ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 21930

FLAT WETCAST

STUBBE'S

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Stubbe's Precast
Address	44 Muir Line, Harley, Ontario, Canada, N0E 1E0
Website	www.stubbes.org

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	ASTM International 100 Bar Harbor Drive West Conshohocken, PA 19428-2959, USA www.astm.org
Reference standard	ISO 21930:2017 and ISO 14025
PCR	NSF PCR for Precast Concrete, V3.0, May 2021
Sub-category PCR reviewer	Thomas P. Gloria, Ph. D. Industrial Ecology Consultants t.gloria@industrial-ecology.com
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	EPD 774
Scope of the EPD	Cradle to gate
EPD author	Steven Van Wyk
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Timothy S. Brooke, ASTM International
Certification Period	08-20-2024 to 08-20-2029

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with TRACI 2.1 and if they are not compared in a building context.

PRODUCT

Product name	Flat Wetcast
Product reference	BA-, L-, S-
Place of production	Ontario, Canada
Period for data	Calendar Year 2023
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 metric tonne of precast concrete
Declared unit mass	1000 kg
GWP-fossil, A1-A3 (kgCO2e)	2.19E+02
GWP-total, A1-A3 (kgCO2e)	2.19E+02
Secondary material, inputs (%)	6.36
Secondary material, outputs (%)	0
Total energy use, A1-A3 (kWh)	570
Net fresh water use, A1-A3 (m3)	3.74

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online

This EPD has been generated by One Click LCA EPD generator.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

EPD verifier	Timothy S. Brooke, ASTM International
Verifier Signature	

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Founded in 1982 Stubbe's Precast specializes in precast concrete building structures.

PRODUCT DESCRIPTION

Flat wetcast are precast concrete elements (balconies, landings, solid slabs) that are either conventionally reinforced and/or prestressed that are typically used in the construction of multi-story buildings.

The product references are the internal manufacturing product naming codes as outlined below

- "BA-" – Precast Balcony Slabs
- "L-" – Precast Landings
- "S-" – Precast Solid Slabs

Further information can be found at www.stubbes.org.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %
Metals	5
Minerals	95
Fossil materials	0
Bio-based materials	0

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 metric tonne of precast concrete
Mass per declared unit	1000 kg

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0.1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The production of the precast elements begins with the preparation of the casting bed, which includes cleaning the casting platform and applying form oil. Reinforcement and any cast-in components are set in the form prior to casting. After casting, the slab is covered and left to cure. When the slab is cured it is stripped out of the form and then stacked in the yard until shipment is ready.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover the transport and installation phase.

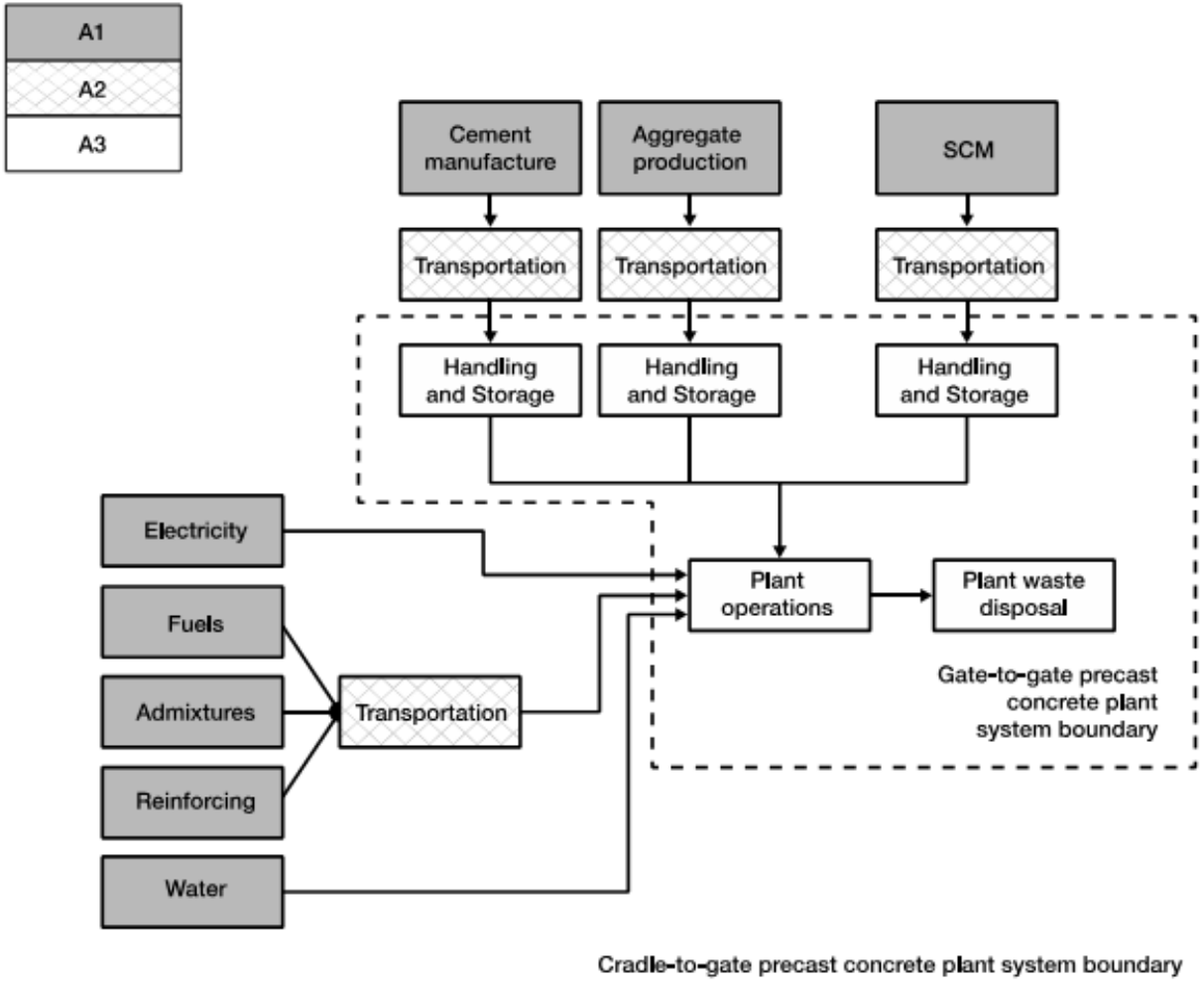
PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

