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Heterogeneous Resilient Sheet: Realities III, City Hub, Vivendi II, Entwined, Paradigm II, Discovery, Bloom, Color Anchor Arc (80mil)

Programme: The International EPD® System
Programme operator: EPD International AB
Licensee: EPD North America (www.epdna.com)
EPD registration number: EPD-IES-0019886
Publication Date: 07-14-2025
Valid Until: 07-14-2030
www.environdec.com

This EPD was done in accordance with ISO 14025 and ISO 21930.
This EPD does not comply with EN15804+A2.
EPD of multiple products, based on the average results of the product group.
An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

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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 5.0. 2024-06-19
EPD Owner The EPD owner has the sole ownership, liability, and responsibility for the EPD.	Mannington Commercial 75 Mannington Mills Road Salem, NJ 08079
LCA Practitioner This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by the LCA practitioner.	WAP Sustainability Consulting 103 Powell Ct., Suite 200 Brentwood, TN 37027
Declaration Number	EPD-IES-0019886
Declared Product and Functional Unit	Heterogeneous Resilient Sheet: Realities III, City Hub, Entwined, Paradigm II, Discovery, Bloom, Color Anchor Arc, White Sands Harmony (80mil) 1 m² 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	07-14-2025
Period of Validity	07-14-2030
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle to Grave
Year of reported manufacturer primary data	2023
LCA Software and Version Number	LCA FE 10.9.0.31 (formerly GaBi)
LCI Database and Version Number	MLC Database 2024.2 (formerly GaBi Database)
LCIA Methodology and Version Number	TRACI 2.1 CML 2001-Jan 2016 IPCC AR6
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
External and Independent third-party verification of the declaration and data, according to ISO 14025:2008, via:	☒ EPD Verification through an Individual EPD Verification ☐ EPD Verification through an EPD Process certification ☐ EPD Verification through an Pre-Verified LCA/EPD 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 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.

Information about EPD Owner

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.

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Product Information

Product Description

Mannington's Heterogeneous Resilient Sheets offers a durable and cost-effective solution, ideal for demanding environments such as healthcare facilities. Available in a variety of visuals—including wood, stone, abstract, and textile textures—it combines aesthetics with functionality. Engineered for healthcare spaces, its Quantum Guard® technology ensures superior abrasion and stain resistance, simplifying maintenance while enhancing hygiene. With a 2,000-psi rating and seam-minimizing widths of 6', 9', and 12', it delivers durability and cost efficiency. Additionally, its ortho-phthalate and PFAS-free construction supports sustainability.

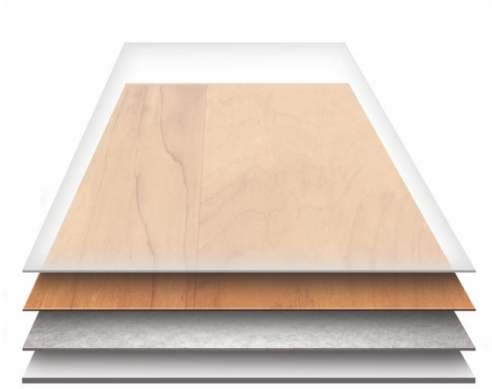

Figure 1: Product Construction

Application

Mannington Resilient Sheet products are used as interior flooring in healthcare, wellness environments, and hospitality interiors.

Figure 2: Product Application

Properties of Declared Product as Delivered

A standard 12 foot heterogeneous 100 yd^2 roll is packaged with a cardboard core, two plastic plugs, two cardboard headers, and paper.

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Table 1: Technical Data

Name	Heterogeneous Resilient Sheets	Unit
Total thickness	2.0	mm
Wear Layer Thickness	0.5	mm
Product weight	3.1	kg/m^2
Product form (Tiles/Planks/Rolls)	Rolls	

Manufacturing Sites

Mannington Resilient Sheets are manufactured in Salem, NJ, United States.

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Content Declaration

Manufacturing and Packaging

The manufacturing process for heterogeneous sheet production involves four main stages:

1. Saturation and Gelling: A fiberglass scrim is saturated and gelled with plastisol, then planished to achieve a smooth coating.
2. Printing: The sheet is printed using engraved rotogravure cylinders with water-based inks.
3. Fusion: The product is encapsulated in vinyl and fused. Any volatile emissions generated during this process are treated using a thermal oxidizer.
4. Finishing: The sheets are cut, inspected, and packaged into salable roll lengths.

