

UPFRONT EMBODIED CARBON ASSESSMENT RIBA STAGE 3 REPORT

Postal Street Manchester

Manchester City Council

5th December 2025

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About This Report

AtkinsRéalis have been appointed to undertake an embodied carbon assessment for the Postal Street Project for Manchester City Council. This aligns with the Council’s Climate Change Action Plan (2025–2030) and the Manchester Climate Change Framework, which set science-based carbon budgets and require all new developments to be “net zero ready.” As the grid decarbonises, embodied carbon is becoming an increasingly significant proportion of a building’s whole-life carbon. Reducing embodied carbon for Postal Street is therefore critical to achieving net zero ready without relying heavily on offsetting or extensive onsite renewables.

This report, prepared during RIBA Stage 3, is based on RIBA Stage 3 design and cost information provided by the design team. Its purpose is to identify the carbon performance early in the design process, enabling the team to prioritise and implement effective embodied carbon reductions.

The assessment scope covers Product stages A1–A3 and Construction stages A4–A5, in line with BS EN 15978:2011 Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method.

The embodied carbon assessment aims to inform design decisions and aligns with the RICS Professional Statement Whole Life Carbon Assessment for the Built Environment, 2nd Edition (2023) as well as Places for Everyone (PfE) guidance for Greater Manchester. At this stage, the report focuses on upfront embodied carbon (A1–A5) only. Appendix A provides a detailed breakdown of results by life cycle stage and building element.

For embodied carbon targets, results, methodology, assumptions, and potential reduction opportunities, please refer to the relevant sections of this report.

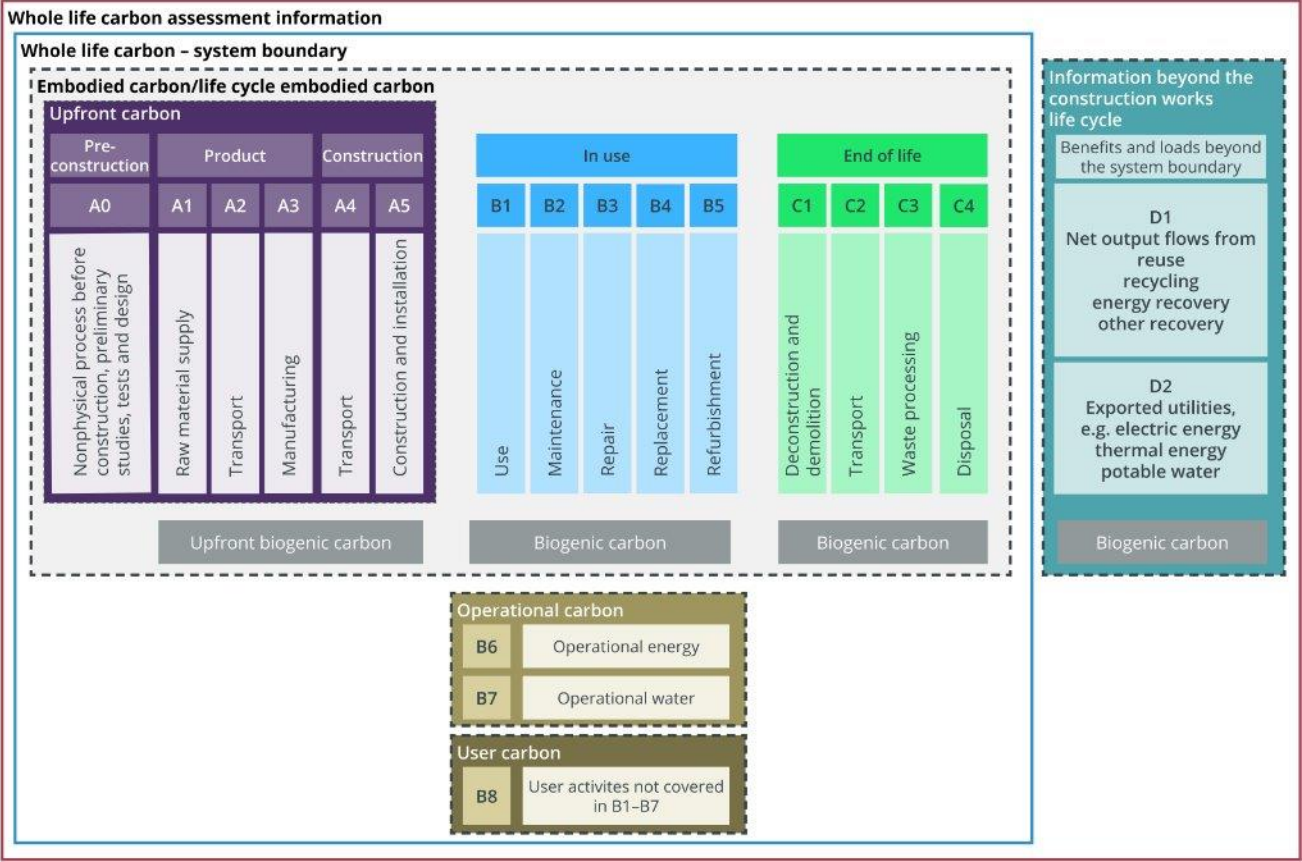


Figure 1: Building and infrastructure life cycle stages and information modules (adapted from EN 15978, EN 17472 and EN 15643, with additions to illustrate biogenic carbon)

About The Project

The Postal Street project is a new-build residential led development located in the heart of Manchester's vibrant Northern Quarter. The scheme will deliver 126 high-quality, low-carbon apartments, at least 20% of which will be offered at Manchester Living Rent, ensuring genuinely affordable homes for local people.

