125 Shaftesbury Avenue

Whole Life Carbon Assessment

Prepared by SWECO SUSTAINABILITY

Submitted on behalf of VREF Shaftesbury SCS

November 2024

Contents

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Revisions & Author Details

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Executive Summary

1.1 Results Summary

This Whole Life Carbon assessment (WLCA) has been prepared on behalf of VREF Shaftesbury SCS (the 'Applicant') by Sweco UK for the remodelling, refurbishment and extension of 125 Shaftesbury Avenue, London, WC2H 8AD (the Proposed Development) in the London Borough of Camden (LBC). This report sits alongside the following documents, which should be read together as a complete set of information for the purposes of planning:

- Energy & Sustainability Statement
- Condition & Feasibility Study
- Pre-Demolition Audit
- Circular Economy Statement

The Proposed Development can be summarised as:

"Remodelling, refurbishment and extension of the existing building to provide Use Class E commercial and retail space, amenity terraces, a new public route, relocated entrances, cycle parking, servicing and rooftop plant along with associated highway, landscaping and public realm improvements and other associated works."

The Proposed Development takes a 'retrofit first' approach, focusing on maximising the retention of the existing structure, with the Materials Index Pre-Demolition Audit reporting that 74% of the existing building materials are retained insitu. The Proposed Development delivers a total uplift in area of 10,434 m^2 GIA, delivering a total of 33,297 m^2 GIA of Class E commercial and retail space. Facades and building services are replaced in full to deliver optimal balance between embodied carbon retained from the structure and enhanced operational energy performance.

The WLCA has been conducted in accordance with the GLA Whole Life-Cycle Carbon Assessments Guidance (March 2022), with some relevant amendments based on latest industry assessment methodologies, as set out in Section 2. The GLA reporting template has also been issued as an Excel file alongside this report. The results in this report represent emissions reported at an early stage of design (pre-RIBA Stage 2), and therefore suitable contingencies and assumptions are applied.

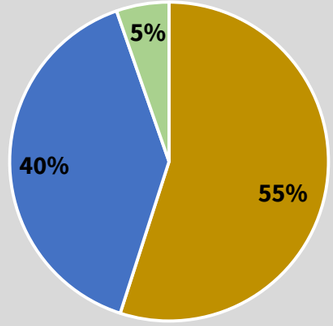
The reported upfront embodied carbon results are 18% lower than the GLA benchmark for commercial offices, underlining the benefits of strong structural retention at this early stage of the WLC process. The scheme also benefits from a strong baseline position on steel and concrete procurement, as well as specifying MEP equipment with refrigerant GWPs <700 in all systems. The A-C embodied carbon is also below the GLA benchmark, and further consideration is given to the issues associated with estimating early-stage impacts in Modules B & C in section 5. There are significant further reduction opportunities that have not yet been taken and will be explored in detail with the supply chain, as set out in Section 1.2 and Section 6, that may contribute to further reductions in emissions at the specification level.

Summary Results – Overall WLC

	Modules	Intensity	
Upfront Embodied Carbon	**A1-A5**	**783**	**kgCO₂e/m² GIA**
Life Cycle Embodied Carbon	**A-C (ex. B6 & B7)**	**1,380**	**kgCO₂e/m² GIA**
Whole Life Carbon	**A-C (inc. B6 & B7)**	**2,017**	**kgCO₂e/m² GIA**

All values inclusive of contingency – see Section 4.1.6
Reported Life Cycle Embodied Carbon (1,380) **includes** sequestration to align with GLA template.

Embodied Carbon Life Cycle Distribution



Modules	Intensity	
A1-A5	**783**	**kgCO₂e/m² GIA**
B1-B5	**566**	**kgCO₂e/m² GIA**
C1-C5	**76**	**kgCO₂e/m² GIA**

Above reported values **exclude** sequestration to align with reported values in Row 361 of the GLA Template

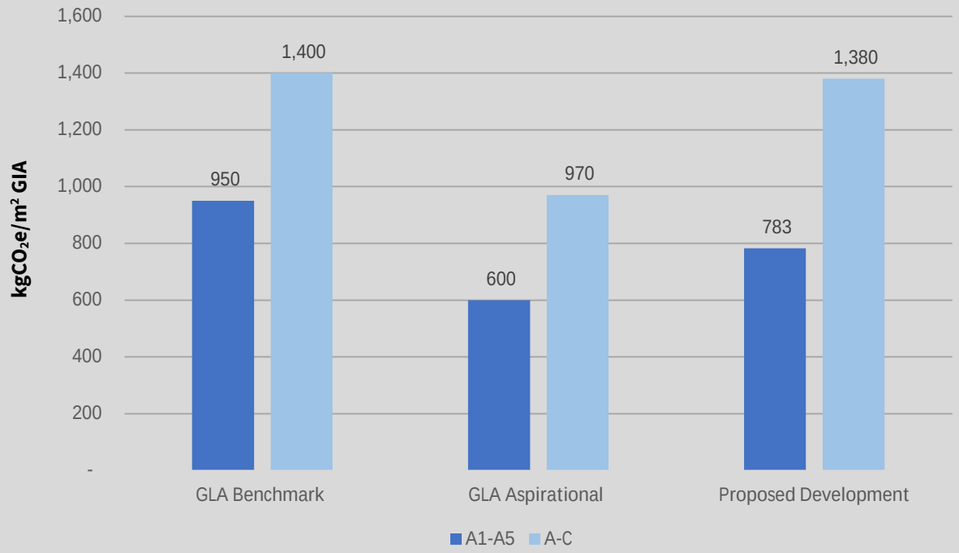
Benchmarking

D	**LETI**	**Upfront Embodied (A1-A5)**
BEN	**GLA WLC Benchmarks**	**Upfront Embodied (A1-A5)**
BEN	**GLA WLC Benchmarks**	**Life Cycle Embodied (A-C)**

BEN = GLA Benchmark

ASP = GLA Aspirational

GLA Benchmarks, Project Target & Planning Performance



Top 5 Future Reduction Opportunities

Rank	Option	Potential Saving $kgCO_2e/m^2$ GIA A1-A5
1	Target steel carbon factor of 0.33 $kgCO_2e/kg$ (rolled sections only)	-53
2	Calcium sulphate raised access flooring	-41
3	Target 10 kgCO2e/m2 GIA for site activities	-20
4	Target low-carbon aluminium in facades	-10 to 15
5	Target product-specific EPDs for lifts	-10

1.2 Opportunities & Next Steps

A set of further reduction opportunities have been established for the Proposed Development and are captured in the GLA reporting template and summarised in Section 6 of this report. Given the early stage of the WLCA modelling, the WLCA model includes a number of assumptions (both in the carbon data selection and within the quantity surveyor's quantities that inform the study) and utilises market typical-carbon data, aligned with the RICS Professional Statement Second Edition. Specification-level commitments to low-carbon materials beyond those included in the base design require detailed supply chain interrogation and contractor/trade input, which will be provided when these processes commence during the next stage of design (see also approach in Section 11.11 of the Energy & Sustainability Statement). Therefore, confidence in what can be quantified and relied upon to steer future optimisation is low at this stage, and the opportunities listed below will be explored in the correct way at the right time in the design process.

The future opportunities to be explored for the Proposed Development can be summarised as follows:

- **Structural steel:** the current steel allowances in the planning WLCA model include for a 50/50 split procurement of electric arc furnace (EAF) steel and market-typical blast furnace steel. While this is a strong starting position, structural steel is still the most emissive material overall for the Proposed Development. During the latter design stages and into construction, the project team will look to further optimise the steel procurement to increase the quantum of low carbon steelwork and explore opportunities to deploy reused sections for the scheme, subject to availability and suitability for the intended use.
- **Raised access flooring:** alternative options for raised access flooring (RAF) will be explored at the next stage, including tiles with EAF steel coatings, calcium sulphate cores and reused tiles (subject to market availability). These opportunities will be tested with the supply chain and against the project performance parameters.
- **Low-carbon aluminium:** options for using low-carbon aluminium in the facades will be explored, including hydroelectrically-produced aluminium and aluminium with a higher recycled content.
- **Concrete:** concrete will be tested for further optimisations and $kgCO_2e/m^3$ targets will be set for concrete mixes to control the carbon content.
- **Rebar:** alternative suppliers for rebar will be reviewed, and opportunities considered for procurement of rebar with higher recycled content and from local manufacturers.
- **Challenging baseline data:** gathering actual product data for products such as lifts and building services equipment is like, in Sweco experience, to yield further potential reductions in carbon. The assumptions in the current model are conservative and reflective of early-stage information, and the contingency should also reduce during the latter project stages.

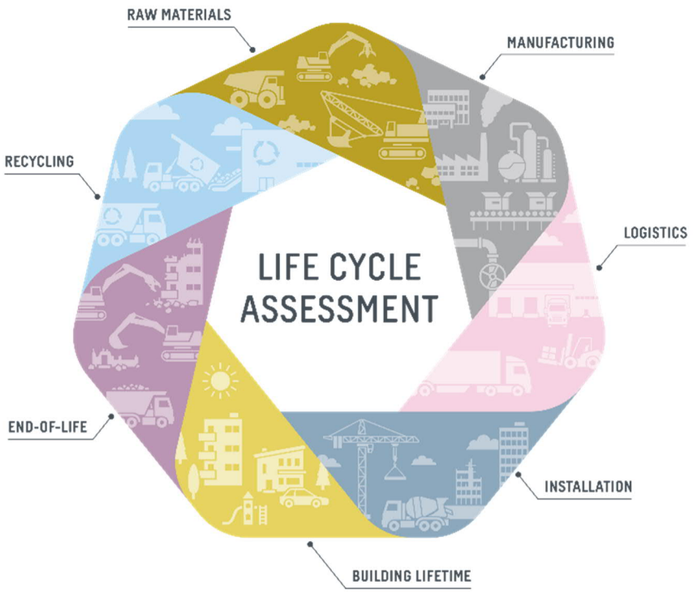
Introduction & Planning Context

2.1 Introduction

A Whole Life Carbon Assessment (WLCA) is viewed as an essential component of successful futureproofed sustainable development, and the core strategies of this methodology have been integrated into design at the pre-application stage. Engagement with WLCA allows the project team to consider both embodied and operational carbon impacts and interrogate the synergies and interplay between these two-key performance metrics.

Whole life carbon emissions are those associated with the construction, use, and eventual deconstruction of a development over its whole life cycle, considering impacts of construction materials, along with their repair, maintenance, and replacements, as well as regulated, and unregulated operational carbon emissions. The process follows the method set out in EN 15978:2011, which is the European methodology for life cycle assessment. The generalised life cycle stages included in a typical WLCA are seen in Figure 2.1 below. Refer to further detail in Section 2.2.

Figure 2.1: Sweco visual of the life cycle assessment stages included in a WLCA.



It is acknowledged that the proportional impact of embodied and operational carbon over a building's life cycle is beginning to change; the focus in the past few decades has been almost solely on tackling operational carbon emissions, with embodied carbon impacts largely dismissed. However, as the industry continues to innovate, and drive down operational energy consumption, and its consequent emissions, the importance of embodied carbon impacts become more pronounced. For an energy-efficient, electric-led building in 2024, embodied carbon emissions can make up >70% of the whole life cycle impacts; therefore, it is not reasonable to claim to have developed a low-carbon development without a strategy to address and reduce the embodied carbon impacts associated with materials.

