AUSTRALASIA EPD®

ENVIRONMENTAL PRODUCT DECLARATION

AUSTRALIA'S PIPELINE SPECIALISTS

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iPLEX Pipelines

ENVIRONMENTAL PRODUCT DECLARATION

POLYETHYLENE PIPES

Environmental Product Declaration (EPD) in accordance with ISO 14025 and EN 15804
Version 1.3 31/05/2018
Approval date 30/5/2016
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Geographical area of application of this EPD: Australia
Year taken as a reference for the data: 2014
EPD of Iplex Pipelines PE Pipe Products – In collaboration with the Australian Plastics Industry Pipe Association (PIPA)

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1.0 ENVIRONMENTAL PRODUCT DECLARATION DETAILS

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). Environmental product declarations within the same product category from different programmes may not be comparable. EPD of construction products may not be comparable if they do not comply with EN 15804.

This version of the EPD has been updated to clarify and correct impact assessment results for Abiotic Resource Depletion Potential.

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CEN STANDARD EN 15804 SERVED AS THE CORE PCR

PCR: Construction Products and Services, Version 2, 2015-03-03

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INDEPENDENT EXTERNAL VERIFICATION OF THE DECLARATION AND DATA, ACCORDING TO ISO 14025:2010:

☐ EPD process certification (Internal)
☑ EPD verification (External)

ACCREDITED OR APPROVED BY The Australasian EPD® Programme

2.0 GREEN STAR EPD COMPLIANCE

- ✓ The EPD conforms to ISO 14025 and EN 15804.
- ✓ The EPD has been verified by an independent third party.
- ✓ The EPD has at least a cradle-to-gate scope.
- ✓ The EPD has product specific results.

This EPD may be used to obtain Product Sustainability credit points under the GBCA's Green Star rating tools.

The polyethylene (PE) pipe EPD results can also be used to represent PE pipe products in Whole of Building Life Cycle Assessments under Green Star rating tools. See the product details tables to convert the product results from kilogram of installed pipe to length of pipe for individual pipe products.

3.0 IPLEX PIPELINES AUSTRALIA

Iplex Pipelines (Iplex), Australasia's largest manufacturer and supplier of plastics piping systems, is pleased to publish this independently verified Environment Product Declaration (EPD), for Poliplex®, Greenline™, Sewerplex™, Millennium® and Thermapipe® branded polyethylene pipe and conduits, in sizes ranging from DN16 to DN2000 (EPD's covering the company's polypropylene and polyvinyl chloride pipe products are also available through The Australasian EPD Programme website).

A wholly owned business unit of the ASX listed company Fletcher Building Limited, with operations in every state and New Zealand, Iplex supplies polyethylene pipe and conduit to applications including plumbing, irrigation, mining, industrial and chemical processes, electrical, telecommunications, gas, storm, sewer, raw, recycled and potable water. Polyethylene pipe manufacturing plants are strategically located close to major development regions in Townsville, Toowoomba, Albury and Perth.

More than 50 years' experience in the manufacture of plastics pipes qualifies Iplex as a pioneer in pipe production, a foundation member of the Plastics Industry Pipes Association of Australia (PIPA) and the sole manufacturer of AS/NZS 4130 polyethylene pressure pipe and fittings in sizes as large as DN2000 in Australasia.

As part of its ongoing commitment to the development of Australian and International Standards for plastics pipe and fittings, Iplex personnel serve on Standards Australia, ISO, PIPA technical committees and Australian Pipelines and Gas Association working groups.

In addition to WaterMark®, StandardsMark™ and ApprovalMark™ third party product certification to Australian Standard AS/NZS 4130 all operations are conducted under a quality management system, certified by SAI Global to ISO 9001, Licence QEC 0037.

In support of its extensive product range, Iplex employs professional engineers to assist pipe users and designers and publishes comprehensive engineering design guides that are freely available for download via its website: www.iplex.com.au.

The Iplex PocketENGINEER™ is a web portal where registered users can access design software to simplify hydraulic, structural and chemical resistance aspects of pipeline design. Visit www.pocketengineer.com.au.

For more information on Iplex's extensive range of pipeline products, visit www.iplex.com.au.

IPLEX POLYETHYLENE PIPES

POLIPLEX®

Poliplex® pipes are the mainstay of the Iplex polyethylene range. Manufactured from pre-compounded AS/NZS 4131 resins listed on PIPA POP004, Poliplex® water, sewer, slurry and gas pipes operating at mid-wall temperatures up to 30°C offer a minimum design life of 100 years. For buried applications, pipe is supplied with colour identification stripes or jackets to indicate the fluid type being conveyed. The Poliplex® sizes range from DN16 to a massive DN2000; the largest polyethylene pressure pipe manufactured in Australasia.

GREENLINE™

Rural Greenline™ polyethylene pipe is backed by Iplex's 20 year manufacturer's warranty and is specifically intended for use in on-farm irrigation applications, economically conveying non-potable water at up to 80 metres head. These pipes are manufactured in imperial sizes from ¾" to 2" ID to the company's exacting specifications and are supplied in convenient long-length coils to minimise joints.

SEWERPLEX™

Sewerplex™ pipe is provided with a light coloured internal skin to facilitate CCTV camera inspection and is designed to be used in gravity sewer applications. The thicker wall of Sewerplex™ pipe provides ring stiffness which in larger sizes is comparable to that of ductile iron pipe. A full range of compatible junctions, sweep bends and maintenance shaft drops allow curved gravity sewers to be constructed. When coupled to Iplex Ezipit™ maintenance shafts, a low maintenance, tree root, leak and infiltration-proof sewer system is ensured.