Designed to reflect the area's rich industrial heritage and creative character, the development features a mix of one- and two-bedroom homes, ground floor commercial spaces, and active frontages along Newton, Dean, and Faraday Streets.

The project aims to transform an underutilised brownfield site into a sustainable, community-focused neighbourhood, enhancing the local streetscape and supporting Manchester's ambitions for inclusive, low-carbon urban living.

The building is an 8-storey concrete frame building with reinforced concrete piles foundation. The main façade cladding is brickwork.

The building's Gross Internal Floor Area (GIFA) is based on the RIBA Stage 3 cost plan, which specifies a total area of 10,546 m².



Figure 2: RIBA Stage 3 Proposed Design and Floorplan

Embodied Carbon Scope

Scope

Total embodied emissions are the greenhouse gas (GHG) emissions and removals associated with materials and construction processes, throughout the whole life cycle of an asset (Modules A0-A5, B1-B5, C1-C4 in line with EN 15978).

‘Upfront Carbon’ embodied emissions are the GHG emissions associated with materials and construction processes up to practical completion (Modules A1-A5 as per EN 15978). Upfront carbon excludes the biogenic carbon sequestered in the installed products at practical completion.

The scope of the assessment includes A1-A5 only. Please note this report does not cover any bespoke carbon reduction strategies. Total embodied carbon emissions in product and construction includes the following emissions:

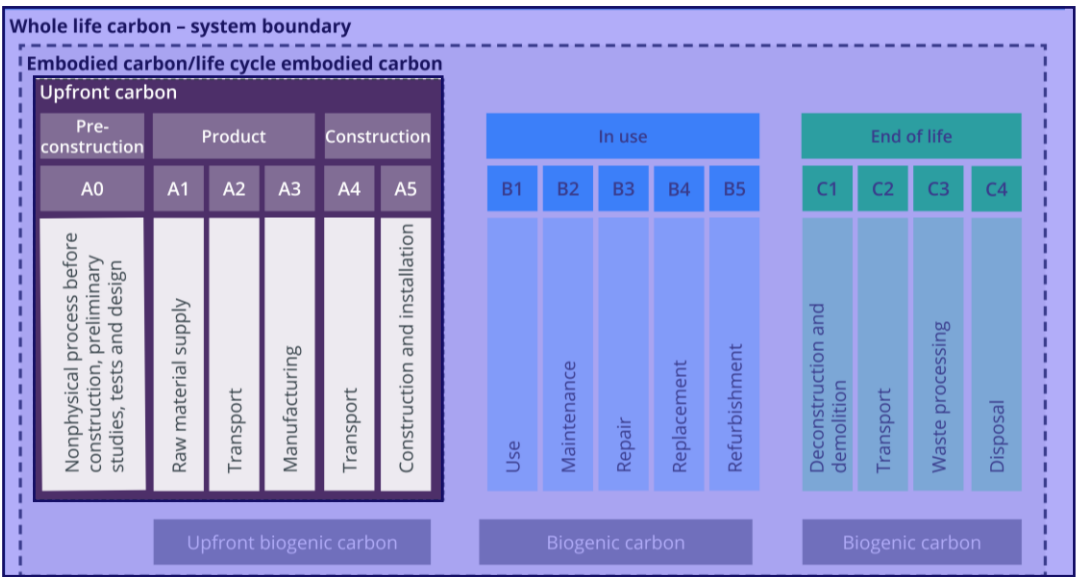


Figure 3: Total embodied carbon lifecycle stages

Building Elements Scope

A complete whole life carbon assessment should cover of all items listed in the project’s cost plan that fall under the building element categories listed in the RICS Professional Statement Whole Life Carbon Assessment for the built environment 2nd Edition, 2023. We have included the following building elements listed in **Table 1**.

Table 1: Elements in scope

Substructure	Substructure	FF&E	FF&E
Superstructure	Frame	Building Services	Building Services
	Upper floors		
	Roof		
	Stairs and Ramps	External Works	Roads, Paths, Paving's and Surfacing's
	External Walls		Fencing, Railings and Walls
	Windows and External Doors		External Fixtures
	Internal Walls and Partitions		External Drainage
	Internal Doors		External Services
Finishes	Wall Finishes		
	Floor Finishes		
	Ceiling Finishes		

RIBA Stage 3 Upfront Embodied Carbon (A1-A5) Results

Upfront embodied carbon (life cycle stages A1-A5) is a metric used broadly across the industry to compare results to other buildings and targets. It is assumed to be more comparable as it excludes the impact of future carbon emissions where there is typically more uncertainty. Upfront embodied carbon, like total embodied carbon, is typically reported per m2 of gross internal floor area (GIFA).

