SRCPipes Steel Reinforced Concrete Pipes

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019

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

RCPA

THE AUSTRALIAN PIPE COMPANY

AUSTRALASIA EPD®

ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

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PROGRAM INFORMATION AND VERIFICATION

An Environmental Product Declaration (EPD) is a standardised way of quantifying the potential environmental impacts of a product or system. EPDs are produced according to a consistent set of rules – Product Category Rules (PCR) – that define the requirements within a given product category. These rules are a key part of ISO 14025 as they enable transparency and comparability between EPDs. This EPD provides environmental indicators for Reinforced Concrete Pipes Australia's (RCPA's) steel reinforced concrete pipes produced at our five manufacturing facilities throughout Australia. This EPD is a "cradle-to-gate with modules C1–C4 and module D" declaration covering cradle-to-gate production of steel reinforced concrete pipes, plus their end-of-life.

This EPD is verified to be compliant with EN 15804+A2. EPDs of construction products may not be comparable if they do not comply with EN15804. EPDs within the same product category but from different programs or utilising different standards or PCRs may not be comparable.

RCPA, as the EPD owner. has the sole ownership, liability, and responsibility for the EPD.

Declaration Owner	**Reinforced Concrete Pipes Australia (Holdings) Pty Ltd** 69-99 Ferris Road, Cobblebank VIC 3338 Australia www.rcpa.com.au Email: sales@rcpa.com.au Phone: 1800 88 72 72
EPD Program Operator	**EPD Australasia Limited** 315a Hardy Street, Nelson 7010, New Zealand www.epd-australasia.com Email: info@epd-australasia.com Phone: 02 8005 8206
EPD Produced by:	**Rob Rouwette, start2see** 36 Renaissance Blvd, Mernda, Vic 3754, Australia www.start2see.com.au Email: rob.rouwette@start2see.com.au Phone: +61 403 834 470
Third Party Verifier accredited or approved by: EPD Australasia Ltd.	**Andrew D. Moore, Life Cycle Logic** PO Box 571 Fremantle WA 6959, Australia www.lifecyclelogic.com.au Email: andrew@lifecyclelogic.com.au Phone: +61 4 2432 0057

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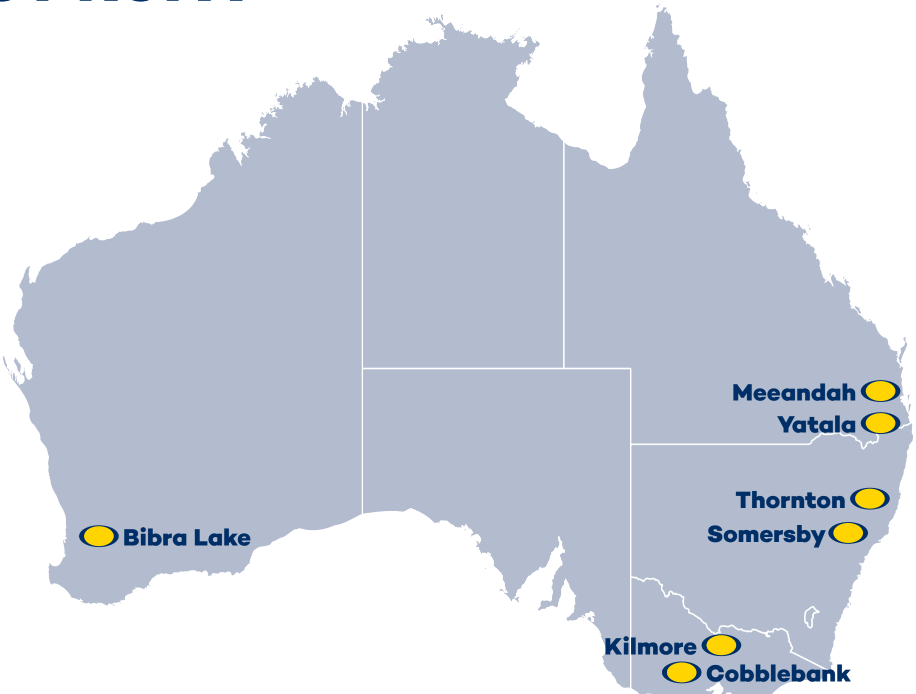
CEN standard EN 15804:2012+A2:2019 served as the core PCR

PCR:	PCR 2019:14 Construction Products, Version 1.11, 2021-02-05 (valid until 2024-12-20) c-PCR-003 Concrete and Concrete Elements (EN 16757:2017), 2019-12-20 (valid until 2024-12-20)
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Claudia A. Peña Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:	☐ EPD process certification (Internal) ☒ EPD verification (External)
Procedure for follow-up of data during EPD validity involves third-party verifier:	☐ Yes ☒ No

ABOUT RCPA



RCPA aspires to be the supplier of choice and market leader in stormwater pipe & associated precast products. Our corporate values are founded by a culture of Safety, Performance, being Customer centric, Teamwork & Innovation.

In 1995 the vertical dry cast pipe manufacturing process was brought to Australia and adapted to produce steel reinforced concrete pipes for the Australian market. Following a period of expansion Reinforced Concrete Pipes Australia Pty Ltd (RCPA) was formed in 2009 as a result of the merger between Reinforced Concrete Pipes (RCP) and Australasian Pipeline & Pre-Cast (APP). This merger resulted in the only Australian owned national supplier of steel reinforced concrete pipe using vertical dry casting technology.

Continued investments in high technology machinery by RCPA has created a significant alternative supplier to those producers using traditional spun pipe and precast production in Australia. The constant drive for innovative products and processes, RCPA not only incorporates many production efficiencies of the “dry cast method” but also minimises environmental impact and the usage of power in its factories throughout Australia. A faster, more flexible and efficient manufacturing process allows us to offer shorter lead times and a very responsive customer service.

In 2015, RCPA acquired the fibre-reinforced concrete pipe division of James Hardie. Now known as FRCPipes, this product range extension gives RCPA a unique product offer including a range of specialty drainage systems across Australia.

RCPA has plants located in Sydney, Melbourne, Brisbane & Perth as well as partnering with local leading civil precasters in Adelaide, Canberra, Tasmania and Darwin.

RCPA are focused on tailoring our product or service to individual customer needs, big or small. Our commitment to exceeding expectations is paramount to the success of RCPA.

Service is in our DNA. From our people, to our technology and processes we truly believe that we service our customers like no-one else can. Our manufacturing processes utilise methods that enable us to produce dependable quality products in the shortest possible time so that we can keep our customers and their projects on track.

Technology is core to our business which enables us to deliver an experience you won’t get anywhere else. RCPA pioneered the vertical dry-cast SRC pipe process in Australia and today we are the only supplier offering this product range throughout the country. Our unique FRC pipe technology delivers fibre reinforced 4m length pipes that offer speed of installation combined with concrete pipe strength. Our precast product technology and range is ever growing and offering our clients a diverse range of options for culverts, pits, headwalls and associated products.

Compliance goes hand-in-hand with all of our processes. RCPA maintains an ISO9001 certified QMS and runs a strong EH&S program focused on the health and safety of our people. The design and manufacture of our products meets local, state and national regulations, standards and specifications.

PRODUCT DESCRIPTION - SRCPIPES

The dry-cast pipe making process was introduced to Australia by RCPA and has been in use for two decades. Vertical production using dry-cast concrete is the most efficient method of concrete pipe manufacture available and produces a high-quality pipe at superior production rates in full compliance with Australian Standards.

Figure 1:

Reinforced concrete pipes are classified under UN CPC 375 (Articles of concrete, cement and plaster) and ANZSIC 20340 (Concrete products manufacturing).

Process

- Vertical cast process successfully used for over 50 years.
- Pipe performance exceeds requirements of AS4058.
- Dry-cast concrete with low water-cement ratio and high durability.
- Bi-directional compaction to provide a high-quality internal surface.
- Process suited to rapid and mass production providing reduced lead times.

Environmental

- Efficient use of materials with minimal wastage.
- No slurry waste produced with the dry-cast concrete process.
- Concrete is made using locally sourced materials where possible with low energy inputs.

Product

- Standard joint design, for each diameter all classes of pipe can be joined together.
- Continuous reinforcement cage through spigot and socket with cage spacers designed to minimise exposure.
- **SRCPipes** are primarily used in stormwater drainage projects but can be used in other applications if required.
- Concrete is produced in automated batch plants with world-class moisture control technology
- Typical concrete compressive strengths greater than 50MPa.

SRCPipes outlined in this Environmental Product Declaration are manufactured at RCPA's production facilities in Bibra Lake (Western Australia), Cobblebank (Victoria), Kilmore (Victoria), Somersby (NSW) and Yatala (Queensland).

SRCPipes made at the newly established Thornton (NSW) production facility will be included in a revised EPD as production data becomes available.

