



CWC

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One North Parade

Manchester

Whole Life Carbon Analysis

Date: 17/10/2025

Ref: 3369-CWC-XX-XX-RP-N-7020 P02

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Revision Record

Date	Reference	Revision	Prepared	Checked	Authorised
12/09/2025	3369-CWC-XX-XX-RP-N-7020	P01	Nazhan Nizam	Obaid Rahman	Obaid Rahman
			NN	OR	OR
17/10/2025	3369-CWC-XX-XX-RP-N-7020	P02	Nazhan Nizam	Obaid Rahman	Obaid Rahman
			NN	OR	OR

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1.0 Executive Summary

This report summarises Embodied Carbon / Life Cycle Assessment undertaken at detailed planning stage for the proposed development at One North Parade, Manchester.

1.1 Proposed Development:

- Site name: One North Parade, Parsonage Gardens, Manchester
- One North Parade is a proposed new office development in Manchester city centre. It's planned as a ground plus 13 storeys office building designed to replace existing, underutilized office blocks, delivering a gross internal area of 11,054m².

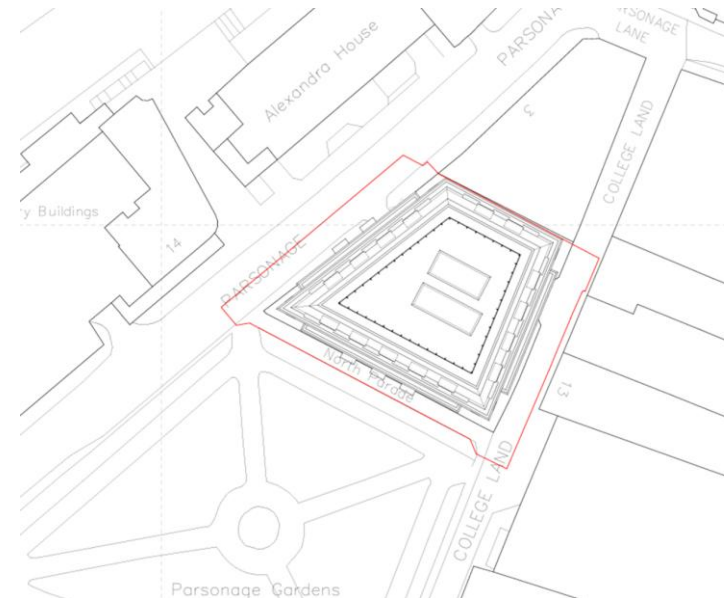
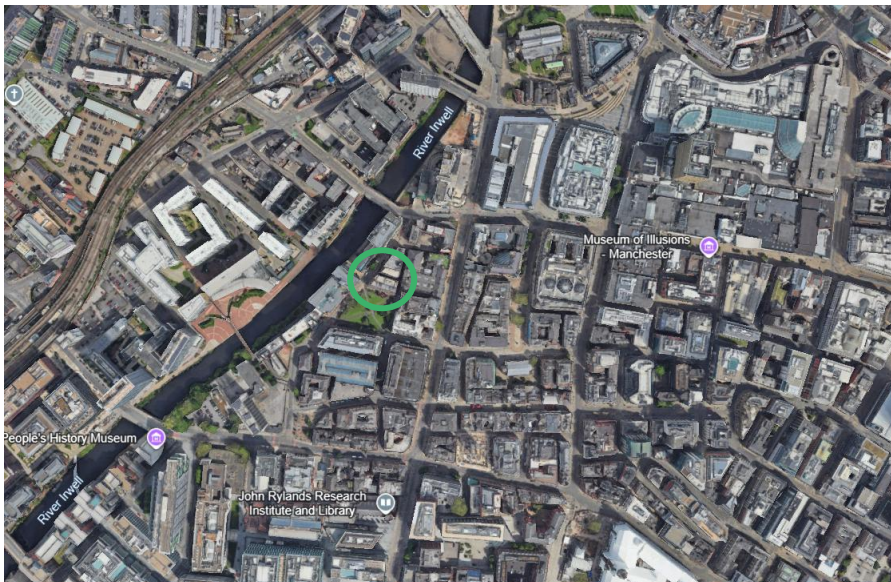


Figure 1. Site Location

2.0 Policy

The planning policy context comprises three levels of adopted policy: national, regional and local. Within each level there is both planning policy and guidance which combine to provide the framework for the consideration of the proposals. Furthermore, where applicable, development must have regard for any emerging policies. The key policy considerations are listed below:

- Greater Manchester Five-Year Environment Plan (2025–2030)
- Greater Manchester Design Guidance for Net Zero
- National Planning Policy Framework (2024).
- Manchester Core Strategy (2012) and Addendum (2024)
- Saved UDP Policies (1995)
- Places for Everyone Joint Development Plan (2024)
- Greater Manchester Design Guidance (2025)
- Other policies of relevance:
 - Places for Everyone:
 - JP-S1 – Sustainable Development
 - JP P-S3: Heat and Energy Networks
- Core Strategy Policies:
 - Policy EN4: Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development
 - Policy EN5: Strategic Areas for low and zero carbon decentralised energy infrastructure
 - Policy EN6: Target Framework for CO₂ reductions from low to zero carbon energy supplies
 - Policy EN8: Adaption to Climate Change

2.1 Policy JP-S2: Carbon and Energy

The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including:

Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy, heating and cooling.

Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured.

Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities.

Increasing the range of nature-based solutions including carbon sequestration through the restoration of peat-based habitats, woodland management, tree planting and natural flood management techniques.

An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable.

1. Be net zero carbon (29) which applies:
 - a. from adoption– to regulated operational carbon emissions.
 - b. from 2028 - to all emissions 'in construction'.

From 2025 development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions. Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which in order of importance seeks to:

- i. Minimise energy demand.
- ii. Maximise energy efficiency.
- iii. Use renewable energy.

- iv. Use low carbon energy; and
- v. Utilise other energy sources.

From 2025 any residual carbon emissions that cannot be fully mitigated on-site should be offset, in agreement with the relevant local planning authority through a financial contribution to a carbon offset fund.

As an interim measure, development should be consistent with the 2022 Part L Building Regulations unless superseded by changes to building regulations and/or national or local planning policies.

2. Incorporate adequate electric vehicle charging points, in line with Part S of the Building Regulations, unless superseded by relevant Local Plan policies, to future proof for the likely long-term demand, taking account of the potential maximum energy demand for the site.
3. Where practicable, prioritise connection to a renewable energy/heating/cooling network in the first instance or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels later.
4. In residential developments, achieve energy demand reductions in terms of space heat demand, hot water energy demand and the delivery of on-site renewable energy generation.

For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced.

For non-residential developments, achieve at least BREEAM 'Excellent' standard (or equivalent) for the 'Ene 01 – reduction of energy use and carbon emissions' category rising to BREEAM 'Outstanding' equivalent for ENE 01 from 2028.

5. Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximize reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate

measures for post occupancy evaluation. Whole life cycle emissions should be considered where possible Districts may set out specific carbon emission reduction and energy demand targets within Local Plans.

2.2 Embodied Carbon

This embodied carbon assessment for One North Parade has been undertaken in alignment with the principles set out in the Net Zero Carbon Buildings: UK Framework Definition (Net Zero Guidance). We have carefully reviewed the guidance and ensured that the core principles have been applied throughout this assessment to provide a robust and transparent evaluation of the project's embodied carbon impacts.

As illustrated in Figure 2 below, taken from the Net Zero Guidance, the assessment follows the defined process for calculating and reporting embodied carbon emissions across the building's life cycle stages. This ensures consistency with industry best practice and supports the project's commitment to achieving net zero carbon performance.

Embodied carbon - explained

The making of materials, their transport, repair and deconstruction affects how much carbon is associated with them. Embodied carbon is assessed through the use of different boundaries. This is a summary of the key boundaries and the terms associated with them.

Upfront and lifecycle embodied carbon is measured in tonnes (tCO_2e) and is normalised to $\text{kgCO}_2\text{e}/\text{m}^2$. For example, if the volume of concrete in one building is the same as that of another, they will emit the same total tCO_2e . However, if one building is twice the floor area of the other, when normalised, it will become obvious that the smaller building has higher emissions per m^2 GIA ($\text{kgCO}_2\text{e}/\text{m}^2$).

Upfront embodied carbon

Upfront embodied carbon refers to the greenhouse gas emissions associated with material and construction stages: raw material supply, manufacture, transport and construction of all building elements

Life cycle embodied carbon

Life cycle embodied carbon includes both upfront embodied carbon and the embodied carbon associated with:

- In-use - maintenance, replacement and refrigerant leakage.
- End of life - waste processing of demolition/deconstruction and disposal of any products.