The Proposed Development aims to provide a strategy that looks at every stage of the development's life cycle to establish targets, and goals for reducing embodied carbon. The concept is to move away from the linear economy and treat the development more like a 'resource bank', which begins with establishing what can be reused from the existing building, and ends with a strategy for deconstruction, recycling, and reuse at the conclusion of the development's design life.

This WLCA appendix links closely with the Circular Economy Statement (CES) and the 'Materials' section of the Energy & Sustainability Strategy and should be read in conjunction with that section.

2.2 Planning Context - GLA

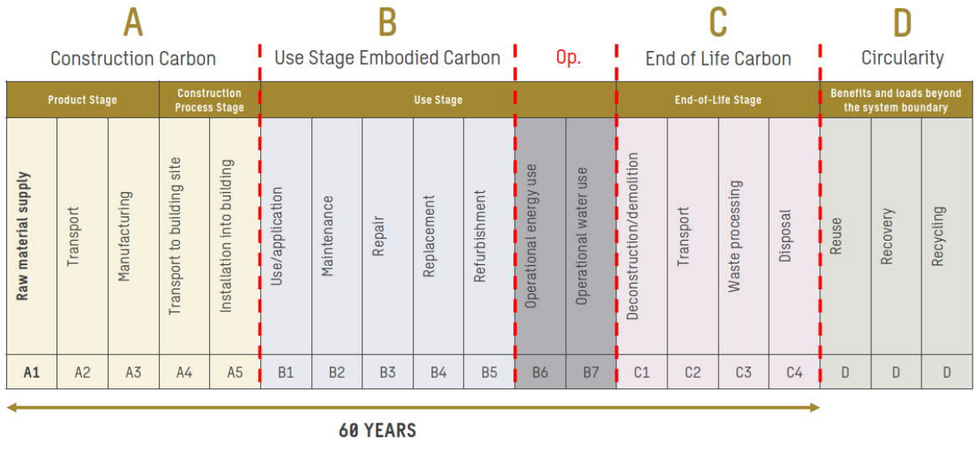
The GLA's London Plan 2021 explicitly notes a requirement for WLC assessment for new developments within Policy SI 2 (F), which is supported by their London Plan Guidance Whole Life-Cycle Carbon Assessments (LPG WLCA) publication, released in March 2022. This is required for all referable developments, and also by many local authorities in London.

Policy SI 2 Minimising greenhouse gas emissions

F Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

The LPG WLCA guidance sets out the requirements for a whole life carbon assessment. A WLCA is to be completed in accordance with EN 15978:2011 and the RICS Professional Statement Whole life carbon assessment for the built environment (2017) publication, henceforth referred to as the 'RICS PS' in this application document. The RICS PS is the most comprehensive methodology available for assessment of UK buildings against EN 15978:2011, which itself was not built specifically to assess buildings, but rather to set out the calculation rules and modular grouping structure of life cycle stages in the assessment. The modular grid and life cycle assessment stages under EN 15978:2011 are set out below in Figure 2.2. Note that the GLA guidance is based on the 2017 First Edition of RICS PS. Recent updates have an impact on reportable results (refer to Section 2.4).

Figure 2.2: image to show the modular grid structure of EN 15978:2011 and the typical development reference study period (RSP) in a WLCA (60 years).



A WLCA needs to cover all modules from A-D to be in compliance with the LPG WLCA guidance and thus Policy SI 2 (F) of the London Plan 2021. It also covers a reference study period (RSP) of 60 years which is in accordance with the RICS PC study period allocations and LPG WLCA guidance section 2.5.3. Unless specifically stated otherwise in Section 2.1, the RSP for this application submission WLCA is 60 years.

In terms of reporting and benchmarking in relation to module coverage related to the elemental grid allocations of EN15978, there are three key terms that are used to describe reported module coverage that are used throughout this assessment document. These are in accordance with the typical nomenclature of industry bodies and benchmarking from RIBA, LETI and the UKGBC. These are as follows:

Whole Life Carbon

EN 15978:2011 Modules A-C <u>including</u> B6 & B7

This includes the embodied operational energy and water emissions and provides the full comprehensive view of whole life carbon emissions.

Whole Life Embodied Carbon

EN 15978:2011 Modules A-C, <u>excluding</u> B6 & B7

This includes embodied carbon emissions over the life cycle only (modules A-C), and excludes emissions associated with operational carbon and water consumption.

Upfront Embodied Carbon

EN 15978:2011 Modules A1-A5

This covers embodied carbon associated with Modules A1-A5 only, which is commonly known as 'upfront' embodied carbon. This is the embodied carbon that occurs from raw material extraction up to the practical completion boundary. It is also sometimes known as 'construction carbon'. Any offsetting to achieve Net Zero under the UKGBC (2019) definition is related to Modules A1-A5 only.

The LPG WLCA is typically conducted in three stages, as defined in Section 2.2 of the March 2022 publication. These stages are as follows:

Part 1 – Pre-Application

Submission of the GLA WLCAG pre-application narrative tab, setting project WLC intent and providing information in line with LPG WLCA section 3.1.

Part 2 – Planning Submission Stage

Submission of the reporting template with relevant tab filled out (outline/detailed) providing comprehensive WLCA for the building design at the time of application, in line with LPG WLCA guidance section 3.2.

Part 3 – Final Post-Construction Stage

Submission of the LPG WLCA template with the post-construction tab filled out with all relevant data as required and noted under WLCAG Section 3.3.

This appendix report represents a supporting document for 'Part 2' of the LPG WLCA process, with the completion of the WLCA template for a detailed planning application.

The latest LPG WLCA template is included with this planning application submission. This is submitted as an MS Excel document, in accordance with the requirements of the GLA. All relevant fields have been completed in accordance with the requirements of the LPG WLCA guidance. While every effort is made to ensure that this submission template is as accurate as possible, the RIBA Stage and timing of the submission largely dictates the availability and accuracy of a WLCA, particularly where planning submissions are made early in the design process (see also method & assumptions in Section 4). Sweco have an extensive portfolio of RICS-scope WLCAs, and where data cannot be provided for a development due to the timing of the submission, submitted data is either input as a placeholder using guidance from the RICS Professional Statement Second Edition (2023, or is supplemented by actual data from a similar design or readily comparable scheme, to ensure that the fields required by the GLA are completed to the fullest extent.

2.3 Planning Context – Camden

The London Borough of Camden (LBC) take a strong stance on sustainability and have had a number of forward-thinking policies related to this subject in place for a number of years. There are two key adopted planning policy documents from LBC that have been reviewed for relevant WLCA policy during the application process. These are:

- Camden Local Plan (2017)
- Energy Efficiency & Adaptation CPG (January 2021), which supports compliance with policies CC1 of the Camden Local Plan (2017)

The following policies are relevant for this WLCA submission:

Camden Local Plan (2017)

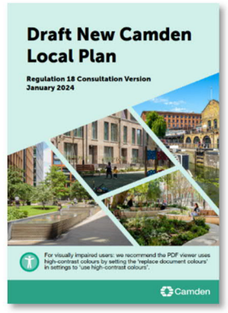
Policy CC1 Climate change mitigation: the policy addresses the importance of limit carbon dioxide emissions from new developments through resource efficiency and retrofitting existing buildings. The policy acknowledges the major embodied carbon emissions associated with new construction materials and all larger developments are encouraged to assess the embodied carbon emissions associated with the development and to consider using low embodied carbon materials.

Energy Efficiency & Adaptation CPG (January 2021)

CPG Chapter 9: Reuse and optimising resource efficiency

The chapter emphasises reusing existing buildings as far as possible as this reduces the requirement for virgin materials and therefore decreases the developments embodied carbon impact. Paragraphs 9.6-9.7 states that if a development is not suitable to be reused and will be completely or partly demolish, the development proposal needs to submit a pre-demolition audit, identifying all materials within the building and documenting how they will be managed. If a proposal involves substantial demolition a Whole Life Carbon assessment will be expected to be submitted.

Draft New Camden Local Plan



Like many local boroughs, LBC is currently in the process of updating it's Local Plan from the 2017 adopted version to a new 2024 update (currently Regulation 18 draft), known as the 'Draft New Camden Local Plan', issued in January 2024. This draft update includes a number of significant changes and enhancements to the sustainability policy. As noted across the wider sustainability submissions for this application, while we recognise that the draft exists and that the requirements are beeing updated and are important the draft carries limited weight while still it remains in this form.

2.4 RICS Professional Statement Second Edition (2023)

The RICS Professional Statement *Whole life carbon assessment for the built environment* Second Edition was released in September 2023 (and updated in November 2023) and has been applied in the industry since 1st July 2024. This replaces the extant RICS Professional Statement First Edition, which was first released in 2017. The RICS methodology is the central methodology through which WLCA is conducted in the UK, and provides a set of rules, assumptions and modelling requirements that UK developments should adhere to. It is the foremost WLC calculation methodology in the UK and one of the most onerous and robust of such methodologies in Europe. Compliance with all industry benchmarks and targets requires WLC assessors to comply in full with the RICS Professional Statement.

The GLA LPG Whole Life-Cycle Carbon Assessments (March 2022) guidance makes direct reference to the RICS Professional Statement, with paragraph 2.4.4 making it clear that applicants should follow the RICS Professional Statement when completing WLCAs to comply with GLA policy, except in a few instances where the GLA deviates from this (because of the 5 year gap between RICS Professional Statement First Edition issue in 2017 and GLA guidance issue reflecting changes in approach and considerations for reporting).

Both the GLA guidance document and the reporting template and based on the 2017 version of the RICS Professional Statement. At present, it is unclear when the GLA will update their proformas and guidance to accommodate the changes within the RICS Second Edition, or whether the GLA guidance will differ in some ways from the updated RICS document. This puts developments being submitted during the interim period in an awkward position, where updated best-practice guidance is readily available representing the most robust industry-approved approach to conducting WLCA, but the planning guidance and tools are not built to accommodate some of these changes, nor are the impacts of these changes on planning submission carbon reporting conducted at early project design stages readily able to be understood by planning officers and members.

The Applicant feels strongly that the WLCA should be conducted using the most up to date and robust industry methodology guidance available at the time of submission, so we are submitting this WLCA using the RICS Professional Statement Second Edition. However, as we also need to complete the GLA reporting for submission to LBC, this represents a 'hybrid' or abridged approach to WLCA reporting for planning. Table 2.4.1 explains how we have identified and managed some of these key methodology changes and how we will report them in the WLCA submitted for planning.

Table 2.4.1: identifying the key methodology changes in the RICS Professional Statement Second Edition (RICS PS SE) that impact a WLCA submission and how we have accommodated these within the extant GLA reporting template.

