

Environmental Product Declaration

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

HYNDS PIPE SYSTEMS Lusit Retaining Wall System

EPD of multiple products, based on a representative product. The products covered in the EPD are listed on page 18.



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www.environdec.com

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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

Table of Contents



About us	4
Hynds Group Map	5
Hynds Sustainability	6
Product Information	7
General Information	19

ABOUT US



Founded in 1973 by John and Léonie Hynds, the privately owned Hynds Group of Companies is New Zealand's premier product supplier for the management of water and water-based waste in the civil and rural infrastructure markets.

Hynds Pipe Systems Limited is the largest operating company within the Hynds Group, and is split into two operating divisions: Manufacturing and Sales & Distribution.

Hynds Concrete Manufacturing operates six factory sites across New Zealand, operating independently audited ISO9001 quality, ISO45001 health and safety, and ISO14001 environmental management systems (see hynds.co.nz/about-us/ for certificates).

Hynds operates a sales & distribution network of 36 branches and 3 distribution centres throughout New Zealand supplying over 40 000 product types for drainage, watermain, environmental, industrial process and rural applications.

The Hynds' fleet of 70 delivery trucks ensure reliable stock availability and delivery to all corners of the country.

From its early inception five decades ago, Hynds has been focused on delivering positive change with industry-leading, sustainable solutions. The manufacture of products to support stormwater and wastewater treatment, and ultimately to protect the environment, remains at the heart of our product innovation today.