Our estimate of the upfront embodied carbon for the project, based on the RIBA Stage 3 design, is shown below. Please refer to Appendix A for detailed breakdown of the upfront embodied carbon results.

Our estimate of the upfront embodied carbon for the project based on the RIBA Stage 3 design, including contingency, is **711.5 kgCO2e/m²**. The total sequestered carbon of the building is **27 kgCO2e/m²**. We have reported biogenic carbon separately. For details on this and the contingency please refer to Appendix B and D.

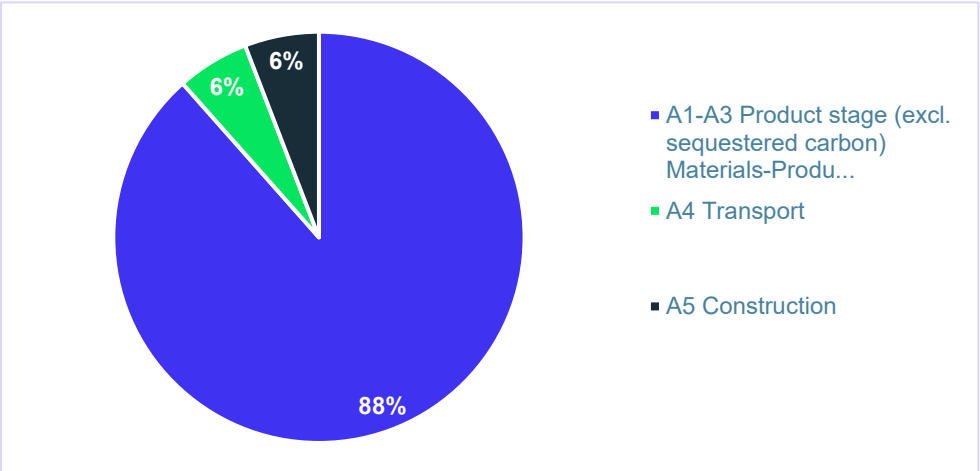


Figure 4: Upfront Embodied Carbon Breakdown by Life Cycle Stages

Table 2: Upfront Embodied Carbon Results

Life Cycle Stages	Total	Total per GIFA m2
A1-A3 Sequestered Carbon Materials	- 283,255	- 26.86
A1-A3 Product stage (excl. sequestered carbon)	6,665,434	632.03
A4 Transport	428,736	40.65
A5 Construction	457,342	38.85
Total Upfront Embodied Carbon A1-A5 (incl. contingency and excl. sequestered carbon)	7,551,512	711.54

