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ENERGISING ENVIRONMENTS

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Whole Life Carbon – Supporting Document

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Residential Care Home,
Cricket Field Road,
Uxbridge

CLIENT:

Hillingdon Council



DOCUMENT CONTROL

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1.0 EXECUTIVE SUMMARY

1.1 Project Background and Intent

The Whole Life Carbon (WLC) assessment has been prepared by Davies Partnership on behalf of London Borough of Hillingdon to support the planning application for the proposed redevelopment of Cricket Field Road, Uxbridge.

The proposed development involves the demolition of the existing Civic Centre multi-storey car park and construction of a 160-bed specialist residential care home. The proposed development has a total Gross Internal Area (GIA) of approximately 8,658 m², comprising basement, ground and four upper floors.

The assessment has been undertaken using One Click LCA in accordance with the **Greater London Authority (GLA) Whole Life Carbon Guidance**, the RICS Whole Life Carbon Assessment for the Built Environment (2nd Edition) and BS EN 15978.

The assessment has been undertaken at **RIBA Stage 2/planning stage** and therefore incorporates a combination of project information, architectural drawings, performance specifications and reasonable industry-based assumptions where detailed structural, MEP and product information is not yet available.

1.2 The Retrofit vs Demolition Justification

The proposed development comprises the replacement of the existing multi-storey car park with a purpose-designed specialist residential care home. Retention and retrofit of the existing building and structural frame have been considered; however, the existing car-park configuration is not directly compatible with the accommodation, circulation, servicing and accessibility requirements of the proposed care home. Retention would require substantial alteration and potentially significant structural strengthening. The WLC assessment therefore considers demolition of the existing car park and construction of a purpose-designed care home, while opportunities to minimise demolition impacts through the reuse, recycling and recovery of suitable materials will be pursued. Further details of the retention and retrofit assessment are provided in Section 2.2.

1.3 Methodology and Dual Track Grid Trajectories

The assessment was undertaken using One Click LCA and evaluates WLC impacts over a 60-year study period across modules A1-C4. Results are reported using both a non-decarbonised (static grid) scenario and a decarbonised Future Energy Scenarios (FES) pathway in accordance with GLA reporting requirements.

1.4 WLC Performance Summary

Embodied Carbon in Grid Scenarios	Total embodied carbon (A1-C4) Excl B6 & B7
GWP total Decarbonised Scenario per m2 kg CO ₂ e/m ²	732
GWP total Non-Decarbonised Scenario per m2 kg CO ₂ e/m ²	761

Table 1. Comparison of embodied carbon results of the proposed development

The calculated whole-life carbon intensity is **761 kgCO₂e/m² GIA** under the non-decarbonised/static scenario and **732 kgCO₂e/m² GIA** under the decarbonised FES scenario. Both **results are below the current GLA WLC benchmark** of 1,200 kgCO₂e/m² GIA and within the 800 kgCO₂e/m² GIA aspirational benchmark.

1.5 Principal Carbon Reduction Commitments

The following low carbon strategies have been incorporated at Stage 2 and will be refined as the project progresses based on procurement routes.

- Use of **low-carbon concrete incorporating supplementary cementitious material (GGBS) replacement**.
- Explore opportunities to incorporate recycled concrete aggregate (RCA) within suitable structural concrete mixes, subject to mix design, technical requirements and supplier availability.
- Maximisation of opportunities for reuse and recycling of suitable demolition materials arising from the existing car park.
- Prioritisation of products supported by **third-party verified EPDs** or **CIBSE TM65** calculations.

2.0 PROJECT OVERVIEW

2.1 Site Location and Proposed Development

The proposed development is located on Cricket Field Road, Uxbridge, UB8, on the site of the existing Civic Centre multi-storey car park.

The proposal involves the demolition of the existing car park and redevelopment of the site to provide a 160-bed specialist residential care home. The new development will provide purpose-designed accommodation together with associated communal, care, staff, service and operational facilities. The proposed building has a total GIA of approximately 8,658 m², comprising a basement, ground floor and four upper floors.



Fig 1. Existing Civic Centre Car Park, Uxbridge

2.2 Existing building retention and material recovery options

The proposed development comprises the replacement of the existing multi-storey car park with a purpose-designed specialist residential care home. The existing car park is currently underutilised, with the available parking provision substantially exceeding observed demand. The redevelopment therefore provides an opportunity to make more efficient use of the previously developed site through the delivery of purpose-designed care accommodation.

Retention and adaptation of the existing structure have been considered as part of the redevelopment assessment. The existing building form, floor-to-floor heights, layout and circulation arrangements were designed specifically for multi-storey car parking and are not compatible with the spatial, accessibility, servicing, fire-safety and residential amenity requirements of the proposed care home. Retaining the existing reinforced-concrete frame would also require confirmation of the suitability of the existing columns, slabs, ramps and foundations for the proposed use, with significant strengthening and alteration potentially required.

The assessment therefore considers demolition of the existing car park and construction of a purpose-designed care-home facility. While the principal structural elements are not considered practicably suitable for incorporation into the proposed building, opportunities for the recovery of discrete materials and components, including suitable brickwork, paving and metalwork, will be assessed prior to demolition. Materials that cannot be directly reused will be separated and directed towards

appropriate recycling and recovery routes in accordance with the project's pre-demolition audit and Circular Economy Statement.

Material	Arising waste in tonnes
Reinforced concrete	9,275.78
Reinforcing steel	376.81
Steel guardrails / railings	19.06
Existing brickwork	306.18
Total identified arisings	9,977.83

Table 2. Estimated material arisings from demolition of the existing car park

Option	Assessment	Reason / Consideration
Retain entire building	Not preferred	Existing car-park configuration is incompatible with the proposed care-home use.
Retain RC frame	Subject to structural feasibility	Compatibility of columns, slabs, ramps and foundations would require structural assessment.
Retain selected components	Potential	Paving, railings/guardrails and other suitable components to be assessed.
Direct reuse of materials/components	Potential	Suitable brickwork, paving and discrete steel components to be reused where feasible.
Recycle concrete	High potential	Concrete to be processed for recycled aggregate where technically feasible.
Recycle reinforcement steel	Very high potential	Reinforcement to be separated and sent for steel recycling.
Disposal	Last resort	Only for materials that cannot be retained, reused or recycled.

Table 3. Material retention and recovery options

Refer to the demolition audit and circular economy statement for further details.

Opportunities for direct reuse, on-site recycling and off-site recycling will be prioritised in accordance with the material hierarchy established within the Circular Economy Statement.

2.3 Core Spatial and Building Parameters

PARAMETER	PROPOSED DEVELOPMENT
Building Use	Specialist residential care home
Residential Care Beds	160
Total GIA	8,658 m ²
Basement GIA	609 m ²
Ground Floor GIA	1,877 m ²
First Floor GIA	1,854 m ²
Second Floor GIA	1,854 m ²
Third Floor GIA	1,541 m ²
Fourth Floor GIA	923 m ²
Number Of Above-Ground Floors	5
Basement	1

Table 4. Details of the proposed development

3.0 SCOPE & METHODOLOGY

3.1 Assessment Framework and Standards

The WLC assessment has been undertaken using the One Click LCA platform in accordance with the Greater London Authority (GLA) Whole Life-Cycle Carbon Assessments Guidance and template, with BS EN 15978 and the RICS Whole Life Carbon Assessment for the Built Environment (2nd Edition) also referenced within the assessment methodology.

Units of measurement: kgCO₂e, tonnesCO₂e and kgCO₂e/m²

The assessment accounts for all carbon impacts over a mandatory **60-year** building life-cycle study period, tracking from **Cradle-to-Grave (Modules A1–C4)**.

