AUSTRALASIA EPD®
ENVIRONMENTAL PRODUCT DECLARATION

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iPLEX Pipelines

ENVIRONMENTAL PRODUCT DECLARATION

BLACKMAX™ AND SEWERMAX™ POLYPROPYLENE PIPES

Environmental Product Declaration (EPD) in accordance with ISO 14025 and EN 15804
Version 1.2 17/10/2017
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Year taken as a reference for the data: 2014
EPD of Iplex Pipelines PP Pipe Products – In collaboration with the Australian Plastics Industry Pipe Association (PIPA)

PIPA

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ENVIRONMENTAL PRODUCT DECLARATION

BLACKMAX™ AND SEWERMAX™ POLYPROPYLENE PIPES

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 which pipe dimensions the installation results refer to, corrected the installation impact calculations and added installation impact results for a broader range of pipes.

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CEN STANDARD EN 15804 SERVED AS THE CORE PCR	
PCR:	Construction Products and Services, Version 2, 2015-03-03
PCR PREPARED BY:	IVL Swedish Environmental Research Institute Moderator: Martin Erlandsson, **e:** martin.erlandsson@ivl.se
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 CONFORMITY

- ✓ 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 Transparency credit points under the GBCA's Green Star rating tools.

The BlackMAX™ and SewerMAX™ polypropylene (PP) pipe EPD results can also be used to represent PP 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 Environment Product Declaration, for its structured wall polypropylene BlackMAX™ SN8 stormwater and SewerMAX™ SN10 sewer pipes.

As a wholly owned business unit of the ASX listed company, Fletcher Building Limited, with operations in every state and New Zealand, Iplex supplies pipe, conduits and fittings to applications including plumbing, irrigation, mining, industrial and chemical processes, electrical, gas, stormwater, sewer, raw, recycled and potable water.

More than 50 years' experience in the manufacture of plastics pipes makes Iplex an Australian pioneer in the plastics pipe production and a foundation member of the Plastics Industry Pipes Association of Australia. As part of its ongoing commitment to the development of Australian and International Standards for plastics pipe products, company personnel serve on Standards Australia and ISO technical committees and working groups.

In addition to WaterMark and StandardsMark product certification to AS/NZS 5065, 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 BLACKMAX™ AND SEWERMAX™ PP PIPES

Iplex BlackMAX™ and SewerMAX™ pipes are manufactured to a high standard in accordance with the Australian Standard AS/NZ 5065 - *Polyethylene and polypropylene pipes & fittings for drainage and sewerage application.* Whilst most commonly used in underground drain and sewer applications, when provided with appropriate support these products are equally suitable for installation above ground in suspended stormwater systems. The pipes' highly effective jointing system protects against sewer leakage into groundwater and infiltration of storm run-off into sewer systems whilst their smooth internal surfaces maintain gravity flow at very low gradients.

The high ring strain tolerance of polypropylene enables the pipe to be safely buried without risk of buckling or collapse in a very broad range of ground conditions, provided adequate compacted bedding and support is provided during installation.

BlackMAX™ and SewerMAX™ pipes are a fraction of the weight of equivalent concrete or earthen ware pipes providing faster installation for contractors, often without the need for mechanical handling equipment.

Polypropylene is a tough, abrasion resistant material with exceptional chemical resistance and will never rust or spall, making these pipes ideally suited for use in marine and corrosive soil environments. Polypropylene pipe used in stormwater applications has no effect on the pH or chemistry of run-off water.

A complementary range of fittings including bends, tees, junctions, saddles and adaptors completes the system and permits seamless integration into existing drainage and sewer pipe networks.

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

TABLE 1 - PRODUCT CHARACTERISTICS OF PP PIPE

PRODUCT CHARACTERISTICS	
PRODUCT NAMES/APPLICATION	Polypropylene (PP) pipes covered in this EPD are: BlackMAX™ PP drainage pipe SewerMAX™ PP sewerage pipe See Table 9 for individual product codes.
UN CPC CODE	36320 - Tubes, pipes and hoses, and fittings therefor, of plastics
RESIN DENSITY	900 kg/m³
CIRCUMFERENTIAL FLEXURAL MODULUS (2MM/MIN)	≥1300MPa
SHORE D HARDNESS	60
COEFFICIENT OF LINEAR THERMAL EXPANSION	150×10^{-6} / K
TENSILE YIELD STRESS (50MM/MIN)	31 MPa
POISSON'S RATIO	0.45
RING BENDING STIFFNESS	≥ BlackMAX™ 8000 N/m.m (SN8) ≥ SewerMAX™ 10000 N/m.m (SN10)
NOMINAL DIAMETER	225-600 mm