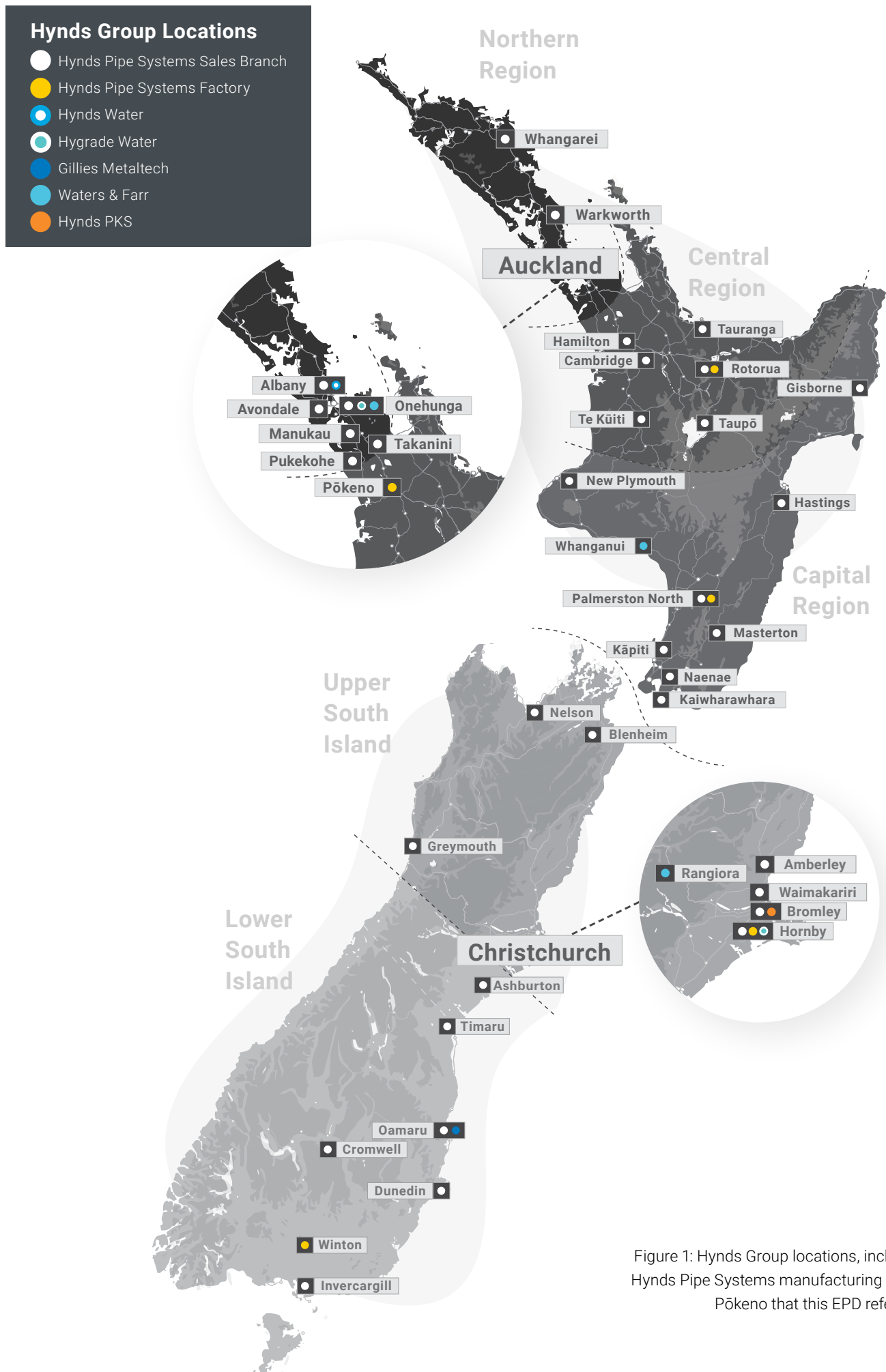


Figure 1: Hynds Group locations, including Hynds Pipe Systems manufacturing site in Pōkeno that this EPD refers to.

HYNDS SUSTAINABILITY

Our business was built around finding sustainable solutions to support the three waters (*drinking water, wastewater and stormwater infrastructure services*) and ultimately keeping our country's waterways clean and our communities safe – both for today and for future generations.

Hynds has adopted a sustainability framework which focuses on three strategic pillars; the planet (our natural environment), people (our people but also our wider communities and stakeholders) and products (innovating and building resilience into what we do to meet the needs of future generations).

Addressing the effects of climate change is a huge challenge that we all face. Hynds believes that addressing climate change will make us better off and is committed to New Zealand's transition to a low-emissions economy. Hynds has committed to a 42% reduction in Scope 1 (direct) and Scope 2 (indirect) carbon emissions by 2032.

To support our customer's sustainability goals, Hynds now offers a lower carbon product range, HyndsLC®. The new HyndsLC® range assists our customers in meeting their sustainability requirements without compromising on quality and durability.

For more information on Hynds sustainability framework and HyndsLC® range, visit

hynds.co.nz/sustainability/

or email sustainability@hynds.co.nz.

HYNDS[®]LC
Our low carbon future



PRODUCT INFORMATION

Products Covered by EPD

This EPD covers the Lusit Retaining Wall System manufactured at Hynds state-of-the-art precast concrete manufacturing plant in Pōkeno. The full range of products covered by this EPD are given in the Product Mass Table (Table 16).

The Lusit Retaining Wall System range is generally only supplied to North Island projects but can be shipped to South Island projects when required.

Product Description

As the leading manufacturer of reinforced concrete products in New Zealand, Hynds' Lusit Panels are available in a wide range of heights and thicknesses.

Hynds Reinforced Concrete Box Culvert are manufactured using high strength concrete (50 MPa or greater), hard drawn steel wire. The concrete consists of coarse and fine aggregates, cement, supplementary cementitious materials (SCMs) and chemical admixtures.

Lusit® Angle Supports (LAS elements) are a German-engineered and designed pre-cast retaining wall system that provides endless configurations and finishes for residential, commercial, industrial and roading applications.

Declared Unit

The declared unit for the EPD is one kg of reinforced concrete Lusit Panels. A conversion table is provided with product weights for all products covered by this EPD, as required (see Table 16).

Design Standard

Lusit Precast Concrete Retaining Wall Panels are designed and manufactured to the requirements of NZS 3101 and NZS 3109.

The Standard ranges of Hynds Reinforced Concrete Lusit Panels have a specified intended service life of 100 years when correctly installed in a non-aggressive environment.

Packaging

The product is transported without packaging.

Dangerous Substances

All products covered by this study as supplied are non-hazardous, and do not contain any substances of very high concern as defined by European REACH regulation in concentrations >0.1% (m/m). Precast concrete products and pipes are classified as non-dangerous goods according to the Land Transport Rule: Dangerous Goods 2005 (ECHA, 2022).