Operational carbon

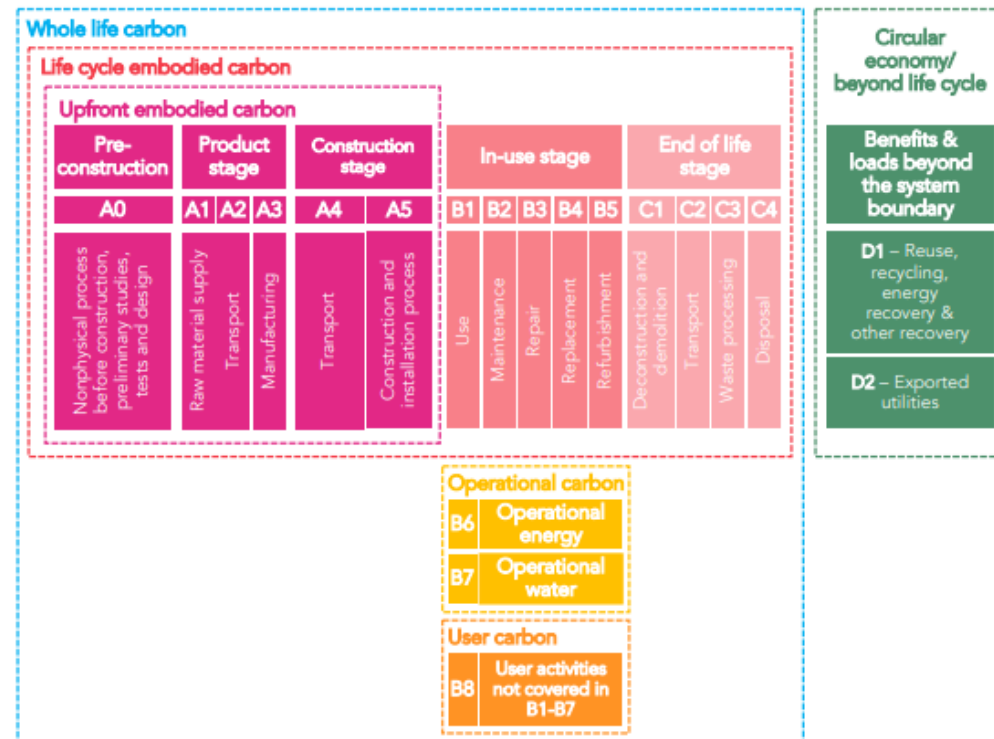
Operation carbon refers to the emissions associated with energy and water use during operation.

User carbon

User carbon covers the emissions from user activities, outside of the use of energy and water emissions from the operation of the building. An example includes transport or vehicle charging. This module is typically outside the remit of building design and has not been included on following pages.

Whole life carbon (WLC)

For buildings, whole life carbon is the sum of **life cycle embodied carbon** and **operational carbon**.



Modular information for the different boundaries of the building assessment. This version of the diagram is adapted from a combination of the diagram from the BS EN 15978, RICS 2023 and LETI.

Circular economy/beyond life cycle

A circular economy seeks to ensure materials can be re-used again and again and are ultimately diverted from landfill or incineration. This builds on embodied carbon principles, such as material re-use, recovery and recycling.

Figure 2. Embodied Carbon

3.0 Industry Benchmarks

It is recognised that buildings are responsible for producing around 49% of the UK's carbon emissions. Carbon emissions are produced due to the energy used during the construction phase as well as the operational phase of the building. There was little guidance available to assist building designers who wanted to design low or net zero carbon (NZC) buildings. However, since 2018 several publications have been produced that provide guidance and industry benchmarks, mapping out a route to meet the UK National target of net zero carbon by 2050.

Carbon emissions fall into two main categories:

- Operational Carbon – the carbon produced through the ongoing energy consumed during the operation of a building over its life.
- Embodied Carbon – the carbon emissions associated with raw material extraction, manufacture and transport of building materials, construction and the emissions associated with maintenance, repair and replacement, as well as dismantling, demolition, and eventual material disposal.

3.1 RIBA 2030 Climate Challenge v.2

In response to the climate emergency, the Royal Institute British Architects (RIBA) has set voluntary performance targets for energy use, embodied carbon and water consumption. The current non-domestic targets are given in Figure 3 below.

As the targets are for performance outcomes of buildings in operation, the RIBA advocates that buildings in design today should, as a minimum, adopt the 2025 targets.

RIBA 2030 Climate Challenge target metrics for domestic / residential

RIBA Sustainable Outcome Metrics	Business as usual (new build, compliance approach)	2025 Targets	2030 Targets	Notes
Operational Energy  kWh/m ² /y	120 kWh/m ² /y	< 60 kWh/m ² /y	< 35 kWh/m ² /y	Targets based on GIA. Figures include regulated & unregulated energy consumption irrespective of source (grid/renewables). BAU based on median all electric across housing typologies in CIBSE benchmarking tool. 1. Use a 'Fabric First' approach 2. Minimise energy demand. Use efficient services and low carbon heat 3. Maximise onsite renewables
Embodied Carbon  kgCO ₂ e/m ²	1200 kgCO ₂ e/m ²	< 800 kgCO ₂ e/m ²	< 625 kgCO ₂ e/m ²	Use RICS Whole Life Carbon (modules A1-A5, B1-B5, C1-C4 incl sequestration). Analysis should include minimum of 95% of cost, include substructure, superstructure, finishes, fixed FF&E, building services and associated refrigerant leakage. 1. Whole Life Carbon Analysis 2. Use circular economy strategies 3. Minimise offsetting & use as last resort. Use accredited, verifiable schemes (see checklist). BAU aligned with LETI band E; 2025 target aligned with LETI band C and 2030 target aligned with LETI band B.
Potable Water Use  Litres/person/day	125 l/p/day (Building Regulations England and Wales)	< 95 l/p/day	< 75 l/p/day	CIBSE Guide G.

