the PMMA raw materials is geographically representative, as the production locations lies within the region for which the relevant Ecoinvent 3.9 environmental records have been selected, which are within Europe. The overall data Quality Level, according to Table E.1 of EN 15804:2012+A2:2019/AC :2021, Annex E, is classified as “very good”, for geographical, technical and time representativeness, as clarified under the various sub-headings below:

Geographical representativeness: Data is from the area under study (Europe), where all the raw materials come from western Europe. The geographical representativeness is thus assumed to be ‘very good’.

Technical representativeness: Data is from the processes and products under study. The same state of technology that is used by Tarstone is that defined in the goal and scope. The processes at Tarstone use electricity, propane and diesel. The electricity record is for electricity generated by renewables, The technical representativeness is thus assumed to be ‘very good’.

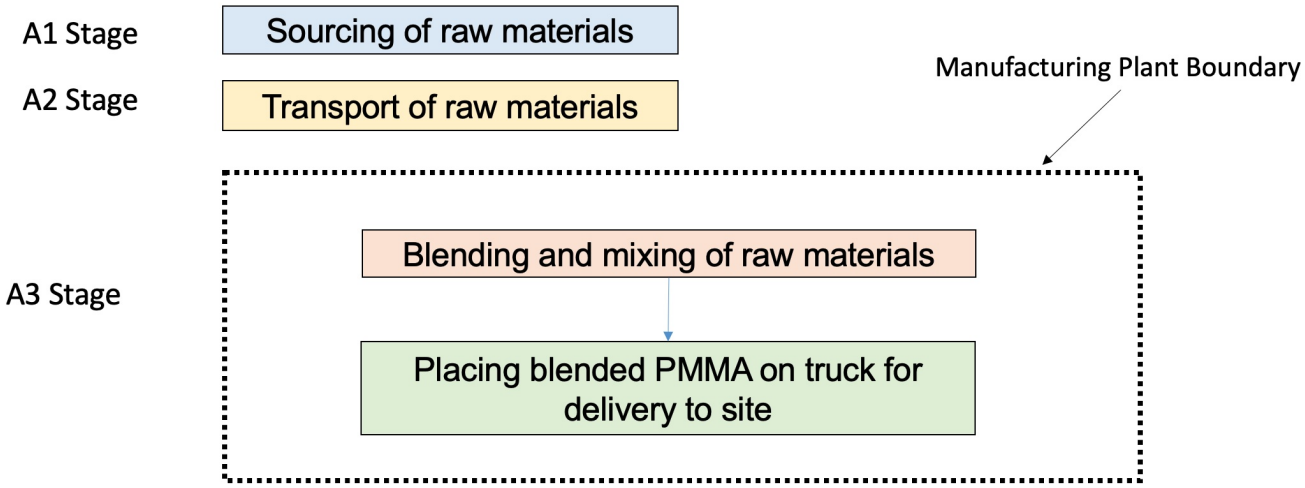
Time representativeness: The production year used in this LCA is 2023. The Ecoinvent version 3.9.1 database was used to represent energies, and materials. This version of Ecoinvent was issued in March 2023. The time representativeness is thus assumed to be ‘very good’.

Scope and type of EPD (X = Module declared; ND = Module not declared)

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

System boundary:

This LCA covers the Product (A1, A2 and A3), Transport to site (A4), Construction Process (A5), End of Life (C1 to C4) and Benefits/loads beyond the system boundary (D) Stages, as indicated above. This is termed: "Cradle to gate with options, modules C1 to C4, and module D". A schematic of these stages is presented in the flow diagram below.



Additional technical information:

Electricity modelling

The CO2 intensity of the electricity is 0.037 kg CO2 per kWh (modelled as wind, on-shore, using Ecoinvent 3.9.1).

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

A4. Transport to customer
The transport to the customer phase (A4), modelled on delivery of the products from Tarstone's production site in Co. Meath, to an average customer in Ireland, is assumed to be a distance of 90 km.

The amount of product placed on the truck bringing the material to site is in the order of 2 tonnes of PMMA product, on a truck of capacity of 16 tonnes. Installation equipment accounts for the remainder of the load on the truck., which is a permanent load. Thus transport is modelled as 16 tonnes going out, and 14 tonnes returning to production site.

A5. Installation
The mastic blocks are transported to the site by truck. At the production site the blocks are heated in a special chamber on the back of the truck to bring up to the required application temperature of 140 C. Heating is by propane gas. The heated mastic is mixed again and then applied in to place, manually. Diesel is used for the on-site mixing.

