

2026

re:shape

Whole Life Carbon Assessment

Ashley Park

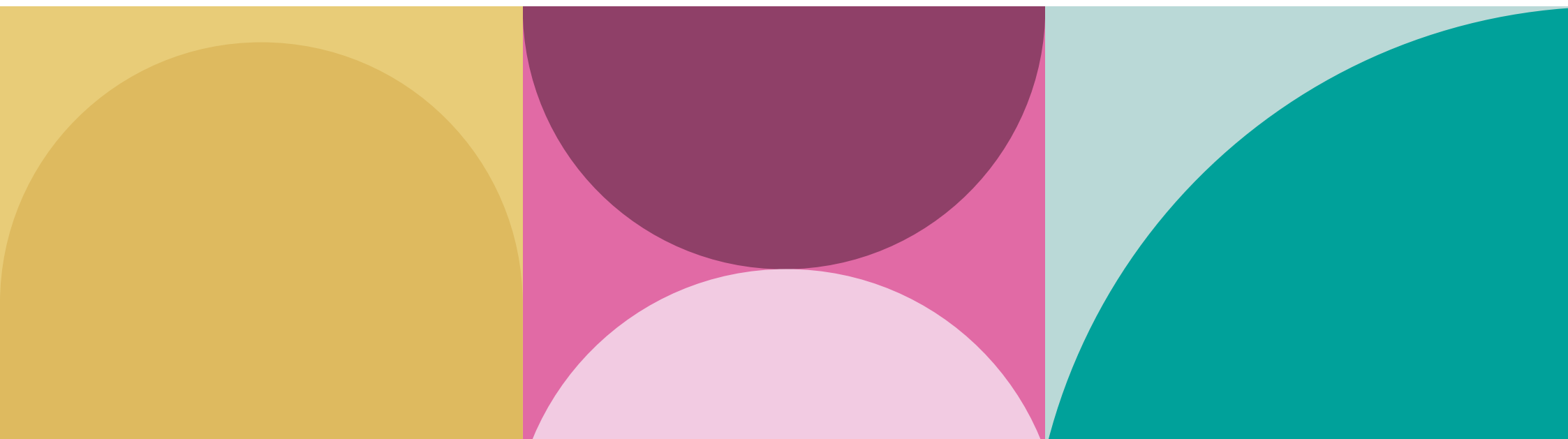




Stage 2

Whole Life Carbon Assessment

Ashley Park, Tottenham



About us

Carbon.Climate.Certified

Established for over 30 years, Carbon.Climate.Certified have grown into a leading UK based Sustainability Consultant, working on multiple award winning schemes in the UK and overseas.

We offer holistic sustainability and environmental impact services in the built environment, drawing on our experience in the rapidly evolving sustainability sector we help our clients to develop and implement a clear framework of service delivery, defining and achieving their sustainability goals.

We approach this in different ways to many in our field, with a strong commercial awareness, built on extensive experience which continues to expand and by attempting to steer an evolving sustainability movement in a positive direction. In recent years our core services have progressed into more strategic planning in the ESG space alongside our award winning accreditation services and we continue to offer consultancy on policy, social value and environmental performance to global brands and financial institutions across five continents. Our international client base includes some of the world's most successful organisations and the UK's most established institutions including Russell Group Universities, the National Trust, the NHS and some of the worlds largest companies including Amazon, Jaguar Land Rover, Blackstone and DHL.

We believe sustainability in the built environment at both organisational and project level must offer value and avoid where possible a 'box ticking' culture. This philosophy, when applied to environmental impact, sustainability strategies and carbon analysis has been recognised with multiple awards including BREEAM Assessor of the Year in 2013 & 2015, & highly commended in the category of Best Assessor company at the 2025 BREEAM Awards.

Our overarching aspiration is to provide our clients with ways in which they can aim to be responsible, to reduce their carbon emissions directly or indirectly and to safeguard the environment for future generations.

Author & Assessor Details

The report has been produced by Thea Brooman, a sustainability consultant and certified professional. Thea has experience conducting Life Cycle Assessments (LCAs) and Whole Life Carbon Assessments (WLCA's) for a diverse portfolio of projects. She holds an ARB Part 2 Master of Sustainable Architecture that equips her with the skills to interpret construction documentation, including Bills of Materials (BoMs), architectural drawings and energy modelling reports, allowing her to effectively perform Whole Life Carbon Assessments.

The report has been reviewed by Jade Cox, Associate at Carbon.Climate.Certified who has an MArch degree and over 8 years experience working directly in the field of Architecture, Sustainability and the built environment. Jade specialises in the field of Whole Life Carbon Assessments, Life Cycle Assessments and Circular Economy. She is also a qualified ESOS Assessor.

Executive Summary

Project Description

This Whole Life Carbon Assessment has been prepared by Carbon.Climate.Certified on behalf of Re:shape T Ltd ("the Applicant") in support of an application for planning permission submitted to the London Borough of Haringey. The application seeks planning permission for the following development at Former Ashley House site, Ashley Road, Tottenham Hale, London Borough of Haringey, N17 9LZ ("the Site"):

"Full planning permission for a phased mixed-use development comprising: (i) enabling works and operations; (ii) residential development (Use Class C3) including affordable housing; (iii) shared living accommodation (Sui Generis), (iv) commercial and community floorspace (Use Classes E and F2); and (v) site-wide and/or phase-specific access, servicing, public realm, blue-badge parking, cycle parking, open space, hard and soft landscaping, utilities, plant and all other associated works.

To allow for accurate reporting and data granularity, each building within the proposed development has been assessed individually as follows:

Assessment 1 Block A: a mixed-use redevelopment comprising 522 shared-living rooms, employment space, ancillary residential facilities and community spaces.

Assessment 2 Block B: a mixed-use redevelopment comprising 87 social-rented affordable units (C3), employment and community spaces.

Overall: The proposal involves active ground floor retail uses, and public realm improvements including landscaping and enhanced pedestrian connections.

Project Targets

Re:Shape have strong sustainability ambitions and have developed a considered sustainability brief for the project in line with their ESG framework. The targets outlined within this document refer to industry best practice targets established by the Greater London Authority and RIBA 2030 for new construction projects.

The assessment has been completed in line with London Plan Guidance (LPG) for WLCA and draws on guidance from the UK Green Building Council (UKGBC). These guidance documents promote the standardisation of whole life carbon (WLC) methodologies, supporting consistency in reporting and benchmarking across the industry. Collectively, these initiatives are steering the built environment towards a more sustainable, low-carbon future. By embedding WLC assessments as a core element of early design stages and fostering innovation in low-carbon materials and construction techniques, they are driving significant reductions in lifecycle emissions.

WLCA Methodology

Issue Summary

Revision No	Status	Comment	Author	Checked	Date
R01	Draft	Issued for client comment	TB	JC	29.07.26
R02	Final	Issued for client comment	TB	JC	24.08.26
R03	Final	Planning Issue	TB	JC	31.08.26

This Whole Life Carbon (WLC) Assessment has been prepared for the development at RIBA Stage 2, in line with the RICS Whole Life Carbon for the Built Environment 1st edition, November 2017 and LPG guidance. The GLA reporting tool has been completed and should be read in conjunction with this report.

The assessment follows a sequential approach through design, procurement, construction, and post-completion, beginning at concept stage.

Early-stage assessments establish a baseline, integrate WLC into the design process, and identify reduction opportunities while there is scope to influence decisions. As the process is still evolving, early-stage calculations using tools such as OneClick LCA may yield uncertain results; however, these are refined as design detail improves.

Stage 2 Results

The project's performance has been assessed against GLA Benchmarks as these provide the most accurate benchmark for the project. Table 1 on the following page demonstrates that currently, the proposed design is achieving the GLA Benchmarks for residential buildings.

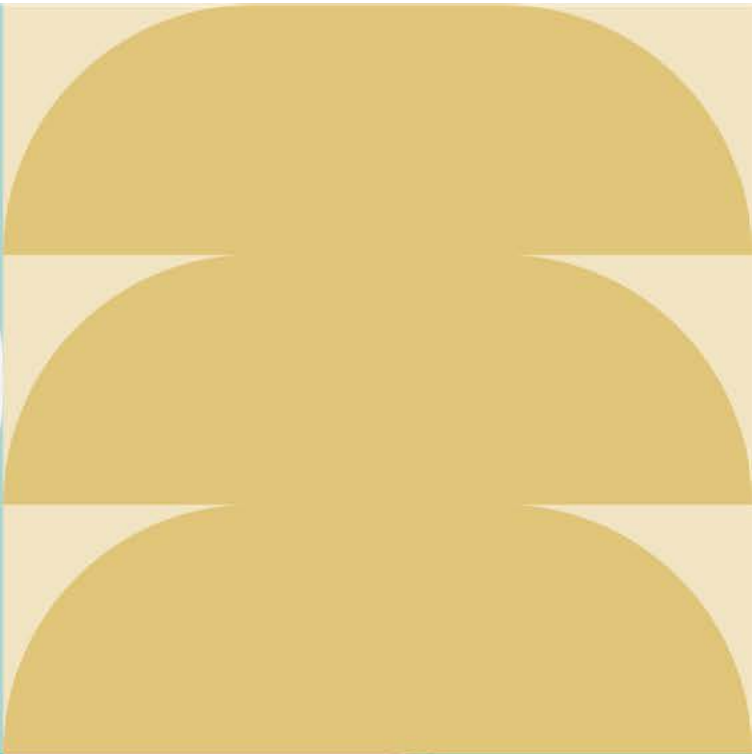
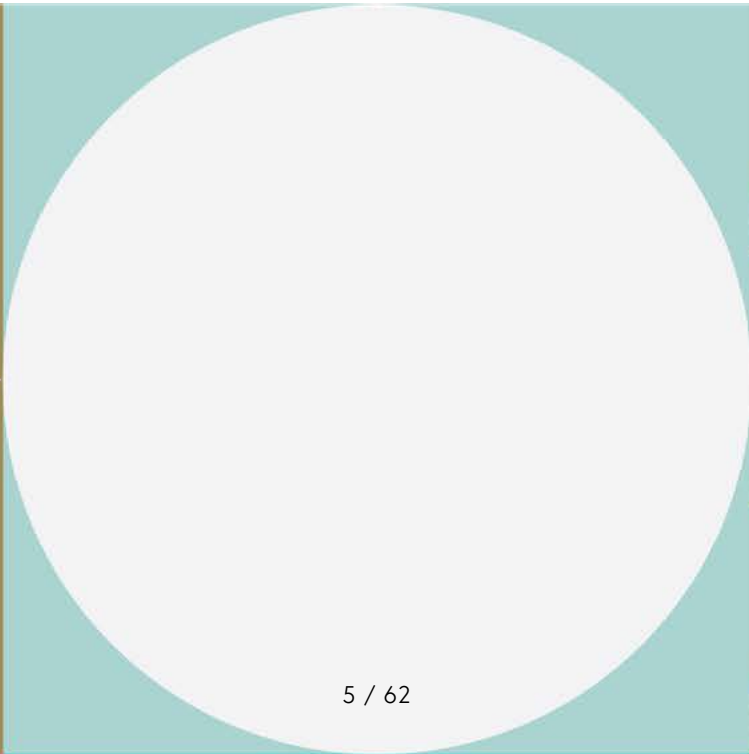
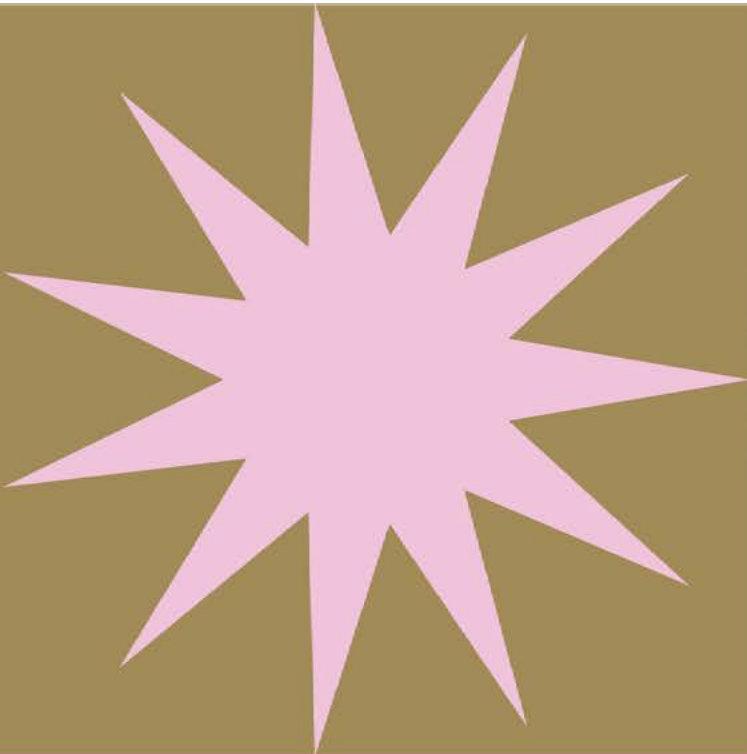
Executive Summary

Executive Summary			Upfront Embodied Carbon Modules A1 - A5 (excl. seq carbon)	Whole Life Embodied Carbon Modules A-C (excl. B6 & B7, incl. seq carbon)	Operational Energy Module B6
Targets	GLA Benchmark (Residential)		< 850 kgCO ₂ e/m ²	< 1200 kgCO ₂ e/m ²	N/A
	GLA Aspirational (Residential)		< 500 kgCO ₂ e/m ²	< 800 kgCO ₂ e/m ²	N/A
	RIBA 2030		N/A	< 625 kgCO ₂ e/m ²	< 35 kWh/m ² /yr
	UKNZCBS 2028 (Block A: Commercial Residential)		< 495 kgCO ₂ e/m ²	N/A	< 70 kWh/m ² /yr
	UKNZCBS 2028 (Block B: Home - Flats)		< 450 kgCO ₂ e/m ²	N/A	< 49 kWh/m ² /yr
Stage 2 Results	Block A	Total	12,290 tCO ₂ e	21,289 tCO ₂ e	N/A
		Per m ² GIA	588 kgCO ₂ e/m ²	1,018 kgCO ₂ e/m ²	64 kWh/m ² /yr
	Block B	Total	5,698 tCO ₂ e	9,675 tCO ₂ e	N/A
		Per m ² GIA	583 kgCO ₂ e/m ²	991 kgCO ₂ e/m ²	34.63 kWh/m ² /yr
	Combined	Total	17,993 tCO ₂ e	30,960 tCO ₂ e	N/A
		Per m ² GIA	587 kgCO ₂ e/m ²	1,009 kgCO ₂ e/m ²	54.38 kWh/m ² /yr
	GLA Benchmark Achieved		Achieved	Achieved	N/A

Table 1: Summary of Building A & Building B performance at Stage 2

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01

Introduction



01.1 Introduction

Project Introduction

Introduction

This Whole Life Carbon Assessment has been prepared by Carbon.Climate.Certified on behalf of Re:shape T Ltd ("the Applicant") in support of an application for planning permission and submitted to Haringey Council.

The application seeks planning permission for "Full planning permission for a phased mixed-use development comprising: (i) enabling works and operations; (ii) residential development (Use Class C3) including affordable housing; (iii) shared living accommodation (Sui Generis), (iv) commercial and community floorspace (Use Classes E and F2); and (v) site-wide and/or phase-specific access, servicing, public realm, blue-badge parking, cycle parking, open space, hard and soft landscaping, utilities, plant and all other associated works."

The Proposed Development is located at Ashley House, Ashley Road in Tottenham within the London Borough of Haringey. The Site is rectangular in shape bordering Ashley Road on the east, Hale Road to the south and Down Lane park to the west/north west. The existing site has no existing buildings.