When concrete products are cut, sawn, abraded or crushed, dust is created which contains crystalline silica, some of which may be respirable (particles small enough to go into the deep parts of the lung when breathed in), and which is hazardous. Exposure through inhalation should be avoided. Dust from these products is classified as Hazardous under the Hazardous Substances and New Organisms Act 1996 (HSNO Act) and is subject to Workplace Exposure Standards (WorkSafe NZ WES-BEI indices Edition 13, April 2022).

Table 1: Industry classification

Product	Classification	Code	Category
Product name/type	UN CPC Ver.2	3755	Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone
	ANZSIC 2006	2034	Concrete Product Manufacturing

Content Declaration

Table 2: Composition of Lusit Retaining Wall System (per 1 kg)

Product components	Weight, kg	Post-consumer recycled material, weight-% of product	Biogenic material, weight-% of product	Biogenic material, kg C/product or declared unit
Aggregate	0.422 (0.410 - 0.506)	0	0	0
Fine sand	0.233 (0.202 - 0.237)	0	0	0
GP Cement	0.128 (0.124 - 0.153)	0	0	0
Slag	0.0295 (0.00603 - 0.0300)	0	0	0
Plasticiser	9.44E-04 (8.70E-04 - 9.59E-04)	0	0	0
Superplasticiser	9.44E-04 (7.38E-04 - 9.59E-04)	0	0	0
Limestone	0.0393 (0.00804 - 0.0400)	0	0	0
Water	0.102 (0.0706 - 0.104)	0	0	0
Bar	0.0417 (0.0256 - 0.102)	0	0	0
Mesh	0.00255 (0.00228 - 0.00507)	0	0	0
Total	1	0	0	0

*Individual masses may not sum to total due to rounding. See Table 21 for mass conversion factors.

No products declared within this EPD contain substances exceeding the limits for registration according to the European Chemicals Agency's "Candidate List of Substances of Very High Concern for authorisation" (European Union, 2024). Reinforced concrete products are not classified as dangerous goods according to the Land Transport Rule: Dangerous Goods 2005.

Table 3: Composition of packaging (per 1 kg of pipe)

Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg of product
Product's packaging	0	0	0
Total	0	0	0

Manufacturing Process

Hynds Lusit Retaining Wall System are manufactured at Hynds state-of-the-art, precast concrete manufacturing site in Pōkeno, Auckland.

Lusit Precast Concrete Retaining Wall Panels are manufactured using a manual wet-casting process, utilizing the latest European and Japanese mould technology to ensure that the product meets strict quality requirements. This process uses high strength, wet-cast concrete batched on-site and controlled curing conditions to provide high quality durable products.

When Hynds developed the state-of-the-art precast concrete manufacturing facility in Pōkeno in 2019, sustainability was front of mind. Rainwater is captured onsite and sent to a holding tank where it is mixed with onsite collected bore water and recovered wastewater from truck and machinery washdowns. This mixed water is used in concrete batching to reduce potable water use, with town supply water only used when there is insufficient recycled water. The on-site treatment of process water reduces the load on municipal infrastructure.