Our product range covered by this EPD:

- Class 2, 3 and 4 Rubber Ring Joint (RRJ) pipes, DN225 – DN2700
- Class 2, 3 and 4 Flush Joint (FJ) pipes, DN225 – DN2700

Table 1: Product composition, per declared unit (1 tonne of reinforced concrete pipe)

Product components	Mass	Post-consumer material, mass-%	Renewable material, mass-%
Ready mixed concrete	92-98%	0%	0%
• GP cement	15-22%		
• Fly ash	0-6%		
• Coarse aggregates	30-45%		
• Natural sand	30-45%		
• Water	4-7%		
• Admixtures	0-0.5%		
Reinforcement steel	2-8%	70%*	0%
Additional components supplied with each pipe			
Rubber ring	one per pipe**	0%	65%***
Plastic lifting hole cap	One per pipe# (excluding small diameters)	0%	0%##

* Reinforcement steel contains post-consumer scrap. The value provided is an estimate based on average data that may or may not be representative for the steel we receive from our suppliers.

** One rubber ring is supplied with each pipe. We have not included the rubber as part of the pipe product composition as they are supplied separately.

*** The rubber rings are made with natural rubber.

\# The lifting hole caps are supplied with pipes that have a lifting hole DN450 and larger. The caps are included in the results as part of the concrete material and are not listed as separate items.

\## The lifting hole caps are made from polypropylene.

Packaging materials are not relevant for the concrete pipes contained in this EPD.

The products included in this EPD do not contain any substances of very high concern as defined by European REACH regulation in concentrations >0.1% (m/m).

TECHNICAL COMPLIANCE

RCPA **SRCPipes** are made in accordance with all relevant specifications, including Australian Standards, state road authority, and local government requirements. The primary reference for manufacture and testing of steel reinforced concrete pipes is:

AS/NZS 4058:2007 – Precast concrete pipes (pressure and non-pressure)

Declared unit

1 tonne of concrete used in reinforced concrete pipes
1 kg of reinforcement used in reinforced concrete pipes

We produce hundreds of product variations (pipe class, diameter, joint type) across our sites. All these product variations are manufactured using only a few concrete mixes, but each product contains a different amount of reinforcement per tonne. To avoid having to present hundreds of environmental profiles in this EPD to cover all of our products, we have presented the environmental profiles of the concrete and reinforcement steel separately for each site. We then provide mass conversion tables that allow the user to determine the environmental footprint of each pipe product based on the quantity of concrete and steel for that product.

We also supply a rubber ring and cap for covering a lifting hole with each pipe. We don't manufacture the rings or caps, but nonetheless have provided environmental results for these items based on generic data. We have supplied results for rubber rings per kg of rubber. The conversion tables in the Product Specifications section outline the quantity of rubber (mass per ring) per pipe type and diameter. Flush joint (FJ) pipes are sometimes supplied without external sealing bands (commonly known as sand bands), however for this analysis we have assumed that every FJ pipe is supplied with a sealing band.

SCOPE OF THE ENVIRONMENTAL PRODUCT DECLARATION

This EPD covers the cradle to gate with modules C1–C4 and module D (modules A1-A3, C1-C4, D). Construction and use stages have not been included as we cannot define a typical scenario for our range of concrete pipes, and these stages are best modelled at the project level. The modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are shown in table 2.

Table 2: Scope of EPD

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				RESOURCE RECOVERY STAGE
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction Demolition	Transport	Waste Processing	Disposal	Reuse-Recovery-Recycling-Potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared*	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	AU, MY, JP	AU	AU	-	-	-	-	-	-	-	-	-	AU	AU	AU	AU	AU
Specific Data Used	70 - >90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – Products	<6%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – Sites	not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Modules declared are noted with "X"; Modules that are not declared are noted as "ND".

This EPD is a specific EPD for products manufactured in Bibra Lake, Kilmore and Yatala. For products manufactured in Cobblebank and Somersby, we present various concrete mixes using a representative mix design. As such, these results are for an average product (with variation in GWP-GHG between products less than 6%).

Raw material supply, Transportation and Manufacturing (A1-A3)

RCPA produces a wide range of steel reinforced concrete pipes from key raw materials (cement, fly ash, coarse aggregates, natural sand, water and admixtures).

The raw materials are supplied by third parties. All raw materials are typically transported to our sites by truck.

Our production process consists of manufacture of steel wire reinforcement cages and concrete which are placed into a mould and compacted to form a pipe. Pipes are then cured, finished, tested, and stored prior to despatch to construction sites for installation.

End-of-life (C1-C4; D)

At the end of their functional life, concrete pipes can enter into one of the following disposal scenarios:

1. exhumed and recycled.
2. left in the ground, filled with a grout to avoid cave-in
3. left in the ground, abandoned
4. left in the ground, re-lined (e.g. with a plastic HDPE pipe and thus going into a second life; the re-lining process is considered part of the second life)

Due to high uncertainty in the parameters and lack of data, CO_2-uptake (carbonation) has not been included at end-of-life.

This EPD covers end-of-life options **1.** and **2.**, as the most likely end-of-life scenarios.

Deconstruction/Demolition – Module C1

When pipes are left in-ground, there is no activity attributed to module C1. In the recycling scenario, it is assumed that when the pipe is exhumed it is replaced with another new product. The excavation and back-filling of the trench is part of the next pipe's life cycle and is not included in the replaced pipe's end-of-life scenario. Removal of pipes is included.

Transport – Module C2

When pipes are left in-ground, there is no activity attributed to module C2. In the recycling scenario, this includes transportation of the discarded pipe to a recycling site or transportation of waste to a final sorting yard or disposal site.

Waste Processing – Module C3

When pipes are left in-ground, there is no activity attributed to module C3. The waste processing includes crushing of waste pipes (recycling) into concrete rubble and steel scrap.

Disposal – Module C4

For pipes that are left in-ground, we modeled emissions from concrete plus a controlled low strength material (grout fill) as waste disposed to landfill. Note that module C impacts are based on a scenario. When the combined variation of grout volume per tonne of pipe and cement content of the grout is taken into account, it is clear that users of this EPD should look at their specific situation, rather than rely on the generic values provided in this EPD.

Reuse, recovery, recycling potential – Module D

The information in module D includes environmental benefits or loads resulting from recyclable materials leaving a product system. The concrete rubble and steel scrap produced in module C3 can replace natural coarse aggregates (crushed rock) and virgin steel (after further processing), respectively. Module D is only relevant when pipes are exhumed and recycled.

Recycling (scenario 1)

Table 3. End-of-life of SRC pipes, recycling scenario, per tonne

Processes	Quantity	Unit
Collection process specified by type	1,000	kg collected separately
	0	kg collected with mixed construction waste
Transport to from demolition site to recovery/disposal sites	50	km transport (transport, truck, 16 to 28t, fleet average/AU U)
Recovery system specified by type	0	kg for re-use
	1,000	kg for recycling (recycling brick rubble and concrete, at plant/AU U)
	0	kg for energy recovery
Disposal to landfill	0	kg product or material for final deposition
Assumptions for scenario development	1	Assumed 1 m^3 of excavation (Excavation, hydraulic digger/RER U/AusSD U) per tonne of pipe (in module C1). This equates to 0.13 kg diesel use.*

* The process relates to the removal of the pipe (excluding digging of the trench), where we conservatively assumed digging one m3 equals removing one tonne of pipe. This approach assumes that (if the pipe is removed at end of life) a new pipe will be installed (i.e. as part of an upgrade or replacement rather than removal). The excavation is considered part of module A5 (of the next life cycle) and as such it has not been double-counted in module C1 of this life cycle.

Table 4. Assumptions relating to Module D of SRC pipes, pipe recycling scenario

Parameter	Unit / effect	
$M_{MR\ out}$ =	amount of material exiting the system that will be recycled in a subsequent system	
100%	concrete	
100%	steel	
$M_{MR\ in}$ =	amount of recycled input material	
0%	concrete component	
70%	steel component *	
$E_{MR\ after\ EoW\ out}$ =	specific emissions and resources consumed per unit of analysis arising from material recovery processes of a subsequent system after the end-of-waste state	
n/a	concrete	
transport + recycling	steel	transport = 50 km transport, *truck, 28t, fleet average/AU U* recycling process: *Steel, low-alloyed {RoW} | steel production, electric, low-alloyed | Cut-off, U*
$E_{VMSub\ out}$ = *virgin materials*	specific emissions and resources consumed per unit of analysis arising from acquisition and pre-processing of the primary material, or average input material if primary material is not used, from the cradle to the point of functional equivalence where it would substitute secondary material that would be used in a subsequent system	
virgin aggregates	concrete: Gravel, crushed, at mine/CH U/AusSD U	
virgin steel	steel: Steel, low-alloyed {RoW}| steel production, converter, low-alloyed | Cut-off, U	
$Q_{R\ out}$	quality of the outgoing recovered material	
Q_{Sub}	quality of the substituted material	
$Q_{R\ out}$ / Q_{Sub} = 1	quality ratio between outgoing recovered material and the substituted material is assumed to be 1 (equal quality)	

* InfraBuild EPD 855 (Bar, Rod, Wire) does not contain the percentage of post-consumer recycled content, but it does show Secondary Materials (SM) of 734 kg per tonne. We assumed 70% recycled content across the two steel suppliers.