The Site is less than 200m to the north west of Tottenham Hale underground station on the Victoria Line, providing connections to Highbury & Islington, Kings Cross, Oxford Circus and Victoria, as well as direct trains to Stansted airport. As such, the Site benefits from a Public Transport Accessibility Level (PTAL) of 5, where on a scale of 1 – 6b, 6b is the highest rating. The immediate surroundings also consist of The Sessile (a 12 storey residential building) to the north of the site and terraced houses next to West apartments (15 storeys) located to the south of the site. Beyond this, Tottenham Hale Retail park is located approximately 320m south and Walthamstow Wetlands approximately 965m west of the site.



→ **Figure 1:** Project image, DLA Architecture



01.2 Introduction

Planning Policy Position

Planning Policy Position

The statutory development plan for the London Borough of Haringey, and in turn the proposed development, consists of:

- The London Plan (2021)
- The Haringey Local Plan 2017

The London Plan (2021) Policy SI 2 requires major developments to calculate and reduce whole life-cycle carbon emissions, following the RICS Whole Life Carbon Assessment (WLCA) methodology. This requirement reflects the recognition that embodied carbon - the carbon associated with materials, construction, maintenance, and end of life - can represent a significant proportion of a building's total carbon impact, particularly as operational emissions reduce through grid decarbonisation.

The London Borough of Haringey's Local Plan (2017) forms part of the statutory development plan for the borough. Policy SP4 requires new development to minimise carbon emissions in support of the borough's net zero carbon commitment, while Policy SP11 requires development to adopt sustainable design and construction techniques to reduce impacts on climate change. These policies provide the local policy basis for addressing whole life carbon, read alongside the requirements of the London Plan.

This Whole Life Carbon Assessment has been prepared in accordance with the RICS Whole Life Carbon Assessment for the Built Environment (1st Edition, 2017) as required by LPG guidance, and addresses all relevant policy requirements. Where possible, measures to reduce whole life carbon have been investigated and integrated within the design response. Where full alignment with policy targets is considered unfeasible, the relevant measures and the reasons for this have been clearly explained.

→

Figure 2: Project image, DLA Architecture



01.3 Introduction

Project Targets

Project Targets

To establish a clear carbon reduction trajectory for the proposed residential development and in line with Re:shape's ESG framework, GLA Aspirational and the RIBA 2030 have been identified as the most appropriate reference frameworks for this scheme.

Project Targets

The scheme aims to achieve the GLA aspirational target for upfront embodied carbon for residential developments, as set out in the GLA Whole Life Carbon Assessment Guidance (2022). The project team will reference this benchmark to inform material selection, structural design, and construction strategies, with the objective of minimising upfront embodied carbon emissions associated with life cycle stages A1–A5. This target is applicable for both blocks A & B.

In parallel, the RIBA 2030 Climate Challenge (2021) establishes whole life carbon intensity targets for new residential developments, providing a recognised benchmark for reducing both embodied and operational emissions. The project will reference the RIBA 2030 whole life carbon targets to inform material selection, structural design, and operational energy strategies, with the aim of minimising upfront embodied carbon (A1–A5) and in-use emissions (B1–B7) through coordinated design optimisation. This target is applicable for both blocks A & B.

The GLA whole life carbon benchmarks will also be referenced as an additional industry comparator to contextualise the project's overall performance against regional best practice targets.

GREATER LONDON AUTHORITY

Greater London Authority

The GLA Whole Life Carbon Benchmarks provide a robust framework for assessing and reducing carbon emissions across the full lifecycle of buildings in London. Developed to support the Greater London Authority's net zero ambitions, the benchmarks set clear performance targets for both operational and embodied carbon, ensuring that project teams consider emissions from construction through to end-of-life.

By embedding these benchmarks into planning and design processes, stakeholders can deliver buildings that align with climate commitments, improve accountability, and drive the transition toward a more sustainable and resilient built environment.

'ASPIRATIONAL' TARGET

- Upfront Embodied Carbon <500 kgCO₂e/m²

RIBA 2030 Climate Challenge

RIBA 2030 Climate Challenge

The RIBA has developed voluntary performance targets for operational energy use, water use and embodied carbon.

Originally launched in October 2019, the RIBA 2030 Climate Challenge has now been re-issued as Version 2 (2021) with refined and updated targets that encompass development in the knowledge base of performance trajectories – particularly in the embodied carbon field.

The embodied carbon targets in Version 2 are now aligned with LETI and others.

2030 TARGET

- Whole Life Embodied Carbon <625 kgCO₂e/m²



01.4 Introduction

Project Targets

Project Targets

While the embodied carbon limits established within the UKNZCBS have not been adopted as the primary project targets for this development, the project team is seeking to verify the scheme against the Standard and, as such, the relevant embodied carbon benchmarks have been included within this assessment for reference and comparative purposes. These benchmarks provide an additional industry-recognised framework for assessing the project's embodied carbon performance against emerging best practice for residential-led development.

Furthermore, the UKNZCBS embodied carbon limits broadly align with the Greater London Authority (GLA) aspirational whole life carbon targets, providing consistency between the project's strategic carbon objectives and wider regional planning guidance.

The scheme aims to achieve an operational energy performance in line with the 2028 Energy Use Intensity (EUI) targets and upfront embodied carbon performance in line with 2028 module A1-A5 targets, both established by the UK Net Zero Carbon Buildings Standard (2024).

Block A: The project will reference the Commercial Residential Embodied Carbon and EUI targets for the operational energy performance.

Block B: The project will reference the Homes (Flats) Embodied Carbon and EUI targets for the operational energy performance.

These targets have informed the building fabric, servicing strategy, and operational energy design, with the objective of minimising regulated and unregulated energy demand through coordinated design optimisation.



UK Net Zero Carbon Buildings Standard

The UK Net Zero Carbon Building Standard (UKNZCBS) provides a comprehensive framework to define and achieve net zero carbon in the built environment. Developed through industry collaboration, it addresses both operational and embodied carbon, offering clear metrics, benchmarks, and methodologies to guide project teams in reducing emissions.

By embedding these targets into every stage of a building project, stakeholders can ensure meaningful progress toward net zero carbon, contributing to the UK's broader climate goals while driving innovation and accountability in the industry.

2028 EMBODIED CARBON LIMITS

- Block A: Embodied Carbon Limit for Commercial Residential <495 kgCO₂e/m²
- Block B: Embodied Carbon Limit for Homes (Flats) <450 kgCO₂e/m²

2028 OPERATIONAL ENERGY LIMITS

- Block A: Operational Energy Use Intensity for Commercial Residential <70 kWh/m²/year
- Block B: Operational Energy Use Intensity for Homes (Flats) <49 kWh/m²/year

02

Whole Life Carbon Assessment



02.1 Whole Life Carbon Assessment

Aim & Purpose

Aim & Purpose

WLC assessments provide a true picture of the impact that the associated carbon emissions of a product, service or process have on the environment over their entire life cycle. The included emissions capture a building's operational carbon emissions from both regulated and unregulated energy use, in addition to its embodied carbon emissions. Embodied emissions are considered to be those corresponding to the 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. In addition, a WLC assessment further includes a review of the potential carbon emissions 'benefits' from the reuse or recycling of components after the end of a building's useful life.

The aim of the WLCA:

The fundamental objective of a whole life carbon measurement is the mitigation of carbon impact in the built environment. Better understanding and consistent measurement of the whole life carbon emissions of built projects will in turn enable comparability of results, benchmarking and target setting to achieve carbon reductions. A further aim is to reduce the burden on the environment from construction products by recognising and encouraging measures to optimise construction product consumption efficiency and the selection of products with a low environmental impact (including embodied carbon), over the life cycle of the building.

The purpose of the WLCA:

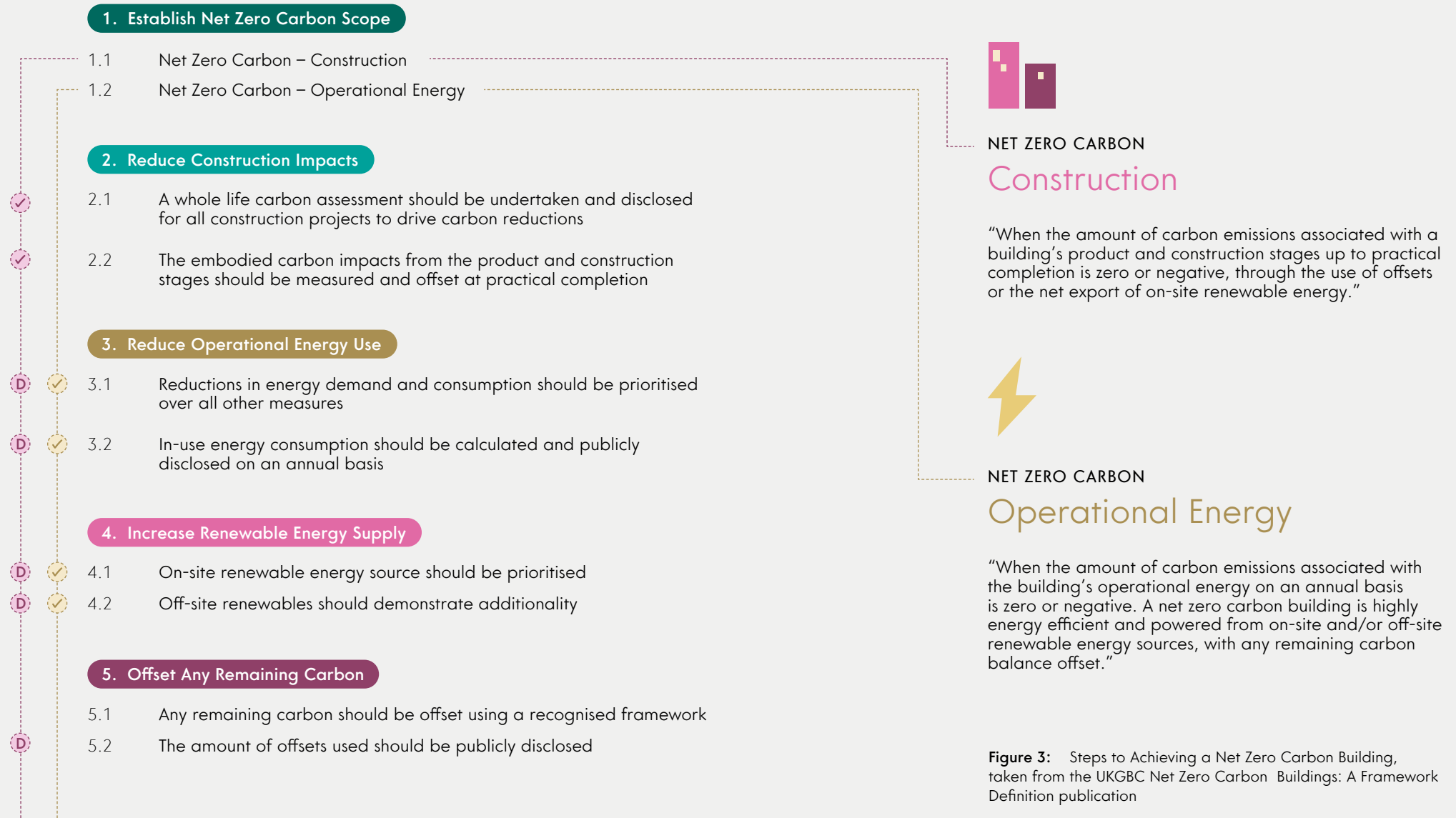
This process is intended to standardise whole life carbon assessments in line with the methodology in EN 15978 to achieve coherent and comparable results that can be used to benchmark the whole life carbon performance of the current design against possible design options and to other built assets. Even at an early stage it is still beneficial to gauge coherence in the calculations where more detailed project-specific information might not yet be available as appropriately timed and sequenced carbon assessments help identify carbon reduction opportunities as well as monitor the project's progress in achieving wider sustainability and climate change related goals.

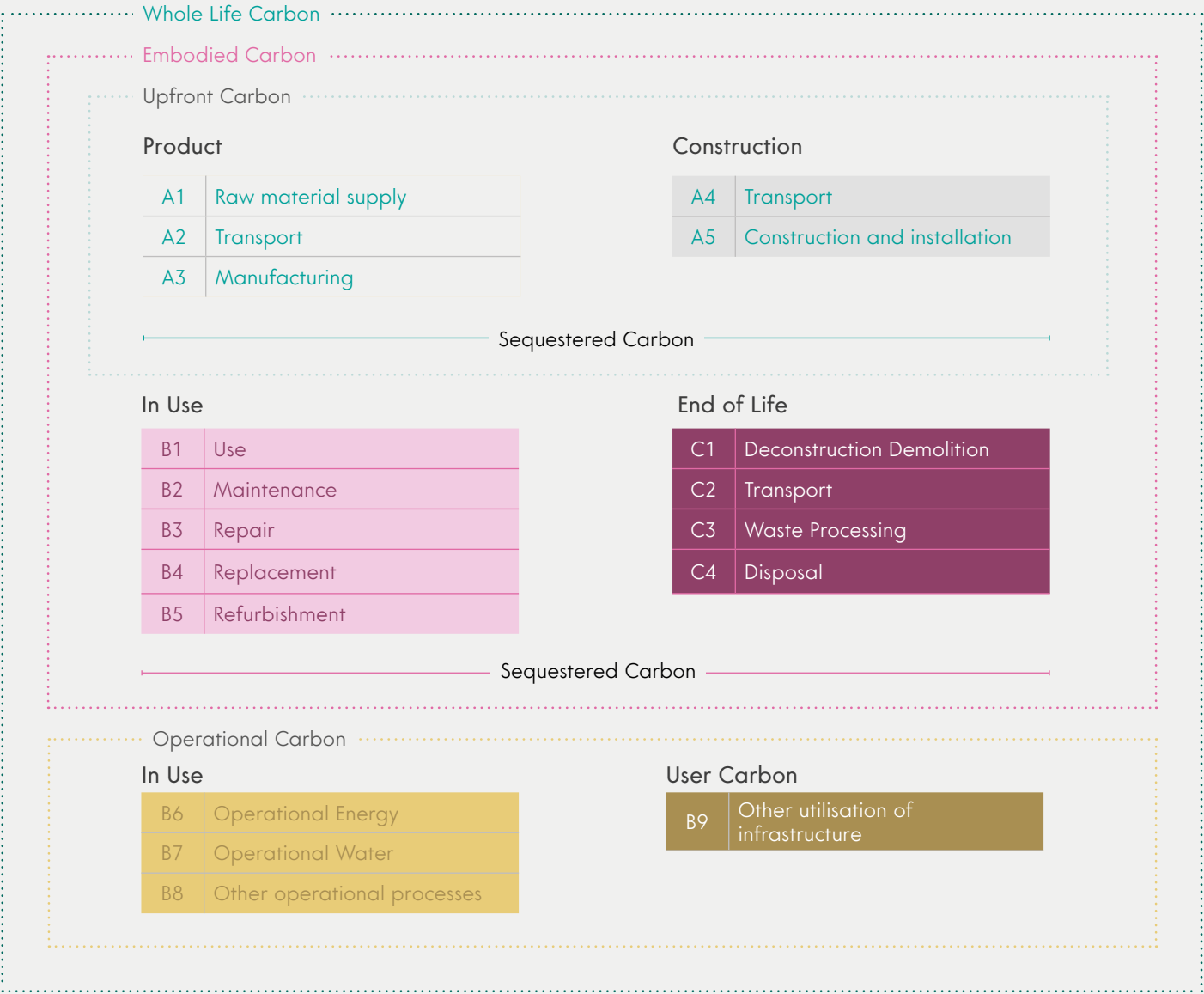
Undertaking a WLC assessment is a requirement of the UKGBC Net Zero Carbon Framework as follows:

- A whole life carbon assessment should be undertaken to determine the building's carbon impact, in line with the RICS Professional Statement 'Whole life carbon assessment for the built environment'
- A building's product and construction stages are defined as modules A1 to A5 of EN15978 ('embodied carbon to practical completion' as per Section 1 of the RICS Professional Statement)
- The whole life carbon assessment and the related offsetting of carbon (either through net export of on-site renewable energy or the purchase of offsets) should be audited by a third-party

The figure on the following page outlines which principles should be followed (according to the UKGBC NZC framework) to demonstrate alignment with net zero carbon for construction and for operational energy.

