Environmental Product Declaration

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

HYNDS PIPE SYSTEMS HySpec Reinforced Concrete Pipes Class 6

EPD of multiple products, based on a representative product. The products covered in the EPD are listed on page 17.

THE INTERNATIONAL EPD® SYSTEM

AUSTRALASIA EPD® INTERNATIONAL EPD SYSTEM

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HYNDS

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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.

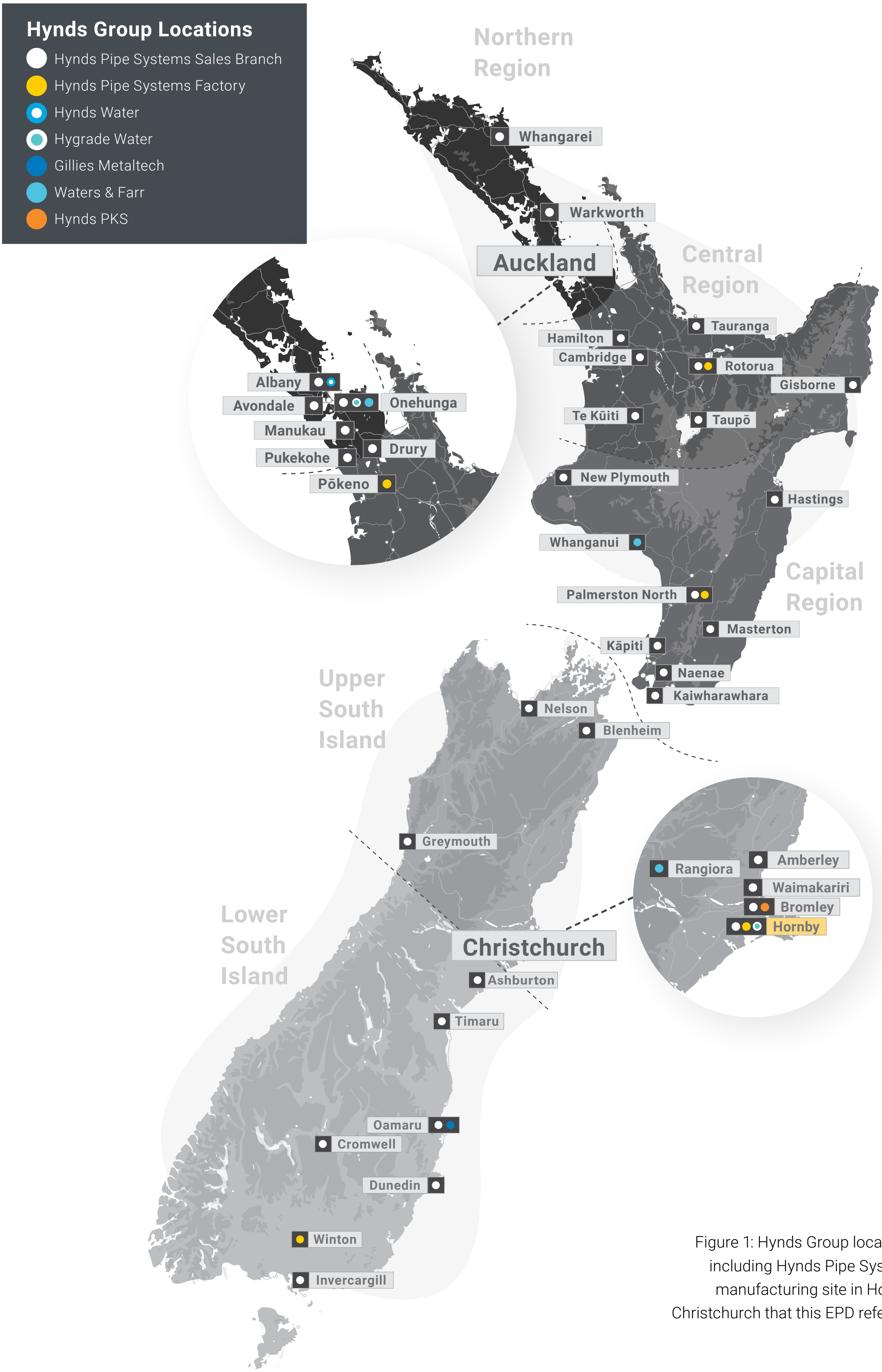


Figure 1: Hynds Group locations, including Hynds Pipe Systems manufacturing site in Hornby, Christchurch that this EPD refers to.