Methodology/Guidance Item (RICS PS Second Edition 2023)	How this has been included in this submission for GLA reporting
Preconstruction Demolition – RICS now requires demolition to be reported in Module A5 (A5.1) and included in upfront emissions	Sweco have continued to report demolition in C1-C4 in the appropriate boxes of the GLA template, but it is at least included in the assessment for review and reporting.
Inclusion of contingency margins (15% margin applies at RIBA Stage 2)	All values included in the GLA template include appropriate margin applied for this stage. Refer to Section 4.1.6 for detail. The margin is wrapped into the reported figures in the GLA sheet, not reported as a separate figure.
Application of long-term material and energy decarbonisation within the model – new guidance and reporting rules, creation of secondary matrix for reporting.	Decarbonisation has not been applied to either life cycle embodied carbon modules (B & C) or Module B6 for this model and is not reportable in the GLA template.
New rules for refurbishments – need to quantify existing materials that may be replaced within the RSP (i.e., retained facades) and include their impacts in Modules B & C	Item not specifically relevant to the Proposed Development as retained structural materials assumed to last the life cycle of the new RSP.
Material assumption specifications (A1-A3) have been updated (RICS PS SE Table 16)	Unless otherwise determined by design specification, base material assumptions are aligned with RICS PS SE Table 16.
Transport assumptions (A4) have been updated (RICS PS SE Table 17)	Base transport assumptions are aligned with RICS PS SE Table 17. Note that transport assumptions also now include a return leg for transports as well as just transports to the site from supplier.
Construction activities (new RICS PS SE Module A5.2) – where unknown assume 40 $kgCO_2e/m^2$ GIA for this.	Given the extent of retention on this scheme, and consequent reduction in site emissions, 20 $kgCO_2e/m^2$ GIA has been used (50% of RICS value). Previous RICS (2017) was based on 1400 $kgCO_2e$/£100k project value.
A5 waste % assumptions have been updated (RICS PS SE Table 18) and are now reported as A5.3	Waste % values updated to new RICS assumptions in Table 18 but are reported against each building element in the GLA template in column F.
Modules B2 and B3 – calculation updates	The RICS PS SE actually aligns now with the GLA guidance, so this remains as previously reported for GLA assessments.
Module B4 assumptions related to service lives of different components have been extended and updated (RICS PS SE Table 20)	Unless otherwise determined by design specification, material and product replacement cycles are aligned with RICS PS SE Table 20.
Module B6 (operational energy) – updates to reporting and quantum of data/information expected to be reported.	There is no mechanism for reporting this additional information within the GLA template. The application still reports regulated and unregulated energy as single values, using the CIBSE TM54 methodology.
New Module B8 – reporting emissions associated with user activities.	This is an optional reporting module in RICS PS SE and is not accounted for in the assessment. There is no reporting functionality for this in the GLA template, and therefore it has been excluded.
Module C1 – End of Life Demolition – updates assumptions based on a % of A5	It is possible to report this in the GLA template, and therefore a % of A5.2 has been used and reported in the GLA template, distributed across the elemental categories.
Modules C2-C4 – end of life materials treatment and management – various changes and scenario creation required	The One Click LCA tool, which Sweco use as our modelling tool for WLCA, has not been updated to allow for the application of inputs set out in RICS PS SE for C2-C4. Therefore, these need to remain as per GLA guidance and the RICS PS 2017.

In addition to the lack of update to the GLA template tool, the central tool that is used for the WLCA modelling by Sweco, One Click LCA (GLA-approved modelling tool), also needs to be updated to accommodate the changes within the updated RICS Professional Statement Second Edition. At the time of this submission, One Click LCA have not yet updated their tool to accommodate this. As a result, our ability to fully implement some of the new methodology approaches is limited by the tool itself (see C2-C4 item in Table 2.4.1 in particular). There is a beta testing tool available, but it is unreliable and cannot be used for the purposes of the planning submission.

Regardless of the current limitations of using One Click LCA in relation to the RICS Professional Statement Second Edition, Table 2.4.1 clearly identifies that there are a large number of new methodology measures that can in fact be readily applied at this stage. It is the opinion of the Applicant that where these new best practice approaches can in fact be applied, they should be, to improve the robustness and comprehensiveness of the WLCA.

It should be understood however that this will likely mean that numbers submitted for planning will be higher than those LBC would traditionally see under the previous RICS PS (2017) and LPG WLCA guidance/methodology. This is because:

- Inclusion of **contingency margins** within reported values (as is best practice) as per Section 4.1.6 has a significant impact on reportable values but is required because of the stage of submission and uncertainties within the assessment at this stage. This is the most significant impact on reportable values at application stage.

- The Applicant has initially **aligned EPD selections and A1-A3 data with RICS PS SE (2023)** assumptions, given that actual procurement of low carbon materials remains a risk at this stage due to lack of defined specification and limited input from the design team. We have identified a number of key measures we will look to progress at the right time during specification and procurement to achieve our project targets.

- The majority **of transport also contains a return leg** and the associated emissions in line with current best practice, so A4 will be proportionally higher than LBC may expect for a building under this type issued with historic submission.

- **Module B4 also includes replacements of existing materials** over the 60 year RSP and thus will be higher than historic submissions for commercial refurbishment as this rule did not exist under past RICS PS (2017) and GLA guidance. However, as the Proposed Development retains only the structure, and this is designed to last for a further 60-year design life, there are no B4 impacts to be counted under this specific change in method do this is considered n/a for the Proposed Development WLCA.

Project Information

3.1 The Existing Building

The existing building at 125 Shaftesbury Avenue, located in the LBC sits between the distinct character areas of Soho, Covent Garden, Seven Dials and Bloomsbury. The building was constructed in 1982, making it approximately 42 years old at the time of writing this report. The current use of the building, which aligns with the original design intent, is as a commercial office with retail space spanning across one level of basement, the ground floor, and ten upper floors. A recent refurbishment was undertaken in 2018 and early 2019. Please refer to the Condition & Feasibility study for further information on the specifics of the existing building.

Figure 3.1.1: image of the existing building at 125 Shaftesbury Avenue.

The area measure report undertaken by Plowman Craven identifies an existing gross internal area of 22,863 m^2 GIA.

Our understanding of the existing building has been informed by multiple building surveys, assessments, and technical due diligence (TDD) reports, which help us to explore the various details and design/construction factors that inform our approach to the Proposed Development in Section 3.2.

The key features of the existing building are as follows:

Building Structure

The primary frame of the existing building is made of reinforced concrete (RC), with slabs supported by RC columns and walls. The slabs consist of a combination of flat RC slabs and ribbed infills of varying dimensions, all supported by band beams. There are two main life safety and stair cores, along with two additional stair cores located to the west of the site. These cores provide stability, extending continuously to the foundation and having a thickness of approximately 200mm.

The building features a single basement that covers the site footprint and is accessible via a vehicle ramp from the ground floor. The substructure primarily consists of 300mm RC perimeter retaining walls and under-reamed piles with pile caps (larger caps are present beneath the cores), along with a ground-bearing 300mm thick RC slab supported by pile caps. There is some variation in the levels of the basement structural slab, resulting in internal headroom that typically ranges between 3.5m and 4.75m, depending on the specific location within the basement.

Roofs & External Envelope

The roof coverings are in a sound condition, some being only installed 2018. The main flat roofs over the 10^{th}, 9^{th}, 6^{th} and 1^{st} floor levels, are of inverted nature and consists out of RC decks with asphalt coverings, cold applied liquid roof membrane, rigid insulation and pebble ballast finish. The building tapers in at every level from the sixth floor, creating various roof terraces with liquid applied roof membrane and a pebble ballast finish. The roofs feature RC upstands topped with brick slip capping.

Facades

The existing facades feature brick-clad precast concrete mullions and uninsulated spandrel beams attached to the slab edges or to the concrete columns. The windows were updated during the 2010s fit out with new double-glazed units with aluminium frames. Overall, the facades are in poor condition, with numerous cracks and defects in the cladding, which has led to temporary remedial measures such as netting on the parapets to reduce the risk of falling debris. The current façade system does not contribute positively to the streetscape; its monotonous, dark, and oppressive appearance detracts from the surrounding buildings in the area.

Internal Finishes, Fittings and Wall Systems

The reception area features an exposed double-height ceiling, vinyl concrete-effect flooring, and painted walls. At the back, automatic key-controlled turnstiles lead to the stair core and lift lobby. Finishes in the stair cores include vinyl flooring, painted plasterboard walls, timber skirting, and steel balustrades. The lifts, situated in the central core, feature bespoke finishes and decorations.

Levels 1-9 were subjected to the 2018 and 2019 refurbishment. The office spaces primarily feature a large open-plan layout with exposed ceilings, carpet tiles, and painted plasterboard walls. The floors also host individual meeting rooms and workspaces, finished with carpet tiles and

suspended ceiling tiles. Each floor includes tea points, and a satellite kitchen is located on the 9th floor. The office spaces primarily feature a large open-plan layout with exposed ceilings, carpet tiles, and painted plasterboard walls. Individual meeting rooms and workspaces are also present on these floors, finished with carpet tiles and suspended ceiling tiles. Each floor includes tea points, and a satellite kitchen is located on the 9th floor.

On the 2nd floor, there is a staff restaurant with a fully equipped industrial kitchen. Additional bespoke areas include event spaces, presentation auditoriums, and multi-purpose rooms.

Gender-divided WCs are situated in the central core of each floor and in the secondary core on floors 1-6. The finishes are consistent across all floors, featuring tiled flooring, ceramic sanitaryware, and a combination of tiled and wallpapered walls.

Building Services

The existing MEPH equipment remaining service life is adequate as they were installed during the previous fit out, and a good proportion of the equipment could be considered for onward reuse.

The existing building services systems is comprised of an all-electric VRF-led heating and cooling solution. Most of the heating, cooling and ventilation plant can be found at roof levels (VRF units, AHUs etc.) across L10 and L07, with most of the central electrical equipment (HV/LV etc.) found at basement level across electrical plantrooms. There are no PV panels, water recycling or other such measures within the current building. Although the majority of the measured floor area achieves an EPC rating of B, the operational energy consumption of the existing building remains poor, even after the most recent fit out and services installations, suggesting a more fundamental change is required to achieve the kind of energy performance expected to meet today's onerous energy efficiency and reporting standards.

3.2 The Proposed Development

The Proposed Development for 125 Shaftesbury Avenue aspires to create a high-quality, low-carbon, mixed-use development that is historically and environmentally sensitive, focusing on a Regenerative Approach (refer also to Section 1.4 of the Design & Access Statement). A new pedestrian arcade will restore the historic link between Old Compton Street and New Compton Street, enhancing active frontage and site permeability. Additionally, two new public spaces will be created on Caxton Walk and Stacey Street, complemented by green, biodiverse balconies or terraces for tenants at every level. The proposal looks to embrace the forthcoming 'retrofit first' policy by retaining significant elements of the existing structure. The existing roof slab will be demolished, and lightweight structural additions will be added to vertically extend the existing building with two additional levels. The Proposed Development will provide 33,297 m^2 GIA of premium office and retail space.

Figure 3.2.1: image of the Proposed Development [DSDHA].

Full detail on the proposals for the Site can be found within the Design & Access Statement and are not repeated in full here. For the purposes of the WLCA, it is important that they key interventions to each of the building elements modelled as part of this study are identified and described, which assists in the understanding and interpretation of the WLCA results presented in Section 5. This also highlights the extent of retention and redevelopment for the site. This covers each of the key building elements defined by the RICS Professional Statement and describes what level of intervention has been applied to each. The interventions are then modelled using the cost plan data from the quantity surveyor and information highlighted within Section 4 of this report. Table 3.2.1 overleaf describes these interventions.

Table 3.2.1: key interventions into the existing building by building element to deliver the Proposed Development and inform the WLCA.