Figure 3. RIBA 2030 Climate Challenge Target Metrics

4.0 Methodology

WLC assessments are a new requirement under the Greater Manchester Five-Year Environment Plan (2025–2030). Policy JP-S2 has been developed to ensure new developments consider the WLC of the scheme, which includes operational (both regulated and unregulated) and embodied carbon emissions, as well as any future ‘benefits’, post ‘end life’, including carbon reductions achieved from reuse and recycling of building structure and material.

The assessment follows the guidance for WLC assessments outlined in EN 15978:2011. Calculations were undertaken using “Etool LCA”. The purpose of this is to assess the WLC emissions of the proposed development and to inform future design decisions to reduce carbon emissions throughout the building’s lifespan.

The object of the assessment is the building and surrounding areas within the site boundary. The building elements covered by the assessment are outlined in Table 1 below and were selected following the guidance detailed in the RICS WLC assessment for the built environment (2023).

Assessed Elements
Substructure – <i>Lowest floor construction, Basement excavation, Basement retaining walls.</i>
Superstructure – <i>Upper Floors, Roof Coverings, External Walls, Windows and external doors, Internal Wall and Partitions</i>
Finishes and FF&E – <i>finishes to internal walls, floors and ceilings</i>
Building Services – <i>Space Heating and Air Conditioning, Ventilation, Renewables</i>
External Works – <i>Hard Landscaping, Soft Landscaping</i>

Table 1. Assessed Elements

4.1 WLC Stages

The life cycle of a building is divided into distinct Project Stages to represent the timeline of a project. Each stage is sub-divided into smaller Activity Categories. These are shown in the RICS Professional Statement (RICS PS) table below.

For a given WLC Assessment, it is important to understand not only the building elements included within the analysis such as external walls or upper floors, but also the Project Stage and Activity categories. BS EN 15978 and the RICS Professional Statement: WLC assessment for the built environment (RICS PS), set out five stages in the life of a typical project, with each stage having several modules associated with it:

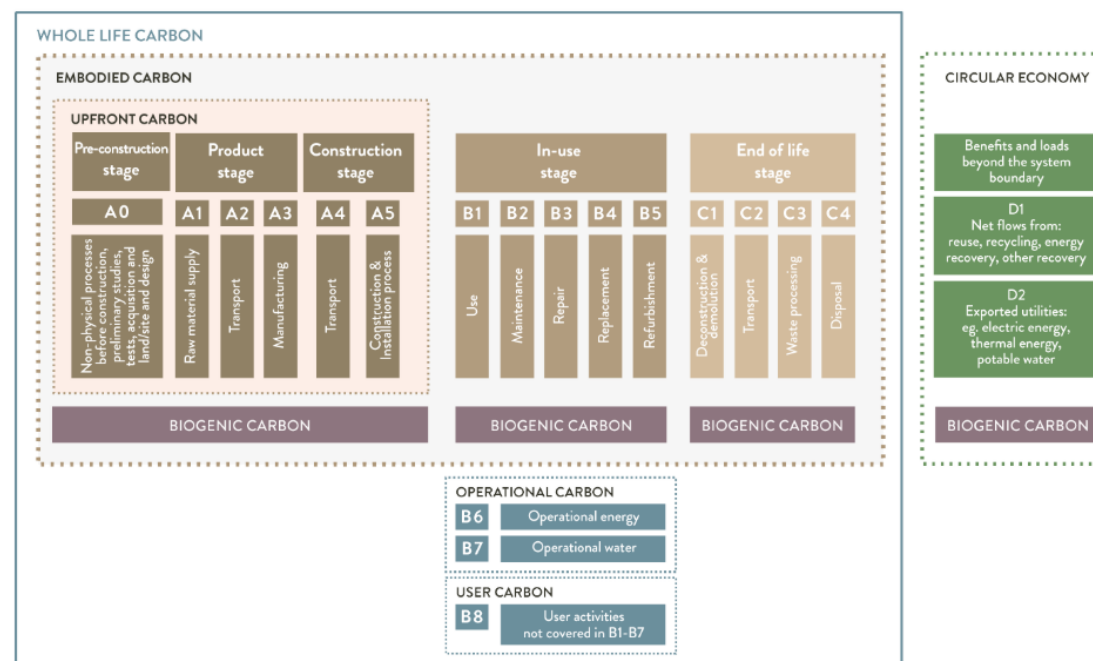


Figure 4. Whole Life Carbon Stages (RICS Whole Life Carbon Assessment (WLCA) Standard, 2nd edition).