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.

HYNDSLC®
Our low carbon future

PRODUCT INFORMATION

Products Covered by EPD

This EPD covers the HySpec Reinforced Concrete Pipes Class 6 manufactured at Hynds precast concrete manufacturing plant in Hornby, Christchurch. The full range of products covered by this EPD are given in the Product Mass Table (Table 16).

The HySpec Reinforced Concrete Pipes Class 6 range is generally only supplied to South Island projects.

Product Description

As the leading manufacturer of reinforced concrete pipe in New Zealand, Hynds' pipes are available in a wide range of diameters and strength classes.

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

HySpec Reinforced Concrete Pipes have a belled socket joint type, also referred to as a rubber ring joint, which allows for easy installation and to meet necessary flexure characteristics.

Declared Unit

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

Design Standard

Hynds HySpec Concrete Pipes are designed and manufactured to the requirements of AS/NZS 4058:2007. They are designed to suit a 'normal' environment, as defined in AS/NZS 4058:2007.

The Standard ranges of Hynds Reinforced Concrete Pipes 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. Provide this reference here (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 HySpec Reinforced Concrete Pipes Class 6 (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	0.512 (0.504 - 0.516)	0	0	0
Fine sand	0.256 (0.252 - 0.258)	0	0	0
GP Cement	0.158 (0.156 - 0.160)	0	0	0
Plasticiser	0.00158 (0.00155 - 0.00159)	0	0	0
Water	0.0371 (0.0365 - 0.0374)	0	0	0
Wire	0.0355 (0.0280 - 0.0497)	0	0	0
Total	1	0	0	0

**Individual masses may not sum to total due to rounding. See Table 16 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 pipes are not classified as dangerous goods according to the Land Transport Rule: Dangerous Goods 2005.

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

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 HySpec Reinforced Concrete Pipes Class 4 are manufactured at Hynds precast concrete manufacturing site in Hornby, Christchurch, using spun pipe technology.

Thin-walled spun concrete pipes have been proven in New Zealand since the 1930's. The centrifugal spinning process has the unique advantage of a reduction in the water/cement ratio and a dense concrete pipe without inducing excessive stresses into the reinforcing cage. The spinning process generates highly uniform and passive compaction forces up to x100 gravitational force.

To manufacture HySpec pipes, high strength concrete is batched on site and poured directly into steel moulds. The moulds are then spun to compact the concrete, giving a uniform and strong pipe wall. The spun pipes are cured inside the steel moulds in controlled conditions. This eliminates relaxation stresses within the uncured pipe and ensures the integrity and durability of the pipe structure.

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 modules are A4 and A5.

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
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	NZ	NZ	NZ	-	-	-	-	-	-	-	NZ	NZ	NZ	NZ	NZ
Share of specific data		85%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
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. CO_2 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)

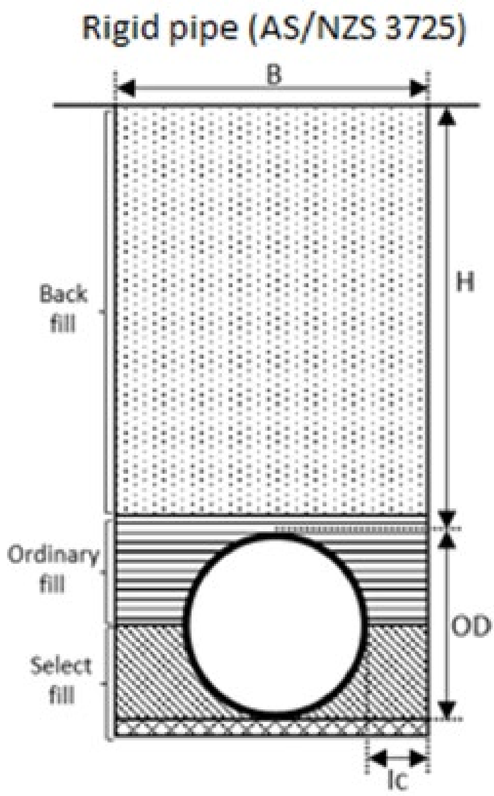
The average transport distance from Hynds Christchurch manufacturing site to customer sites is 100 km.

Installation (A5)

For the EPDs, Module A5 has been modelled using the representative product for each group and assuming an open trench installation. The EPDs also present additional results for module A5 for the diameter ranges included in the product group.