Building Element	Key Interventions & Information
Structure	74% of existing structure retained (see also the demolition drawings included in the submission pack). Infills and lateral extensions to retained floorplates in steel & composite metal deck construction. Vertical extension floors in same. Existing column strengthening in defined locations. New core positions proposed for north and south. New RC flat slab to ground floor where existing demolished. Large extent of substructure retained. Where new cores are required, existing pile caps will be broken out and new pile caps installed.
Roof	New roof and balcony systems & associated build-ups including accessible areas, planting and best-practice thermal performance.
Stairs	New stairs in new cores, and some retained stairs. Proposal also includes additional stair between ground commercial lobby and basement level up to L01 (feature stairs).
Facades & External Doors	Full façade replacement proposed. Main façade typologies include: - Stone-faced and fair-faced precast donut panels & W-panels - Brick-faced precast panels - Stone-faced precast panels - Unitised curtain wall systems (crown) - Double-glazed window units Facades have been designed to achieve strong thermal performance supported by the energy performance and regulatory compliance of the Proposed Development at application stage.
Internal Walls & Doors	Full replacement of internal walls and doors to suit revised layout of the Proposed Development. Mixture of blockwork and plasterboard internal partition systems depending on location.
Finishes & FF&E	Full replacement of internal finishes and FF&E. Current design model reflected in the application is for a Cat A fit out, including raised access flooring. This is included in the WLCA.
Building Services	Full replacement of building services. Air Source Heat Pump-based 100% electric HVAC building services systems with on-floor air provision and delivered by climate islands. Design includes for stormwater storage, PV panels and greywater harvesting systems. A full description of the building services approach is included in the Energy Strategy.
External Works	Includes for external landscaping and public realm improvements within the ownership boundary including landscaping, seating and greening.

Further key information on the Proposed Development that may be useful for review of this WLCA is set out in Table 3.2.2 below.

Table 3.2.2: Key building information for the Proposed Development

Category	Description
Site Address	125 Shaftesbury Avenue London WC2H 8AD
Asset Type	Remodelling, refurbishment & extension
Proposed GIA (m^2)	33,297 m^2
Proposed NIA (m^2)	23,039 m^2
No. Storeys Above Ground	Thirteen [13] storeys (Ground floor and twelve [12] upper levels)
No. Storeys Below Ground	One [1] level of basement.
Building Height (m)	Parapet level + 72.360 m
Planning Use Class	Use Class E

3.3 Proposed Development WLCA Targets

Onerous embodied carbon performance targets have been set for the Proposed Development. These are set in reference to the GLA benchmarks for commercial offices in Table A2.1 of the LPG WLCA guidance and also in appreciation of LBC Policy CC1 and the Energy Efficiency & Adaptability CPG Chapter 9, as well as acknowledging the proposed performance targets under Draft Policy CC$ of the Draft Camden Local Plan. The Proposed Development aspirational embodied carbon targets are as follows:

Table 3.3.1: Proposed Development aspirational embodied carbon targets.

Modules	GLA Benchmark	Project Aspirational Targets
Upfront Embodied Carbon (A1-A5)	**950** $kgCO_2e/m^2$ GIA A1-A5 LETI E	**600** $kgCO_2e/m^2$ GIA A1-A5 LETI C/GLA Aspirational
Life Cycle Embodied Carbon (A-C ex. B6 & B7)	**1400** $kgCO_2e/m^2$ GIA A-C LETI E	**970** $kgCO_2e/m^2$ GIA A-C LETI C /GLA Aspirational

WLC Method & Assumptions

4.1 Methodology

4.1.1 - Introduction

This Section sets out the underwriting methodology used by the Applicant for conducting the planning application WLCA. The approach largely follows the LPG WLCA guidance, except for the variations set out in Section 2.4 of this document in relation to applying current best-practice methodologies including the advice set out within the RICS Professional Statement Second Edition (2023). The Applicant feels that it is important to ensure that the WLCA captures the latest thinking and approaches in relation to conducting robust and meaningful WLCAs.

This methodology summarised how WLCA has been conducted by the Applicant and sets out key information that can be reviewed and quality-assured were this to be required by the planning officers during the determination period.

The WLCA was conducted by Carolina Jogner, Whole Life Carbon Consultant for Sweco UK, between October and November 2024.

4.1.2 – Project Stage & Assessment Implications

The stage at which a WLCA is undertaken is very important for determining the methodology used, assumptions made, and the outturn results presented. It is well understood that the accuracy of a WLCA improves as the design stages progress, with higher degrees of design accuracy at RIBA Stages 3 and 4, and the final construction WLCA providing the most accurate indication of a development's WLC performance.

This assessment has been conducted using preliminary design information with a pre-Stage 2 level of detail. The Proposed Development has not yet reached RIBA Stage 2 of design, and as a result only limited information is available for WLCA modelling. The conclusion of RIBA Stage 2 typically represents the first time sufficient design information is available to conduct a robust WLCA and is a key milestone for WLCA reporting. As this stage has not yet ben completed for the Proposed Development, a number of assumptions have needed to be made (see Section 4.2) and contingencies added (see Section 4.1.6) to manage the limited availability of design information.

With the above noted, it should be understood that this WLCA does not necessarily represent a compromised position, in that the project team have endeavoured to provide sufficient detail to inform a WLCA process. This has included preliminary drawings, base specifications to inform EPD selections, materials quantities from a Quantity Surveyor (QS), façade bay material breakdowns to inform preliminary CWCT calculations, MEPH equipment lists and return of Sweco's RFI schedule, which is used to plug typical information gaps for early-stage WLCAs. This is set out in more detail in Section 4.2.

4.1.3 – WLCA Data Sources

Key building areas information (GIA/NIA) is aligned with the wider planning application documentation and is as set out in Table 3.2.2. This is aligned with the QS measurements and cost plan/bill of quantities. GIA is used for this assessment as per LPG WLCA guidance paragraph 2.6.2.

The majority of material quantities information was derived from the cost plan/bill of quantities, as required under paragraph 2.6.3 of the LPG WLCA guidance. This has been provided by project QS Gardiner & Theobald for the purpose of completing the WLCA at application stage.

There are a few exceptions to this (also detailed in Section 2.4), including:

- **Roof build-ups**: Veretec have provided indicative roof build-ups which inform material selection for roof systems (cost plan only provides m^2 of plan roof area).

- **Facades:** Arup Facades have provided CWCT calculations for three of the main façade types to Sweco. Sweco have use these numbers together with m^2 surface area rates for the different façade typologies provided by G&T. Other facades typologies are entered as placeholder carbon metrics, also provided by Arup Facades.

- **Building Services:** services engineer SWECO have provided a detailed plant and equipment schedule to Sweco to assist in the correct data selection for the WLCA model.

The majority of carbon data comes from the One Click LCA Environmental Product Declaration (EPD) database (see Section 4.1.8 below). All data used for the planning application WLCA for the Proposed Development is based on one or more of the following key standards:

- Verified Type III EPDs in accordance with BS EN 15804 2012+A1:2013 or A2:2019
- Verified Type III EPDs in accordance with ISO 21930: 2017
- Verified Type III EPDs in accordance with ISO 21930: 2007
- Third-party (independently) verified, or peer-reviewed, carbon emissions to ISO 14067. EN 15804 or ISO 21930:2017 should be used as a CFP-PCR where relevant.
- Verified Type III EPDs in accordance with ISO 14025
- Peer-reviewed Life-cycle Carbon Assessment studies in accordance with ISO 14044
- Independently verified or peer-reviewed carbon emissions to PAS 2050:2011. EN 15804 should be used as the product sector specific requirements where relevant.

For Building Services data in particular, Sweco use our own collated database of CIBSE TM65 data to provide an assessment of embodied carbon for MEPH equipment. Where the products have not been specified at the planning stage, 'basis of design' information is used, and is therefore subject to change in the final assessment. We also have created an alignment tool which allows us to model our TM65 data within the One Click LCA tool, which we have used for this submission WLCA (where

appropriate). In accordance with the LPG WLCA guidance section 3.2.12, where TM65 is unavailable for services equipment, a generic 'closest type' EPD has been selected in line with the standards set out in the above bullet-point list.

4.1.4 – Reference Study Period (RSP)

The Reference Study Period (RSP) for this WLCA is **60 years**. This is in accordance with the RICS Professional Statement (first and second editions) and paragraph 2.5.3 of the LPG WLCA Guidance document.

4.1.5 – Reportable Units

The LPG WLCA template allows for reporting of whole life carbon in the following units:

- Total carbon emissions as **$kgCO_2e$**
- Carbon intensity (normalised units) as **$kgCO_2e/m^2$ GIA**

For the purposes of results reporting in this application WLCA, no further units are used.

4.1.6 – Applied Contingencies

As set out in Section 2.4, Table 2.4.1, and Section 4.1.2 of this report, the timing of the WLCA prior to the conclusion of RIBA Stage 2 brings with it a degree of uncertainty. While every effort has been made to mitigate this uncertainty by ensuring that we have QS-verified quantities and key supporting information sufficient to complete a comprehensive WLCA, an early-stage WLCA can simply never be as detailed as one completed with the benefit of Stage 3 or 4 level of design, supply chain input and detailed specifications.

For this reason, the Applicant has chosen to include contingency within the submitted WLCA model. The RICS Professional Statement Second Edition (2023) recommends a contingency margin of 15% during RIBA Stages 1 and 2 of design for emissions reporting. This is to account for undeveloped design detail and to cover 'unknowns' that simply cannot be modelled at such an early stage as their design packages have not progressed. In line with the RIBA 2020 Plan of Works, Stage 2 is 'concept design', and therefore it is highly unlikely that a sufficient level of detail will be available across design packages to inform a wholly reliable WLCA. Contingency is therefore required at an early stage to mitigate this.

While the RICS Professional Statement Second Edition (2023) recommends a 15% contingency, this has not been applied to all of the building elements and inputs. This is because some of the underwriting methodologies such as the CWCT guidance for facades already includes built-in contingency within that calculation, so there would be an element of double counting were an extra 15% to be added on top. Table 4.1.6 below sets out the contingencies applies to each of the building elements in the planning WLCA model.

Table 4.1.6: contingencies added to the calculated emissions for the various reportable building elements under the LPG WLCA guidance and reasoning for application or omission.

Building Element	Applied Contingency (%)	Reasoning
Demolition	15%	Emissions calculation uses generic datapoints and EPDs so unknows remain, and quantities come a site survey and existing survey drawings review by Material Index.
Structure	15%	As per RICS PS SE Guidance
Roof	15%	As per RICS PS SE Guidance
Stairs	15%	As per RICS PS SE Guidance
Facades	0%	Calculated using CWCT methodology, which already includes substantial margins. No additional margin applied so as not to double-count contingencies.
Internal Walls & Doors	15%	As per RICS PS SE Guidance
Finishes	15%	As per RICS PS SE Guidance
FF&E	0%	This is already a placeholder value used for this model based on Sweco portfolio data so includes an element of contingency already.
Building Services	15%	As per RICS PS SE Guidance
External Works	15%	As per RICS PS SE Guidance, but only a very limited area at 125 Shaftesbury Avenue.
A5 Site Activities	0%	Calculation utilises a modified average rate from the RICS PS SE and therefore does not require additional margins to be applied.

The application of margins does add significant emissions to the results of this application WLCA. In total, contingency margins account for an addition of **+78 $kgCO_2e/m^2$ GIA (A1-A5)** and **+162 $kgCO_2e/m^2$ GIA (A-C)** to the reportable results within the GLA WLCA reporting template.

It should be noted that this is applied instead of the '95% coverage by cost' margin required under paragraph 2.6.3 of the LPG WLCA guidance and is therefore a stated deviation from that guidance. Applying the 95% coverage method often came with no basis of evidence and would only ever theoretically add a maximum of +5% to results. The contingencies applied here as per Table 4.6.1

are in line with the latest industry guidance and result in more substantial additions to the reportable carbon results. Therefore, this is considered to be a more robust contingency process for early stage WLCAs.