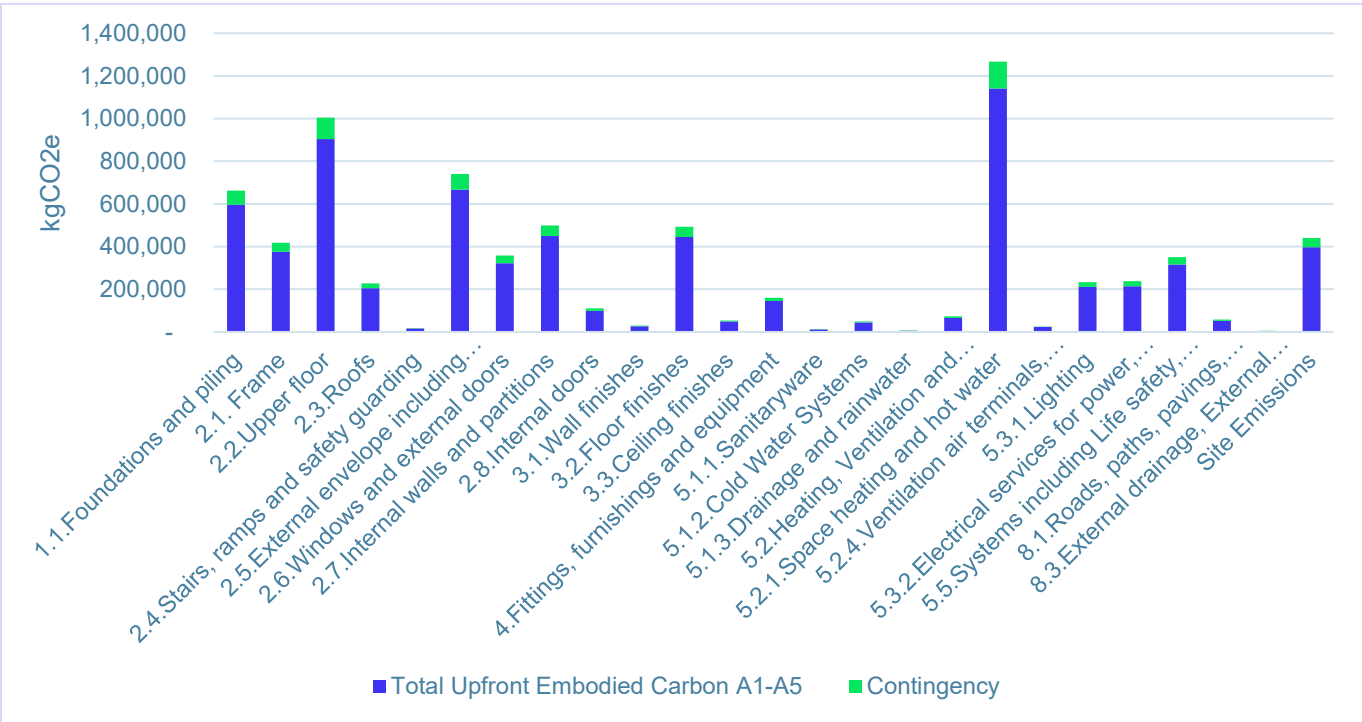
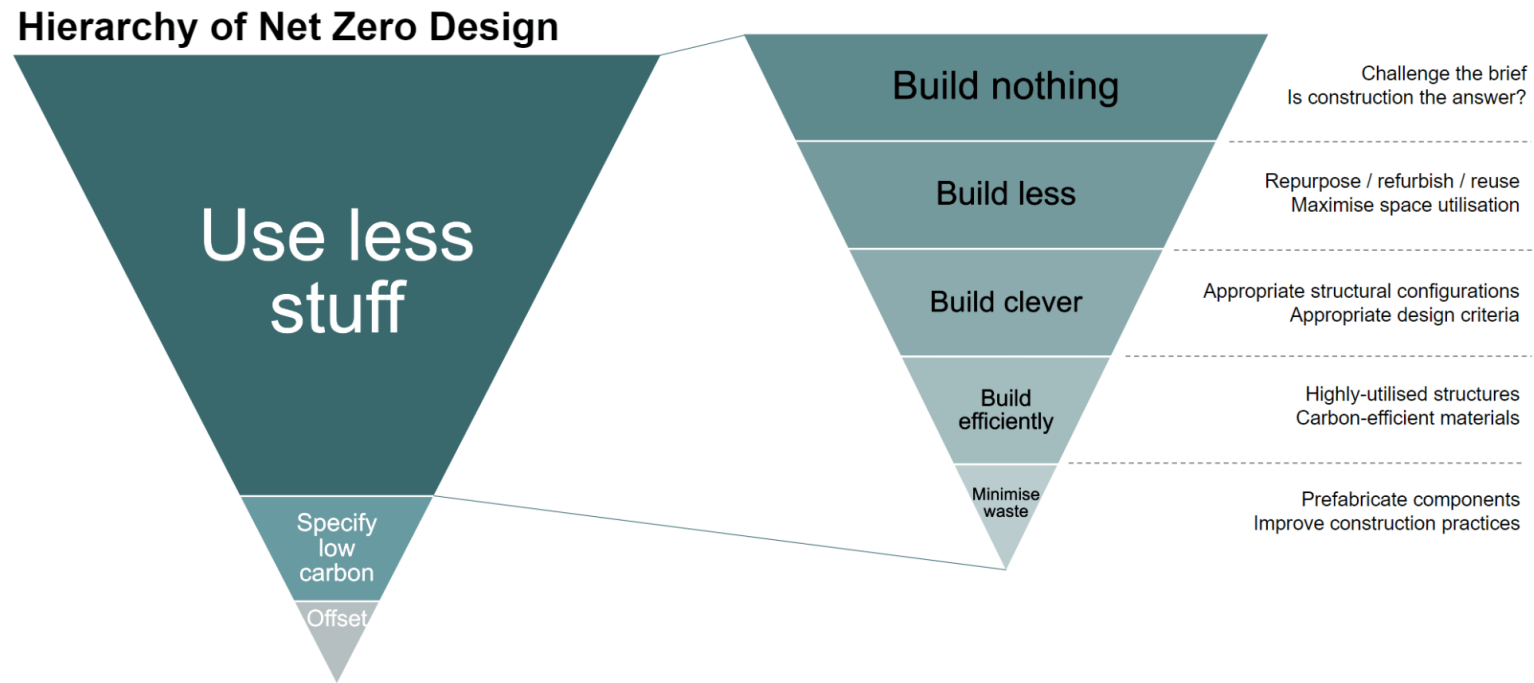


Figure 5: Upfront Embodied Carbon per GIFA m2 Breakdown by Element



Carbon Reduction Potential

When exploring carbon reduction potential for your project, it is important to consider the Hierarchy of Carbon Reduction/Net Zero Design throughout the design stages (illustrated below). At the top of the hierarchy is the need to consider 'building nothing' and 'building less'. We would recommend considering the possibility of reusing existing materials wherever possible, such as steelwork from nearby construction sites. Additionally, more carbon-efficient materials can be considered to achieve 'building efficiently'.



Adapted from PAS 2080

Figure 6: Net Zero Hierarchy of Design, adapted from PAS2080 Carbon Management Standard

Next Steps- Project Roadmap

We would suggest the following next steps, in line with the guidance from LETI shown in Figure 7 to ensure embodied carbon is integrated into the design and construction of Postal Street:

- 1. Issue the findings from this embodied carbon report to the project team.
- 2. Project team to review findings and consider carbon reduction actions.
- 3. Update the result at RIBA Stage 4.