Abandonment (scenario 2)

Table 5. End-of-life of SRC pipes, abandonment scenario, per tonne

Processes	Quantity	Unit
Collection process specified by type	0	kg collected separately
	0	kg collected with mixed construction waste
Transport to from demolition site to recovery/disposal sites	0	km transport (transport, truck, 16 to 28t, fleet average/AU U)
Recovery system specified by type	0	kg for re-use
	0	kg for recycling (recycling brick rubble and concrete, at plant/AU U)
	0	kg for energy recovery
Disposal to landfill	1,000	kg product or material for final deposition (Disposal, concrete, 5% water, to inert material landfill/CH U/AusSD U) i.e. we assumed that abandoning pipes equals landfilling
Assumptions for scenario development	1,950	Estimated quantity (in kg) of grout required per tonne of pipe, based on a grout density of 2,250 kg/m^3. The grout is assumed to contain 80 kg/m^3 cement and 270 kg/m^3 fly ash. *

* When the combined variation of grout volume and cement content of the grout is taken into account, it is clear that users should look at the specific situation, rather than rely on the generic values provided in this EPD.

Table 6. Assumptions relating to Module D of SRC pipes, pipe abandonment scenario

Parameter	Unit / effect
$M_{MR\ out}$ =	amount of material exiting the system that will be recycled in a subsequent system
0%	concrete
0%	steel
$M_{MR\ in}$ =	amount of recycled input material
0%	concrete component
70%	steel component *
$E_{MR\ after\ EoW\ out}$ =	specific emissions and resources consumed per unit of analysis arising from material recovery processes of a subsequent system after the end-of-waste state
n/a	
$E_{VMSub\ out}$ = *virgin materials*	specific emissions and resources consumed per unit of analysis arising from acquisition and pre-processing of the primary material, or average input material if primary material is not used, from the cradle to the point of functional equivalence where it would substitute secondary material that would be used in a subsequent system
n/a	
$Q_{R\ out}$	quality of the outgoing recovered material
Q_{Sub}	quality of the substituted material
$Q_{R\ out}$ / Q_{Sub} = 1	quality ratio between outgoing recovered material and the substituted material is assumed to be 1 (equal quality)

For both scenarios, we have assumed that the rubber ring is landfilled (in module C4).

* InfraBuild EPD 855 (Bar, Rod, Wire) does not contain the percentage of post-consumer recycled content, but it does show Secondary Materials (SM) of 734 kg per tonne. We assumed 70% recycled content across the two steel suppliers.

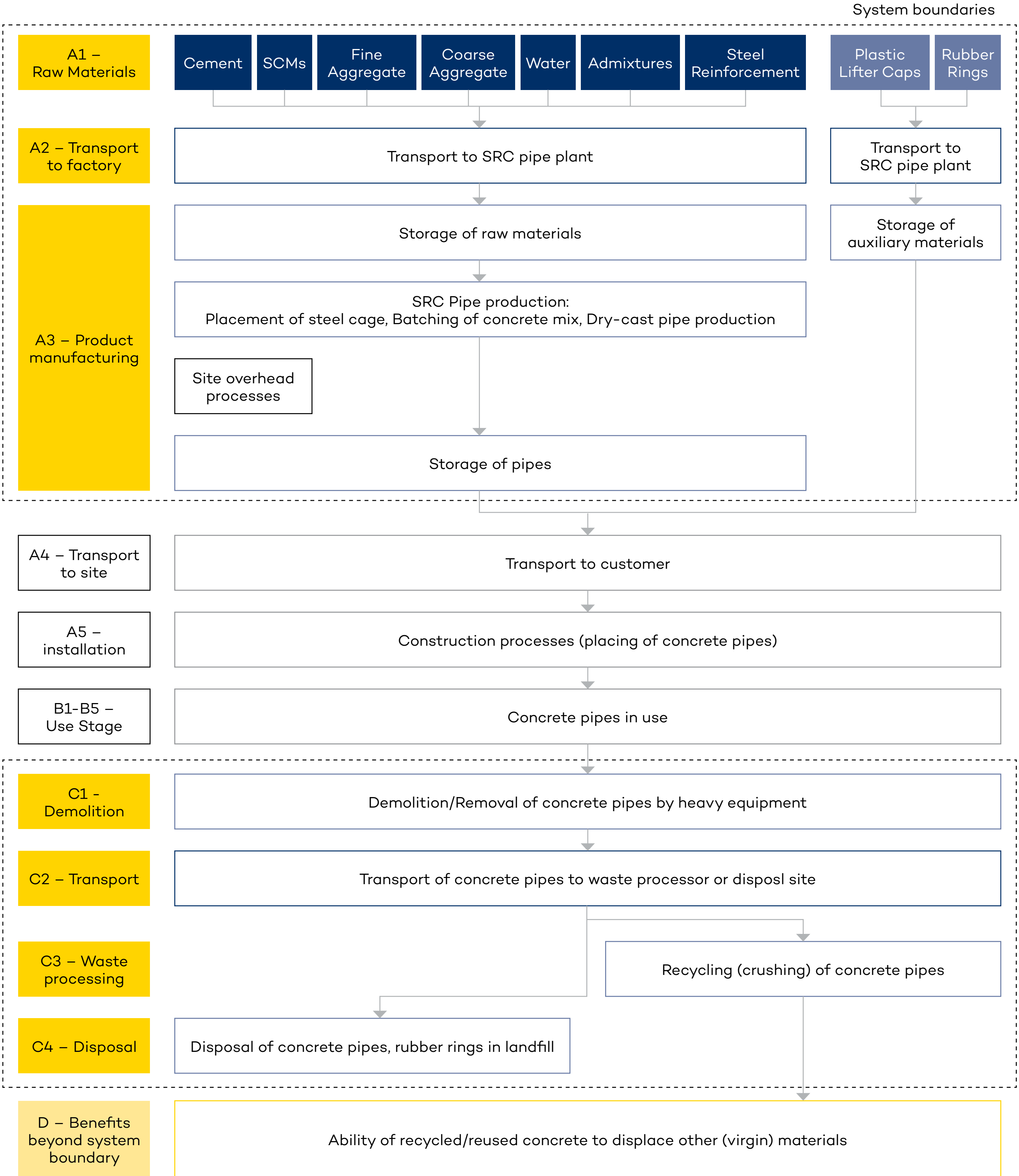


Figure 3: System boundary diagram of steel reinforced concrete pipes

LIFE CYCLE ASSESSMENT (LCA) METHODOLOGY

Background Data

RCPA has collected and supplied the primary data for the LCA based on the FY21 reporting period (1 July 2020 – 30 June 2021). RCPA provided data for concrete pipe production as well as its supply chains.

Background data (i.e. for reinforcement steel, energy and transport processes) have predominantly been sourced from AusLCI and the AusLCI shadow database (v1.36) (AusLCI 2021), as well as ecoinvent v3. Where applicable, we have used Australian EPD data from our key suppliers of cement and steel. Background data used are either less than 10 years old or have been reviewed within this period.

End-of-life processes are based on scenarios. The scenarios are currently in use and are representative for (one of) the most probable alternatives.

Methodological choices have been applied in line with EN 15804; deviations have been recorded.

Allocation

The key processes that require allocation are:

- **Shared production of various concrete pipes and other precast products:** overhead processes (i.e. energy use) for concrete pipe production have been allocated to different pipes on a mass basis (share in total tonnes of reinforced concrete pipes and other precast products).
- **Fly ash:** all environmental impacts of the power plant have been allocated to the main product: electricity. Fly ash has only received the burdens of transport to our sites.
- **Steel and steel slag:** Although RCPA currently does not use steel slag (GGBFS) in the production of pipes, the allocation between steel and slag is still relevant for the reinforcement steel that goes into the pipes. Allocation has occurred in the background data and does not materially affect the results of this LCA.

Cut-off Criteria

The cut-off criteria applied are 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of a process, while considering environmental impacts of small flows:

- The amount of packaging used for admixtures is well below the materiality cut-off and these materials have been excluded.

The contribution of capital goods (production equipment and infrastructure) and personnel is excluded, as these processes are non-attributable and they contribute less than 10% to GWP-GHG.

Key Assumptions

The key choices and assumptions in the LCA are:

- For reinforcing steel, we used a combination of datasets. For reinforcing steel sourced from InfraBuild, we used data from InfraBuild's EPD model for "Reinforcing Rod, Bar and Wire" (EPD S-P-00855). For imported reinforcement steel, we used modified ecoinvent data.
- For rubber rings, we use proxy data for natural latex rubber (literature data), plus proxy data for carbon black and the production process (AusLCI)
- For lifting hole caps, we use proxy data for PP and injection moulding (AusLCI).
- Due to high uncertainty in the parameters and lack of data, CO_2-uptake (carbonation) has not been included at end-of-life.

The end-of-life scenarios are based on a set of assumptions that may influence the outcome of the assessment. It is important to understand the scenarios before drawing conclusions based on this EPD.

LIFE CYCLE ASSESSMENT (LCA) RESULTS

The background LCA serves as the foundation for this EPD. An LCA analyses the environmental processes in the value chain of a product. It provides a comprehensive evaluation of all upstream (and sometimes downstream) material and energy inputs and outputs. The results are provided for a range of environmental impact categories, in line with EN 15804:2012+A2:2019.

Legend

Indicator aligned with Australia's greenhouse gas reporting framework

Abbreviation	Unit	Description
GWP-GHG	kg CO_2 eq	The GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). This indicator is determined using the IPCC AR5 Global Warming Potentials (GWP) with a 100-year time horizon.