Full details of the methodology used to undertake the WLC Assessment are provided in Appendix A.





Circular Economy

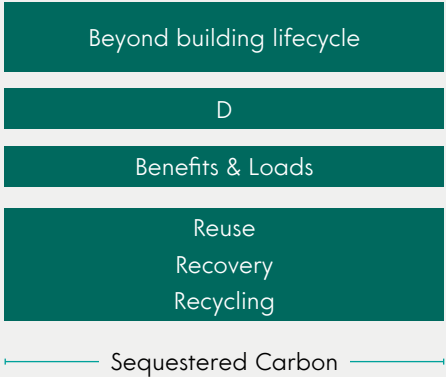


Figure 4: Modular information for the assessment as per EN 15978 including typical system boundaries

02.2 Whole Life Carbon Assessment

Data Sources & Input

Data Sources & Input

Embodied Carbon & End-of-life Assessment

The project information (including Gross Internal Area, material quantities and specifications) used to inform this assessment has been taken from the following sources;

260804 Ashley Park Cost Estimate R4 - Design Freeze Certified

(561)2604-JC-SD-Ashley_Park_CD_R02

Provided by KS4 & Whitby Wood

Operational Energy

The building's operational carbon emissions have been predicted using SAP, HES & SBEM calculations detailed in the following documents;

261109 Ashley House Energy Assessment Report

Provided by Meinhardt

Statement of the Scope & Boundaries

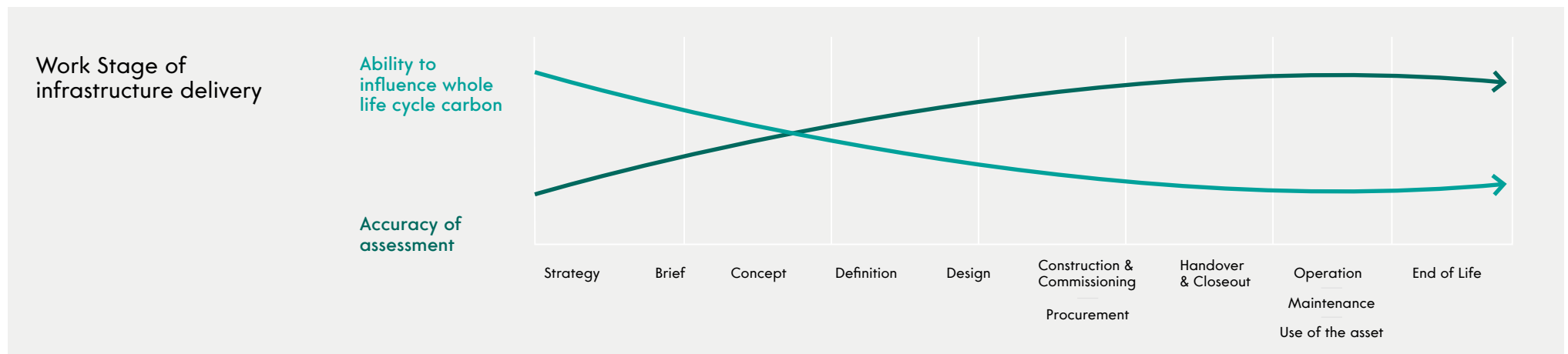
Due to the stage of the project, not all information was available during the analysis programme. In most cases assumptions could be made however, in some instances, elements had to be excluded from the assessment. Nevertheless, this WLCA complies with the minimum requirements of the RICS methodology.

As the scheme progresses throughout the workstages, the ability to more accurately model the whole life carbon emissions will increase, as shown below.

Details of data sources and assumptions made within the model are provided in Tables 18-23, set out in accordance with the RICS guidance.

A full breakdown of data sources from the OneClick software is provided within Appendix C & D. Table 24 displays the building elements coverage of the project and in accordance with the RICS guidance, highlighting any building element category where the percentage coverage is less than the recommended threshold. Any occurrences of this will be indicated alongside the corresponding carbon calculation results.

Figure 5: Accuracy and ability to influence WLCA



03

Carbon Reductions

03.1 Carbon Reductions

Implemented Reduction Measures

Implemented Reduction Measures

Omission of basement

One decision that was central to the scheme's reduction of carbon was the decision to omit basements from both block A (Shared living) and block B (Affordable). The associated foundation and sub-structure works (including basement slabs, secant piling, reinforcement, insulation and waterproofing) represented one of the most carbon-intensive elements of the scheme, driven primarily by the secant piling required to retain the excavation. Omitting the basements avoids an estimated 2,025 tCO₂e in total (1,030 tCO₂e for Block A, 995 tCO₂e for Block B).

Limiting transfer slabs to local areas

A further consideration has been made to ensure that there are limited transfer slabs to localised areas. As transfer slabs use substantially more concrete and steel reinforcement to allow for a change in the structural grid, they create an increase in carbon. The scheme has been designed with a consistent structural grid carried through from foundation to roof wherever possible, avoiding the need for transfer structures except where unavoidable, such as at ground floor level to accommodate commercial units and amenity spaces below the residential grid above. By limiting transfers to these localised areas rather than across full floor plates, this represents a carbon saving.

Omission of suspended ceilings

When considering finishes for the shared living block, a decision was made to omit suspended ceilings in the amenity spaces. Suspended ceilings require additional materials, typically a supporting grid system and ceiling tiles, on top of the exposed soffit finish, adding embodied carbon without a corresponding structural or acoustic necessity in these spaces. Over the amenity floor area of approximately 1,387 m², omitting suspended ceilings avoids an estimated 25 tonnes of CO₂e, equivalent to a carbon saving of approximately 18 kgCO₂e/m².



Figure 6: Ground Floor plan of building A & B (provided by DLA Architects) which include basement areas that carbon calculation for a basement has been based on.

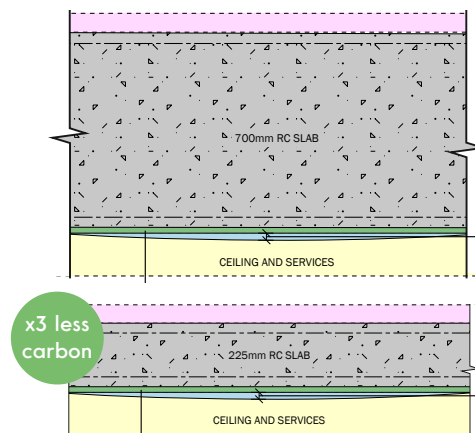


Figure 7: (Top) Image of transfer slab detail (provided by Whitby Wood) vs (bottom) image of typical slab.



Figure 8: Ground Floor plan of building A (provided by DLA Architects) which highlights amenity areas omitting a suspended ceiling finish.

03.2 Carbon Reductions Opportunities

Superstructure studies

Superstructure studies

R.C Flat Slab

A reinforced concrete flat slab is a traditional flat-soffit slab system with no beams, spanning directly between columns at up to 6.5m, here modelled at 225mm deep with an embodied carbon of 153 kgCO₂e/m².

Advantages: excellent flexibility for partition and services layouts due to the flat soffit, strong inherent fire resistance and acoustic performance, straightforward buildability using a simple and widely-used construction method and competitive tender pricing given how common the system is.

Disadvantages: highest embodied carbon of the concrete options studied, along with heavier construction that increases loading on the foundations.

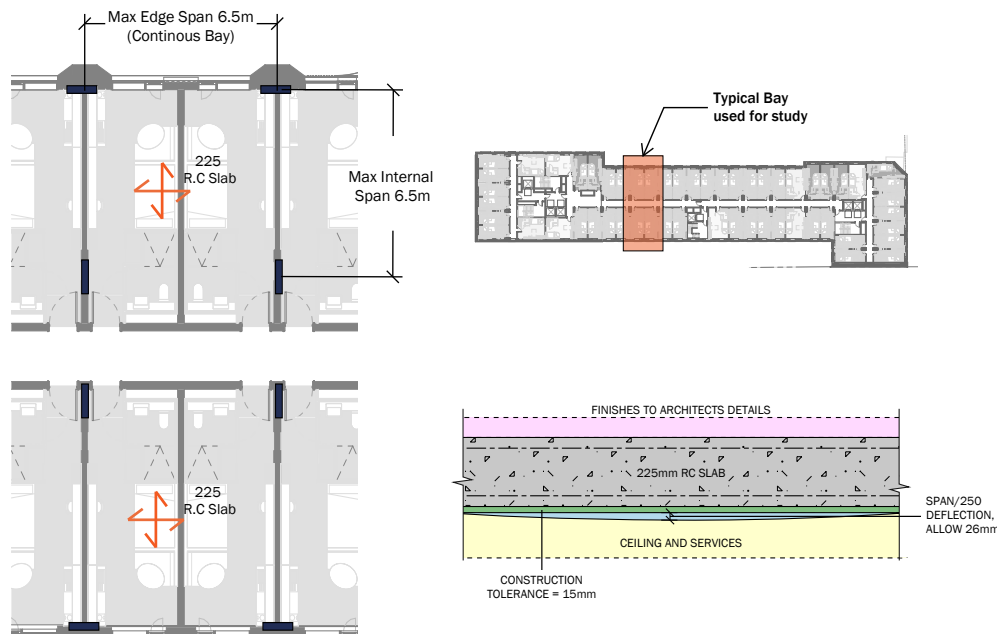


Figure 9: Information, plans and sections provided by Whitby Wood.

Post Tensioned Slab

A post-tensioned slab uses tensioned steel tendons within a 200mm reinforced concrete slab to reduce depth and self-weight while spanning the same 6.5m grid, achieving a lower embodied carbon of 142 kgCO₂e/m².

Advantages: thinner structural zone that can reduce floor-to-floor heights, reduced embodied carbon compared to a flat slab due to lower concrete volume, good fire resistance and acoustic properties, and lower foundation loads as a result of the reduced slab depth.

Disadvantages: the need for specialist frame contractors and machinery to jack and coordinate the tendons, which adds cost and construction complexity compared to conventional reinforced concrete.

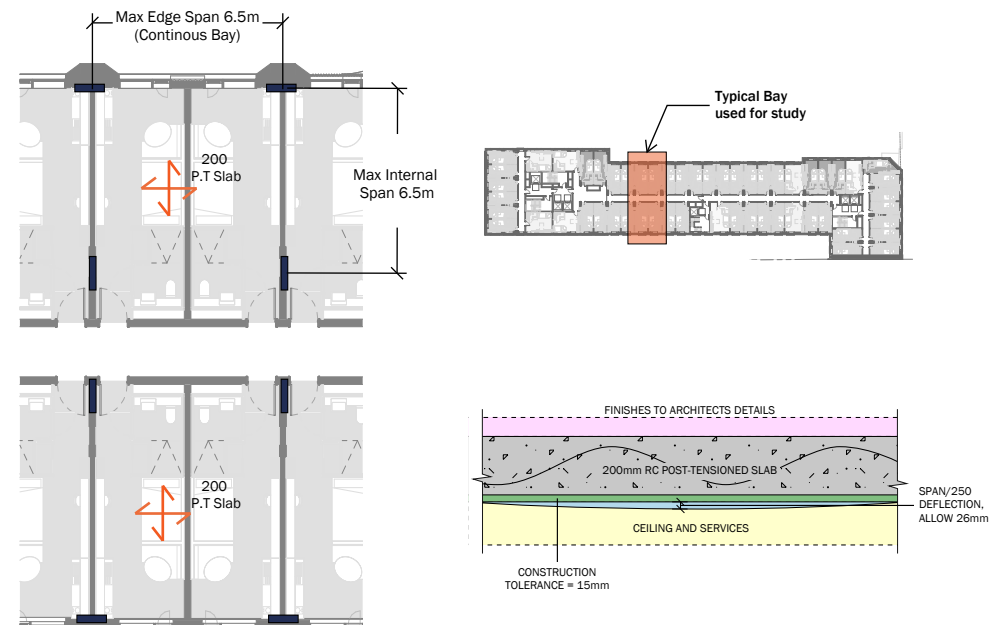


Figure 10: Information, plans and sections provided by Whitby Wood.

03.3 Carbon Reductions Opportunities

Superstructure studies

Superstructure studies

One way ribbed slab

A one way ribbed slab consists of 250mm deep ribs at 750mm centres with a 120mm structural topping, spanning onto 600x300mm RC beams, giving an embodied carbon of 131 kgCO₂e/m².

Advantages: reduced embodied carbon relative to a flat slab through lower concrete volume, and good inherent fire and acoustic performance.

Disadvantages: a more complex, stepped soffit that complicates buildability, the need for MEP services to be routed around the ribs, columns that must align to suit the beam layout, more traditional and labour-intensive formwork, and heavy construction loads on the foundations.

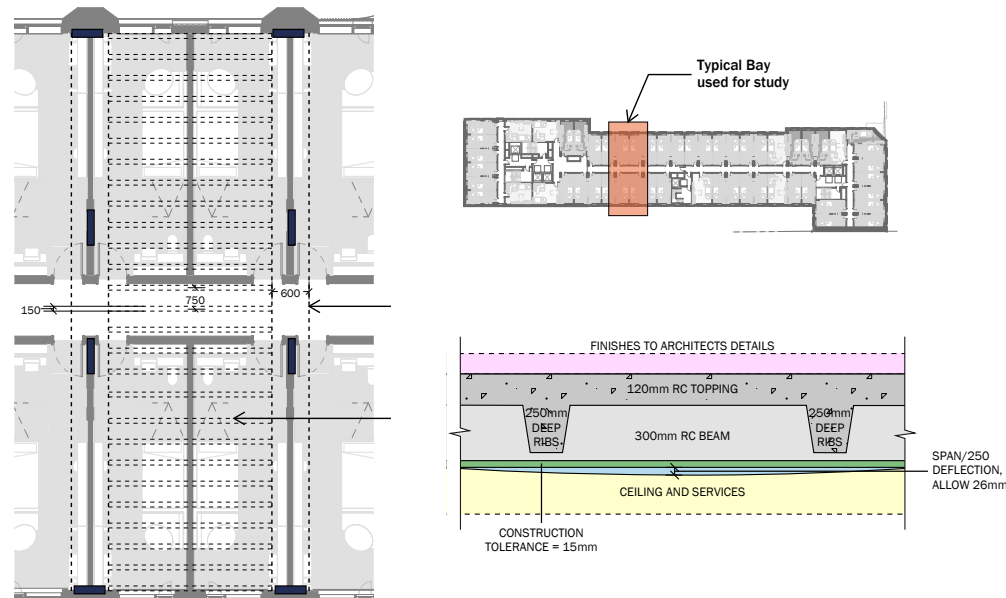


Figure 11: Information, plans and sections provided by Whitby Wood.

One Way slab with band beam

This system uses 150mm one-way spanning slabs bearing onto wide, shallow 2400x250mm band beams, resulting in an embodied carbon of 144 kgCO₂e/m².

Advantages: a soffit that is largely flat except at the band beam junctions, good fire resistance and acoustic properties, and a widely-used construction methodology that should attract competitive tender returns.

Disadvantages: embodied carbon comparable to a flat slab, services needing to be positioned to avoid the band beams, columns needing to align to suit the beam grid, and heavy construction loads on the foundations.

