Environmental Product Declaration

EPD of multiple products, based on the average results of the product group. The products covered in the EPD are listed on page 19. In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

HYNDS PIPE SYSTEMS
Hyforce® Concrete Jacking Pipes Class 4 In-Wall Joint

EPD® THE INTERNATIONAL EPD® SYSTEM

AUSTRALASIA EPD® ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

Programme:	The International EPD® System, www.environdec.com	Fully aligned regional hub: EPD Australasia, https://epd-australasia.com/
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HYNDS

Table of Contents

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.

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.

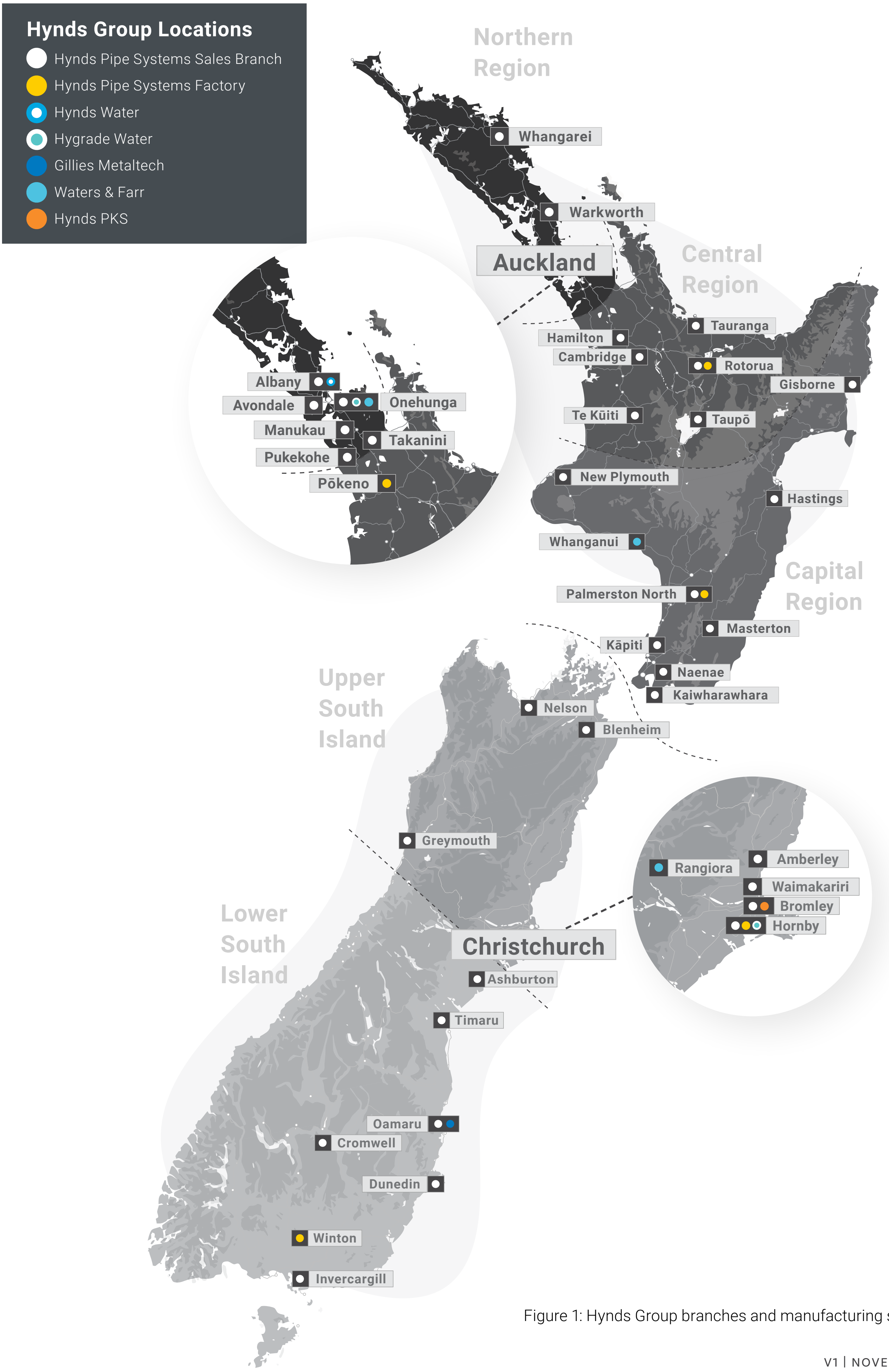

Figure 1: Hynds Group branches and manufacturing sites

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. This target is aligned with the Science Based Targets initiative goal of limiting warming to 1.5˚C (SBTi, 2021a).

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. The range can be tailored to meet specific project requirements and embodied carbon reduction targets, including net zero carbon.