Indicators for EN15804+A2

Abbreviation	Unit	Description
Core Environmental Impact Indicators		
GWP-total	kg CO_2 eq	Global Warming Potential total
GWP-fossil	kg CO_2 eq	Global Warming Potential fossil fuels
GWP-biogenic	kg CO_2 eq	Global Warming Potential biogenic
GWP-luluc	kg CO_2 eq	Global Warming Potential land use and land use change
ODP	kg CFC 11 eq.	Depletion potential of the stratospheric ozone layer
AP	mol H^+ eq.	Acidification potential
EP-freshwater	kg P eq.	Eutrophication potential, fraction of nutrients reaching freshwater end compartment
EP-marine	kg N eq.	Eutrophication potential, fraction of nutrients reaching marine end compartment
EP-terrestrial	mol N eq.	Eutrophication potential, Accumulated Exceedance
POCP	kg NMVOC eq.	Formation potential of tropospheric ozone
ADP-minerals & metals*	kg Sb eq.	Abiotic depletion potential for non-fossil resources
ADP-fossil*	MJ	Abiotic depletion potential for fossil resources potential
WDP*	m^3	Water (user) deprivation potential, deprivation-weighted water consumption

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

Abbreviation	Unit	Description
Additional Environmental Impact Indicators		
PM	disease incidence	Particulate matter emissions
IRP**	kBq U235 equivalent	Ionising radiation, human health
ETP-fw*	CTUe	Ecotoxicity (freshwater)
HTP-c*	CTUh	Human toxicity, cancer effects
HTP-nc*	CTUh	Human toxicity, non-cancer effects
SQP*	-	Land use related impacts / soil quality
Parameters		
Use of Resources		
PERE	MJ	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	MJ	Use of renewable primary energy resources used as raw materials
PERT	MJ	Total use of renewable primary energy resources
PENRE	MJ	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	MJ	Use of non-renewable primary energy resources used as raw materials
PENRT	MJ	Total use of non-renewable primary energy re-sources
SM	kg	Use of secondary material
RSF	MJ	Use of renewable secondary fuels
NRSF	MJ	Use of non-renewable secondary fuels
FW	m^3	Use of net fresh water
Waste Production		
HWD	kg	Hazardous waste disposed
NHWD	kg	Non-hazardous waste disposed
RWD	kg	Radioactive waste disposed
Output Flows		
CRU	kg	Components for re-use
MFR	kg	Material for recycling
MER	kg	Materials for energy recovery
EE	MJ	Exported energy, electricity and thermal

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

** **Disclaimer:** 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.

Indicators for EN15804+A1

Abbreviation	Unit	Description
GWP	kg CO_2 eq	Global Warming Potential
ODP	kg CFC11 eq	Depletion potential of the stratospheric ozone layer
AP	kg SO_2 eq	Acidification potential
EP	kg PO_4^{3-} eq	Eutrophication potential
POCP	kg C_2H_4 eq	Formation potential of tropospheric ozone
ADPE	kg Sb eq	Abiotic depletion potential for elements
ADPF	MJ_{NCV}	Abiotic depletion potential for fossil resources

We are also providing EN 15804:2012+A1:2013 compliant results (see table below) to assist our customers who want to use this EPD in tools, such as the Infrastructure Sustainability Council's Sustainability Rating Tool, that are currently based on this method.

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.

Environmental Profiles for Cradle-to-Gate Production of SRCPipes

The following environmental profiles are expressed per tonne of concrete, and per kilogram of steel and rubber rings. By presenting the results separately for concrete, steel and rubber, the reader can calculate the most accurate environmental profile for any of our pipe products.

How to calculate the environmental profiles for individual pipe designs (cradle-to-gate production):

Step 1 Refer to the Product Specification tables for the relevant site (page 34 and beyond). Separate tables are provided for Rubber Ring Joint and Flush Joint pipes when these are both manufactured from a single site.

Should there be a pipe not listed (such as Marine grade or higher-Class designs) contact RCPA for details.

Step 2 Record the details for the pipe design being analysed:

1. Concrete weight (tonnes)
2. Steel weight (kilograms)
3. Rubber weight (kilograms)

Step 3 Select the relevant table for the environmental indicators associated with the manufacturing site. Locate the potential environmental impact indicator values for each material type (concrete, steel, and rubber).

Step 4 Multiply the respective material weights by the indicator values and record these individually.

Add the three material results to determine the total environmental impact indicators for the pipe design being analysed.

Example

Below is shown an example of A1-A3 data for a 2.34m length of DN600 Class 4 rubber ring joint pipe manufactured in Yatala, for the GWP-GHG indicator for Australian climate change reporting framework.

Material	Unit	Material weights per pipe *a*	GWP-GHG Indicators per unit *b*	GWP-GHG for each material per pipe *a x b*	GWP-GHG for a 2.34m length of DN600 Class 4 pipe manufactured in Yatala QLD
Concrete	*Tonnes*	0.788	197	155	227 kg CO_2 eq
Steel reinforcement	*Kilograms*	35	2.03	71.1	
Rubber ring	*kilograms*	0.37	3.33	1.23	

To convert this result to the required length of pipeline, multiply the result (227 kg CO_2e) by total length of pipe used divided by 2.34 m/pipe. For a 100m pipeline this is 227/1000 * 100/2.34 = 9.7 t CO_2e.

Site	Product specifications	*Cradle-to-gate (A1-A3) results*	*End-of-life (C1-C4; D) results*
Bibra Lake, WA	Page 35	Page 20	Page 30 to 33
Cobblebank, Vic	Page 36	Page 22	Page 30 to 33
Kilmore, Vic	Page 40	Page 24	Page 30 to 33
Somersby, NSW	Page 42	Page 26	Page 30 to 33
Yatala, QLD	Page 44	Page 28	Page 30 to 33

Bibra Lake, WA

Table 1: Carbon footprint in line with Australian climate change reporting frameworks

Results per declared unit (A1-A3 total)				
Indicator	**Unit**	**Concrete** (Per Tonne)	**Steel Reinforcement** (Per kg)	**Rubber Rings** (Per kg)
GWP-GHG	kg CO_2 eq.	185	1.91	3.21

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)				
Indicator	**Unit**	**Concrete** (Per Tonne)	**Steel Reinforcement** (Per kg)	**Rubber Rings** (Per kg)
GWP-total	kg CO_2 eq.	1.86E+02	1.98E+00	3.25E+00
GWP-*fossil*	kg CO_2 eq.	1.86E+02	1.97E+00	3.29E+00
GWP-*biogenic*	kg CO_2 eq.	9.40E-02	9.10E-03	-4.94E-02
GWP-*luluc*	kg CO_2 eq.	4.64E-04	2.06E-03	3.58E-04
ODP	kg CFC 11 eq.	3.47E-06	4.90E-08	1.25E-06
AP	mol H^+ eq.	1.00E+00	8.51E-03	2.06E-02
EP-freshwater	kg P eq.	2.94E-04	5.56E-05	3.39E-06
EP-marine	kg N eq.	2.72E-01	2.14E-03	3.81E-03
EP-terrestrial	mol N eq.	3.05E+00	1.94E-02	4.17E-02
POCP	kg NMVOC eq.	7.33E-01	6.94E-03	1.07E-02
ADP-minerals & metals*	kg Sb eq.	1.34E-06	1.42E-06	4.36E-08
ADP-fossil*	MJ	1.25E+03	2.11E+01	6.54E+01
WDP*	m^3	1.71E+03	7.19E-01	5.04E+01

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)				
Indicator	**Unit**	**Concrete** (Per Tonne)	**Steel Reinforcement** (Per kg)	**Rubber Rings** (Per kg)
PM	disease incidence	5.37E-06	1.82E-07	2.70E-07
IRP**	kBq U235 equivalent	9.08E-01	1.39E-02	1.58E-03
ETP-fw*	CTUe	7.47E+02	2.24E+01	1.06E+01
HTP-c*	CTUh	1.54E-08	1.20E-08	2.75E-10
HTP-nc*	CTUh	8.81E-07	5.66E-08	1.09E-08
SQP*	-	6.29E+02	1.58E+00	1.40E+01

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

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Table 4: Use of Resources, Waste Production & Output Flows

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
Use of resources - results per declared unit (A1-A3 total)				
PERE	MJ	2.20E+01	1.03E+00	2.07E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.20E+01	1.03E+00	2.07E+00
PENRE	MJ	1.27E+03	2.17E+01	6.80E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.27E+03	2.17E+01	6.80E+01
SM	kg	0.00E+00	3.77E-01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	2.41E-02	0.00E+00
FW	m^3	1.74E+00	6.76E-02	3.48E-02
Waste production - results per declared unit (A1-A3 total)				
HWD	kg	0.00E+00	2.71E-09	0.00E+00
NHWD	kg	8.48E-02	2.30E-01	1.09E-01
RWD	kg	0.00E+00	2.06E-05	0.00E+00
Output flows - results per declared unit (A1-A3 total)				
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.50E+01	3.69E-02	0.00E+00
MER	kg	0.00E+00	2.62E-04	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP	kg CO_2 eq	1.85E+02	1.90E+00	3.20E+00
ODP	kg CFC11 eq	2.81E-06	4.20E-08	1.29E-06
AP	kg SO_2 eq	6.98E-01	6.94E-03	9.80E-03
EP	kg PO_4^{3-} eq	9.48E-02	9.80E-04	1.45E-03
POCP	kg C_2H_4 eq	3.35E-02	1.03E-03	7.91E-04
ADPE	kg Sb eq	1.41E-06	1.45E-06	4.56E-08
ADPF	MJ_{NCV}	1.25E+03	2.38E+01	6.44E+01