4.1.7 – Grid decarbonisation

In accordance with Section 2.8 of the LPG WLCA guidance, no grid decarbonisation has been applied to any of the embodied or operational carbon results presented in this WLCA at application stage. This is a minor variance from the RICS Professional Statement Second Edition (2023) which requires a secondary model to be created with decarbonisation scenarios for B & C Module embodied carbon and for operational carbon. However, there is no facility for reporting this within the extant GLA WLCA reporting template, and therefore no grid decarbonisation has been applied.

4.1.8 – Software Modelling Tool

Sweco have used the One Click LCA software to complete the WLCA for the Proposed Development, specifically as a key data source for EPDs that are used at this early stage. One Click LCA is an approved software tool in accordance with Appendix 1 of the LPG WLCA guidance, and includes:

- Coverage of the assessment scope from BS EN 15987:2011 (and a specific GLA tool to aid completion of these assessments)
- Covers Modules A-C, and also allows for Module D to be reported, which is provided line-by-line through the software tool outputs; Sweco do not calculate Module D manually outside of the software.
- Database reflects the country of origin of the material selected.

Sweco use One Click LCA in a modified way. It provides us with the basis of inputs for consistent reporting in line with the LPG WLCA guidance, but Sweco always export our data into excel and use the raw data for reporting. That way we can also add elements and reporting (such as the CWCT guidance) which One Click does not yet have the facility to undertake. It also means that we can employ many of the key criteria of the RICS Professional Statement Second Edition (2023), including our detailed application of contingencies as reported in Section 4.1.6, as the One Click tool is not yet set up to deliver this.

4.2 Model Assumptions & Calculation Information

4.2.1 - Introduction

This section set out the key assumptions that were employed within the model for the completion of the WLCA exercise. As the model conducted for this WLCA at application stage is extensive, with a large number of inputs, this section is non-exhaustive, focusing primarily on the key materials that either represent a significant material quantity or are known to have a significant carbon impact. Where appropriate, this section also provides information on the calculation method used for specific building elements. The main purpose is to provide a bit more supporting evidence where this WLCA may be quality-assured (QA), if required by LBC.

4.2.2 – Pre-Construction Demolition

Emissions associated with pre-construction demolition were calculated using the Pre-Demolition Audit Report (17/07/2024) undertaken by Material Index, and assumptions from the RICS Professional Standard SE.

C1 Emissions (associated specifically with preconstruction demolition process)

This emission is for site works associated with demolishing the existing building, prior to enabling or main construction works. While 74% of the existing structure is retained, all of the rest of the equipment and materials on floors is stripped out back to structure. Therefore, site works for strip out are still assumed to be relatively significant. In the absence of more detail or a more nuanced way of estimating emissions from C1 at this early stage, Sweco have assumed a C1 emission of 3.6 times the existing buildings GIA in line with the First Edition of the RICS Professional (2017) guidance.

C2-C4 Emissions (removal and end of life of existing materials)

Given the extent of retained materials from the existing structure, the impact of modules C2-C4 is lower than typical as there is a reduced mass of materials to remove and treat at end of life.

Sweco's process for modelling this impact is as follows:

1. Use the Material Index Pre-Demolition Audit Report (17/07/2024) to determine quantities of existing materials to be removed from the scheme under the proposals.
2. Break down individual material quantities using the % target rates for reuse/recycling/disposal as identified in the audit.
3. Input these materials and their sub-splits (as per item 2) in One Click LCA using generic industry datapoints (typically ICE data), using the end of life drop down menu selections in One Click to determine appropriate scenario and their associated C2-C4 embodied carbon impacts.

4. Export all data and extract C2-C4 data. Collate and report within the GLA WLCA reporting template.

This process derived a total reportable emission for demolition and strip out of **146,433 $kgCO_2e$** or normalised as **4.4 $kgCO_2e/m^2$ GIA** (including contingency margin) based on the GIA of the Proposed Development. Given the constraints of the GLA reporting template, this is reported in Modules C1-C4 in cells O340 to R340 of the reporting template, in line with the March 2022 guidance.

4.2.3 – Modules A1-A3

The assumptions for Modules A1-A3 centre on the EPD data selection used for the first stage of the WLCA modelling process. In general, data selection for these modules is in accordance with the rules set out in Section 4.1.3. This section sets out a non-exhaustive list of the key assumptions for each of the building elements that informed the A1-A3 calculations.

Structure

The key project structural assumptions have been reviewed with project structural engineer AKT II and can be stated as follows:

Building Element	Material	Assumption
Composite Metal Deck Systems	Concrete	Assume C32/40, 187 $kgCO_2e/m^3$ (representative of c.50% cement replacement) cc:360 kg/m^3
	Rebar mesh	0.79 $kgCO_2e/kg$ CARES average (loose bar EPD used as a proxy for its carbon factor)
	Profiled Metal decking	ComFlor 80 1mm gauge. Model includes assumptions for shear studs and edge trims.
Core Walls	Concrete	Assume C32/40, 187 $kgCO_2e/m^3$ (representative of c.50% cement replacement) cc:360 kg/m^3
	Rebar	0.79 kgCO2e/kg CARES average
Structural Steel Sections	Steel	Plated sections @ 100% BOF Rolled section blended 50:50 BOF:EAF BOF @ ECF of 2.45 $kgCO_2e/kg$ BOF:EAF @ ECF of 1.55 $kgCO_2e/kg$ Assume intumescent paint to above @ 0.8mm total film thickness inc. primers
RC Piles & Pile Caps	Concrete (Piles)	Assume C32/40 wr, 224 $kgCO_2e/m^3$ (representative of c.70% cement replacement) cc:400 kg/m^3 + wr Assume rebar cage to 50% pile depth
	Concrete (Pile Caps)	Assume C32/40 no wr, 146 $kgCO_2e/m^3$ (representative of c.70% cement replacement) cc:400 kg/m^3
	Rebar (all)	0.79 kgCO2e/kg CARES average

This table represents the key additional building elements within the Proposed Development. There are other minor elements included in the model, but they represent small quantities or small emissions and are not formally reported here but can be provided on request.

Roof & Stairs

Structural elements of the roof and terrace systems are included in the building structure and therefore the assumptions related to A1-A3 selections are the same as stated there. Veretec have provided indicative roof build-ups which inform material selection for roof systems. Following roof build-ups assumptions has been included in the model.

Flat roof: 200mm hard insulation, one layer bitumen membrane waterproofing, 50 mm gravel.

External plant area: metal pedestal system and concrete pavers.

Green roof: protection mat, drainage layer and 200mm insulation layer.

Note that these are indicative build-ups assumed at an early stage and are subject to change as the detail within the design develops at later stages. Appropriate data selections and EPDs have been used for each.

New stairs within the new core as well as additional staircases are assumed to be made from RC with steel balustrades. Model input is based on measurements from drawings.

Facades

Carbon factors for three of the façade typologies have been provided by Arup Facades and Sweco has used these numbers together with the façade areas provided by Gardiner & Theobald LLP. For the façade typologies that has not yet been calculated, a suitable placeholder provided by Arup Facades has been used.

Façade Type	Description	FSA (m^2)	Intensity ($kgCO_2e/m^2$ FSA A1-A5)	Model Type
EWS01a	Stone-faced and fair-faced precast donut panel at Shaftesbury Av.	1,235	330	CWCT - calculation by Arup
EWS01b	Stone-faced and fair-faced precast 'W-panel' at Charing Cross Rd.	1,138	370	CWCT - calculation by Arup
EWS01c	Brick-faced and fair-faced precast donut panel at Stacey St.	327	370*	*Not assessed at this stage – Intensity numbers from EWS01b has been used as a placeholder

EWS01e	Stone-faced precast panel at ground floor	1,377	370*	*Not assessed at this stage – Intensity numbers from EWS01b has been used as a placeholder
EWS02a	Glazed stick curtain wall / window system installed off-site	587	330	CWCT - calculation by Arup
EWS02b	Glazed stick curtain wall / window system installed on-site	938	370	CWCT - calculation by Arup
EWS02c	Glazed stick curtain wall / window system installed off-site	99	370*	*Not assessed at this stage – Intensity numbers from EWS01b has been used as a placeholder
EWS02d	Glazed stick curtain wall	183	370*	*Not assessed at this stage – Intensity numbers from EWS01b has been used as a placeholder
EWS02e	Glazed stick curtain wall	280	370*	*Not assessed at this stage – Intensity numbers from EWS01b has been used as a placeholder
EWS03a	Unitized curtain wall system at crown (with lightweight concrete and aluminium spandrel)	3,158	435	CWCT- calculation by Arup
EWS03b	Unitized or stick curtain wall at balconies at Stacey St.	63	209**	**Not assessed at this stage - Benchmark value used

There are additional items added to the façade model in One Click such as the external balustrades which add to the overall emissions reported in this category in the GLA reporting template.

Internal Walls & Doors

Assumptions for internal walls and doors have been provided by architect DSDHA. The following assumptions are used for the model to extrapolate the m^2 rates provided in the cost plan:

- Internal partitions, shaft walls and liner walls – 70mm c-stud @ 450mm cc BG partition with 2 x 12.5mm boards each side for internal partition walls.
- Fire rated Glazing to separate atrium from commercial space.

EPD data selection for these elements is in accordance with the advice set out in Table 16 of the RICS Professional Statement Second Edition (2023).

Finishes & FF&E

Assumptions for finishes has been provided by Piercy & Co. The following assumptions are used in the model together with m^2 rates provided in the cost plan.

- Reception: stone / terrazzo tile floor finish, timber wall finish, plaster & paint ceiling finish
- Shower & Change areas: terrazzo tile floor finish, plaster & paint / ceramic tile wall finish, plaster & paint ceiling finish.
- Washrooms: terrazzo tile floor finish, timber / plaster & paint / ceramic tile wall finish, plaster & paint ceiling finish.
- Lift areas: stone / terrazzo tile floor finish, timber wall finish (lobbies) stone / mirror / metal wall finish (lift car) barrisol stretch ceiling finish.
- Core stairs: terrazzo tile floor finish, fair faced concrete wall finish, plaster & paint ceiling finish.
- Feature stair: stone / plaster / timber finish.

At this early stage the specification remains unknown, so the following assumptions have been used in the WLCA model for A1-A3 data selection:

Finishes Element	Data Selection
Raised Access Flooring	Kingspan RMG 600 tiles and pedestals 40.56 $kgCO_2e/m^2$ (A1-A3) Pedestals added separately

Very little detail was provided for FF&E at application stage given the current stage of the design (see Section 4.1.2). Sweco have quantified what we can at this stage (cycle racks, lockers, shower cubicle FF&E etc.) and supplemented this with an additional placeholder $kgCO_2e/m^2$ rate metric derived from our large portfolio of commercial WLCAs, applied to the Proposed Development GIA, to determine the emissions of this element. For clarity, this is 19 $kgCO_2e/m^2$ GIA for A1-A5.

Building Services

Estimates for building services information have been undertaken using the key equipment list provided by project MEPH engineer, the cost plan and the advice in the RICS Professional Statement. Given the stage of submission and the speculative nature of the design at this stage, very little TM65 data was able to be gathered.

However, the estimation guidance in TM65 and Appendix F of the RICS Professional Statement Second Edition (2023) were used to inform the modelled services and selection for MEP to ensure consistency across industry application of MEP assumptions within WLCA models.

Other systems and products needed to be input using m^2 rate averages given the early stage of the design process, and therefore present placeholders at this stage. This includes:

- Electric distribution
- Lighting

The above presents a summary of the major big-ticket items within the MEP packages. There are a number of other smaller systems and products that are not listed here but are included in the overall WLCA, which can be provided in detail should there be a requirement for a third party QA of the results. The overall emissions values presented as part of the submitted WLCA are within the expected range of MEP performance for embodied carbon that Sweco would expect to see given for a development of this type.

