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Proxy Modular Flooring – Tile/Plank

Programme: The International EPD® System
Programme operator: EPD International AB
EPD registration number: S-P-07160
Publication Date: 10-20-2023
Valid Until: 6-12-2028
www.environdec.com

This EPD was done in accordance with ISO 14025 and ISO 21930.
This EPD does not comply with EN15804+A2.

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Programme and Programme Operator	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com as provided by EPD North America
General Program instructions and Version Number[1]	General Programme Instructions for the International EPD® System. Version 4.0. 2021-03-29
Manufacturer Name and Address	Mannington 75 Mannington Mills Road Salem, NJ 08079
Declaration Number	S-P- 07160
Declared Product and Functional Unit	Proxy Modular Tile 1 m^2 of installed flooring and with a building service life of 75 years
Reference PCR and Version Number[2]	UL Part A: Life Cycle Assessment Calculation Rules and Report Requirements, Version 4.0 UL Part B: Flooring EPD Requirements. UL 10010-7, September 28, 2018
Product's intended Application and Use	Commercial Flooring Applications
Product RSL	30 years
Markets of Applicability	North America
Date of Issue	10-20-2023
Period of Validity	6-12-2028
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle to Grave
Year of reported manufacturer primary data	2022
LCA Software and Version Number	MLC Database 2023.1 (formerly GaBi Database)
LCI Database and Version Number	LCA FE 10.7 (formerly GaBi)
LCIA Methodology and Version Number	TRACI 2.1 CML 2001-Jan 2016 IPCC AR5
Part A PCR review was conducted by:	Lindita Bushi, PhD, Chair Hugues Imbeault-Tétreault, Eng., M.A.Sc. Jack Geibig
The sub-category PCR review was conducted by:	Jack Geibig (Chair) Thomas Gloria, PhD Thaddeus Owen
Independent third-party verification of the declaration and data, according to ISO 14025:2008.	☐ EPD Process Certification ☒ EPD Verification ☐ Pre-Verified Tool
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v4.0, based on CEN Norm EN 15804 (2012) and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) **☐ Internal ☒ External**	James Mellentine, Thrive ESG
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG
The procedure for follow-up of data during EPD validity, as defined by the GPI, involves third party verifier:	☒ Yes ☐ No

[1]Not all requirements in the GPI are fulfilled, particularly the requirement, for construction products, to follow EN 15804 for certain aspects of the LCA method.
[2]This EPD is based on a PCR that satisfies procurement rules at the federal, state, and municipal levels which call for EPDs based on the UL Part B PCR. The UL Part B PCR was used to meet regulatory (example: Buy Clean California Act, etc.) and market expectations (example: Building Transparency EC3 comparisons, LEED and existing vendor procurement requirements, product scoring programs, etc.). The EPD should not be used outside of this context.

Limitations:
Environmental declarations from different programs (ISO 14025) may not be comparable.
The declared environmental performance in the EPD shall not be compared with EN 15804-compliant EPDs developed under PCR 2019:14 in the International EPD System.
Comparison of the environmental performance of Flooring Products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR.
Full conformance with the PCR for Products allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.
The EPD owner has the sole ownership, liability, and responsibility of the EPD.

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Product Definition and Information

Company Description

Founded in 1915, Mannington continues to pursue its commitment to quality, customer satisfaction and the environment through innovative product design and marketing, state-of-the-art processes, and industry-leading programs. It manufactures and supplies a portfolio of flooring products including residential and commercial sheet vinyl, luxury vinyl, laminate, hardwood floors, carpet, and rubber.

Mannington is a leader in resilient flooring, allowing customers to achieve the look of hardwood or tile at a fraction of the cost. Proxy Modular planks are waterproof, easy to clean and maintain, scratch resistant, and durable. All Mannington resilient floors are FloorScore® certified which means they are independently tested and meet stringent indoor air quality standards. This certification also qualifies all of our floors for low VOCs.