Cobblebank, VIC

Table 1: Carbon footprint in line with Australian climate change reporting frameworks

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-GHG	kg CO_2 eq	224	2.05	3.33

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-total	kg CO_2 eq.	2.26E+02	2.13E+00	3.37E+00
GWP-*fossil*	kg CO_2 eq.	2.25E+02	2.13E+00	3.42E+00
GWP-*biogenic*	kg CO_2 eq.	9.93E-02	4.54E-03	-4.95E-02
GWP-*luluc*	kg CO_2 eq.	5.44E-04	8.86E-04	3.58E-04
ODP	kg CFC 11 eq.	4.30E-06	2.93E-08	1.27E-06
AP	mol H^+ eq.	1.27E+00	7.94E-03	2.14E-02
EP-freshwater	kg P eq.	3.52E-04	2.56E-05	3.37E-06
EP-marine	kg N eq.	3.27E-01	1.98E-03	3.94E-03
EP-terrestrial	mol N eq.	3.66E+00	2.01E-02	4.31E-02
POCP	kg NMVOC eq.	8.85E-01	7.02E-03	1.11E-02
ADP-minerals & metals*	kg Sb eq.	1.48E-06	9.19E-07	4.38E-08
ADP-fossil*	MJ	1.51E+03	2.27E+01	6.72E+01
WDP*	m^3	2.01E+03	5.07E-01	4.97E+01

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
PM	disease incidence	7.37E-06	2.11E-07	2.48E-07
IRP**	kBq U235 equivalent	1.08E+00	8.28E-03	1.58E-03
ETP-fw*	CTUe	8.94E+02	9.22E+00	1.11E+01
HTP-c*	CTUh	1.76E-08	4.80E-09	2.75E-10
HTP-nc*	CTUh	1.04E-06	2.28E-08	1.07E-08
SQP*	-	5.96E+02	1.50E+00	1.10E+01

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

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Table 4: Use of Resources, Waste Production & Output Flows

Use of Resources - Results per declared unit (A1-A3 total)				
Indicator	**Unit**	**Concrete** (Per Tonne)	**Steel Reinforcement** (Per kg)	**Rubber Rings** (Per kg)
PERE	MJ	2.50E+01	1.10E+00	2.05E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.50E+01	1.10E+00	2.05E+00
PENRE	MJ	1.54E+03	2.30E+01	6.99E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.54E+03	2.30E+01	6.99E+01
SM	kg	0.00E+00	6.04E-01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	3.85E-02	0.00E+00
FW	m^3	1.78E+00	3.16E-02	3.50E-02
Waste production - Results per declared unit (A1-A3 total)				
HWD	kg	0.00E+00	4.34E-09	0.00E+00
NHWD	kg	1.07E-01	3.67E-01	1.09E-01
RWD	kg	0.00E+00	3.29E-05	0.00E+00
Output flows - Results per declared unit (A1-A3 total)				
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.60E+01	5.90E-02	0.00E+00
MER	kg	0.00E+00	4.20E-04	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit (A1-A3 total)

Indicator	**Unit**	**Concrete** (Per Tonne)	**Steel Reinforcement** (Per kg)	**Rubber Rings** (Per kg)
GWP	kg CO_2 eq	2.23E+02	2.04E+00	3.32E+00
ODP	kg CFC11 eq	3.48E-06	2.44E-08	1.31E-06
AP	kg SO_2 eq	8.36E-01	6.29E-03	1.02E-02
EP	kg PO_4^{3-} eq	1.14E-01	7.94E-04	1.49E-03
POCP	kg C_2H_4 eq	4.08E-02	1.36E-03	9.60E-04
ADPE	kg Sb eq	1.57E-06	9.61E-07	4.58E-08
ADPF	MJ_{NCV}	1.50E+03	2.37E+01	6.61E+01

Kilmore, VIC

Table 1: Carbon footprint in line with Australian climate change reporting frameworks

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-GHG	kg CO_2 eq	252	2.04	3.31

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-total	kg CO_2 eq.	2.54E+02	2.13E+00	3.35E+00
GWP-*fossil*	kg CO_2 eq.	2.54E+02	2.12E+00	3.40E+00
GWP-*biogenic*	kg CO_2 eq.	1.22E-01	4.53E-03	-4.95E-02
GWP-*luluc*	kg CO_2 eq.	8.32E-04	8.85E-04	3.58E-04
ODP	kg CFC 11 eq.	5.52E-06	2.85E-08	1.27E-06
AP	mol H^+ eq.	1.44E+00	7.91E-03	2.12E-02
EP-freshwater	kg P eq.	4.21E-04	2.55E-05	3.37E-06
EP-marine	kg N eq.	3.71E-01	1.97E-03	3.87E-03
EP-terrestrial	mol N eq.	4.16E+00	2.00E-02	4.24E-02
POCP	kg NMVOC eq.	1.01E+00	7.00E-03	1.09E-02
ADP-minerals&metals*	kg Sb eq.	2.16E-06	9.18E-07	4.38E-08
ADP-fossil*	MJ	1.77E+03	2.27E+01	6.68E+01
WDP*	m^3	2.28E+03	5.03E-01	4.97E+01

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
PM	disease incidence	8.74E-06	2.11E-07	2.47E-07
IRP**	kBq U235 equivalent	1.21E+00	8.28E-03	1.58E-03
ETP-fw*	CTUe	1.01E+03	9.20E+00	1.10E+01
HTP-c*	CTUh	2.07E-08	4.79E-09	2.75E-10
HTP-nc*	CTUh	1.19E-06	2.28E-08	1.06E-08
SQP*	-	6.41E+02	1.50E+00	1.10E+01

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Table 4: Use of Resources, Waste Production & Output Flows

Use of Resources - Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
PERE	MJ	2.77E+01	1.10E+00	2.05E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.77E+01	1.10E+00	2.05E+00
PENRE	MJ	1.81E+03	2.30E+01	6.95E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.81E+03	2.30E+01	6.95E+01
SM	kg	0.00E+00	6.04E-01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	3.85E-02	0.00E+00
FW	m^3	2.03E+00	3.16E-02	3.50E-02
Waste production - Results per declared unit (A1-A3 total)				
HWD	kg	0.00E+00	4.34E-09	0.00E+00
NHWD	kg	1.19E-01	3.67E-01	1.09E-01
RWD	kg	0.00E+00	3.29E-05	0.00E+00
Output flows - Results per declared unit (A1-A3 total)				
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.90E+01	5.91E-02	0.00E+00
MER	kg	0.00E+00	4.20E-04	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP	kg CO_2 eq	2.52E+02	2.03E+00	3.30E+00
ODP	kg CFC11 eq	4.50E-06	2.38E-08	1.30E-06
AP	kg SO_2 eq	9.55E-01	6.27E-03	1.00E-02
EP	kg PO_4^{3-} eq	1.31E-01	7.92E-04	1.47E-03
POCP	kg C_2H_4 eq	4.92E-02	1.36E-03	9.35E-04
ADPE	kg Sb eq	2.28E-06	9.60E-07	4.58E-08
ADPF	MJ_{NCV}	1.77E+03	2.37E+01	6.58E+01

Somersby, NSW

Table 1: Carbon footprint in line with Australian climate change reporting frameworks

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-GHG	kg CO_2 eq	194	2.05	3.14

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-total	kg CO_2 eq.	1.96E+02	2.14E+00	3.18E+00
GWP-*fossil*	kg CO_2 eq.	1.96E+02	2.14E+00	3.23E+00
GWP-*biogenic*	kg CO_2 eq.	1.53E-01	1.49E-03	-4.95E-02
GWP-*luluc*	kg CO_2 eq.	6.86E-05	1.04E-04	3.58E-04
ODP	kg CFC 11 eq.	2.11E-06	1.10E-09	1.24E-06
AP	mol H^+ eq.	7.49E-01	6.95E-03	1.97E-02
EP-freshwater	kg P eq.	4.22E-05	5.50E-06	3.36E-06
EP-marine	kg N eq.	2.44E-01	1.73E-03	3.41E-03
EP-terrestrial	mol N eq.	2.74E+00	1.90E-02	3.73E-02
POCP	kg NMVOC eq.	6.49E-01	6.69E-03	9.66E-03
ADP-minerals & metals*	kg Sb eq.	1.10E-06	5.84E-07	4.36E-08
ADP-fossil*	MJ	1.17E+03	2.25E+01	6.46E+01
WDP*	m^3	3.25E+02	2.94E-01	4.96E+01

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
PM	disease incidence	5.03E-06	2.21E-07	2.39E-07
IRP**	kBq U235 equivalent	9.17E-03	4.54E-03	1.58E-03
ETP-fw*	CTUe	6.80E+02	2.79E-02	1.04E+01
HTP-c*	CTUh	1.49E-08	2.38E-13	2.72E-10
HTP-nc*	CTUh	9.11E-07	1.73E-11	1.04E-08
SQP*	-	5.81E+02	1.45E+00	1.10E+01