The use of such benchmark data means that it is very difficult to meaningfully quantify reduction opportunities related to MEP equipment, but this will be explored during the later stages of the WLCA process.

4.2.4 – Module A4

For emissions associated with site transport, the Applicant has utilised the assumptions set out in Table 17 of the RICS Professional Statement Second Edition (2023). There are a few notable exceptions to this or deviations from the guidance that Sweco apply based on our supply chain and procurement experience:

- **Structural steel:**. Sweco assume a more conservative transport for structural steel (1500km by road + 100km by sea) than the RICS assumption. Sweco deem that this is a more appropriate distance at this early stage where the manufacturing of the steelwork is not yet known.
- **Rebar/Reinforcement:** our experience suggests that rebar is procured from all over Europe and sometimes further afield, not just from the UK. While this remains unknown, Sweco assume transport for rebar as 1500km by road + 100km by sea.
- **Facades**: all façade transport is included within the CWCT calculations, and the CWCT guidance includes a set of assumptions for façade component modelling which have been followed for this assessment.

The planning officers should note that the modelling of transport under RICS Professional Statement Second Edition (2023) includes emissions associated with a return leg, which will not have been seen in historic WLCA submissions.

4.2.5 – Module A5

This section is specifically about the emissions associated with site activities (referenced as A5.2 in the RICS Professional Statement Second Edition), associated with site energy, water and fuels use over the construction period. Emissions for site activities for demolition and strip out are covered separately in Section 4.2.2.

Sweco have used the benchmark rate stated in the RICS Professional Statement Second Edition Guidance (40 $kgCO_2e/m^2$ GIA, including an allowance for temporary works), for the site activities module. Our aspiration is to go further than this, targeting <10 $kgCO_2e/m^2$ GIA for site activities, but this has not yet been included in the model as this needs to be tested with contractors for viability.

Application of waste rates for each material and product is in accordance with RICS Professional Statement Second Edition (2023) Table 18.

4.2.6 – Module B1

Module B1 includes the impacts of refrigerants for this scheme. These are present in the Air Source Heat Pumps and in the on floor and the entrance lobby Air Handling Units, as specified by project MEPH engineer Sweco. Basis of design information is used to determine the type and quantum of refrigerants that would be present on the scheme, and CIBSE TM65 is used to determine leakage rates and end of life impacts. Impacts of refrigerants are reported separately within the GLA WLCA reporting template.

4.2.7 – Modules B2 & B3

Modules B2 and B3 are covered by the assumptions set out in paragraph 2.5.12 of the LPG WLCA guidance, which aligns with the updated advice provided in the RICS Professional Statement Second Edition (2023) Sections 5.2.2 and 5.2.3.

Application of 10 $kgCO_2e/m^2$ GIA is made here for B2, as 1% of A1-A5 would be significantly lower, so the larger number is chosen in line with guidance. Module B3 is estimated as 25% of the B2 value for this assessment.

The above is applied to reporting in relevant elements; for example, there would not be expected to be any B2/3 impacts in structure, but there would be in finishes and FF&E. Facades are excluded from this as the CWCT guidance already includes allowances and additions for the B2 and B3 modules.

4.2.8 – Module B4

Inputs for Module B4 are in line with Table 20 of the RICS Professional Statement Second Edition (2023). Where MEP systems are not listed in the RICS table, CIBSE Guide M is used to represent the life cycle replacement of these components. In accordance with the guidance, B4 is modelled as replacements on a 'like for like' basis. No decarbonisation of material manufacture in the future is assumed or included within the assessment calculations.

4.2.9 – Module B6 – Operational Energy

The emissions associated with Module B6, associated with operational energy consumption of the Proposed Development are reported in the GLA WLCA reporting template and are derived from the operational energy modelling and reported energy use intensities within the Energy & Sustainability Strategy. The extent of these models is in line with paragraph 2.5.14 of the LPG WLCA guidance.

Given that the output nomenclature of the more advanced operational energy modelling methods is different from the stated reporting in the GLA WLCA reporting template, the following is how this assessment should be read:

- Value reported in the 'regulated' energy emissions reporting in the GLA WLCA reporting template is the 'landlord/base build' energy as reported by TM54.
- Value reported in the 'unregulated' energy emissions reporting in the GLA WLCA reporting template is the 'tenant' energy as reported by TM54.

The energy use intensity (EUI) is calculated through CIBSE TM54 are reported as follows:

Reporting Type	**EUI (kWh/m^2/yr. GIA)**
Landlord/Base Build EUI (reported in GLA template as 'regulated')	29 kWh/m^2/yr. (GIA)
Tenant EUI (reported in GLA template as 'unregulated')	48 kWh/m^2/yr. (GIA)

To generate the emissions, the above annual EUIs are multiplied by the current grid emissions factor for electricity of 0.136 $kgCO_2e/kWh_e$. As the Proposed Development is 100% electric HVAC, this is an appropriate method of calculation for this assessment. This is then reported over the 60-year RSP. The grid factor is assumed to remain static over the RSP; no decarbonisation is applied to Module B6 for reporting purposes, even though it is likely that the UK grid will decarbonise significantly over this assessment period.

This is an early estimate of the operational performance of the Proposed Development using the available project data and

The EUIs are also reported in the Energy & Sustainability Statement under the 'Be Seen' reporting requirements that are also required by LBC.

4.2.10 – Module B7 – Operational Water

Emissions associated with water consumption have been calculated using the guidance in paragraph 2.5.15 of the LPG WLCA guidance and using the latest carbon factors for water supply and treatment from Thames Water. An assumption has been made that 90% of the water supplied to the building is then removed from the building as wastewater and treated.

4.2.11 – Modules C1-C4

C1 – End of Life Demolition

Module C1 is calculated in accordance with the First Edition of the RICS Professional Statement (2017). The business as usual benchmark is chosen for a placeholder at this stage. This is calculated as 3.4 $kgCO_2e$ times the existing buildings GIA, which equates to **2 $kgCO_2e/m^2$ GIA** for the Proposed Development.

As there is no function for reporting this value in a single cell within the GLA WLCA reporting template, this emission is distributed between building elemental categories as a proportion of their overall A1-A5 impact, purely for the purposes of reporting within the constraints of the template. The overall reported value is the same as stated above.

C2-C4 – Treatment of materials at end of life

As noted in Table 2.4.1 of this report, the current One Click LCA modelling tool does not yet allow for the end of life scenario modelling set out for Modules C2-C4 in the RICS Professional Statement Second Edition (2023) to be included or reported. The tool is not yet updated to accommodate this.

In this case, Modules C2-C4 are calculated in line with the current One Click LCA approach and as per paragraph 2.5.17 of the LPG WLCA guidance.

4.2.12 – Reporting Sequestration/Biogenic Carbon

Sequestration, or biogenic carbon, is automatically included in the A-C life cycle embodied carbon overall results within the GLA template row 23 if input into the results table. Sequestration is counted in the A-C emissions reported as per of the GLA guidance. The total impact of sequestration for the proposed development is **-46 kgCO_2e/m^2 GIA**.

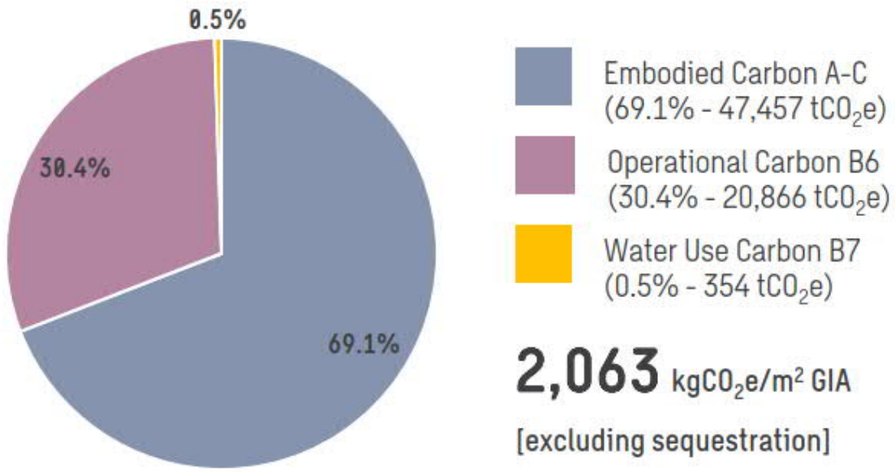
Results & Analysis

5.1 WLCA Results

5.1.1 – Whole Life carbon

The estimated whole life carbon of the Proposed Development is 2,063 $kgCO_2e/m^2$ GIA A-C, including operational energy ((B6), including both office and retail energy) and Operational Water (B7). The distribution of carbon between embodied, operational and water is demonstrated in Figure 5.1.1.1 below.

Figure 5.1.1.1: chart to show the distribution of whole life carbon between embodied carbon (A-C), operational carbon (B6) and water emissions (B7) for the Proposed Development at application stage (excluding sequestration).



Looking at the distribution of embodied and operational carbon it can be seen that embodied carbon stands for 69.1% of the emissions associated to the building over the 60-year RSP, equal to 1,425 $kgCO_2e/m^2$ GIA (excluding sequestration in this view). This is not surprising because even though the Proposed Development is retaining significant elements of the existing structure, the building will be further rearranged and extended. Additionally, most of the façade will be replaced, and all internal finishes, fittings and building services will be replaced. There are no industry benchmarks to compare the whole life carbon emissions against, given the variability in reported results, particularly for B6 and B7.

The emissions associated with operational energy (Module B6) contribute an estimated 627 $kgCO_2e/m^2$ GIA, or 20,866 tCO_2e over the 60 year RSP. The energy use intensities (EUI) that informed this calculation are from the CIBSE TM54 study undertaken by The Applicant ahead of the planning application and are detailed in Section 4.2.9. No gird decarbonisation has been applied to the results here, and they are calculated using the current UK electricity grid carbon factor.

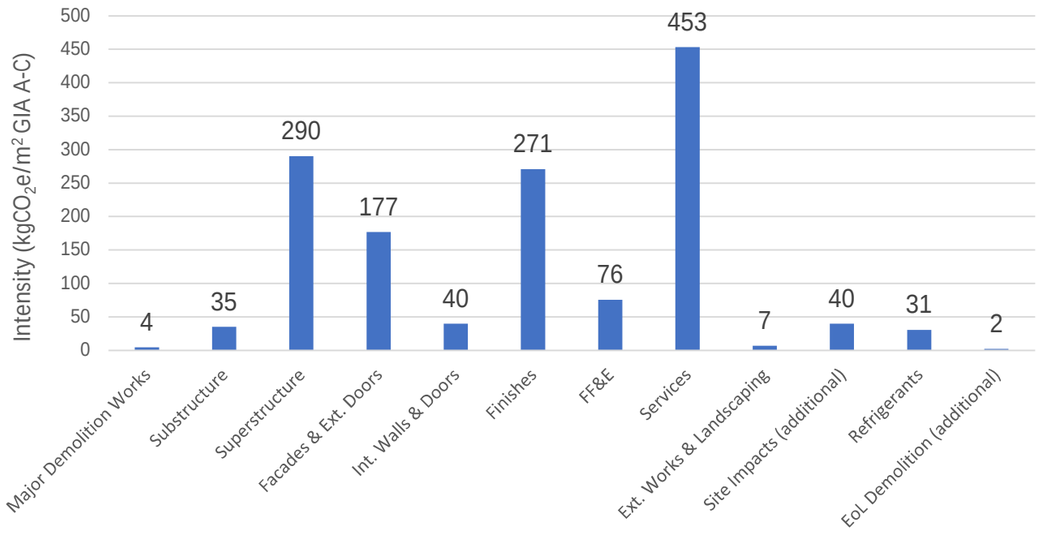
In addition, the Proposed Development will be able to take advantage of future grid decarbonisation given that the building is 100% electric HVAC. Using gird decarbonisation factors from the RICS Professional Statement Second Edition, the emissions associated with B6 operational energy may reduce to 141 $kgCO_2e/m^2$ GIA or 4,689 tCO_2e over the 60 year RSP, some 78% lower than the values presented as part of this WLCA. Given the uncertainties associated with future decarbonisation of UK electricity and as per the rules of the GLA WLCA methodology, this value is not included in the WLCA results, however it demonstrates the potential positive long-term impact the choice of operational solution for the Proposed Development could have in the future.