TABLE 2 - CONTENT DECLARATION

MATERIAL	PERCENTAGE CONTENT	CAS NO.
POLYPROPYLENE BLOCK COPOLYMER	98%	9003-07-0
NON-HAZARDOUS INGREDIENTS	2.0%	CONFIDENTIAL
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 AAEPDP, (2015) and four information modules according to ISO 21930 and EN 15804, and supplemented by an optional information module on potential loads and benefits beyond the building life cycle. The scope of this 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). Other than module B2, all other use stage modules were also deemed not relevant. Only minor maintenance for clearing pipes ("jetting") was required during the use stage in module B2.

TABLE 3 – SYSTEM BOUNDARY AND SCOPE OF THE STUDY

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT	INSTALLATION	MATERIAL EMISSIONS	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY	OPERATIONAL WATER	DECONSTRUCTION/DEMOLITION	TRANSPORT	WASTE PROCESSING	DISPOSAL
X	X	X	X	X	NR	X	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 OF IPLEX PP PIPES

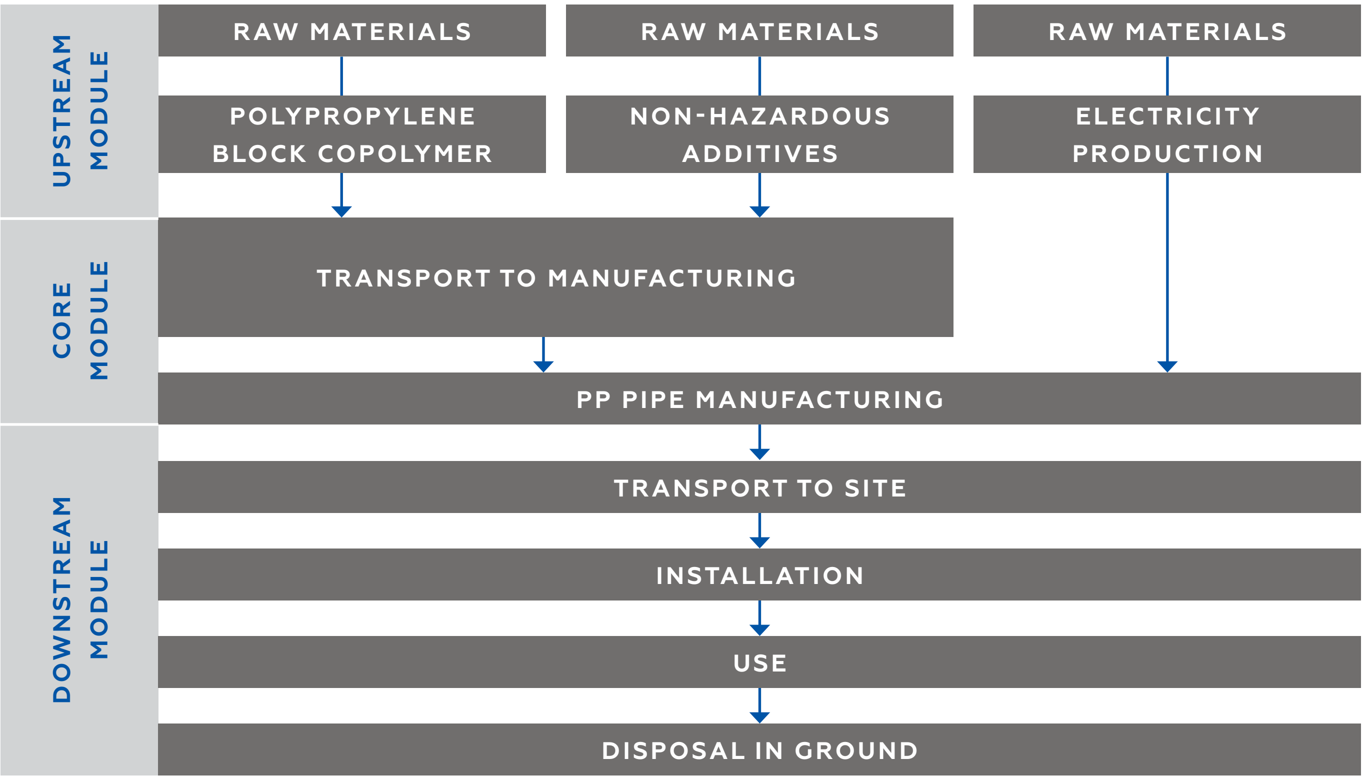


FIGURE 1 - LIFE CYCLE DIAGRAM OF PP PIPE PRODUCTION

IPLEX PP PIPE MANUFACTURING