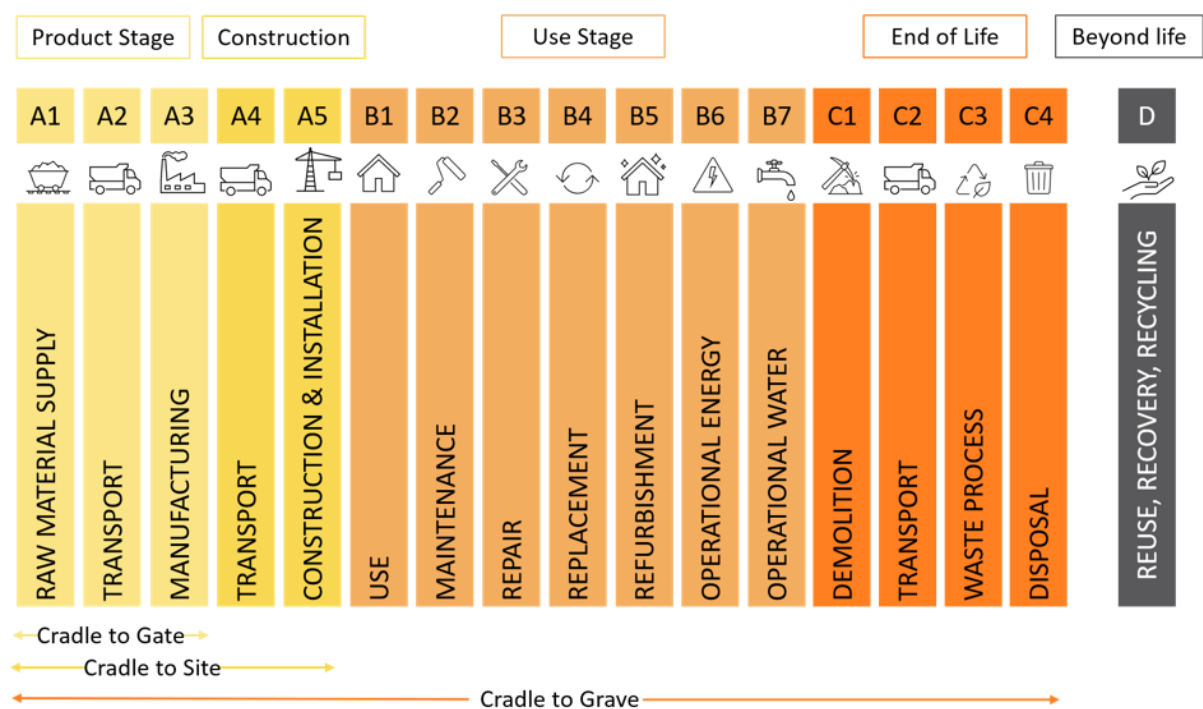


Fig 2. Building Life Cycle Information and life cycle stages

3.2 Dual-Track Grid Decarbonisation Scenarios

The Whole Life Carbon Assessment has been undertaken using two electricity grid scenarios over the 60-year reference study period

- **Decarbonised Scenario/ Dynamic (FES):** incorporates projected electricity-grid decarbonisation using the **FES 2020 Steady Progression scenario**, as implemented within the One Click LCA GLA/RICS assessment tool.
- **Non-Decarbonised Scenario/ Static:** represents the current status of the electricity grid and provides the point-in-time assessment used for comparison against the GLA Whole Life Carbon benchmarks.

The resulting whole life carbon intensity is **761 kgCO₂e/m² GIA under the non-decarbonised scenario** and **732 kgCO₂e/m² GIA under the decarbonised scenario**, representing a difference of approximately **4%**.

The difference is primarily attributable to the reduction in use-stage emissions associated with the decarbonisation of the electricity grid over the assessment period.

3.3 Biogenic Carbon Accounting

Biogenic carbon has been accounted for in accordance with the **BS EN 15804+A2** principles where applicable.

The proposed scheme contains limited quantities of bio-based materials within the current Stage 2 model. Any biogenic carbon associated with timber or other bio-based products is reported in accordance with the selected One Click LCA methodology and is **not treated as a permanent life-cycle carbon saving** where it is expected to be released at end of life.

3.4 Addressing Uncertainty and Contingency

In accordance with the RIBA Stage 2 level of design development and associated uncertainty, a **15% building-level contingency factor** has been applied within the One Click LCA assessment to account for ongoing design development, specification refinement and structural coordination.

The 15% contingency is applied to the calculated whole life carbon impacts across Modules A–D, excluding B6 (operational energy) and B7 (operational water), in accordance with the assessment methodology.

In addition, the data quality **uncertainty factor has been enabled** within One Click LCA. This factor assesses the data quality of the 10 most carbon-contributing materials within the assessment, based on factors including the year, verification status, technological representativeness and geographical representativeness of the datasets.

3.5 Assessment Inventory Boundaries

The physical components included within this assessment boundary comprise:

- Demolition of the existing multi-storey car park
 - Site preparation and facilitating works
 - Excavation and groundworks
 - Substructure - foundations, basement and retaining walls.
 - Reinforced concrete structural frame – columns and beams
 - Upper Floors and roof
 - Staircases and lift structures
 - External walls and façade systems
 - Windows and external doors
 - Internal walls and partitions
 - Internal doors
 - Finishes – wall, floor and ceiling
 - Building Services (MEP) – electrical, heating, ventilation, water, wastewater, photovoltaic installations, lifts, fire suppression systems, etc.
 - External Areas – paver blocks, road, landscaped areas
 - Relevant maintenance, repair and replacement impacts over the 60-year study period.
- End-of-life impacts (C1-C4), with benefits and loads beyond the system boundary reported separately under Module D.

3.6 Data Sources & Inputs

Data limitations

The WLC model has been developed using information available at the current planning/design stage. Where detailed structural, MEP or product information is unavailable, quantities and material specifications have been estimated using architectural information, OCLCA Carbon Designer outputs and reasonable early-stage assumptions.

The current project information includes planning drawings, elevations, project specifications and MEP design intent. Detailed plant schedules, final material selections and coordinated structural information remain subject to further design development.

Particular uncertainty remains regarding below-ground construction, foundation and pile dimensions, reinforcement quantities, slab construction and concealed building elements. The material inventory should be updated where more detailed project information becomes available.

RICS building category	Building element	Basis for information
Demolition	Existing car park	Pre-demolition audit/ existing building drawings
Groundworks	Excavation	OCLCA early-stage assumption based on basement arrangement
Substructure	Foundations, basement and ground floor elements	OCLCA Carbon Designer and architectural information
Frame	Columns, beams, shear walls	OCLCA Carbon Designer / early-stage structural assumptions/ architectural drawings
Upper Floors	Structural floor slabs	OCLCA Carbon Designer/ drawings
Roof	Roof structure and covering	Architectural drawings and OCLCA
External Walls	Brickwork and metal cladding	Architectural elevations and specification
Windows & External Doors	Windows and external doors	Architectural elevations/plans
Internal Walls & Partitions	Internal partitions	OCLCA Carbon Designer and project specification
Finishes	Walls, floors and ceilings	Architectural/RDS information
Services / MEP	HVAC, electrical, water, drainage, fire protection, etc.	MEP design strategy and OCLCA GIA-based assumptions