MILLENNIUM®

Millennium® pipe has been formulated in close association with Iplex's polyethylene supplier to provide previously inconceivable service life expectations in demanding trenchless installations and ploughed coal seam gas applications. Millennium® offers resistance to slow crack growth failure mode that is more than an order of magnitude better than standard PE100 pipe, rendering it virtually immune to failure initiated by surface scoring, squeeze-off or rock impingement. Millennium® pipe produced from black and coloured PE resin in wall thicknesses up to 80mm exceeds the stringent high stress crack resistance performance requirements of PIPA POP016. When used in conventional open trench construction, Millennium® pipe eliminates the need to import granular embedment, saving as much as 20% of the pipeline construction cost. For demanding installation conditions in rocky ground, trenchless installations and for critical infrastructure assets, there is no safer long-term piping solution than Iplex Millennium®.

THERMAPIPE®

Thermapipe® was conceived by Iplex development engineers specifically for above ground water and mining slurry pipelines, where heat absorption has the potential to significantly reduce operating pressure and service life. As part of Thermapipe's® manufacturing process, a reflective white jacket of light stabilised PE containing titanium dioxide is coextruded on the outer surface of the pipe. This feature reduces solar absorptance ratio by more than 50% and typically lowers the peak mid-wall temperature of an exposed pipeline by 15-20°C, thereby increasing the maximum allowable operating pressure and service life of the pipe.

Table 1 lists key product characteristics of Iplex PE pipe and Table 2 shows the content declaration.

TABLE 1 - PRODUCT CHARACTERISTICS OF PE PIPE

PRODUCT CHARACTERISTICS	
PRODUCT NAMES	Poliplex®, Greenline™, Sewerplex™, Millennium® and Thermapipe®
POLYETHYLENE MATERIAL TYPE	PE100*
UN CPC CODE	3632
MINIMUM REQUIRED STRENGTH (50 YEAR @20°C)	10 MPa
FLEXURAL YIELD STRENGTH	32 MPa
CIRCUMFERENTIAL FLEXURAL MODULUS (3 MINUTE)	950 MPa
CIRCUMFERENTIAL FLEXURAL CREEP MODULUS (50 YEAR)	260 MPa
DENSITY	955 kg/m^3
TENSILE YIELD STRESS (50MM/MIN)	25 MPa
TENSILE YIELD STRAIN (50MM/MIN)	10%
TENSILE MODULUS	900 MPa
POISSON'S RATIO	0.4
THERMAL EXPANSION COEFFICIENT	0.18 mm/m K
THERMAL CONDUCTIVITY	0.38 W/m K

*PE100 Resin is supplied to Iplex precompounded from manufactures with 2-3% carbon black and <1% non-hazardous proprietary additives.

TABLE 2 - CONTENT DECLARATION

MATERIAL	PERCENTAGE CONTENT	CAS NO.
PE100	97.25 ± 0.25%	9002-88-4
CARBON BLACK	2.25 ± 0.25%	1333-86-4
NON-HAZARDOUS ADDITIVES	<1 %	
TOTAL	100%	

PRODUCT LIFE CYCLE OVERVIEW

The life cycle of a building product is divided into three process modules according to the General Program Instructions (GPI) of the Australasian EPD Programme (AEPDP, 2015) and four information modules according to ISO 21930 and EN 15804. The scope of the EPD is "cradle to gate with options" as defined by EN 15804 – the specific system boundary is shown in Table 3. The intent of the EPD is to cover all significant environmental impact over the full product life cycle. Due to the fact that the pipes are left in the ground at end of life with negligible potential environmental impact, modules C1-C4 were deemed not relevant (of negligible impact). All other use stage modules were also deemed not relevant (of negligible impact).

TABLE 3 - SYSTEM BOUNDARY AND SCOPE OF ASSESSMENT

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS & LOADS BEYOND THE SYSTEM BOUNDARY
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT	INSTALLATION	MATERIAL EMISSIONS	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY	OPERATIONAL WATER	DECONSTRUCTION/DEMOLITION	TRANSPORT	WASTE PROCESSING	DISPOSAL	REUSE/RECYCLING/RECOVERY POTENTIAL
X	X	X	X	X	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

X = module included in EPD

NR = module not relevant (does not indicate zero impact result) – see text above table for explanation.