HYNDS PROCESS

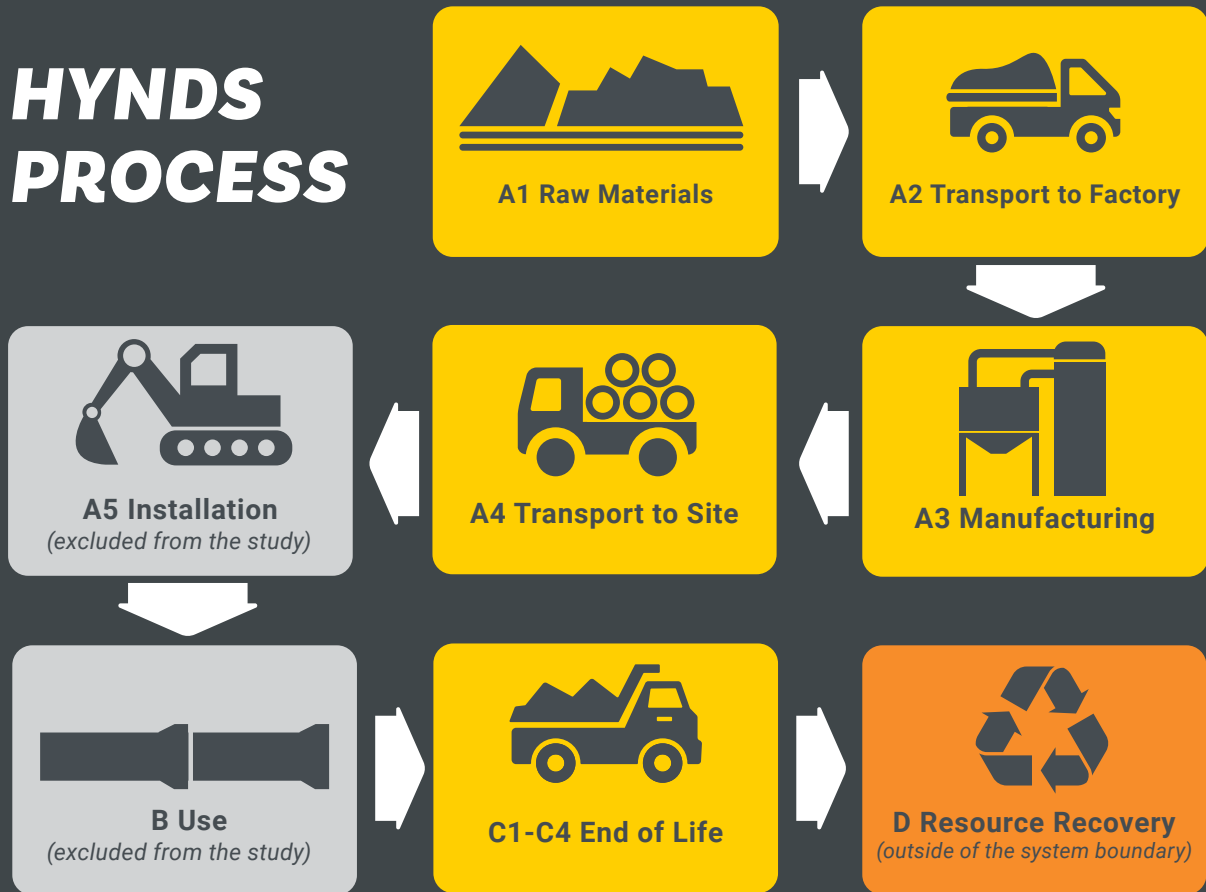


Diagram of Hynds process

System Boundaries

As shown in the table below, this EPD has a scope of cradle-to-gate with options, modules C1-C4, module D and with additional modules (type b). The additional module is A4.

Table 4: Modules included in the scope of the EPD

	Product stage			Construction process stage		Use stage							End of life stage				Recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	NZ	NZ	-	-	-	-	-	-	-	-	NZ	NZ	NZ	NZ	NZ
Share of specific data	76%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation: product groups	10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation: sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = included in the EPD; ND = Module not declared

*Share of specific data is calculated based on the GWP-GHG results and A1-A3 processes. Energy data (e.g. electricity, LPG) and material data pertaining to primary resource inputs (e.g. concrete, slag, GGBFS, steel) is specific, however data pertaining to the consumables used in manufacturing are not specific. This is consistent across both manufacturing sites.

Production (Modules A1-A3)

The production stage includes the environmental impacts associated with raw materials extraction and processing of inputs, transport to, between and within the manufacturing site, and manufacturing of average product at the exit gate of the manufacturing site. CO₂ absorption effects due to concrete carbonation during the products' life cycle are not taken into account in any of the declared modules.

Transport to Site (Module A4)

The average transport distance from Hynds Pōkeno manufacturing site to customer sites is 100 km.

End of Life (Modules C1-C4)

When infrastructure reaches the end of its functional life, it is typically demolished and disposed of making way for new infrastructure. Lusit Panels are a special case since they are typically buried and are often simply abandoned. Other options are for the Lusit Panels to be exhumed and sent for recycling or exhumed and sent to landfill.

Scenarios shall be realistic and representative of one of the most probable alternatives and shall not include processes or procedures that are not in current use, or which have not been demonstrated to be practical.