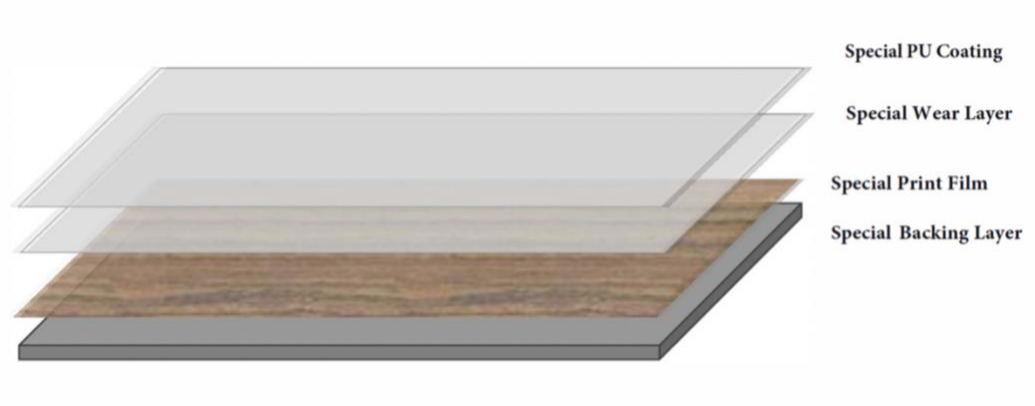

Figure 1: Product Construction

Product Description

Proxy modular, heterogeneous hard surface flooring planks and tiles are constructed by combining layers of non-PVC modified polyester polymer materials. The multi-layered construction consists of a clear wear layer, a decorative print film, a robust middle layer, and a supportive backing layer, all laminated and topped with a protective polyurethane coating. Proxy Modular uses conventional Mannington adhesives for bonding.

Proxy modular is within CSI MasterFormat section 09 65 19 and UN CPC 36910.

Application

Mannington's resilient tiles/planks are used in healthcare, educational, specialty retail, hospitality interiors, and multi-family residential complexes as flooring.

Figure 2: Product Application

Properties of Declared Product as Delivered

The product is usually delivered packaged in a cardboard box to protect the tiles during transportation to the customer. Multiple boxes are then sacked on a wooden pallet for shipment.

Table 1: Technical Data

	Standard	Value
Tile Size	-	18" x 18" (457 x 457 mm) 7.25" x 48" (184 x 1219 mm)
Wear Layer Thickness	ISO 24340	0.50 mm
Overall Thickness	ISO 24346	2.5 mm
Flexibility	ASTM F137	1.5" Mandrel - No Crack/Break
Dimensional Stability	ASTM F2199/F3261	Max 0.020 in./lin.ft.
Squareness	ASTM F540	0.010 in. Max
Static Load	ASTM F970 mod.	2000 PSI; Resid. Indent < 0.005"
Residual Indentation	ASTM F1914/3261	< 0.007"
Flooring Radiant Panel	ASTM E648	Class 1; ≥ 0.45 watts/cm2
Smoke Density	ASTM E662	≤ 450
Slip Resistance	ASTM C1028, Dry	≥ 0.5 leather, 0.6 rubber
Resistance to Light	ASTM F1515	Passes
Chemical Resistance	ASTM F925	Passes
Resistance to Heat	ASTM F1514	Passes