Table 2: Product Composition

Layer	Composition [%]	Recycled Material [%]
Acrylate	0.77%	0%
DOTP	12.3%	0%
Ester	4.48%	0%
Fiberglass	0.91%	0%
Limestone	31.5%	0%
Mineral Oil	1.55%	0%
Stabilizer	2.64%	0%
PVC	43.2%	0%
Pigment	2.68%	0%

Table 3: Packaging

Material	Value [kg per m²]	Biogenic Material [kg C / m²]
Cardboard	5.20E-02	2.86E-02
Paper	1.46E-02	6.28E-03
Plastic	1.63E-03	-

There are no substances on the US EPA EPCRA EHS list present in Heterogeneous Resilient Sheets at >100ppm. As such, no substances required to be reported as hazardous waste are associated with the production of this product.

Transportation

Raw materials are sourced from North America and Europe. It is assumed that all raw materials sourced from North America are delivered to the manufacturing facility via truck, based on global region, while materials sourced from Europe travel on an ocean ship, followed by a shipping leg by truck. Distances were calculated using the supplier location and the location of manufacturing. The product is distributed from the manufacturing facility in Salem, NJ to customers in North America via truck.

Product Installation

The recommended method for installing Resilient Sheets is to use the full adhesive method. The instructions for this installation procedure can be found on the Mannington Commercial website.

The life cycle assessment modeled the installation stage with adhesive being applied at a rate of 0.3 kg/m².

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 estimated based on Mannington Resilient Sheets maintenance instructions. Resilient Sheet 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 soft surface flooring are provided on Mannington's website.

Table 4: Maintenance Procedure

Cleaning Process	Cleaning Frequency per year	Consumption of energy and resources
Sweeping	Daily	None
Damp mop/ Neutral cleaner	Weekly	Hot water, neutral detergent
Machine Cleaning	Monthly	Electricity

Reference Service Life and Estimated Building Service Life

The service life for Heterogeneous Resilient Sheets will vary depending on the amount of floor traffic, level of maintenance and the desired appearance of the floor covering. The reference service life for Resilient Sheets is 30 years. Therefore, after initial installation in a building with an estimated service life (ESL) of 75 years there will be 1.5 replacements needed after the initial installation. The RSL was selected based on the RCFI industry average EPD for each of the respective product categories.

Reuse, Recycling and Energy Recovery

Resilient Sheets 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 Information