This study assumes that the most likely scenario is that the Channel Lusit Panels will be abandoned. It is not economically feasible to remove and recover Lusit Panels at the end of their

service life. According to Hynds, decommissioned Lusit Panels are usually left in ground. No additional processes are included at end-of-life to model the decommissioning of a Lusit Panel.

Recovery and Recycling potential (Module D)

Module D declares a potential credit or burden for the net scrap associated with a recycled product. As the Lusit Panel is modelled as abandoned in the ground there is no credit for concrete or steel recycled.

Default factors from PEF R2 values are therefore not used and are replaced with 0 (European Commission, 2020).

Table 5: End of life scenario and processes, per declared unit (1 kg)

Scenario / Module	Parameter	Left in ground
Deconstruction (C1)	Process and assumptions	n/a
	kg collected	0
Transport (C2)	Process and assumptions	n/a
	kg transported	0
Waste processing (C3)	Process and assumptions	n/a
	kg for re-use	0
	kg for recycling	0
Disposal (C4)	Process and assumptions	n/a
	kg disposed	0

Life Cycle Inventory (LCI) Data and Assumptions

Primary data was used for all manufacturing operations up to the factory gate, including upstream data for general purpose (GP) cement. Primary data were collected based on output data from Hynds systems during July 2023 – June 2024, excluding the sourcing of steel reinforcing wire and mesh which uses 2023 calendar year data.

Background datasets were obtained from Environmental Product Declarations (EPD) specific to suppliers in the case of steel and cement (EPD details omitted because of confidentiality), and EPDs covering similar products i.e. admixtures. All other materials were from the ecoinvent database 3.11 (Wernet, 2016). The reference year for most datasets range from 2019-2024.

Steam curing using natural gas as an energy input, takes place based on the need to turn around a product to fulfill an order. Records associated with steam curing use on a product by product basis is not available. Therefore, natural gas use has been allocated according to the mass of the concrete.

Electricity

Purchased electricity accounts for 100% of electricity use at Pokeno. It has been modelled using the residual electricity mix of the market.

The composition of the residual electricity grid mix of New Zealand is modelled in LCA FE based on published data for the year 1 April 2021 – 31 March 2022 (BraveTrace, 2023). The New Zealand residual electricity mix is made up of hydro (56.6%), geothermal (19.7%) natural gas (12.5%), wind (6.55%), coal (4.25%), biomass (0.266%) and biogas (0.160%).

Onsite consumption (3.00%), and the low voltage (<1kV) grid's transmission and distribution losses (6.73%) are calculated based on data from the Ministry of Business, Innovation & Employment (MBIE, 2023). The emission factor for the New Zealand residual grid mix for the GWP-GHG indicator is 0.151 kg CO₂-eq./kWh (based on EF3.1).

Transport

Primary transport data was collected for most input materials to the product. The transport data included the transport modes and distances from suppliers. Transport distances were mapped against each line of Bill of Material (BOM) data and used to calculate upstream transport impacts.

All auxiliary materials and minor input materials were estimated to travel 55 km by truck and be shipped 9 358 km (from Shanghai).

Transport modes:

- Transport, freight, lorry 7.5-16 metric ton, EURO5.
- Transport, freight, sea, container ship.

Cut off criteria

In this study capital goods and infrastructure have been included in the background datasets as provided by ecoinvent (Wernet, 2016). It is not possible, within reasonable effort, to subtract the data on infrastructure/capital goods from these datasets. The results, therefore, of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/ infrastructure in generic datasets, in case infrastructure/ capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes. In line with the PCR, personnel-related activities, such as transportation to and from work, are not accounted for in the LCI, while all process related transport are included.

Allocation

It was not possible to discern the specific quantities of energy (natural gas, electricity, diesel), water, consumables, dunnage and wastes per product. Data was available at the site-wide level and is allocated to products.

Mass of concrete is used for allocation:

- Allocation of energy (natural gas, electricity and diesel) is based on mass of concrete per product as concrete production and movement is the main driver for on-site energy consumption.
- Water input is allocated based on mass of concrete as batching is the primary area of water use.
- Inputs and (outputs) such as consumables, dunnage and wastes (data collected at site-wide level) are allocated based on mass of concrete for consistency.