Flow Diagram

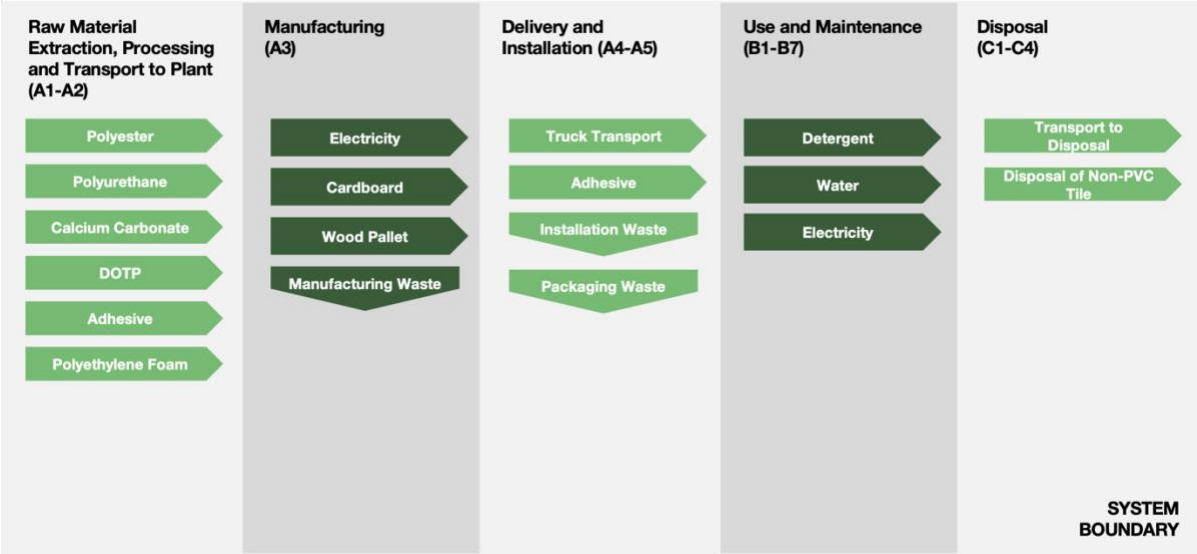

Figure 3: System Boundary

Manufacturing and Packaging

The product is manufactured in China. The manufacturing process begins with mixing of raw materials that form the backing layer. The PU, wear, print film, and middle layer are cut and hot pressed, before being pressed with the backing layer. After pressed together, the product is coated, annealed, and pressed a final time before being sent to trimming. The tile is then beveled and receives a final treatment before they are inspected. Finally, the tiles are packaged in cardboard and stacked on a wooden pallet for transport to customer. Packaging materials are either recycled, landfilled, or incinerated based on waste classification mentioned in Section 2.8.5- and 2.8.6-Part A of the reference PCR. No substances required to be reported as hazardous are associated with the production of this product.

Table 2: Product Composition

Material	Percent
Polyester	25-35%
Polyurethane	25-35%
Calcium Carbonate	35-60%
DOTP	2.0-20%
Polyurethane coating	<0.1%
Adhesive	0-1%
Polyethylene foam	0-2%

Table 3: Packaging

Material	Value [kg per m²]
Cardboard	2.53E-01
Wood Pallet	1.66E-01

Transportation

It is assumed that all raw materials are delivered to the manufacturing facility via truck, based on global region. Distances were calculated using the supplier location and the location of manufacturing.

Product Installation

Installation of Mannington Proxy Modular Tiles or Planks primarily consists of application of adhesive to the prepared subfloor. While installation equipment is required to install the flooring product, it is not included in the study as these are multi-use tools and the impacts per declared unit is considered negligible. The recommended coverage rate of the adhesive identified by Mannington adhesive specifications and RFCI's industry wide EPD is used for this study. All waste generated during installation, including packaging waste, is disposed of according to the tables found in Section 2.8.5 of *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment.

Use

The table below shows the parameters for the use phase scenario undergoing study while Table 9 shows the total material and energy inputs required in the study. These inputs were taken from Resilient Floor Coverings Institute's (RFCI) maintenance guidelines indicated in the industry wide EPD. Excluded from this model is the use of finish and finish remover, as specified by the RFCi industry average EPD. This is because Mannington products do not require finishes and thus are not relevant. Resilient tile products are traditionally not repaired or refurbished and are only replaced if the product fails or a new look is desired. Detailed maintenance instructions for resilient flooring are provided on Mannington's website: www.manningtoncommercial.com/resources/lvt/#technical.

Table 4: Maintenance Procedure

Level of Use	Cleaning Process	Cleaning Frequency	Consumption of energy and resources
Commercial/ residential/ industrial	Dust mop	Daily	None
	Damp mop/ neutral cleaner	Weekly	Hot water, neutral detergent
	Spray buff	Monthly	Electricity

Reference Service Life and Estimated Building Service Life

The reference service life of Mannington Proxy modular plank/tile is assumed to be 30 years given that the product is installed as per manufacturer guidelines. Preliminary testing data on the product shows the RSL to not be significantly different from a typical vinyl tile. Because of this, the RSL was chosen to match the value selected for the RFCI industry wide vinyl tile EPD. (RFCi, 2018). Therefore, after initial installation in a building with an estimated service life (ESL) of 75 years there will be 1.5 replacements needed.

Reuse, Recycling and Energy Recovery

Mannington's Proxy Modular plank/ tile flooring can be easily disposed of, without any special handling requirements and without the threat of contamination.

Disposal

The product is considered to be 100% landfilled as specified in Sections 2.8.5 and 2.8.6 of Part A: Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment.

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Life Cycle Assessment Background Information

Declaration of Methodological Framework

The LCA follows an attributional approach.