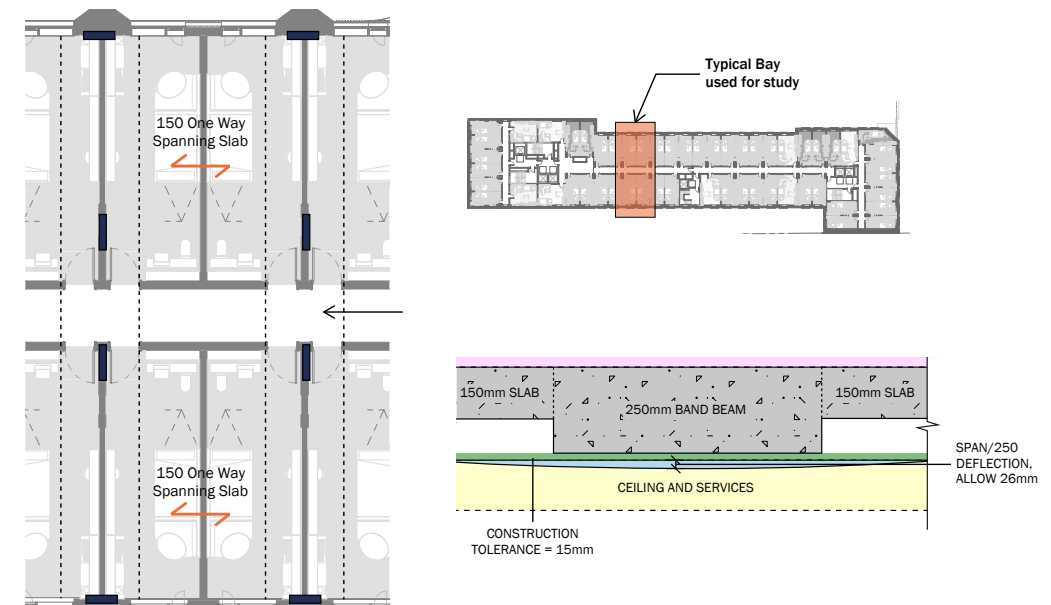


Figure 12: Information, plans and sections provided by Whitby Wood.

03.4 Carbon Reductions Opportunities

Superstructure studies

Superstructure studies

Lightweight Steel Gauge Frame

A lightweight gauge steel frame uses a 150mm LGSF deck on light steel studwork spanning up to 3.5m, achieving a significantly lower embodied carbon of 84 kgCO₂e/m².

Advantages: low embodied carbon from minimal concrete use, quick, single-subcontractor erection on site, and light construction that minimises loads on the foundations.

Disadvantages: restriction to a panelised wall system with limited flexibility for repositioning partitions, a requirement for all steel to be fire-rated with acoustically-treated decking, higher relative cost due to the specialist nature of the system, shorter 3.5m spans dictated by unit dimensions, and the need for a concrete transfer slab at Level 01 to convert down to the podium structure below.

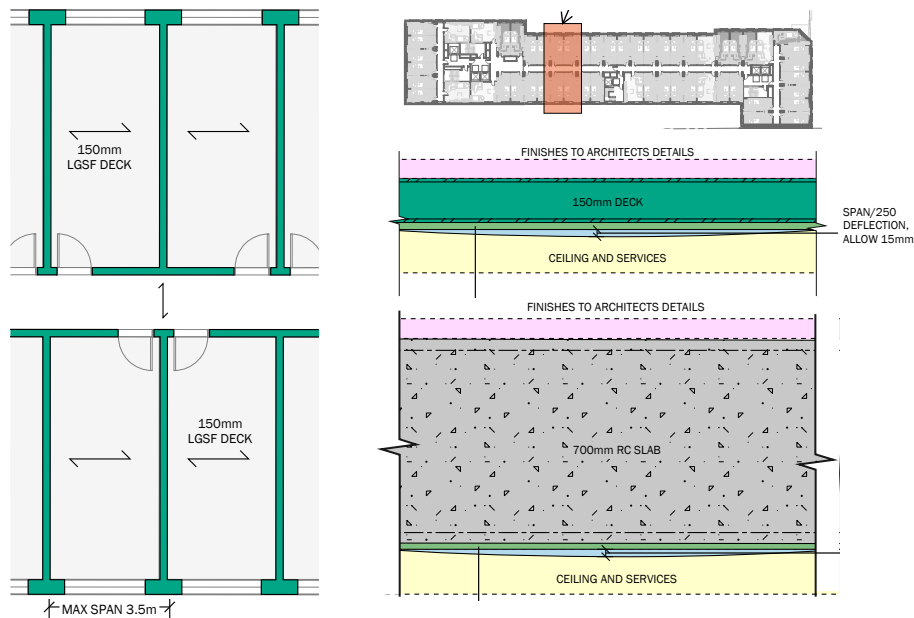


Figure 13: Information, plans and sections provided by Whitby Wood.

Modular Steel Frame

A modular steel frame uses prefabricated volumetric units with a 150mm module deck spanning up to 3.5m, offering the second lowest embodied carbon of the options studied at 89 kgCO₂e/m².

Advantages: low embodied carbon and reduced operational carbon on site, and very fast construction as units can arrive largely complete.

Disadvantages: suitability being limited to co-living units on a regular grid, a specialist system that can carry a cost premium compared to traditional methods, 3.5m spans dictated by unit dimensions, an allowance required for a double wall system at unit junctions, and, as with the LGSF option, the need for a concrete transfer slab at Level 01.

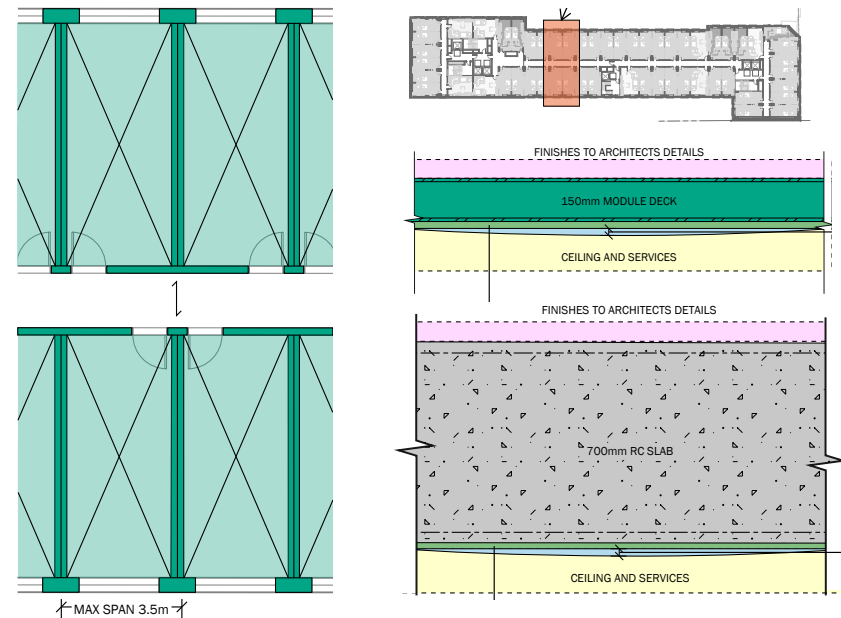


Figure 14: Information, plans and sections provided by Whitby Wood.



03.5 Carbon Reductions Opportunities
Insulation Optioneering

Insulation Optioneering

The external wall insulation specification at Ashley House presents an opportunity to assess the embodied carbon of different stone wool rainscreen insulation products. The insulation forms part of the external wall build up. Two options have been assessed using verified Environmental Product Declarations (EPDs) compliant with EN 15804+A2:2019, both published under the International EPD System (Environdec) and independently third-party verified. Both products are manufactured in Wales, UK and are specifically designed for use in ventilated rainscreen façade systems on buildings of any height.

Option 1 NyRock Rainscreen 032

Rockwool NyRock Rainscreen 032 (EPD-IES-0007330:002, Environdec). Stone wool insulation, dual-density construction which provides a firmer outer face for cladding fixing support and a softer inner layer that adapts to the substrate. Non-combustible Euroclass A1.

Option 2 Knauf Insulation Rocksilk RainScreen Slab

Knauf Insulation Rocksilk RainScreen Slab EE (EPD-IES-0009197:003, Environdec). Rock mineral wool with ECOSE Technology bio-based binder (which uses a plant-based binder with no added formaldehyde, derived from rapidly renewable plant starch), glass veil tissue facing, Non-combustible A2-s1,d0.



Implementation to be explored within next RIBA Stage.



Figure 15: Option 01, NyRock Rainscreen 032



Figure 16: Option 02, Knauf Insulation Rocksilk RainScreen Slab

	NyRock Rainscreen 032	Knauf Rocksilk RainScreen Slab EE
Density	100 kg/m ³	55 kg/m ³
Wool Type	Stone wool	Rock Mineral Wool
Origin	Bridgend, Wales, UK	Queensferry, Wales, UK
Mass per m ² at 150mm	15 kg/m ²	8.5 kg/m ²
Lambda	0.032 W/(m.K)	0.034 W/(m.K)
Fire Classification	Euroclass A1	A2-s1,d0
Lifecycle Stages included	A1-A3, C1-C4, D	A1-A3, A4-A5, C1-C4, D
Binder	Phenol-formaldehyde resin	ECOSE bio-based binder (no formaldehyde)
GWP-total A1-A3 (declared unit)	41.4 kgCO ₂ e/t	21.5 kgCO ₂ e/t
Mass over 100m ² at 150mm	1.5 tonnes	0.85 tonnes
Total upfront carbon over 100m ² at 150mm (A1-A3)	62.1 kgCO ₂ e	18.3 kgCO ₂ e
Total carbon saved in building A		5.28 tCO ₂ e

Table 2: Summary of results from insulation optioneering comparison.

Key findings

Despite both products being rock mineral wool rainscreen slabs manufactured in Wales, their embodied carbon profiles differ significantly. The NyRock Rainscreen 032 registers approximately 0.62 kgCO₂e/m² at A1-A3 for 150mm, compared to approximately 0.18 kgCO₂e/m² for the Knauf Rocksilk. This results in a saving of approximately 0.44 kgCO₂e/m², or around 70% per m² of wall area. The carbon difference is primarily driven by density, as the NyRock product is significantly denser at 100 kg/m³ than the Knauf at 55 kg/m³. More mass per m² means more raw material extraction, more melting energy and more product per unit area. The NyRock's patented fibre structure achieves better thermal performance per unit thickness (0.032 vs 0.034 W/mK), which partially offsets the density difference, but the density effect dominates the carbon calculation. The Knauf ECOSE binder also contributes a small carbon benefit by replacing petrochemical phenol-formaldehyde resin with a bio-based alternative.



03.6 Carbon Reductions Opportunities

Re:shape Responsible Materials & Procurement Strategy

Re:shape Responsible Materials & Procurement Strategy

Coliving Units

As part of a wider Responsible Materials & Procurement Strategy, re:shape are working directly with manufacturers to develop internal wooden furniture, such as the seating, joinery and storage solutions, as seen in the images, which prioritises durability and easily replaceable components, avoiding the use of adhesives wherever possible. This design-for-disassembly approach is a core application of circular economy principles: individual components can be repaired or replaced without damaging or discarding the wider connecting pieces, keeping materials in active use for longer and displacing the need for new, carbon-intensive furniture over the building's lifetime. Avoiding adhesives where possible keeps materials uncontaminated at end of life, meaning timber can be cleanly separated, reused, or recycled back into the supply chain rather than treated as mixed waste destined for landfill or incineration. This directly reduces embodied carbon associated with raw material extraction and manufacture. For residents, this means furniture that can be adapted and repaired in parts, rather than large areas being replaced outright. For the overall lifecycle of the scheme, it lowers whole-life embodied carbon, reduces long-term maintenance and replacement costs, and closes the material loop in line with circular economy best practice.

→

Figure 17: Images produced by Holloway Li of indicative co-living unit layouts.

Wider Re:shape Strategy

Beyond FF&E, this strategy extends to the procurement of materials across the re:shape schemes more broadly. We are collecting carbon, air-emissions, and social value data on procured materials to establish a re:shape brand standard, enabling streamlined, consistent data collection on sustainability credentials across future projects and supply chain partners. Building this evidence base allows the project team to identify and prioritise lower-carbon, circular materials, including those with recycled content, take-back schemes or verified end-of-life recovery routes. This allows comparison between suppliers on a like-for-like basis. Over time, embedding this as a brand standard means every future re:shape project draws on a growing, verified dataset, driving continuous reduction in embodied carbon across the supply chain, accelerating the shift toward circular material flows project-wide, and creating a stronger, evidence-backed narrative for the environmental and social value the project delivers.



04

Results and Analysis - Block A

04.1 Results & Analysis - Block A (Shared Living)

Building Description

Building Area	
Proposed GIA	20,905 m ²
Element	Description
Major Demolition	N/A
Minor Demolition	N/A
Foundations	Concrete piles and pile caps (C32/40 with 50% GGBS) with associated steel reinforcement. RC slab with blinding, DPM and insulation with associated steel reinforcement.
Structural Frame	Concrete frame (C50/60 for columns and core walls) with associated reinforcement.
Upper Floors	RC C32/40 slabs (225mm thickness) with associated reinforcement.
Roof	RC slab C32/40 (300mm) with associated reinforcement and insulation. Roof coverings include green roof, blue roof and hot melt roofing systems.
Stairs & Ramps	RC Stairs and metal balustrade to stair cores.
External Walls	SFS system with 12mm calcium silicate board, vapour control layer, 100mm metal stud with rockwool insulation. Cladding includes traditional brickwork (various grey tones) and PPC aluminium perforated rainscreen cladding. Double glazed curtain wall system included on ground floor.
Windows & Doors	Windows: Double glazed aluminium frame external windows Internal doors: Timber doors External doors: Glazed PPC aluminium doors to ground floor amenity space.
Internal Walls	Metal stud partitions with plasterboard and insulation. Blockwork walls with dot and dab plasterboard lining.
Wall Finishes	Emulsion paint and ceramic tiling.
Floor Finishes	Carpet, Vinyl flooring, ceramic tiles, engineered timber flooring, timber skirting, dust sealant, latex levelling compound and screed flooring.
Ceiling Finishes	Gypsum board, suspended ceiling system and emulsion paint.
Building Services	Bathroom pods, lifts, electricity distribution system, fresh water distribution system, waste water drainage system, ventilation system, PV modules and heat distribution system.
External Works	Permeable paving and concrete kerbstone in addition to bike stands, integrated benches and play equipment.

Table 3: Description of proposal Block A



04.2 Results & Analysis - Block A (Shared Living)
Embodied Carbon

Embodied Carbon

The following chapter presents the results of the WLC Assessment. In addition, it later highlights the materials that significantly contribute to the embodied carbon totals. The results of this WLCA can be used to inform material choices on future projects with the intention of reducing the environmental impact of future schemes.

The performance against the project targets for whole life and upfront embodied carbon are demonstrated in figures 18 & 19. At present, the project is currently achieving the GLA Benchmark for both upfront embodied carbon and whole life embodied carbon.

Contingency Factors

A contingency factor is applied to the WLC model at every assessment stage, and applies to modules A, B, C and D. It reflects uncertainty regarding the design of the asset, its construction and the quantities and types of materials used. If detailed uncertainty information unknown, default values are applied. Uncertainty generally reduces as the project phases proceed and more is known and finalised. In the case of this project, the default value of 15% has been applied for this assessment at Concept Design Stage.

We reinforce that WLCA is an iterative process. The team are currently reviewing and refining the design. These design developments are expected to further reduce the associated embodied carbon, impacts will be captured within the next iteration of the assessment, expected to be completed during RIBA workstage 3.

