# Glazing: Thermal Analysis (Existing)

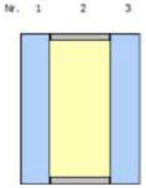
FMDC Ltd.

**Calculation SommerGlobal**

**Project: 2024_07_18**
**Position: 01**

**Layer composition (outside to inside)**

| Number | BE | Description | mm |
|---|---|---|---|
| 1 | | Float ExtraClear | 3.00 |
| 2 | | Air | 6.00 |
| 3 | | Float ExtraClear | 3.00 |
| | | | 12.00 |




**Transmission, reflexion, absorption**

$\rho_v$ = 0.15 (external light reflectance) — $\tau_{UV}$ = **0.64** (ultraviolet transmittance)

$\rho'_v$ = 0.15 (internal light reflectance) — $\tau_v$ = **0.83** (light transmittance)

$\rho_e$ = 0.14 (solar direct reflectance outside) — $\tau_e$ = **0.78** (solar direct transmittance)

$\rho'_e$ = 0.14 (solar direct reflectance inside) — $R_a$ = 99 (general color rendering index (CRI))

$\alpha_e$ 1 = 0.05; 3 = 0.04 (solar direct absorptance)

**EN 410**

SC = 0.93 (Shading Coefficient, g/0,87) — $q_i$ = **0.03** (secondary heat inside)

b-Faktor = 1.01 (VDI 2078, g/0,80) — g = **0.81** (solar heat gain coefficient)

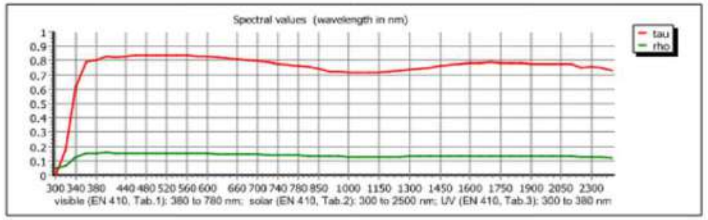
**EN 673** Installation angle = 90° vertical — $U_g$ = **3.3 W/m²K** (Heat transfer coefficient)
Corrected emissivity according to EN 12898:2019

**EN ISO 52022-3** $T_e$ = 5.00 °C $T_i$ = 20.00 °C — $E_S$ = 300.00 W/m² System height = 1.50 m

$g_{th}$ = 0.015 (Thermal radiation factor) — $h_{c,e}$ = 18.00 W/m²K $h_{c,i}$ = 3.60 W/m²K

$g_c$ = 0.011 (Convection factor) — $q_i$ = **0.026** (secondary heat inside)

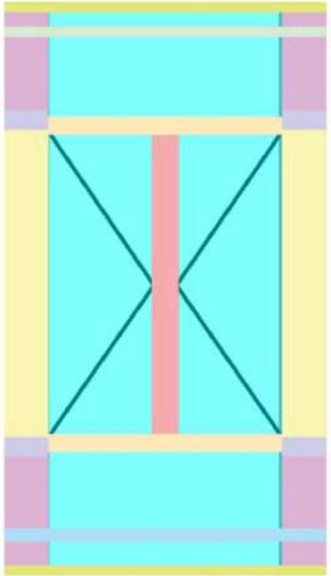
$g_v$ = 0.000 (Ventilation factor) — $g_{tot}$ = **0.81** (solar heat gain coefficient)

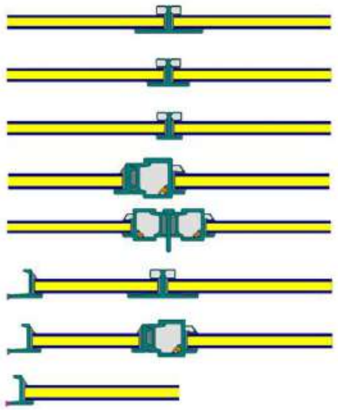



Fluctuations of light and radiation technical values for the chemical composition of glass and manufacturing process possible. Function values take into account the permitted tolerances according to the product standards. The calculation-result does not give information about the technical practicability of this construction. We point out that the calculations were created on the basis of the manufacturers' spectral data. The company Sommer Informatik GmbH assumes no liability for the integrity of the manufacturers' data. For the declaration of performance the manufacturers' data placed at the disposal has to be confirmed separately.

EN 410, EN 673, EN ISO 52022-3, EN 12898:2019

ift-certified lt. validation report no. 410 42167 (status as of 11/2009)
Registered for: FMDC Ltd. - FMDC Ltd. Manuel
SommerGlobal 8.0000  18/07/2024 - 11:09:11 | 1 / 1





| Detail Code | U-Value [W/m²K] | A [m²] | $H_t$ [W/K] |
|---|---|---|---|
| Glass | 1.500 | 0.53 | 1.59 |
| Glass | 1.500 | 0.18 | 0.54 |
| Glass | 1.500 | 2.00 | 5.99 |
| Glass | 1.500 | 0.55 | 1.66 |
| Glass | 1.500 | 0.13 | 0.38 |
| Openable Middle | 8.785 | 0.18 | 1.62 |
| Fixed-Openable Middle | 6.980 | 0.18 | 1.25 |
| Fixed-Openable Perimeter | 5.371 | 0.69 | 3.71 |
| Fixed-Fixed Perimeter 40mm and 80mm | 4.930 | 0.18 | 0.87 |
| Fixed-Fixed Perimeter 40mm and 80mm | 4.930 | 0.17 | 0.85 |
| Fixed-Fixed Perimeter 40mm and 80mm | 4.930 | 0.06 | 0.31 |
| Fixed-Fixed Perimeter 40mm and 80mm | 4.930 | 0.04 | 0.21 |
| Fixed-Fixed Middle 80mm | 4.930 | 0.07 | 0.33 |
| Fixed-Fixed Middle 50mm | 6.943 | 0.08 | 0.58 |
| Fixed-Fixed Middle 30mm | 9.142 | 0.05 | 0.46 |
| Fixed Perimeter 30mm | 4.780 | 0.10 | 0.48 |
| Safety factor | - | - | 15% |

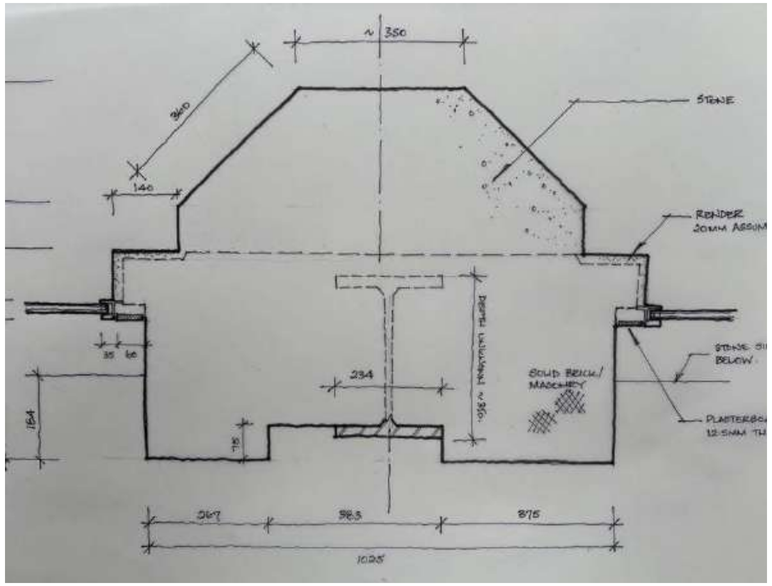
| | | | |
|---|---|---|---|
| Total | 4.6 | 5.20 | 20.82 |

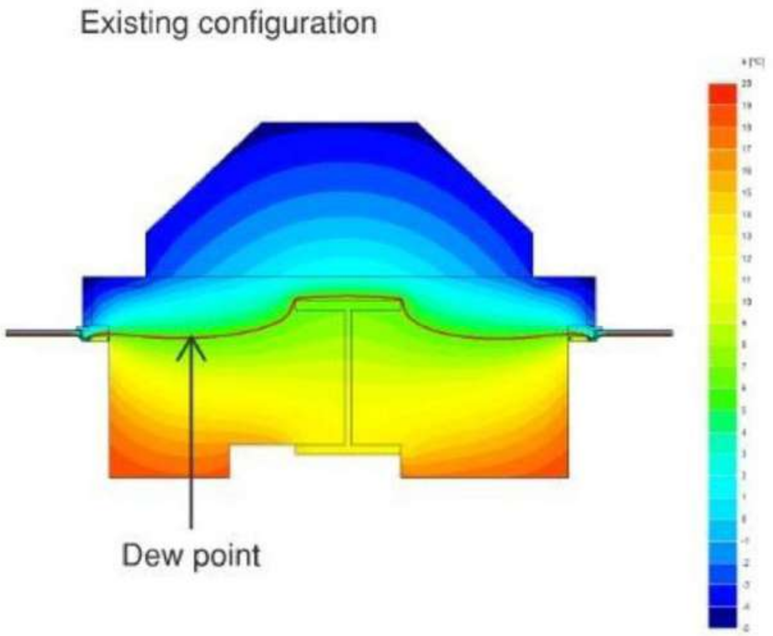
The average weighted overall U-value = **4.6 W/m2K**.

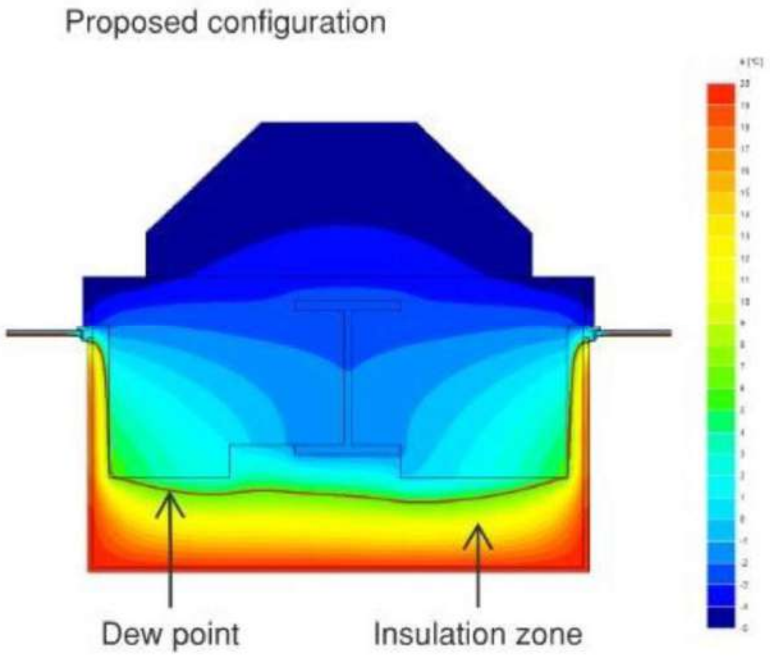
# Load Bearing External Walls

FM
DC

# Load Bearing External Walls: Condensation Risk Analysis




FMDC

# Load Bearing External Walls: Corrosion Risk

Regent Street Disease [or Deansgate Disorder] is a structural/material condition affecting early 20th Century Steel-framed, masonry-clad buildings.

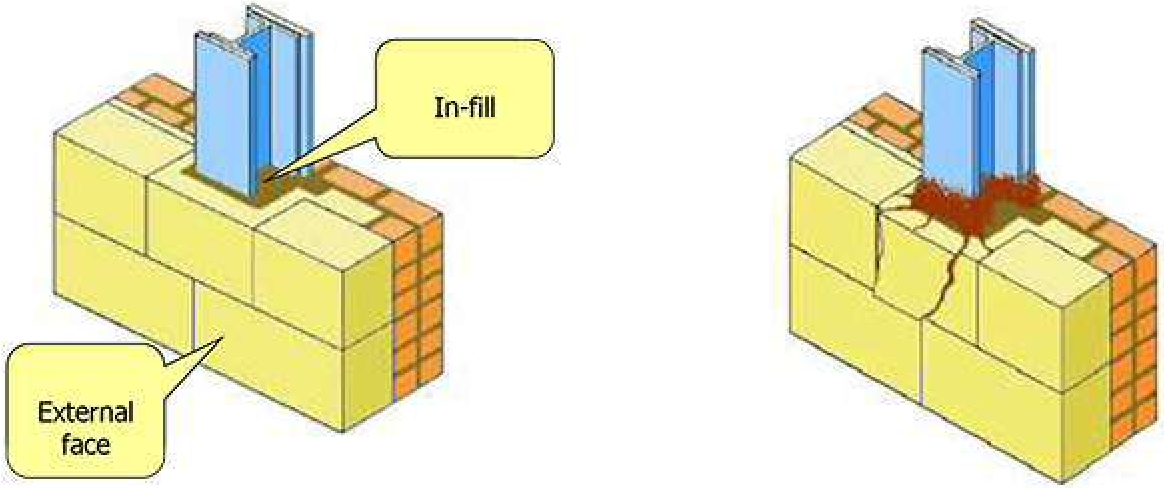
In the late-Victorian, Edwardian and inter-war period, many buildings were constructed with skeletal structural frames of steel and/or iron. These buildings were then clad in masonry with the voids around the frame loosely infilled with grout, rubble and/or concrete. Although there are several advantages to this form of construction [rigidity, fire-protection] the result is that, in certain circumstances, this environment will lead to expansive corrosion of the metal.

When metal corrodes it expands by seven to ten times the volume of the original metal. In this way, relatively low levels of corrosion can create large tensile forces within the masonry, causing cracking and displacement of the cladding, without structurally significant section-loss. The parallel cracking at beam and column locations is often referred to as Regent Street Disease.

Upgrading existing walls not only could damage the aesthetic of historic buildings but could also cause technical conflicts between the existing construction and the changes to improve the thermal performance. To address this, Part L includes some exemptions and circumstances where special considerations apply.

Buildings exempted from the need to comply with Part L requirements are Listed Buildings at Grades I, II* and II, *as well as buildings in conservation areas*. This latter exemption may be applicable to TCB.

Our recommendation for retained facades with embedded structural steelwork is that they are not internally insulated. [You can also refer to *Historic England - Energy Efficiency and Historic Buildings: Application of Part L of the Building Regulations to Historic and Traditionally Constructed Buildings*.]