Functional Unit

The functional unit of the flooring product is one (1) m2 of floor covering. The mass per functional unit is 4.62 kg.

System Boundary

This EPD is a Cradle-to-Grave study.

Table 5: System Boundary and Modules

Module Name	Description	Analysis Period	Summary of Included Elements
A1	Product Stage: Raw Material Supply	2022	Raw Material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	2022	Shipping from supplier to manufacturing site. Fuel use requirements estimated based on product weights and estimated distance.
A3	Product Stage: Manufacturing	2022	Energy inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.
A4	Construction Process Stage: Transport	2022	Shipping from manufacturing site to project site. Fuel use requirements estimated based on product weights and mapped distance.
A5	Construction Process Stage: Installation	2022	Installation materials, installation waste and packaging material waste.
B1	Use Stage: Use	2022	Use of the product.
B2	Use Stage: Maintenance	2022	Cleaning energy, water, and materials, including refinishing the product.
B3	Use Stage: Repair	2022	Product typically not repaired during use.
B4	Use Stage: Replacement	2022	Total materials and energy required to manufacture a replacement.
B5	Use Stage: Refurbishment	2022	Product typically not refurbished during use.
B6	Operational Energy Use	2022	Operational Energy Use of Building Integrated System During Product Use
B7	Operational Water Use	2022	Operational Water Use of Building Integrated System During Product Use
C1	EOL: Deconstruction	2022	No inputs required for deconstruction.
C2	EOL: Transport	2022	Shipping from project site to waste disposal.
C3	EOL: Waste Processing	2022	Waste processing if incineration as chosen disposal pathway per Part A of the PCR.
C4	EOL: Disposal	2022	Disposal modeled by region as per Part A of the PCR.
D	Benefits beyond system	MND	Credits from energy or material capture.

Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals for electricity usage and production volume. For the LCA, the electricity usage information was divided by the production to find an energy use per square meter. Another assumption is that the installation tools are used enough times that the per square meter impacts are negligible.

Cut-Off Criteria

A cut-off rule of 1% has been applied to this assessment, meaning the included inventory data must account for greater than 99% of the total material and energy inputs into the system. Furthermore, greater than 99% of the environmental impacts from the product system must be accounted for in the assessment. No known material or manufacturing inputs or outputs are deliberately excluded from this EPD. Cumulative excluded inputs within the life cycle account for less than 1% of the total mass inputs, energy inputs, and environmental impacts.

Data Sources

Primary data were collected by facility personnel and from utility bills and was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production process. When primary data did not exist, secondary data for raw material production was utilized from Sphera MLC Database 2023.01.

Data Quality

The geographical scope of the manufacturing portion of the life cycle is China. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent. The primary data provided by the manufacturer represent all information for calendar year 2022. Time coverage of this data is considered good. Primary data provided by the manufacturer is specific to the technology used in manufacturing their product. It is site-specific and considered of good quality. Data necessary to model cradle-to-gate unit processes was sourced from Sphera Managed LCA Content LCI datasets. Improved life cycle data from suppliers would improve technological coverage.

Period Under Review

The period under review is calendar year 2022.

Allocation

General principles of allocation were based on ISO 14040/44. To derive a per-unit value for manufacturing electricity, allocation based on total production by area was adopted. As a default, secondary Sphera Managed LCA Content datasets use a physical basis for allocation.

Of relevance to the defined system boundary is the method in which recycled materials were handled. Throughout the study recycled materials were accounted for via the cut-off method. Under this method, impacts and benefits associated with the previous life of a raw material from recycled stock are excluded from the system boundary. Additionally, impacts and benefits associated with secondary functions of materials at end of life are also excluded (i.e., production into a third life or energy generation from the incineration plant). The study does include the impacts associated with reprocessing and preparation of recycled materials that are part of the bill of materials of the products under study.

Comparability and Benchmarking

The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the uncertainty of the final results and make comparisons misleading. Without understanding the specific variability, the user is therefore, not encouraged to compare EPDs. Even for similar products, differences in use and end-of-life stage assumptions, and data quality may produce incomparable results. Comparison of the environmental performance of Flooring Products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance with the PCR for Products allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

Comparison of the environmental performance of construction works and construction products using EPD information shall be based on the product's use and impacts at the construction works level. In general, EPDs may not be used for comparability purposes when not considered in a construction works context. Given this PCR ensures products meet the same functional requirements, comparability is permissible provided the information given for such comparison is transparent and the limitations of comparability explained.