Workstage	Concept Design	Technical Design	Post Completion
Contingency Factor	15%	6%	0%

Table 4: RICS contingency factors for WLC assessments

Upfront Embodied Carbon A1-A5 (excl. sequestration)

Total Upfront Embodied Carbon: 12,290 tCO₂e



Figure 18: Performance against project target for upfront embodied carbon

Whole Life Embodied Carbon A1-B5, C1-4

Total Whole Life Embodied Carbon: 21,289 tCO₂e



Figure 19: Performance against project target for whole life embodied carbon

04.3 Results & Analysis - Block A (Shared Living)

Key Findings

Key Findings

The substructure, frame and upper floors are the largest contributors to upfront embodied carbon (A1-A5), accounting for 20%, 22% and 21% respectively. This is closely followed by the building services, which contributes a further 14%. This reflects the material intensity associated with delivering the services to the building.

When in use and end of life stages are considered, the embodied carbon associated with finishes increases significantly, rising from 5% to 12%, as does the carbon associated with the building services, rising from 14% to 24%. This increase is primarily driven by the shorter service lives of these elements, resulting in more frequent maintenance and replacement over the building lifecycle.

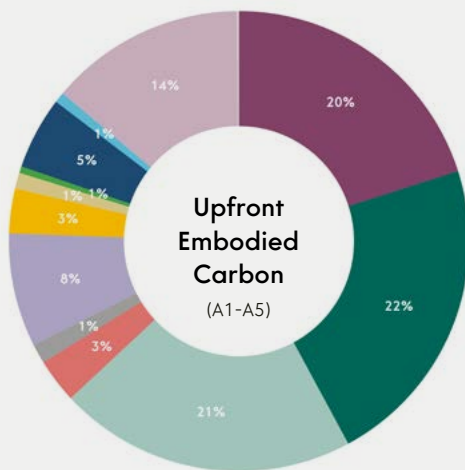


Figure 20: Upfront embodied carbon breakdown by Building Element Group

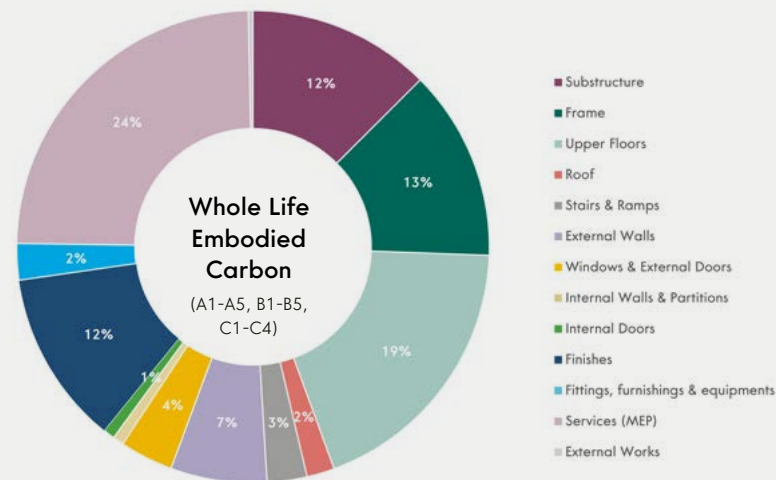


Figure 21: Embodied carbon breakdown by Building Element Group

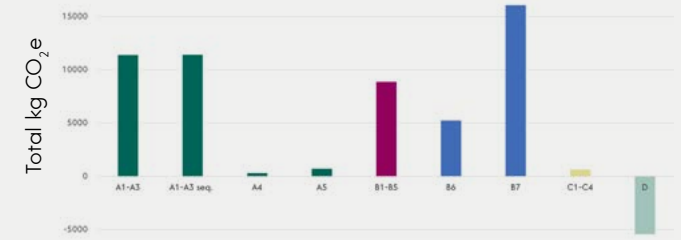


Figure 22: Total kgCO₂e Life Cycle Stages, using SAP 10.1 carbon factors



04.4 Results & Analysis - Block A (Shared Living)
Embodied Carbon Breakdown

Embodied Carbon Breakdown

Table 5 presents a breakdown of upfront embodied carbon (A1–A5) by building element using the results generated within OneClick LCA. Each element is reported with its total embodied carbon in kgCO₂e, the intensity by kgCO₂e/m² GIA, and its percentage contribution to the total upfront carbon emissions. This breakdown highlights the relative carbon impact of each element, identifying key material hotspots and priority areas for design optimisation and carbon reduction.

Building Element	A1 - A5 Total kgCO ₂ e	A1-A5 kgCO ₂ e/m ²	Percentage %
Substructure	2447271	117	19.7
Frame	2687587	129	21.7
Upper Floors	2552857	122	20.6
Roof	379228	18	3.1
Stairs & Ramp	166837	8	1.3
External Walls	975724	47	7.9
Windows & External Doors	354533	17	2.9
Internal Walls & Partitions	136394	7	1.1
Internal Doors	56257	3	0.5
Finishes	620961	30	5.0
Fittings, Furnishing & Equipments	88621	4	0.7
Services (MEP)	1676408	80	13.5
External Works	19477	1	0.2
Construction Site Impacts	236436	11	1.9
Total	12,290,591 kgCO ₂ e	588 kgCO ₂ e/m ²	100 %

→ Table 5: Summary of building element impacts

04.5 Results & Analysis - Block A (Shared Living)

Reduction Opportunities

Embodied Carbon Reduction Opportunities

It is important that the environmental impact for the embodied carbon of the project is reduced in order to meet the upfront embodied carbon targets. The measures listed within this section have been provided for the team's consideration with a view to further reducing the embodied carbon emissions.

It should be noted that these carbon reduction material suggestions have been considered in reference to carbon embodiment only, and other influencing factors must be taken into account and assessed by suitably qualified team members before adoption in the design.

Table 6 provides a list of the 'most contributing materials' identified within the embodied carbon study. This will allow the design team to consider where the greatest impact can be made, with regards to material specification.

The table accounts for 81.1% of the total cradle to gate embodied carbon emissions. Whilst the ability to reduce this substantially is always limited (no products are carbon free when not considering sequestration) the elements with the most significant cradle to gate impacts are the obvious starting point in terms of seeking further reductions.

→

Table 6: Most contributing elements towards total cradle to gate emissions

Element	Product	Cradle to gate impacts TCO ₂ e	Of cradle to gate (A1-A3)	Global warming potential (A1-A3) before local compensation
Structure	Ready-mix concrete, C40/50, 25% GGBS content, CEM II/B-S portland-slag cement	1,621	14.2%	452 kg CO ₂ e / m ³
Structure	Ready-mix concrete, C32/40, 50% GGBS content, CEM III/A blast furnace cement	1,470	12.9%	332 kg CO ₂ e / m ³
Structure	Ready-mix concrete, C50/60, 25% GGBS in cement, CEM II/B-S portland-slag cement	1,408	12.3%	610 kg CO ₂ e / m ³
Structure	Ready-mix concrete, C32/40 25% GGBS in cement, CEM II/B-S cement	1,009	8.9%	432 kg CO ₂ e / m ³
Structure	Reinforcement steel (rebar), 97% recycled content, A615	922	8.1%	0.62 kg CO ₂ e / kg
Services	Composite bathroom system (water closet, washbasin, shower)	472	4.1%	904 kg CO ₂ e / unit
Internal Finishes	Suspended metal ceiling system	420	3.7%	22.4 kg CO ₂ e / m ²
Structure	Steel purlins & frame	381	3.3%	2.76 kg CO ₂ e / kg
Services	Electricity distribution system	316	2.8%	15.1 kg CO ₂ e / m ²
Facade	Clay brick	277	2.4%	0.21 kg CO ₂ e / kg
Facade	Steel brackets for facade cladding	252	2.2%	6.57 kg CO ₂ e / kg
Facade	XPS Insulation Boards	251	2.2%	129.21 kg CO ₂ e / m ³
Window	Aluminium framed tilt and turn operable window, double glazed	246	2.2%	117 kg CO ₂ e / m ²
Services	Elevator	200	1.8%	40100 kg CO ₂ e / unit



04.6 Results & Analysis - Block A (Shared Living)
Operational Energy & Carbon

Operational Energy & Carbon

Results and target comparisons

A net zero carbon building for operational energy is required to annually disclose in-use energy performance. A verified net zero carbon building is one that is based on in-use, rather than modelled, energy performance. Nevertheless it is important to consider that the likely operational performance of the building through modelling.

The annual predicted regulated and unregulated operational carbon emissions for both the domestic and non-domestic areas have been calculated using the predicted energy consumption figures provided by Meinhardt. The carbon associated with the energy use has been calculated within OneClick LCA using the SAP 10.1 & 10.2 profiles as per the RICS v1 guidance.

The development is currently achieving the UK Net Zero Carbon Buildings Standard (UKNZCBS) 2027 target for operational energy use. As shared living developments are not currently assigned a standalone typology within the UKNZCBS, the commercial residential student residential benchmark has been adopted as the closest appropriate comparator due to the building's communal amenity spaces and shared facilities.

The predicted Energy Use Intensity (EUI) has been assessed against the applicable UKNZCBS commercial residential student residential target of 70 kWh/m²/yr, with the current design assessed at 6kWh/m²/year lower than this benchmark.

Operational Energy B6

Total Operational Carbon: 21,291 TCO₂e

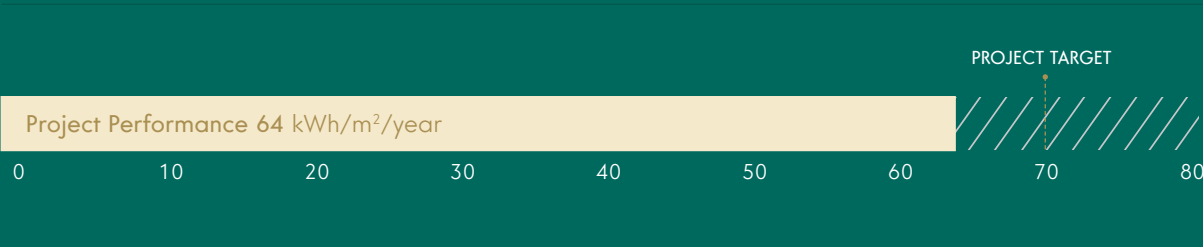


Figure 23: Performance against project target for energy use intensity

Operational Energy		Annual Energy Consumption (kWh/m ² /yr)	Annual Operational Carbon Emissions (kgCO ₂ e/m ² /yr)	Source
LSPBSA	Regulated	15.7	4.23	CIBSE TM54
	Unregulated	48.3	13.04	CIBSE TM54
On Site Renewables	55.5m ²			Cost Plan

Table 7: Operational carbon emissions

05

Results and Analysis - Block B

05.1 Results & Analysis - Block B (Affordable)

Building Description

Building Area	
Proposed GIA	9,758 m ²
Element	Description
Major Demolition	N/A
Minor Demolition	N/A
Foundations	Concrete piles and pile caps (C32/40 with 50% GGBS) with associated steel reinforcement. RC slab with blinding, DPM and insulation with associated steel reinforcement.
Structural Frame	Concrete frame (C50/60 for columns and core walls) with associated reinforcement.
Upper Floors	RC C32/40 upper floor slabs (225mm thickness) with associated reinforcement.
Roof	RC slab C32/40 (300mm) with associated reinforcement and insulation. Roof coverings include green roof, blue roof and hot melt roofing systems.
Stairs & Ramps	RC Stairs and metal balustrade to stair cores.
External Walls	SFS system with 12mm calcium silicate board, vapour control layer, 100mm metal stud with rockwool insulation. Cladding includes traditional brickwork (grey and white tone) and PPC aluminium rainscreen cladding (light grey).
Windows & Doors	Windows: Double glazed aluminium frame external windows Internal doors: Timber doors External doors: Glazed PPC aluminium doors to ground floor amenity space. Glazed PPC aluminium swing doors to balconies
Internal Walls	Metal stud partitions with plasterboard and insulation. Blockwork walls with dot and dab plasterboard lining.
Wall Finishes	Emulsion paint and ceramic tiling.
Floor Finishes	Carpet, Vinyl flooring, ceramic tiles, engineered timber flooring, timber skirting, dust sealant, latex levelling compound and screed flooring.
Ceiling Finishes	Gypsum board, suspended ceiling system and emulsion paint.
Building Services	Bathroom pods, lifts, electricity distribution system, fresh water distribution system, waste water drainage system, ventilation system, solar PV units and heat distribution system.
External Works	Permeable paving and concrete kerbstone in addition to bike stands, integrated benches and play equipment.

Table 8: Description of proposal Block B



05.2 Results & Analysis - Block B (Affordable)
Embodied Carbon

Embodied Carbon

The following chapter presents the results of the WLC Assessment. In addition, it later highlights the materials that significantly contribute to the embodied carbon totals. The results of this WLCA can be used to inform material choices on future projects with the intention of reducing the environmental impact of future schemes.

The performance against the project targets for whole life and upfront embodied carbon are demonstrated in figures 24 & 25. At present, the project is currently achieving the GLA Benchmark for both upfront embodied carbon and whole life embodied carbon.

Contingency Factors

A contingency factor is applied to the WLC model at every assessment stage, and applies to modules A, B, C and D. It reflects uncertainty regarding the design of the asset, its construction and the quantities and types of materials used. If detailed uncertainty information unknown, default values are applied. Uncertainty generally reduces as the project phases proceed and more is known and finalised. In the case of this project, the default value of 15% has been applied for this assessment at Concept Design Stage.

We reinforce that WLCA is an iterative process. The team are currently reviewing and refining the design. These design developments are expected to further reduce the associated embodied carbon, impacts will be captured within the next iteration of the assessment, expected to be completed during RIBA workstage 3.

Workstage	Concept Design	Technical Design	Post Completion
Contingency Factor	15%	6%	0%

Table 9: RICS contingency factors for WLC assessments

Upfront Embodied Carbon A1-A5 (excl. sequestration)

Total Upfront Embodied Carbon: 5,698 tCO₂e



Figure 24: Performance against project target for upfront embodied carbon

Whole Life Embodied Carbon A1-B5, C1-4

Total Whole Life Embodied Carbon: 9,675 tCO₂e



Figure 25: Performance against project target for whole life embodied carbon

05.3 Results & Analysis - Block B (Affordable)

Key Findings

Key Findings

The substructure and upper floors are the largest contributors to upfront embodied carbon (A1-A5), accounting for 23% and 20% respectively. This is closely followed by the building services and frame, which contributes a further 14% and 12%. This reflects the material intensity associated with delivering the services to the building.

When in use and end of life stages are considered, the embodied carbon associated with finishes increases significantly, rising from 5% to 19%. This is also the case for building services, rising from 14% to 23%. This increase is primarily driven by the shorter service lives of these elements, resulting in more frequent maintenance and replacement over the building lifecycle.