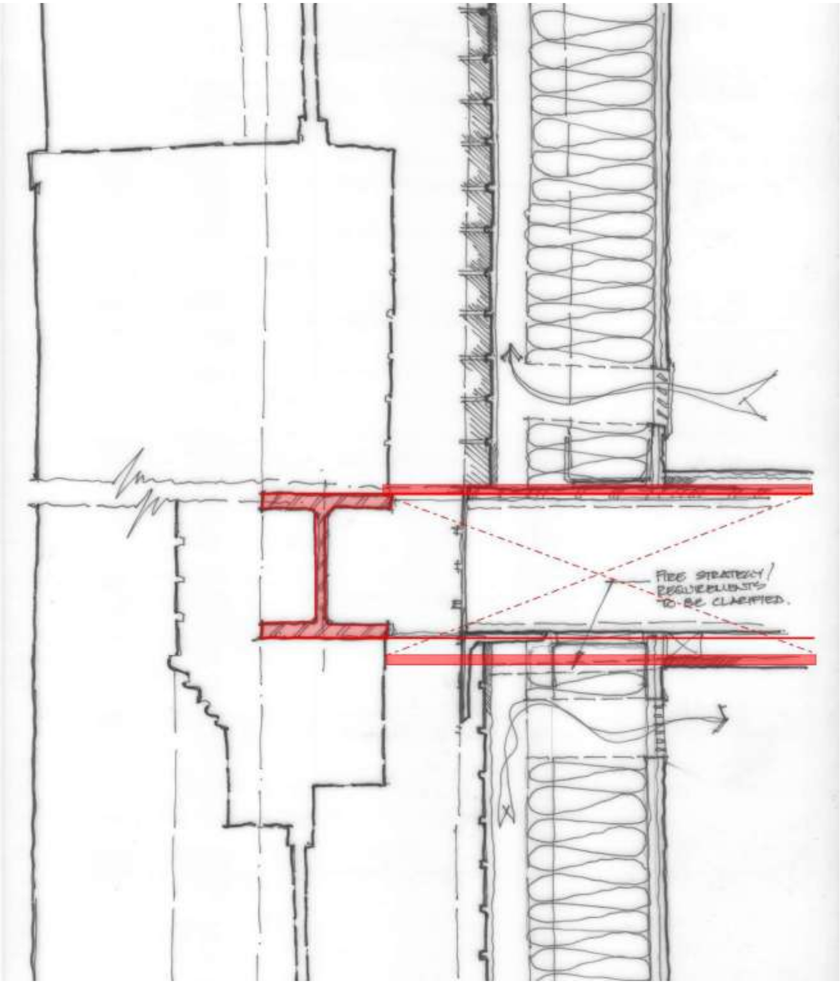


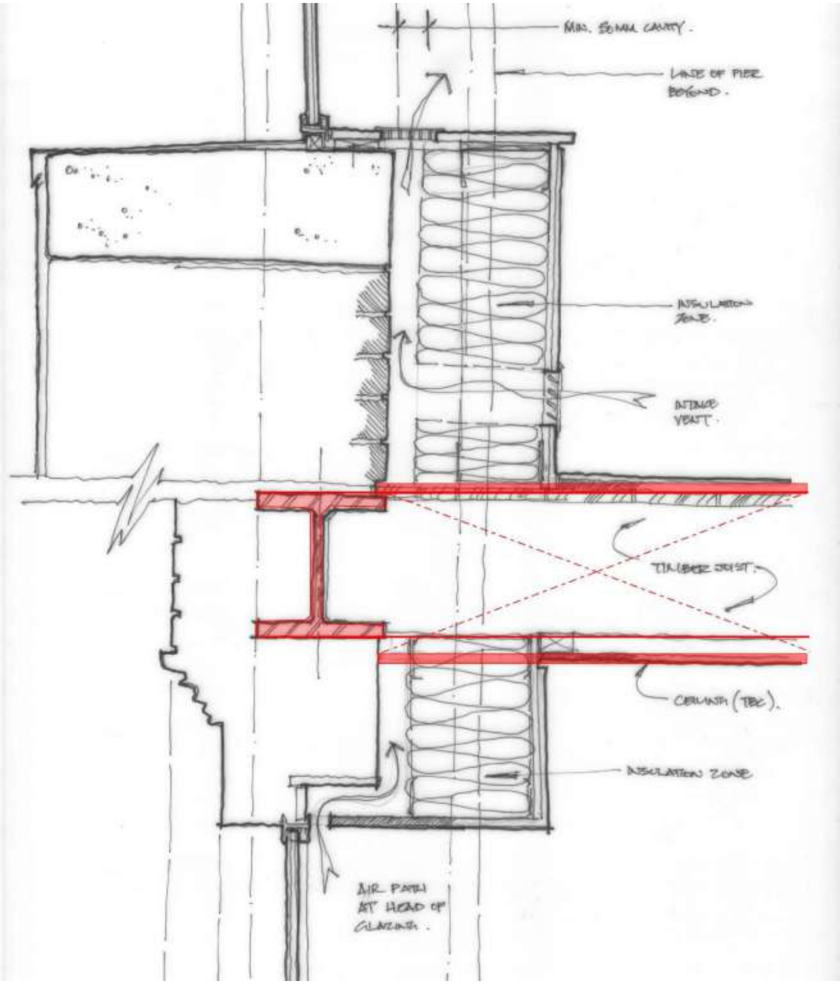
# Load Bearing External Walls – Vented Cavity Study

At the request of the design team, an assessment was carried out to understand the potential to insulated the external walls, but providing a pressurised, vented cavity to allow air movement from within the occupied spaces to dry-out any possible condensation/moisture on the interior face of the exterior wall.

A 50mm vented cavity, with a 200mm thick mineral wool insulation was analysed.

While this would improve the overall thermal performance, achieving a u-value of 0.18W/m$^2$K, due to the requirement to encapsulate and fire protect the structure (Shown in red in adjacent images), there is no way to ensure the structural elements will not be exposed to moisture, without the ability to breath/dry-out; and without any means to observe or monitor any potential corrosion &/or rotting in this area – this option was discounted.




FM
DC

# Appendix E

## Whole Life Carbon Assessment

Whole Life Carbon Assessment

# The Courtyard Building

Planning Application

October 2024

## Contents

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## Revisions & Author Details

| Revision no. | Date | Author | Checked/Approved By | Date Approved |
|---|---|---|---|---|
| 01 | 11/10/2024 | David Bruce | Matthew Mapp | 18/10/2024 |
| | | | | |
| | | | | |



# Executive Summary

## Executive Summary

# 1.1 Results Summary

This Whole Life Carbon Assessment (WLCA) has been prepared on behalf of Knighton Estates Limited (the 'Applicant') by Sweco UK for the refurbishment and extension of The Courtyard Building, 1 Alfred Place, WC1E 7EB (the Proposed Development) in the London Borough of Camden (LBC). The development is described as follows:

*"Refurbishment and extension of the building to provide commercial, business and service use (Class E) including infill extension, roof extension and replacement facades to Alfred Place, reconfiguration of entrances and servicing arrangements, rooftop plant equipment, PV panels, new landscaping, provision of cycle parking and other ancillary works."*

The Proposed Development is for part demolition of the existing roof to facilitate the construction of a roof extension providing additional office floorspace, amenities and external terraces. Parts of the existing building that does not meet the design intent will be demolished and partially rebuilt for better cohesion of the Development. The existing and retained building will be comprehensively refurbished to enhance the quality of the space including the introduction of additional cycle parking spaces and end of journey facilities. Alterations to the existing façade are proposed to improve the entrance to the building along Portman Square and provide greater retail activation along Orchard Street.

The Proposed Development embraces the 'retrofit first' approach detailed within adopted and draft policy by London Borough of Camden retaining significant elements of the existing building structure and facades, while extending, upgrading and reinventing the development to deliver a modern, market-leading sustainable commercial office-led development of 8,324 m$^2$ GIA.

The WLCA is conducted in accordance with GLA London Plan Guidance (LPG) Whole Life-Cycle Carbon Assessments (March 2022) and supported by recent updates to industry best-practice WLCA methodologies including the RICS Professional Statement *Whole life carbon assessment for the build environment* Second Edition (2023). A detailed review of the applied methodology is set out in Section 4 of this report.

The application stage WLCA results can be observed opposite, and are as presented in the GLA WLCA reporting template, which is submitted alongside this document to provide detail on the reported WLC emissions for the Proposed Development.

With an upfront embodied carbon of **619 kgCO$_2$e/m$^2$ GIA A1-A5**, the proposal performs 35% better than the GLA Benchmark. This clearly demonstrates the benefits of retrofit first in this instance. Life cycle embodied carbon of **1,265 kgCO$_2$e/m$^2$ GIA A-C** performs 10% better than the GLA Benchmark. Due to the early stage of this model, all results include significant contingencies.

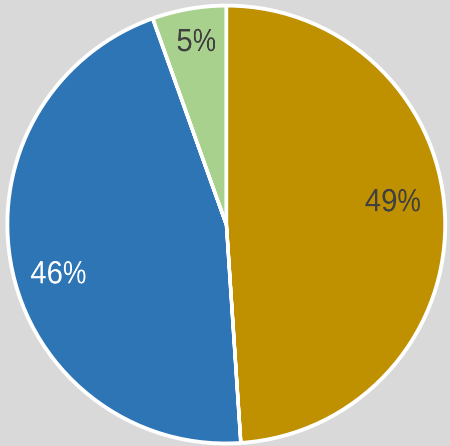
Reported operational emissions have been created by energy estimates made in line with TM54 and NABERS, with an estimated annual total energy demand of 621,874 kWh, including landlord and tenant energy.

## Summary Results – Overall WLC

| | Modules | Intensity | |
|---|---|---|---|
| **Upfront Embodied Carbon** | **A1-A5** | **619** | **kgCO$_2$e/m$^2$ GIA** |
| **Life Cycle Embodied Carbon** | **A-C (ex. B6 & B7)** | **1,265** | **kgCO$_2$e/m$^2$ GIA** |
| **Whole Life Carbon** | **A-C (inc. B6 & B7)** | **2,600** | **kgCO$_2$e/m$^2$ GIA** |

All values inclusive of contingency & include a Cat A fit out – see Section 4.1.6

## Embodied Carbon Life Cycle Distribution




| Modules | Intensity | |
|---|---|---|
| **A1-A5** | **619** | **kgCO$_2$e/m$^2$ GIA** |
| **B1-B5** | **577** | **kgCO$_2$e/m$^2$ GIA** |
| **C1-C4** | **69** | **kgCO$_2$e/m$^2$ GIA** |

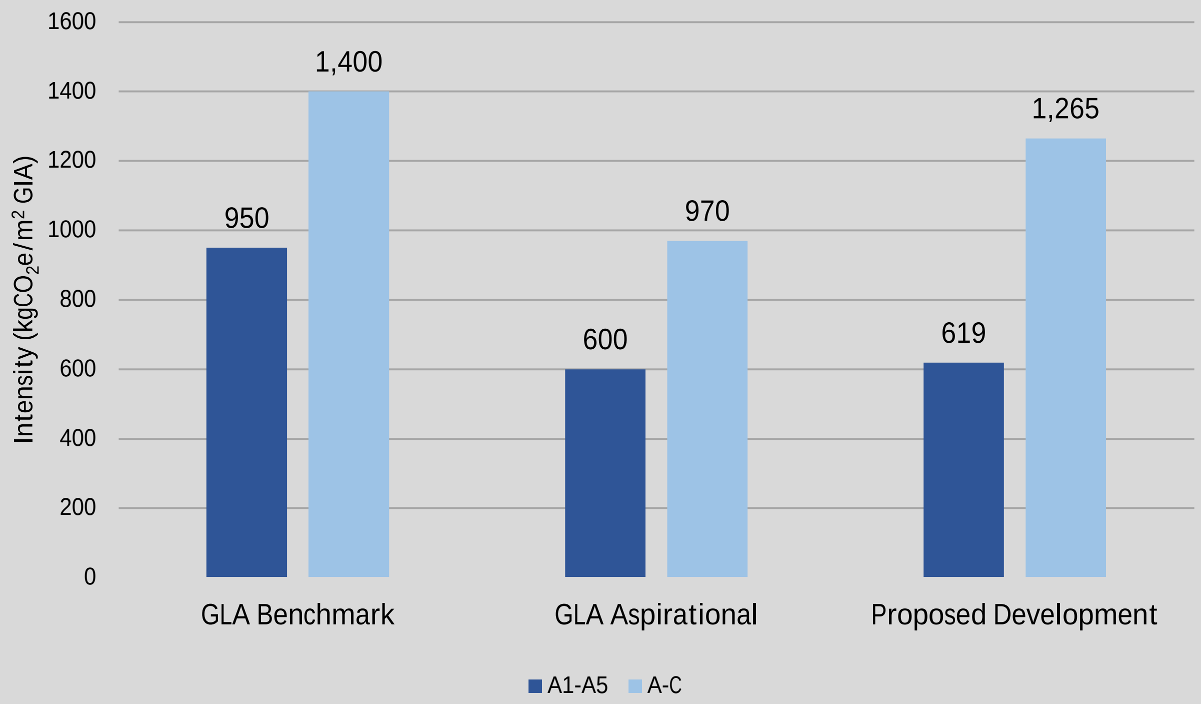
## Benchmarking

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

**BEN** = GLA Benchmark

**ASP** = GLA Aspirational

## GLA Benchmarks, Project Target & Planning Performance




## Top 5 Reduction Opportunities

| Rank | Option | Potential Saving kgCO$_2$e/m$^2$ GIA A1-A5 |
|---|---|---|
| 1 | Low carbon steel for rolled sections | -55 |
| 2 | Maximise utilisation of recycled/reused RAF tiles | -25 |
| 3 | Target <10 kgCO$_2$e/m$^2$ GIA for site activities | -10 |
| 4 | Low carbon concrete to concrete elements as applicable | -7 |
| 5 | Low-carbon rebar | -4 |

## 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 and utilises market typical carbon data, aligned with the RICS Professional Statement Second Edition. Therefore, confidence in what can be quantified and relied upon to steer future optimisation is low at this stage.

In some building elements, it has been possible to quantify some future potential reduction opportunities, which have been included within the GLA reporting template. This includes the following measures:

- Explore options to procure low carbon rebar and to explore supply of rebar from the UK.
- Utilise kgCO$_2$e/m$^3$ targets for concrete mixes, allowing for contractors to meet these requirements in a variety of different ways, including but not limited to cement replacement technologies such as GGBS.
- Explore various options and opportunities for low-carbon steelwork procurement, including the modelling of different proportions of electric arc furnace (EAF) steelwork from Europe.
- Push for lower carbon steelwork opportunities for fabricated plate sections, which are just starting to come to the market but need specific conversations with specific suppliers at procurement stage to realise.
- Review options for raised access flooring specification, looking at opportunities with EAF casings and reused tiles from other sources such as Calcium Sulphate (CaSO4) tiles + pedestals.
- Push harder on-site activities, targeting 10 kgCO$_2$e/m$^2$ GIA A5 (excluding waste).

The items set out above represent those that could be meaningfully quantified at this stage of the process, where material quantities are relatively robust. There are myriad additional opportunities not listed above that will be explored as the design detail develops and more information becomes available to the WLC assessor.

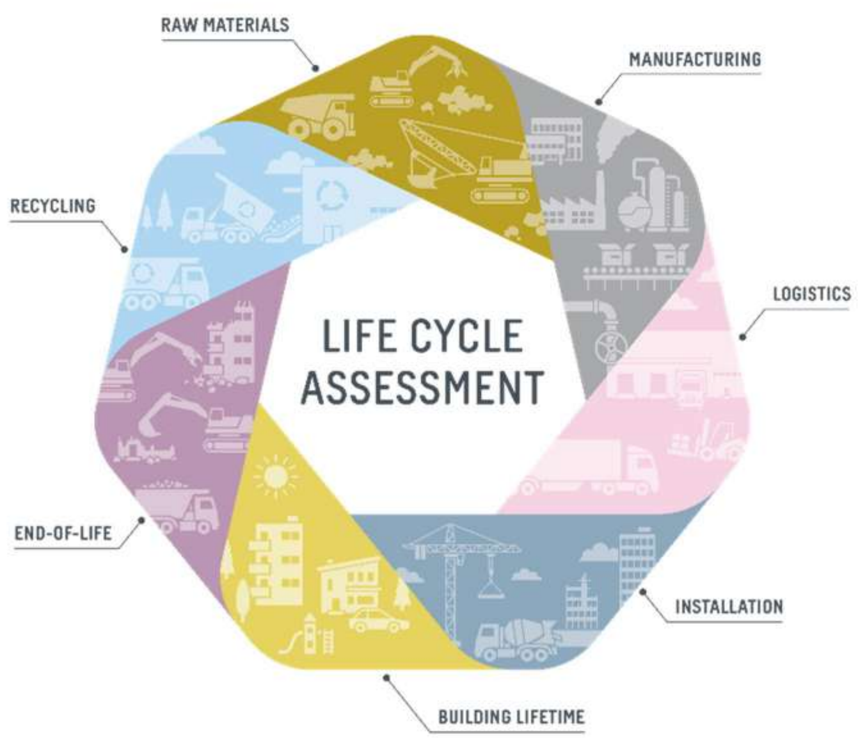
# Introduction & Planning Context

## 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 2021, 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.

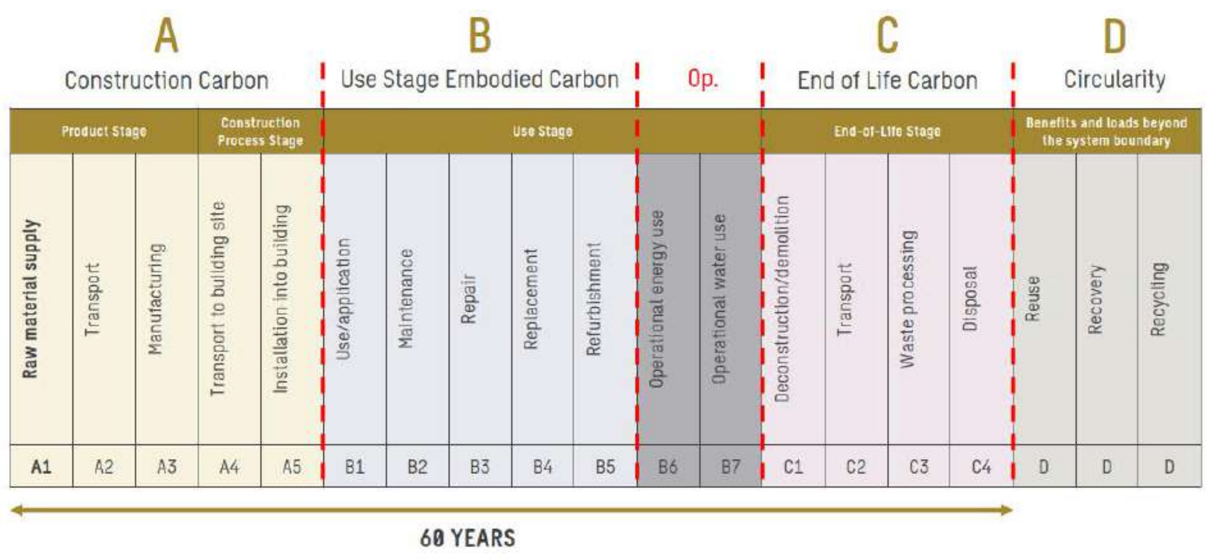
THE LONDON PLAN

**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 1.2.1. 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 1.2.1:** 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 including 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, excluding 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 31.