Table 6: Life Cycle Stages Included in the Study

Production			Construction		Use							End of Life				Benefits & Loads Beyond System Boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw Material Supply	Transport	Manufacturing	Transport to Site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

X = Module Included in LCA Report, MND = Module not Declared

Life Cycle Assessment Scenarios

Table 7: Transportation to Building Site (A4)

	Shipping Leg 1	Shipping Leg 2
Volume of Products Transported [kg]	4.74	
Vehicle Type	Bulk commodity carrier, 1.000 to 250.000 dwt payload capacity, deep sea	Truck - Heavy Heavy-duty Diesel Truck / 53,333 lb payload - 8b
Fuel Efficiency [L/100km]	5.470	42
Fuel Type	Heavy fuel oil	Diesel
Distance [km]	26600	800
Capacity Utilization [%]	53%	68%
Capacity Utilization Volume Factor	1	1
Weight of Products Transported [kg]	4.74	4.74

Table 8: Reference Service Life

Name	Proxy
RSL [years]	30
Declared product properties (at the gate) and finishes, etc.	See Table 1 for technical details
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Per industry standards
Indoor environment	Can be installed in any typical indoor environment, assuming manufacturer's installation instructions and recommendations are followed
Maintenance	See Use section above for maintenance instructions

Table 9: Installation at building site (A5)

	Value
Adhesive [kg]*	3.00E-01
Cardboard Packaging Waste to Landfill [kg]	6.70E-02
Cardboard Packaging Waste to Incineration [kg]	1.24E-02
Cardboard Packaging Waste to Recycling [kg]	1.69E-01
Wood Packaging Waste to Landfill [kg]	5.37E-02
Wood Packaging Waste to Incineration [kg]	9.95E-03
Wood Packaging Waste to Recycling [kg]	1.35E-01
Biogenic Carbon Content of Packaging	
Cardboard [kg C/kg]	4.30E-01
Wood [kg C/kg]	4.31E-01
No freshwater, electricity, or fuels are used in installation. **Emissions from the adhesive during installation were considered for this assessment. However, no emissions were modeled due to the manufacturer-recommended adhesives having low- to no-VOC content.*	

Table 10: Maintenance (B2)

Name	Value	Unit
Maintenance process information	Industry wide EPD by RFCI	-
Maintenance cycle	1560 (weekly)	Cycles/ RSL
Maintenance cycle	3900 (weekly)	Cycles/ ESL
Net freshwater consumption	0.435	m^3/ ESL
Detergent Finish Finish Remover	8.9 Not required Not required	kg/ ESL kg/ ESL kg/ ESL
Electricity (for spray buffing)	1.7	kWh/ ESL
Power output of equipment	1.1	kW
No waste or direct emissions occur during regular maintenance		

Table 11: End-of-Life Scenario Details (C1-C4)

	Value
Collected as mixed construction waste [kg]	4.62
Waste to Landfill [kg]	4.62
Distance to Landfill [km]	161
Waste to Incineration [kg]	0
Distance to Incineration [km]	0
Waste to Recycling [kg]	0
Distance to Recycling [km]	0

Life Cycle Assessment Results

All results are given per functional unit, which is 1 m2 of installed flooring over an estimated building life of 75 years. Environmental Impacts were calculated using the Sphera LCA for Experts software platform. Impact results have been calculated using IPCC AR5, TRACI 2.1 and CML 2001-Jan 2016 characterization factors. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. The Impact Category Key table gives definitions of relevant acronyms.

The LCIA impact categories referenced below are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

Table 12: Impact Category Key – LCIA Indicators

Abbreviation	Parameter	Unit
IPCC AR5		
GWP	Global warming potential (100 years, includes biogenic CO2)	kg CO2 eq
CML 2001-Jan 2016		
GWP	Global warming potential (100 years, includes biogenic CO2)	kg CO2 eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
AP	Acidification potential of soil and water	kg SO2 eq
EP	Eutrophication potential	kg Phosphate eq
POCP	Photochemical ozone creation potential	kg Ethene eq
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb eq
ADPF	Abiotic depletion potential for fossil resources	MJ, net calorific value
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO2 eq
EP	Eutrophication potential	kg N eq
GWP	Global warming potential (100 years, includes biogenic CO2)	kg CO2 eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
Resources	Depletion of non-renewable fossil fuels	MJ, surplus energy
SFP	Smog formation potential	kg O3 eq