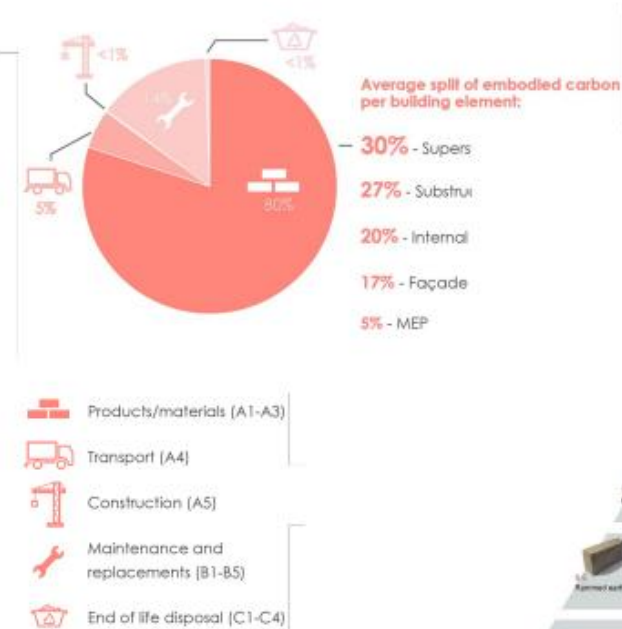
Where:

A0:	Preconstruction stage
A1 – A3	Product Stage
A4 – A5	Construction Process Stage
B1 – B5	Use Stage
C1 – C4	End of Life Stage (EoL)

Upfront carbon is a relatively new term which considers the Product and Construction Stages together. This provides a total figure for carbon up to practical completion and has been borne out of the industry targets set by LETI and the GLA.

Measuring upfront embodied carbon – materials and quantities

Upfront embodied carbon associated with one particular material is calculated by multiplying its embodied carbon rate by its quantity. Materials used in superstructure and substructure are generally used in large quantities, so their selection is likely to have a significant impact on the overall upfront embodied carbon. Using a high embodied carbon material may be acceptable if it is used in small quantities. If used in large quantities, lower carbon alternatives should be investigated.



Reducing embodied carbon for the largest uses/greatest quantities (Source: LETI)



These are Danish figures and are not intended to be used in the UK, but the hierarchy is useful **as an illustration**. The material selection pyramid illustrates high embodied carbon materials at the top and low embodied carbon materials at the bottom (module A1-A3, based on global warming potential). Follow link www.materialepyramiden.dk to see the pyramid in more detail.

5.0 Results

5.1 Carbon Emissions by Whole Life Cycle Sector

This section presents the results of the Whole Life Carbon Assessment (WLCA) conducted for the North Parade development, in accordance with the RICS Whole Life Carbon Assessment for the Built Environment guidance. The assessment encompasses all life cycle stages as outlined in the RICS framework and categorised under Modules A through D. These modules provide a comprehensive overview of the carbon impacts associated with the development, from initial material extraction to end-of-life processes and potential future benefits beyond the building's life cycle.

The results are structured as follows:

- Modules A0–A5 cover the upfront embodied carbon, including the raw material supply, transport, manufacturing, and construction processes.
- Modules B1–B5 account for the in-use stage emissions, such as operational energy and water use, as well as maintenance and repair.
- Modules C1–C4 examine the end-of-life carbon emissions, including deconstruction, transport, waste processing, and disposal.

Each module's carbon impact has been calculated in terms of kilograms of equivalent carbon (kgCO₂e), allowing for a detailed understanding of where emissions are concentrated and identifying opportunities for carbon reduction across the building's full life cycle.

Module	Global warming (kg.CO ₂ e)	Global warming per GIA (kg.CO ₂ e/m ²)
Module A0-A5	9,056,371	787
Module B1-B5	380,788	33
Module C1-C4	50,579	4
Totals	9,487,738	824