Waste generated by the site are not product specific and hence are allocated per product based on mass allocation (i.e. as a factor of specific product mass and total mass of products manufactured at the facility). Reinforcing steel wire and steel fibres including any steel scrap inputs is based on EPD data. The following allocation process occurred.

- Steel Supplier 1's reinforcing bar and wire co-product allocation is proportioned by physical mass according to EN15804 and ISO14044 guidance. Scrap steel input allocation is unclear and likely to have zero burden applied.
- Steel Supplier 2 did not require co-product allocation as data was provided for individual products. Scrap steel input was modelled with an environmental burden based on economic allocation.
- Steel fibre Supplier has a co-product allocation based on product mass basis (17% of total mass production in the manufacturer's facility). Scrap steel input allocation is unclear and likely to be zero burden.

Noting the above Steel Fibre Supplier and Steel Supplier 1 EPDs, PCR suggests that: "Some LCI databases include datasets that are described as being compliant with the allocation rules of EN 15804, but which have been modelled using cut-off allocation (i.e., waste allocation according to Section 4.5.2) for some production (A1-A3) scrap.... Such datasets can be used without adjustments, if the production scrap has no, negligible, or negative economic value (as co-product allocation then yields the same or nearly the same result as cut-off allocation, see Section 4.5.2) or if it can be justified that co-product allocation is not possible (if so, the use of cut-off allocation shall be declared in the EPD). Otherwise, such datasets shall be adjusted by manually adding an environmental burden in compliance with EN 15804 or as a conservative assumption" (section 4.5.5, (EPD International, 2024)).

In the case of Steel Supplier 1 and Steel Fibre Supplier EPDs (used as inputs for this study), any open scrap inputs into

manufacturing remain unknown, and so have been treated as 'burden free.' This is not consistent with the PCR – however, adjusting Steel Supplier 1 and Steel Fibre Supplier EPDs is not possible. As per Section 4.5.2 of the PCR, if it can be justified that co-product allocation is not possible the use of cut-off allocation shall be declared in the EPD.

Explanation of Representative Products & Variation

This is an EPD of multiple products, based on a representative product.. The representative product is closest to or matches the sales-weighted average GWP-GHG impacts of the product group. The variation between individual products in the group is up to 10% for modules A1-A3, for the GWP-GHG indicator.



RESULTS

Assessment Indicators

The results tables describe the different environmental indicators for each product per declared unit, for each declared module. The EN 15804 reference package based on EF 3.1 has been used.

The first section of each table contains the environmental impact indicators, describing the potential environmental impacts of the product as shown in Table 11. The second section shows the resource indicators, describing the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water, as

shown in Table 12. The final section of each table displays the waste and other outputs, as shown in Table 13.

The use of primary energy is separated into energy used as raw material and energy used as energy carrier as per option C in Annex 3 of the PCR (EPD International 2024).

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Energy indicators (MJ) are always given as net calorific value.

Table 6: Indicators for life cycle impact assessment

Impact category	Indicator	Unit
Climate change – total	GWP-total	kg CO ₂ -eq.
Climate change – fossil	GWP-fossil	kg CO ₂ -eq.
Climate change – biogenic	GWP-biogenic	kg CO ₂ -eq.
Climate change – land use and land use change	GWP-luluc	kg CO ₂ -eq.
Ozone depletion	ODP	kg CFC-11 eq.
Acidification	AP	Mole of H ⁺ eq.
Eutrophication aquatic freshwater	EP-freshwater	kgP eq.
Eutrophication aquatic marine	EP-marine	kgN eq.
Eutrophication terrestrial	EP-terrestrial	Mole of N eq.
Photochemical ozone formation	POCP	kgNMVOC eq.
Depletion of abiotic resources – minerals and metals ^{1,2}	ADP-m&m	kgSb eq.
Depletion of abiotic resources – fossil fuels ¹	ADP-fossil	MJ
Water use ¹	WDP	m ³ world equiv.