LIFE CYCLE DIAGRAM OF PE PIPE PRODUCTION

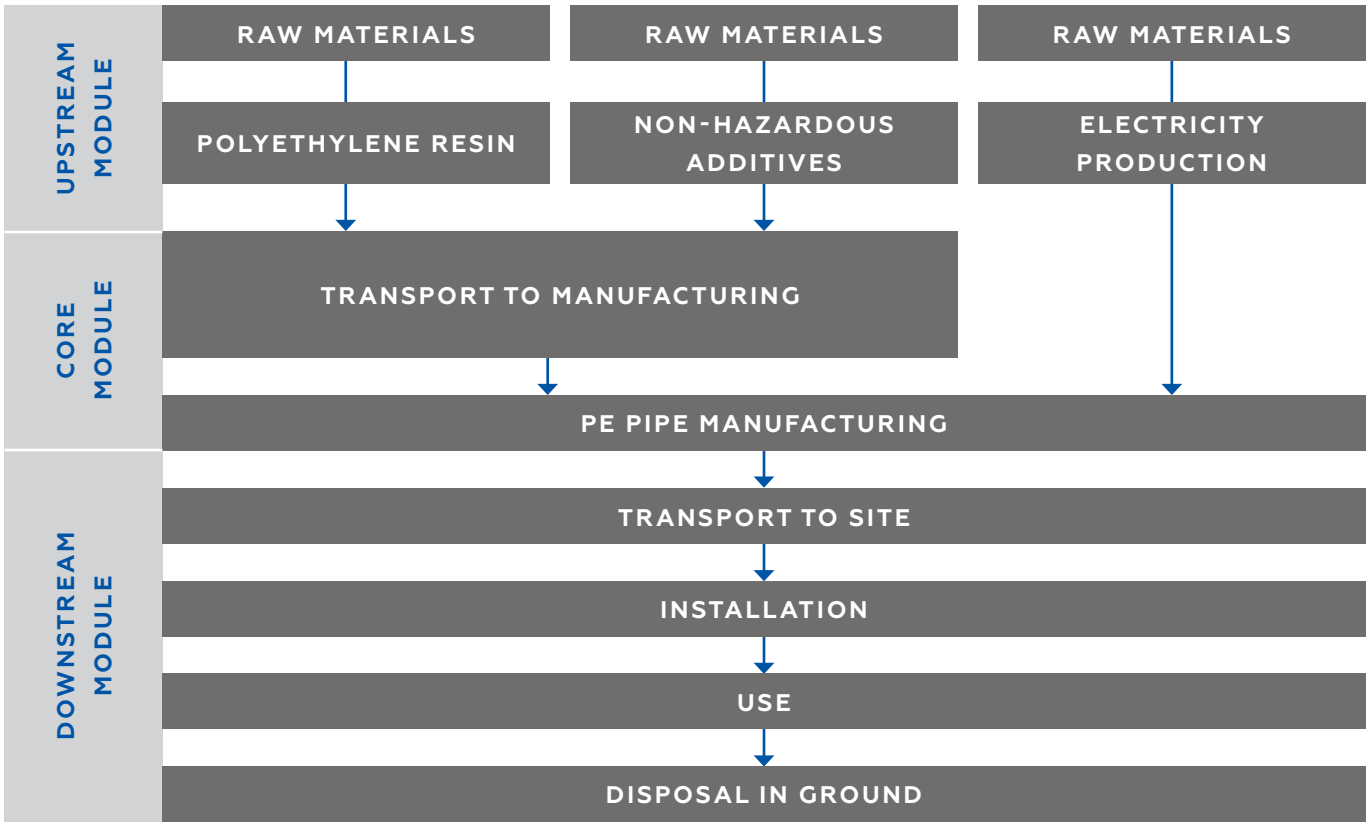


FIGURE 1 - LIFE CYCLE DIAGRAM OF PE PIPE PRODUCTION

IPLEX POLYETHYLENE PIPE MANUFACTURING

Iplex PE pipes are manufactured from PE100 resin sourced from Victoria and overseas. The PE resin is delivered to the manufacturing site by bulk road tankers and is unloaded into storage silos. From the silos it is pneumatically transferred to the extruders where a portion of selected internal PE pipe scrap is fed back into the feed mix to be utilised in production. Through a combination of friction and heat, the resin is brought up to the ideal temperature for plastification, at which point it is forced through an annular die to form a pipe. The newly formed pipe is then cooled by refrigerated water whilst passing though a vacuum sizing sleeve. Pipe wall thickness is controlled with the computerised haul-off speed that also controls the saw which cuts the pipe at predetermined lengths. Finally, the lengths of pipe are either crated or coiled with PET strapping, or stored as loose lengths. Iplex PE pipe is manufactured in Townsville and Toowoomba (Queensland), Albury (New South Wales) and Perth (Western Australia) as shown below in Figure 2.