Table 5. Data sources of the whole-life carbon assessment

3.7 Key Inputs, Assumptions And Design Specifications

STRUCTURE				
Category	Sub-element	Quantity	Unit	Material / assumption
Basement	Basement	609	m ²	Reinforced concrete
Foundation	Piles, Pile Caps, Ground Beams	1,877	m ²	RC with 25% GGBS, 97% recycled reinforcement.
	Cleanliness / blinding	1,877	m ²	Concrete
	Ground slab	1,877	m ²	Suspended RC slab -25% GGBS, 97% recycled reinforcement.
Frame	Columns	1,236	m	RC with 25% GGBS and up to 97% recycled reinforcement.
	Beams	4,394	m	
	Shear walls	234	m	
Upper Floors	Struct Floor slabs	6,618	m ²	
Stairs & Ramps	Staircases	186.25	m	
Roof	Roof slab	1,558	m ²	
	Roof covering	1,558	m ²	Standing-seam zinc / roof build-up
ARCHITECTURE – ENVELOPE				
External Walls	External walls	3,280	m ²	Predominantly facing brick, precast brick slips
	Metal cladding	690	m ²	Standing-seam metal cladding
Windows & External Doors	Windows	1,277	m ²	Powder-coated aluminium, double glazing units
	External doors	26	m ²	Powder-coated aluminium
Underground Walls	Basement / Retaining walls	396	m ²	Reinforced concrete shear retaining walls
External Features	Balconies	639	m ²	Aluminium/steel/glass with decking
ARCHITECTURE – INTERNAL ELEMENTS				
Internal Walls & Partitions	Internal walls & partitions	10,989	m ²	Blockwork, Plasterboard faced blockwork, metal stud partitions, hygienic wall lining systems
Internal Doors	Internal doors	1648	m ²	Timber doors
Wall Finishes	Internal wall finishes	24,477	m ²	Paint / hygienic wall lining where required
Floor Finishes	Floor finishes	8,658	m ²	Carpet, resilient/non-slip vinyl, other specified finishes
Ceiling Finishes	Ceiling finishes	8,658	m ²	Plasterboard / GI suspended ceiling systems

Table 6: Data assumptions and inputs of the embodied carbon assessment of the structure and the architectural elements

SERVICES / MEP				
Category	Sub-element	Quantity	Unit	Assumption / system
Heating / Cooling	Heat distribution	8,658	m ²	ASHP-based heating and hot water
	Cooling	8,658	m ²	Cooling bolt on
Ventilation	Ventilation	8,658	m ²	MVHR / local extract
Electrical	Electrical installations	8,658	m ²	LV electrical distribution
Lighting	Lighting	8,658	m ²	LED lighting
Water	Water distribution	8,658	m ²	Boosted cold water
Drainage	Wastewater drainage	8,658	m ²	PVC drainage
Fire Protection	Fire suppression	8,658	m ²	Fire detection systems
Vertical Transport	Lifts	5	units	Passenger/bed size lifts
Telecommunications	Telecoms	8,658	m ²	ICT/BMS infrastructure
Renewables	PV	495	m ²	Roof-mounted PV
GROUNDWORKS/ SITE				
Groundworks	Excavation	3,268	m ³	Basement excavation allowance
Site / Existing Building	Demolition	11,800	m ²	Refer Pre-Demolition Audit
External Works	Pavers	10120	kg	Paving stones
	Roads	500	m ²	Polished concrete pavers
	Roof garden	590	m ²	Vegetation mat for green roofs
	Landscaped areas	1200	m ³	Structural growing medium for trees

Table 7: Data assumptions and inputs of the embodied carbon assessment of the services and external elements

OTHER ASSUMPTIONS

LCA Modules	Details of assumption
Transport Distances A4	Transport distances and vehicle types were assumed based on typical UK construction supply chains and logistics. These will be refined at later design stages when material suppliers and procurement routes are confirmed. • Bulk Structural Concrete- 25 km_ Rigid Concrete Mixer Truck • Steel/ Metal- 120km_ Articulated HGV (40t) • MEP & Internal Fixtures- 200 km_ Articulated HGV (40t)
Construction stage A5	Construction site energy consumption and installation impacts (Module A5) are modelled using software-defined regional baseline benchmarks, to be refined during detailed design.
Use phase B2-B5	Repair and replacement cycles have been modelled based on typical component Reference Service Lives (RSL) of materials and systems.
End of Life C1-C4	Modelled via standard UK default scenarios in the absence of product-specific EPDs: • Concrete & Inert Masonry: crushed and reused as aggregate (on/ offsite) • Steel/aluminium: Diverted to standard regional recycling streams. • Timber: Energy recovery via controlled downstream incineration
Module D	Benefits and loads beyond the system boundary are reported separately and are not included within the main A1–C4 total.

Table 8: Summarises the key assumptions made for LCA stages A4-C4

4.0 RESULTS

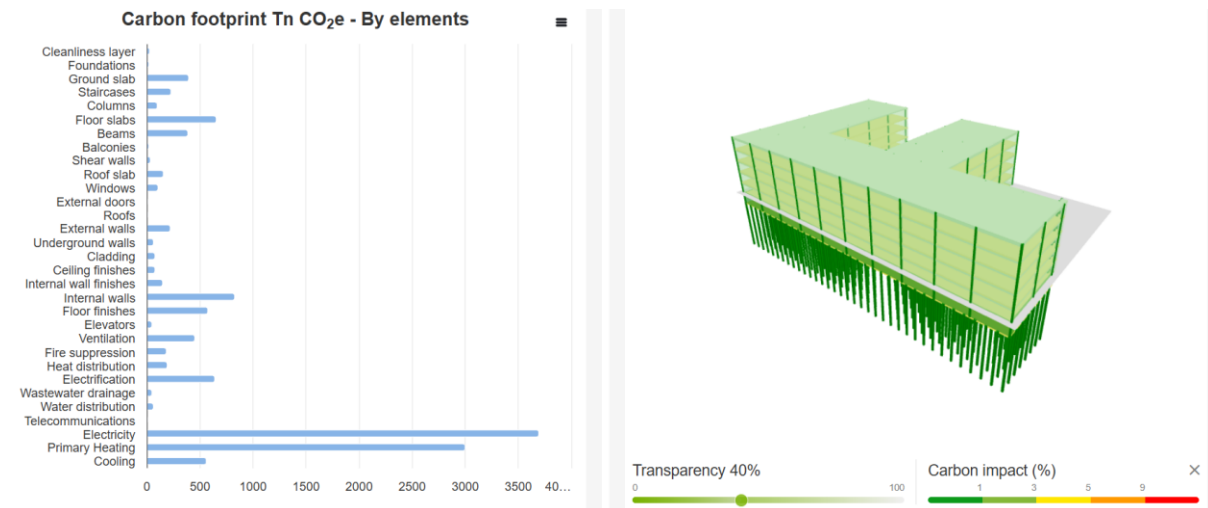


Fig 3: Results calculated on OneClick LCA

4.1 Summary Of WLC Results

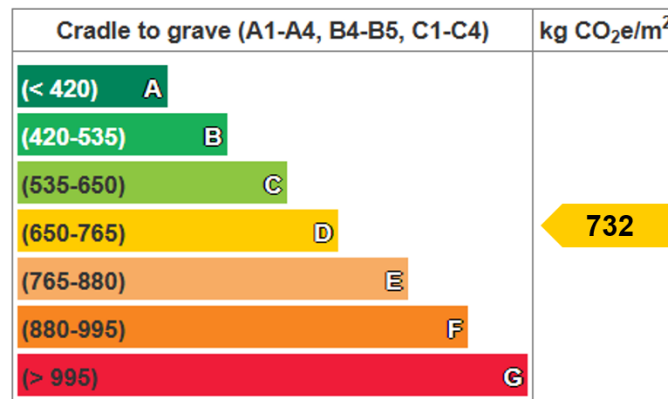


Fig 4: Embodied carbon benchmark against generic residential buildings in 2025 in the United Kingdom, Source: OneClick LCA

(excluding biogenic carbon)	Module A1-A5	Module B1-B5	Module C1-C4	Total embodied carbon A1-C4
GWP Total Decarbonised Scenario kgCO ₂ e/m ²	443.8	249.79	51.92	732.2
GWP Total Non-Decarbonised Scenario kg CO ₂ e/m ²	443.8	330.82	51.92	761.36

Table 9: Summarises the WLC performance of the proposed development under the assessed electricity-grid scenarios