We would also recommend that embodied carbon of the scheme is verified post-construction.

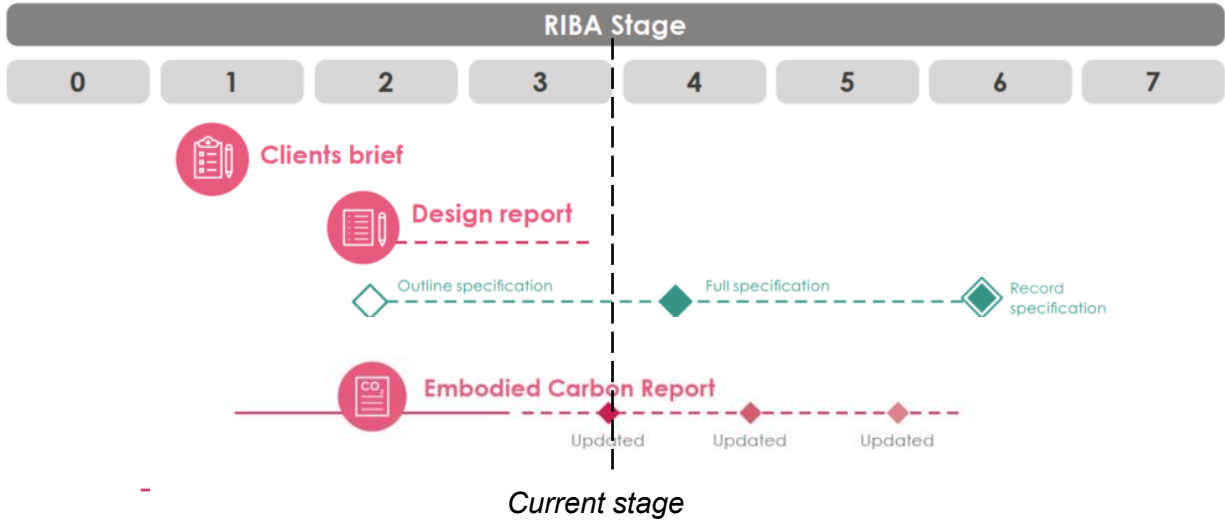


Figure 7: LETI guidance for whole life carbon reporting

Methodology and Assumptions for Embodied Carbon Assessment

The methodology for calculating the embodied carbon emissions for this report is outlined as follows:

1. Project and cost plan information available based on RIBA Stage 3 design was reviewed.
2. The cost plan quantities were converted into suitable units of measurement (e.g. m³, kg) for input into the One Click LCA tool. GIFA was provided by the PM.
3. Available project information details and areas were inputted into the One Click LCA tool.
4. Information from the design report and relevant drawings were reviewed.
5. The cost plan quantity information and specification information from the spec document for all the elements within scope was entered into the One Click LCA tool.
6. Once the materials were modelled, we allowed for an embodied carbon uncertainty factor at this stage. See Appendix B for more information.

Key assumptions made:

- The cement replacement of all concrete in the design was assumed to be 25% (RICS, 2023).
- The weight of reinforcement bars in the reinforced concrete was estimated using the IStructE Structural Carbon Tool.
- We have assumed the piles to be 450mm diameter and 20m depth, as confirmed by the quantity surveyor.
- At this stage, we have assumed C32/40 for all structural concrete, except for the columns and core wall, which are assumed to be C40/50, in line with the structural engineering report.
- In addition to the Stage 3 cost plan, we have allowed for additional glazing of 272.08 m², additional Juliet balconies to the façade, glazed brick in the two central bays to the Newton Street elevation, as confirmed by the quantity surveyor.
- We have assumed the additional acoustic works for windows are additional glazing.

Information and Data Source

The following sources of information is included in the embodied carbon assessment:

- RIBA Stage 3 Cost Plan “MCC Postal Street - RIBA Stage 3 Addendum Cost Plan Options (AN 07.04.25)” received 07/10/2025.
- RIBA Stage 3 design report ‘POST-HBA-XX-XX-RP-A-080000’ received 29/10/2025.
- IStructE How to Calculate Embodied Carbon Version 3
- RICS Professional Statement Whole life carbon assessment for the built environment 2nd edition, November 2023
- LETI Embodied Carbon target alignment

LCA Tool

The One Click LCA tool we’ve used for this assessment is a widely used IMPACT compliant Building Life Cycle Assessment software used to calculate Whole Building Life Cycle Assessments. One Click LCA carries out calculations based off its building material database.

One Click reviews, verifies, curates and integrates data from various public and private sources to the One Click LCA database. All data undergoes a rigorous ten-point verification using a process that has been reviewed by Building Research Establishment. All data in the database is the database is classified, structured, and offered to end users using a dynamic algorithm which ensures users will only be able to choose data in conformity with the data quality requirements of the target certification users are working with.