C. End of Life Stage
C1. Deconstruction and demolition
Deconstruction parameters are given in Table 6.6 of the TII PCR for bituminous mixtures [6]. The deconstruction impacts arise from the fuel consumption of the equipment required for cold milling, breaking, cleaning and sweeping the PMMA.

C2. Transport
Transport of removed material (i.e. site-won asphalt) is assumed to be a default distance of 100km from the removal of site-won asphalt from the site to the re-processing site, as per the TII PCR for bituminous mixtures [6].

C3. Waste Processing
It is assumed that 100% of the site-won PMMA is reprocessed into reclaimed asphalt. Of this site-won asphalt, the following end-of-life scenarios are assumed:

a) 55% is recycled into unbound foundation materials
b) 45% is recycled into new bituminous mixtures

The waste processing impacts arise from the fuel consumption of the equipment required for waste processing, being: crane & digger, and crusher, as outlined in the TII PCR for bituminous mixtures [6],

C4. Disposal
Module C 4 is considered zero, as 100% of site-won asphalt materials is reprocessed to reclaimed asphalt for re-use.

D. Environmental loads and benefits of recycling and product reuse
The benefits that accrue from recycling site-won PMMA arise from using the reclaimed material to replace virgin unbound foundation materials and virgin new bituminous mixtures.

100% of the PMMA removed from site at the end of life is reclaimed. Of this, 55% is recycled into unbound foundation materials, and 45% is recycled into new bituminous mixtures. The calculation model provided in appendix B of the TII PCR for bituminous mixtures [6] is used to determine mass flows and impacts for module D.

The net output flows per tonne of reclaimed PMMA are 550 kg recycled into unbound foundation material, and 450 kg recycled into new bituminous mixtures, being equal to 1,000 kg of the PMMA material.

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact												
Indicator		Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	6.22E+01	2.28E+01	5.78E+01	1.90E+02	3.18E+02	4.11E-04	1.63E+01	4.59E-04	0.00E+00	-1.83E+01
	GWP-fossil	kg CO_2 -eq	6.22E+01	2.28E+01	5.77E+01	1.90E+02	3.18E+02	4.11E-04	1.63E+01	4.59E-04	0.00E+00	-1.83E+01
	GWP-biogenic	kg CO_2 -eq	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	GWP-luluc	kg CO_2 -eq	3.05E-02	9.10E-03	7.22E-03	8.57E-02	7.16E-02	2.33E-07	6.51E-03	2.61E-07	0.00E+00	-1.57E-02
	ODP	kg CFC11 -eq	7.50E-05	5.27E-06	9.08E-07	4.04E-06	6.03E-06	5.55E-03	3.77E-06	7.88E-03	0.00E+00	-1.61E-05
	AP	mol H+ -eq	6.32E-01	6.46E-02	5.25E-01	3.82E-01	9.09E-01	3.62E-06	4.62E-02	4.07E-06	0.00E+00	-2.02E-01
	EP-FreshWater	kg P -eq	1.25E-03	1.62E-04	2.65E-04	1.46E-03	2.34E-03	2.17E-03	1.16E-04	3.30E-03	0.00E+00	-4.28E-04
	EP-Marine	kg N -eq	8.81E-02	1.28E-02	2.39E-01	9.25E-02	3.38E-01	2.38E-02	9.19E-03	3.63E-02	0.00E+00	-4.30E-02
	EP-Terrestial	mol N -eq	1.03E+00	1.43E-01	2.60E+00	9.62E-01	3.70E+00	6.29E-03	1.02E-01	9.32E-03	0.00E+00	-5.41E-01
	POCP	kg NMVOC -eq	5.15E-01	5.50E-02	7.71E-01	5.97E-01	1.41E+00	1.49E+01	3.94E-02	1.68E+01	0.00E+00	-1.80E-01
	ADP-minerals&metals[1]	kg Sb-eq	4.54E+03	8.07E-05	1.40E-04	5.92E-04	6.20E-04	2.33E-02	5.77E-05	2.61E-02	0.00E+00	-1.04E-04
	ADP-fossil[1]	MJ	2.19E+02	3.45E+02	7.35E+02	2.61E+03	4.19E+03	5.60E-07	2.47E+02	6.29E-07	0.00E+00	-1.04E+03
	WDP[1]	m^3	2.54E+01	1.05E+00	1.97E+00	9.93E+00	1.05E+01	2.34E-08	7.52E-01	3.10E-08	0.00E+00	-1.03E+01