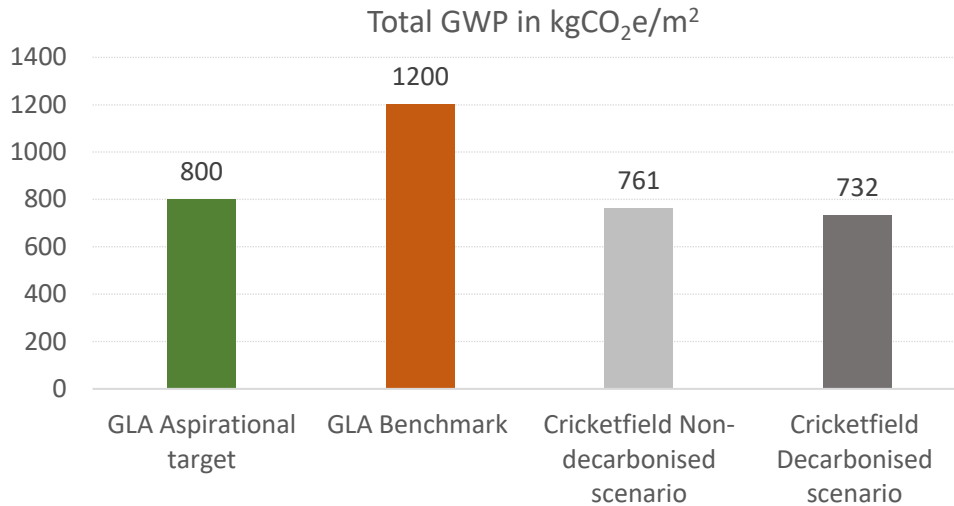


Fig 5: Demonstrates that the development performs below both the current GLA benchmark of 1,200 kgCO₂e/m² and the aspirational benchmark of 800 kgCO₂e/m².

4.2 Detailed Performance Breakdown

Life cycle stage	A1-A5	B1-B5	B6-B7	C1-C4	D (not included in totals)	Total
Unit for impacts	kg CO₂e	kg CO₂e	kg CO₂e	kg CO₂e	kg CO₂e	kg CO₂e
0.1 Demolition	42			203,911		203,953
0.2 Facilitating works	4,740	0		0		4,740
1. Substructure	624,844	0		52,876	-75,116	677,821
2. Superstructure	2,134,487	431,660		160,685	-381,139	2,620,199
3. Finishes	177,371	488,513		11,043	-95,503	668,719
4. FFE						
5. MEP	706,725	1,145,052	17,139,000	6,968	-821,266	18,997,706
6. Prefabricated units						
7. General maintenance		564				564
8. External works	99,232	96,864		14,465	-44,809	210,525
Other construction impacts	94,200					
Total GWP A1-C4	3,842,480	2,162,727	17,139,000	449,598	-1,417,833	23,478,426
Total A-C excl B6 & B7, incl seq carbon						6,339,384

Table 10: Summarises the WLC performance of the proposed development categorised by RICS building element and life-cycle module.

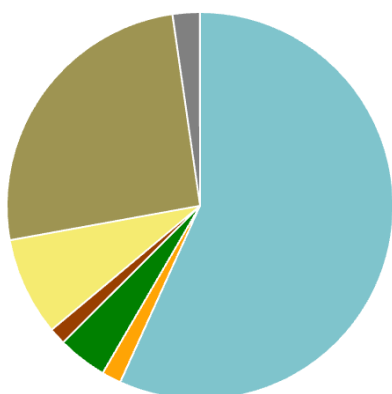
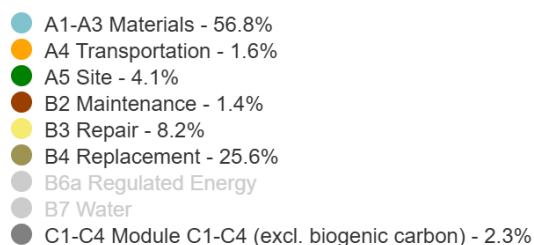
Breakdown by Life-cycle modules

LCA Modules	GWP
Product stage (A1-A3)	3,490,040
Transport to construction site (A4)	99,780
Installation/Assembly (A5)	252,660
Use stage (B1-B5)	2,162,727
Energy/Water use (B6-B7)	17,139,000
End of life stage (C1-C4)	449,598
Beyond the system boundary (D)	-1,417,833
Sequestered Carbon	-115,420
Total A-C kgCO₂e (incl sequestered carbon; excl Module D)	23,478,426

Table 11: Whole-life carbon GWP breakdown by life-cycle modules

Note: For a granular, tabular breakdown of each individual building classification and its corresponding emissions across all life-cycle stages, please refer to the data tables in Appendix 8.1

TOTAL kg CO₂e - Life-cycle stages



TOTAL kg CO₂e - Classifications

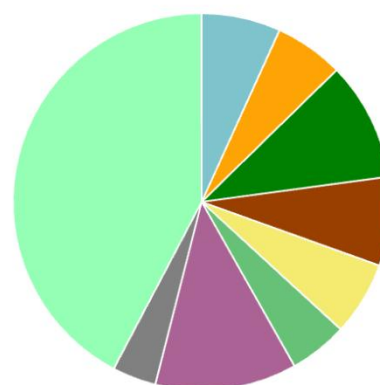
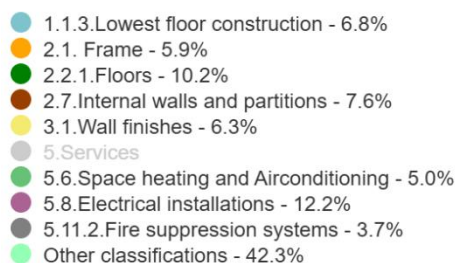


Fig 6: Embodied carbon GWP by lifecycle stages (left) and building element category (Right). B6 and B7 are excluded from the plotted results.

LCA Breakdown by material, building category – Dual Grid scenarios

Global warming potential - Non-Decarbonised scenario (GWP-total-Non-Decarbonised Scenario) grouped by Building element breakdown

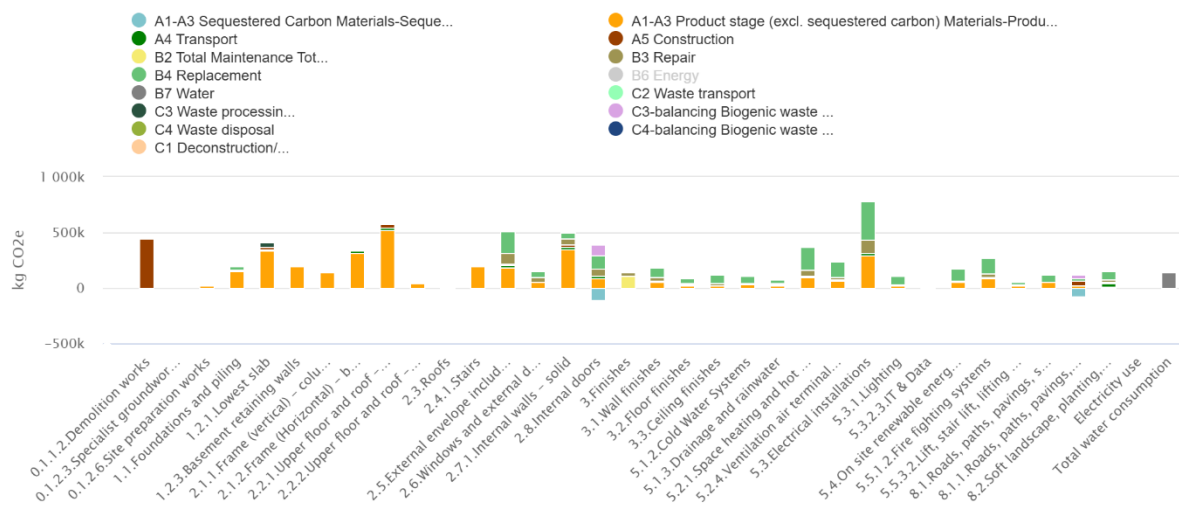


Fig 7: GWP of the proposed development– **Non-Decarbonised** (Static) Scenario grouped by Building element breakdown – categorised by LCA stages