Flow Diagram

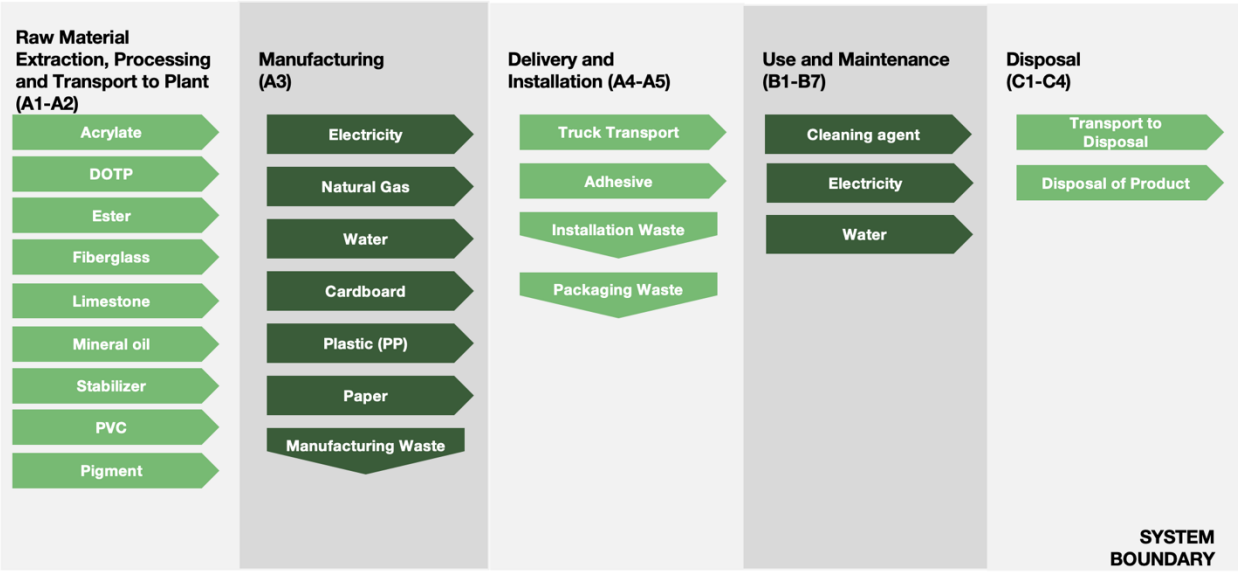

Figure 3: System Boundary

Declaration of Methodological Framework

The LCA follows an attributional approach.

Functional Unit

The functional unit of the flooring product is one (1) m^2 of floor covering. The mass per functional unit for the Heterogeneous Resilient Sheets is 3.11 $kg/m^{2,}$ including installation adhesive. The total thickness is 80 mil (1 mil refers to one thousandth of an inch).

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	2023	Raw Material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	2023	Shipping from supplier to manufacturing site. Fuel use requirements are estimated based on product weights and estimated distance.
A3	Product Stage: Manufacturing	2023	Energy and water inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.
A4	Construction Process Stage: Transport	2023	Shipping from manufacturing site to project site. Fuel use requirements are estimated based on product weights and mapped distance.

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Module Name	Description	Analysis Period	Summary of Included Elements
A5	Construction Process Stage: Installation	2023	Installation materials, installation waste and packaging material waste.
B1	Use Stage: Use	2023	Use of the product.
B2	Use Stage: Maintenance	2023	Cleaning energy, water, and materials, including refinishing the product.
B3	Use Stage: Repair	2023	Product typically not repaired during use.
B4	Use Stage: Replacement	2023	Total materials and energy required to manufacture a replacement.
B5	Use Stage: Refurbishment	2023	Product typically not refurbished during use.
B6	Operational Energy Use	2023	Operational Energy Use of Building Integrated System During Product Use
B7	Operational Water Use	2023	Operational Water Use of Building Integrated System During Product Use
C1	EOL: Deconstruction	2023	No inputs required for deconstruction.
C2	EOL: Transport	2023	Shipping from project site to waste disposal.
C3	EOL: Waste Processing	2023	Waste processing if incineration as chosen disposal pathway per Part A of the PCR.
C4	EOL: Disposal	2023	Disposal modeled by region as per Part A of the PCR.
D	Benefits beyond system	MND	Credits from energy or material capture.

Infrastructure and capital goods have been excluded from this assessment. By default, Sphera MLC datasets exclude infrastructure and capital goods.

Software

Sphera LCA for Experts 2024.2.

Period Under Review

The period under review is calendar year 2023.

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 were collected as annual totals for manufacturing utilities and production volume. For the LCA, the manufacturing utilities were divided by the production to find an energy use per unit of mass. 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. Additionally, packaging waste of inbound raw materials to Mannington facilities and office waste were excluded. Cumulative excluded inputs within the life cycle account for less than 1% of the total mass inputs, energy inputs, and environmental impacts.

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Data Sources

Primary data were collected by facility personnel and from internal management systems for all manufacturing processes. When primary data did not exist, secondary data for raw material production were utilized from Sphera MLC Database 2024.2.