Iplex PP pipes are manufactured from polypropylene block copolymer resin sourced from overseas. The PP 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 PP 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 tube with distinct inner and outer walls. The newly formed twin-walled pipe is then cooled by refrigerated water whilst passing though vacuum corrugator blocks that form the pipes' outer skin into a structured wall of trapezoidal ribs. Pipe wall thickness is controlled with the computerised haul-off speed which also controls the saw which cuts the pipe at predetermined lengths. One end of the pipe is re-heated after cutting and expanded to allow for pipe joining. Finally, the lengths of pipe are crated with a softwood timber frame, steel and PET strapping. Iplex PP pipe is manufactured in Strathpine (Queensland) as shown in Figure 2.

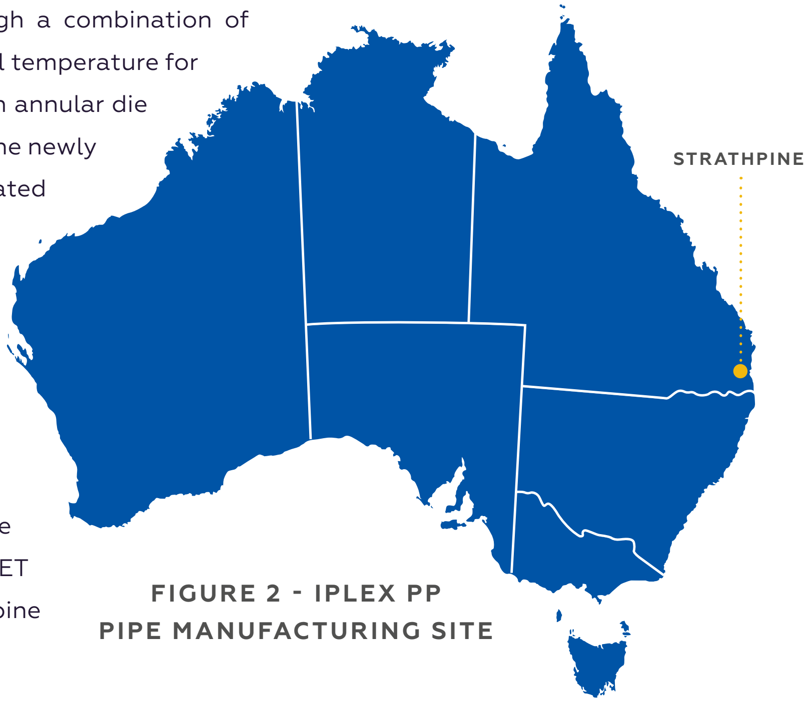
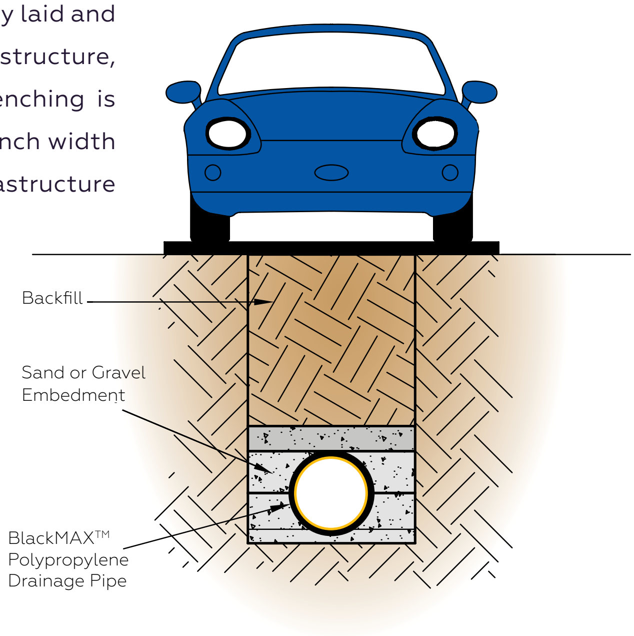


FIGURE 2 - IPLEX PP PIPE MANUFACTURING SITE

DISTRIBUTION STAGE

Iplex has only one PP pipe manufacturing facility in Australia, requiring significant distribution distances to all major Australian markets apart from Brisbane. The impact of distribution was calculated by using the distance from manufacturing to each capital city in Australia weighted by PP pipe sales volumes in each state. While some BlackMAX™ and SewerMAX™ pipe is transported to regional areas the vast majority is sold in capital cities.