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels; 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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment: EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Remarks to environmental impacts

Additional environmental impact indicators

Indicator		Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	3.83E-06	1.83E-06	1.44E-05	1.15E-05	1.77E-05	6.38E-02	1.31E-06	7.14E-02	0.00E+00	-2.07E-06
	IRP[2]	kgBq U235 -eq	2.06E+01	1.50E+00	1.65E-01	1.53E+00	1.39E+00	8.70E+00	1.07E+00	9.77E+00	0.00E+00	-4.61E+00
	ETP-fw[1]	CTUe	4.52E+03	2.71E+02	7.11E+02	2.46E+03	2.89E+03	3.38E-10	1.94E+02	3.77E-10	0.00E+00	-2.48E+03
	HTP-c[1]	CTUh	2.87E-08	8.71E-09	2.17E-08	7.70E-08	1.21E-07	4.91E-09	6.23E-09	5.99E-09	0.00E+00	-1.23E-08
	HTP-nc[1]	CTUh	7.47E-07	2.74E-07	5.10E-07	2.19E-06	2.97E-06	1.90E+00	1.96E-07	2.13E+00	0.00E+00	-2.31E-07
	SQP[1]	dimensionless	6.00E+02	2.41E+02	6.77E+01	1.35E+03	2.90E+02	0.00E+00	1.72E+02	0.00E+00	0.00E+00	-7.54E+02

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Resource use												
Indicator		Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
	PERE	MJ	3.77E+01	4.93E+00	1.21E+02	4.56E+01	5.81E+01	0.00E+00	3.53E+00	0.00E+00	0.00E+00	0.00E+00
	PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	3.77E+01	4.93E+00	1.21E+02	4.56E+01	5.81E+01	0.00E+00	3.53E+00	0.00E+00	0.00E+00	0.00E+00
	PENRE	MJ	1.24E+03	3.66E+02	7.82E+02	2.77E+03	4.60E+03	0.00E+00	2.62E+02	0.00E+00	0.00E+00	0.00E+00
	PENRM	MJ	3.82E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	5.06E+03	3.66E+02	7.82E+02	2.77E+03	4.60E+03	0.00E+00	2.62E+02	0.00E+00	0.00E+00	0.00E+00
	SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m^3	7.14E-01	3.91E-02	6.01E-02	3.57E-01	2.97E-01	0.00E+00	2.79E-02	0.00E+00	0.00E+00	0.00E+00

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Waste

Indicator		Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
	HWD	kg	1.95E-03	9.01E-04	4.97E-03	1.66E-02	2.01E-02	0.00E+00	6.45E-04	0.00E+00	0.00E+00	0.00E+00
	NHWD	kg	2.41E+00	1.81E+01	2.19E+00	1.08E+02	1.30E+01	0.00E+00	1.29E+01	0.00E+00	0.00E+00	0.00E+00
	RWD	kg	3.27E-02	2.33E-03	9.02E-05	1.03E-03	8.92E-04	0.00E+00	1.67E-03	0.00E+00	0.00E+00	0.00E+00

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Output flow

Indicator		Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+03	0.00E+00	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

Biogenic Carbon Content

Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2

Additional requirements

Dangerous substances

None of the substances contained in the product are listed in the “Candidate List of Substances of Very High Concern for authorisation”, or they do not exceed the limit for registration with the European Chemicals Agency.

Mandatory additional information on release of dangerous substances to indoor air, soil and water.

Bibliography

[1] ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organisation for Standardisation, ISO14040:2006.

[2] ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organisation for Standardisation, ISO14044:2006.

[3] ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organisation for Standardisation, ISO14025:2006.

[4] I.S. EN 15804:2012+A2:2019/AC :2021,: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', EN 15804:2012+A2:2019/AC :2021

[5] Product Category Rules: Part A, Implementation and use of EN 15804:2012+A1:2013, EN 15804:2012+A2:2019 and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations", version 2.1, issued on 05/03/2022.

[6] Complementary Product Category Rules for Bituminous Mixtures (c-PCR Bituminous Mixtures), Transport Infrastructure Ireland, DN-PAV-03077, January 2024.

[7] EcoChain, 2024, web: http://app.ecochain.com.

[8] https://eplca.jrc.ec.europa.eu/LCDN/developerEF.html

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