**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 – London Borough of Camden

The key referrable document for local planning context for the Proposed Development is the Camden Local Plan (2017) and Draft New Camden Local Plan (2024). The Draft New Camden Local Plan includes key policies related to how the borough expects the climate emergency to be managed through the application.

The validation requirements for this set out in the Draft New Camden Local Plan includes the GLA Whole Lifecycle Carbon Assessments Guidance, and as per Section 2.2 this report is intended to provide compliance with the intent of that document.

In addition, a number of other key policies are pertinent to this WLCA:

- CC1 – Climate change mitigation / Responding to the climate emergency
- CC2 – Repurposing, Refurbishment and Re-use of Existing Buildings
- CC3 – Circular economy and reduction of waste
- CC4 – Minimising carbon emissions
- CC5 - Energy reduction in existing buildings
- T4 – Sustainable movement of goods and materials
- DS1 – Delivering Healthy and Sustainable Development

Section 8.28 of the Draft New Camden Local Plan specifically refer to LBC's support of '…retrofitting of existing buildings to make them more energy efficient…'.

## 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 is due for formal application in the industry from 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, expect in a few instances where the GLA deviates from this (because of the 5 year gap between RICS Professional Statement issue 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 | This has been accommodated within the GLA WLC model, reported specifically for the retained facades up to L07. |
| 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.<br>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 3.4.1 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 3.4.1 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.

# Project Information

## 3.1 The Existing Building

The Courtyard Building is located in London, with frontages on Tottenham Court Road, Store Street, and Alfred Place. The existing building presents a dated appearance and is considered utilitarian with no significant historical or architectural value. The shops along these streets are part of the building's street-level frontage, which is seen as an opportunity for revitalization by providing high-quality commercial space. The bank on the corner between Tottenham Court Road and Store Street is noted to be outside the scope of the proposed works.

The building's main access to the upper floors is set back from Alfred Place and is described as lacking presence and not being inviting. The existing office entrances are from Alfred Place, with one primary entrance set back from the street and a second entrance further north. Retail units have visitor entrances on Tottenham Court Road and Alfred Place, with the Nationwide Bank occupying the corner of Store Street and Tottenham Court Road.

The building is interconnected from the first floor upwards through an infill building to the north of a central lightwell and a series of stairs and lifts on the south side, which were part of refurbishment works approximately 25 years ago. The internal load-bearing walls between the first and third floors have large openings that were created during refurbishment to allow for horizontal circulation across the building.

The roof condition is described as poor, with plant areas located mainly at the top of the building on the north side. Ducts and condensers are situated in the valleys of the pitched roofs, and a large duct runs along the western side of the lightwell, preventing access to the edge. Some parts of the roof structure have been replaced, and a steel grillage at the third floor was formed to support plant gantries in the valleys of the pitched roofs during the 1998 refurbishment.

The building's use types include retail at the ground and basement levels, with office spaces on the upper floors. The existing building's size is not explicitly stated in the provided facts, but there is mention of a proposed development seeking to provide an uplift of 988 m$^2$ of non-residential floorspace across infills and extensions.

Overall, The Courtyard Building is an existing commercial property with retail and office spaces, in need of modernization and improvement to meet contemporary standards and contribute positively to the local environment. The proposed scheme aims to address these issues by enhancing the building's functionality, accessibility, and aesthetic appeal while also considering sustainability and urban greening.

**Figure 3.1.1:** image of the existing Courtyard Building. Source: Google Maps and Emrys Architects


The area measure report undertaken by Emrys Architects identifies an existing gross internal area of 7,336 m$^2$ GIA.

Section 3 has largely been informed by the architects two pre-application submissions, the structural engineers latest information and the MEP engineers reports.

The key features of the existing building are as follows:

**Building Structure**

The floor levels are different between the two buildings 3 and 5-7 Alfred Place. They in turn are different from the buildings on Tottenham Court Road and Store Street which are aligned with each other.

The building's structural framework includes steel beams and columns, some of which have undergone crude interventions that may require strengthening. There are instances of retrofitted beams that are not adequately tied into adjacent supports, potentially posing safety concerns. At least 15-20 locations have been identified where significant strengthening support will be required, and 5-10 locations with inadequate bearing length and detailing will also require structural work.

There is evidence of historic water ingress at upper levels and around internal interventions through the slab, leading to significant corrosion with potential section loss to affected beams at multiple locations.

Very limited fire protection was present to any of the structural frame on floors 2, 3, 4, and the roof. Some newer steel beams were painted, but there was no indication that the painted coating was intumescent, therefore providing fire no/limited protection.

**Roofs & External Envelope**

The existing building's roof system consists of duo-pitched roofs with trusses forming the structure. Some parts of the roof structure have been replaced over time. The roof plant areas are primarily located at the top of 3-7 Alfred Place and the link building on the north side of the site. There is some degradation of the bearing ends to the rafters and sarking boards to the pitched roof within where repair will be required. Ducts and condensers are situated in the valleys of the pitched roofs, and a large duct runs along the western side of the lightwell, which hinders access to the edge.

**Facades**

The façade system of the existing building includes large existing windows that are of high heritage value and provide high-quality natural lighting to office spaces. The frontage of the building, particularly the shops fronting Tottenham Court Road, Store Street, and Alfred Place, is considered dated and utilitarian with no historical or architectural significance. There is an opportunity to reinvigorate the frontage with high-quality commercial space. The bank on the corner between Tottenham Court Road and Store Street is outside the scope of the proposed works, but other shopfronts are included in the replacement proposals. The main access to the upper floors is set back from Alfred Place and lacks presence.

**Internal Finishes, Fittings and Wall Systems**

The internal finishes, fittings, and wall systems of the existing building are not explicitly detailed in the provided facts. However, it is mentioned that the internal load-bearing walls between the first and third floors have large openings, which were part of refurbishment works to allow for horizontal circulation across the building. The existing building fabric is to be retained and repaired, with improvements to the interior build-up to update to 21st-century sustainability targets.

**Building Services**

The building services systems of the existing building has already been largely removed, part of an old oil boiler in the basement and remnants of a VRF system at roof level are still existing.

## 3.2 The Proposed Development

The Proposed Development involves the demolition and reconstruction of the building at 3 Alfred Place, as well as the removal of the 1990s connecting structure at 1 Alfred Place. The project will also include the renovation of the existing structures. The redeveloped space will offer newly arranged and additional office space suitable for a variety of business uses (Class E), along with retail spaces on parts of the ground and basement levels.

The current gap between the buildings is intended to be transformed into a versatile area, which will be covered with a transparent, glass roof structure. To enhance the quality of the workspace, the upper levels will feature lounge spaces and planted areas.

Furthermore, it is planned to enhance all the storefronts along Tottenham Court Road, Store Street, and Alfred Place to create a cohesive and engaging street-level presence.

**Figure 3.2.1:** image of the Proposed Development. Source: Emrys Architects

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 and information highlighted within Section 4 of this report. Table 3.2.1 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 | 73% (by volume) of the existing floor slabs are retained.<br>New steel frame and composite metal deck infills where the 1999 extension is removed to connect the buildings.<br>New steel frame & composite metal deck construction to extensions & roof.<br>New cores & circulation. |
| Roof | New roof to majority of building.<br>Stepped terraces with blue/green roof systems to L04, high thermal performance and accessibility for building occupants and maintenance.<br>New roof at L05 for plant equipment with plant screening. |
| Stairs | The existing late 20th-century lift/stair is to be removed.<br>The proposal includes improved vertical circulation to ensure a more accessible environment. |
| Facades & External Doors | **Street-level shopfronts:** upgraded façade with new glazing.<br>**Levels 01-03 (generally):** retained historic facades with internal calcium silicate insulation and existing glazing retention. Additional secondary glazing at L01 due to extent of glazing at these levels.<br>**Internal courtyard:** some glazing replacement at L01, other elevations and levels solid and glazed elements retained.<br>**Level 04:** new façade systems for extension elements, high-performance systems, except for retained façade along Alfred Place in north corner which is as per L01-03 generally).<br>**1-3 Alfred Place:** new façade from GF-L03 where existing 1999 glass box extension is being demolished and infilled. |
| Internal Walls & Doors | New internal walls throughout.<br>New doors throughout. |
| Finishes & FF&E | Strip out of all finishes and fittings.<br>100% new finishes and fittings, the extent of this is still to be determined. |
| Building Services | New building services systems throughout.<br>100% electric HVAC systems employed. |
| External Works | Limited works to public realm within the site boundary. |

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 | The Courtyard Building, 1 Alfred Place, London, WC1E 7EB |
| Asset Type | Offices with retail at ground floor and basement levels |
| Proposed GIA ($m^2$) | 8,324 |
| Proposed NIA ($m^2$) | 5,913 |
| No. Storeys Above Ground | 5 |
| Planning Use Class | Class E |

## 3.3 Proposed Development WLCA Targets

Upfront and life cycle 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 The Draft New Camden Local Plan. Where possible, given the extent of retention for both structures and facades, the Applicant will set aspirational targets to go beyond this, subject to future interrogation of low-carbon material opportunities. The project embodied carbon targets are as follows:

**Table 3.3.1:** Proposed Development embodied carbon targets.

| Modules | Project Aspirational Targets |
|---|---|
| Upfront Embodied Carbon (A1-A5) | **600** $kgCO_2e/m^2$ GIA A1-A5<br>LETI C/37% improvement on GLA Benchmark |
| Life Cycle Embodied Carbon (A-C ex. B6 & B7) | **970** $kgCO_2e/m^2$ GIA A-C<br>LETI C/GLA Aspirational |

**Table 3.3.2:** Proposed Development aspirational embodied carbon targets.

| Modules | Project Aspirational Targets |
|---|---|
| Upfront Embodied Carbon (A1-A5) | **475** $kgCO_2e/m^2$ GIA A1-A5<br>LETI C/37% improvement on GLA Benchmark |
| Life Cycle Embodied Carbon (A-C ex. B6 & B7) | **750** $kgCO_2e/m^2$ GIA A-C<br>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 David Bruce, Senior Whole Life Carbon Consultant at Sweco UK, between June and September 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 G&T 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**: Elliott Wood and Emrys Architects have provided indicative roof build-ups which inform material selection for roof systems (cost plan only provides m$^2$ of plan roof area).

- **Facades:** the cost plan only provides m$^2$ surface area rates for façade types, which is insufficient detail for a WLCA. Emrys Architects have provided a breakdown of a typical façade bay to Sweco which has been run through the Centre for Window & Cladding Technology's (CWCT) façade embodied carbon calculation method, using Sweco's custom-built CWCT tool). Other facades are input as placeholder carbon metrics.

- **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.

Further detail can be found in Section 2.4.

### 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 4.6.1:** 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. |
| 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 | 15% | As per RICS PS SE Guidance |
| 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 the Proposed Development |
| 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 **+62 $kgCO_2e/m^2$ GIA (A1-A5)** and **+150 $kgCO_2e/m^2$ 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

It is important that demolition emissions account not just for removed structure but for all removed materials and strip-out of the scheme. As per the constraints of the extant LPG WLCA reporting template, these need to be reported in Modules C1-C4. The Sweco process for this is as follows:

**C1-C4 Emissions (Site Emissions from demolition works)**

This emission is for site works associated with demolishing the existing building and removal and end of life of existing materials. While only part of the existing GIA is removed to facilitate the Proposed Development, all of the rest of the equipment and materials on floors are stripped out back to structure. Therefore, site works for strip out are still assumed to be relatively significant. In the absence of more detail, Sweco have assumed a C1-C4 emission of 11kg$CO_2$e/m$^2$ GIA (of existing GIA) to account for demolition and strip out site works.

### 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 Elliott Wood and can be stated as follows:

| Building Element | Material | Assumption |
|---|---|---|
| Composite Metal Deck Systems | Concrete | C32/40, 286 $kgCO_2e/m^3$ (representative of c.25% 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 51 1.2mm gauge. |
| Core Walls | Concrete | C50/60, 356 $kgCO_2e/m^3$ (representative of c.25% cement replacement) cc:460 $kg/m^3$ |
| | Rebar | 0.79 kgCO2e/kg CARES average |
| Structural Steel Sections | Steel | Blended 60% BOF & 40% EAF (RICS PS SE)<br>BOF @ ECF of 2.45 $kgCO_2e/kg$<br>EAF @ ECF of 0.567 $kgCO_2e/kg$<br>Assume intumescent paint to above @ 1mm total film thickness inc. primers |
| Basement Slab | Concrete | C40/50, 328 $kgCO_2e/m^3$ (representative of c.25% cement replacement) cc:420 $kg/m^3$ |
| | Rebar | 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**

The new roofs will be of a lightweight construction with steel frame and profiled metal deck to avoid additional strengthening works. The existing cupola will be raised to allow access to a new internal space below. This will require a new steel frame to support the cupola at the higher level, which will be supported on the new terrace structure.

The stairs in the new core are assumed to be precast stairs. Small additional stairs are also to be added in multiple places. A new steel stair is assumed to be installed in the atrium.

**Facades**

At this stage the carbon impacts from the façades have been calculated by using placeholder figures based on historic data that Sweco have obtained from similar projects. The assumptions are based on the CWCT guidance and as such contain reasonable margins and uplifts at this stage for the intended areas.

| Façade Type | Description | FSA ($m^2$) | Intensity ($kgCO_2e/m^2$ FSA A1-A5) |
|---|---|---|---|
| Type 1 | New Facades at L04 | 543 | 350 |
| Type 2 | Handmade faience façade system | 192 | 300 |
| Type 3 | Replica historic façade | 70 | 300 |
| Type 4 | Type 04 - Interventions into the existing façade (EXISTING) @ 150 FSA A1-A5 | 1,380 | 150 |
| TBC | Ground floor shopfront facades | 583 | 250 |
| TBC | Plant screen | 330 | 250 |
| TBC | Atrium Façade | 1,160 | 200 |
| TBC | Allowance for treatment to party wall at L04 | 94 | 50 |

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 Emrys Architects. The following assumptions are used for the model to extrapolate the m2 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.
- Blockwork thickness 140mm

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**

Finishes quantities are as set out in the cost plan. Material information is still developing at this stage and below are the main areas and their assumptions:

- **Reception/Lobby:** High quality finishes
- **Basement showers:** Walls/floors: Ceramic tiles
- **WCs:** Floors: Ceramic tiles; Walls: Partially Ceramic tiles / painted surfaces
- **Lift lobbies:** High quality finishes

Where available, A1-A3 data has been selected in line with Table 16 of the RICS Professional Statement Second Edition (2023).