This EPD does not cover the end of life phase.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

DATA COLLECTION

Life cycle inventory data was collected from the manufacturing facility for the calendar year 2023. All hardware (lifting or connection) is included. The primary data was collected from the sources of data in the following table.

Primary Data	Calendar Year
Concrete Batch Reports	2023
Purchasing Inventory Reports	2023
Utility Bills	2023
Fuel Usage Reports	2023

See Annex A for a list of all secondary data sets used.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

This sub-category PCR recognizes fly ash, silica fume, and granulated blast furnace slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a precast concrete material input.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	Partly allocated by mass or volume
Packaging materials	Not applicable
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

ENVIRONMENTAL IMPACTS – TRACI 2.1. / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1.88E+02	7.02E+00	2.40E+01	2.19E+02	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ozone Depletion	kg CFC_{-11}e	1.00E-05	1.18E-06	4.54E-06	1.58E-05	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acidification	kg SO_2e	5.04E+00	2.28E+00	4.46E+00	1.18E+01	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eutrophication	kg Ne	1.18E-01	3.43E-03	9.93E-03	1.31E-01	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
POCP (“smog”)	kg O_3e	1.40E+01	3.67E-02	8.70E-02	1.41E+01	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADP-fossil	MJ	7.46E+02	1.39E+01	5.31E+01	8.13E+02	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[1,2]	MJ	1.50E+02	1.56E+00	1.31E+02	2.82E+02	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renew. PER as material[2]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renew. PER[2]	MJ	1.50E+02	1.56E+00	1.31E+02	2.82E+02	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-re. PER as energy[2]	MJ	1.28E+03	1.03E+02	3.83E+02	1.77E+03	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-re. PER as material[2]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-re. PER[2]	MJ	1.28E+03	1.03E+02	3.83E+02	1.77E+03	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary materials[2]	kg	6.36E+01	4.19E-02	5.10E-02	6.37E+01	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renew. secondary fuels[2]	MJ	1.89E-03	3.08E-04	5.87E-04	2.78E-03	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-ren. secondary fuels[2]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	3.35E+00	1.48E-02	3.76E-01	3.74E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00

1) *PER = Primary energy resources.*
2) *Some LCA impact categories and inventory items are still under development and can have high levels of uncertainty. To promote uniform guidance on the data collection, calculation, and reporting of results, the ACLCA methodology (ACLCA 2019) was used.*

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste[2]	kg	5.83E+00	1.75E-01	3.16E-01	6.32E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste[2]	kg	6.46E+01	2.73E+00	8.01E+00	7.53E+01	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste[2]	kg	2.84E-03	6.90E-04	1.73E-03	5.26E-03	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use[2]	kg	5.90E-02	0.00E+00	0.00E+00	5.90E-02	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling[2]	kg	1.19E+00	0.00E+00	0.00E+00	1.19E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy rec[2]	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy[2]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00

REFERENECES

STANDARDS AND PCR

ISO 21930: 2017 Building construction – Sustainability in building construction –Environmental declaration of building products.