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Table 4: Use of Resources, Waste Production & Output Flows

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
Use of Resources - Results per declared unit (A1-A3 total)				
PERE	MJ	1.78E+01	1.15E+00	2.05E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.78E+01	1.15E+00	2.05E+00
PENRE	MJ	1.18E+03	2.25E+01	6.71E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.18E+03	2.25E+01	6.71E+01
SM	kg	0.00E+00	7.54E-01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	4.82E-02	0.00E+00
FW	m^3	1.45E+00	7.47E-03	3.46E-02
Waste production - Results per declared unit (A1-A3 total)				
HWD	kg	0.00E+00	5.42E-09	0.00E+00
NHWD	kg	2.54E-01	4.59E-01	1.09E-01
RWD	kg	0.00E+00	4.11E-05	0.00E+00
Output flows - Results per declared unit (A1-A3 total)				
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.00E+01	7.38E-02	0.00E+00
MER	kg	0.00E+00	5.25E-04	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP	kg CO_2 eq	1.94E+02	2.04E+00	3.13E+00
ODP	kg CFC11 eq	1.71E-06	8.71E-10	1.28E-06
AP	kg SO_2 eq	4.34E-01	5.56E-03	9.23E-03
EP	kg PO_4^{3-} eq	8.43E-02	6.23E-04	1.31E-03
POCP	kg C_2H_4 eq	2.15E-02	1.52E-03	7.60E-04
ADPE	kg Sb eq	1.12E-06	6.37E-07	4.56E-08
ADPF	MJ_{NCV}	1.17E+03	2.24E+01	6.36E+01

Yatala, QLD

Table 1: Carbon footprint in line with Australian climate change reporting frameworks

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-GHG	kg CO_2 eq	197	2.03	3.33

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP-total	kg CO_2 eq.	1.99E+02	2.11E+00	3.37E+00
GWP-*fossil*	kg CO_2 eq.	1.99E+02	2.11E+00	3.42E+00
GWP-*biogenic*	kg CO_2 eq.	6.60E-02	4.54E-03	-4.95E-02
GWP-*luluc*	kg CO_2 eq.	4.79E-04	8.86E-04	3.58E-04
ODP	kg CFC 11 eq.	4.06E-06	2.64E-08	1.27E-06
AP	mol H^+ eq.	1.10E+00	7.81E-03	2.14E-02
EP-freshwater	kg P eq.	3.08E-04	2.56E-05	3.37E-06
EP-marine	kg N eq.	3.02E-01	1.95E-03	3.93E-03
EP-terrestrial	mol N eq.	3.39E+00	1.98E-02	4.30E-02
POCP	kg NMVOC eq.	8.15E-01	6.94E-03	1.10E-02
ADP-minerals & metals*	kg Sb eq.	1.24E-06	9.19E-07	4.38E-08
ADP-fossil*	MJ	1.35E+03	2.25E+01	6.71E+01
WDP*	m^3	1.80E+03	4.93E-01	4.97E+01

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
PM	disease incidence	5.96E-06	2.09E-07	2.48E-07
IRP**	kBq U235 equivalent	9.35E-01	8.29E-03	1.58E-03
ETP-fw*	CTUe	7.91E+02	9.16E+00	1.11E+01
HTP-c*	CTUh	1.73E-08	4.80E-09	2.75E-10
HTP-nc*	CTUh	9.11E-07	2.28E-08	1.07E-08
SQP*	-	4.13E+02	1.50E+00	1.10E+01

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

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Table 4: Use of Resources, Waste Production & Output Flows

Use of Resources - Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
PERE	MJ	1.85E+01	1.10E+00	2.05E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.85E+01	1.10E+00	2.05E+00
PENRE	MJ	1.38E+03	2.28E+01	6.98E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.38E+03	2.28E+01	6.98E+01
SM	kg	5.57E+01	6.03E-01	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	3.85E-02	0.00E+00
FW	m^3	1.74E+00	3.16E-02	3.50E-02
Waste production - Results per declared unit (A1-A3 total)				
HWD	kg	0.00E+00	4.34E-09	0.00E+00
NHWD	kg	1.63E-01	3.67E-01	1.09E-01
RWD	kg	0.00E+00	3.29E-05	0.00E+00
Output flows - Results per declared unit (A1-A3 total)				
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.40E+01	5.90E-02	0.00E+00
MER	kg	0.00E+00	4.20E-04	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit (A1-A3 total)

Indicator	Unit	Concrete (Per Tonne)	Steel Reinforcement (Per kg)	Rubber Rings (Per kg)
GWP	kg CO_2 eq	1.97E+02	2.02E+00	3.32E+00
ODP	kg CFC11 eq	3.29E-06	2.21E-08	1.31E-06
AP	kg SO_2 eq	7.53E-01	6.22E-03	1.01E-02
EP	kg PO_4^{3-} eq	1.05E-01	7.85E-04	1.49E-03
POCP	kg C_2H_4 eq	3.73E-02	1.35E-03	9.59E-04
ADPE	kg Sb eq	1.33E-06	9.61E-07	4.58E-08
ADPF	MJ_{NCV}	1.35E+03	2.35E+01	6.61E+01

Environmental profiles for end-of-life stages of Steel Reinforced Concrete Pipes

The following environmental profiles are expressed per tonne of reinforced concrete pipe for modules C1-C4. Module D is separated into concrete (per tonne of concrete) and steel (per kilogram of reinforcement steel) as the impacts vary significantly with the steel content of pipes.

The end-of-life scenarios and environmental profiles are representative for all sites.

Calculation of environmental profiles for individual pipe designs (end of life):

As steel reinforced concrete pipes are expected to have a long service life in excess of 100 years, calculation of environmental profiles for end-of-life stages should be done with caution. It is logical to expect that methods for disposal or rehabilitation of buried pipe infrastructure and recycling efficiency of concrete and steel will change during the service life of the pipe, and the values presented are reflective of current practices.

For modules C1 to C4, the potential environmental impact indicators are calculated on the total weight of the concrete pipe, including steel. For module D, where the constituent materials have been separated, the concrete and steel components must be calculated separately.

Step 1 Refer to the Product Specification tables for the relevant site. Separate tables are provided for Rubber Ring Joint and Flush Joint pipes when these are both manufactured from a single site.

Should there be a pipe not listed (such as Marine grade or higher-Class designs) contact RCPA for details.

Step 2 Record the details for the pipe design being analysed:

1. Concrete weight (tonnes)
2. Steel weight (kilograms)

For modules C1 to C4, combine the concrete and steel weight, converting steel from kilograms to tonnes to get a total pipe weight.

Step 3 Locate the potential environmental impact indicator values for the module being analysed.

Step 4 Multiply the respective material weight(s) by the indicator values and record.

For Module D add the concrete and steel results to determine the total environmental impact indicators for the pipe design being analysed.

Recycling (Scenario 1)

Table 1: Indicator aligned with Australia's greenhouse gas reporting framework

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
GWP-GHG	kg CO_2 eq	0.48	6.41	4.21	3.32	-9.55	-0.26

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
GWP-total	kg CO_2 eq.	4.88E-01	6.52E+00	4.24E+00	4.19E+00	-9.65E+00	-2.75E-01
GWP-*fossil*	kg CO_2 eq.	4.88E-01	6.52E+00	4.23E+00	5.85E-03	-9.86E+00	-2.77E-01
GWP-*biogenic*	kg CO_2 eq.	4.83E-05	5.98E-04	5.47E-03	3.91E+00	2.12E-01	2.23E-03
GWP-*luluc*	kg CO_2 eq.	2.31E-07	3.02E-06	1.90E-06	2.37E-09	-1.34E-06	1.91E-04
ODP	kg CFC 11 eq.	7.72E-08	1.01E-06	5.18E-07	7.83E-10	-2.96E-07	-6.53E-09
AP	mol H^+ eq.	5.36E-03	5.68E-02	1.52E-02	1.93E-05	-6.08E-02	-1.03E-03
EP-freshwater	kg P eq.	6.53E-08	4.52E-07	3.56E-06	1.74E-09	-1.04E-05	-5.15E-07
EP-marine	kg N eq.	2.32E-03	1.78E-02	2.52E-03	3.24E-06	-8.12E-03	-1.49E-05
EP-terrestrial	mol N eq.	2.54E-02	1.95E-01	2.74E-02	3.53E-05	-8.73E-02	-2.69E-03
POCP	kg NMVOC eq.	6.12E-03	4.75E-02	7.33E-03	1.01E-03	-2.35E-02	-1.53E-03
ADP-minerals & metals*	kg Sb eq.	5.68E-10	7.42E-09	1.02E-06	5.79E-12	-1.29E-06	-7.57E-06
ADP-fossil*	MJ	6.72E+00	8.77E+01	5.67E+01	7.96E-02	-1.15E+02	-2.12E+00
WDP*	m^3	3.89E-01	4.77E+00	5.60E+01	3.53E-02	-3.28E+02	7.79E-02