Two of the most significant elements in the finishes section (in terms of their contribution to the reported embodied carbon) are the raised access flooring and the suspended ceilings. 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<br>40.56 $kgCO_2e/m^2$ (A1-A3)<br>Pedestals added separately |
| Suspended Ceilings | Plasterboard on metal frame |

Little detail was provided for FF&E at application stage given the current stage of the design (see Section 4.1.2). Sweco have used a placeholder $kgCO_2e/m^2$ rate metric derived from a large portfolio of commercial WLCAs, applied to the Proposed Development GIA, to determine the emissions of this element. For clarity, this is 21 $kgCO_2e/m^2$ 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.

A good amount of detail for such an early project stage was included within the cost plan for the planning application, which was cross-referenced with basis of design information from the project MEP engineer and utilised for the purposes of this WLCA. This included:

- Heating and cooling system based on a hybrid VRF setup supplied via roof located heat pump and fan coil units as emitters.
- Ventilation system with centralised air handling units located at roof level and basement.
- Localised ventilation also provided by local heat recovery units to landlord areas.
- Water installations including domestic hot water.
- Firefighting installations including sprinkler system.
- Power systems with power supply and back-up.
- Lifts.

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:

- Power distribution throughout.
- Ducting and pipework including insulation.
- Cable ladders, trays and baskets.
- Light fixtures, in line with RICS PS SE.
- Sprinkler heads.

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. This also impacts the B modules in a significant way, as services are replaced regularly over the life cycle and often have a significant impact in the B modules. This is one of the primary reasons for the B-C results being higher than the GLA benchmark for the Proposed Development, alongside the additional contingency in these modules.

**CAT A and CAT B**

As set out in the Energy & Sustainability Statement, the Proposed Development will be a flexible office, i.e., not occupied by a number of large commercial tenants but variously occupied in a flexible working fashion, managed by the building owner (the Applicant). At this stage, as it is not yet defined to what extent the Proposed Development will be fitted out, nor are there any specific details about the fit out materials to inform a WLCA, there remains potential that the Development will be fitted out with CAT B at completion. For reporting purposes CAT A have been allowed for in the WLCA model to align with the GLA Guidance, where the benchmarks include Cat A for the commercial values.

The results of the CAT A have been included in the results of this document, and additionally Section 5.1.6 shows the results split out from the Shell & Core results. As noted above, a Cat B fit had not been modelled at this stage but for comparison this has been given a placeholder value of 150 $kgCO_2e/m^2$, also reported in Section 5.1.6.

### 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:** as the assumptions in A1-A3 state a significant proportion of structural steel coming from electric arc furnace (EAF), and the fact that this is not manufactured in the UK, the RICS assumption of 120km is not appropriate. Sweco assume transport for structural steel as 1500km by road + 100km by sea.
- **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.

RICS Professional Statement Second Edition (2023) recommends 40kg$CO_2$e/$m^2$ GIA for new construction, as the Proposed Development is largely a refurbishment, Sweco have assumed 20 kg$CO_2$e/$m^2$ GIA for site activities at this stage.

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 VRF system 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. All refrigerant used on site is R32 (within the VRF systems), which has a GWP of c.700. This is aligned with the new requirements on refrigerants from the UK Net Zero Carbon Buildings Standards, which uses R32 as a limiting parameter for compliance.

### 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 kg$CO_2$e/$m^2$ 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 guidance of TM 54 and NABERS. This is in line with paragraph 2.5.14 of the LPG WLCA guidance.

The annual energy use is estimated with the guidance of TM 54 and NABERS are reported as follows:

| Reporting Type | Annual Energy Demand (kWh/yr.) |
|---|---|
| Landlord/Base Build Annual Energy Demand (reported in GLA template as ‘regulated’) | 283,410 |
| Tenant Annual Energy Demand (reported in GLA template as ‘unregulated’) | 338,463 |

To generate the emissions, the above annual energy demand are multiplied by the current grid emissions factor for electricity of 0.295 $kgCO_2e/kWh_e$. 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

## 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 Table 25 of the RICS Professional Statement Second Edition (2023). As the end of life treatment for this building is unknown, the business as usual benchmark is chosen for a placeholder at this stage. This is calculated as 25% of the A5 site activities metric used in RICS Professional Statement Second Edition (2023), which equates to **10 $kgCO_2e/m^2$ 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 sheet row 23 if input into the results table. Including sequestration at early stages can be problematic, especially given that its end of life treatment cannot be reasonably provisioned for or specified at this point.

Due to the difficulty of knowing the end of life for biogenic carbon containing products, the Applicant have chosen to not include any biogenic carbon in the whole life carbon model at this stage. All timber procured on the project will be 100% sustainably sourced with certification, which is a requirement to achieve any rating under the BREEAM scheme.

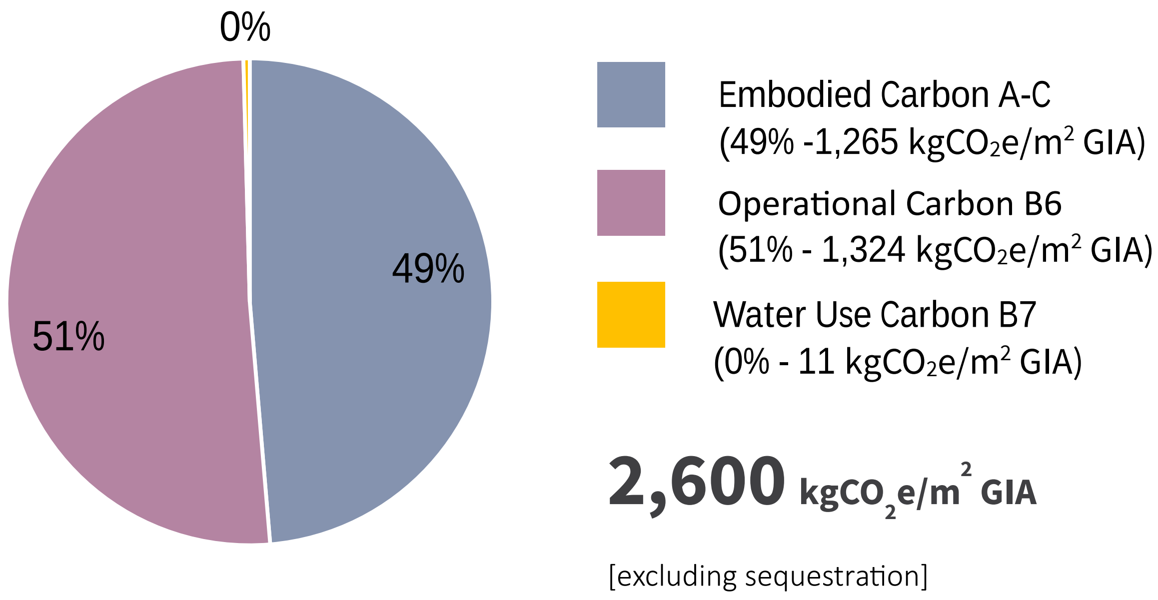
# Results & Analysis

# 5.1 WLCA Results

## 5.1.1 – Whole Life carbon

The estimated whole life carbon of the Proposed Development is **2,600 $kgCO_2e/m^2$ GIA A-C**, including operational energy (B6) 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 as per GLA template.




The operational energy estimates based on the limitations of a refurbishment have resulted in almost 50/50 split between the embodied carbon and the operational energy. There are no industry benchmarks to compare the whole life carbon emissions against, given the variability in reported results, particularly for B6 and B7.

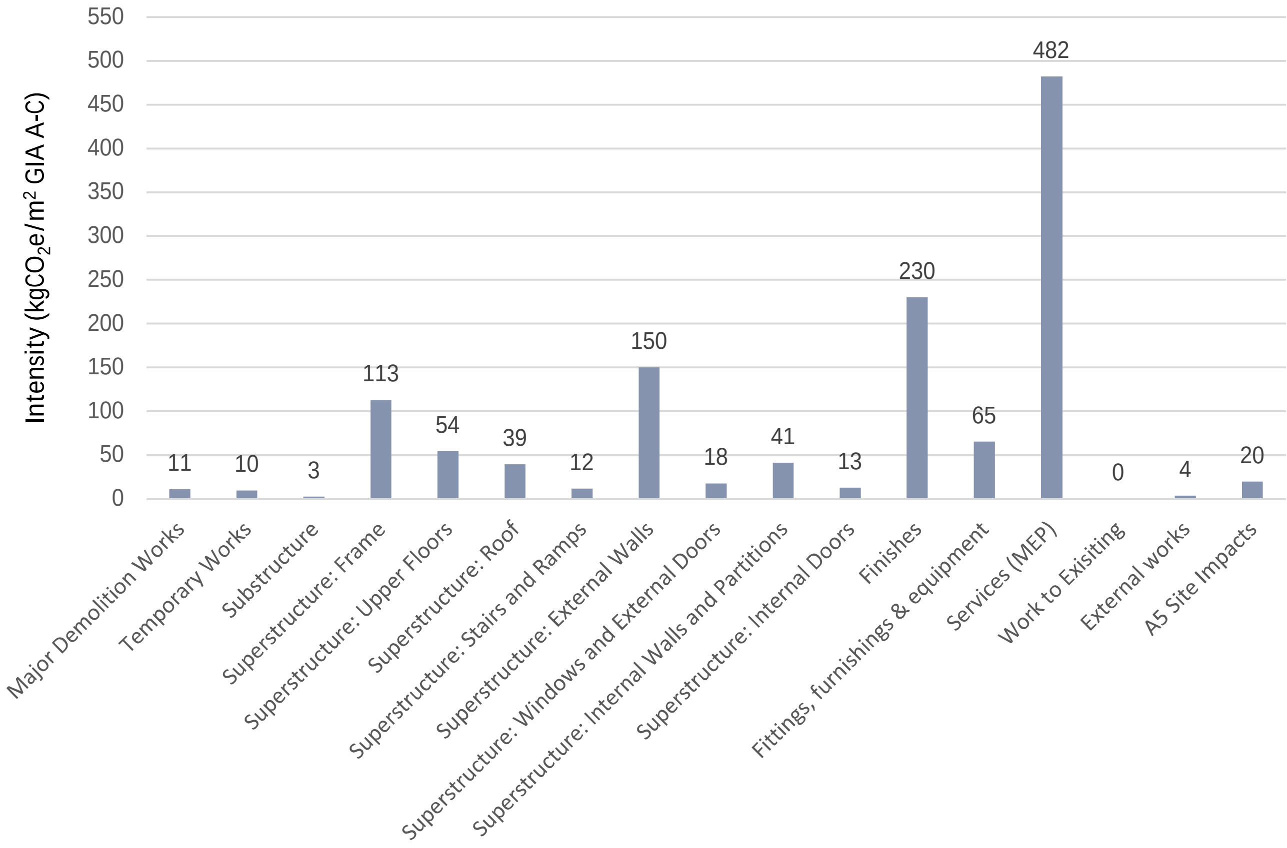
The emissions associated with operational energy (Module B6) contribute an estimated 1,324 $kgCO_2e/m^2$ GIA over the 60 year RSP. The energy usage that informed this calculations are estimated in line with CIBSE TM54 as detailed in Section 4.2.9. No grid decarbonisation has been applied to the results here, and they are calculated using the recommended carbon factor set out in RICS PS SE of 0.295 $kgCO_2e/kWh$. All emissions are from electricity consumption, given that the development is 100% electric HVAC.

In addition, the Proposed Development will be able to take advantage of future grid decarbonisation given that it is 100% electric. Using grid decarbonisation factors from the RICS Professional Statement Second Edition, the emissions associated with B6 operational energy may reduce to 292 $kgCO_2e/m^2$ GIA over the 60 year RSP. 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.

## 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 **1,265 $kgCO_2e/m^2$ GIA A-C**. This result is 10% lower than the GLA Benchmark for commercial offices with regards to the A-C embodied carbon target. 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 (A-C) between reportable building elements as per the GLA reporting template.

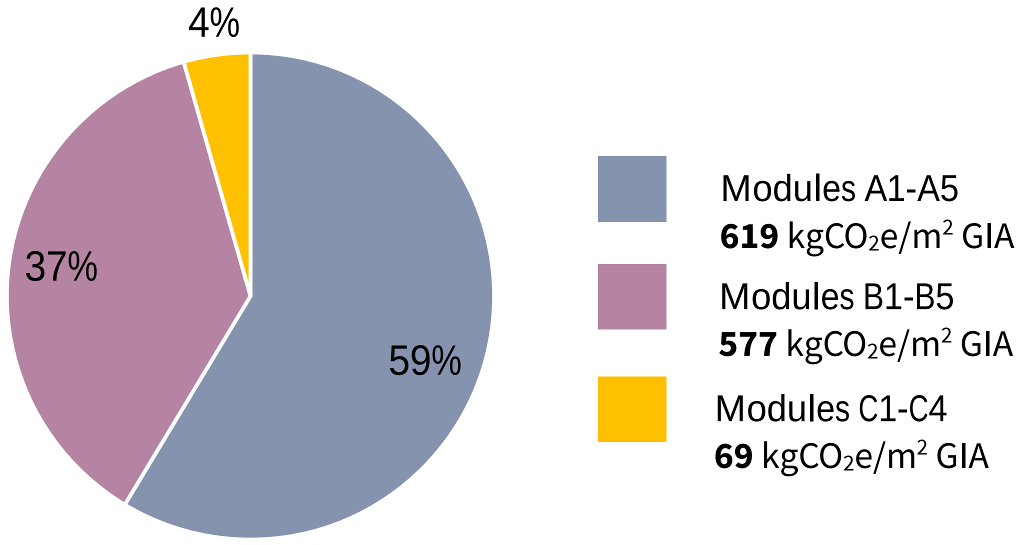


As would be expected from a retrofit development. The emissions associated with the building services equipment and refrigerants dominates the A-C results, making up 38% of the A-C emissions for the Proposed Development (481 $kgCO_2e/m^2$ GIA A-C). This is due to the fact that the majority of building services are new, and the components within this category get replaced a number of times over the life cycle study period. 251

$kgCO_2e/m^2$ 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 in this category.

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 (as reported in Section 1).




Upfront embodied carbon is still marginally the dominant source of emissions, typically associated with the building services impacts and the additional structural materials added for the Proposed Development. The latter still has significant reduction opportunities, which are included in Section 6 of this report and set out within the GLA WLCA reporting template. Modules B1-B5 are more significant proportionally than they would typically be in a new construction, given that a significant source of upfront embodied carbon emissions associated with structures are not applicable to this proposal due to the maximised retention of the existing building. C1-C4 emissions are still significant, and most of this occurs in Module C3, associated with disposal emissions from the timber elements of the raised access flooring. Focus on upfront emissions is set out in Section 5.1.3 below.