Table 13: Impact Category Key – Biogenic Carbon Indicators

Abbreviation	Parameter	Unit
BCRP	Biogenic Carbon Removal from Product	[kg CO2]
BCEP	Biogenic Carbon Emission from Product	[kg CO2]
BCRK	Biogenic Carbon Removal from Packaging	[kg CO2]
BCEK	Biogenic Carbon Emission from Packaging	[kg CO2]
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	[kg CO2]
CCE	Calcination Carbon Emissions	[kg CO2]
CCR	Carbonation Carbon Removals	[kg CO2]
CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes	[kg CO2]

Table 14: Impact Category Key – Resource Use, Waste, and Output Flow Indicators

Abbreviation	Parameter	Unit
Resource Use Parameters		
RPRE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value (LHV)
RPRM	Use of renewable primary energy resources used as raw materials	MJ, net calorific value
RPRT	Total use of renewable primary energy resources	MJ, net calorific value
NRPRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPRM	Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPRT	Total use of non-renewable primary energy resources	MJ, net calorific value
SM	Use of secondary materials	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Net use of fresh water	m3
Waste Parameters and Output Flows		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste, conditioned, to final repository	kg
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
CRU	Components for reuse	kg
MR	Materials for recycling	kg
MER	Materials for energy recovery	kg
EEE	Exported electrical energy	MJ
EET	Exported thermal energy	MJ

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Mannington Proxy Modular Tile – Results

Table 15: LCIA results for Proxy Modular, per one square meter of installed flooring.

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
IPCC AR5															
GWP [kg CO_2 eq]	1.24E+01	7.74E-01	9.66E-01	0.00E+00	9.92E-01	0.00E+00	2.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-02	0.00E+00	9.93E-02	MND
CML LCIA Impacts (Europe, Rest of World)															
GWP [kg CO_2 eq]	1.20E+01	7.66E-01	9.21E-01	0.00E+00	8.86E-01	0.00E+00	2.08E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-02	0.00E+00	9.73E-02	MND
ODP [kg CFC 11 eq]	2.32E-11	9.77E-14	2.36E-12	0.00E+00	2.47E-07	0.00E+00	3.89E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-15	0.00E+00	2.66E-13	MND
AP [kg SO_2 eq]	1.84E-02	1.30E-02	2.05E-03	0.00E+00	4.33E-03	0.00E+00	5.11E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	0.00E+00	4.83E-04	MND
EP [kg Phosphate eq]	4.01E-03	1.57E-03	4.63E-04	0.00E+00	6.93E-04	0.00E+00	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-05	0.00E+00	1.04E-03	MND
POCP [kg Ethene eq]	2.64E-03	2.83E-04	2.22E-04	0.00E+00	8.52E-04	0.00E+00	4.71E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.25E-05	0.00E+00	3.64E-05	MND
ADPE [kg Sb eq]	2.15E-05	4.90E-08	1.23E-06	0.00E+00	1.10E-06	0.00E+00	3.42E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-09	0.00E+00	2.90E-08	MND
ADPF [MJ]	2.69E+02	1.00E+01	1.85E+01	0.00E+00	2.41E+01	0.00E+00	4.49E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.31E-01	0.00E+00	1.50E+00	MND
TRACI LCIA Impacts (North America)															
AP [kg SO_2 eq]	2.13E-02	1.41E-02	2.39E-03	0.00E+00	4.76E-03	0.00E+00	5.76E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-04	0.00E+00	5.13E-04	MND
EP [kg N eq]	2.17E-03	5.47E-04	2.84E-04	0.00E+00	4.49E-04	0.00E+00	5.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	0.00E+00	8.21E-04	MND
GWP [kg CO_2 eq]	1.19E+01	7.64E-01	9.07E-01	0.00E+00	8.59E-01	0.00E+00	2.06E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-02	0.00E+00	9.65E-02	MND
ODP [kg CFC 11 eq]	4.93E-13	1.75E-15	4.56E-14	0.00E+00	2.47E-07	0.00E+00	8.18E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-16	0.00E+00	4.75E-15	MND
Resources [MJ]	3.43E+01	1.34E+00	2.44E+00	0.00E+00	2.77E+00	0.00E+00	5.76E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	1.95E-01	MND
POCP [kg O_3 eq]	4.27E-01	2.68E-01	4.23E-02	0.00E+00	7.82E-02	0.00E+00	1.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-03	0.00E+00	9.35E-03	MND
Carbon Emissions and Uptake															
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCRK [kg CO_2]	6.49E-01	0.00E+00	2.92E-02	0.00E+00	0.00E+00	0.00E+00	1.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCEK [kg CO_2]	0.00E+00	0.00E+00	6.48E-01	0.00E+00	0.00E+00	0.00E+00	9.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
CWNR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Table 16: Resource use, waste, and output flow results for Proxy Modular per one square meter of installed flooring.