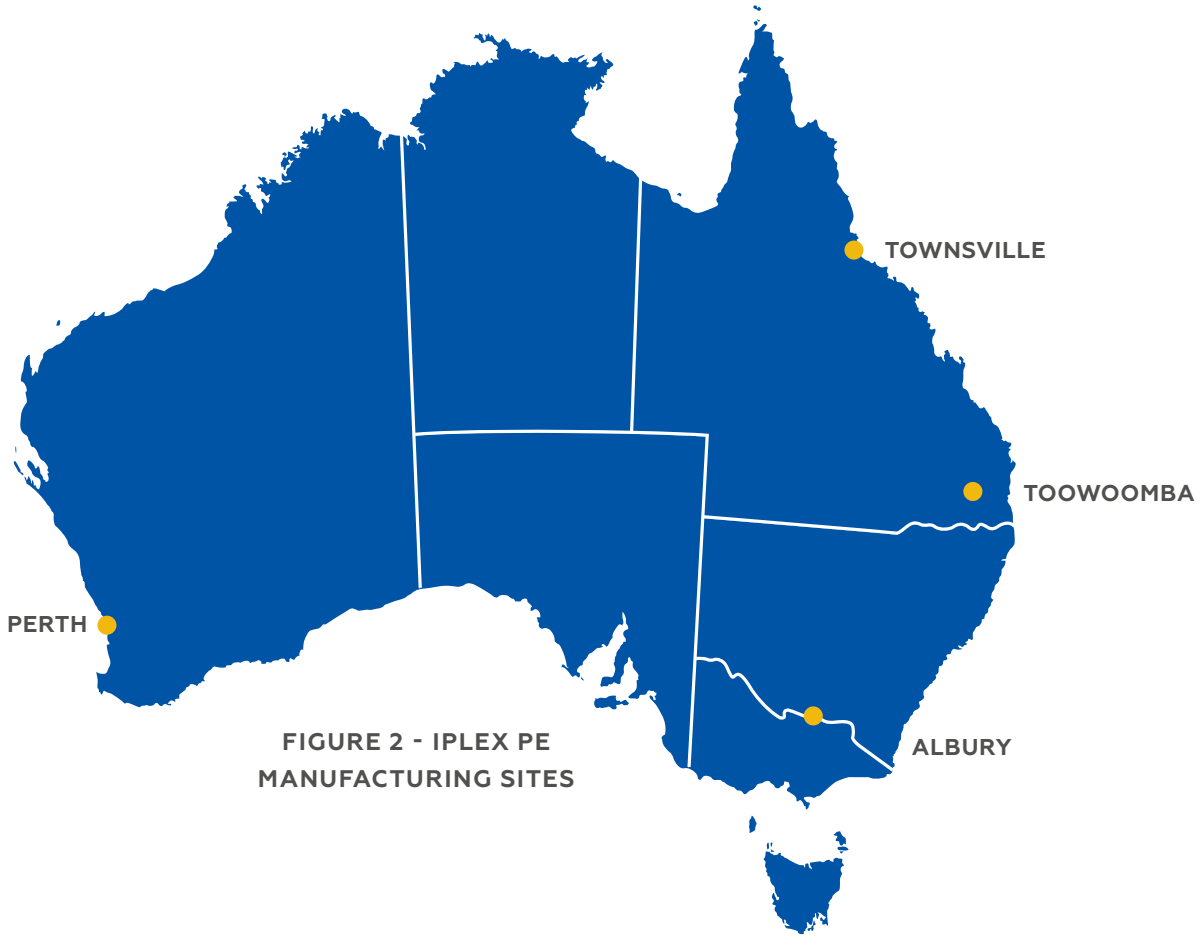
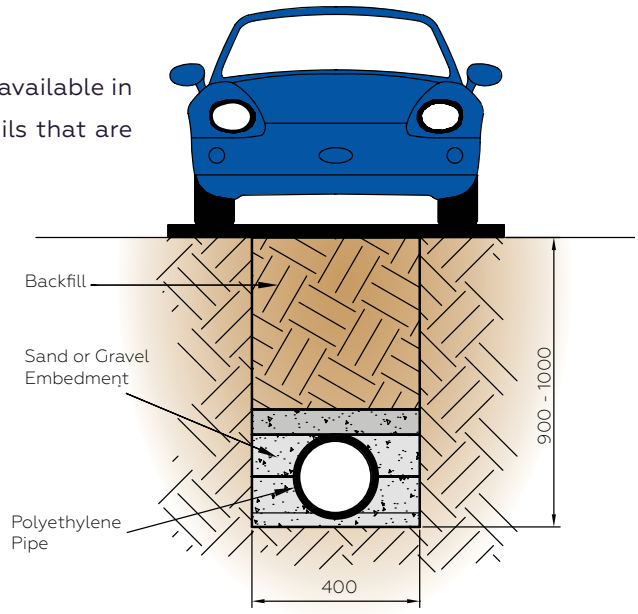


FIGURE 2 - IPLEX PE MANUFACTURING SITES

DISTRIBUTION STAGE

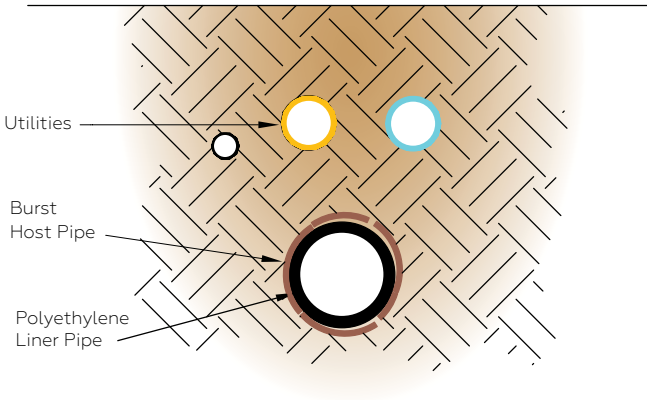
Iplex has PE pipe manufacturing facilities in Perth, Townsville, Toowoomba and Albury. The majority of PE pipe is sold for agricultural and mining applications, which generally require greater transportation from manufacturing facilities than civil and industrial applications. The impact of distribution was calculated by using the average distance from each manufacturing site to major markets, and calculating a weighted average distribution distance using market volumes. The weighted average distance to site was estimated to be approximately 230 km. A much shorter distance is required for civil and building applications in major markets close to manufacturing sites, while a longer distance was required for minor markets away from manufacturing sites, as well as agricultural and mining installation sites.

INSTALLATION STAGE



Iplex PE pipes are usually installed below ground. The pipe is available in a variety of lengths typically from 6m straight lengths to coils that are hundreds of metres long (size limitations apply). PE pipe systems utilise welded joints and as such results in long continuous lengths of pipeline that can take advantage of trenchless installation techniques (e.g. pipe cracking, slip lining and directional drilling).

PE is also installed using typical open trench options and is mostly used for pressure applications or non-pressure applications where installation to grade is not required (for example in communications applications). In this EPD a deliberately conservative approach to installation has been adopted where the installation conditions will reflect the open trench technique.



A typical open trench installation (based around a DN200 pipe) requires an average trench width of around 400mm and a typical trench depth of 900-1000mm; noting that 95% of pipes sold are smaller than this so would need narrower trenches. The results in module A5 do not apply to pipe sizes larger than DN200. Bedding and backfill materials vary in specification. In many cases no imported material is used but for many city-based agencies sand bedding and gravel are used in the areas immediately below and at the sides of the pipe. It is estimated that if imported backfill materials are used there would be less than 0.3m³ of material per meter of pipeline. Handling and positioning of individual pipes on site is done predominately by hand or with the assistance of a small excavator.