Data Quality

The geographical scope of the manufacturing portion of the life cycle is the United States. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent. The primary data provided by the manufacturer represents all information for calendar year 2023. Time coverage of this data is considered excellent. Primary data provided by the manufacturer are specific to the technology used in manufacturing their product. They are site-specific and considered good quality. Data necessary to model cradle-to-gate unit processes were sourced from Sphera Managed LCA Content LCI datasets. Improved life cycle data from suppliers would improve technological coverage.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP GHG results for A1-A3[1]
Production of DOTP	Database	Sphera LCA for experts 2024.2	2023	Secondary Data	0%
Production of Ester	Database	Sphera LCA for experts 2024.2	2023	Secondary Data	0%
Production of PVC	Database	Sphera LCA for experts 2024.2	2023	Secondary Data	0%
Generation of electricity used in manufacturing product	Database	Sphera LCA for experts 2024.2	2023	Primary Data	13%
Generation and use of natural gas in manufacturing	Database	Sphera LCA for experts 2024.2	2023	Primary Data	<1%
Transportation	Database	Sphera LCA for experts 2024.2	2023	Primary Data	3%
Total share of primary data, of GWP-GHG results for A1-A3					**16%**

[1]The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that do not capture all relevant aspects of data quality. The indicator is not comparable across product categories.

Table 6: Declaration of data sources and share of primary data

Allocation

General principles of allocation were based on ISO 14040/44. To derive a per-unit value for manufacturing utilities, allocation based on total production by mass 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 7: Life Cycle Stages Included in the Study

	Production			Construction		Use							End of Life				Benefits & Loads Beyond System Boundary
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module Description	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
Modules Declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND
Geography	United States																MND

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

Table 8: Transportation to Building Site (A4)

	Heterogeneous Resilient Sheet
Weight of Products Transported [kg]	2.88

	Heterogeneous Resilient Sheet
Vehicle Type	Truck - Heavy Heavy-duty Diesel Truck / 53,333 lb payload - 8b
Fuel Efficiency [L/100km]	42
Fuel Type	Diesel
Distance [km]	800
Capacity Utilization [%]	67%
Capacity Utilization Volume Factor	1

Table 9: Reference Service Life

Name	Value
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 10: Installation at building site (A5)

	Value
Adhesive [kg][1]	3.00E-01
Paper Packaging Waste to Landfill [kg][2]	1.80E-02
Paper Packaging Waste to Incineration [kg][2]	3.33E-03
Paper Packaging Waste to Recycling [kg][2]	4.53E-02
Plastic Packaging Waste to Landfill [kg]	1.21E-03
Plastic Packaging Waste to Incineration [kg]	2.78E-04
Plastic Packaging Waste to Recycling [kg]	1.47E-04
Biogenic Carbon Emissions from Packaging Disposal	
Cardboard [kg $CO2_e/m^2$]	2.86E-02
Paper [kg $CO2_e/m^2$]	6.28E-03
No freshwater, electricity, or fuels are used in installation. *[1]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.* *[2]Cardboard and paper packaging is combined.*	

Table 11: Maintenance (B2)

Activity	Details	Value	Unit
Sweep	Frequency	27,375	Cycles/ ESL
Damp Mop	Frequency	3,900	Cycles/ ESL
	Net freshwater consumption	0.0058	$m^3/m^2/yr$

Activity	Details	Value	Unit
Machine Cleaning	Cleaning Agent	0.0119	kg/m²/yr
	Frequency	900	Cycles/ ESL
	Electricity for deep cleaning	0.022	kWh/m²/yr

Table 12: End-of-Life Scenario Details (C1-C4)

	Heterogeneous Sheet
Collected as mixed construction waste [kg]	3.11
Waste to Landfill [kg]	3.11
Distance to Landfill [km]	161

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Life Cycle Assessment Interpretation

Within the Heterogeneous Sheet lifecycle, replacements (B4) drive impacts across all TRACI 2.1 impact categories, except eutrophication, due to the 30-year service life of the product. The 30-year product service life means that 1.5 replacements of the Heterogeneous Sheet will occur over the estimated 75-year service life of a building. Each replacement includes A1-A5 and C1-C4 lifecycle stages, explaining its outsized impact. For eutrophication maintenance (B2) drive TRACI 2.1 impacts. Within B2, all maintenance inputs across the 75-year service life are included.