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Resource Use Indicators															
RPR_E [MJ]	1.44E+01	2.15E-01	2.08E+00	0.00E+00	1.62E+01	0.00E+00	2.54E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-02	0.00E+00	1.81E-01	MND
RPR_M [MJ]	6.67E+00	0.00E+00	3.00E-01	0.00E+00	0.00E+00	0.00E+00	1.05E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RPR_T [MJ]	2.11E+01	2.15E-01	2.38E+00	0.00E+00	1.62E+01	0.00E+00	3.59E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-02	0.00E+00	1.81E-01	MND
$NRPR_E$ [MJ]	1.36E+02	1.01E+01	1.28E+01	0.00E+00	2.82E+01	0.00E+00	2.41E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.38E-01	0.00E+00	1.55E+00	MND
$NRPR_M$ [MJ]	7.28E+01	0.00E+00	3.28E+00	0.00E+00	0.00E+00	0.00E+00	1.14E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
$NRPR_T$ [MJ]	2.08E+02	1.01E+01	1.60E+01	0.00E+00	2.82E+01	0.00E+00	3.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.38E-01	0.00E+00	1.55E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m^3]	8.67E-02	6.74E-04	5.18E-03	0.00E+00	4.59E-01	0.00E+00	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-04	0.00E+00	1.92E-04	MND
Output Flows and Waste Categories															
HWD [kg]	1.43E-08	2.82E-11	1.78E-06	0.00E+00	6.24E-04	0.00E+00	2.69E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-12	0.00E+00	3.86E-11	MND
NHWD [kg]	1.81E-01	6.56E-04	3.04E-01	0.00E+00	1.41E-01	0.00E+00	7.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.29E-05	0.00E+00	4.60E+00	MND
HLRW [kg]	5.34E-06	3.30E-08	3.13E-07	0.00E+00	1.77E-06	0.00E+00	8.56E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-09	0.00E+00	1.91E-08	MND
ILLRW [kg]	4.47E-03	2.77E-05	2.76E-04	0.00E+00	1.48E-03	0.00E+00	7.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-06	0.00E+00	1.71E-05	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MR [kg]	4.96E-03	0.00E+00	2.85E-01	0.00E+00	0.00E+00	0.00E+00	4.35E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	2.09E-02	0.00E+00	0.00E+00	0.00E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Life Cycle Assessment Interpretation

In terms of Global Warming Potential, B4 emerges as the major contributor. This follows the fact that with an RSL of 30 years, there are 1.5 replacements that need to occur during the 75 years of building operation, apart from the initial product installation. This includes raw material extraction, manufacturing, distribution, install and end of life (for replaced product) for every replacement. This causes impacts from B4 to overshadow impacts from any other phase in the life cycle.

If the impacts from B4 are set aside to observe impacts from other phases, A1-A3 emerges as a major contributor over a 75-year ESL of the building. This is primarily due to the consumption of energy and resources used to maintain resilient tile over the course of its lifetime. Figure 4 shows the dominance analysis to highlight which of the life cycle modules contributes to the majority of the impacts.

Within raw material extraction and manufacturing (A1-A3) raw material extraction drives impact, specifically polyester and polyurethane. These are fossil-based materials, who make up the majority of the product based on weight, which explains their presence as top contributors within the A1-A3 stage.