INSTALLATION STAGE



Iplex BlackMAX™ and SewerMAX™ PP pipe systems are usually laid and buried in an excavated trench to form drainage or sewer infrastructure, or similar applications as part of a large building site. Trenching is commonly undertaken using a mechanical excavator. The trench width and depth varies with pipe size and is specified by the infrastructure agency. For the size ranges nominated in this EPD, PIPA suggests an average trench width of 559mm and an average trench depth of 1509mm is appropriate. (Based on DN225 from AS/NZS 2566.1) PIPA discussions with contractors reveal an average installation rate for a trench of this size in a Greenfield site is 10-12m/h using a 5-8t excavator and 18-19m/h using a 12-20t machine. For this study it was assumed that 15 metres of trench is excavated per hour of operation. Assuming 3.91 kilogram of pipe per metre installed, this equates to 0.017h excavator operation per kilogram of pipe installed. This was modelled using Excavator/AU U from the Australasian Unit Process LCI, with 0.0022L diesel consumed per kilogram pipe installed. The energy required for trench excavation leads to significant impact during the PP pipe installation stage.

Results are presented for installation of DN300 and DN600. Module A5 results are only available for these specific pipe sizes, and the results do not apply to other pipe sizes included in the EPD.

Bedding and backfill materials vary in specification. In some cases no imported material is used but for most 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 for embedment, there is 0.232m^3 of material per metre of pipeline – or 0.059m^3 per kilogram of pipe (assuming average mass of 3.91kg/m). This material will be transported to site and given the predominance of this approach to city based installation, it is estimated the typical transport distance would be 30-50km.

The joints for PP pipes of this type are all rubber sealed spigot and socket joints – there is no heat used, no thermal or chemical welding and no solvent used. Handling, cutting, and positioning of individual pipes on site is done by hand – no mechanical lifting equipment required even for the larger diameter pipes nominated in this EPD.

Wastage of pipe is minimal as short lengths are often required elsewhere and easily reused on subsequent sites or within the same site. A very rough estimate puts wastage from unusable offcuts at less than 2%.

USE STAGE

According to AS/NZS 5065:2005, the pipe systems are designed to outlast the building with a life expectancy of in excess of 100 years (Standards Australia, 2005). The failure rate is also extremely low and is considered to be inconsequential (not relevant) in this EPD. Maintenance of these pipe systems is not planned as deterioration of the pipe in service is not an issue. The only unplanned maintenance activities involve "jetting" to clear blockages. Jetting involves the insertion of a high pressure water hose and spray nozzle. This requires energy to pressurise the water and water is also consumed. The failure rate is also extremely low and is considered to be inconsequential (not relevant) in this EPD. It was estimated that over the life of a pipeline such as this that on average there would be the need to jet clean the pipeline only twice.

The failure rate of the pipe itself is extremely low and is considered to be inconsequential. Given the major risk with plastics pipe systems is third party interference, and that these PP pipe systems used primarily in drainage and sewer 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. Repairing a damaged PP pipe is simple using either a mechanical saddle fitting or cutting out the affected section and replacing with a new section of pipe.

END OF LIFE

The PP drainage and sewerage pipes which are installed underground are assumed to remain underground at end of life. The PP 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

DECLARED UNIT	1 kg of installed pipe
GEOGRAPHICAL COVERAGE	Australia
LCA SCOPE	Cradle to grave
REFERENCE SERVICE LIFE	100 years - While the design life of the PP pipe is in excess of 100 years, the duration of the pipe use in buildings will be less for buildings with a shorter lifetime

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. Electricity consumption was allocated to pipe via mass of pipe produced.

BACKGROUND DATA

Generic background data was sourced for raw materials in the upstream module and transportation. Background data was adapted to represent Iplex PP 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 suitable Australian data was not available. The polypropylene block copolymer and polymer inputs sourced from outside Australia were 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), section 6.6. 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), section 6.7. 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.

BLACKMAX™ AND SEWERMAX™ ENVIRONMENTAL PERFORMANCE

The potential environmental impacts used in this EPD are explained in Table 5 and the results for Iplex PP 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.