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 Class 4 Hyforce In-Wall Joint Concrete Jacking Pipes, with and without a PERFECT PE internal liner, 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).

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 Hyforce 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, supplementary cementitious materials (SCM's) and chemical admixtures.

Hynds PERFECT® Concrete Pipes incorporate a PE liner to give the pipe increased resistance to H_2SO_4 and can withstand a chemical strain of pH1–pH14. The internal PERFECT® Connector provides a tight seal and flexibility from pipe to pipe.

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.

Design Standard

Hynds Pinnacle® and Perfect® 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.

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


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Content Declaration

*Table 2: **Composition of Hyforce Pipe Class 4 In-Wall Joint (per 1 kg)***

Product components	Weight, kg	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg	Environmental / hazardous properties
Aggregate	4.01E-01 – 4.18E-01	0	0	Crystalline-silica (quartz) may be a constituent.
Fine sand	2.19E-01 – 2.65E-01	0	0	Crystalline-silica (quartz) may be a constituent.
GP Cement	1.37E-01 – 1.49E-01	0	0	Contains traces of Chromium VI (hexavalent).
Slag	6.18E-02 – 6.82E-02	0	0	Crystalline-silica (quartz) may be a constituent, may contain traced of metals.
Plasticiser	≤1.69E-03	0	0	None
Superplasticiser	≤6.83E-04	0	0	None
Limestone	3.38E-02 – 3.82E-02	0	0	Crystalline-silica (quartz) may be a constituent.
HDPE	≤6.82E-03	0	0	None
Water	5.20E-02 – 8.61E-02	0	0	None
Reinforcing steel wire	2.30E-02 – 3.51E-02	0	0	*None*
Total	1	0	0	

Manufacturing Process

Hynds Hyforce Reinforced Concrete Jacking Pipes are manufactured at Hynds state-of-the-art, precast concrete manufacturing site in Pokeno, Auckland.

Hynds Hyforce Reinforced Concrete Jacking Pipes are manufactured by two processes. The 525 to 1350mm Ø range are manufactured using a highly automated process utilising the latest European manufacturing technology. The process features controlled concrete batching, placing and curing techniques, using high performance self-compacting or super workable concrete producing high quality durable products.

The automated manufacturing process also includes in-line vacuum testing of the full pipe length. This state-of-the-art process helps to ensure that a high-quality pipe is produced consistently, with smooth surface finishes and precision dimensional accuracy especially around the Joint profile.

Larger Hynds Hyforce Reinforced Concrete Jacking Pipes are manufactured using a wet-casting process, utilising 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.

Hynds PERFECT® PE Lined Concrete Pipes are only manufactured using the highly automated process utilising the latest European manufacturing technology. Multiple anchoring points are used to connect the liner tightly to the surrounding concrete pipe. The high anchor density locked to the pipe sections and the optimum anchor geometry developed for PERFECT® Pipe facilitates a reliable connection right into the sleeve.

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.

Diagram of Hynds process

System boundaries

As shown in the table below, this EPD is cradle to gate modules (A1-A3) with options (A4) and modules C1-C4 and module D.

Modules A5 and B1-B7 are excluded as it is dependent on multiple scenarios and best modeled at the project level.

Table 3: ***Modules included in the scope of the EPD***

	Product stage			Construction process stage		Use stage							End of life stage				Resource Recovery
	Raw material supply	Transport of raw materials	Manufacturing	Transport to customer	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to waste processing	Waste processing	Disposal	Reuse - Recovery- Recycling- 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	NZ, SG, ID	NZ	NZ	NZ									NZ	NZ	NZ	NZ	NZ
Specific data	>75%																
Variation: Products	< 10%																
Variation: Sites	0%																

X = included in the EPD; ND = Module not declared (such a declaration shall not be regarded as an indicator result of zero)

Production (Module 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.

Construction (Module A4)

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

Given the large number of variables involved in the installation of concrete jacking pipes, Module A5 has been excluded and it is recommended that this is modeled at the project level.

End of Life (Module C1-C4)

When a pipe reaches its end-of-life, the pipe is either abandoned in the ground or exhumed and disposed of. In New Zealand, the most common scenario is to abandon the pipe and this scenario has therefore been modelled in this module. The only process included in this scenario is the disposal of 1 kg of 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.

Table 4: End of life scenario and processes, per declared unit (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	
Disposal (C4)	Process and assumptions	n/a
	kg disposed	0

Life cycle inventory (LCI) data and assumption

Primary data was used for all manufacturing operations up to the factory gate, including upstream data for Hynds GP cement. Primary data for Hynds operations was sourced from the period 01 July 2021 to 30 June 2022. Background data was used for input materials sourced from other suppliers including aggregate, steel wire and mesh, and limestone.