Table 2. Module Carbon Impact

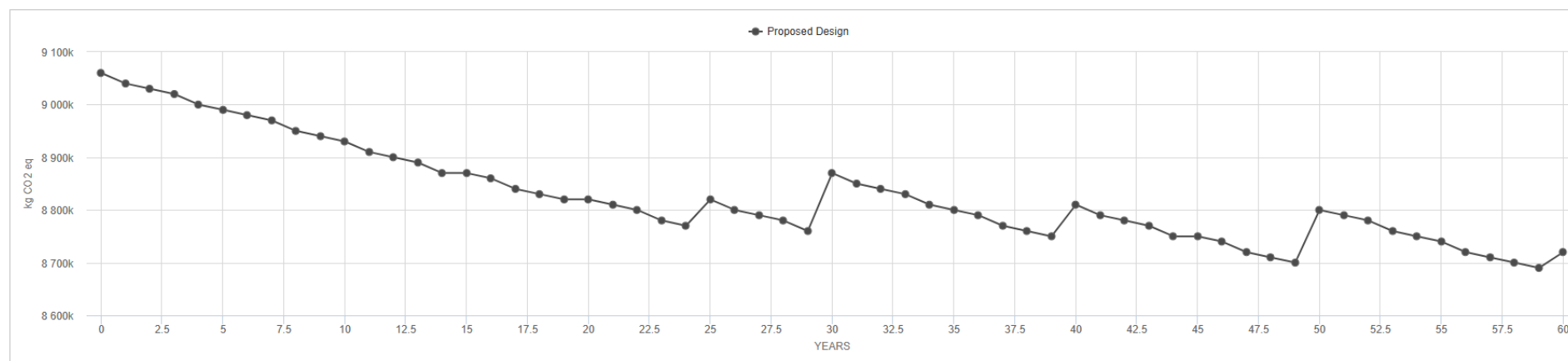
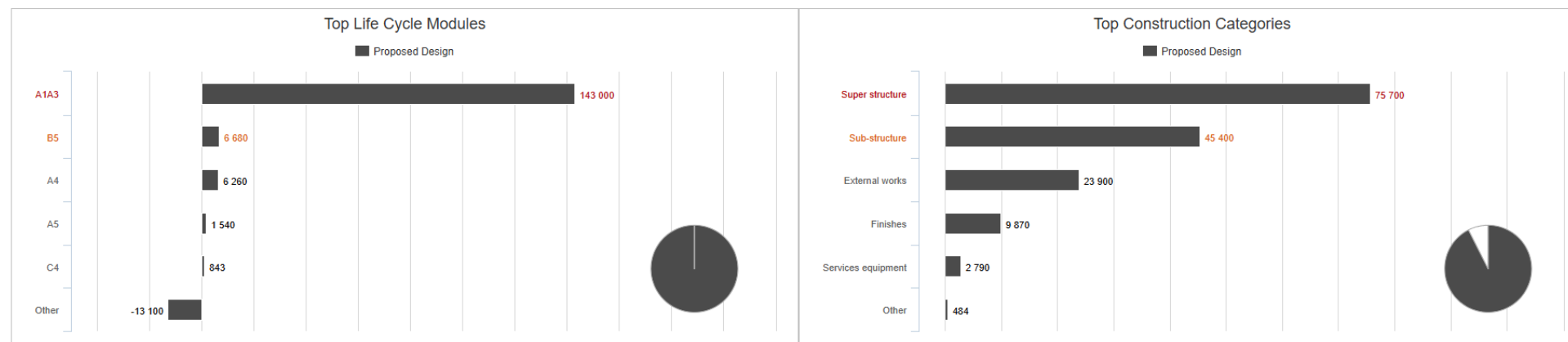


Figure 5: Top Five Global Warming Potential Total, GWP chart



Exported graph data from the model software (Etool) One North Parade development – Global warming potential (GWP)

One North Parade Whole Life Carbon Analysis

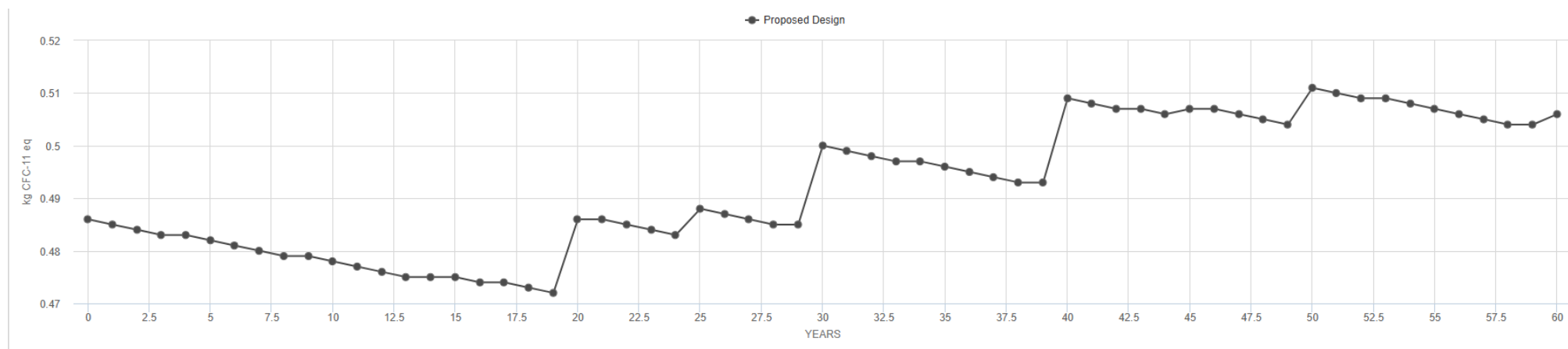
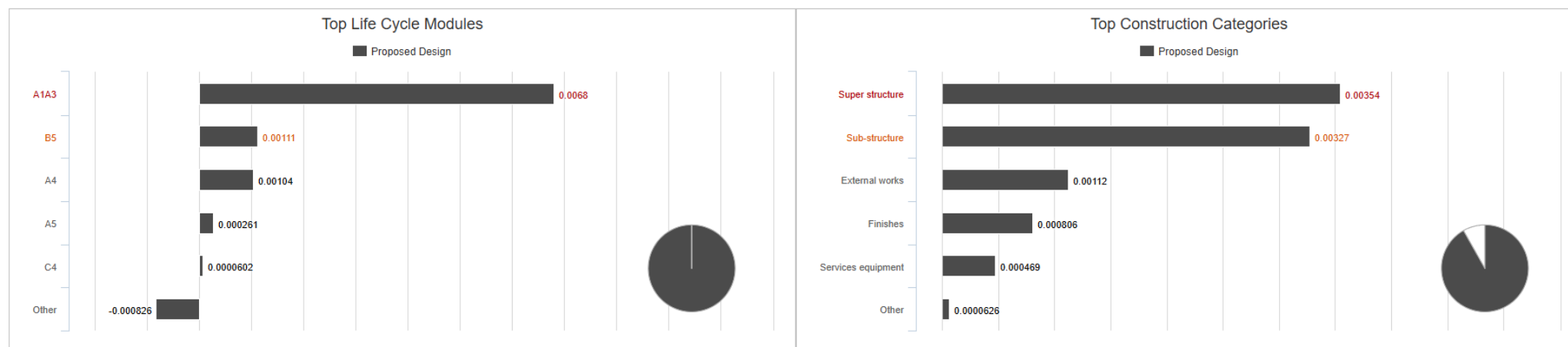