The joints for PE pipes are almost always welded - butt fusion being the most commonly used technique. Specified welding parameters are nominated in a PIPA document POP003 Butt Fusion Jointing of PE Pipes and Fittings (PIPA, 2011). Wastage of pipe is minimal and is estimated that unusable offcuts account for less than 1%.

USE STAGE

According to AS/NZS 4130:2009 and 4401:2006, the pipe systems can logically be expected to have a life expectancy of in excess of 100 years before major rehabilitation is required (Standards Australia, 2009: Standards Australia 2006). Maintenance of these pipe systems is not planned as deterioration of the pipe in service is not an issue.

The failure rate of the pipe itself is extremely low and is considered to be inconsequential (not relevant) in this EPD. Given the major risk with plastics pipe systems is third party interference, and that these PE pipe systems used primarily in mining and irrigation applications not sharing restricted footway allocations as with water and gas reticulation, it is significantly less likely that third parties will encounter these pipe systems.

END OF LIFE

The PE pipes which are installed underground are assumed to remain underground at end of life. The PE pipes are inert and there is no incentive to dig them up to send for waste treatment.

4.0 LIFE CYCLE ASSESSMENT METHODOLOGY

This section includes the main details of the LCA study as well as assumptions and methods of the assessment. A summary of the life cycle assessment parameters is given in Table 4.

TABLE 4 - DETAILS OF LCA

PRODUCT CHARACTERISTICS	
DECLARED UNIT	1kg of installed pipe
GEOGRAPHICAL COVERAGE	Australia
LCA SCOPE	Cradle to gate with options
REFERENCE SERVICE LIFE	100 years

Life cycle assessment (LCA) requires a compilation of the inputs, outputs and environmental impacts of a product system throughout its life cycle. LCA can enable businesses to identify resource flows, waste generation and environmental impacts (such as climate change) associated with the provision of products and services.

Life cycle thinking is a core concept in sustainable consumption and production for policy and business. Upstream and downstream consequences of decisions must be taken into account to help avoid the shifting of burdens from one type of environmental impact to another, from one political region to another, or from one stage to another in a product's life cycle from the cradle to the grave.

According to EN 15804, EPDs of construction products may not be comparable if they do not comply with this standard, and EPDs might not be comparable, particularly if different functional units are used.

CORE DATA COLLECTION

Life cycle data has been sourced from material quantity data and production process data from:

- Iplex's reporting systems and staff
- Iplex suppliers

Core manufacturing data was collected directly from Iplex manufacturing sites.

BACKGROUND DATA

Generic background data was sourced for raw materials in the upstream module and transportation. Background data was adapted to represent Iplex PE pipe product as accurately as possible. Australian inputs were primarily modelled with the AusLCI database (AusLCI, 2009) and the Australasian Unit Process LCI (Life Cycle Strategies, 2015) and the ecoinvent v3 database where inputs were imported or suitable Australian data was not available. The polyethylene resin sourced from outside Australia was modelled based on global averages using the ecoinvent v3 database. Global averages were used since the sourcing of these materials often changes from year to year. All background data used was less than 10 years old.

CUT OFF CRITERIA

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary as per the PCR (IEPDS, 2015). The pre-compounded polyethylene resin includes <1% minor non-hazardous additives that are confidential and were not included in the LCA. All other reported data were incorporated and modelled using the best available life cycle inventory data.

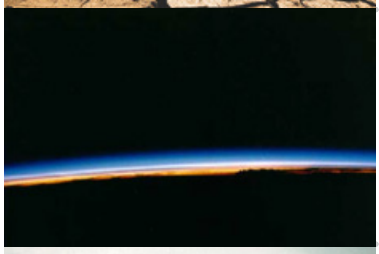
ALLOCATION

Allocation was carried out in accordance with the PCR (IEPDS, 2015). No-allocation between co-products in the core module as there were no co-products created during manufacturing. Energy consumed in core module was allocated to pipe via mass of pipe produced.

5.0 PE PIPE ENVIRONMENTAL PERFORMANCE

The potential environmental impacts used in this EPD are explained in Table 5 and the results for Iplex PE pipe are shown in Table 6. The use of energy and fresh water resources is shown in Table 7. The use of secondary material and secondary material used as energy resources is listed as 'INA' (indicator not assessed). Although Iplex do not directly use secondary material, it is possible that secondary material is used in the supply chain and therefore exists in the product life cycle. Table 8 shows the generation of waste throughout the product life cycle.