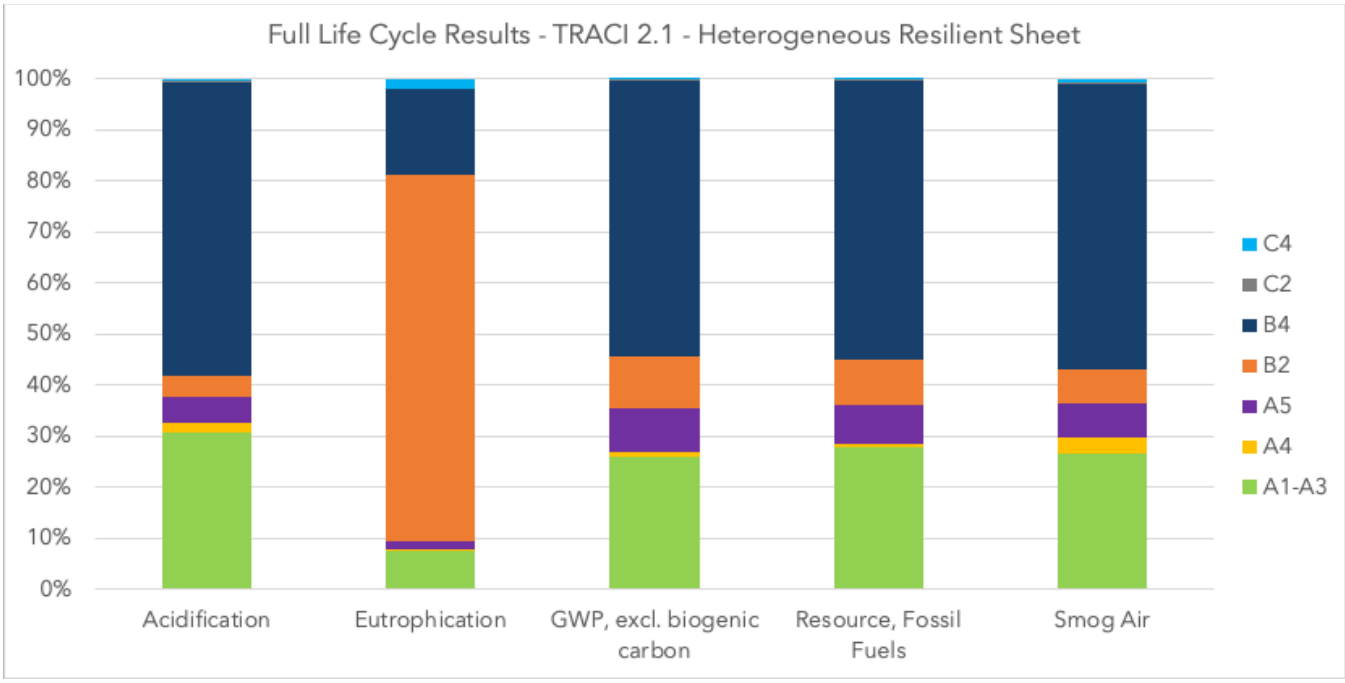

Figure 4: TRACI 2.1 Impacts for Heterogeneous Resilient Sheet

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Environmental Performance

All results are given per functional unit, which is 1 m^2 of installed flooring over an estimated building life of 75 years. The results of the end-of-life stage (module C) should be considered when using the results of the production stage. Environmental impacts were calculated using the Sphera LCA for Experts software platform. Impact results have been calculated using IPCC AR6, 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 in the abbreviations section 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.