Table 7: Life cycle inventory indicators on use of resources

Indicator	Abbreviation	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ
Use of renewable primary energy resources used as raw materials	PERM	MJ
Total use of renewable primary energy resources	PERT	MJ
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ
Total use of non-renewable primary energy resources	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Total use of net fresh water	FW	m ³

Table 8: Life cycle inventory indicators on waste categories and output flows

Indicator	Abbreviation	Unit
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Components for reuse	CRU	kg
Materials for energy recovery	MER	kg
Materials for recycling	MFR	kg
Exported electrical energy	EEE	MJ
Exported thermal energy	EET	MJ



Table 9: Biogenic carbon content indicators

Indicator	Abbreviation	Unit
Biogenic carbon content - product	BCC-prod	kg
Biogenic carbon content - packaging	BCC-pack	kg

Table 10: Additional Environmental Impact Indicators

Indicator	Abbreviation	Unit
Climate Change ³	GWP-GHG	kg CO ₂ -eq.
Particulate Matter emissions	PM	Disease incidences
Ionising Radiation – human health ⁴	IRP	kBq U235 eq.
Eco-toxicity (freshwater) ⁵	ETP-fw	CTUe
Human Toxicity, cancer ⁵	HTP-c	CTUh
Human Toxicity, non-cancer ⁵	HTP-nc	CTUh
Land use related impacts / soil quality ⁵	SQP	Dimensionless

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

²The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/ infrastructure in generic datasets, in case infrastructure/ capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

³ This indicator should be identical to GWP-total except that the CF for biogenic CO₂ is set to zero. It has been included in the EPD following the PCR (EPD International, 2024). In this study, it is calculated by subtracting the value of Climate change – biogenic (GWP-biogenic) from the value of Climate change – total (GWP-total) since the ecoinvent Excel LCIA results do not include the indicator.

⁴ 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.

⁵The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator



Environmental performance per 1 kg of Lusit Retaining Wall System

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Table 11: Core environmental indicators

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D	A-C
GWP-total	kg CO ₂ -eq.	2.39E-01	2.56E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	41.6%
GWP-fossil	kg CO ₂ -eq.	2.39E-01	2.56E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	41.6%
GWP-biogenic	kg CO ₂ -eq.	6.40E-04	1.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.81%
GWP-luluc	kg CO ₂ -eq.	2.22E-04	1.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	25.4%
ODP	kg CFC11-eq.	4.03E-09	3.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56%
AP	Mole of H ⁺ eq.	1.78E-03	8.51E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	17.1%
EP-freshwater	kg P eq.	1.31E-04	2.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	37.7%
EP-marine	kg N eq.	3.15E-04	2.64E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	18.3%
EP-terrestrial	Mole of N eq.	4.39E-03	2.87E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	12.1%
POCP	kg NMCOC eq.	4.60E-03	1.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37%
ADP-m&m	kg Sb-eq.	4.33E-07	8.60E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	18.5%
ADP-fossil	MJ	2.03E+00	3.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	99.8%
WDP	m ³ world eq.	2.10E-01	1.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	97.9%

Table 12: Resource use indicators

Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	3.79E+00	5.08E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ	2.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	5.89E+00	5.08E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRE	MJ	1.99E+00	3.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRM	MJ	1.94E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.01E+00	3.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	7.65E-02	1.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	5.65E-03	1.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	5.11E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	1.21E-02	4.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The results for A1-A3 should not be analysed without considering the impacts represented by module C.

Table 13: Waste output flow indicators

Waste and output flows	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	5.77E-03	7.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	8.35E-02	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	3.87E-06	2.08E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	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
MER	kg	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
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 14: Additional indicators

Waste and output flows	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ -eq.	2.38E-01	2.56E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM	Disease incidences	2.15E-08	1.73E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IRP	kBq U235 eq.	4.09E-03	2.84E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETP-fw	CTUe	1.09E+00	6.94E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTPc	CTUh	2.99E-10	4.06E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTPnc	CTUh	8.69E-09	2.04E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SQP	Pt	7.42E-02	1.77E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 15: Biogenic carbon indicators

Indicators	Units	A1 - A3
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0

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

WEIGHT CONVERSION TABLE

Table 16: Lusit Retaining Wall System products covered by this EPD and their weights for conversion.