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 3.9.1 'system database' (Ecoinvent, 2023). Most datasets have a reference year between 2016 and 2022.

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.

Upstream data

Data for upstream raw materials and unit processes were obtained from the Ecoinvent 3.9.1 'system database' (Ecoinvent, 2023).

Electricity

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

The New Zealand residual electricity grid consumption mix (2021-2022) is made up of hydro (56.6%), geothermal (19.7%) natural gas (12.5%), wind (6.55%), hard coal (4.25%), biomass (0.27%), biogas (0.16%), and diesel (0.04%).

The emission factor for the New Zealand residual grid for the GWP-GHG indicator is 0.167 kg CO2 eq./kWh. As a point of comparison, the national mix is 0.164 kg CO2 eq./kWh.

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 9358 km (from Shanghai).

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, 2023)).

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.

RESULTS

Average product and variation

This is an EPD of multiple products (as listed in Table 21) based on the average results of the product group. Using GWP-GHG as the indicator the largest variation of a product from the average reported here is <10%. Variation across other core indicators is shown in Table 6."

Table 5 - Variation in core EN15804+A2 indicators

Indicator	Variation against the average product
GWP-GHG	-4% to 6%
ODP	-6% to 5%
AP	-11% to 7%
EP-fw	-4% to 4%
EP-m	-14% to 6%
EP-t	-8% to 5%
POCP	-1% to 5%
ADP-m&m	-19% to 51%
ADP-f	-13% to 20%
WDP	-3% to 1%

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.

Resource indicators were calculated according to Option B from Annex 3 of PCR 2019:14 v1.3.3 (EPD International, 2024). Any energy in the product is not transferred to useable energy upon its end-of-life, given the product is considered both inert material and remains in ground without extraction.

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 risk.

Energy indicators (MJ) are always given as net calorific value. The results for A1-A3 should not be analysed without considering the impacts represented by module C.

Table 6: Indicators for life cycle impact assessment

Impact category	Abbreviation
Climate change – total	GWP-total
Climate change – fossil	GWP-fossil
Climate change – biogenic	GWP-biogenic
Climate change – land use and land use change	GWP-luluc
Ozone depletion	ODP
Acidification	AP
Eutrophication aquatic freshwater	EP-fw
Eutrophication aquatic marine	EP-m
Eutrophication terrestrial	EP-t
Photochemical ozone formation	POCP
Depletion of abiotic resources – minerals and metals[1]	ADP-m&m
Depletion of abiotic resources – fossil fuels[1]	ADP-f
Water Depletion Potential[1, 2]	WDP

[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]This environmental indicator uses a New Zealand specific mid-point characterisation factor for tap and bore water **(non-irrigation 1.69)** sourced from AWARE

Table 7: Life cycle inventory indicators on use of resources

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

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

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

Table 9: Biogenic carbon content indicators

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

Table 10: Additional Environmental Impact Indicators

Impact Indicator	Description		Unit	Reference
GWP-GHG[3]	Total global warming potential, excluding biogenic carbon dioxide	GWP-GHG	kg CO2-eq.	(EPD International, 2023)
Respiratory inorganics	Damage to human health from outdoor and indoor emissions of primary and secondary PM2.5 in urban and rural areas	PM	Disease incidences	(Fantke, et al., 2016)
Ionizing radiation - human health[4]	Impact of low dose ionizing radiation on human health of the nuclear fuel cycle and ionizing radiation from the soil, radon, and some construction materials. Effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities are not considered.	IRP	kBq U235 eq.	(Frischknecht, Braunschweig, Hofstetter, & Suter, 2000)
Eco-toxicity - freshwater[5]	Toxic effect on aquatic freshwater species in the water column	ETP-fw	Comparative toxic units (CTUh)	(Rosenbaum, et al., 2008)
Human toxicity, cancer[5]	A measure of the impact of chemical emissions on human health	HTPc	Comparative toxic units (CTUh)	(Rosenbaum, et al., 2008)
Human toxicity, non-cancer[5]	A measure of the impact of chemical emissions on human health	HTPnc	Comparative toxic units *(CTUh)*	*(Rosenbaum, et al., 2008)*
Land use related impacts / soil quality[5]	This index is the result of the aggregation, performed by JRC, of the 4 indicators provided by LANCA model for assessing impacts due to land use	SQP	Dimensionless, aggregated index of: kg biotic production / *(m2 *a)* kg soil / *(m2 *a)*	*(Bos, Horn, Beck, Lindner, & Fischer, 2016)*

For Hynds, the following indicators are not relevant, hence result in zero values:

- *Components for re-use (CRU) is zero since there are none produced.*
- *Materials for energy recovery (MER) is zero since no credits are claimed for any incinerated wastes, applying the cut-off approach.*
- *Exported electrical energy (EEE) is zero since there is none produced.*
- *Exported thermal energy (EET) is zero since there is none produced.*

[3] This indicator is identical to GWP-total except that GWP-biogenic has been removed. This is the equivalent to setting biogenic CO2 uptake and release to zero. It has been included in the EPD following the PCR (EPD International, 2023).