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

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
PM	disease incidence	1.41E-07	3.21E-07	1.10E-07	1.28E-10	-5.31E-07	-1.37E-08
IRP**	kBq U235 equivalent	9.84E-06	1.28E-04	8.27E-04	1.00E-07	-7.99E-04	4.63E-03
ETP-fw*	CTUe	1.94E+00	2.52E+01	1.52E+01	5.23E-02	-1.59E+01	-5.76E+00
HTP-c*	CTUh	2.41E-11	1.06E-10	6.88E-10	2.49E-13	-1.06E-09	2.71E-09
HTP-nc*	CTUh	2.23E-09	8.57E-09	2.30E-08	4.98E-09	-3.45E-08	1.70E-08
SQP*	-	3.12E-02	3.84E-01	1.11E+04	2.76E-03	-7.71E+01	-6.17E-01

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

** **Disclaimer:** 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.

Table 4: Use of Resources, Waste Production & Output Flows

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
Use of Resources							
PERE	MJ	9.12E-03	1.11E-01	8.98E-01	9.19E-04	-6.54E+00	-2.76E-01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	9.12E-03	1.11E-01	8.98E-01	9.19E-04	-6.54E+00	-2.76E-01
PENRE	MJ	7.12E+00	9.30E+01	5.94E+01	8.37E-02	-1.16E+02	-2.23E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	7.12E+00	9.30E+01	5.94E+01	8.37E-02	-1.16E+02	-2.23E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	9.79E-04	1.28E-02	2.11E-02	1.20E-05	-1.38E+00	1.11E-02
Waste production							
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	6.80E-05	8.30E-04	6.35E-03	2.71E+00	1.16E+00	1.40E-07
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Output flows							
CRU	kg	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	1.00E+03	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
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
GWP	kg CO_2 eq	4.83E-01	6.40E+00	4.20E+00	2.75E+00	-9.52E+00	-2.56E-01
ODP	kg CFC 11 eq	6.09E-08	7.97E-07	4.09E-07	6.18E-10	-2.34E-07	-1.02E-08
AP	kg SO_2 eq	3.79E-03	3.12E-02	7.71E-03	1.07E-05	-1.30E-02	-8.32E-04
EP	kg PO_4^{3-} eq	7.82E-04	5.99E-03	8.74E-04	1.11E-06	-2.81E-03	1.78E-05
POCP	kg C_2H_4 eq	4.43E-04	6.79E-03	9.05E-04	2.26E-02	-6.84E-04	-2.07E-04
ADPE	kg Sb eq	5.71E-10	7.45E-09	1.02E-06	5.97E-12	-1.29E-06	-7.57E-06
ADPF	MJNCV	6.55E+00	8.55E+01	5.56E+01	7.79E-02	-1.14E+02	-3.50E+00

Abandonment (Scenario 2)

Table 1: Indicator aligned with Australia's greenhouse gas reporting framework

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
GWP-GHG	kg CO_2 eq	0.00	0.00	0.00	104	0.00	0.61

Table 2: Potential environmental impacts – core indicators according to EN 15804:2012+A2:2019

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
GWP-total	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	1.06E+02	0.00E+00	6.44E-01
GWP-*fossil*	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	9.80E+01	0.00E+00	6.49E-01
GWP-*biogenic*	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	7.81E+00	0.00E+00	-5.19E-03
GWP-*luluc*	kg CO_2 eq.	0.00E+00	0.00E+00	0.00E+00	2.23E-04	0.00E+00	-4.46E-04
ODP	kg CFC 11 eq.	0.00E+00	0.00E+00	0.00E+00	4.93E-06	0.00E+00	1.56E-08
AP	mol H^+ eq.	0.00E+00	0.00E+00	0.00E+00	4.38E-01	0.00E+00	2.42E-03
EP-freshwater	kg P eq.	0.00E+00	0.00E+00	0.00E+00	7.99E-05	0.00E+00	1.20E-06
EP-marine	kg N eq.	0.00E+00	0.00E+00	0.00E+00	1.18E-01	0.00E+00	3.85E-05
EP-terrestrial	mol N eq.	0.00E+00	0.00E+00	0.00E+00	1.33E+00	0.00E+00	6.32E-03
POCP	kg NMVOC eq.	0.00E+00	0.00E+00	0.00E+00	3.23E-01	0.00E+00	3.59E-03
ADP-minerals & metals*	kg Sb eq.	0.00E+00	0.00E+00	0.00E+00	1.36E-06	0.00E+00	1.77E-05
ADP-fossil*	MJ	0.00E+00	0.00E+00	0.00E+00	8.27E+02	0.00E+00	4.99E+00
WDP*	m^3	0.00E+00	0.00E+00	0.00E+00	5.76E+02	0.00E+00	-1.80E-01

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

Table 3: Potential environmental impacts – additional indicators according to EN 15804:2012+A2:2019

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
PM	disease incidence	0.00E+00	0.00E+00	0.00E+00	3.81E-06	0.00E+00	3.22E-08
IRP**	kBq U235 equivalent	0.00E+00	0.00E+00	0.00E+00	1.08E-01	0.00E+00	-1.08E-02
ETP-fw*	CTUe	0.00E+00	0.00E+00	0.00E+00	8.74E+02	0.00E+00	1.34E+01
HTP-c*	CTUh	0.00E+00	0.00E+00	0.00E+00	4.99E-08	0.00E+00	-6.32E-09
HTP-nc*	CTUh	0.00E+00	0.00E+00	0.00E+00	1.93E-06	0.00E+00	-3.96E-08
SQP*	-	0.00E+00	0.00E+00	0.00E+00	1.38E+02	0.00E+00	1.44E+00

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Table 4: Use of Resources, Waste Production & Output Flows

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
Use of Resources							
PERE	MJ	0.00E+00	0.00E+00	0.00E+00	8.98E+00	0.00E+00	6.45E-01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	0.00E+00	0.00E+00	0.00E+00	8.98E+00	0.00E+00	6.45E-01
PENRE	MJ	0.00E+00	0.00E+00	0.00E+00	8.54E+02	0.00E+00	5.25E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	0.00E+00	0.00E+00	0.00E+00	8.54E+02	0.00E+00	5.25E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	0.00E+00	0.00E+00	0.00E+00	2.46E+00	0.00E+00	-2.58E-02

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
Waste production							
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	0.00E+00	0.00E+00	0.00E+00	2.95E+03	0.00E+00	0.00E+00
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Output flows							
CRU	kg	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
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 5: Potential environmental impacts – mandatory indicators according to EN 15804:2012+A1:2013

Results per declared unit: 1 tonne of steel reinforced concrete pipe

Indicator	Unit	Module C1	Module C2	Module C3	Module C4	Module D (per 1 tonne of concrete)	Module D (per 1 kg of steel)
GWP	kg CO_2 eq	0.00E+00	0.00E+00	0.00E+00	1.02E+02	0.00E+00	5.99E-01
ODP	kg CFC 11 eq	0.00E+00	0.00E+00	0.00E+00	3.94E-06	0.00E+00	2.40E-08
AP	kg SO_2 eq	0.00E+00	0.00E+00	0.00E+00	2.56E-01	0.00E+00	1.95E-03
EP	kg PO_4^{3-} eq	0.00E+00	0.00E+00	0.00E+00	4.21E-02	0.00E+00	-4.02E-05
POCP	kg C_2H_4 eq	0.00E+00	0.00E+00	0.00E+00	6.40E-02	0.00E+00	4.84E-04
ADPE	kg Sb eq	0.00E+00	0.00E+00	0.00E+00	1.37E-06	0.00E+00	1.77E-05
ADPF	MJNCV	0.00E+00	0.00E+00	0.00E+00	8.17E+02	0.00E+00	8.19E+00

PRODUCT SPECIFICATIONS

Tables of pipe concrete weight (tonnes), steel weight (kgs), and rubber ring weight (kgs) for each site.

Bibra Lake, WA

Rubber Ring Joint only – all pipes have a nominal effective length when jointed of 2.34m.

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Rubber Ring Weight (kg)
300	2	0.236	8	0.14
	3	0.236	9	0.14
	4	0.236	9	0.14
375	2	0.307	9	0.17
	3	0.306	10	0.17
	4	0.305	13	0.17
450	2	0.445	13	0.28
	3	0.445	15	0.28
	4	0.442	24	0.28
525	2	0.554	21	0.33
	3	0.553	23	0.33
	4	0.552	28	0.33
600	2	0.680	23	0.37
	3	0.678	28	0.37
	4	0.677	33	0.37
750	2	1.020	31	0.46
	3	1.016	46	0.46
	4	1.013	53	0.46
900	2	1.390	47	0.68
	3	1.665	59	0.68
	4	1.656	88	0.68
1050	2	1.606	66	0.78
	3	2.032	84	0.78
	4	2.029	94	0.78
1200	2	2.060	73	0.89
	3	2.532	119	0.89
	4	2.521	152	0.89

Notes: SRCPipes manufactured in Bibra Lake are produced without lifting holes.

Cobblebank, VIC

Rubber Ring Joint – all pipes have a nominal effective length when jointed of 2.34m, except for DN1950 = 2.33m and DN2400/DN2700 = 2.30m.