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions, Version 8.0, revised April 29, 2020.

NSF PCR for Precast Concrete, V3.0, May 2021

American Center for Life Cycle Assessment (2019) ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017

ANNEX A

SECONDARY DATA SETS

Stage	Resource name	Region	Date	Data Source	Data quality score
A1	Air entrainers concrete admixtures	ontario, alberta, britishColumbia, canada	2022	EPD SIKA CONCRETE ADMIXTURES AND CEMENT ADDITIVES	Very good
A1	Alkyd paint production, white, water-based, product in 60% solution state	world	2021	ecoinvent 3.8	Very good
A1	Blast furnace cement, industry average (North America)	northAmerica	2021	EPD An Industry Average Environmental Product Declaration for Slag Cement	Very good
A1	Direct resource extraction: Water, well, Europe	world	2019	-	Very good
A1	Glass fiber reinforcement vinylester (GFRP) straight bars	canada	2022	EPD Glass Fiber Reinforced Rebars from Pultrall Incorporated	Very good
A1	Gravel and sand quarry operation	world	2021	ecoinvent 3.8	Very good
A1	Gravel production, crushed	world	2021	ecoinvent 3.8	Very good
A1	Market for reinforcing steel	world	2021	ecoinvent 3.8	Very good
A1	Market for steel, low-alloyed, hot rolled	world	2021	ecoinvent 3.8	Very good
A1	Polypropylene fibre for concrete reinforcement	LOCAL	2023	One Click LCA	Very good
A1	Portland cement	ontario, canada	2021	EPD for St Marys Cement, St. Marys Plant	Very good
A1	Portland cement	canada	2016	EPD GENERAL USE (GU) AND PORTLAND-LIMESTONE (GUL) CEMENTS	Very good
A1	Reinforcement steel (rebar)	ontario, canada	2021	EPD Gerdau Rebar, Whitby Steel Mill	Very good

Stage	Resource name	Region	Date	Data Source	Data quality score
A1	Reinforcement steel (rebar), generic	LOCAL	2022	One Click LCA	Very good
A1	Reinforcement steel bars (rebar)	quebec, canada	2019	EPD Steel Rebar and Merchant Bar Quality	Very good
A1	Secondary Material	world	2019	-	Very good
A1	Set accelerators concrete admixtures	ontario, alberta, britishColumbia, canada	2022	EPD SIKA CONCRETE ADMIXTURES AND CEMENT ADDITIVES	Very good
A1	Water reducers, high-range concrete admixtures	ontario, alberta, britishColumbia, canada	2022	EPD SIKA CONCRETE ADMIXTURES AND CEMENT ADDITIVES	Very good
A1	XPS insulation boards, closed-cell	quebec, canada	2021	EPD EXTRUDED POLYSTYRENE THERMAL INSULATION BOARD	Very good
A1*	Lubricating oil	USA, canada	2023	FedLCAComms	Very good
A1*	Plywood production	quebec, canada	2021	ecoinvent 3.8	Very good
A1*	Direct resource extraction: Water, well, Europe	world	2019	-	Very good
A2	Market for transport, freight train	world	2021	ecoinvent 3.8	Very good
A2	Market for transport, freight, lorry >32 metric ton, EURO5	world	2021	ecoinvent 3.8	Very good
A2	Market for transport, freight, lorry 3.5-7.5 metric ton, EURO5	world	2021	ecoinvent 3.8	Very good
A2	Market for transport, freight, sea, container ship	world	2021	ecoinvent 3.8	Very good
A2	Market group for transport, freight train	world	2021	ecoinvent 3.8	Very good

Stage	Resource name	Region	Date	Data Source	Data quality score
A3	Diesel, burned in building machine	world	2021	ecoinvent 3.8	Very good
A3	Electricity production, natural gas, conventional power plant	ontario, canada	2021	ecoinvent 3.8	Very good
A3	Heat production, natural gas, at boiler condensing modulating >100kW	quebec, canada	2021	ecoinvent 3.8	Very good
A3	Lubricating oil	USA, canada	2023	FedLCAComms	Very good
A3	Market for electricity, medium voltage	ontario, canada	2021	ecoinvent 3.8	Very good
A3	Propane, burned in building machine	world	2021	ecoinvent 3.8	Very good
A3	Direct resource extraction: Water, well, Europe	world	2019	-	Very good
A3	Gravel production, crushed	world	2021	ecoinvent 3.8	Very good
A3	Treatment of municipal solid waste, sanitary landfill	quebec, canada	2021	ecoinvent 3.8	Very good

*Ancillary materials