Global warming potential - Decarbonised scenario (GWP-total-Decarbonised Scenario) grouped by Building element breakdown

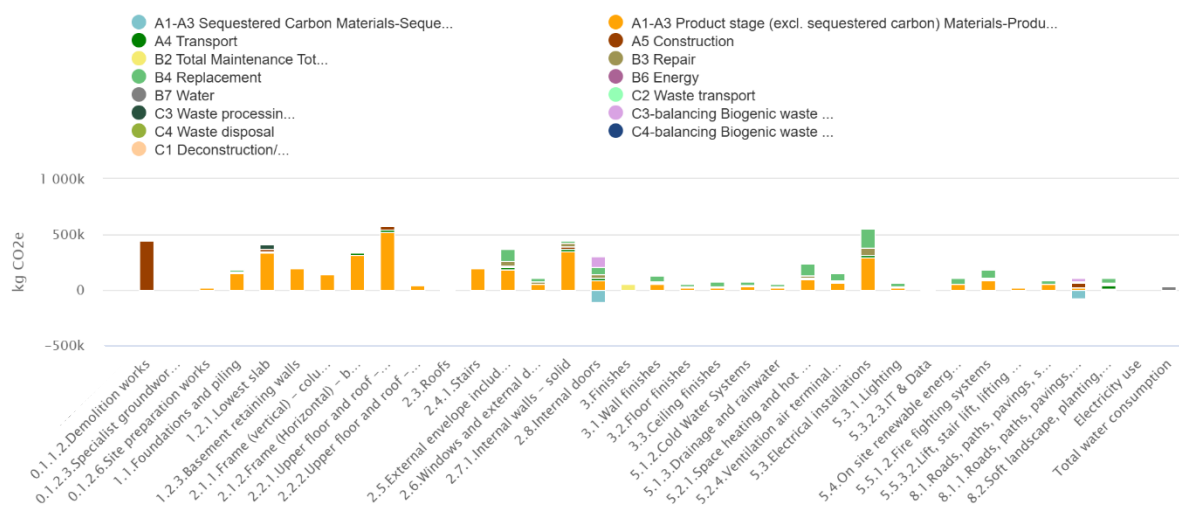


Fig 8: GWP of the proposed development **Decarbonised** (FES) Scenario grouped by Building element breakdown – categorised by LCA stages

As illustrated in the graphs above, the **demolition impacts** associated with Module C1 represent a material contribution to the overall life-cycle carbon profile and remain consistent across both grid scenarios. The A1–A5 and C1–C4 impacts are also broadly unchanged between the non-decarbonised and decarbonised scenarios, as these impacts are largely independent of the future electricity-grid trajectory. In contrast, the **B3–B4 impacts associated with the repair and replacement of building elements, particularly finishes and MEP systems**, are higher under the non-decarbonised scenario. Under the decarbonised FES scenario, these impacts reduce because of the assumed reduction in electricity-grid carbon intensity over the 60-year assessment period.

4.3 Hotspot Analysis & Key Findings

The building-element breakdown identifies the principal sources of whole-life carbon within the proposed development. Structural elements, particularly the **reinforced concrete substructure, frame and upper floors**, represent significant contributors to the upfront carbon profile due to the quantity of material required for the proposed development.

The use-stage profile also identifies notable impacts associated with finishes and building services. Internal finishes contribute significant B3–B4 impacts as a result of repair and replacement cycles over the 60-year study period. **Building services** similarly generate significant life-cycle impacts through their maintenance and replacement requirements. **Module B6 represents the largest individual life-cycle contribution**, reflecting the long-term operational energy demand of the 24-hour specialist care facility over the 60-year assessment period.

The **demolition of the existing car park contributes approximately 204 tCO₂e** through Module C1. While this represents a smaller carbon contribution than the principal structural and building-services categories, demolition is significant from a circular-economy and material-resource perspective due to the substantial quantity of materials arising from the existing building. The pre-demolition assessment identifies reinforced concrete, reinforcement steel, steel guardrails and railings, and existing brickwork as the principal material streams, with opportunities for reuse, reclamation and recycling identified within the pre-demolition audit.

Overall, the hotspot analysis identifies **structural materials – like frame and floors, MEP installations and demolition-related material arisings** as the principal areas influencing the whole-life carbon profile of the proposed development. These findings inform the carbon-reduction measures incorporated into the current design and the further reduction opportunities identified for subsequent design stages.

Data uncertainty: The assessment remains subject to refinement as structural design, MEP plant schedules, specifications, supplier information and product-specific EPDs become available.

5.0 STRATEGIES TO REDUCE WHOLE-LIFE CARBON

The proposed development incorporates several strategies to reduce upfront embodied carbon and support circular economy objectives.

5.1 Low-Carbon, Recycled and Reused Materials

1. **LOW-CARBON CONCRETE MIXES** – The stage 2 model assumes a minimum **25% Ground Granulated Blast-Furnace Slag (GGBS)** replacement of Portland cement has been incorporated within the in-situ concrete specification for the substructure, frame and upper floor slabs. Opportunities to increase GGBS replacement levels within substructure elements will be reviewed during technical stages, subject to structural requirements.

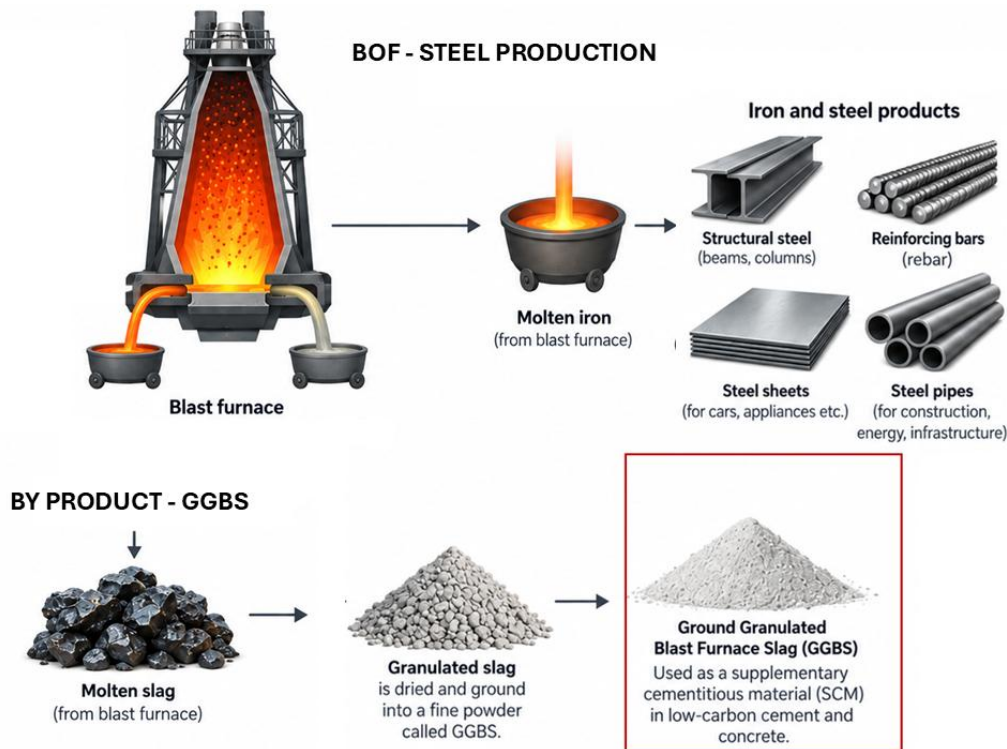


Fig 9: Ground granulated Blast-furnace Slag – obtained as a by-product of steel production

2. **CRUSHED OR RECYCLED AGGREGATES** – The use of recycled concrete aggregate (RCA) within selected structural concrete mixes is proposed as a potential measure to support the project's recycled-content and Circular Economy objectives. Its incorporation will be subject to mix design, technical requirements and supplier availability.