TABLE 5 - ENVIRONMENTAL INDICATORS USED IN THE EPD

	ENVIRONMENTAL INDICATOR	UNIT	DESCRIPTION
	**GLOBAL WARMING POTENTIAL** [A]	KG CARBON DIOXIDE EQUIVALENTS	Increase in the Earth's average temperature, mostly through the release of greenhouse gases. A common outcome of this is an increase in natural disasters and sea level rise.
	**OZONE DEPLETION POTENTIAL** [B]	KG CFC-11 EQUIVALENTS	The decline in ozone in the Earth's stratosphere. The depletion of the ozone layer increases the amount of UVB that reaches the Earth's surface. UVB is generally accepted to be a contributing factor to skin cancer, cataracts and decreased crop yields.
	**ACIDIFICATION POTENTIAL** [C]	KG SULPHUR DIOXIDE EQUIVALENTS	A process whereby pollutants are converted into acidic substances which degrade the natural environment. Common outcomes of this are acidified lakes and rivers, toxic metal leaching, forest damage and destruction of buildings.
	**EUTROPHICATION POTENTIAL** [C]	KG PHOSPHATE EQUIVALENTS	An increase in the levels of nutrients released to the environment. A common outcome of this is high biological productivity that can lead to oxygen depletion, as well as significant impacts on water quality, affecting all forms of aquatic and plant life.
	**PHOTOCHEMICAL OZONE CREATION POTENTIAL** [C]	KG ETHYLENE EQUIVALENTS	Ozone in the troposphere is a constituent of smog that is caused by a reaction between sunlight, nitrogen oxide and volatile organic compounds (VOCs). This is a known cause for respiratory health problems and damage to vegetation.
	**ABIOTIC DEPLETION POTENTIAL – ELEMENTS / MINERALS** [C]	KG ANTIMONY EQUIVALENTS	The extraction of non-living and non-renewable elements and minerals. These resources are essential in our everyday lives and many are currently being extracted at an unsustainable rate.
	**ABIOTIC DEPLETION POTENTIAL – FOSSIL FUELS** [C]	MJ NET CALORIFIC VALUE	The extraction of non-living and non-renewable fossil fuels. These resources are essential in our everyday lives and many are currently being extracted at an unsustainable rate.

Life cycle impact assessment methods used: a - CML (v4.1) – based on IPCC AR4 (GWP 100); **b** - CML (v4.1) – based on WMO 1999; **c** - CML (v4.1)

TABLE 6 - POTENTIAL ENVIRONMENTAL IMPACTS

	A1 – A3	A4	A5
GWP ($kgCO_2$ eq)	2.946	0.0462	1.08
ODP (kgCFC11 eq)	7.00E-08	1.17E-09	5.45E-08
AP ($kgSO_2$ eq)	0.0107	1.12E-04	3.43E-03
EP ($kgPO_4^{3-}$ eq)	1.36E-03	2.72E-05	8.35E-04
POCP (kgC_2H_2 eq)	5.44E-04	7.22E-06	1.77E-04
ADPE (kgSb eq)	1.77E-06	8.18E-08	2.57E-06
ADPF (MJ)	77.6	0.718	14.2

GWP = Global Warming Potential, **ODP =** Ozone Depletion Potential, **AP =** Acidification Potential, **EP =** Eutrophication Potential, **POCP =** Photochemical Oxidant Formation Potential, **ADPE=** Abiotic Resource Depletion Potential – Elements, **ADPF =** Abiotic Resource Depletion Potential – Fossil Fuel

TABLE 7 - USE OF RESOURCES

	A1 – A3	A4	A5
PERE (MJ)	1.48	3.18E-03	0.356
PERM (MJ)	INA	INA	INA
PERT (MJ)	1.48	3.18E-03	0.356
PENRE (MJ)	90.2	7.21E-01	14.5
PENRM (MJ)	INA	INA	INA
PENRT (MJ)	90.2	7.21E-01	14.5
SM (kg)	INA	INA	INA
RSF (MJ)	INA	INA	INA
NRSF (MJ)	INA	INA	INA
FW (m^3)	0.137	1.03E-02	0.863

PERE = Use of renewable primary energy excluding raw materials, **PERM =** Use of renewable primary energy resources used as raw materials, **PERT =** Total use of renewable primary energy resources, **PENRE =** Use of non-renewable primary energy excluding raw materials, **PENRM =** Use of non-renewable primary energy resources used as raw materials, **PENRT =** Total use of non-renewable primary energy resources, **SM =** Use of secondary material, **RSF =** Use of renewable secondary fuels, **NRSF =** Use of non-renewable secondary fuels, **FW =** Use of net fresh water, **INA =** Indicator not accessed due to a limitation of the LCA tools and databases used to calculate the required resource flows. INA does not imply zero impact

TABLE 8 - GENERATION OF WASTE

	A1 – A3	A4	A5
HWD (kg)	6.59E-06	3.83E-07	1.44E-05
NHWD (kg)	0.147	3.68E-03	0.254
RWD (kg)	2.38E-05	9.32E-09	4.50E-07

HWD = Hazardous waste disposed, **NHWD =** Non-hazardous waste disposed, **RWD =** Radioactive waste disposed

INTERPRETATION OF LCA RESULTS

The majority of environmental impact lies within the PE raw material supplied to Iplex followed by the energy used for excavation during the pipe installation phase and pipe distribution – comparatively little impact is caused by the PE pipe manufacturing at Iplex sites. From the feed mix ingredients, PE100 resin is responsible for the majority of all environmental impacts and use of resources, followed by the pipe installation.

6.0 ADDITIONAL ENVIRONMENTAL INFORMATION

GUIDANCE FOR PE PIPE RECYCLING

All PE pipe offcuts from installation can be completely recycled back into new pipe products. There are general plastics recyclers in all Australian capital cities that will recycle PE or contact Iplex. Although the PE pipes covered in this EPD are most likely to be left in the ground at end of life, PE has a high recyclability and can be mechanically or chemically recycled to replace virgin polyethylene in new products.

7.0 PRODUCT SPECIFICATIONS

The following table (Table 9) can be used to calculate the environmental results for specific Iplex PE pipe products. The density and length of pipe give the total mass of pipe for each product code.