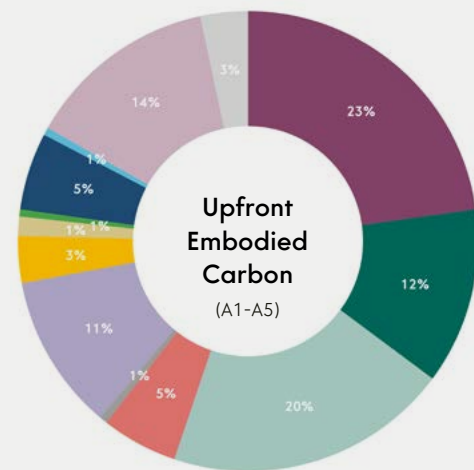


Figure 26: Upfront embodied carbon breakdown by Building Element Group

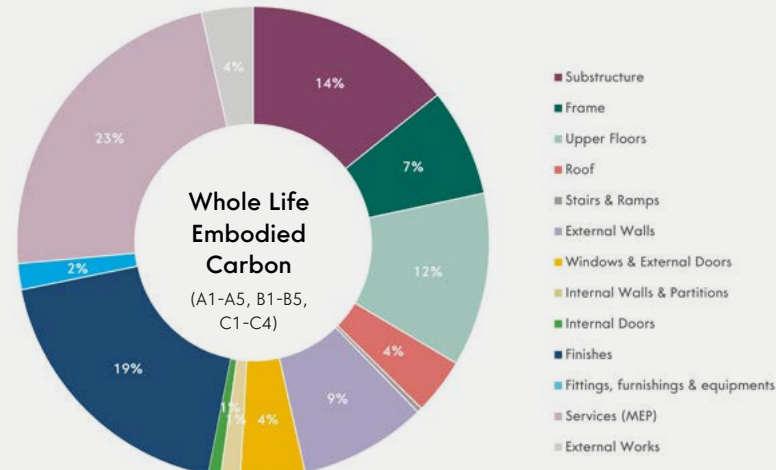


Figure 27: Embodied carbon breakdown by Building Element Group

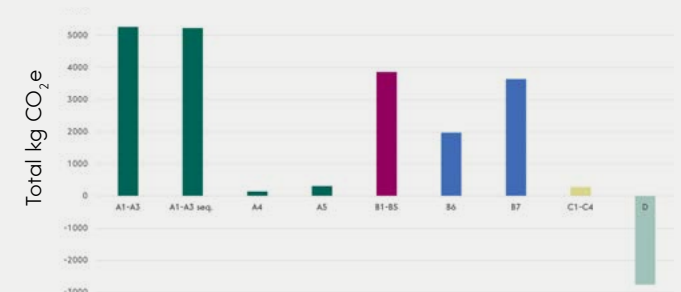


Figure 28: Total kgCO₂e Life Cycle Stages, using SAP 10.1 carbon factors

05.4 Results & Analysis - Block B (Affordable)

Embodied Carbon Breakdown

Embodied Carbon Breakdown

Table 10 presents a breakdown of upfront embodied carbon (A1–A5) by building element using the results generated within OneClick LCA. Each element is reported with its total embodied carbon in kgCO₂e, the intensity by kgCO₂e/m² GIA, and its percentage contribution to the total upfront carbon emissions. This breakdown highlights the relative carbon impact of each element, identifying key material hotspots and priority areas for design optimisation and carbon reduction.

Building Element	A1 - A5 Total kgCO ₂ e	A1-A5 kgCO ₂ e/m ²	Percentage %
Substructure	1277647	131	22.3
Frame	695060	71	12.2
Upper Floors	1121985	115	19.6
Roof	300406	31	5.3
Stairs & Ramp	30067	3	0.5
External Walls	616108	63	10.8
Windows & External Doors	184480	19	3.2
Internal Walls & Partitions	75951	8	1.3
Internal Doors	27808	3	0.5
Finishes	305019	31	5.3
Fittings, Furnishing & Equipments	29472	3	0.5
Services (MEP)	756272	78	13.2
External Works	186825	19	3.3
Construction Site Impacts	110363	11	1.9
Total	5,698,463 kgCO₂e	583 kgCO₂e/m²	100 %

→ **Table 10:** Summary of building element impacts

05.5 Results & Analysis - Block B (Affordable)

Embodied Carbon Reduction Opportunities

Embodied Carbon Reduction Opportunities

It is important that the environmental impact for the embodied carbon of the project is reduced in order to meet the upfront embodied carbon targets. The measures listed within this section have been provided for the team's consideration with a view to further reducing the embodied carbon emissions.

It should be noted that these carbon reduction material suggestions have been considered in reference to carbon embodiment only, and other influencing factors must be taken into account and assessed by suitably qualified team members before adoption in the design.

Table 11 provides a list of the 'most contributing materials' identified within the embodied carbon study. This will allow the design team to consider where the greatest impact can be made, with regards to material specification.

The table accounts for 80.9% of the total cradle to gate embodied carbon emissions. Whilst the ability to reduce this substantially is always limited (no products are carbon free when not considering sequestration) the elements with the most significant cradle to gate impacts are the obvious starting point in terms of seeking further reductions.

→

Table 11: Most contributing elements towards total cradle to gate emissions

Element	Product	Cradle to gate impacts TCO ₂ e	Of cradle to gate (A1-A3)	Global warming potential (A1-A3) before local compensation
Structure	Ready-mix concrete, C32/40, 25% GGBS content, CEM II/B-S portland-slag cement	1,013	19.2%	432 kg CO ₂ e / m ³
Structure	Ready-mix concrete, C32/40, 50% GGBS content, CEM III/A blast furnace cement	834	15.8%	332 kg CO ₂ e / m ³
Structure	Reinforcement steel (rebar), 97% recycled content, A615	402	7.6%	0.62 kg CO ₂ e / kg
Structure	Ready-mix concrete, C40/50, 25% GGBS content, CEM II/B-S portland-slag cement	380	7.2%	452 kg CO ₂ e / m ³
Structure	Steel purlins & frame	220	4.2%	2.76 kg CO ₂ e / kg
External Works	Aluminium balcony system	202	3.8%	3610 kg CO ₂ e / unit
Internal Finishes	Suspended metal ceiling system	196	3.7%	22.4 kg CO ₂ e / m ²
Facade	Stainless steel wall ties	187	3.5%	5.49 kg CO ₂ e / kg
Lifts	Elevator	160	3%	40100 kg CO ₂ e / unit
Facade	Clay brick	149	2.8%	0.21 kg CO ₂ e / kg
Services	Electricity distribution system	147	2.8%	15.1 kg CO ₂ e / m ²
External Works	Aluminium balustrade railing system with vertical infill for balconies	112	2.1%	117 kg CO ₂ e / m ²
Services	Roof integrated mono-crystalline photovoltaic module	105	2%	148.29 kg CO ₂ e / m ²
Facade	Calcium silicate board, 12mm	88	1.7%	12.3 kg CO ₂ e / m ²
Services	Composite bathroom system	79	1.5%	904 kg CO ₂ e / unit



05.6 Results & Analysis - Block B (Affordable)
Operational Energy & Carbon

Operational Energy & Carbon

Results and target comparisons

A net zero carbon building for operational energy is required to annually disclose in-use energy performance. A verified net zero carbon building is one that is based on in-use, rather than modelled, energy performance. Nevertheless it is important to consider that the likely operational performance of the building through modelling.

The annual predicted regulated and unregulated operational carbon emissions for both the domestic and non-domestic areas have been calculated using the predicted energy consumption figures provided by Meinhardt. The carbon associated with the energy use has been calculated within OneClick LCA using the SAP 10.1 & 10.2 profiles as per the RICS v1 guidance.

The development is currently achieving the UK Net Zero Carbon Buildings Standard (UKNZCBS) 2027 target for operational energy use. As shared living developments are not currently assigned a standalone typology within the UKNZCBS, the home (flat) residential benchmark has been adopted as the closest appropriate comparator due to the building's providing individual flats within a larger residential block.

The predicted Energy Use Intensity (EUI) has been assessed against the applicable UKNZCBS homes (flat) residential target of 49 kWh/m²/yr, with the current design assessed at 14.4kWh/m²/year lower than this benchmark.

Operational Energy B6

Total Operational Carbon: 5,614 TCO₂e



Figure 29: Performance against project target for energy use intensity

Operational Energy		Annual Energy Consumption (kWh/m ² /yr)	Annual Operational Carbon Emissions (kgCO ₂ e/m ² /yr)	Source
LSPBSA	Regulated	12.15	3.28	Space heating & regulated from SAP. Commercial from CIBSE TM54.
	Unregulated	22.46	6.06	Unregulated from HES. Commercial from CIBSE TM54.
On Site Renewables		61.05m ²		Cost Plan

Table 12: Operational carbon emissions

05.7 Results & Analysis

Energy Strategy

Energy Strategy

The energy statement for the proposed development has been provided by Meinhardt (which can be found as part of the full planning application), with design principles developed alongside members of the design team. The report demonstrates that the proposed scheme will improve the sustainability and environmental performance of the built environment by increasing energy efficiency, reducing CO₂ emissions, generating energy services efficiently and utilising Low or Zero Carbon Technologies (compared to a notional equivalent scheme). It outlines how the scheme has adapted The London Plan's Energy Hierarchy (Figure 5) principles of Be Lean, Be Clean, Be Green and Be Seen. The energy calculations within the report have been carried out using dynamic simulation analysis, and recognised design calculations have been undertaken and provided to demonstrate compliance with relevant building regulations and policy targets. The proposed construction, design and specification will deliver a scheme that is inherently energy efficient during occupation maximising opportunities to reduce energy demand and consumption within the design of the building envelope and key building services.

Be Lean

In accordance with the first stage of the London Plan energy hierarchy (Policy SI 2) and Haringey's Local Plan Policy SP4, the proposed development adopts a fabric-first approach to minimise operational energy demand through passive design measures, enhanced building fabric performance and energy efficient building services. By reducing energy consumption over the building's operational life, these measures support the efficient use of resources and contribute to the reduction of whole life carbon impacts, aligning with the wider objectives of the Circular Economy Statement. A summary of the design measures proposed for the scheme is set out below.

The scheme exceeds Part L 2021 fabric standards through enhanced U-values, improved air permeability and minimised thermal bridging, with overheating managed via optimised glazing/g-values, balcony shading and natural ventilation. Heat-recovery MVHR ventilates the development, while heat pumps with low-loss pipework provide heating and hot water. Dwellings rely on natural/mechanical ventilation rather than mechanical cooling, with an MVHR cooling module as backup where windows must stay closed; commercial areas use heat-recovery VRF, feeding rejected heat into residential heating. Further measures include LED lighting, zoned controls with smart metering, a central BMS, and energy-efficient appliances specified or encouraged via the Building User Guide.

Be Clean

The second stage of the energy hierarchy considers the efficient supply of energy through decentralised energy infrastructure. In accordance with London Plan Policy SI 3 and Haringey's Local Plan Policy SP4, opportunities for connection to existing and proposed heat networks have been assessed to ensure the development remains adaptable to future low-carbon energy infrastructure and supports long-term resource efficiency. The London Heat Map has been reviewed to identify existing and planned heat networks in the vicinity of the site. No existing heat networks have been identified nearby; however, a proposed heat network is located in the surrounding area. The site is also located within a Heat Network Priority Area, and therefore a communal heating system is proposed to facilitate connection to a wider district heat network should one become available in the future. In accordance with the GLA heating hierarchy, connection to an existing or planned heat network has been considered but is not currently feasible. The development will therefore incorporate a site-wide communal heating network served by air source heat pumps (ASHPs), with heat distributed to each block via insulated pipework. The system will be designed to allow future connection to a wider district heat network, should one become available. The proposed all-electric heating strategy avoids the use of on-site fossil fuel combustion and supports the transition towards a lower-carbon heat supply. The communal network also provides flexibility to incorporate future low-carbon heat sources as the local heat network infrastructure develops.

Be Green

In accordance with the next stage of the London Plan energy hierarchy, an appraisal of on-site renewable and low-carbon energy technologies has been undertaken. Biomass boilers, photovoltaics (PV), solar thermal, ground source heat pumps, air source heat pumps and wind turbines were considered based on their suitability for the development. Air source heat pumps (ASHPs) are proposed as the primary heat source for the development, serving the communal heating network. The heat pumps are expected to provide a saving of approximately 211.034 kgCO₂e per year in regulated carbon dioxide emissions. The all-electric heating strategy avoids reliance on fossil fuel combustion and supports the long-term decarbonisation of operational energy. Approximately 63 photovoltaic (PV) panels, with a total peak output of 28.5 kWp, are proposed across the available roof areas of the two residential blocks. The panels are expected to provide a regulated carbon saving of approximately 3566 kgCO₂e per year. Solar thermal and ground source heat pumps have been discounted due to the availability of roof space for PV and the poor balance between heating and cooling demand, respectively. Biomass boilers have also been discounted due to competition with the proposed heat pump system and potential impacts on local air quality and servicing requirements. Wind turbines are not proposed due to their potential architectural, townscape and noise impacts. Together, the proposed ASHP and PV systems will reduce reliance on fossil fuel-based energy sources and support the long-term reduction of operational carbon emissions.



06

Conclusion

06.1 Conclusion

Performance & Next Steps

Performance

Block A - Shared Living

As per the requirements of the LPG Whole Life Carbon Assessment guidance, a Whole Life Carbon Assessment has been undertaken in accordance with RICS Whole Life Carbon Assessment for the Built Environment, Version 1 (1st edition, November 2017).

The assessment has been prepared in alignment with the UK Green Building Council (UKGBC) Net Zero Carbon framework. It is noted that the results presented are representative of a number of assumptions that have been made with regards to distance travelled and expected life span of product, as explained within Tables 21 & 22. Once available, these assumptions will be replaced by more accurate data.

At present, the project is achieving the GLA benchmark for upfront embodied carbon and the GLA benchmark target for whole life embodied carbon.

As the design matures, the accuracy of the information available to the WLC modeller will increase, and therefore improve the accuracy of the predicted whole life carbon emissions.

		Upfront Embodied Carbon Modules A1 - A5 (excl. seq carbon)	Whole Life Embodied Carbon Modules A-C (excl. B6 & B7)	Operational Energy Module B6
Targets	GLA Benchmark (Residential)	< 850 kgCO ₂ e/m ²	< 1200 kgCO ₂ e/m ²	N/A
	GLA Aspirational (Residential)	< 500 kgCO ₂ e/m ²	< 800 kgCO ₂ e/m ²	N/A
	RIBA 2030	N/A	< 625 kgCO ₂ e/m ²	< 35 kWh/m ² /yr
	UKNZCBS 2028 (Block A: Commercial Residential)	< 495 kgCO ₂ e/m ²	N/A	< 70 kWh/m ² /yr
	UKNZCBS 2028 (Block B: Homes - Flats)	< 450 kgCO ₂ e/m ²	N/A	< 49 kWh/m ² /yr
Stage 2 Results	Total	12,290 tCO ₂ e	21,289 tCO ₂ e	N/A
	Per m ² GIA	588 kgCO ₂ e/m ²	1,018 kgCO ₂ e/m ²	64 kWh/m ² /yr
	GLA Benchmark Achieved	Achieved	Achieved	N/A

Table 13: Summary of performance for Block A

06.2 Conclusion

Performance & Next Steps

Performance

Block B - Affordable

As per the requirements of the LPG Whole Life Carbon Assessment guidance, a Whole Life Carbon Assessment has been undertaken in accordance with RICS Whole Life Carbon Assessment for the Built Environment, Version 1 (1st edition, November 2017).

The assessment has been prepared in alignment with the UK Green Building Council (UKGBC) Net Zero Carbon framework. It is noted that the results presented are representative of a number of assumptions that have been made with regards to distance travelled and expected life span of product, as explained within Tables 21 & 22. Once available, these assumptions will be replaced by more accurate data.

At present, the project is achieving the GLA benchmark for upfront embodied carbon and the GLA benchmark target for whole life embodied carbon.

As the design matures, the accuracy of the information available to the WLC modeller will increase, and therefore improve the accuracy of the predicted whole life carbon emissions.

		Upfront Embodied Carbon Modules A1 - A5 (excl. seq carbon)	Whole Life Embodied Carbon Modules A-C (excl. B6 & B7)	Operational Energy Module B6
Targets	GLA Benchmark (Residential)	< 850 kgCO ₂ e/m ²	< 1200 kgCO ₂ e/m ²	N/A
	GLA Aspirational (Residential)	< 500 kgCO ₂ e/m ²	< 800 kgCO ₂ e/m ²	N/A
	RIBA 2030	N/A	< 625 kgCO ₂ e/m ²	< 35 kWh/m ² /yr
	UKNZCBS 2028 (Block A: Commercial Residential)	< 495 kgCO ₂ e/m ²	N/A	< 70 kWh/m ² /yr
	UKNZCBS 2028 (Block B: Homes - Flats)	< 450 kgCO ₂ e/m ²	N/A	< 49 kWh/m ² /yr
Stage 2 Results	Total	5,698 tCO ₂ e	9,675 tCO ₂ e	N/A
	Per m ² GIA	583 kgCO ₂ e/m ²	991 kgCO ₂ e/m ²	34.63 kWh/m ² /yr
	GLA Benchmark Achieved	Achieved	Achieved	N/A

Table 14: Summary of performance for Block B

06.3 Conclusion

Performance & Next Steps

Performance

Combined Block A & Block B

At present, when combined the project is achieving the GLA benchmark for upfront embodied carbon and the GLA benchmark target for whole life embodied carbon.