[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 kg

Hyforce Jacking Pipe Class 4 In-Wall Joint

Table 11: Core environmental indicators, Hyforce Jacking Pipe CL4 IWJ, abandoned end-of-life scenario, per kg

Environmental Impact	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-total	kg CO2-eq.	2.30E-01	2.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-fossil	kg CO2-eq.	2.30E-01	2.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-biogenic	kg CO2-eq.	5.76E-04	1.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-luluc	kg CO2-eq.	6.40E-05	1.22E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ODP	kg CFC11-eq.	6.44E-09	3.52E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AP	Mole of H+ eq.	1.51E-03	8.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EP-f	kg P eq.	1.21E-04	1.96E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EP-m	kg N eq.	2.99E-04	2.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EP-t	Mole of N eq.	4.27E-03	2.86E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
POCP	kg NMVOC eq.	4.86E-03	1.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADP-m&m[1]	kg Sb-eq.	2.97E-07	7.84E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADP-f[1]	MJ	1.90E+00	3.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
WDP[1, 2]	m3 world eq.	2.78E-01	1.53E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 12: Resource use indicators, Hyforce Jacking Pipe CL4 IWJ, abandoned end-of-life scenario, per kg

Environmental Impact	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	4.40E-01	4.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ	2.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.61E-01	4.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRE	MJ	1.45E+00	3.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRM	MJ	6.45E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.51E+00	3.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	kg	7.43E-02	1.42E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	6.04E-03	1.72E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	5.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	1.33E-02	3.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 13: Waste output flow indicators, Hyforce Jacking Pipe CL4 IWJ, abandoned end-of-life scenario, per kg

Waste and output flows	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	1.90E-03	2.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	2.15E-02	8.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD	kg	3.91E-06	4.82E-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
MER	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
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, Hyforce Jacking Pipe CL4 IWJ, abandoned end-of-life scenario, per kg

Waste and output flows	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-GHG[3]	kg CO2-eq.	2.30E-01	2.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM	Disease incidences	1.42E-08	1.69E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IRP[4]	kBq U235 eq.	2.35E-03	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETP-fw[5]	CTUe	1.06E+00	1.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTPc[5]	CTUh	5.62E-10	1.01E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HTPnc[5]	CTUh	9.03E-09	2.31E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SQP[5]	Pt	4.82E-02	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 15: Biogenic carbon indicators, A1-A3, per kg of Hyforce Jacking Pipe CL4 IWJ

Indicators	Units	Pinnacle® Pipe Jacking
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: Weights conversion table - Hyforce Jacking Pipe CL4 IWJ

Product code	Product full name	Product mass (kg/pipe)	Representative product
PC070030JIC4LM	Pipe Conc Ø0700 3.0m IWJ CL4 Jacking PE Lined PERFECT	3864	
PC070025JIC4M	Pipe Conc Ø0700 2.5m IWJ CL4 Jacking Pinnacle	3285	
PC090030JIC4LM	Pipe Conc Ø0900 3.0m IWJ CL4 Jacking PE Lined PERFECT	4737	
PC090030JIC4M	Pipe Conc Ø0900 3.0m IWJ CL4 Jacking Pinnacle	4707	
PC090025JIC4M	Pipe Conc Ø0900 2.5m IWJ CL4 Jacking Pinnacle	4021	
PC195025JIC4W	Pipe Conc Ø1950 2.5m IWJ CL4 Jacking Pinnacle	8423	Yes
PC210025JIC4W	Pipe Conc Ø2100 2.5m IWJ CL4 Jacking Pinnacle	9438	
PC255020JIC4W	Pipe Conc Ø2550 2.0m IWJ CL4 Jacking Pinnacle	9758	
PC255030JIC4W	Pipe Conc Ø2550 3.0m IWJ CL4 Jacking Pinnacle	14387	

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General information

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 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.

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CEN standard EN 15804+A2 served as the core PCR	
PCR:	PCR 2019.14 Construction Products Version 1.3.3 c-PCR-003 Concrete and concrete elements, version 2023-01-02
PCR review was conducted by:	The Technical Committee of the International EPD System. See www.environdec.com for a list of members.
Chair:	Claudia A. Peña, University of Concepción, Chile. 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: (Approved by: EPD Australasia)	Rob Rouwette, start2see Rob.rouwette@start2see.com.au
Procedure for follow-up of data during EPD validity involved third-party verifier	❑ Yes ☑ No


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