TABLE 9 - PRODUCT SPECIFICATIONS FOR PE SOLID WALL PIPE PRODUCTS

SDR	41				26				21				17			
PN for PE100	4				6.3				8				10			
DN	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	1.6	21.7	1.2	0.12
32	-	-	-	-	-	-	-	-	1.6	28.7	1.3	1.3	1.9	28	1.3	0.19
40	-	-	-	-	-	-	-	-	1.9	36.1	1.4	1.4	2.4	35	1.4	0.3
50	-	-	-	-	-	-	-	-	2.4	45	1.4	1.4	3	43.9	1.4	0.46
63	-	-	-	-	2.4	58.1	1.5	0.48	3	56.9	1.5	1.5	3.8	55.2	1.5	0.73
75	-	-	-	-	2.9	69.2	1.6	0.68	3.6	67.7	1.6	1.6	4.5	65.8	1.6	1.03
90	-	-	-	-	3.5	83	1.8	0.99	4.3	81.3	1.8	1.8	5.4	79	1.8	1.48
110	2.7	104.7	2.2	0.95	4.3	101.3	2.2	1.48	5.3	99.2	2.2	2.2	6.6	96.5	2.2	2.2
125	3.1	118.9	2.5	1.24	4.8	115.4	2.5	1.86	6	112.9	2.5	2.5	7.4	109.9	2.5	2.8
140	3.5	133.2	2.8	1.56	5.4	129.2	2.8	2.35	6.7	126.5	2.8	2.8	8.3	123	2.8	3.52
160	4	152.3	3.2	2.02	6.2	147.6	3.2	3.08	7.7	144.5	3.2	3.2	9.5	140.7	3.2	4.59
180	4.4	171.5	3.6	2.51	6.9	166.3	3.6	3.84	8.6	163.1	3.6	3.6	10.7	158.3	3.6	5.81
200	4.9	190.5	4	3.08	7.7	184.6	4	4.76	9.6	180.6	4	4	11.9	175.8	4	7.16
225	5.5	214.4	4.5	3.9	8.6	207.9	4.5	5.98	10.8	203.3	4.5	4.5	13.4	197.8	4.5	9.09
250	6.2	238	5	4.89	9.6	230.9	5	7.41	11.9	226	5	5	14.8	220	5	11.14
280	6.9	266.7	9.8	6.06	10.7	258.7	9.8	9.25	13.4	253	9.8	9.8	16.6	246.3	9.8	13.99
315	7.7	300.2	11.1	7.62	12.1	290.9	11.1	11.78	15	284.9	11.1	11.1	18.7	276.6	11.1	17.72
355	8.7	338.2	12.5	9.69	13.6	327.9	12.5	14.89	16.9	321	12.5	12.5	21.1	312.1	12.5	22.55
400	9.8	380	14	12.28	15.3	369.5	14	18.88	19.1	361.5	14	14	23.7	351.9	14	28.5
450	11	428.9	15.6	15.49	17.2	415.8	15.6	23.87	21.5	406.8	15.6	15.6	26.7	395.9	5.6	36.11
500	12.3	476.3	17.5	19.28	19.1	462	17.5	29.45	23.9	452	17.5	17.5	29.6	439.9	17.5	44.48
560	13.7	533.6	19.6	24	21.4	517.4	19.6	36.91	26.7	506.4	19.6	19.6	33.2	492.7	19.6	55.89
630	15.4	600.4	22.1	30.37	24.1	582.1	22.1	46.77	30	569.8	22.1	22.1	37.3	554.4	22.1	70.62
710	17.4	676.5	24.9	38.65	27.2	655.9	24.9	59.45	33.9	641.9	24.9	24.9	42.1	624.6	24.9	89.82
800	19.6	762.3	28	49.01	30.6	739.2	28	75.29	38.1	723.4	28	28	47.4	703.9	28	113.89
900	22	857.8	31.5	61.81	34.4	831.7	31.5	95.23	42.9	813.9	31.5	31.5	53.5	791.7	31.5	144.55
1000	24.5	952.9	35	76.54	38.2	924.1	35	117.5	47.7	904.2	35	35	59.3	879.8	35	178.06
1200	29.4	1143.1	42	110.14	45.9	1108.5	42	169.18	57.2	1084.7	42	42	67.9	1062.7	42	245.17
1400	34.4	1332.6	49	150.19	53.2	1293.1	49	239.54	66.7	1266.1	49	49	82.4	1233.1	49	346.07
1600	39.3	1522.3	56	195.75	61.3	1476.1	56	300.95	76.2	1447	56	56	94.1	1409.4	56	451.49
1800	43.8	1716	-	245.95	69.1	1662.8	-	382.16	85.7	1628	63	63	-	-	-	-
2000	48.8	1906.4	-	304.41	76.9	1847.4	-	472.24	95.2	1808.9	70	70	-	-	-	-