Life Cycle Stages and Assumptions

Table 3: Life Cycle Stages and Assumptions

Stages	Description	Assumptions
A1-A3	Carbon emissions attributable to the cradle to gate processes; raw material supply, transport and manufacturing	Calculated using EPD's of the products in the specification document. In the absence of specification, the most applicable similar product was selected in accordance with Table 16, RICS PS 2023.
A4	Exhaust emissions resulting from the transport of building products from manufacturer's production plant to building site as well as the environmental impacts of production of the used fuel.	The A4 carbon was estimated using Transportation distance default values for material, based on material type with accordance with Table 17, RICS PS 2023.
A5	Exhaust emissions resulting from using energy during the site operations, the environmental impacts of production processes of fuel and energy and water (A5.2) as well as handling of waste until the end-of waste state (A5.3).	At this stage of design, the A5.2 carbon was estimated in accordance with RICS PS 2023 guidance using 35 kgCO ₂ e/m ² . The A5.3 was estimated using recommended waste rate data primarily from BRE Global Product Category Rules (PCR) for Type III EPD of Construction Products to EN 15804+A2 (2023) or SmartWaste Data in accordance with Table 18, RICS PS 2023.
B1-B5	Environmental impacts from maintaining (B2) and repairing (B3) products in-situ, as well as replacing (B4) building products after they reach the end of their service life. Including impacts from raw material supply, transportation and production of the replaced new material as well as the impacts from manufacturing the replaced material and handling of waste until the end-of-waste state	<i>Please note that this is not in scope for this embodied carbon assessment</i>
B6	Exhaust emissions from any building level energy production as well as the environmental impacts of production processes of fuel and externally produced energy. Energy transmission losses are also considered	<i>Please note that this is not in scope for this embodied carbon assessment.</i>
C1-C4	The impacts of deconstruction include impacts for processing recyclable construction waste flows for recycling (C3) until the end-of-waste stage or the impacts of pre-processing and landfilling for waste streams that cannot be recycled (C4) based on type of material. Additionally, deconstruction impacts include emissions caused by waste energy recovery	<i>Please note that this is not in scope for this embodied carbon assessment.</i>

Appendices

Appendix A. RIBA Stage 3 Upfront Embodied Carbon A1-A5 Breakdown

Category	A1-A3 Sequestered Carbon Materials	A1-A3 Product stage (excl. sequestered carbon)	A4 Transport	A5 Construction	Total Upfront Embodied Carbon A1-A5	Total Upfront per GIFA m2	% of total
1.1. Foundations and piling	- 34	572,219	24,170	-	596,388	56.55	8.8%
2.1. Frame	-	363,681	13,036	-	376,717	35.72	5.6%
2.2. Upper floor	-	868,300	36,152	-	904,452	85.76	13.4%
2.3. Roofs	- 4,270	199,570	6,022	-	205,592	19.49	3.0%
2.4. Stairs, ramps and safety guarding	-	15,515	450	-	15,965	1.51	0.2%
2.5. External envelope including roof finishes	- 202	632,122	34,955	-	667,077	63.25	9.9%
2.6. Windows and external doors	- 41,386	287,060	35,229	-	322,289	30.56	4.8%
2.7. Internal walls and partitions	-	396,274	53,500	-	449,774	42.65	6.7%
2.8. Internal doors	- 85,038	76,652	22,568	-	99,220	9.41	1.5%
3.1. Wall finishes	-	25,766	649	-	26,415	2.50	0.4%
3.2. Floor finishes	- 26,759	424,916	19,615	-	444,531	42.15	6.6%
3.3. Ceiling finishes	- 1,203	45,744	2,891	-	48,635	4.61	0.7%
4. Fittings, furnishings and equipment	- 91,724	130,318	14,319	-	144,636	13.71	2.1%
5.1.1. Sanitaryware	- 4,067	9,271	2,132	-	11,403	1.08	0.2%
5.1.2. Cold Water Systems	-	43,004	1,563	-	44,567	4.23	0.7%
5.1.3. Drainage and rainwater	-	4,821	588	-	5,408	0.51	0.1%
5.2. Heating, Ventilation and Cooling (HVAC)	-	65,131	1,026	-	66,157	6.27	1.0%
5.2.1. Space heating and hot water	-	1,081,123	59,737	-	1,140,860	108.18	16.9%
5.2.4. Ventilation air terminals, ductwork and ancillaries, control dampers, attenuation, fire safety related to ventilation equipment	-	21,678	1,504	-	23,182	2.20	0.3%
5.3.1. Lighting	-	200,764	10,150	-	210,915	20.00	3.1%
5.3.2. Electrical services for power, communications, security, IT and fire detection	-	198,918	15,189	-	214,106	20.30	3.2%
5.5. Systems including Life safety, Fuel installations, Lift and conveyor installations, Services equipment, Disposal installations, Specialist installations, Builders work in connection with services	-	290,993	24,514	-	315,507	29.92	4.7%
8.1. Roads, paths, pavings, surfaces, Fencing, railings, walls, External fixtures	- 502	46,846	5,776	-	52,622	4.99	0.8%
8.3. External drainage, External services, Minor building works	-	4,211	513	-	4,724	0.45	0.1%
Site Emissions	-	-	-	369,110	369,110	35.00	5.5%
Total	- 255,185	6,004,895	386,249	369,110	6,760,254	641.03	100.0%
Total incl. Contingency	- 283,255	6,665,434	428,736	409,712	7,503,882	711.54	