Approximately 9,275 tonnes of concrete arisings are anticipated from demolition works. The project will seek opportunities to process and reuse suitable concrete material on site as recycled aggregate or engineered fill. Where on-site recycling is not feasible, demolition arisings will be diverted to approved recycling facilities and equivalent recycled aggregate products sourced through the supply chain.

3. **RECYCLED REINFORCEMENT STEEL** – Structural reinforcement is assumed to be sourced from Electric Arc Furnace (EAF) production routes, achieving recycled content of **90–97%**, significantly reducing embodied carbon compared with conventional virgin steel production- (See Fig 10).

Collectively, these measures support the project's circular economy objectives and reduce reliance on virgin material resources. Recycled content levels and material sourcing assumptions will be refined during detailed design and procurement stages.

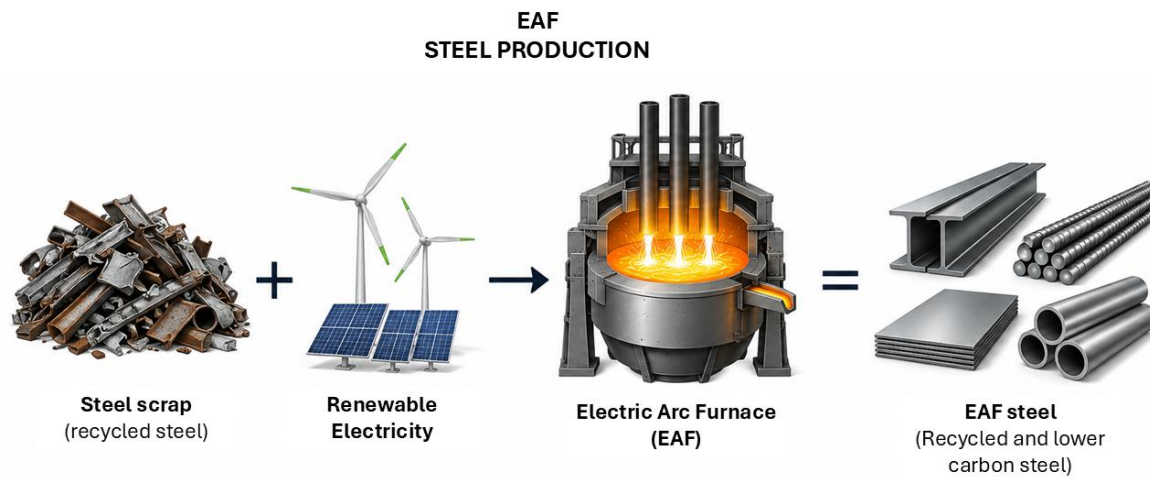


Fig 10: Recycled steel, obtained via EAF steel production

5.2 Minimise Operational Energy Use – B6

The proposed care home adopts an **all-electric MEP strategy**, incorporating ASHP-based heating and hot water, low-temperature heat distribution, MVHR and other mechanical ventilation systems, LED lighting and roof-mounted PV.

The total operational energy impacts modelled within Module B6 are:

- Energy Use Intensity (EUI) = 104 kWh/m²/yr
- Regulated energy consumption (HVAC, hot water, lighting, etc.) = **444,976 kWh/yr**
- Unregulated energy consumption (equipment, internal loads, etc.) = **431,873 kWh/yr**
- Total Renewable energy generated = **105,834 kWh/yr**
- Total development electricity consumption = **876,849 kWh/yr**

Carbon emissions of B6 = 17,000 tonnes CO₂e

Module B6 represents the largest lifecycle contribution, reflecting the long-term operational energy demand of the 24-hour specialist care facility over the 60-year study period.

5.3 Minimise the carbon emissions of operational water use- B7

Water-efficient fixtures and low-flow fittings will be specified throughout the development to reduce potable water demand and associated carbon emissions.

The total carbon emissions associated with operational water use B7 are as follows:

- No. of beds = 160
- Water demand target = 105 litres/person/day
- Annual water consumption = 6,130 m³

Carbon emissions of B7 = 139 tonnes CO₂e

5.4 Minimising Waste

- The project commits to a **95% diversion from landfill by weight** for all non-hazardous demolition and construction waste.
- Concrete comprises approximately **93% (9,275 tonnes)** of the identified demolition waste. At the construction stage, the contractor will evaluate the feasibility of crushing, cleaning, and stockpiling this concrete for direct on-site reuse as structural sub-base or piling mats. If on-site processing proves unviable during contractor selection and site constraint reviews, the concrete will be hauled to the nearest commercial recycling facility, and certified recycled aggregates will be procured to maintain circular economy objectives.

- For detailed management, tracking, and metric breakdowns of all secondary waste streams, refer to the **Circular Economy Statement**.

5.5 Material Selection

Material selection should prioritise:

- Third-party verified EPDs or CIBSE TM65 data where EPDs are unavailable for building services;
- High recycled-content materials for steel or aluminium components such as glazing frames and metal cladding;
- Locally available materials where appropriate;
- low-carbon concrete and masonry solutions for the façade.

6.0 FURTHER REDUCTION STRATEGIES

The hotspot analysis identifies structural materials, finishes and building services as key areas for further carbon reduction. As the project progresses through RIBA Stages 3 and 4, the following opportunities will be investigated and refined as detailed design, structural information and procurement data become available.

1. **Substructure Concrete (GGBS):** Evaluate the structural viability of increasing the Ground Granulated Blast-furnace Slag (GGBS) replacement level from 25% to 50% within foundation elements. If implemented, this intervention offers a potential site-wide carbon reduction of approximately 20 kgCO₂e/m².
2. **Increase recycled aggregate content** where technically appropriate. Investigate increasing recycled aggregate content, potentially up to 50% in suitable foundation elements, subject to structural, durability and specification requirements.
3. **Optimise structural quantities** through detailed structural design and rationalisation of spans, slab thicknesses, beams and columns.
4. **Internal Partitions:** Investigate the use of high-recycled-content galvanised steel sections for internal studwork. This has the potential to reduce embodied carbon compared with higher-carbon steel alternatives, subject to recycled content, production route, availability and procurement.
5. **Internal Finishes:** Apply appropriate durability and reference service life (RSL) criteria to flooring, ceiling and wall finishes to minimise repair and replacement impacts over the 60-year study period.
6. **Building Services:** Specify MEP installations that prioritise component longevity, modular maintenance access, and high operational efficiency, balancing long-term embodied impacts against operational carbon benefits.
7. **Verified EPD Procurement:** Prioritise the specification of materials and products that hold third-party verified Environmental Product Declarations (EPDs). Substituting generic industry datasets with manufacturer-specific EPDs during detailed design will improve the accuracy of the Whole Life Carbon assessment and often yields measurable reductions in the final reported footprint.

7.0 CONCLUSION

This Whole Life Carbon Assessment has been prepared to support the planning application for the proposed 160-bed specialist residential care home at Cricket Field Road, Uxbridge. The assessment has been undertaken at RIBA Stage 2 using the architectural, specification and MEP information available at planning stage, supplemented by reasonable early-stage assumptions where detailed structural, plant and product information is not yet available.

The assessment evaluates the development over a 60-year reference study period and presents results under both non-decarbonised and decarbonised electricity-grid scenarios. The calculated whole-life carbon intensity is **761 kgCO₂e/m² GIA under the non-decarbonised**/static scenario and **732 kgCO₂e/m² GIA under the decarbonised** FES scenario, representing a difference of approximately 4%.