The impact of the emission from water only accounts for 0.5% of the total Whole Life Carbon Impact, this is equal to 11 $kgCO_2e/m^2$ GIA or 354 tCO_2e/60 years.

5.1.2 – Life Cycle Embodied Carbon (A-C)

The estimated life cycle embodied carbon (A-C excluding B6 and B7) of the Proposed Development is **1,380 $kgCO_2e/m^2$ GIA A-C**, including sequestration. This result is lower than the GLA Benchmark for commercial offices. Life cycle embodied carbon is distributed between building elements as shown in the figure below.

Figure 5.1.2.1: graph to show the distribution of life cycle embodied carbon between reportable building elements as per the GLA reporting template (sequestration is omitted in this graph).

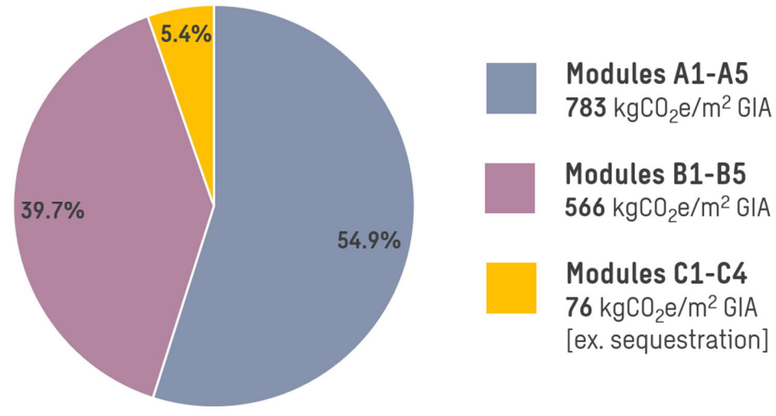


As would be expected from a retrofit development. The emissions associated with the building services equipment dominates the A-C results, making up 31.8% of the A-C emissions for the Proposed Development (453 $kgCO_2e/m^2$ GIA A-C). This is due to the fact that the building services will be newly installed, and the components within this category get replaced a number of times over the life cycle study period. 286 $kgCO_2e/m^2$ GIA can be found in Modules B2-B4 of building services alone, underlining this point. Given the limited availability of information on services a number of assumptions and placeholders are used for this early-stage WLCA, and therefore it is difficult to challenge assumptions and provide meaningful reduction opportunities at this stage. This will be key for reducing the impact of this category at later stages (see Section 6). A similar observation can be made for finishes, which are also significant at 271 $kgCO_2e/m^2$ A-C for this category.

The impact from the substructure and the superstructure, together stands for 22.8% of the emissions in this view. The structure is normally the most carbon intensive element within a building but due to the extensive retention of the structure this number has significant been reduced. Differing from the building services and the finishes, the majority of the emissions for the structure falls within Modules A1-A5 as the element within the structure do not include any replacements.

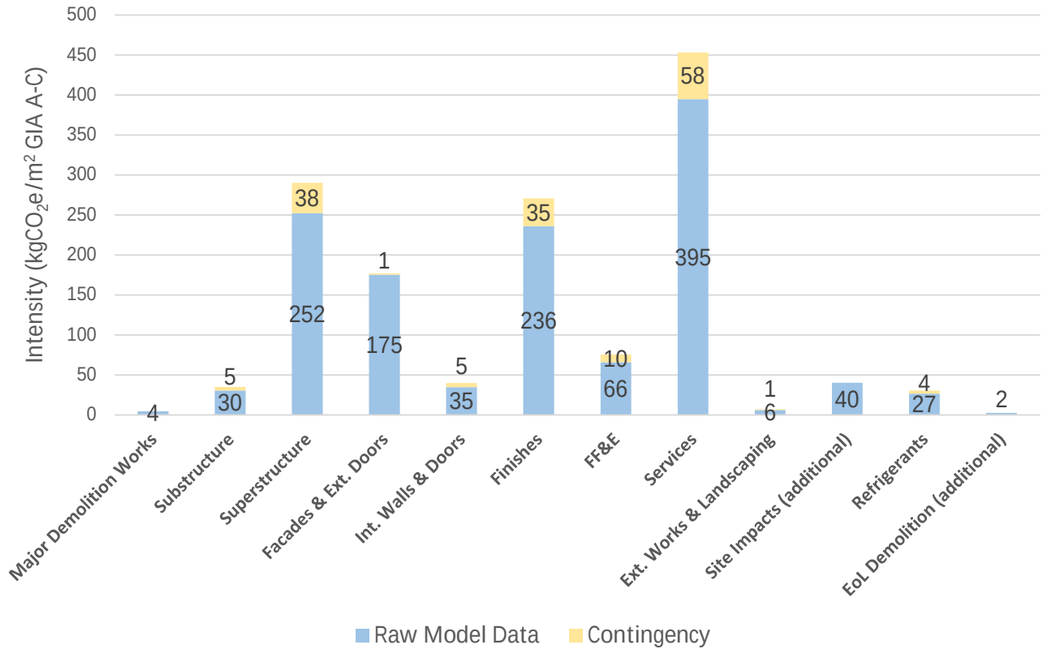
When looking at life cycle embodied carbon, it is also important to understand the proportional distribution of emissions between life cycle stages (A1-A5, B1-B4 and C1-C4). This is set out below in Figure 5.1.2.2.

Figure 5.1.2.2: proportional distribution of life cycle embodied carbon emissions (A-C) for the Proposed Development (excluding B6 and B7) between grouped modules, excluding sequestration.



The values presented within this section for the A-C emissions include contingency, applied as set out in Section 4.1.6. These are applied element-by-element. The total contingency in the A-C model is 162 $kgCO_2e/m^2$ GIA. Without this contingency applied, the raw model results would be 1,263 $kgCO_2e/m$ GIA (excluding sequestration. For clarity/ease of review, the graph below shows where contingency is applied within the A-C model and the impact this has on the overall reportable values.

Figure 5.1.2.3: graph to show the distribution of life cycle embodied carbon (1,425) between reportable building elements as per the GLA reporting template (sequestration omitted), including the contingency applied to each element.

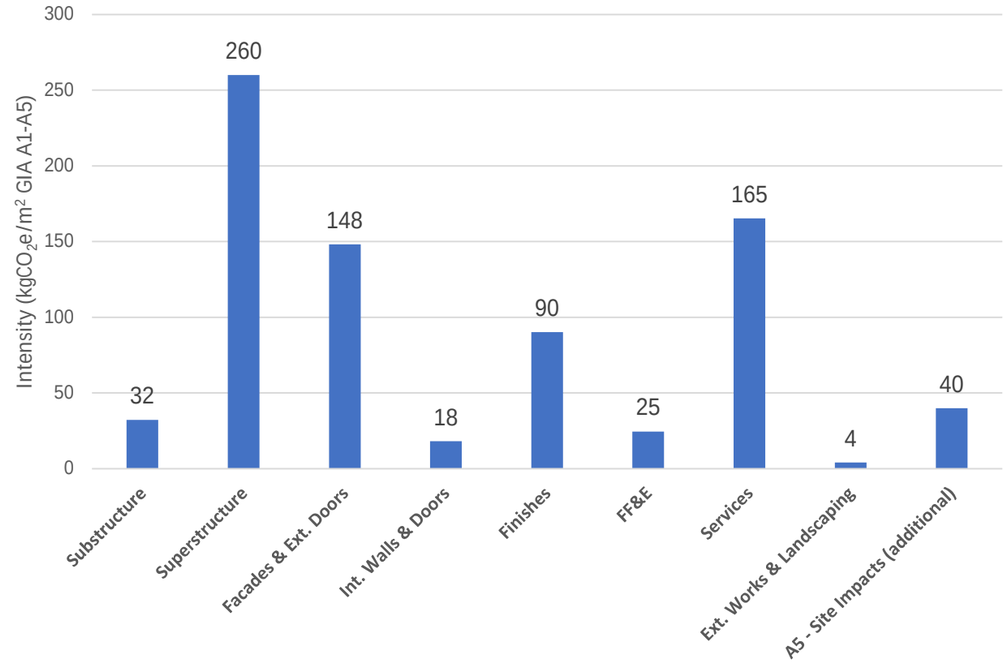


5.1.3 – Upfront Embodied Carbon (A1-A5)

The estimated upfront embodied carbon (A1-A5) of the Proposed Development is 783 $kgCO_2e/m^2$ GIA A1-A5, which is 17.6% lower than the GLA Benchmark. This demonstrates the early success of the scheme and the benefits of maximising the retention of existing structures and facades. Given that this is generally utilising baseline material selections, this is a strong upfront performance.

Upfront embodied carbon is distributed between building elements as shown in the figure below.

Figure 5.1.3.1: graph to show the distribution of upfront embodied carbon (783) between reportable building elements as per the GLA reporting template and including contingencies.



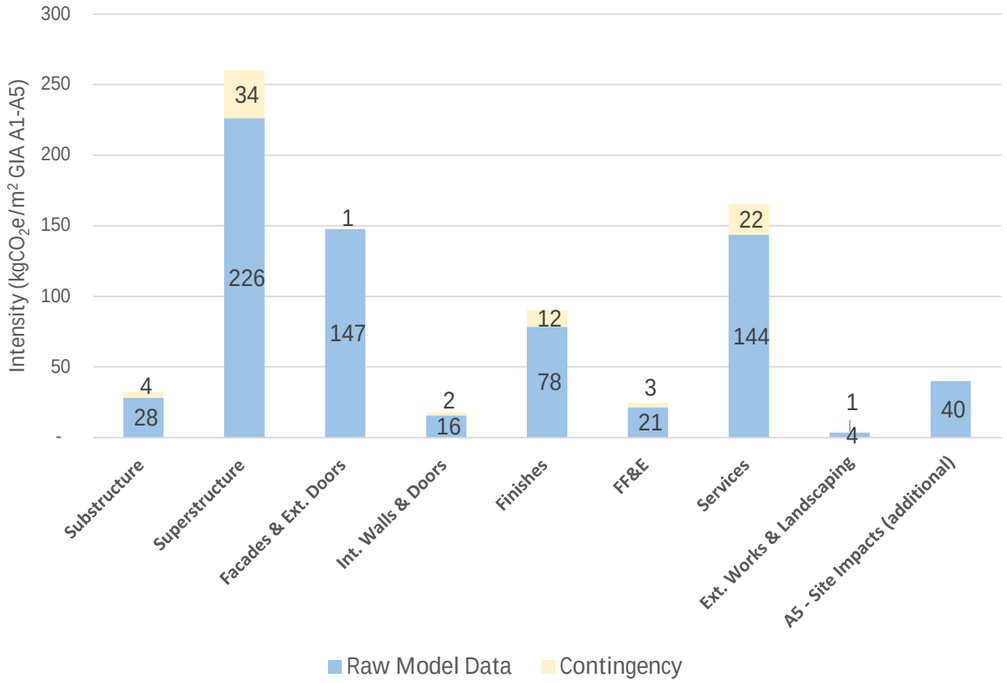
In this view, the superstructure is the dominant emitter and stands for 33.1% of the overall upfront embodied carbon emissions. This is not surprising as the majority of the emissions from this category falls within the A1-A5 Modules. The impact from building services however has diminish in the A1-A5 view, this is explained by that in this view the replacement cycles are not included. Nonetheless, the service category is the second largest impactor in this view. Emissions from the substructure is significantly lower than a typical new construction. This underlines the benefits of maximised retention.