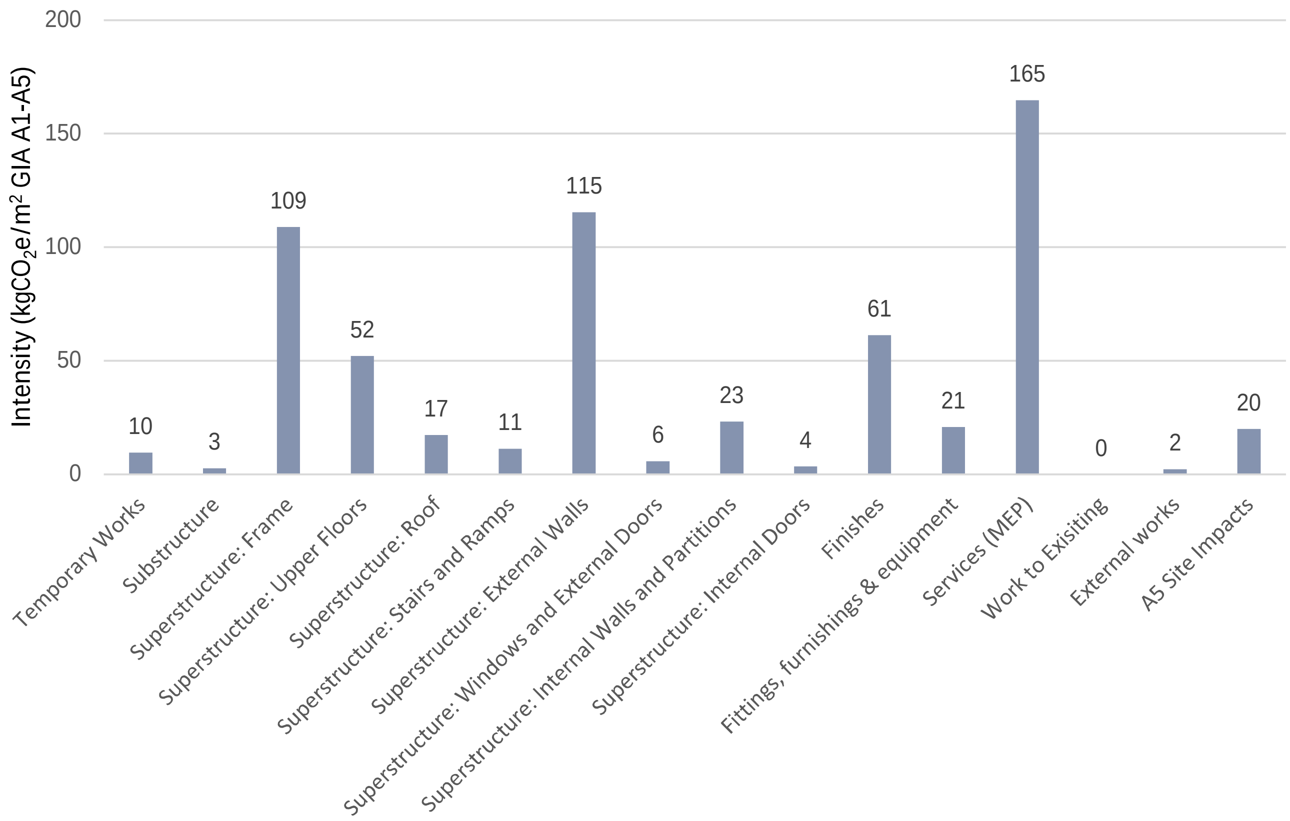
The values presented within this section for the A-C emissions include contingency, applied as set out in Section 4.1.6. These are applied element-by-element and include for sub-methodologies (such as CWCT for facades) that already include for contingency within their calculations. The total contingency in the A-C model is **150 $kgCO_2e/m^2$ GIA**. Without this contingency applied, the raw model results would be 1,116 $kgCO_2e/m^2$ GIA, and would therefore demonstrate a further improvement upon the GLA Benchmark for A-C.

## 5.1.3 – Upfront Embodied Carbon (A1-A5)

The estimated upfront embodied carbon (A1-A5) of the Proposed Development is **619 $kgCO_2e/m^2$ GIA A1-A5**, which is 35% lower than the GLA Benchmark and just 8% higher than the GLA Aspirational 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 (A1-A5) between reportable building elements as per the GLA reporting template and including contingencies.



As with the life cycle embodied carbon, upfront emissions are dominated by the building services, which make up 27% of the overall upfront emissions at the Proposed Development. This is not an unusual position for retrofits, as all building services are new, and new industry methodologies for assessment have generally increased the overall proportion of upfront emissions associated with this category.

Emissions from substructure, frame and upper floors (164 $kgCO_2e/m^2$ GIA A1-A5 excluding roof and stairs) are significantly lower than a typical new construction, which may have upfront emissions associated with these categories upwards of 300 $kgCO_2e/m^2$ GIA A1-A5. This underlines the benefits of maximised retention. There are still a number of opportunities for improved material selection and procurement within this category, 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 **62 $kgCO_2e/m^2$ GIA**.

### 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**<br>**A-C inc. B6, B7 & sequestration** | **2,600** | **2,450** |
| **Life Cycle Embodied Carbon**<br>**A-C ex. B6 & B7, inc. sequestration** | **1,265** | **1,116** |
| **Upfront Embodied Carbon**<br>**A1-A5** | **619** | **557** |

Overall, the results represent a strong position for the Proposed Development at application stage, with all metrics below the GLA Benchmark rates 9upfrotn carbon being significantly below) even when carrying significant contingency at this early stage of the project and basing material selection on RICS-aligned assumptions. 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. Where future evidence is provided to reduce these contingencies (which naturally occurs during RIBA Stages 3, 4 and 5), they will be revised accordingly – see Section 4.1.2 for detail as to the current design stage of the Proposed Development at application stage.

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. These will be explored at the design matures towards specification.

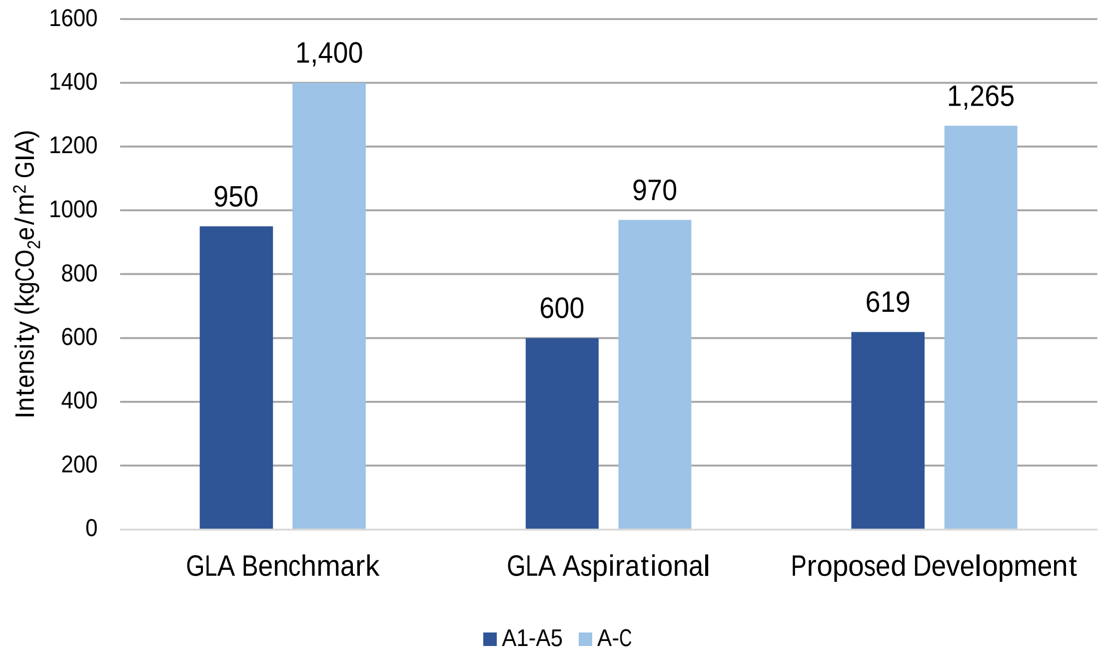
### 5.1.5 – Comparison with GLA Benchmarks

As set out in previous sections, the Proposed Development demonstrates an improved position compared to 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.

The Proposed Development achieves:

- Upfront embodied carbon (A1-A5) **35%** lower than the GLA Benchmark for offices (including contingency), with a base rate **7%** lower than the GLA Aspirational Benchmark (when excluding contingency).
- Life cycle embodied carbon (A-C) **10%** lower than the GLA Benchmark for offices (including contingency), with a base rate **20%** lower than the GLA Benchmark (when excluding contingency).

**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).




Refurbishments always show disparity between A1-A5 and A-C figures when modelling a WLCA. This is because elements that are retained insitu such as structures (noting 73% by volume of the structure is retained for the Proposed Development) typically have a significant upfront emission and a very small emission in Modules B & C. On the other hand, elements that are replaced often over the RSP, such as finishes, fittings and MEP equipment, are often newly installed. This means that the impact in A1-A5 is lowered, but the B & C Module emissions remain like a new-build.

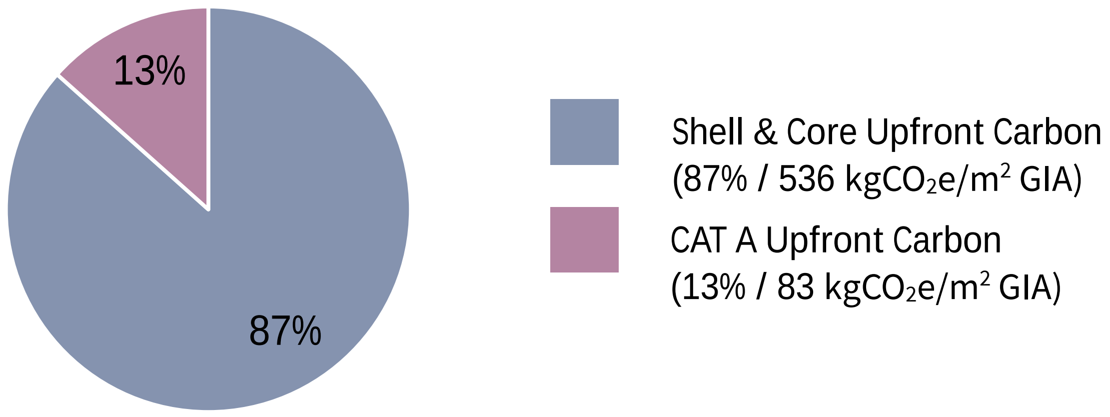
The reported emissions from Module B are higher than the GLA benchmark rate, as demonstrated in the GLA template issued with this submission. This is by no means unusual from a Sweco perspective, based on our portfolio of commercial office projects. The reasoning for this includes:

- A significant portion of the A-C contingency occurs in this module, which artificially inflates this number in the GLA sheet (as the reported values are inclusive of the contingency applied for unknowns at an early stage). We believe that a contingency is necessary to maintain at this stage.
- We do not believe the GLA target value for Module B is appropriate for commercial offices based on our modelling experience. New data and modelling approaches such as CIBSE TM65 and the advice within the RICS Professional Statement Second Edition have resulted in better-informed modelling of life cycle replacements and the extent of systems that need to be modelled under the MEP header, which has increased upfront emissions from MEP significantly, and this has a consequent knock-on impact on the B Modules as this higher emission gets replaced regularly over the life cycle, resulting in inflated emissions in Module B.
- Given that the assessment has followed all the necessary best-practice industry guidance on how to model MEP, and that the project is at RIBA Stage 2 (where there is only limited basis-of-design information for MEP equipment), challenging this value at this stage is problematic. That the value is in excess of the GLA benchmark has been noted and every effort will be made to challenge this at the appropriate stage of design, when actual selections and specification happens and such things can be meaningfully compared and contrasted to determine the best solution over the life cycle.

We expect that any pre-commencement or post-completion WLCA will be reporting B Module values that are closer to the GLA benchmark, but the nature of WLCA application during early project stages provides us with limited ability to challenge this at this early stage. However, we would still argue that the B Module benchmarks in the GLA guidance are outdated based on the most recent and robust methods to calculate the impact of MEP equipment over the life cycle, which has historically been significantly undercounted in industry WLCAs.

### 5.1.6 – CAT A and CAT B results

At this stage it is not yet defined how the Development will be fitted out, the GLA WLCAG assumed that CAT A is allowed for and as such this is included in the previous results. For reporting purposes and to show the importance of fitout this section show the Shell & Core results split from the CAT A results.




When looking at the CAT A results alone it results in 83 $kgCO_2e/m^2$ GIA, or 13% of the total Upfront Carbon (A1-A5), a significant impact, this includes raised access flooring systems, MEP equipment such heating and cooling, ventilation and lighting an electrical installation. Depending on how the building is handed over to future potential tenants the CAT A materials should be installed with care to not waste any unnecessary carbon.

CAT B elements have not been included in the results, to align with the benchmarking within the GLA WLCAG and it is not yet defined if this is part of the intent from the Applicant. If CAT B is included, Sweco would suggest allowing for further 250$kgCO_2e/m^2$ NIA (A1-A5) which equals to 168 $kgCO_2e/m^2$ GIA (A1-A5). This should cover all materials, products and equipment that a CAT B install would entail.

# 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.

If all reduction options are taken, the development could further reduce upfront embodied carbon by as much as c.100 $kgCO_2e/m^2$ GIA A1-A5, assisting the project in working towards the aspirational targets set out earlier in this report. This does not currently include any identified reductions in building services given the use of $m^2$ rate assumptions and the lack of data in this section, but these may be added later to further reduce emissions when evidence can support the accuracy of the quantified reduction opportunities.

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

- **Structural steel:** the structural steel has the most significant impact in the new structure. The project team will explore opportunities to utilise a higher quantum of electric arc furnace (EAF) steel which have lower carbon impact compared to BOF manufactured steel but will come from Europe.
- **Structural steel:** the team will investigate the use of very low carbon steelwork, such as Arcellor Mittal's XCarb steelwork. However, this limits procurement to only one supplier, which may be problematic. Again, input and assistance from the steel supply chain at the next stage will help us to understand the viability of specifying this type of steel.
- **Structural steel:** the project team will explore the use of reused steel in suitable locations and are monitoring recent progression of reused steel catalogues from businesses such as EMR and Cleveland Steel. Again, this is a timing issue, as we will need to secure suitable sections closer to the time of procurement, and this cannot currently be guaranteed or secured with any level of certainty.
- **Concrete:** Reducing the embodied carbon in all new concrete elements will be a priority. This is a developing area with new alternatives being brought into market or being investigated and therefore the solution is being kept material agnostic at this stage. A traditional way of reducing the embodied carbon in concrete is by maximising the use of recycled materials such as GGBS and/or fly ash in the concrete, this will also be investigated whilst keeping up with the latest best practice and making sure that the project programme is not detrimentally affected.
- **Concrete:** the project will look to challenge and review the strength grades of the concretes during the next stage of design; higher grades often include higher quantities of cement which may lead to higher embodied carbon impacts.
- **Rebar:** the current model includes a market-typical rebar. The project team will investigate the ability to supply rebar with a carbon factor <0.5 $kgCO_2e/kg$, subject to procurement and input from the supply chain.
- **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.
- **Facades:** use of aluminium and glass with a high recycled content will be explored but often typically have limited supply from a single supplier, so its availability and usability will need to be monitored and tested during the next stages of design. Where possible, we will ensure that any aluminium and glass coming out of the existing building is appropriately removed and recycled.
- **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.
- **Finishes & fittings:** we will investigate use of recycled raised access flooring panels. These are items that require further review at stages 3 and 4 of design.
- **Finishes & fittings:** utilisation of the suspended ceilings will be explored in detail during the latter stages of design; at present they are applied to all floorplates consistent with the existing building.
- **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%.

While it is recognised that the current design intent, with retrofit first as its key pillar, significantly reduces embodied carbon, the above list shows that further reductions can still be made. This is the purpose of setting targets beyond the norm, to ensure that new materials installed in the Proposed Development are also optimised for their embodied carbon performance.

# Appendix F

## Pre-Demolition Audit (Elliott Wood Partnership)

ElliottWood

# The Courtyard Building
## 1 Alfred Place, London, WC1E 7EB

- **2230235-EWP-XX-ZZ-RP-Y-00006 -Pre-demolition Audit**

| | |
|---|---|
| Project number | 2230235 |
| Project name | The Courtyard Building |
| Client | Knighton Estates Limited |
| Status | For Planning |
| Revision | P1 |
| Date | 18-10-2024 |

# Document Control

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Remarks** | V1 | | | | | |
| Revision: 1 | Prepared by: | Luca Carboni | Nicholas McDonald | Checked by: | Louisa Treadwell BA (Hons) BREEAM AP & Assessor | Approved by: | Ben Holmes BREEAM AP WELL AP |
| Date: 18.10.24 | Signature: | | | Signature: | | Signature: | |

This report is for the sole use of the Knighton Estates Limited for whom the report is undertaken and cannot be relied upon by third parties for any use whatsoever without the express authority of Elliott Wood.

# Contents

# 1. Introduction

This document has been structured to cover the requirements of a 'pre-demolition audit', as set out in the Energy efficiency and adaptation Camden Planning Guidance (CPG)[1] document by the London Borough of Camden (LB Camden) and BREEAM UK Refurbishment and Fit Out (BREEAM RFO) 2014.

This report is for the sole use of Knighton Estates Limited for whom the report is undertaken and cannot be relied upon by third parties for any use whatsoever without the express authority of Elliott Wood Partnership Ltd (EWP).