Installation activities like excavation, fill placement, and rubber seals depend on trench geometry and length, not pipe mass. For modelling, scenarios were first defined per metre of pipe per diameter. Results were then converted to per kilogram using average mass per metre for each group. The reported per kilogram values show installation scenario per declared unit, not implying impacts scale linearly with pipe mass, which varies with wall thickness, not diameter.

Hynds' pipes are designed for underground infrastructure applications. They are usually installed in trenches, with imported aggregate providing bedding and support, and a rubber ring seal placed between each pipe. The figure below shows a typical trench-type pipe installation with an H1 support, where the trench size, excavation volume, and aggregate quantity scale with the outer diameter of the pipe (OD) (Standards Australia, 2002; Standards Australia, 2007).



Pipe Installation (Standards Australia, 2002; Standards Australia, 2007)

The following assumptions have been made, and represent the most likely scenario for installation, considering a trench size based on AS/NZS 3725:

- 1 m height above pipe
- H1 installation
- 100% imported select fill
- 50 km distance, fill at quarry to site
- Excavated material not removed from site
- 80% native soil compaction
- 85% bedding and haunch compaction, 80% backfill compaction
- Excavator emissions for backfilling and placing pipe
- Rubber ring for seal

The imported fill quantity depends on trench size, and excavation is also based on it, doubled to cover trench digging and pipe embedding and compacting. Rubber seal weight depends on joint type and pipe size. Table 5 shows installation specification by pipe diameter.

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. Pipes are a special case since they are typically buried and are often simply abandoned. Other options are for the pipes 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 pipes will be abandoned. It is not economically feasible to remove and recover pipes at the end of their service life. According to Hynds, decommissioned pipes are usually left in ground. No additional processes are included at end-of-life to model the decommissioning of a pipe.

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 pipe 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: Installation specifications according to diameter size

Diameter	External diameter (mm)	Imported fill (kg)	Transport of fill 50 km to site (kg.km)	Trench excavation, doubled (m^3)	Rubber seal (kg)
DN 525-675	779	368	18 400	5.28	0.389
DN 750 - 900	1 026	528	26 400	7.66	0.619
DN 1050-1350	1 520	1 152	57 600	14.16	0.996
DN 1500 - 1800	2 040	1 760	88 000	22.56	1.85

Table 6: 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 avaialble. Therefore, natural gas use has been allocated according to the mass of the concrete.

Electricity

Purchased electricity accounts for 100% of electricity use at Christchurch. 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 CO_2-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 24 km by truck and be shipped 10 622 km (from Shanghai).

Transport modes:

- Transport, freight, lorry 7.5-16 metric ton, EURO5.

- Transport, freight, sea, container ship.

Cut off criteria

thinkstep consistently exclude impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the foreground production process, ('capital goods') regardless of potential significance.

Infrastructure/capital goods are excluded from all MLC datasets. An important exception is the inclusion of capital goods for electricity generation, where the capital goods are very important for modelling of changes towards more renewable generation. Capital goods related to electricity generation are included in all MLC electricity datasets.

Note: The system boundaries on manufacturing of equipment and for employees are not regarded as limiting the scope of the inventory or as an incomplete inventory (i.e. a cut-off).

Cut-off criteria were applied to the following:

Cut-off was applied to to the packaging of raw materials and the packaging materials which accompany the wooden dunnage (included) in minor quantities. Raw materials are delivered in bulk and represents a proportion below 1% of cumulative mass and environmental relevance of inputs to the product.

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 (see Table 17) 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 7% 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 7: 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 8: 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 9: 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 10: Biogenic carbon content indicators

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

Table 11: 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

[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 experience with the indicator.

[2] The 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 CO_2 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.