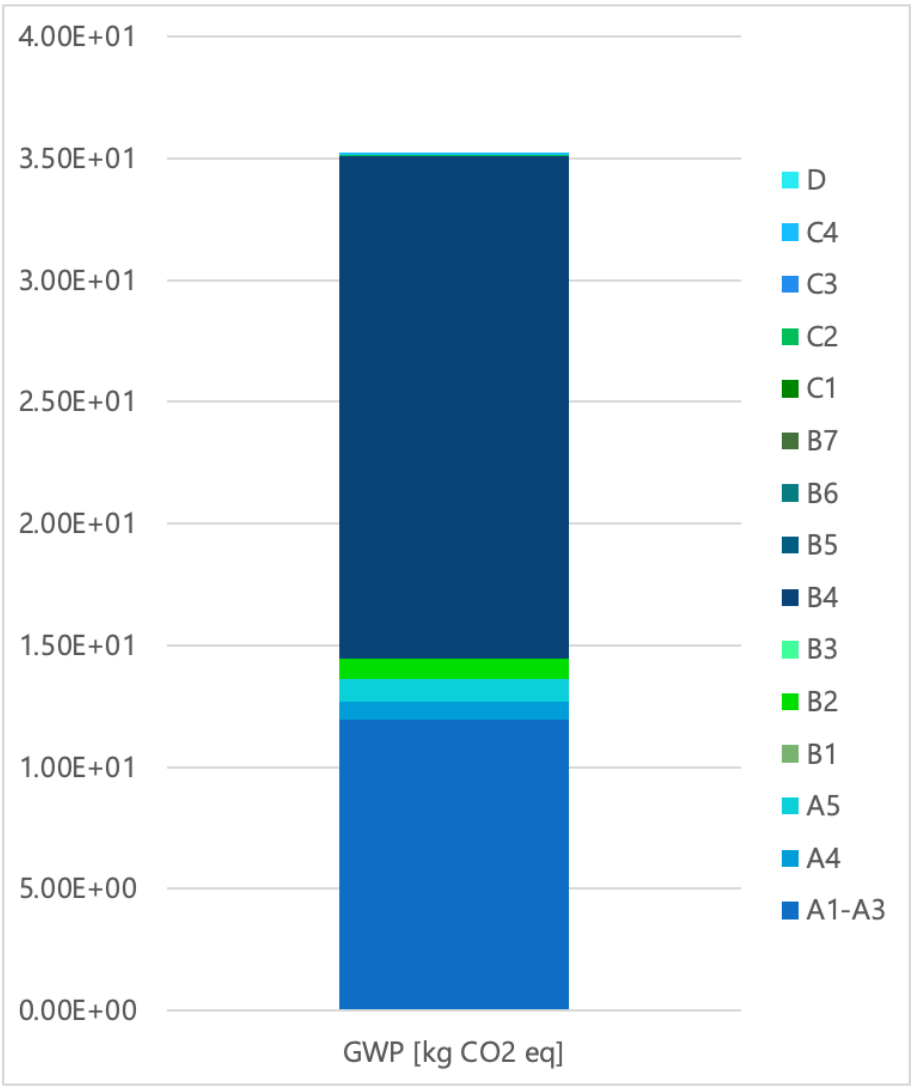

Figure 4: Global Warming Potential Over Estimated Service Life (75 years)

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Additional Environmental Information

Environmental and Health During Manufacturing

Mannington's Proxy Modular product is produced in a facility that is ISO 14001 and ISO 9001 certified.

Environment and Health During Installation

The product should be installed according to the manufacturer's instructions found at https://www.manningtoncommercial.com/resources/lvt/#technical. This is a non-hazardous product. According to the product's PDS, due to solid, inert properties, scrap pieces from installation may simply be swept up and disposed of as a solid, non-hazardous waste per local, state and federal regulations.

Extraordinary Effects

Fire

Proxy Modular flooring has received Bfl-S1 for EN 13501-1 reaction to fire classification.

Water

There are no environmental impacts associated with the product being flooded.

Mechanical Destruction

According to the product's PDS, this building product is relatively non-toxic, presenting no known hazard to people, except under thermal decomposition conditions which may yield hazardous by-products.

Environmental Activities and Certifications

Mannington's Proxy modular plank/tile and its adhesives emit minimal levels of volatile organic compounds (VOCs, FloorScore Certified; CDPH v1.2-2017), which are dissipated quickly through normal ventilation. Products included in this EPD are also FloorScore® certified and may be eligible for LEED credits. Mannington has also disclosed its Proxy modular plank/tile ingredients in a publicly available Health Product Declaration.

Additional information about the products can be found on Mannington's Technical Resources page.

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