Comparing the two blocks individually, Block A and Block B perform similarly on upfront embodied carbon, at 588 kgCO₂e/m² and 583kgCO₂e/m² respectively, suggesting a broadly consistent structural and envelope strategy across both buildings at this stage. The whole life embodied carbon diverges more significantly as Block A's result of 1,018 kgCO₂e/m² is around 3% higher than Block B's result of 991 kgCO₂e/m², which may reflect differences in the commercial fit-out, servicing strategy or replacement cycles assumed for Block B's predominantly commercial-residential use, compared with Block A's residential (flats) typology.

This divergence is also reflected in operational energy performance, where Block A (64 kWh/m²/yr) is materially higher than Block B (34.63 kWh/m²/yr).

		Upfront Embodied Carbon Modules A1 - A5 (excl. seq carbon)	Whole Life Embodied Carbon Modules A-C (excl. B6 & B7)	Operational Energy Module B6
Targets	GLA Benchmark (Residential)	< 850 kgCO ₂ e/m ²	< 1200 kgCO ₂ e/m ²	N/A
	GLA Aspirational (Residential)	< 500 kgCO ₂ e/m ²	< 800 kgCO ₂ e/m ²	N/A
	RIBA 2030	N/A	< 625 kgCO ₂ e/m ²	< 35 kWh/m ² /yr
	UKNRCBS 2028 (Block A: Commercial Residential)	< 495 kgCO ₂ e/m ²	N/A	< 70 kWh/m ² /yr
	UKNRCBS 2028 (Block B: Homes - Flats)	< 450 kgCO ₂ e/m ²	N/A	< 49 kWh/m ² /yr
Stage 2 Results	Total	17,993 tCO ₂ e	30,960 tCO ₂ e	N/A
	Per m ² GIA	587 kgCO ₂ e/m ²	1,009 kgCO ₂ e/m ²	54.38 kWh/m ² /yr
	GLA Benchmark Achieved	Achieved	Achieved	N/A

Table 15: Summary of performance for combined Block A & Block B



06.4 Conclusion

Embodied Carbon Reduction

Next Steps

To ensure that whole life carbon is addressed effectively throughout the continuation of the design and construction period, the following next steps are recommended:

The design team should review the durability, focusing on the replacement cycles of materials when specifying for stage 4 technical design. This is particularly important for finishes, as the whole life carbon is significantly increased due to the regular replacement needed for finishes.

The GGBS content should be reviewed by the client and structural engineer. The substructure elements have been modelled with 50% GGBS content and the remaining frame at 25% GGBS content. These should be reviewed and increased where possible to reduce the carbon in the largest contributing building elements.

Further optioneering workshops should be scheduled with the WLC modeller and the design team, to discuss opportunities for reduction measures.

The 'most contributing elements' table (section 4.5 & 5.5) should be used as guidance for identifying opportunities to reduce the embodied carbon impacts as the design develops. Alternative materials with lower GWP should be considered and implemented where appropriate. These design decisions should be communicated to the WLC modeller to ensure the model is accurate and reflects the developed design, ensuring up to date benchmarking against the established project targets.

The Principal Contractor should review and implement the recommendations provided in Section 5 to ensure the project targets are considered during procurement and site activities.

A further assessment during the construction period is advisable for monitoring the carbon budget progress as the project develops and a final WLCA should be provided at practical completion.

Interrogation of supply chain with contractor

The UKGBC have published a 'NZ WLC Roadmap; Stakeholder Action Plan' which provides a set of recommended industry-wide actions for achieving net zero carbon in the construction, operation and demolition of buildings in the UK.

Within the publication is a 'Contractor Action Plan'. A number of the key 'immediate' actions that can be considered at project level have been outlined below for consideration by the contractor:

- The contractor should work with the supply chain to ensure they are aware of the net zero carbon targets that have been established by the client.
- Develop and implement training to deliver NZC targets internally and with key suppliers and with key suppliers, covering all pertinent sources of emissions during the construction process:
 - Establishing baseline carbon literacy across staff
 - Transport and site (modules A4-A5) & upfront carbon issues
 - Closing the energy performance gap
 - Ensuring sub-metering is fully operational
- The contractor should request EPDs (APD A-D to EN15804 & externally verified) from all supply chains. This requirement should be clearly communicated to the supply chain at the point of tender submissions.
- The contractor must track construction site emissions, measuring and monitoring all emissions from transport (A4), construction processes (A5), as well as materials quantities brought on to site and material wastage rates.

Ensure robust systems are in place to ensure quality standards and mitigation of performance gaps.

The contractor should develop a clear and robust Sustainable Procurement Plan to guide specification towards sustainable construction products. The plan should be clearly communicated to the supply chain.

General material specification & understanding of WLC assessment

It is important to note that the material specification of products has been limited by the utilisation of WLCA software on the market such as the One Click LCA software used for this assessment.

WLCA is still a relatively new technology and has emerged from an extremely narrow database of materials that continue to grow globally on a daily basis. As the product grows, so will the opportunity to identify materials and products that perform better than others and are more accurately reflected.

In short, further close analysis of material component performance will be needed to achieve marginal gains which overall could improve the embodied carbon output as a whole, whereby close communication with the WLCA modeller, more accurate material quantities and more detailed material specifications considering EPD performance will lead to improved results.

Any proposed material substitutions should be clearly communicated to the WLCA modeller to review the potential impacts to the project targets.

07

Appendix A

Methodology



07.1 Appendix A
Methodology - Guidance & Standards

Guidance & Standards

This section describes the pertinent guidance and methodological standards of the WLC assessment. Information detailed below includes the national standards, software tools, and external data sources, that have been used to inform the assessment.

EN 15978: 2011

The appraisal framework in the UK concerning environmental impacts of the built environment is provided by BS EN 15978: 2011 (Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method). This modular structure outlines the necessary principles that guide whole life assessments of the environmental impacts of built projects formulated on life-cycle assessment. As part of the wider set of standards EN 15643, the BS EN 15978 modular structure outlines the necessary principles that guide whole life assessments of the environmental impacts of built projects formulated on life-cycle assessment.

RICS Guidance

As a result of diverse interpretations of BS EN 15978, the Royal Institute of Chartered Surveyors (RICS) released a professional statement (RICS PS) addressing the need for technical details of the numerous aspects influencing whole life carbon calculations for built projects. The RICS PS guidance serves to avoid erratic application of the BS EN 15978 methodology and the subsequent discrepancies of assessment results, with a distinct emphasis on the practicalities of implementation.

Given the known factors, such as poor quality data selectivity, inappropriate data use, miscellaneous assumptions, and conflicting client requirements, the harmonised approach that the RICS PS outlines provides a solution to the shortcoming of the building industry to properly account for the embodied carbon emissions. Existing industry efforts have previously had a more significant impact on reducing the operational emissions through targets in building regulations (Part L) and local authority planning requirements. Accounting for both operational and embodied carbon emissions simultaneously is a key principle of the WLC assessment, highlighting the importance of complying with the RICS PS guidance.

Building parts to be included	0.1 Demolition Works 1. Substructure 2. Superstructure 3. Finishes 4. FF&E 5. Services 6. Prefabricated buildings and units 7. Works to existing buildings 8. External works
Life stages to be included	Product stage [A1-A3] Construction process stage [A4-A5] In Use emissions [B1] Replacement stage [B4] Regulated and Unregulated energy[B6] Water use (essential systems) [B7] Operational energy use [B6] End of Life [C1-C4] Benefits and loads from exported utilities [D2]
Assessment timing	At design stage (prior to technical design) - At least one other whole life carbon assessment should be conducted for each project after practical completion to represent the 'as built' carbon position.

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Table 16: Minimum requirements for WLC assessments

07.2 Appendix A

Methodology - Software

OneClick LCA Software

To accurately calculate the embodied carbon produced by the new development, One Click LCA software has been utilised. The One Click LCA tool is based on the EN 15978 standard, which is in line with the ISO 14040 / 44 standards for LCA. Furthermore, the One Click database is IMPACT compliant, which means it uses manufacturer specific environmental product declaration (EPD) data licensed by the Building Research Establishment (BRE).

Table 17 demonstrates the life-cycle stages covered by the software for each material.

A number of assumptions are made by the software (which can be overridden by the appraiser), further details of these are provided in tables 21 & 22.

A1-A3 Materials	Includes raw material supply, transport of material to production lines and production impacts.
A4 Transportation	Includes 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.
A5 Construction	Covering the exhaust emissions resulting from using energy during the site operations, the environmental impacts of production processes of fuel and energy and water as well as handling of waste until the end-of-waste state.
B1 In Use	This life stage includes the in-use emissions of products such as refrigerants. It also includes materials and products which are capable of absorbing carbon dioxide from the atmosphere.
B2-B3 Maintenance and Repair	Emissions associated with ongoing maintenance and repair of the development.
B4-B5 Replacement	The environmental impacts of material replacements after they reach the end of their service life.
B6 Operational Energy Use	The in-use phase energy consumption impacts include exhaust emissions from any building level energy production as well as the environmental impacts of production processes of fuel and externally produced energy. Regulated energy is the energy used by the building for MEP services such as heating and cooling. Unregulated energy use is the electricity used by small power load, for example white goods and appliances for personal use.
B7 Operational Water Use	Impacts of in-use water consumption (potable and non-potable) can be measured and reported.
C1-C4 End of Life	The impacts of deconstruction include impacts for processing recyclable construction waste flows for recycling or the impacts of pre-processing and land filling for waste streams that cannot be recycled.
D External Impacts	The reuse, recovery and recycling potential which is expressed as a net benefit.

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Table 17: Minimum requirements for WLC assessments

07.3 Appendix A

Methodology - Building Element & Data Sources

Building Element Group	Building Element	Comments
Demolition	0.1 Toxic / hazardous / contaminated material	No toxic / hazardous / contaminated material applicable.
	0.2 Major demolition works	Not applicable
0 Facilitating Works	0.3 & 0.5 Temporary / diversion works	No temporary or temporary diversion works were applicable.
	0.4 Specialist groundworks	No specialist groundworks were applicable.
1 Substructure		Material quantity and composition of the foundations were calculated based on the quantities provided in the stage 2 RFI completed by Whitby Wood - '(561)2604-JC-SD-Ashley_Park_CD_R02'
2 Superstructure	2.1 Frame	Material quantity and composition of the frame were calculated based on the quantities provided in the Stage 2 RFI completed by Whitby Wood - '(561)2604-JC-SD-Ashley_Park_CD_R02'
	2.2 Upper floors	Material quantity and composition of the upper floors were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	2.3 Roof	Material quantity and composition of the roof were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	2.4 Stairs and ramps	Material quantity and composition of the stairs and ramps were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	2.5 External walls	Material quantity and composition of the external walls were calculated based on the quantities provided in the stage 2 cost plan -X.
	2.6 Windows and doors	Material quantity and composition of the windows and doors were calculated based on the quantities provided in the stage 2 cost plan -X.
	2.7 Internal walls and partitions	Material quantity and composition of the internal walls were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	2.8 Internal doors	Material quantity and composition of the internal doors were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'

Table 18: Data Sources for building elements in WLCA

07.4 Appendix A

Methodology - Building Element & Data Sources

Building Element Group	Building Element	Comments
3 Finishes	3.1 Wall finishes	Material quantity and composition of the wall finishes were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	3.2 Floor finishes	Material quantity and composition of the floor finishes were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	3.3 Ceiling finishes	Material quantity and composition of the ceiling finishes were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
4 Fittings, Furnishings and Equipment		Material quantity and composition of all fittings, furnishings and equipment were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
5 Building Services / MEP		Material quantity and composition of the Building Services / MEP were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
6 Prefabricated Buildings and Building Units		No prefabricated building units applicable at this stage.
7 Works to existing building	7.1 Minor demolition and alteration works	All works to existing structure picked up within the above.
8 External Work	8.1 Site preparation works	Material quantity and composition of Site Preparation works were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	8.2 Roads, paths, paving and surfacing	Material quantity and composition of Roads, paths and pavings were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	8.3 Soft landscaping, planting and irrigation systems	No works were included at this stage.
	8.4 Fencing, railings and walls	No works were included at this stage.
	8.5 External fixtures	Material quantity and composition of External fixtures were calculated based on the quantities provided in the stage 2 cost plan provided by KS4 - '260804 Ashley Park Cost Estimate R4 - Design Freeze Certified'
	8.6 External drainage	Due to the stage in the design, quantifiable information is not yet available and therefore has not been included within the assessment.
	8.7 External services	Due to the stage in the design, quantifiable information is not yet available and therefore has not been included within the assessment.
	8.8 Minor building works and ancillary buildings	No allowance was considered for minor building works and ancillary buildings.

Table 19: Data Sources for building elements in WLCA

07.5 Appendix A

Methodology - Life Cycle Stages & Data Sources

Life Cycle Stage	Life Cycle Module	Comments
Product Stage [A1-A3]	A1 - Raw material extraction and supply	Calculated using various data sources within the OneClick software, including ecoinvent, GaBi and product specific Environmental Product Declarations (EPDs).
	A2 - Transport to manufacturing plant	
	A3 - Manufacturing and fabrication	
Construction Stage [A4-A5]	A4 - Transport to project site	At Stage 2, it is not possible to report all specific construction site impacts, therefore the OneClick software provides a function which allows the impact of site operations to be estimated based on climate region and building area. This function has been used for the development under the selection of 'Average energy and fuel use in construction site - per £million' for a project in the UK.
	A5 - Construction and installation process	
Use Stage [B1-B7]	B1 - In use	Information required for the calculations of the B1 emissions has not been provided at this stage.
	B2 - Maintenance	Specific products and EPDs are required to confirm the maintenance and repair emissions associated with the operation of the development. At this early stage in the development, it is not possible to know the majority of products which will be procured, therefore these emissions have been excluded from the assessment.
	B3 - Repair	
	B4 - Replacement	
	B5 - Refurbishment	Replacement emissions have been calculated using the RICS guidance service life defaults where EPDs and product specific information is not available.
	B6 - Operational energy use (regulated)	Results from the SAP & SBEM Calculations completed by Meinhardt provided data for this input.
	B6 - Operational energy use (un-regulated)	Results from the SAP & SBEM Calculations completed by Meinhardt provided data for this input.
End of Life Stage [C1-C4]	B7 - Operational water use	Part G results from Meinhardt confirm 105l/person/day for the shared living block and 80l/person/day for the residential (C3) block.
	C1 - Deconstruction / Demolition	These modules have been reported as a combined figure in line with the OneClick software which assumes default scenarios for the disposal of materials. For example, metals are assumed to be recycled, whereas materials with high heating potential are assumed to be incinerated for energy generation.
	C2 - Transport to disposal facility	
	C3 - Waste processing for reuse, recovery or recycling	
	C4 - Disposal	
Benefits and loads beyond the system boundary [D]	D - Reuse, recovery, recycling potential	OneClick assumes default scenarios for the benefits of a number of materials, such as the recycling of metal to avoid use of virgin materials, and crushing of concrete for use as hard core.