Figure 7: Top Five Ozone Depletion Potential, ODP chart



Exported graph data from the model software (Etool) One North Parade development – Ozone Depletion Potential (ODP)

5.2 Comparison Metrics and key performance indicators

This section of the report presents a comparative analysis of the upfront embodied carbon associated with the proposed development at One North Parade benchmarked against the metrics and key performance indicators outlined in the 'Design Guidance for Net Zero for the Greater Manchester Combined Authority (GMCA)'. The focus is on evaluating the project's alignment with the GMCA's target for major developments.

As buildings and construction account for a significant share of carbon emissions, reducing embodied carbon, particularly in the early stages of construction, is critical to achieving regional and national net zero goals. The GMCA guidance sets ambitious, performance-based thresholds intended to drive down emissions from materials and construction processes.

Development	Upfront Embodied Carbon (kg.CO ₂ e)	Upfront Embodied Carbon (kg.CO ₂ e/m ²)
One North Parade	9,056,156	787

Table 3. Embodied Carbon Value

The proposed development at One North Parade, has been assessed for its upfront embodied carbon in accordance with guidance set out in the Greater Manchester Combined Authority (GMCA) documents. The latest calculations confirm that the scheme, based on current design proposals, is on track to achieve an upfront embodied carbon footprint of 787 kgCO₂/m².

	Minor development		Major development	
	Small minor <100m ²	Minor 100-999m ²	Major 1,000-4,999m ²	Large major +5,000m ²
Space heating and cooling demand (kWh/m ² _{GIA} /yr) <i>Minimise energy demand</i>				
Energy Use Intensity (EUI) (kWh/m ² GIA/yr) <i>Maximise energy efficiency</i>	<i>Not applicable</i>	 Outstanding from 2028	 Outstanding from 2028	
PV footprint area (% of ground floor footprint (fp)) <i>Use renewable energy</i>				
Fossil fuel free (yes/ no) <i>Use low carbon energy</i>				
TM52 met and passed (yes/no) <i>Reduce overheating risk</i>	<i>Not applicable</i>			
Upfront embodied carbon (kgCO ₂ e/m ² _{GIA}) <i>Minimise embodied carbon</i>				
Offset contribution (£) <i>Offsets</i>	<i>Not applicable</i>	<i>Not applicable</i>	 Options for offsetting currently under development and to be adopted by each local authority.	

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GMCA Major development upfront embodied carbon target (kg.CO ₂ /m ²)	One North Parade upfront embodied carbon target (kg.CO ₂ /m ²)
No benchmarking currently specified in the GMCA.	787

Table 4. Embodied Carbon Target

5.3 Reporting top three materials with the highest upfront embodied carbon emissions

In alignment with Greater Manchester's planning policies and Net Zero Carbon guidance, this section identifies and reports the three materials contributing the highest levels of upfront embodied carbon emissions in the development of One North Parade. Upfront embodied carbon, primarily associated with product stage emissions (Modules A1–A3), plays a critical role in early design decision-making and long-term carbon performance. The findings presented here are based on a whole life carbon assessment in accordance with the RICS 2023 methodology.

A. Upper Floor Concrete

The concrete used in the upper floors of the proposed development at One North Parade is confirmed to be one of the top three materials with the highest up-front embodied carbon. Due to the high cement content typically required for structural concrete, especially in multi-storey buildings, its production involves significant carbon emissions associated with both the energy-intensive manufacturing process. Given the volume of concrete used in the upper floors, it represents a major contributor to the overall embodied carbon footprint of the building.

Opportunities to reduce embodied carbon - Using fly ash or ground granulated blast furnace slag (GGBS) as partial replacements for cement in concrete can significantly reduce its embodied carbon. These industrial by-products require less energy to produce than Portland cement, thereby lowering the overall carbon emissions associated with the concrete mix.