Product code	Product full name	Product mass (kg per 1 unit of pipe)	Representative product
LSSHR1200200	Lusit - Reverse 1.2m Heavy Duty	904	
LSSHR1400200	Lusit - Reverse 1.4m Heavy Duty	983	
LSSHR1600200	Lusit - Reverse 1.6m Heavy Duty	1 082	
LSSL1400150	Lusit LAS Element 15er 140H 50Fcm L-Light	685	
LSSL2000200	Lusit LAS Element 20er 200H 65Fcm L-Light	1 327	
LSSL2400200	Lusit LAS Element 20er 240H 80Fcm L-Light	1 543	
LSSL3000250	Lusit LAS Element 25er 300H 110Fcm L-Light	2 493	Yes
LSSM1000150	Retaining Panel Conc 100Hx50F cm 15er LAS L-Medium Lusit	572	
LSSM1200150	Retaining Panel Conc 120Hx50F cm 15er LAS L-Medium Lusit	624	
LSSM1400150	Retaining Panel Conc 140Hx65F cm 15er LAS L-Medium Lusit	774	
LSSM1600150	Retaining Panel Conc 160Hx65F cm 15er LAS L-Medium Lusit	850	
LSSM1800150	Retaining Panel Conc 180Hx80F cm 15er LAS L-Medium Lusit	997	
LSSM2000200	Retaining Panel Conc 200Hx80F cm 20er LAS L-Medium Lusit	1 743	
LSSM2200200	Retaining Panel Conc 220Hx95F cm 20er LAS L-Medium Lusit	1 581	
LSSM2400200	Retaining Panel Conc 240Hx95F cm 20er LAS L-Medium Lusit	1 678	
LSSM2600200	Retaining Panel Conc 260Hx110F cm 20er LAS L-Medium Lusit	1 869	
LSSM2800250	Retaining Panel Conc 280Hx110F cm 25er LAS L-Medium Lusit	2 327	
LSSM3000250	Retaining Panel Conc 300Hx130F cm 25er LAS L-Medium Lusit	2 758	
LSSM3200250	Retaining Panel Conc 320Hx130F cm 25er LAS L-Medium Lusit	2 770	
LSSM3400250	Retaining Panel Conc 340Hx140F cm 25er LAS L-Medium Lusit	2 972	
LSSM3600250	Retaining Panel Conc 360Hx140F cm 25er LAS L-Medium Lusit	3 291	
LSSM3800250	Retaining Panel Conc 380Hx160F cm 25er LAS L-Medium Lusit	3 558	
LSSM4000250	Retaining Panel Conc 400Hx160F cm 25er LAS L-Medium Lusit	3 686	
LSSMR1000150	Retaining Panel Conc 100Hx50F cm 15er LAS Rev L-Med Lusit	514	
LSSMR1200150	Retaining Panel Conc 120Hx50F cm 15er LAS Rev L-Med Lusit	583	
LSSMR1400150	Retaining Panel Conc 140Hx65F cm 15er LAS Rev L-Med Lusit	710	
LSSMR1600150	Retaining Panel Conc 160Hx65F cm 15er LAS Rev L-Med Lusit	781	

LSSMR1800150	Retaining Panel Conc 180Hx80F cm 15er LAS Rev L-Med Lusit	905	
LSSMR2000200	Retaining Panel Conc 200Hx80F cm 20er LAS Rev L-Med Lusit	1 280	
LSSMR2200200	Retaining Panel Conc 220Hx95F cm 20er LAS Rev L-Med Lusit	1 456	
LSSMR2400200	Retaining Panel Conc 240Hx95F cm 20er LAS Rev L-Med Lusit	1 554	

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The Technical Committee of the International EPD System.
See www.environdec.com for a list of members.

Chair:

The most recent review chair: Claudia Peña, PINDA LCT SpA.
The review panel may be contacted via the Secretariat:
www.environdec.com/contact

Independent third-party verification of the declaration and data, according to ISO 14025:

☒ EPD verification (by individual verifier)

Third-party verifier:

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Procedure for follow-up of data during EPD validity involved third-party verifier

☐ Yes

☒ No

An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR (Product Category Rules).

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

HYNDS

A thick, bright yellow curved line that starts under the 'H' and sweeps upwards and to the right, ending under the 'S', resembling a stylized smile or a swoosh.