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Rubber Ring Weight (kg)
375	2	n/a	n/a	0.17
	3	n/a	n/a	0.17
	4	0.314	14	0.17
450	2	0.460	16	0.28
	3	0.460	16	0.28
	4	0.457	19	0.28
525	2	0.573	23	0.33
	3	0.572	24	0.33
	4	0.735	29	0.33
600	2	0.692	29	0.37
	3	0.690	34	0.37
	4	0.805	43	0.37
675	2	0.830	36	0.42
	3	0.827	47	0.42
	4	1.219	48	0.42
750	2	1.014	38	0.46
	3	1.010	51	0.46
	4	1.201	56	0.46
825	2	1.167	52	0.51
	3	1.163	66	0.51
	4	1.539	55	0.51
900	2	1.382	59	0.68
	3	1.609	65	0.68
	4	1.598	100	0.68
1050	2	1.613	102	0.78
	3	1.965	103	0.78
	4	1.960	120	0.78
1200	2	2.105	126	0.89
	3	2.508	127	0.89
	4	2.506	134	0.89
1350	2	2.492	139	1.68
	3	2.952	205	1.68
	4	2.945	230	1.68

Pipe Nominal Diameter (mm)	**Class**	**Concrete Weight** (t)	**Steel Weight** (kg)	**Rubber Ring Weight** (kg)
1500	2	3.012	174	1.86
	3	3.641	205	1.86
	4	3.638	215	1.86
1650	2	3.376	211	2.02
	3	4.711	219	2.02
	4	4.705	241	2.02
1800	2	3.808	220	2.20
	3	5.514	259	2.20
	4	5.500	307	2.20
1950	2	n/a	n/a	8.38
	3	n/a	n/a	8.38
	4	6.001	333	8.38
2100	2	4.636	289	2.54
	3	6.367	295	2.54
	4	6.357	329	2.54
2400	2	n/a	n/a	11.06
	3	8.106	424	11.06
	4	8.106	470	11.06
2700	2	9.656	469	12.13
	3	9.656	469	12.13
	4	n/a	n/a	12.13

Flush Joint – all pipes have a nominal effective length when jointed of 2.34m, except for DN1950/DN2400/DN2700 = 2.425m.

Pipe Nominal Diameter (mm)	**Class**	**Concrete Weight** (t)	**Steel Weight** (kg)	**Sand Band Weight** (kg)
450	2	n/a	n/a	0.67
	3	0.396	14	0.67
	4	0.395	16	0.67
525	2	0.498	16	0.78
	3	0.498	17	0.78
	4	0.635	23	0.78
600	2	0.602	26	0.88
	3	0.600	31	0.88
	4	0.726	31	0.88
675	2	0.741	28	0.98
	3	0.739	34	0.98
	4	1.201	40	0.98
750	2	0.875	39	1.09
	3	0.875	39	1.09
	4	1.121	54	1.09
825	2	1.053	54	1.20
	3	1.050	64	1.20
	4	1.437	43	1.20
900	2	1.234	64	1.30
	3	1.227	86	1.30
	4	1.502	102	1.30
1050	2	1.400	110	1.49
	3	1.870	79	1.49
	4	1.860	110	1.49
1200	2	1.718	123	1.70
	3	2.201	128	1.70
	4	2.198	139	1.70
1350	2	2.106	138	1.91
	3	n/a	n/a	1.91
	4	n/a	n/a	1.91

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Sand Band Weight (kg)
1500	2	2.466	177	2.11
	3	3.207	210	2.11
	4	3.201	232	2.11
1650	2	2.695	211	2.31
	3	n/a	n/a	2.31
	4	n/a	n/a	2.31
1800	2	3.192	225	2.51
	3	n/a	n/a	2.51
	4	4.890	263	2.51
1950	2	n/a	n/a	2.85
	3	n/a	n/a	2.85
	4	5.865	348	2.85
2100	2	4.495	257	2.93
	3	n/a	n/a	2.93
	4	5.854	315	2.93
2400	2	7607	449	3.44
	3	n/a	n/a	3.44
	4	7.607	479	3.44
2700	2	9.053	499	3.84
	3	n/a	n/a	3.84
	4	n/a	n/a	3.84

Kilmore, VIC

Rubber Ring Joint – all pipes have a nominal effective length when jointed of 2.34m.

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Rubber Ring Weight (kg)
225	2	n/a	n/a	0.11
	3	n/a	n/a	0.11
	4	0.191	7	0.11
300	2	n/a	n/a	0.14
	3	n/a	n/a	0.14
	4	0.235	10	0.14
375	2	n/a	n/a	0.17
	3	n/a	n/a	0.17
	4	0.317	11	0.17
450	2	0.464	16	0.28
	3	0.462	22	0.28
	4	0.458	25	0.28
525	2	0.577	23	0.33
	3	0.576	24	0.33
	4	n/a	n/a	0.33
600	2	0.703	29	0.37
	3	0.702	32	0.37
	4	n/a	n/a	0.37
675	2	0.830	36	0.42
	3	0.827	47	0.42
	4	n/a	n/a	0.42
750	2	1.014	38	0.46
	3	1.010	51	0.46
	4	n/a	n/a	0.46
825	2	1.167	52	0.51
	3	1.163	66	0.51
	4	n/a	n/a	0.51
900	2	1.382	59	0.68
	3	n/a	n/a	0.68
	4	n/a	n/a	0.68

Flush Joint – all pipes have a nominal effective length when jointed of 2.34m.

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Sand Band Weight (kg)
300	2	n/a	n/a	0.46
	3	n/a	n/a	0.46
	4	0.231	9	0.46
375	2	n/a	n/a	0.56
	3	n/a	n/a	0.56
	4	0.290	10	0.56
450	2	0.399	14	0.67
	3	0.398	15	0.67
	4	0.397	18	0.67
525	2	0.500	22	0.78
	3	0.500	23	0.78
	4	n/a	n/a	0.78
600	2	0.606	26	0.88
	3	0.606	31	0.88
	4	n/a	n/a	0.88
675	2	0.745	31	0.98
	3	0.739	34	0.98
	4	n/a	n/a	0.98
750	2	0.882	37	1.09
	3	0.882	40	1.09
	4	n/a	n/a	1.09
825	2	1.053	54	1.20
	3	1.050	64	1.20
	4	n/a	n/a	1.20
900	2	1.234	64	1.30
	3	1.227	86	1.30
	4	n/a	n/a	1.30

Somersby, NSW

Rubber Ring Joint – all pipes have a nominal effective length when jointed of 2.34m.

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Rubber Ring Weight (kg)
375	2	n/a	n/a	0.17
	3	n/a	n/a	0.17
	4	0.301	15	0.17
450	2	n/a	n/a	0.28
	3	n/a	n/a	0.28
	4	0.449	18	0.28
525	2	n/a	n/a	0.33
	3	0.561	19	0.33
	4	0.559	27	0.33
600	2	0.671	27	0.37
	3	0.670	30	0.37
	4	0.667	40	0.37
675	2	0.795	31	0.42
	3	0.794	36	0.42
	4	0.788	55	0.42
750	2	0.981	33	0.46
	3	0.979	39	0.46
	4	0.972	60	0.46
825	2	1.127	40	0.51
	3	1.124	50	0.51
	4	1.117	73	0.51
900	2	1.336	50	0.68
	3	1.334	58	0.68
	4	1.327	78	0.68
1050	2	1.546	67	0.78
	3	1.539	89	0.78
	4	1.527	130	0.78
1200	2	2.159	98	0.89
	3	2.150	125	0.89
	4	2.138	165	0.89
1350	2	2.508	110	1.68
	3	2.502	128	1.68
	4	2.484	184	1.68
1500	2	3.376	141	1.86
	3	3.366	173	1.86
	4	3.354	212	1.86


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Yatala, QLD

Rubber Ring Joint – all pipes have a nominal effective length when jointed of 2.34m.

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Rubber Ring Weight (kg)
300	2	n/a	n/a	0.11
	3	n/a	n/a	0.11
	4	0.243	10	0.11
375	2	n/a	n/a	0.17
	3	n/a	n/a	0.17
	4	0.332	15	0.17
450	2	0.446	16	0.28
	3	0.446	16	0.28
	4	0.446	19	0.28
525	2	0.565	23	0.33
	3	0.565	24	0.33
	4	0.684	27	0.33
600	2	0.717	30	0.37
	3	0.715	35	0.37
	4	0.788	35	0.37
675	2	0.818	41	0.42
	3	0.816	47	0.42
	4	1.000	42	0.42
750	2	0.978	45	0.46
	3	0.975	51	0.46
	4	1.203	55	0.46
825	2	1.159	51	0.51
	3	1.162	65	0.51
	4	1.557	43	0.51
900	2	1.372	57	0.68
	3	1.600	65	0.68
	4	1.590	100	0.68
1050	2	1.606	98	0.78
	3	1.993	119	0.78
	4	1.990	129	0.78

Pipe Nominal Diameter (mm)	Class	Concrete Weight (t)	Steel Weight (kg)	Rubber Ring Weight (kg)
1200	2	2130	121	0.89
	3	2464	133	0.89
	4	2461	144	0.89
1350	2	2372	146	1.68
	3	3123	121	1.68
	4	3099	202	1.68
1500	2	3610	119	1.86
	3	3589	191	1.86
	4	3577	231	1.86
1650	2	3312	205	2.02
	3	4563	210	2.02
	4	4545	270	2.02
1800	2	3849	231	2.20
	3	5342	224	2.20
	4	5323	288	2.20
2100	2	4559	277	2.54
	3	6279	253	2.54
	4	6252	344	2.54

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Contact:
1800 88 RCPA (7272)
rcpa.com.au