The information presented in this report is based on:

- Site visits carried out by Luca Carboni and Nick McDonald from EWP on 7th October 2024 and Nick McDonald and Charlie Vella from EWP on 11th October 2024; and,
- An existing 2D survey model by Digitalinc provided by the client.

## 1.1 Aims and objectives

The aim of this report is to determine whether materials within the existing buildings can be reused for the Proposed Development and maximise the recovery of material for subsequent high grade or value applications. This report has been written to meet the Energy efficiency and adaptation CPG document (2021) by the LB Camden, and the requirements of BREEAM RFO 2014 credit issue Wst01, summarised in Section 1.3.

The objectives of this report are to:

- Guide the design;
- Consider materials for reuse;
- Set targets for waste management and minimise waste; and,
- Engage contractors in the process of maximising high-grade reuse and recycling opportunities.

The audit has been undertaken by suitably qualified professionals from EWP with expertise in reclamation of components and materials and experience in preparing these types of reports.

## 1.2 Pre-demolition audit

*"A pre-demolition audit is a detailed inventory of the materials in the building that will need to be managed upon demolition".[2]*

In accordance with the London Plan (2021) and the LB Camden Local Plan (2017), this audit identifies all the materials within the building and documents how they will be managed, implementing the following hierarchy:

- Reuse on-site;
- Reuse off-site; and,
- Remanufacture or recycling.

The client and contractor will be advised to allocate time in the project programme for selective deconstruction techniques and provide storage for maximise material reuse.

This report provides the following:

- A summary of the key components and materials present in the existing buildings, with an estimate of the quantities and whether they are suitable for reclamation; and,
- Opportunities for reuse and recycling either within the Proposed Development or off-site nearby/locally or further afield.

The following best practice information has also been included:

1. How the value of existing building elements or materials can be recovered;
2. The estimated quantity of demolition waste;
3. A schedule of practical and realistic providers who can act as brokers for each of the reclaimed items; and,
4. Targets for reuse and reclamation rates.

## 1.3 BREEAM

The project is targeting certification under BREEAM RFO 2014 To achieve credits under assessment issue *Wst 01: Project waste management* a pre-refurbishment audit must be carried out, and must cover:

1. Identification and quantification of the key materials where present on the project (see Table 10.3);
2. Potential applications and any related issues for the reuse and recycling of the key materials in accordance with the waste hierarchy;
3. Opportunities for reuse and recycling within the same development;
4. Identification of local reprocessors or recyclers for recycling of materials;
5. Identification of overall recycling targets where appropriate;
6. Identification of targets for reuse where appropriate; and,
7. Identification of overall landfill diversion rate for all key materials.

This report will be submitted to support the BREEAM RFO 2014 application of the proposed development.

To secure the relevant credit this report must be referenced in the project's Resource Management Plan (RMP). Actual waste arisings and waste management routes must be compared with those forecast, any significant deviations from planned targets must be investigated and explained.

## 1.4 Description of the existing buildings

The site comprises several buildings spanning the early 20$^{th}$ century. It has been assumed that circa 25 years ago refurbishment works took place to infill and develop a modern link block. The buildings are:

- Building 1 – 220-226 Tottenham Court Road;
- Building 2 – 3-5 Alfred Place;
- Building 3 – 22 Store Street;
- Building 4 – South Block of 220-226 Tottenham Court Road;
- Building 5 – Courtyard Infill Link Building; and,
- Building 6 – Link Block between Buildings 3 and 4, and Building 2

Based on the preliminary desk study and site visits Buildings 1-4 are assumed to have been constructed in the early 20$^{th}$ Century, though each of the 4 primary buildings (1-4 on sketch) have slightly different forms.

Buildings 5 & 6 are likely to have been constructed ~25 years ago, when the refurbishment works took place.

Figure 1 below shows the different buildings at first floor level.

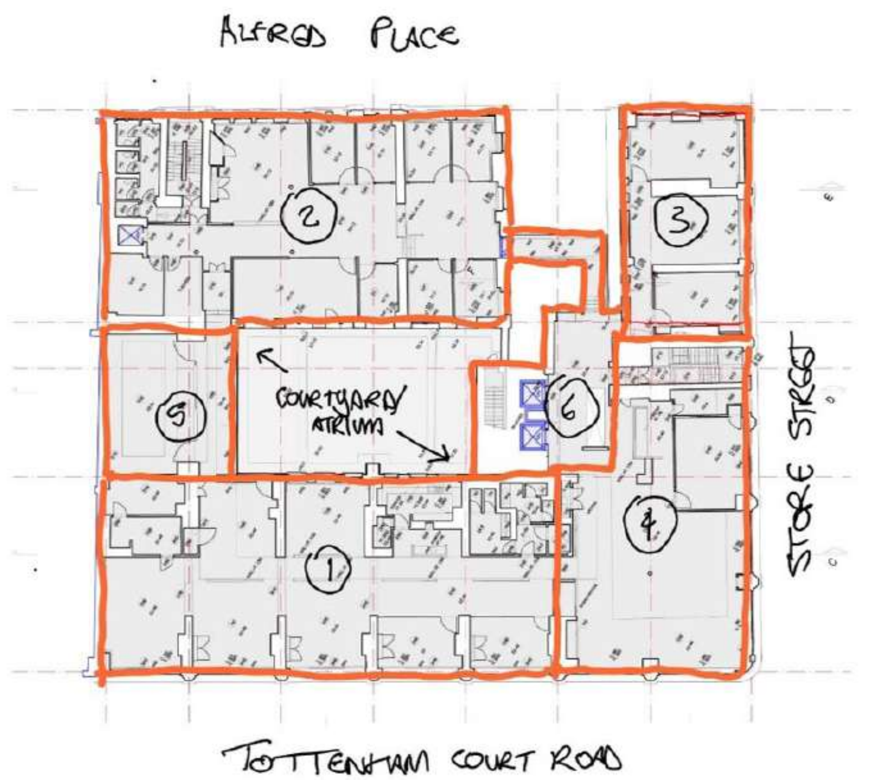



*Figure 1: Sketch illustrating buildings 1-6, first floor.*

### 1.4.1 Building 1 – 220-226 Tottenham Court Road

Building 1 is comprised of a basement level and ground plus four floors.

Constructed with load bearing masonry walls and timber floors, the ground floor unit is framed, with load bearing walls having been transferred out at first floor.

Between first and third floors the internal load bearing walls have large openings which are assumed to have been completed during the refurbishment works. The openings, as shown in Figure 7, open up the floor plate of Building 1, allowing horizontal circulation across the building.

*Figure 2:Openings through load bearing walls in Building 1.*

The roof of each original unit is duo-pitched with trusses forming the structure. A ceiling exists which is assumed to have been installed as part of the refurbishment works.

[1] Camden Planning Guidance – Energy efficiency and adaptation – January 2021
[2] *BREEAM UK Refurbishment and Fit-out 2014, BRE Global Ltd, 2020.*

The ceiling is poorly installed often with inadequate details and may require augmentation to allow it to be retained.

The existing roof has a steel grillage below assumed to have been installed as part of the refurbishment works. The grillage is assumed to support the plant gantries located in the valleys of the pitched roofs.

### 1.4.2 Building 2 – 3-5 Alfred Place

Likely to have originally been an industrial use (possibly linked to the timber yard shown on archive drawings), Building 2 is constructed with steel/iron framing and concrete filler joist floors.

Column centres are approximately 4.5m x 5.5m, the building floor heights are very compressed above first floor ranging from 3m – 3.2m floor to floor.

There are signs of surface corrosion throughout, though it Is likely this can be cleaned relatively easily, and there is some cracking of the soffit of the filler joist floors.

At ground floor there is access into a loading bay within the adjoining 7 Alfred Place.

### 1.4.3 Building 3 – 22 Store Street

Constructed with timber floors, and a hybrid of load bearing external walls with steel frame internally (2 central columns). At ground floor level the retail unit has been extended to the north and it is assumed a transfer frame exists to re-support the remaining facade over.

On the north wall of the building are steelwork penetrations from the construction of Building 6 (see Figure 3). It is assumed this has been done to facilitate installation of the beams that frame Building 6.

*Figure 3:Penetration through external wall of building 3.*

### 1.4.4 Building 4 – South Block of 220-226 Tottenham Court Road

Constructed alongside Building 1, but likely to have been a multistorey retail/restaurant unit. The building has a hybrid of load bearing masonry walls and steel/iron framing with timber floors.

The steel grillage and ceiling installed during the refurbishment works has a number of unorthodox details and will require further investigation if it is to be salvaged, it has been recommended by EWP structures that this is to be replaced to allow it to continue to support the roof, plant deck, and/or be adapted to become a terrace.

*Figure 4:Photo of unorthodox steel detailing in steel grillage. Key issues include lack of appropriate stiffeners and end plates to beams & top plate to columns.*

### 1.4.5 Buildings 5 – Courtyard Infill Link Building

Building 5 is an infill to the courtyard linking Buildings 1 and 2. It is constructed as a steel grillage with metal deck floors supported off existing walls to Buildings 1 and 2.

The party wall with 7 Alfred Place appears to have been an infill in blockwork with metal deck floors on steel beams. The floors have been built into the adjoining properties in each location, this is assumed to be a result of partially infilling the original courtyards in each property.

### 1.4.6 Building 6 – Link Block

The office entrance structure to link Buildings 2, 3 and 4 above ground floor is via a series of stair bridge links. The structure is steel and metal deck with glass facades.

A number of the support details of the link are poorly executed and will need to be adapted or strengthened as part of the works.

## 1.5 Description of the proposed development

The two main moves at the core of the scheme are to infill the current gap along Alfred Place and provide additional massing at fourth floor. Both allow the scheme to work as one connected building, whilst also celebrating the character of the existing and its surroundings.

A new glazed brick facade is proposed to fill the void between the two existing buildings. Creating a more consistent building line, rhythm and enclosure to Alfred Place will generate greater visual continuity in the townscape.

The central cupola on the Tottenham Court Road front is a hidden feature of historic interest. The scheme proposes to enhance its prominence in street level views by lifting this feature and integrating it as part of the new amenity terraces at roof level.

Terrace areas at fourth floor are designed to be heavily planted to contribute to thegreening of London with raised planting beds at the perimeter.

The key elements of the proposed development are:

1. Join Building 2 and Building 3 on the site in a more sensitive manner than the existing glass extension installed in 1999. The infill section will form a more engaging entrance to the office that will enhance the character of the area.
2. Resolve several access issues by rebuilding the slab in one section of 3-7 Alfred Place to simplify the levels.
3. Retain and repair the existing building fabric, improving interior build-up to better the building performance.
4. Improve street frontage to better engage with the surrounding context and contribute to the area.
5. Provide new End of Journey that supports workers in cycling/running to work.
6. Place more emphasis on the existing heritage value of the cupola by raising it to be visible at street level.
7. Rebuild areas of the roof in poor condition, providing opportunities for amenities, urban greening, and consolidation of plant to improve street views.
8. Create additional roof massing surrounding the cupola to draw attention to it and to reflect diversity in form and material at this level.
9. Sustainable Design and Biodiversity improvements of enhancement to building and amenity offer.
10. The demolition of Building 6 is proposed to create a courtyard that attracts social activities and connects all the buildings comprising the site.

# 2. Methodology

## 2.1 Audit process

EWP carried out this audit in accordance with the LB Camden Local Plan (2017) and BREEAM RFO 2014 requirements.

The following process was followed when carrying out the pre-demolition audit and completing this report:

1. Identification and summary of the key components and materials present in the existing buildings through site visits and review of existing and proposed drawings;
2. Explanation and drawings that show the extent of the proposed demolition and whether any parts of the building are being considered for retention; and
3. Illustration of the opportunities for reuse and recycling of materials.

A 2D and 3D digital survey model, plans and elevations of the existing building were provided by the client.

In addition of the above mentioned procedure, this audit also quantifies the retained materials and provides a detailed section on the retained and deconstructed quantities of the façade.

#### 2.1.1 Site Visit and visual inspection

The existing building was vacant, allowing for nearly all areas to be inspected during two site visits carried out by the EWP team on the dates below:

- 7th October 2024 by Luca Carboni and Nicholas McDonald
- 11th October 2024 by Nicholas McDonald and Charlie Vella

At the time of the visits the strip-out had been carried out for the majority of the buildings but no demolition work had begun. Two areas were still operational: the basement and ground floor units at 226 Tottenham Court Road housing a Nationwide branch and the basement and ground floor units on 22 Store Street, housing a Thai restaurant.

The results of the audit have been reviewed and verified by Ben Holmes, who has an appropriate knowledge of buildings, waste and options for reuse and recycling of different waste streams.

#### 2.1.2 Identification and quantification of key materials and building components

A summary of the key materials present in the existing buildings scheduled to be demolished is presented in Section 3 of this report.

#### 2.1.3 Reuse and recycling of key materials and building components

The following steps were implemented to encourage reuse and recycling of key materials and building components:

1. Recommend potential applications (and any related issues) for the reuse and recycling of the key materials in accordance with the waste hierarchy.
2. Identify opportunities for reuse and recycling within the same development.
3. Identify local re-processors or recyclers for recycling of materials.
4. Identify overall recycling targets.
5. Identify reuse targets where appropriate.
6. Identify overall landfill diversion rate for all key materials.

#### 2.1.4 Target Setting

Targets were set for reuse and reclamation, as well as diversion of demolition waste from landfill. Please see Section 6 for further details.

## 2.2 Limitations of the audit

Limitations to the audit include the two operational units at ground floor, which are not included in the scope.

All finishes had already been stripped from the vacant parts of the buildings, except for limited areas of plaster. It is likely that the quantities of the retained plaster will be negligible.

Wherever possible assumptions have been based on information within the measured survey drawings carried out by Digitalinc.

Due to the complexity of the building and the limited time given on site, some assumptions had to be made. For example, the masonry walls are not uniform and appear to feature different techniques, this is likely due to the different construction years of the buildings on site and the refurbishment works which took place. Additionally, some bricks appear to differ from the standard size – probably imperial size – due to the age of the buildings.

The materials composing the roof structure have been calculated using the 3D model provided by the client.

The MEP building systems have not been measured, but a count of the elements to be demolished is given where feasible.

The decorative elements of the building's exteriors are not included in this report.

At the time of writing, ground investigations were being undertaken and the results had not been received; as such, foundations have not been included in the scope of this audit. Currently it is proposed that these foundations are all to be retained. It must also be noted that the demolition drawings received (Appendix A) were still work in progress at the time of writing, and some assumptions that were discussed with EWP's structural team are not reflected in these drawings.

## 2.3 Waste Hierarchy

32% of the UK's landfill waste originates from the construction and demolition of buildings. It is essential that the construction industry, as a whole, addresses this issue and implements measures to reduce the volume of waste being sent to landfill.

The waste hierarchy (Figure 5) ranks waste management options according to what is best for the environment.

Regarding waste generated during the proposed demolition works, wherever possible recycling pathways will be identified for non-hazardous materials. In those instances where recycling is not possible other recovery methods will be investigated. Disposal of waste in landfill (or via incineration without energy recovery) will be pursued as a last resort.

The waste hierarchy sits within the wider concept of circular construction, as illustrated in Figure 6.