Table 20: Data sources for lifecycle stages in WLCA

07.6 Appendix A

Methodology - Assumptions & Default Scenarios

Building Part	Building elements/components	Expected lifespan
Roof	Roof coverings	30 years
Superstructure	Internal partitioning and dry lining	30 years
	Wall finishes: Render/Paint	30/10 years respectively
	Floor finishes Raised Access Floor (RAF)/Finish layers	30/10 years respectively
	Ceiling finishes Substrate/Paint	20/10 years respectively
FF&E	Loose furniture and fittings	10 years
Services / MEP	Heat source, e.g. boilers, calorifiers	20 years
	Space heating and air treatment	20 years
	Ductwork	20 years
	Electrical installations	30 years
	Lighting fittings	15 years
	Communications installations and controls	15 years
	Water and disposal installations	25 years
	Sanitaryware	20 years
	Lift and conveyor installations	20 years
	Opaque modular cladding e.g. rain screens, timber panels	30 years
Facade	Glazed cladding/Curtain walling	35 years
	Windows and external doors	30 years

Table 21: RICS default lifespans for building elements in WLC assessments

Transport Scenario	km by road	km by sea
Locally manufactured e.g. concrete, aggregate, earth	50	-
Nationally manufactured e.g. plasterboard, blockwork, insulation	300	-
European manufactured e.g. CLT, façade modules, carpet	1500	-
Globally manufactured e.g. specialist stone cladding	200	10000

Table 22: RICS default transport scenarios for UK projects

Material	Details	Baseline specification representative of standard practice (UK)
Concrete, precast	Structural elements: beams, segments, slabs, etc. pours of >25m ³	Reinforced concrete (C40/50, 25% cement replacement, excluding reinforcement)
Concrete reinforcement	Reinforcement bars	UK CARES sector average (EAF production, typically 96% recycled content in UK)
Masonry	Brickwork	Generic UK clay brick, dry brick weight 2.13kg
Insulation	For floors and external walls	Mineral wool
Glass	Glass: general, glazing, toughened, multilayer safety, skylight, fibreglass, expanded glass	Relevant generic datasets
Plastics	Plastics (various)	Relevant generic datasets
Asphalt	For highway and pavement construction	Asphalt, 5% binder content

Table 23: RICS default material specifications for UK projects

08

Appendix B

Cost Validation - Block A & Block B

08.1 Appendix B - Block A & Block B

Cost Plan Validation

RICS Category	Total Cost	Cost Included	Percentage Included	Notes
0.1 Demolition Works	£569,569	£569,569	100.0%	
1. Substructure	£3,623,080	£3,473,016	95.9%	Piling mat is a temporary works process that has been omitted.
2. Superstructure	£42,800,209	£41,385,860	96.7%	Insufficient information to model: mansafe system, davit arms system, acoustic enclosures, masonry supports, thermal breaks, roof terrace amenity fit-out.
3. Finishes	£7,346,948	£7,042,448	95.9%	Bulkhead ceiling finishes are omitted due to insufficient
4. FF&E	£11,003,576	£8,178,800	74.3%	Excludes loose/replaceable fittings (post boxes, storage, amenity fit-out, sinks/taps)
5. Services	£23,058,866	£22,158,866	96.1%	Insufficient information to model: LTHW tank room and ground floor specialist plant are process/MEP plant items not yet assigned
6. Prefabricated buildings and units	n/a	n/a	n/a	
7. Works to existing buildings	n/a	n/a	n/a	
8. External works	£3,444,049	£2,863,399	83.1%	Soft landscaping, tree planting, disabled parking markings, external lighting, fencing, attenuation tanks
Total	£91,846,297	£85,671,958	93.3%	

Table 24: Cost Plan Validation Checklist

Cost Plan Validation

The table above demonstrates the cost plan validation exercise undertaken to demonstrate the Whole Life Carbon (WLC) assessment aligns with the requirements of RICS Whole Life Carbon Assessment for the Built Environment, Version 1 (1st edition, November 2017).

This process involves cross-referencing the project's elemental cost plan with the RICS cost breakdown structure to verify that all major building elements have been represented within the WLC model. By mapping cost plan items to the relevant RICS categories and calculating the proportion of total costs covered, the exercise demonstrates that 93.3% of the project's costed elements are included in the assessment.

The background features a series of overlapping circles in a light purple shade. A dark purple rectangle is positioned in the lower right area, partially overlapping one of the circles.

09

Appendix C

Data Sources - Block A

carbon.
climate.
certified.

team@certified.uk

www.certified.uk



11.1 BREEAM LCA

Methodology and Aim

BREEAM LCA Methodology and Aim

As part of the BREEAM V7 Assessment an LCA at Early Design Stage / Technical Design Stage has been carried out on this project. The LCA has been carried out in accordance with the MAT01 criteria, for Early design LCA and embodied carbon reporting.

BREEAM LCA Methodology:

The LCA assesses the all building elements (that are in the scope of the assessment), in accordance with the RICS NRM classifications, and aligns with the RICS Whole Life Carbon Assessment Standard, 2nd Edition. OneClick LCA has developed a BREEAM V7 compliant tool, which has been used to carry out this assessment. It automatically produces outputs that are aligned with the correct building elements and reporting structure.

An optioneering exercise has also been undertaken with the design team, where potential material or design solutions have been explored to determine the most favourable solution for the scheme. The results of this optioneering are included within this report.

In alignment with RICS v2, all lifecycle modules are reported (A1-A5, B1-B5, C1-C4, D), excluding carbon emissions associated with operational energy and water consumption (Modules B6 & B7).

On completion of the LCA, the results have been submitted to the BRE through the BREEAM Platform and will also be submitted to the Build Environment Carbon Database in alignment with the Exemplary BREEAM Credit.

Credits are also available for project benchmarking, where project results at Technical Design stage for the baseline assessment are compared against the benchmarks set within the BREEAM Platform.

The aim of the LCA:

The objective of the LCA is the mitigation of carbon impact in the built environment. Better understanding and consistent measurement of the whole life carbon emissions of built projects will in turn enable comparability of results, benchmarking and target setting to achieve carbon reductions. A further aim is to reduce the burden on the environment from construction products by recognising and encouraging measures to optimise construction product consumption efficiency and the selection of products with a low environmental impact (including embodied carbon), over the life cycle of the building.

The key values of an LCA are as follows:

- Reduce the impact of the construction and construction product industries
- Provide data on the environmental impact of different material and design choices, promoting the selection of sustainable, low-impact options
- Assess environmental impacts at building level to provide flexibility when specifying construction products, taking into account project-specific conditions and priorities
- Allow identification of solutions, such as resource efficiency, to be adopted to reduce overall environmental impacts arising from construction product use.



11.2 BREEAM LCA
LCA Results

LCA Results

The following page presents the results of the BREEAM LCA Assessment for Building A (Shared Living) which is categorised as Residential institutional for the BREEAM Assessment. The results are aligned with the proposed building elements outlined in Section 4 for the baseline assessment, and the building optioneering detailed in section 3 as option 1.

With a focus on upfront embodied carbon, extensive optioneering has been carried out with the design team identifying opportunities for carbon reduction within substructure, frame, facade and balcony systems. A detailed study of a change in insulation has been carried out quantify the whole life embodied carbon of the baseline design and an alternative option.

TBC upon completion of WLC Assessment. Summary of performance including differences in baseline and option 1.

Baseline Whole Life Embodied Carbon A1-A5, B1-B5, C1-C4 (excl. sequestration and B6 & B7)

Total Whole Life Embodied Carbon: 21,836 tCO₂e

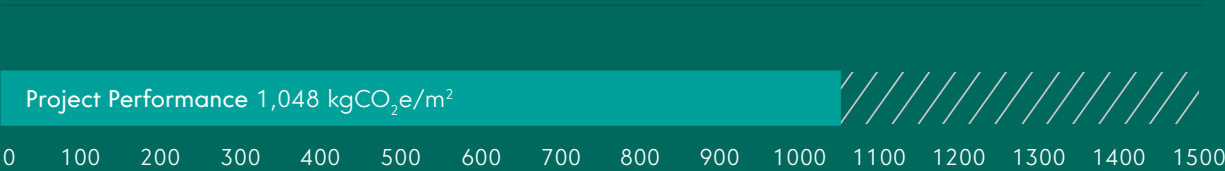


Figure 30: Baseline performance for whole life embodied carbon

Option 1 Whole Life Embodied Carbon A1-A5, B1-B5, C1-C4 (excl. sequestration and B6 & B7)

Total Whole Life Embodied Carbon: XXX tCO₂e

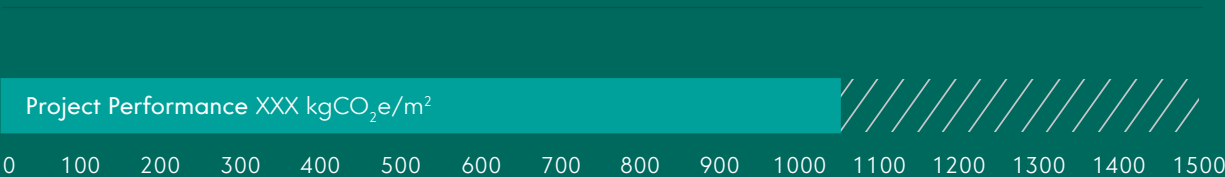


Figure 31: Option 1 performance for whole life embodied carbon



11.3 BREEAM LCA
Stage 2 Benchmark

Stage 2 Benchmark

At stage 2 the scheme is predicted to perform in line with Benchmark Band X. The technical design assessment should be carried out and submitted to the BRE to confirm benchmark performance and award credits.

As per guidance note 20, the weightings have been adjusted in accordance with the various floor areas of the various asset types within the scheme. The areas input are stated below:

Commercial floor area: Xm2

Residential floor area: Xm2

Community space is not a relevant asset type that is benchmarked therefor only the shared living and comercial retail are the only spaces being benchmarked for the criteria.

TBC upon assessment completion.

Benchmark Band	Carbon Limits kgCO ₂ e/m ²	Credits
A	< XXX	2 credits + 1 exemplary credit
B	< XXX	2 credits
C	< XXX	
D	< XXX	1 credit
E	< XXX	
F	< XXX	0 credits
G	< XXX	

Table 25: Performance of current scheme against the benchmark band limits.



11.4 Results & Analysis - Block A (Shared Living)
Upfront Embodied Carbon Breakdown

Embodied Carbon Breakdown

Section to be updated following competition of assessment.

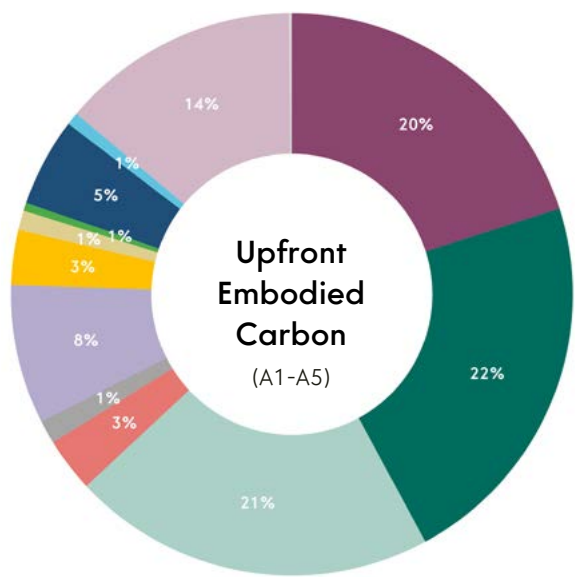
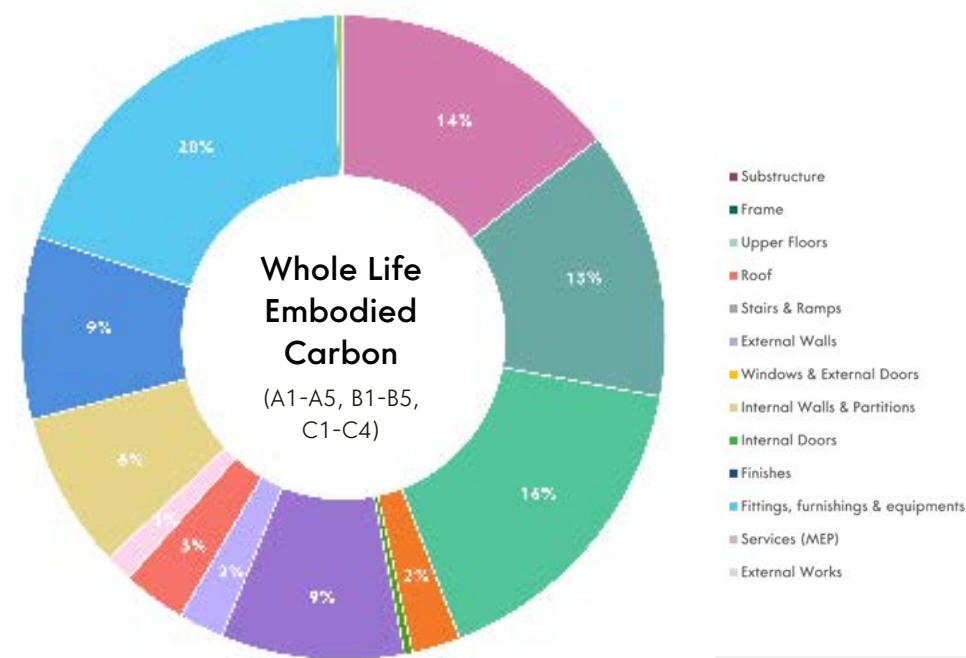


Figure 34: Upfront embodied carbon breakdown by Building Element Group

Building Element	A1 - A5 (Total)	A1-A5 (per m ² GIA)	Percentage
Substructure	xxx kg	xxx kgCO ₂ e/m ²	xx %
Frame	xxx kg	xxx kgCO ₂ e/m ²	xx %
Upper Floors	xxx kg	xxx kgCO ₂ e/m ²	xx %
Roof	xxx kg	xxx kgCO ₂ e/m ²	xx %
Stairs & Ramps	xxx kg	xxx kgCO ₂ e/m ²	xx %
External Walls	xxx kg	xxx kgCO ₂ e/m ²	xx %
Internal Walls & Partitions	xxx kg	xxx kgCO ₂ e/m ²	xx %
Internal Walls & Partitions	xxx kg	xxx kgCO ₂ e/m ²	xx %
Internal Doors	xxx kg	xxx kgCO ₂ e/m ²	xx %
Internal Finishes	xxx kg	xxx kgCO ₂ e/m ²	xx %
FF&E	xxx kg	xxx kgCO ₂ e/m ²	xx %
Services	xxx kg	xxx kgCO ₂ e/m ²	xx %
External Works	xxx kg	xxx kgCO ₂ e/m ²	xx %
Construction Site Impacts	xxx kg	xxx kgCO ₂ e/m ²	xx %



Building Element	A1 - A5 (Total)	A1-A5 (per m² GIA)	Percent
Substructure	xxx kg	xxx kgCO2e/m2	xx %
Frame	xxx kg	xxx kgCO2e/m2	xx %
Floors	xxx kg	xxx kgCO2e/m2	xx %
Roof	xxx kg	xxx kgCO2e/m2	xx %
Facade (inc. Windows)	xxx kg	xxx kgCO2e/m2	xx %
Internal Walls & Partitions	xxx kg	xxx kgCO2e/m2	xx %
Internal Doors	xxx kg	xxx kgCO2e/m2	xx %
Internal Finishes	xxx kg	xxx kgCO2e/m2	xx %
MEP	xxx kg	xxx kgCO2e/m2	xx %
FF&E	xxx kg	xxx kgCO2e/m2	xx %
External Works	xxx kg	xxx kgCO2e/m2	xx %
Construction Site Impacts	xxx kg	xxx kgCO2e/m2	xx %
Total	xxx kgCO2e	xxx kgCO2e/m2	100 %