Both results are below the current **GLA WLC benchmark of 1,200 kgCO₂e/m² GIA** and within the **aspirational benchmark of 800 kgCO₂e/m² GIA**. The assessment therefore demonstrates that the proposed development is currently within the applicable GLA whole-life carbon benchmark range at planning stage.

The assessment incorporates several carbon-reduction measures, including low-carbon concrete, high recycled-content reinforcement, opportunities for demolition material reuse/recycling and an all-electric MEP strategy incorporating ASHPs, MVHR, LED lighting and PV.

Further reductions will be pursued through structural optimisation, increased recycled-content materials, lower-carbon procurement, improved durability and service life of finishes and building components, optimisation of MEP systems, and the use of manufacturer-specific verified EPD data.

As the project progresses through RIBA Stages 3 and 4, the Whole Life Carbon Assessment should be updated to incorporate coordinated structural quantities, detailed MEP plant schedules, final material specifications, supplier information and verified product-specific environmental data. Continued assessment and review will enable the design team to monitor carbon performance and identify further opportunities to reduce the whole-life carbon impact of the proposed development.

8.0 APPENDIX

8.1 GLA WLC Template

Estimated WLC emissions							
N.B. This forms the WLC baseline for the development. The green cells will automatically populate from the tables below							
	Module A1-A5 (excluding sequestered carbon)	Modules B-C (excl B6 & B7)	Modules A-C (excl B6-B7; incl sequestered carbon)	Module B1-B5	Module B6-B7	Module C1-C4	Module D
TOTAL kg CO ₂ e	3,842,480 kg CO ₂ e	2,612,325 kg CO ₂ e	6,339,384 kg CO ₂ e	2,162,727 kg CO ₂ e	17,139,000 kg CO ₂ e	449,598 kg CO ₂ e	-1,417,833 kg CO ₂ e
TOTAL kg CO ₂ e/m ² GIA	443.8068376	301.724	732.200	249.7952183	1979.55648	51.92858836	-163.7598753
Please select most appropriate benchmark from drop-down menu	Residential						
WLC Benchmark	<850	<350	<1200				
Aspirational WLC Benchmark	<500	<300	<800				
Comparison with WLC benchmarks (see Appendix 2 of the guidance)	The proposed development achieves a whole life carbon intensity of 761 kgCO ₂ e/m ² GIA under the non-decarbonised/static scenario, below the current GLA benchmark of 1,200 kgCO ₂ e/m ² GIA and within the aspirational benchmark of 800 kgCO ₂ e/m ² GIA. The corresponding decarbonised FES scenario is 732 kgCO ₂ e/m ² GIA.						

Table 12: Estimated WLC Emissions total development – summary

MATERIAL QUANTITY AND END OF LIFE SCENARIOS		Product and Construction Stage (Module A)		Assumptions made with respect to maintenance, repair and replacement cycles (Module B)	Material 'end of life' scenarios (Module C)	Benefits and loads beyond the system boundary (Module D)	
Building element category		Material type	Material quantity (kg)			Estimated reusable materials (kg)	Estimated recyclable materials (kg)
Note/example		Breakdown of material type	65000 kg	For all primary building systems (structure, substructure, envelope,	Declare 'end of life' scenario as per project's Circular Economy Statement, and used in the WLC assessment to produce Module C results	0 kg	25 kg
		e.g. Reinforcement	5000 kg			2 kg	8 kg
		e.g. Formwork	250 kg			0 kg	0 kg
0.1	DECONTAMINATE: Toxic/Hazardous/Contaminated Material Treatment						
0.2	Major Demolition Works	Concrete, masonry, steel	9,977,830			0	9,478,939 kg
0.3	Temporary Support to Adjacent Structures						
0.4	Specialist Ground Works						
1	Substructure	Concrete, piled foundation, DPM, screed	7,167,963.78	Permanent life	concrete crushed to aggregate, steel recycling	0 kg	6,451,167 kg
2.1	Superstructure: Frame	Reinforced concrete	1,660,932	Permanent life, B3-0%, B4-0%	Concrete crushed to aggregate, steel recycling	0 kg	1,494,839 kg
2.2	Superstructure: Upper Floors	RC slabs, insulation, plasterboard, steel supports,	10,466,026	Permanent life, B3-1%, B4-0%	concrete crushed to aggregate, steel recycling, insulation-landfilling, cement mortar used in backfill, plastic based incineration,	0 kg	8,896,122 kg
2.3	Superstructure: Roof	RC slabs, Standing-seam zinc, bitumen sheets, weather membrane, soil	614,903	Permanent life, >25 yrs, B3-5%, B4-0%	concrete crushed to aggregate, steel recycling, insulation-landfilling, plastic based incineration,	0 kg	491,922 kg
2.4	Superstructure: Stairs and Ramps	Reinforced concrete	1,077,119	Permanent life, B3-1%, B4-0%	concrete crushed to aggregate, steel recycling	0 kg	969,407 kg
2.5	Superstructure: External Walls	Facing brick and metal cladding, brick slips, insulation, cement board	1,275,126	15-30 yrs, B3-2%, B4-2%	inert brick crushed to aggregate, wood and plastic incineration, landfilling for insulation	0 kg	956,345 kg
2.6	Superstructure: Windows and External Doors	Aluminium DGU units	31,972	30 yrs, B3-5%, B4-4%	90% metal recycling, close loop recycling for glass	0 kg	28,775 kg
2.7	Superstructure: Internal Walls and Partitions	Blockwork, plasterboard, metal stud, etc	1,415,394	30 yrs, B3-3%, B4-2%	Steel sections recycling/ reusing, concrete crushed to aggregate, Gypsum recycling, wood incineration, plastic incineration	0 kg	1,061,546 kg
2.8	Superstructure: Internal Doors	Timber	72,857	20 yrs, B3-5%, B4-5%	wood containing product incineration	0 kg	7,286 kg
3	Finishes	Paint, hygienic wall lining, carpet, vinyl, plasterboard, precast cladding	443,302	10-15 yrs, B3-10%, B4-5%	Gypsum recycling, wood incineration, plastic incineration	0 kg	132,991 kg
4	Fittings, furnishings & equipment (FFE)						
5	Services (MEP)	HVAC, hot water, electrical installations, PV, Lifts, drainage	99,388	15-20 yrs, B3-2%, B4-5%	90% metal containing product recycling	0 kg	49,694 kg
8	External works	Roads, pavements, landscape	2,878,817	10-15 yrs, B3-3%, B4-5%	Reuse on site, recover asphalt, recycle as aggregate	1,439,409 kg	2,446,994 kg
		TOTAL	37,181,630 kg			1,439,409 kg	32,466,026 kg
		Material intensity (kg/m2 GIA)	4,294 kg/m2 GIA			166 kg/m2 GIA	3,750 kg/m2 GIA