5.0 PP PIPE ENVIRONMENTAL PERFORMANCE

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 & A2	A3	A4	A5 (DN225)	A5 (DN300)	A5 (DN600)	B2
GWP (kgCO_2 eq)	2.48	0.675	0.626	0.707	0.597	0.470	5.10E-04
ODP (kgCFC11 eq)	1.73E-08	1.41E-09	6.43E-09	5.33E-08	4.49E-08	3.53E-08	1.09E-12
AP (kgSO_2 eq)	8.14E-03	1.47E-03	1.46E-03	2.96E-03	2.50E-03	1.96E-03	6.92E-07
EP (kgPO_4^{3-} eq)	1.05E-03	3.94E-04	3.09E-04	6.18E-04	5.21E-04	4.10E-04	1.91E-07
POCP (kgC_2H_2 eq)	4.81E-04	5.73E-05	9.27E-05	1.34E-04	1.13E-04	8.89E-05	1.83E-08
ADPE (kgSb eq)	3.64E-07	6.28E-07	4.51E-07	1.26E-06	1.06E-06	8.37E-07	5.18E-10
ADPF (MJ)	74.0	7.70	9.42	10.77	9.09	7.15	5.77E-03

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 & A2	A3	A4	A5 (DN225)	A5 (DN300)	A5 (DN600)	B2
PERE (MJ)	0.5490	0.982	0.0205	0.054	0.046	0.036	2.45E-04
PERM (MJ)	0	0	0	0	0	0	0
PERT (MJ)	0.5490	0.982	0.0205	0.054	0.046	0.036	2.45E-04
PENRE (MJ)	83.6	2.08	9.436	11.1664	9.4241	7.4145	0.0058
PENRM (MJ)	0	0	0	0	0	0	0
PENRT (MJ)	83.6	2.08	9.44	11.17	9.42	7.41	5.80E-03
SM (kg)	INA	INA	INA	INA	INA	INA	INA
RSF (MJ)	INA	INA	INA	INA	INA	INA	INA
NRSF (MJ)	INA	INA	INA	INA	INA	INA	INA
FW (m3)	0.016	0.001	0.0007	0.192	0.162	0.127	1.14E-06

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 & A2	A3	A4	A5 (DN225)	A5 (DN300)	A5 (DN600)	B2
HWD (kg)	1.68E-06	1.16E-06	2.12E-06	7.22E-06	6.09E-06	4.79E-06	8.78E-10
NHWD (kg)	0.0840	0.0427	0.0204	0.063	0.054	0.043	2.93E-05
RWD (kg)	8.20E-06	1.46E-08	5.13E-08	1.45E-07	1.23E-07	9.65E-08	2.12E-11

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 PP 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 PP pipe manufacturing at Iplex sites. From the feed mix ingredients, PP block copolymer resin is responsible for the majority of all environmental impacts and use of resources.

6.0 ADDITIONAL ENVIRONMENTAL INFORMATION

GUIDANCE FOR PP PIPE RECYCLING

All PP pipe offcuts from installation can be completely recycled back into new pipe products. Specific PP pipe recycling or take back centres are limited to Sydney, Brisbane and Melbourne. In addition to these sites there are general plastics recyclers in all Australian capital cities. Although the PP pipes covered in this EPD are most likely to be left in the ground at end of life, PP has a high recyclability and can be mechanically or chemically recycled to replace virgin polypropylene in new products.

7.0 PRODUCT SPECIFICATIONS

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

TABLE 9 - PRODUCT SPECIFICATIONS FOR PP STRUCTURED WALL PIPE PRODUCTS

APPLICATION	PRODUCT CODE	DN NOMINAL SIZE (MM)	STIFFNESS / PRESSURE RATING	LENGTH (M)	MEAN OUTSIDE DIAMETER (MM)	MEAN INSIDE DIAMETER (MM)	MASS (KG/M)
Drainage	GR8225	225	SN8	6	259	225	3.56
Drainage	GR8300	300	SN8	6	344	300	6.28
Drainage	GR8375	375	SN8	6	428	373	9.11
Drainage	GR8450	450	SN8	6	514	447	12.7
Drainage	GR8525	525	SN8	6	600	522	15.3
Drainage	GR8600	600	SN8	6	682	596	20.6
Sewerage	GR10225C	225	SN10	3	259	225	4.27
Sewerage	GR10300C	300	SN10	3	344	300	7.65
Sewerage	GR10375C	375	SN10	3	428	373	11.1
Sewerage	GR10450C	450	SN10	3	514	447	14.0
Sewerage	GR10525C	525	SN10	3	600	522	18.5
Sewerage	GR10600C	600	SN10	3	682	596	25.0

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