There are still a number of opportunities for improved material selection and procurement within the structure categories, so there are future opportunities to improve this figure further during the later stages of design.

Facades and finishes are also impactful categories for the proposed development. In a similar way to the structure, the material and data selections for the majority of these systems utilise market typical and industry baseline data selections in the absence of more detailed information, and therefore there are a number of additional opportunities for reducing emissions in these categories (see quantified future opportunities in GLA reporting template and Section 6).

As with the A-C emission, the A1-A5 results include contingency, applied as set out in Section 4.1.6. These are applied element-by-element and include for sub-methodologies (which as CWCT for facades) thar already include for contingency within their calculations. The total contingency in the A1-A5 model is 78 $kgCO_2e/m^2$ GIA. Without this contingency applied, the raw model results would be 705 $kgCO_2e/m^2$ GIA. For clarity/ease of review, the graph below shows where contingency is applied within the A1-A5 model and the impact this has on the overall reportable values.

Figure 5.1.3.2: graph to show the distribution of upfront embodied carbon (783) between reportable building elements as per the GLA reporting template (sequestration omitted), including the contingency applied to each element.



5.1.4 – Results Summary

The summary of the Results for the WLCA of the Proposed Development are shown in the table below, with and without applied contingencies for clarity in line with the results set out within Section 5.1.1 to 5.1.3 of this report.

Table 5.1.4.1: table to summarise the WLCA results for the Proposed Development at application stage as set out in the previous sections.

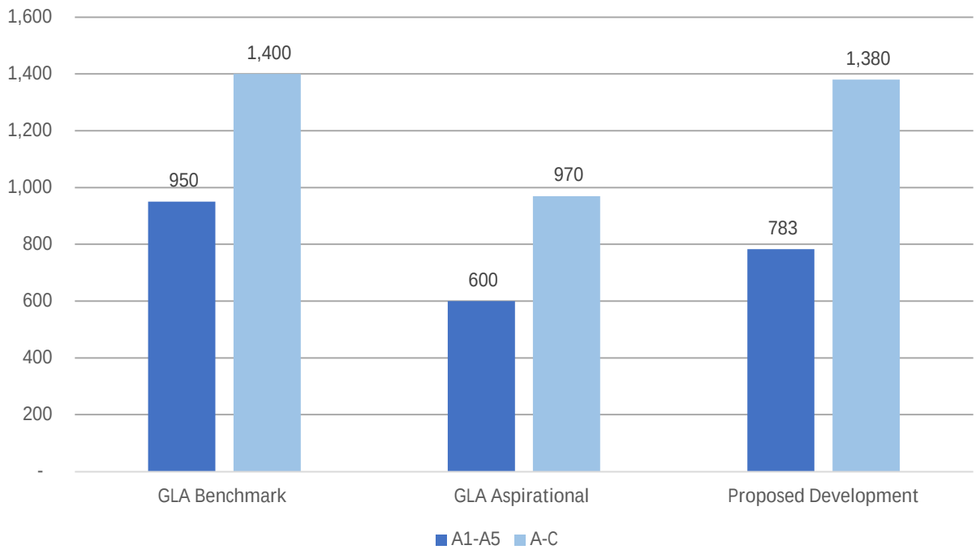
Reportable Metric	Intensity with Contingency $kgCO_2e/m^2$ GIA	Intensity without Contingency $kgCO_2e/m^2$ GIA
Whole Life Carbon A-C inc. B6, B7 & sequestration	**2,017**	**1,855**
Life Cycle Embodied Carbon A-C ex. B6 & B7, inc. sequestration	**1,380**	**1,218**
Upfront Embodied Carbon A1-A5	**783**	**705**

Overall, the results represent a strong position for the Proposed Development at application stage, with all metrics below the GLA Benchmark rates even when carrying significant contingency at this early stage of the project. The Applicant feels strongly that such levels of contingency are appropriate given timing of the study presented here and the information provided that informed this WLCA and as set out in Section 4 of this report. Further opportunities to go beyond the current performance are set out in Section 6 and are quantified in the GLA reporting template. Many of these opportunities represent viable and achievable positions for the development and will be explored in detail as the design progresses towards construction. Reported operational emissions are at an estimated EUI of 77 kWh/m^2/year (GIA), including landlord and tenant energy. Long-term decarbonisation may also occur as the UK grid decarbonises, given the 100% electric HVAC approach, but this is not included in the results at this time to align with GLA reporting requirements.

5.1.5 – Comparison with GLA Benchmarks

As set out in previous sections, the Proposed Development demonstrates a position below the GLA Benchmark, even with significant contingency included in the reported results. Figure 5.1.5.1 below compared the reported results with the GLA benchmarks for clarity.

Figure 5.1.5.1: graph to compare the WLCA results of the Proposed Development with the GLA Benchmark and Aspirational target bands (embodied carbon only).



Within the GLA template, the Applicant notes that the reported life cycle embodied carbon values for Modules B & C are higher than the WLC benchmark, at 643 $kgCO_2e/m^2$ GIA (B & C). There are a number of reasons why the Applicant feels that this position is reasonable at this stage. These are set out below for consideration.

- **Contingency inclusions:** as with the A1-A5 modules, the B&C modules include significant contingency at this stage, as suitable for the early stage of design. Contingency of 83 $kgCO_2e/m^2$ GIA is included within the B&C modules. Without this contingency, the raw reportable value would be 560 $kgCO_2e/m^2$ GIA for modules B & C. This is still higher than the GLA benchmark but is a significant part of the discrepancy.

- **Major impactors & future opportunities:** the major contributors to the reported B&C value are the B4 module impacts of finishes, FF&E and building services. Building services in particular is very significant, with the B4 impacts of building services contributing 44% of the total reported B&C impacts for the Proposed Development at application stage. This is not unusual in Sweco's experience. There are still a number of opportunities within these categories to reduce the carbon impact of key materials (for example raised access flooring, the climate island units etc.) which will bring the B&C values down significantly as well as the A1-A5. So future optimisation and systems selection may bring the reported values back towards the GLA Benchmark figures.

- **Timing of planning application & information availability:** in particular for the categories noted above (services, finishes and FF&E), the availability of detailed information and systems selections is generally basic for an early stage assessment. This means that the model needs to make a number of broad assumptions and fill in data gaps using industry guidance and methodologies rather than be able to utilise specific system and product EPDs/information. As these categories have significant rates of replacement over the 60-year RSP, and these replacements are 'like-for-like' as per the GLA guidance, and assumption made for an A1-A5 selection is multiplied within A-C. As the level of detail available to the WLC assessor increases, so the opportunity to challenge life cycle replacements and longevity also increases. This is a key aim of the latter design stages for the Proposed Development.

- **Positioning of GLA benchmarks for B&C**: when a comprehensive WLCA model is undertaken, particularly for building services including all the latest aspects of the guidance in RICS Second Edition, Sweco have often found that the B&C module impacts are higher than the GLA Benchmark rate, and that this is typically due to the building services elements. Understanding and data availability for building services in a WLCA has come a long way since the GLA Benchmarks were established prior to the 2022 version of the GLA methodology being released. Sweco would argue that it is not appropriate to compare application stage performance against these, given the points raised above (in particular timings and information availability).

The above demonstrates that the Applicant has appraised and appreciates that the reported values for Modules B&C are higher than the GLA Benchmark at this stage of the process. We have recognised that this is a key issue to consider when moving into the later stages of design, and that the assumptions and inputs need to be challenged to ensure that the life cycle impacts for the project are minimised. The Applicant would be aiming to ensure that the B&C Module impacts are demonstrably lower in the Post-Completion WLCA submission than they are at present, in appreciation of the points raised above and the current timing of this WLCA.

Opportunities & Next Steps

6.1 Reduction Opportunities

The GLA reporting template includes a number of potential reduction opportunities that have been quantified as part of the WLCA submission process. As noted in previous section of this report, data selection for carbon is largely based on market-typical materials as this juncture given the early stage of design, to present a 'baseline' for the development. Detailed material selection and procurement options will be integrated during later stages of design when specifications are aligned, and the project team are comfortable with their formal inclusion within the WLCA model.

The following list includes the reduction opportunities currently under early consideration for the Proposed Development:

- **Structural steel:** the current steel allowances in the planning WLCA model include for a 50/50 split procurement of electric arc furnace (EAF) steel and market-typical blast furnace steel. While this is a strong starting position, structural steel is still the most emissive material overall for the Proposed Development. During the latter design stages and into construction, the project team will look to further optimise the steel procurement to increase the quantum of low carbon steelwork and explore opportunities to deploy reused sections for the scheme, subject to availability and suitability for the intended use.
- **Raised access flooring:** alternative options for raised access flooring (RAF) will be explored at the next stage, including tiles with EAF steel coatings, calcium sulphate cores and reused tiles (subject to market availability). These opportunities will be tested with the supply chain and against the project performance parameters.
- **Facades:** the new façade systems will be constantly challenged on material efficiency, but this is closely linked to the operational performance, so the two and being reviewed together. We will set 'per m^2 of façade' targets for the project, and contractually hold façade contractors to achieving these targets.
- **Low-carbon aluminium:** options for using low-carbon aluminium in the facades will be explored, including hydroelectrically-produced aluminium and aluminium with a higher recycled content.
- **Concrete:** concrete will be tested for further optimisations and $kgCO_2e/m^3$ targets will be set for concrete mixes to control the carbon content.
- **Rebar:** alternative suppliers for rebar will be reviewed, and opportunities considered for procurement of rebar with higher recycled content and from local manufacturers.
- **Finishes & fittings:** use of novel plasterboards and alternatives will be explored by the project team at the next stage of design and into specification. Specifications for finishes and fittings will have their own embodied carbon targets.
- **Finishes & fittings:** a 'nothing superfluous' approach will be applied to architecture finishes, which will be minimised as far as possible, and be judged using embodied carbon as part of the selection process.
- **Building Services**: The submission of CIBSE TM65 data as a minimum from the supply chain for services is seen as mandatory for this project and will be reflected in all of Sweco's relevant MEPH specifications. We will prioritise getting EPD data first, then TM65 as a secondary requirement. This will help to increase accuracy of MEP assessments and supports the requirements of the GLA WLCAG.
- **Building Services**: where refrigerants are used opportunities to go further with low carbon refrigerants will be explored, beyond the current specifications.
- **Site activities**: the contractor will be challenged to reduce emissions from the site and will be asked to review the current target and establish opportunities to go further and reduce site emissions by a further 50%.
- **Challenging baseline data:** gathering actual product data for products such as lifts and building services equipment is like, in Sweco experience, to yield further potential reductions in carbon. The assumptions in the current model are conservative and reflective of early-stage information, and the contingency should also reduce during the latter project stages.