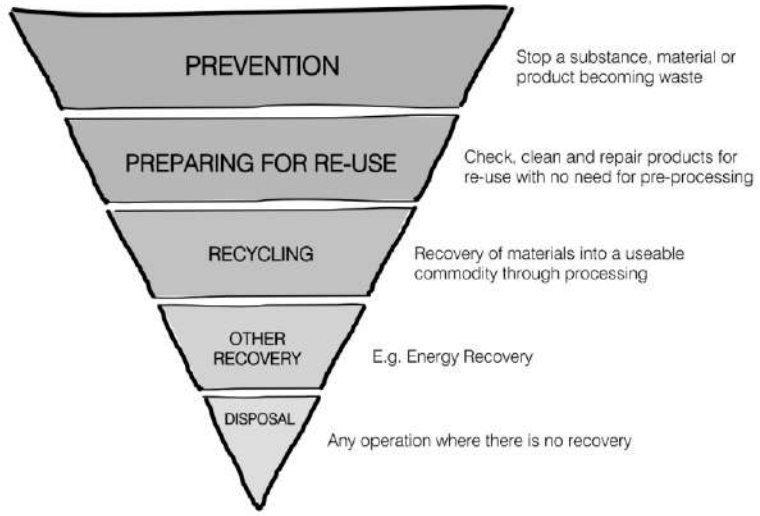



*Figure 5: Waste hierarchy ('Guidance on applying the waste hierarchy', 2011, DEFRA)*

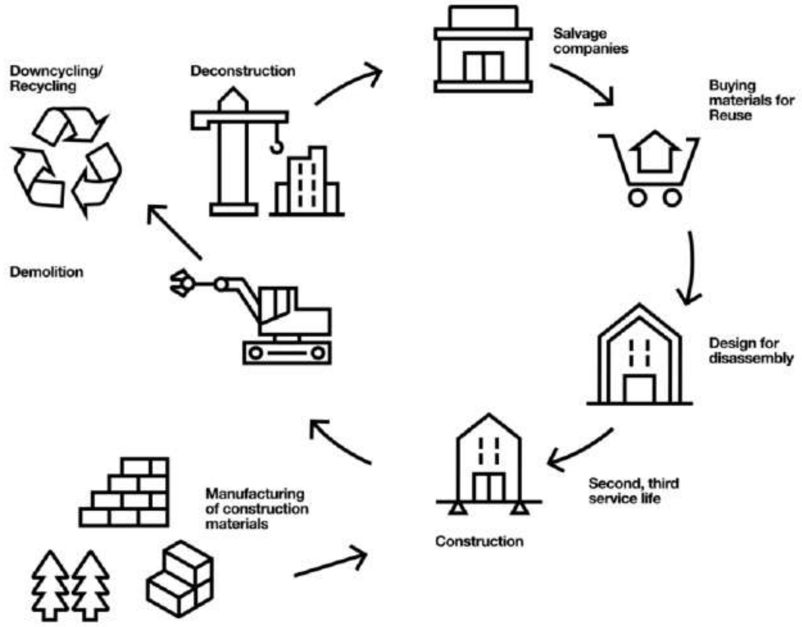



*Figure 6: Circular construction*

## 2.4 Key waste groups

Materials that will arise as part of the demolition works have been grouped into the following categories shown in Table 1.

Table 1: Construction waste groups

| European waste catalogue | Key group | Description |
|---|---|---|
| **170102** | Bricks | Bricks |
| **170101** | Concrete | Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ |
| **170604** | Insulation | Glass fibre, mineral wool, foamed plastic |
| **1501** | Packaging | Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets |
| **170201** | Timber | Softwood, hardwood, board products such as plywood, chipboard, medium density fibreboard (MDF) |
| **1602** | Electrical and electronic equipment | Electrical and electronic TVs, fridges, air-conditioning units, lamps equipment |
| **1301** | Oils | Hydraulic oil, engine oil, lubricating oil |
| **1703** | Asphalt and tar | Bitumen, coal tars, asphalt |
| **170103** | Tiles and ceramics | Ceramic tiles, clay roof tiles, ceramic, sanitary ware |
| **1701** | Inert | Mixed rubble or excavation material, glass |
| **1704** | Metals | Radiators, cables, wires, bars, sheet |
| **170802** | Gypsum | Plasterboard, plaster, fibre cement sheets |
| **170101** | Binders | Render, cement, mortar |
| **170203** | Plastics | Pipes, cladding, frames, non-packaging sheet |
| **1705** | Soils | Soils, clays, sand, gravel, natural stone |
| **Most relevant EWC** | Liquids | Non-hazardous paints, thinners, timber treatments |
| **Most relevant EWC** | Hazardous | Defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC) |
| **Most relevant EWC** | Floor coverings (soft) | Carpets, vinyl flooring |
| **Most relevant EWC** | Architectural features | Roof tiles, reclaimed bricks, fireplaces |
| **170904 (Mixed)** | Mixed or other | Efforts should be made to categorise waste into the above categories wherever possible. |

# 3. Identification and quantification of key materials

At the time of the visits the strip-out had been carried out for the majority of the buildings but no demolition work had begun.

Two areas were still operational:

- The basement and ground floor units at 226 Tottenham Court Road housing a Nationwide branch: and,
- The basement and ground floor units on 22 Store Street, housing a Thai restaurant.

Materials were quantified through a combination of:

- A visual survey of the building; and,
- Measurements from the 2D survey drawings and 3D model.

The materials were organised in a proforma providing the estimated mass of each material in the buildings, as detailed in Table 3.

Major materials identified within the building are discussed in the following sections.

## 3.1 Concrete

Concrete proposed for deconstruction is present in the basement slab of Building 2, the lift shaft in Building 2, internal partitions, architraves and stairs across all buildings (Figure 7, Figure 8).

*Figure 7: Concrete blocks shaft in Building 2, first floor*

*Figure 8: Concrete architrave above Building 2's windows on Alfred Place*

## 3.2 Metals

### 3.2.1 Steel

Most of the steel tonnage proposed to be deconstructed relates to the beams and structural elements located in 1-3 Alfred Place. These are the beams and metal decks in the two eastern bays in Building 2 (Figure 9), and the whole structure supporting Building 6 (the Link Block, see Figure 10).

*Figure 9: 1-3 Alfred Place (Building 2): steel beams and metal deck*

*Figure 10: 1-3 Alfred Place. Steel structure of the Link Building (Building 6)*

Other steel elements are present in the roof structure (see Figure 19) and the metal deck slabs in Building 5 (see Figure 11).

*Figure 11: Metal deck in Building 5 (Second floor level)*

## 3.3 Stone

Stone paving was present in the infill area on Alfred Place, between Building 2 and Building 3, as seen in Figure 12 below. These stones can be cleaned and reused on or off site.

*Figure 12: Stone paving between Building 2 and Building 3 (Alfred Place)*

Large quantities of stone tiles cover the roofs of Building 1, 3 and 4 (Figure 13). Stone slates are reusable and are very durable; a stone slate roof, providing it is well maintained, can last for at least a century and possibly much longer.

*Figure 13: Roof tiles*

Stone elements, assumed to be Portland, are present as windows sills in Buildings 1 and 4 (see section 4.1.1 for details), and stone panels, assumed to be granite, cover the columns on the ground floor of Buildings 1 and 4 on the façade on Tottenham Court Road and Store Street. Both these elements are not in the demolition scope (see Figure 14).


*Figure 14: Stone panels covering and store windows of Building 1, Tottenham Court Road*

## 3.4 Glass

The quantities of glass proposed to be deconstructed from the existing building are from the external glazing of the buildings, and are in the following areas:

- All ground floor external glazing on Tottenham Court Road elevation (illustrated in light blue in the drawings in Figure 15).
- All ground floor external glazing on Store Street elevation (illustrated in light blue in the drawings in Figure 16).
- The partition between Building 5 and the courtyard (see Figure 17);
- The glazing of the Link Building (Building 6, see Figure 10);
- All the windows on 1-3 Alfred Place, including the infill space between Building 2 and Building 3, No. 6 windows on the upper floors of Building 2 on 5-7 Alfred Place (see Figure 18); and,
- No. 6 windows in Building 1, on the first floor facing the courtyard.

*Figure 15: Demolished (blue) and retained (purple) glazing on Tottenham Court Road*

*Figure 16: Demolished (blue) and retained (purple) glazing on Store Street*

*Figure 17: Glass partition between Building 5 and the courtyard*

*Figure 18: Demolished (blue) and retained (purple) glazing on Alfred Place*

The glazing on the ground floor of the commercial unit is modern and in good condition (see Figure 14). To maximise the potential for reuse it is recommended that the glass is removed with care and not damaged. The same applies to the courtyard glazing (see Figure 17) and the link building (Building 6).

## 3.5 Timber

The buildings contain large quantities of timber, most of which will be retained for the proposed development; Building 1 and 4 will retain the timber slabs for the proposed development.

Most of the timber which is due to be deconstructed is in the gable roofs in Buildings 1, 3, and 4. Smaller quantities of timber are in the slabs of Building 2, in the proximity of the staircase.

*Figure 19: 3rd floor timber & steel roof structure*

The timber cupola topping the elevation of Building 1 on Tottenham Court Road (Figure *20*) will be retained, in the proposed development. For its future assembly it is recommended to disassemble it with care, label its elements, and storage them in a dry place during the construction works.

*Figure 20: Timber-framed cupola topping Building 1*

### 3.6 Bricks

The type of bricks seems to vary, with some apparently not as per standard dimensions. This is probably due to the age of the buildings.

The proposed demolition that affects most of the bricks is outlined as follows, in order of quantities:

- Building 2 and Building 4: the façade on 3 Alfred place and the facades on each side of the metal walkway in Building 6 (see Figure 21);
- Building 1: the first-floor façade facing the courtyard and sections of the internal walls; and,
- Building 3: sections of internal walls.

As the proposed development intends to rebuild a section of the façade on Building 2, it is recommended that bricks are salvaged and reused on site wherever possible. Please see section 6 for further recommendations.

*Figure 21: Building 2's brick wall at first floor, looking towards the link bridge*

### 3.7 M&E Equipment

The M&E equipment has not been quantified in terms of mass; however, the number of units has been estimated. Additional pipes and building services distribution – both horizontal and vertical – have not been estimated.

The M&E equipment observed on site is comprised of:

- Approximately No. 66 between air handling units and condensing units were located at roof level of the building (Figure *22*);
- No. 2 lifts were in Building 6 (the link block) between Buildings 3 and 4, and Building 2 (see Figure 23); and,
- No. 17x external lighting fixtures, 13x in the courtyard and 4x in Building 6 (see Figure 24).

*Figure 22: Individual AHU on the roof*

*Figure 23: Lifts at ground floor level (Building 6)*

All lighting fixtures had already been removed from the existing building at the time of the site visits. The only elements still in situ were 13x exterior metal wall lights located in the courtyard (Figure 24).

*Figure 24: Wall lights in the courtyard (first floor)*

### 3.8 Unknown waste quantities

The following materials were present within the building; however, it was not possible to determine quantities during the site inspection.

- **Internal pipework and ductwork**: it was not possible to determine during the site inspection how much plastic and metal pipework and ductwork will be demolished.
- **Gypsum:** it was observed that most of the partitions shown in the demolition drawings were not present on site. Small quantities are present in the risers' partitions, as show in Figure 25 below.

*Figure 25: Plasterboard in the riser of Building 2, second floor*

### 3.9 Waste groups not present

The following waste groups were not present within the building:

- **Plastics**: not observed during the visit
- **Packaging**: not present on site during the inspection
- **Oils**: not observed during visit
- **Liquids**: not present on site during the inspection

### 3.10 Quantification of demolition materials and identification of reuse opportunities

Table 3 summarises the waste materials that were identified during the site inspection. Materials in Table 3 are colour coded based on their suitability for reuse as summarised Table 2.

*Table 2: Key of level of Materials Identified for Reuse*

| Level | Definition |
|---|---|
| **Reuse** | Materials with the potential for to be directly reused with little processing required. |
| **Recycle** | Processing materials (that would otherwise be thrown away as rubbish) and remanufacturing them into new products. Suitable for components that could be damaged during demolition. |
| **Landfill** | A site for the disposal of waste materials – last resort of a component. This should only be used for materials that cannot be recycled due to damage or toxicity (e.g. Asbestos). |

*Table 3: Predicted waste streams from the demolition of the building on site.*

| Waste Group | European waste code | Description | Predicted quantity in The Courtyard | Recommended waste processing route |
|---|---|---|---|---|
| **Concrete** | 170101 | Concrete Walls | 218063 kg | It is highly unlikely for in-situ concrete elements to be suitable for demounting and reuse. Any concrete that cannot be reused in the ways described above will be crushed and reused as a sub-base or hardcore. |
| | | Concrete Frame | 6675 kg | To be crushed and reused as a sub-base or hardcore. |
| | | Concrete Slab | 82500 kg | To be crushed and reused as a sub-base or hardcore. |
| | | Clinker Concrete | 100772 kg | To be crushed and reused as a sub-base or hardcore. |
| | | Pre-cast solid slab | 54196 kg | To be crushed and reused as a sub-base or hardcore. |
| | | Blockwork | 269856 kg | Blockwork can potentially be reused, depending on the condition and type of mortar used for the blocks, in different applications such as for beam and block floors. Any concrete that cannot be reused in the ways described above will be crushed and reused as a sub-base or hardcore. |
| | | Concrete Render | 17108 kg | Crush and return to the production cycle. |
| **Masonry** | 170102 | Masonry Brick – Internal walls | 405476 kg | Waste processing route depends on type of mortar. If lime mortar has been used it may be possible to disassemble brickwork into individual bricks, which could be reused either on-site or sold for use elsewhere. Other options for reuse include cutting the walls into panels for reuse as façade. It should be noted that this process will increase the demolition and deconstruction programme. If it is not possible to salvage and reuse brickwork, bricks should be crushed on site and reused as aggregate within the sub-base for external works. |
| | | Masonry Brick - Facade | 430655 kg | |
| **Timber** | 170201 | Timber Floor Joists | 393 kg | These could be salvaged during deconstruction works and reused either on site or sold to a third party for reuse elsewhere. |
| | | Timber Beams - Softwood | 23179 kg | These could be salvaged during deconstruction works and reused either on site or sold to a third party for reuse elsewhere. |
| | | Chipboard | 3165 kg | To be recycled. |
| **Glass** | 170202 | Glass | 15742 kg | Glass should be sent to a specialist glass recycling facility. It is assumed that the average thickness of glazing throughout the site is 10mm. Glass is pre-treated before it is recycled which removes any paper, plastic and metal objects. It is then crushed, melted and moulded into new products. |
| **Metals** | 1704 | 110 kg/m3 Rebar Reinforcement – Concrete Slabs | 3630 kg | All metals salvaged as part of the demolition works should be recovered and sent for recycling. |
| | | Steel Beams – Supporting Slabs | 64014 kg | All metals salvaged as part of the demolition works should be recovered and sent for recycling. |
| | | Steel Decking – Slab/Galvanised | 6823 kg | All metals salvaged as part of the demolition works should be recovered and sent for recycling. |
| | 170403 | Lead | 3163 kg | All metals salvaged as part of the demolition works should be recovered and sent for recycling. |
| **Stone** | 170504 | Stone slates (roof) and paving | 28281 kg | The slates in good conditions can be carefully removed, cleaned and reused on or off site. The remaining slates can be crushed and used as chippings in landscape or aggregates. |

# 4. Material Retention

## 4.1 Whole Building

The proposed development's approach prioritises retention over demolition and reuse over replacement, and the design team focused on retaining as much of the existing structure as possible. The largest impact is due to the demolition of the floorplate at 3 Alfred Place (Building 2), that will be rebuilt with a new slab at 1 Alfred Place (Building 3). Figure 26 below shows demolition extent in this area.

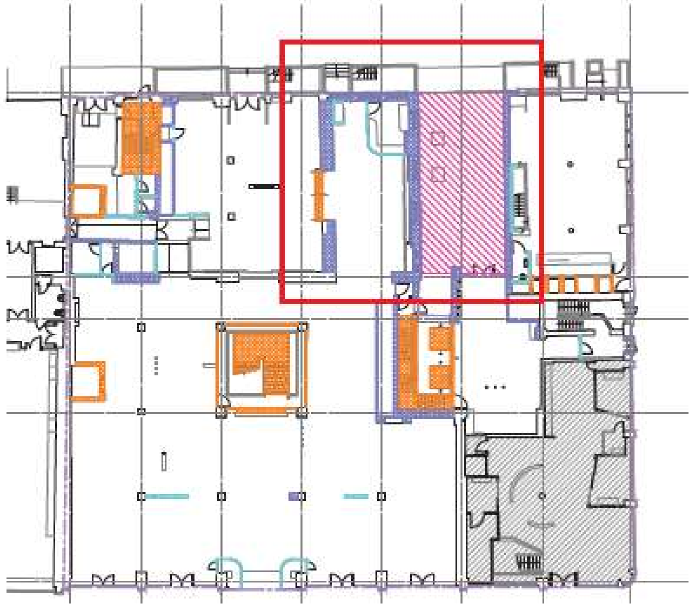


*Figure 26: Proposed demolition at ground floor. Highlighted in red, the infill area proposed to be demolished. In orange, stairs, lift and shafts to be demolished.*

The proposed development also includes the demolition of the roof (see Figure 27) to enable the construction of a roof extension and a blue roof to maximise the attenuation potential of the building.