B. Concrete Foundations

The concrete used in the foundations of the proposed development at One North Parade is confirmed to be one of the top three materials with the highest up-front embodied carbon. Due to the high cement content typically required for structural concrete, particularly in foundational elements where strength and durability are critical, its production results in significant carbon emissions linked to the energy-intensive manufacturing process. Given the substantial volume of concrete required for the foundations, it represents a major contributor to the overall embodied carbon footprint of the building.

Opportunities to reduce embodied carbon - Using fly ash or ground granulated blast furnace slag (GGBS) as partial replacements for cement in concrete can significantly reduce its embodied carbon. These industrial by-products require less energy to produce than Portland cement, thereby lowering the overall carbon emissions associated with the concrete mix.

C. Structural Steel

Reinforced steel has been confirmed as one of the three materials with the highest upfront embodied carbon for the proposed development at One North Parade. This finding highlights its significant contribution to the project's initial carbon footprint and underscores the importance of carefully considering material selection in the sustainability strategy. Steel is one of the most carbon-intensive construction materials because of the energy-intensive processes required to produce the metal.

Opportunities to reduce embodied carbon - **Direct Reuse of Structural Members:** Salvaging beams, columns, and other steel components from deconstructed buildings can drastically cut embodied carbon, since no new manufacturing is required.

Optimised Design: Using advanced structural modelling to reduce over-specification and minimise steel tonnage

Responsible Sourcing: Choosing suppliers who commit to science-based targets and transparency in embodied carbon reporting.

6.0 Actions

The below table summarises recommendations:

Recycled binders within the concrete	Concrete is one of the major material contributors to the building's life-cycle emissions. During this assessment, a typical concrete mix has been used. Products are available that can have a recycled cement replacement content of up to 55%, which can have a significant impact on the carbon emissions of the product.
Recycled Aggregate	Depending on the application and type of concrete, there are opportunities to use recycled aggregates and demolition waste in new on-site concrete. This prevents waste and minimises the requirement for new resources. Using recycled aggregates directly from the demolition of the site minimise emissions associated with the transport of materials.
Reduce volume of concrete	Highly efficient designs will minimise the volume of concrete in the building. This could include reducing overdesign of slabs and columns and optimising amount of reinforcement vs concrete thickness. Floor plates have already been rationalised as much as possible, which reduces material usage. This has the added benefit of reducing the project cost, as well as life cycle carbon emissions. It will be reviewed at the technical design stage.

Façade design and material selection	The proposed development has included double-glazed windows. This is a standardised material that requires little to no maintenance over its life and can often be reclaimed at the end of the building's life, if properly designed to enable dismantling. The development also uses standardised window and door design, allowing more efficient design and production, reducing waste and material use.
Select low carbon materials	When selecting and specifying products across the development, products should be identified that have a low embodied carbon. This information can often be found in the product Environmental Product Declaration (EPD), if available.
Use	The energy strategy proposes the use of air-source heat pump for the development. Quantities cannot be confirmed at this early design stage. However, to minimise in-use emissions from refrigerant leak, all best practice procedures will be followed when installing refrigerant pipework. All relevant F-gas rules will be followed regarding testing for leakage, based on the installed system size.
Transportation to site	All construction materials should be sourced from suppliers as close as possible to the site. This minimises transportation distances and emissions associated with the transport of these materials
Energy Use	The development has been designed to comply with the Places for Everyone energy requirements, and as such demonstrates a significant improvement over the building regulation baseline. An energy strategy has been developed following the energy hierarchy 'Be Lean, Be Clean, Be Green'. The development employs an efficient building fabric, including well-insulated walls and efficient glazing, efficient heating systems.

Water use	Low-flow fixtures and fitting should be used within the development to ensure water usage is kept to a minimum. Water meters should be installed to encourage residents to reduce their water usage.
Deconstruction	The demolition and deconstruction of the development should be considered at the design stage. Materials that can be separated from each other to allow for more effective recycling at the end of life should be considered.

Table 5. Recommendations

7.0 Conclusion

This Whole Life Carbon Assessment (WLCA) for **One North Parade** has been carried out in accordance with both local and national planning policy requirements relating to sustainability and carbon reduction. The assessment has been completed using the RICS Whole Life Carbon Assessment for the Built Environment methodology and has been undertaken using the eTool platform.

The analysis identifies that the most significant contribution to the building's whole-life Global Warming Potential (GWP) arises from the embodied carbon associated with product and construction stages (Modules A0–A5). This highlights the importance of early-stage design decisions in minimising the project's carbon footprint. The largest materials are confirmed to be the concrete and steel within the building design.

Module	Global warming (kg CO ₂ e)	Global warming per GIA (kg CO ₂ e/m ²)
Module A0-A5	9,056,371	787
Module B1-B5	380,788	33
Module C1-C4	50,579	4
Totals	9,487,738	824

Table 6. Module Results