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Table 13: LCIA results for heterogeneous sheet, 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 AR6															
GWPe [kg CO_2 eq]	7.31E+00	2.99E-01	2.44E+00	0.00E+00	2.84E+00	0.00E+00	1.52E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-02	0.00E+00	6.71E-02	MND
GWPi [kg CO_2 eq]	7.09E+00	3.00E-01	2.44E+00	0.00E+00	2.97E+00	0.00E+00	1.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-02	0.00E+00	6.68E-02	MND
CML LCIA Impacts (Europe, Rest of World)															
GWPe [kg CO_2 eq]	7.23E+00	2.98E-01	2.42E+00	0.00E+00	2.80E+00	0.00E+00	1.51E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	0.00E+00	6.66E-02	MND
GWPi [kg CO_2 eq]	7.02E+00	2.98E-01	2.42E+00	0.00E+00	2.93E+00	0.00E+00	1.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	0.00E+00	6.63E-02	MND
ODP [kg CFC 11 eq]	3.20E-09	5.21E-14	1.95E-10	0.00E+00	8.67E-12	0.00E+00	5.09E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.03E-15	0.00E+00	1.90E-13	MND
AP [kg SO_2 eq]	2.09E-02	1.01E-03	3.77E-03	0.00E+00	2.84E-03	0.00E+00	3.91E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.52E-05	0.00E+00	3.28E-04	MND
EP [kg Phosphate eq]	2.56E-03	2.68E-04	6.28E-04	0.00E+00	6.48E-03	0.00E+00	6.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-05	0.00E+00	6.97E-04	MND
POCP [kg Ethene eq]	1.95E-03	-3.75E-04	4.09E-04	0.00E+00	8.59E-04	0.00E+00	2.97E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.96E-	0.00E+00	2.57E-05	MND
ADPE [kg Sb eq]	1.68E-05	4.18E-08	7.27E-06	0.00E+00	1.36E-06	0.00E+00	3.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.65E-09	0.00E+00	2.16E-08	MND
ADPF [MJ]	1.45E+02	3.93E+00	4.20E+01	0.00E+00	4.81E+01	0.00E+00	2.89E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E-01	0.00E+00	9.88E-01	MND
TRACI LCIA Impacts (North America)															
AP [kg SO_2 eq]	2.47E-02	1.39E-03	4.29E-03	0.00E+00	3.20E-03	0.00E+00	4.63E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-04	0.00E+00	3.48E-04	MND
EP [kg N eq]	2.20E-03	1.24E-04	4.88E-04	0.00E+00	2.14E-02	0.00E+00	5.06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-05	0.00E+00	5.53E-04	MND
GWPe [kg CO_2 eq]	7.13E+00	2.96E-01	2.39E+00	0.00E+00	2.77E+00	0.00E+00	1.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-02	0.00E+00	6.58E-02	MND
GWPi [kg CO_2 eq]	6.92E+00	2.97E-01	2.39E+00	0.00E+00	2.90E+00	0.00E+00	1.46E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-02	0.00E+00	6.55E-02	MND
ODP [kg CFC 11 eq]	3.47E-09	8.85E-16	2.08E-10	0.00E+00	1.47E-13	0.00E+00	5.52E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-16	0.00E+00	3.22E-15	MND
Resources [MJ]	1.97E+01	5.64E-01	5.39E+00	0.00E+00	6.32E+00	0.00E+00	3.89E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.62E-02	0.00E+00	1.32E-01	MND
POCP [kg O_3 eq]	2.58E-01	3.20E-02	6.44E-02	0.00E+00	6.32E-02	0.00E+00	5.45E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-03	0.00E+00	6.23E-03	MND
Carbon Emissions and Uptake															
BCRP [kg CO2]	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 CO2]	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 CO2]	1.28E-01	0.00E+00	7.68E-03	0.00E+00	0.00E+00	0.00E+00	2.04E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
BCEK [kg CO2]	0.00E+00	0.00E+00	1.36E-01	0.00E+00	0.00E+00	0.00E+00	2.04E-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 CO2]	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 CO2]	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 CO2]	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 CO2]	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