Table 13: Material Quantities and End of life (EOL) Scenarios

GWP POTENTIAL FOR ALL LIFE-CYCLE MODULES (kgCO ₂ e)		Sequestered carbon(kg CO ₂ e)	Product stage (kgCO ₂ e)	Construction process stage (kgCO ₂ e)	Use stage (kgCO ₂ e)							End of Life (EoL) stage (kgCO ₂ e)				TOTAL Modules A-C kgCO ₂ e	Benefits and loads beyond the system	
					Module B							Module C						
					[A1] to [A3]	[A4]	[A5]	[B1]	[B2]	[B3]	[B4]	[B5]	[B6]	[B7]	[C1]			[C2]
Building element category																	Module D	
0.2	Major Demolition Works	0	4740			0										203,953 kg CO2e		
0.4	Specialist Ground Works													0		4,740 kg CO2e		
0.5	Temporary Diversion Works															0 kg CO2e		
1	Substructure	0	569000	20900	35000			0						11200	41700	21.2	677,821 kg CO2e	
2.1	Superstructure: Frame	0	426000	16400	22900			0						14900	1200		481,400 kg CO2e	
2.2	Superstructure: Upper Floors	0	572000	23600	30300			618	1010	0				14700	1400	1.64	643,630 kg CO2e	
2.3	Superstructure: Roof	-2120	141000	4660	8090			15900	37000	0				3280	3020	76.2	210,906 kg CO2e	
2.4	Superstructure: Stairs and Ramps	0	191000	8250	10200			0						4680	452		214,582 kg CO2e	
2.5	Superstructure: External Walls	0	159000	2820	9880			45500	36900	0				2440	260	87.5	256,888 kg CO2e	
2.6	Superstructure: Windows and External Doors	0	55700	86.6	570			30800	50400	0				1220	21.6	0.278	138,798 kg CO2e	
2.7	Superstructure: Internal Walls and Partitions	0	344000	3490	20000			46500	46500	0				3860	3050	325	467,725 kg CO2e	
2.8	Superstructure: Internal Doors	-105000	83300	363	1690			45800	74800	0				279	105000	37.9	206,270 kg CO2e	
3	Finishes	-8300	170000	1290	6080			86600	116000	0				2430	8530	88.8	668,719 kg CO2e	
4	Fittings, furnishings & equipment																0 kg CO2e	
5	Services (MEP)	0	697000	1620	8120			203000	942000	0	17000000	139000		6340	540	85.6	18,997,706 kg CO2e	
6	Prefabricated Buildings and Building Units																0 kg CO2e	
7	Work to Existing Building							451	113								564 kg CO2e	
8	External works	0	77300	16300	5630			535	96300	0				8400	6060		210,525 kg CO2e	
Other site construction impacts or overall construction stage [A5]					94200												94,200 kg CO2e	
TOTAL kg CO ₂ e		-115420	3490040	99780	252660	0	87051	504766	1570910	0	17000000	139000	203911	73729	171234	724	23,478,426 kg CO2e	
TOTAL kg CO ₂ e/m ² GIA		-13	403	12	29	0	10	58	181	0	1964	16	24	9	20	0	2712	
																	-1417833	
																	-164	

Table 14: Detailed emissions of the development GWP Potential for all life-cycle module

8.2 Existing Building Assessment

Material	Arising waste (tonnes)	Direct reuse potential	Recycling potential	Preferred management route
Reinforced concrete	9,275.78	Low	Very high	On-site crushing where practicable; otherwise, off-site recycling
Reinforcing steel	376.81	Low	Very high	Separate during demolition and recycle
Steel railings	19.06	Potential	High	Dismantle for reuse; recycle remaining material
Existing brickwork	306.18	High Potential	High	Carefully dismantle/salvage suitable bricks for reuse; recycle remaining brickwork
Existing paving	To be confirmed	High Potential	High	Lift carefully and assess for reuse

Table 15: Summary of waste arising from demolition and recommendations

Building Element	Material	Estimated Quantity	Unit	Arising waste (tonnes)
TOTAL BRICKWORK	Brick	170.10	m³	306.18
Superstructure – Floors	Reinforced concrete	3,126.74	m³	
Superstructure – Columns	Reinforced concrete	182.72	m³	
Superstructure – Stairs	Reinforced concrete	72.00	m³	
Substructure – Foundations	Reinforced concrete	86.40	m³	
Substructure – Pile Caps and piles	Reinforced concrete	351.87	m³	
Substructure – Ground Beams	Reinforced concrete	45.00	m³	
TOTAL CONCRETE	Concrete	3,864.73	m³	9275.78
Superstructure – Reinforcement	Reinforcing steel	338.14	tonnes	
Substructure – Reinforcement	Reinforcing steel	38.67	tonnes	
TOTAL REINFORCEMENT	Reinforcing steel	376.81	tonnes	376.81
External / Envelope	Steel guardrails	14.06	tonnes	
Staircases	Steel staircase railings	5.00	tonnes	
TOTAL METAL RAILINGS	Steel railings / guardrails	19.06	tonnes	19.06

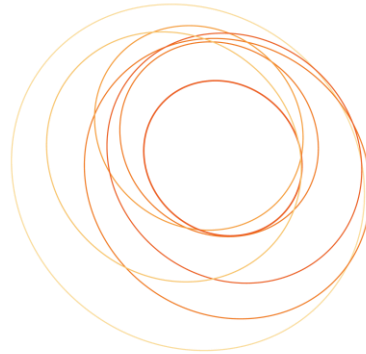
Table 16: Existing Building Material Inventory

8.3 Most Contributing Materials

No.	Resource	Cradle to gate impacts (A1-A3)	Of cradle to gate (A1-A3)
1	Ready-mix concrete, generic, C32/40, 25% GGBS in cement, CEM II/B-S portland-slag cement	1,522 tonnes CO2e	43.60%
2	Reinforcement steel (rebar), generic, 97% recycled content	210 tonnes CO2e	6.00%
3	Clay brick	205 tonnes CO2e	5.90%
4	Medium duty perforated hot-dip galvanized steel cable tray	199 tonnes CO2e	5.70%
5	Polyurethane rigid foam insulation board	101 tonnes CO2e	2.90%
6	Acoustic door with wooden frame	83 tonnes CO2e	2.40%
7	Red brick, average production, UK,	80 tonnes CO2e	2.30%
8	Stone wool insulation, L= 0.037 W/mK, R= 5.41	79 tonnes CO2e	2.30%
9	Brick-faced precast cladding panel, C16/20, 0% recycled binders	66 tonnes CO2e	1.90%
10	ASHP based Water heater 150 kg/unit	59 tonnes CO2e	1.70%
11	Stone wool (mineral wool) insulation, 22% slag content	56 tonnes CO2e	1.60%
12	Monocrystal photovoltaic panels	55 tonnes CO2e	1.60%
13	Ready-mix concrete, generic, C30/37 , 0% recycled binders in cement	51 tonnes CO2e	1.50%
14	Hot-dip galvanized steel sheets, 0% recycled content	46 tonnes CO2e	1.30%
15	Ceramic glazed tile	43 tonnes CO2e	1.20%
16	Weber floor smoothing screed, 5-50mm layer thickness	39 tonnes CO2e	1.10%
17	Float glass, single pane	31 tonnes CO2e	0.90%
18	Exterior rendering from soil-lime mixtire	28 tonnes CO2e	0.80%
19	Building installation cable, 3-core, PVC insulated	28 tonnes CO2e	0.80%
20	Hot-dip galvanized steel sound attenuator for ventilation systems	24 tonnes CO2e	0.70%
21	Cement mortar, gross density: 2000 kg/m3	23 tonnes CO2e	0.70%
22	Ready-mix concrete, generic, C16/20, XC1, 25% GGBS in cement, CEM II/B-S portland-slag cement	23 tonnes CO2e	0.70%
23	Extruded aluminium profiles for window and door frames, generic, 40% recycled content	21 tonnes CO2e	0.60%
24	Steel pipes, STD, DN 100 mm	21 tonnes CO2e	0.60%
25	Passenger elevator car , electrical controls, counter weight, drive and motor of traction	20 tonnes CO2e	0.60%

Table 17: Most contributing materials by percentage. Source – OneClick LCA Export (Sept 2026)

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LIVERPOOL OFFICE

114 Century Buildings, Tower Street,
Brunswick Business Park,
Liverpool, L3 4BJ.

0151 319 2820



CHESTER OFFICE

Cestrian House, Lightfoot Street,
Hoole, Chester, CH2 3AD.

01244 315 568



CONWY OFFICE

15 Connaught House
Riverside Business Park,
Benarth Road, Conwy, LL32 8UB.

01492 550 338