Appendix B. Biogenic Carbon

Trees remove carbon dioxide from the atmosphere through photosynthesis, which is known as 'sequestration'. The carbon from this CO₂ is stored in timber until it is released in the form of a greenhouse gas (CO₂ or CH₄) at the end of its life, for example through burning or decomposition. This stored carbon is called 'biogenic carbon'. Locking biogenic carbon into timber structures is beneficial for the climate as long as the carbon remains within the structure. However, this storage does not negate the immediate effects of fossil carbon emissions (such as those emitted during the production of a timber beam). For the purpose of this embodied carbon assessment, we **have not included biogenic carbon in our overall figures but reported them separately.**

According to the RICS PS, carbon sequestration should be reported separately and can only be included in A1-A3 when the following criteria are met: 1) The whole life carbon assessment of the project includes the impacts of the End-of-Life stage [C], and 2) The timber originates from sustainable sources (certified by FSC, PEFC or equivalent). The negative figure from A1-A3 (the sequestered carbon) has still got to be 're released' and added back into the calculation within the end-of-life stage

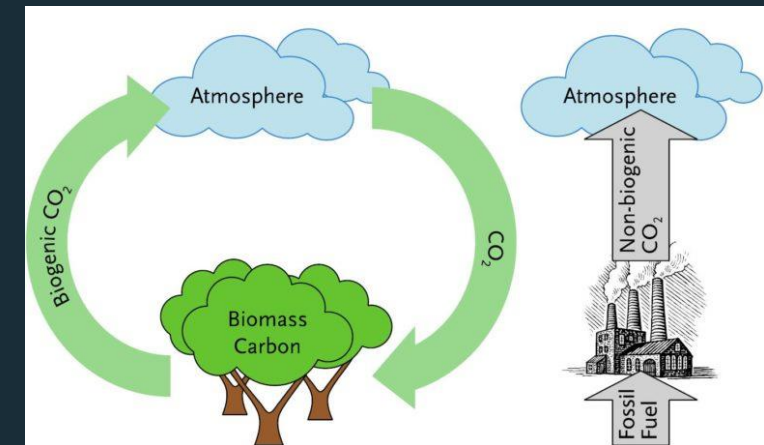
The IStructE also suggests in their "How to calculate embodied carbon (2nd edition)", that if scope of assessment covers:

- Modules A1–A5: do not include biogenic carbon within the A1–A5 total value but report it separately alongside the A1–A5 total
- Stages A–C: include biogenic carbon within the total A–C value reported. It is also possible to report the biogenic carbon separately alongside the A–C total, to help communicate the benefit of locking away carbon during the building's life. Locking sequestered biogenic carbon into a timber structure is a highly beneficial approach for climate change mitigation, especially when the carbon is stored for longer periods of time. This is achieved by designing for life extension, adaptation, deconstruction and reuse.

The rationale behind not including sequestered biogenic carbon when reporting the total A1–A5 value, but reporting it separately alongside, is:

- Including biogenic carbon in the A1–A5 total would typically result in a negative value for A1–A5 embodied carbon (i.e. showing a net extraction of carbon emissions from the atmosphere). This could allow engineers to show that less efficient use of timber results in a lower value (i.e. a greater negative value) of embodied carbon. This must be avoided to prevent unnecessary use of resources
- We should not ignore the fact that sequestration of biogenic carbon happens, and is of climatic benefit — therefore we should report it

The LETI targets also do not include biogenic carbon as stated on page 54 of the LETI Climate Emergency Design Guide



Appendix C. Top Materials

According to RICS PS 2023, the quality and quantities uncertainty factor are considered during RIBA Stage 3. We have provided the top 10 most embodied carbon contributing materials for the building. Please note these are top 10 materials based on their total embodied carbon A-C.

Table 4: Details of Top 10 Materials

No.	Resource name	Total (tonnes CO2e)	Weighting (%)	Carbon data uncertainty factor	Quantities uncertainty factor
1	Ready-mix concrete, in-situ, UK average, C32/40 (IStructE (2025))	1,162	8.7%	2%	1%
2	Reversible air/water heat pump for collective housing, 322.8 kg/unit, P=40 kW, Pompe à chaleur air eau pour logement collectif/bâtiment tertiaire réversible [Pchaud = 40 kW] (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	1,057	7.9%	3%	2%
3	Circular galvanized steel pipe with a diameter of 160 mm and a length of 1 m, Conduit métallique circulaire (Uniclimate)	985	7.4%	3%	2%
4	Cooling tower, Tour de refroidissement (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	758	5.7%	3%	2%
5	Reinforcement steel bar (rebar), UK average (IStructE (2025))	586	4.4%	2%	1%
6	Tufted carpet tile with nylon 6 pile material and bitumen backing, 5.2 kg/m2, maximum surface pile weight 1200 g/m2 (One Click LCA)	527	3.9%	2%	1%
7	Electricity distribution system, cabling and central (switchboards/panelboards), per m2 GFA, for all building types, 3.96 kg/m2 (One Click LCA)	490	3.7%	3%	2%
8	Ventilation centralized with heat recovery (Air handling unit (AHU)), capacity: 10 000 m3/h, 704 kg/unit, EN15804+A1, ref. year 2018	443	3.3%	3%	2%
9	Screed - Levelling	424	3.2%	2%	1%
10	Steel pipes for heating and cooling system, DN=65mm, 6.63 kg/m, Tube en acier noir pour usage en chauffage et climatisation (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	391	2.9%	3%	2%

Please note the Carbon data uncertainty factor is estimated based on Table 11 Carbon data quality matrix in the RICS PS WLCA 2nd Edition. This is estimated based on the selected EPD's geographical representativeness, technological representativeness, Temporal representativeness and Data aspects.