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Table 14: Resource use, waste, and output flow results heterogeneous sheet, 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]	4.83E+00	1.75E-01	2.35E+00	0.00E+00	5.45E+00	0.00E+00	1.12E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-02	0.00E+00	1.26E-01	MND
RPR_M [MJ]	2.69E+00	0.00E+00	1.61E-01	0.00E+00	0.00E+00	0.00E+00	4.28E+00	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]	7.52E+00	1.75E-01	2.51E+00	0.00E+00	5.45E+00	0.00E+00	1.55E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-02	0.00E+00	1.26E-01	MND
$NRPR_E$ [MJ]	1.07E+02	3.96E+00	4.18E+01	0.00E+00	5.38E+01	0.00E+00	2.31E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-01	0.00E+00	1.02E+00	MND
$NRPR_M$ [MJ]	2.63E+01	0.00E+00	1.58E+00	0.00E+00	0.00E+00	0.00E+00	4.18E+01	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]	1.33E+02	3.96E+00	4.34E+01	0.00E+00	5.38E+01	0.00E+00	2.73E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-01	0.00E+00	1.02E+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]	4.99E-02	5.83E-04	1.27E-02	0.00E+00	2.29E-02	0.00E+00	9.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.87E-05	0.00E+00	1.32E-04	MND
Output Flows and Waste Categories															
HWD [kg]	1.45E-06	5.34E-10	9.39E-08	0.00E+00	1.47E-08	0.00E+00	2.32E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.22E-11	0.00E+00	2.52E-10	MND
NHWD [kg]	8.73E-01	3.95E-04	2.87E-01	0.00E+00	1.79E-01	0.00E+00	6.38E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-05	0.00E+00	3.10E+00	MND
HLRW [kg]	6.13E-06	1.42E-08	1.25E-06	0.00E+00	2.39E-06	0.00E+00	1.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-09	0.00E+00	1.21E-08	MND
ILLRW [kg]	5.12E-03	1.19E-05	1.04E-03	0.00E+00	2.00E-03	0.00E+00	9.28E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-06	0.00E+00	1.08E-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]	4.66E-02	0.00E+00	4.83E-02	0.00E+00	0.00E+00	0.00E+00	1.42E-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	3.61E-03	0.00E+00	0.00E+00	0.00E+00	5.42E-03	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

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Additional Environmental Information

Environmental and Health During Manufacturing

Mannington's Heterogeneous Sheets are produced in a facility that is ISO 14001 certified.

Environment and Health During Installation

The product should be installed according to the manufacturer's instructions on Mannington's website.

This is a non-hazardous product. According to the product's SDS, due to solid, inert properties, scrap pieces from installation may simply be swept up and disposed of as solid, non-hazardous waste per local, state, and federal regulations.

Extraordinary Effects

Fire

Mannington's Heterogeneous Sheets received ≤ 450 on the ASTM E662 - NBS Smoke Test.

Water

Should the product become flooded, the floor covering should be removed, and the subfloor should be evaluated and repaired as needed. There are no environmental impacts associated with the product being flooded.

Mechanical Destruction

According to the product's SDS, 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 Heterogeneous Sheets has a published HPD and FloorScore certification.

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

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Abbreviations

Table 15: Impact Category Key – LCIA Indicators

Abbreviation	Parameter	Unit
IPCC AR6		
GWPe	Global warming potential (100 years, excludes biogenic CO_2)	kg CO_2 eq
GWPi	Global warming potential (100 years, includes biogenic CO_2)	kg CO_2 eq
CML 2001-Jan 2016		
GWPe	Global warming potential (100 years, excludes biogenic CO_2)	kg CO_2 eq
GWPi	Global warming potential (100 years, includes biogenic CO_2)	kg CO_2 eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
AP	Acidification potential of soil and water	kg SO_2 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 SO_2 eq
EP	Eutrophication potential	kg N eq
GWPe	Global warming potential (100 years, excludes biogenic CO_2)	kg CO_2 eq
GWPi	Global warming potential (100 years, includes biogenic CO_2)	kg CO_2 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 O_3 eq

Table 16: 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

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Table 17: 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	m^3
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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References

CML - Department of Industrial Ecology. (2016, September 05). *CML-IA Characterisation Factors*. Retrieved from https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors

(n.d.). *General Programme Instructions of the International EPD System. Version 5.0.*

IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

ISO. (2006). *ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.* Geneva: International Organization for Standardization.

ISO. (2006). *ISO 14040/Amd 1:2020: Environmental management - Life cycle assessment - Principles and framework.* Geneva: International Organization for Standardization.

ISO. (2006). *ISO 14044/Amd 1:2017/Amd 2:2020: Environmental Management - Life cycle assessment - Requirements and Guidelines.* Geneva: International Organization for Standardization.

ISO. (2017). *ISO 21930: Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.* Geneva: International Organization for Standardization.

RFCI. (2024). *Industry-Wide EPD: Heterogeneous Sheet Vinyl Flooring*.

UL Environment. (2018). *Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL 10010, V3.2.*

UL Environment. (2018). *Part B: Flooring EPD Requirements.*

US EPA. (2012). *TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Version 2.1 - User Guide*. Retrieved from https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf

Life Cycle Assessment for Flooring, Mannington Commercial, WAP Sustainability Consulting. July 2025.

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