TABLE 9 - PRODUCT SPECIFICATIONS FOR PE SOLID WALL PIPE PRODUCTS *CONTINUED*

13.6				11				9				7.4				SDR
12.5				16				20				25				PN for PE100
Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	DN
-	-	-	-	1.6	12.7	1.2	0.08	1.8	12.3	1.2	0.08	2.2	11.4	1.2	0.1	**16**
1.6	16.7	1.2	0.1	1.9	16	1.2	0.11	2.3	15.2	1.2	0.13	2.8	14.2	1.2	0.16	**20**
1.9	21	1.2	0.14	2.3	20.2	1.2	0.17	2.8	19.2	1.2	0.2	3.5	17.7	1.2	0.24	**25**
2.4	27	1.3	0.23	2.9	26	1.3	0.27	3.6	24.5	1.3	0.33	4.4	22.8	1.3	0.39	**32**
3	33.8	1.4	0.36	3.7	32.3	1.4	0.43	4.5	30.6	1.4	0.52	5.5	28.5	1.4	0.61	**40**
3.7	42.4	1.4	0.55	4.6	40.4	1.4	0.67	5.6	38.4	1.4	0.8	6.9	35.7	1.4	0.95	**50**
4.7	53.3	1.5	0.88	5.8	51	1.5	1.07	7.1	48.2	1.5	1.28	8.6	45.1	1.5	1.5	**63**
5.5	63.7	1.6	1.23	6.8	61	1.6	1.49	8.4	57.6	1.6	1.79	10.3	53.6	1.6	2.13	**75**
6.6	76.5	1.8	1.77	8.2	73	1.8	2.16	10.1	69.1	1.8	2.59	12.3	64.5	1.8	3.05	**90**
8.1	93.3	2.2	2.66	10	89.4	2.2	3.2	12.3	84.5	2.2	3.84	15.1	78.6	2.2	4.57	**110**
9.2	106.1	2.5	3.42	11.4	101.5	2.5	4.15	14	96.1	2.5	4.96	17.1	89.5	2.5	5.88	**125**
10.3	118.9	2.8	4.29	12.7	113.9	2.8	5.17	15.7	107.6	2.8	6.23	19.2	100.2	2.8	7.39	**140**
11.8	135.9	3.2	5.6	14.6	130	3.2	6.78	17.9	123	3.2	8.11	21.9	114.7	3.2	9.62	**160**
13.3	152.8	3.6	7.1	16.4	146.3	3.6	8.58	20.1	138.5	3.6	10.26	24.6	129.1	3.6	12.16	**180**
14.7	170	4	8.71	18.2	162.5	4	10.57	22.4	153.7	4	12.68	27.3	143.4	4	15	**200**
16.6	191	4.5	11.06	20.5	182.9	4.5	13.39	25.1	173.2	4.5	16	30.8	161.3	4.5	19.02	**225**
18.4	212.4	5	13.63	22.7	203.4	5	16.46	27.9	192.5	5	19.73	34.2	179.2	5	23.48	**250**
20.6	237.9	9.8	17.08	25.4	227.8	9.8	20.64	31.3	215.4	9.8	24.8	38.3	200.7	9.8	29.44	**280**
23.2	267.6	11.1	21.64	28.6	256.3	11.1	26.13	35.2	242.4	11.1	31.38	43	226.1	11.1	37.16	**315**
26.1	301.6	12.5	27.43	32.2	288.8	12.5	33.16	39.6	273.3	12.5	39.76	48.5	254.6	12.5	47.24	**355**
29.4	339.9	14	34.79	36.3	325.4	14	42.1	44.7	307.8	14	50.55	54.6	287	14	59.92	**400**
33.1	382.4	15.6	44.07	40.9	366.1	15.6	53.31	50.2	346.5	15.6	63.9	61.5	322.8	15.6	75.92	**450**
36.8	424.9	17.5	54.38	45.4	406.8	17.5	65.78	55.8	385	17.5	78.86	-	-	-	-	**500**
41.2	475.8	19.6	68.22	50.8	455.8	19.6	82.4	62.5	430.3	19.6	98.93	-	-	-	-	**560**
46.3	535.5	22.1	86.23	57.2	512.6	22.1	104.42	70.3	484.1	22.1	125.2	-	-	-	-	**630**
52.2	603.4	24.9	109.55	64.5	577.6	24.9	132.64	79.3	546.5	24.9	159.13	-	-	-	-	**710**
58.8	680	28	138.96	72.5	651	28	168.11	89.3	615.9	28	201.9	-	-	-	-	**800**
66.2	764.9	31.5	176.04	81.7	732.4	31.5	212.91	-	-	-	-	-	-	-	-	**900**
72.5	852.1	35	214.41	90.3	814.9	35	261.4	-	-	-	-	-	-	-	-	**1000**
88.2	1020	42	312.54	-	-	-	-	-	-	-	-	-	-	-	-	**1200**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1400**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1600**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1800**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2000**

Note:
1) All dimensions are in millimetres and mass in kg/m.
2) Nominal Diameter (DN) equals outside diamter.
3) These dimensions also apply to THERMAPIPE®.

8.0 REFERENCES

AEPDP. (2015). General Programme Instructions of the Australasian EPD Programme, Version 1.0, 2015-02-02. Australasian EDP®Programme (AEPDP).

CEN. (2013). EN 15804:2012 Sustainability of construction works. Environmental Product Declarations. Core rules for the product category of construction products. Brussels: Centre of European Standardization (CEN).

European Commission. (2004). Life Cycle Assessment of PVC and principle competing materials. Retrieved from http://ec.europa.eu/enterprise/sectors/chemicals/files/sustdev/pvc-final_report_lca_en.pdf

IEPDS. (2015). PCR 2012:01, Construction products and Construction services, Version 2.0, 2015-03-03. Stockholm: International EPD® System.

ISO. (2006). Environmental labels and declarations - Type III environmental declarations - principles and procedures. Geneva: International Organization for Standardization (ISO).

ISO. (2006). ISO 14040:2006 - Environmental management - life cycle assessment - principles and procedures. Geneva: International Organization for Standardization (ISO).

ISO. (2006). ISO 14044:2006 - Environmental management - life cycle assessment - requirements and guidelines. Geneva: International Organization for Standardization (ISO).

Life Cycle Strategies. (2015). Australasian LCI Database. Retrieved from Life Cycle Strategies: http://www.lifecycles.com.au/#!australasian-database/cbm5

PIPA. (2011). POP003 Butt Fusion Jointing of PE Pipes and Fittings. Retrieved from http://www.pipa.com.au/sites/default/files/document/attachment/pop003.pdf

Standards Australia. (2006). AS/NZS 4401:2006 - Plastic piping systems for soil and waste discharge (low and high temperature) inside buildings - Polyethylene (PE).

Standards Australia. (2009). AS/NZS 4130:2009 - Polyethylene (PE) pipes for pressure applications.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