Appendix D. WLCA Uncertainty Factor

According to RICS PS WLCA 2023, the total WLCA uncertainty factor is calculated by combining three component parts. These are outlined below.

- 1. **Contingency factor:** reflects uncertainty regarding the design of the asset, its construction and the quantities and types of materials used.
- 2. **Carbon data uncertainty factor:** reflects uncertainty regarding the representativeness of the carbon data in relation to the impact of the actual products that will be used, and the quality of the data.
- 3. **Quantities uncertainty factor:** reflects uncertainty regarding the quantities of the products that will be used. It should be high when estimates or benchmark data are used, and low when measured quantities are used. We have selected 2% as the quantities are a mix between estimated data and design measured averages.

Each factor is determined individually and outlined in Table 8. Therefore, a WLCA uncertainty factor of **11%** is applied.

Table 5: Outline of WLCA Uncertainty Factors

Contingency Factor	6%
Carbon Data Uncertainty Factor	3%
Quantities Uncertainty Factor	2%
Total	11%

Contingency factor	%
Early design	15%
Technical design + construction	6%
Post-completion	0%

Carbon data uncertainty factor	%
Based on top 10 embodied carbon materials	3%

Quantities uncertainty factor	%
Very good – Actual measured quantities	0%
Good – Design measured averages	1%
Fair – Estimated	3%
Sufficient – Benchmark	4%



Appendix E. WLCA Project Specific ID Matrix

ID	Item	Description
1	Project Name	Postal Street Manchester
2	Asset Type	Residential
3	UPRN (if applicable)	N/A
4	Identification and Description of Sub-Assets to Include their Individually Compliant WLCAs	N/A
5	Project Phase	Stage 3
6	Project Description Relevant to the Stage of Development	The Postal Street project is a new-build residential led development located in the heart of Manchester's vibrant Northern Quarter. The scheme will deliver 126 high-quality, low-carbon apartments, at least 20% of which will be offered at Manchester Living Rent, ensuring genuinely affordable homes for local people.
7	Relationship with other WLCAs	N/A
8	Location (town/postcode/country)	Manchester, UK
9	Date of completion of construction (if a post-construction assessment)	N/A
10	Date of Original Construction if Refurbishment of Existing Asset	N/A
11	Anticipated Start-on-Site and Completion Dates	Estimated completion in 4Q2027
12	Primary Normalisation / Functional Unit (e.g GIA for buildings)	10,546 m2
13	Secondary Normalisation / Functional Unit (typology dependent, e.g NIA for offices)	N/A
14	GIA of any Demolished Assets	N/A
15	Breakdown of GIA by Use Type	Ground Floor Commercial Area: 711 m2 Residential Area: 11,061 m2

ID	Item	Description
16	Specifically for Buildings:	Building Height Above Ground and Below Ground27.7m above, 0m below Number of Storeys Above and Below Ground8 above, 0 below
17	Specifically for Buildings:	FoundationRC Piles Foundations Ground FloorRC slab Vertical Structural ElementRC columns Horizontal Structural ElementRC core walls Floor SlabRC slab CladdingFacing brick and metal cladding FinishesPaint, ceramic tiling, carpet, screed, plasterboard ceiling
18	Specifically for Buildings:	Types of Main Building Services HeatingASHP's & primary distribution, electric radiator in flats. Cooling VentilationMVHR installation

ID	Item	Description
1	Name / Company of the Assessor	Tom Tang, AtkinsRéalis
2	Date of Assessment	05/12/2025
3	Assessment Scope / Type	A1-A5
4	Key Material Quantities with Associated Carbon Factors and Data Sources	See Appendix C
5	Clear Statement and Explanation of Key Assumptions and Scenarios Used to Facilitate the Carbon Calculations	See Methodology and Assumptions



About the Upfront Embodied Carbon Assessment Report

This document and its contents have been prepared and are intended solely as information for Manchester City Council and use in relation to the Postal Street project.

AtkinsRéalis assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

Revision	Purpose description	Origin-ated	Checked	Reviewed	Author-ised	Date
Rev 1.0	Embodied Carbon Report RIBA Stage 3 Issue	TT	HP	CF	CD	14.11.25
Rev 1.1	Embodied Carbon Report RIBA Stage 3 Issue with updated GIFA	TT	HP	CF	CD	20.11.25
Rev 1.2	Embodied Carbon Report RIBA Stage 3 Issue with updated GIFA and comments from MCC	TT	HP	CF	CD	05.12.25

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