[5] 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 experience with the indicator

Environmental performance per 1 kg of HySpec Reinforced Concrete Pipes Class 6

Table 12: Core environmental indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D	A-C
GWP-total	kg CO_2-eq.	2.14E-01	2.55E-02	3.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.74%
GWP-fossil	kg CO_2-eq.	2.14E-01	2.55E-02	3.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73%
GWP-biogenic	kg CO_2-eq.	2.94E-04	1.20E-05	6.94E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06%
GWP-luluc	kg CO_2-eq.	6.10E-05	1.11E-05	2.19E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	24.4%
ODP	kg CFC11-eq.	3.84E-09	3.14E-10	4.90E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64%
AP	Mole of H+ eq.	1.43E-03	8.49E-05	2.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	20.4%
EP-freshwater	kg P eq.	1.36E-04	2.78E-06	6.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94%
EP-marine	kg N eq.	2.17E-04	2.64E-05	7.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	23.0%
EP-terrestrial	Mole of N eq.	3.55E-03	2.87E-04	7.96E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	14.9%
POCP	kg NMCOC eq.	5.12E-03	1.13E-04	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92%
ADP-m&m	kg Sb-eq.	3.29E-07	8.59E-08	1.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	20.9%
ADP-fossil	MJ	1.47E+00	3.47E-01	5.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	20.6%
WDP	m^3 world eq.	1.10E+00	1.76E-03	2.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.306%

Table 13: Resource use indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.71E-01	5.08E-03	2.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ	1.96E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.71E-01	5.08E-03	2.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRE	MJ	1.45E+00	3.47E-01	5.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRM	MJ	1.97E-02	0.00E+00	3.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.47E+00	3.47E-01	5.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	8.20E-02	1.45E-04	3.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	6.98E-03	1.77E-06	1.58E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	6.34E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.53E-02	4.48E-05	4.73E-04	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 14: Waste output flow indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.76E-03	7.89E-04	1.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	3.82E-02	1.55E-02	4.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	3.68E-06	2.07E-08	1.03E-07	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	0.00E+00
MFR	kg	8.00E-05	3.95E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	2.36E-08	2.90E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	8.17E-05	2.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	4.61E-05	3.16E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 15: Additional indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO_2-eq.	2.14E-01	2.55E-02	3.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM	Disease incidences	1.23E-08	1.73E-09	4.21E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IRP	kBq U235 eq.	7.61E-01	2.84E-04	1.41E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETP-fw	CTUe	8.52E-01	6.93E-02	9.54E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTPc	CTUh	3.12E-10	4.05E-12	6.91E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTPnc	CTUh	9.97E-09	2.03E-10	2.33E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SQP	Pt	5.72E-01	1.77E-01	2.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 16: 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 CO_2

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

WEIGHT CONVERSION TABLE

Table 17: HySpec Reinforced Concrete Pipes Class 4 products covered by this EPD and their weights for conversion.

Product code	Product description	Product mass (kg per 1 unit of pipe)	Representative product
0375RJ1.5ZHYS	Pipe Conc Ø375 2.5m RJ Spun CL6	465	Yes
0375RJC6HYS1.2	HYSPEC SPUN CL6 375x1.2m RJ short	208	
0450RJ1.5ZHYS	Pipe Conc Ø450 2.5m RJ Spun CL6 Hyspec	645	
0525RJ1.5Z1.72	Pipe Conc Ø525 1.72m RJ Spun CL6	558	
0525RJ1.5ZHYS	Pipe Conc Ø525 2.5m RJ Spun CL6	786	
0600RJ1.5Z1.72	Pipe Conc Ø600 1.72m RJ Spun CL6	684	
0600RJ1.5ZHYS	Pipe Conc Ø600 2.44m RJ Spun CL6	940	
0675RJ1.5Z1.72	Pipe Conc Ø675 1.72m RJ Spun CL6	856	
0675RJ1.5ZHYS	Pipe Conc Ø675 2.44m RJ Spun CL6	1 165	
0750RJ1.5ZHYS	Pipe Conc Ø750 2.44m RJ Spun CL6 Hyspec	1 308	
0825RJ1.5ZHYS	Pipe Conc Ø825 2.44m RJ Spun CL6	1 482	
0900RJ1.5ZHYS	Pipe Conc Ø900 2.44m RJ Spun CL6	2 030	
1050RJ1.5ZHYS	Pipe Conc Ø1050 2.44m RJ Spun CL6	2 570	
1200RJ1.5ZHYS	Hyspec Spun CL6 Ø1200mm×2.44m RJ Pipe	2 953	
1350RJ1.5ZHYS	Pipe Conc Ø1350 2.44m RJ Spun CL6 Hyspec	3 311	
1600RJ1.5ZHYS	Pipe Conc Ø1600 2.44m RJ Spun CL6 Hyspec	4 663	
1800RJ1.5ZHYS	Pipe Conc Ø1800 2.44m FJ Spun CL6 Hyspec	6 044	

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General information

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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).

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