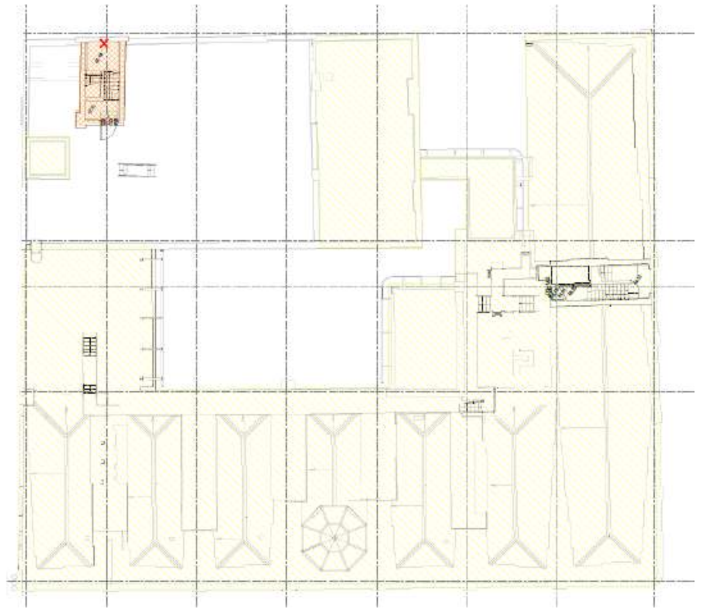


*Figure 27: Roof demolition (in yellow)*

The demolition works comprising the infill on Alfred Place and the roof are the largest source of demolition waste of the proposed development.

EWP carried out a comparison between the retained and the demolished materials, which shows that approximately 2,745 tonnes of the building materials (by weight) will be retained, and 1,730 tonnes will be demolished. This corresponds to approximately 61% retained materials, as shown in Figure 28.

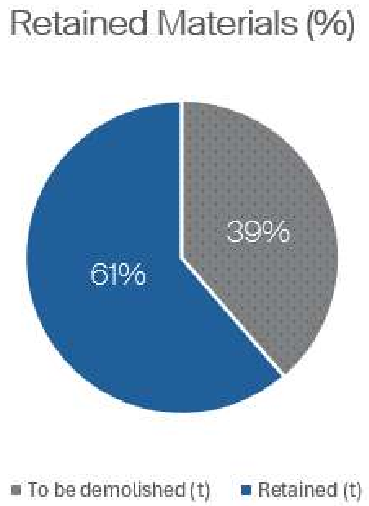



*Figure 28: Chart illustrating the percentage of retained materials in the building (in blue), calculated by weight*

A breakdown of the retained materials by main category is shown in Table 4 below.

*Table 4: Breakdown of the existing, demolished and retained materials in the building*

| Material | Existing (tonnes) | Demolished (tonnes) | Retained (tonnes) | Retained (%) |
|---|---|---|---|---|
| **Bricks** | 2,047 | 836,1 | 1,211.4 | 59.2 |
| **Concrete** | 2,003 | 749.2 | 1,254.4 | 62.6 |
| **Timber** | 103.9 | 26.7 | 77.2 | 74.3 |
| **Steel** | 221.8 | 74.5 | 147.3 | 66.4 |
| **Glass** | 25.4 | 15.7 | 9.6 | 37.8 |
| **Stone** | 74.1 | 28.3 | 45.9 | 61.9 |
| **TOTAL** | **4,476.4** | **1,730.5** | **2,745.8** | **61.3** |

Timber represents the material with the highest retention rate, followed by steel and bricks.

## Façade

The proposed development focuses on keeping large parts of the buildings, including the fabric, which will be largely retained and repaired.

### 4.1.1 Tottenham Court Road and Store Street facades

The façades on Tottenham Court Road (see Figure 29) and Store Street (see Figure 30) will be left mostly unaltered, but for the glazing at street level. The build up of these facades consists of solid brick walls, largely exposed at first and third floor level, and covered with render finishes at second floor level.

*Figure 29: Tottenham Court Road elevation*

*Figure 30: Store Street elevation*

The retained elements include the granite panels that cover the steel columns at ground floor level (see Figure 31).

Large quantities of natural stone, assumed to be Portland, constitute the windowsills of the first, second, and third floor. These elements are not visible externally and vary in height from 20cm to 40 cm (see Figure 32).

Figure 31: Detail of the stone panels at ground floor level (Tottenham Court Road)

Figure 32: Stone windowsill below the windows on Store Street (Building 3, first floor)

#### 4.1.2 Alfred Place facades

A key element of the proposed development is a new infill section that will change the elevation on Alfred Place (Figure 33) by replacing the existing glass extension (Building 6) installed in 1999, creating a more engaging entrance to the new office spaces. The proposed infill will resolve access issues and simplify the floor levels between Building 2 and Building 3.

Figure 33: Alfred Place elevation. The 1999 glass extension is clearly visible between Building 2 (right) and Building 3 (left)

#### 4.1.3 Fabric's retained materials

EWP carried out a study to determine the quantities of the façade's main material demolished and retained, illustrated in Table 5 below.

*Table 5: Material retention for the facade elements*

| Material | Existing (tonnes) | To be demolished (tonnes) | Retained (tonnes) | Retained (%) |
|---|---|---|---|---|
| Bricks | 1,075.2 | 430.6 | 644.5 | 59.9 |
| Portland stone | 26.3 | 0 | 26.3 | 100 |
| Stone (Granite) | 2 | 0 | 2 | 100 |
| Glazing | 25.4 | 15.7 | 9.6 | 37.8 |
| **TOTAL** | **1,128.9** | **446.3** | **682.4** | **60.4** |

Overall, the proposed development is retaining approximately 60% of the façade materials by weight, as illustrated also in Figure 34 below.

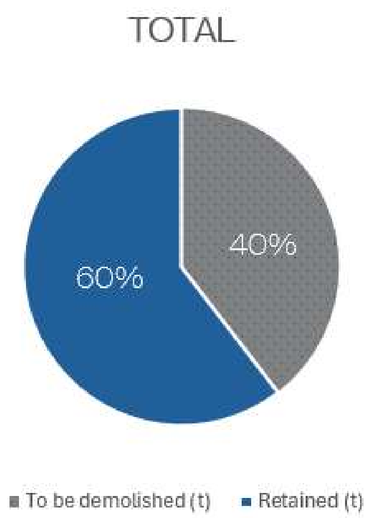



*Figure 34: Percentage of facade materials retained by weight (in blue)*

From the study it results that the proposed development will retain all stone and approximately 60% of the masonry. It must be noted that part of the proposed new façade should be rebuilt using salvaged bricks from the demolished one, if feasible.

The retention rate of the glass is approximately 38%, due to the demolition of Building 6, the floor-to-ceiling glazing in Building 5 facing the courtyard, and the store windows at street level.

# 5. Local Waste processing facilities

The following section identifies companies / waste processing centres in the local area that could assist with reclamation, reuse, and recycling of the strip out waste.

## 5.1 Metal waste material recovery facilities

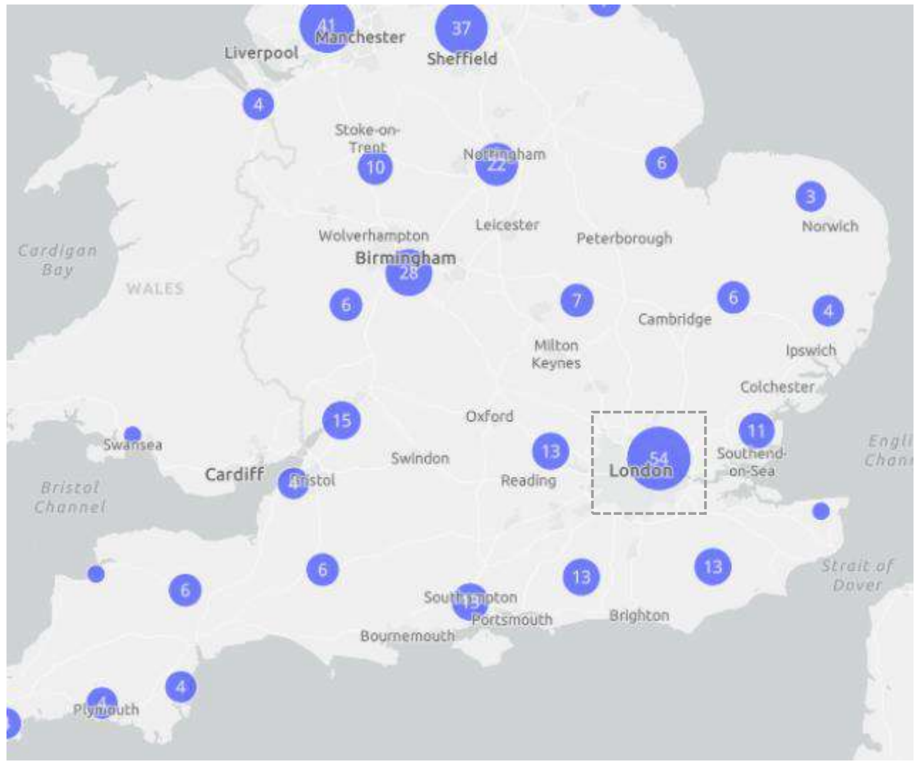



*Figure 35: Overview of metal waste material recovery facilities across England*

Figure 35 shows there are numerous material recovery facilities across England that recover steel from construction sites.

As Figure 36 shows, there are at least 4 facilities within 5 miles of The Courtyard Building, with the closest recovery facilities being the following:

- London Metals Ltd – 2 miles
- Burdett Metals – 3 miles
- Aura Metals – 4 miles
- EMR Willesden – 5 miles

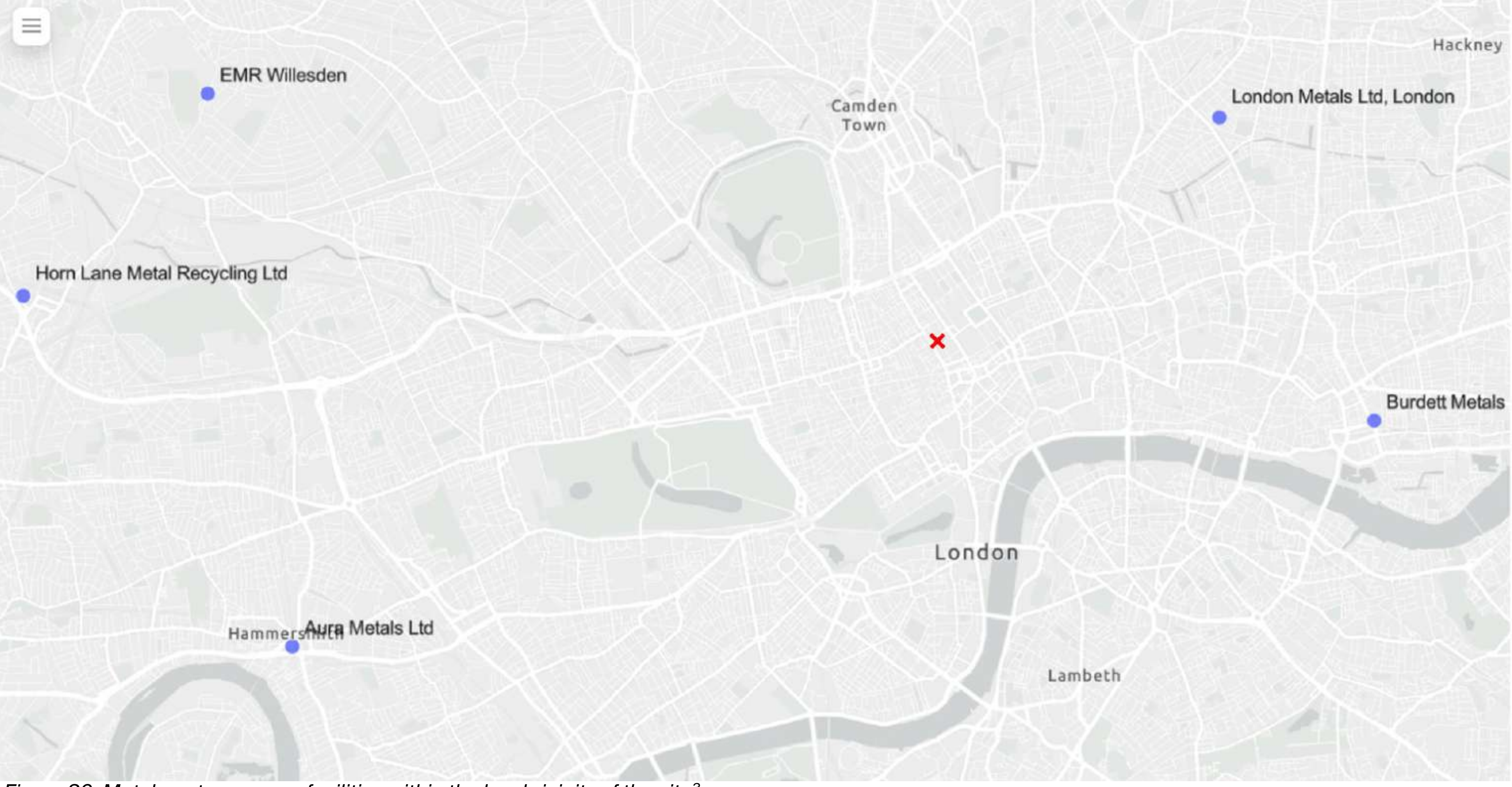



*Figure 36: Metal waste recovery facilities within the local vicinity of the site[3]*

[3] *Data collected from: Scrap metal recycling| Find a scrap metal dealer | BMRA (recyclemetals.org)*

# 6. Waste Processing Routes

Current waste processing routes for each key waste group are identified in Figure 37.

Materials that can potentially be reused are identified in blue; materials that can be recycled are identified in green. Landfill should be treated as a last resort for waste disposal and should only be used for hazardous materials that cannot be disposed of in any other way. Relevant local waste processors are identified in Section 5.

## 6.1 Timber

Timber elements could be deconstructed from the existing building and reused either on site or sold to third parties for reuse on other construction projects.

There are companies, that will purchase reclaimed timber materials. Doors and other joinery could also be salvaged, refurbished, and reused.

Other salvaged timber could be reused on site in multiple applications; for example, new internal partitions and temporary works.

## 6.2 Glazing

The proposed development's strategy is to retain and improve as much of the building fabric as possible. The glazing elements of the store fronts on Tottenham Court Road and Store Street are in good conditions and can be salvaged. The large glazing panels of the link building and the floor to ceiling panels in Building 5 can also be salvaged and reused off-site.

If salvage and reuse is not an option, glass and steel should be segregated during deconstruction to allow for recycling. Both materials are recyclable, with steel window frames being used as feed stock for new steel manufacture and glass being re-used in the manufacture of new float glass.

## 6.3 Steel

The main sources of steel within the building are the steel frame of the roof, the beams supporting Building 2 slabs, the galvanized decks in Buildings 2 and 5, and the steel frame of Building 6. The steel beams can be removed and reused on or off-site.

Further steel is present in the reinforcement bars in Building 2 and Building 5 slabs. This steel cannot be directly reused and are typically separated from concrete waste and sent to a steel mill to be recycled into new steel.

## 6.4 Bricks

The process for reusing and recycling bricks is set out in Figure 38. As noted in this diagram, reuse potential is affected by the mortar used to set bricks. Brickwork that utilises traditional lime mortar is significantly easier to clean and reuse than brickwork that uses sand-cement mortar mixes. If lime mortar has been used it may be possible to disassemble brickwork into individual bricks, which could be reused either on-site or sold for use elsewhere. Other options for reuse include cutting the walls into panels for reuse as façade. It should be noted that this process will increase the demolition and deconstruction programme. Given the different ages of the buildings, it is likely that both types of mortar have been used and the type of mortar must be determined by the demolition contractor. If it is not possible to salvage and reuse brickwork, bricks should be crushed on site and reused as aggregate within the sub-base for external works.

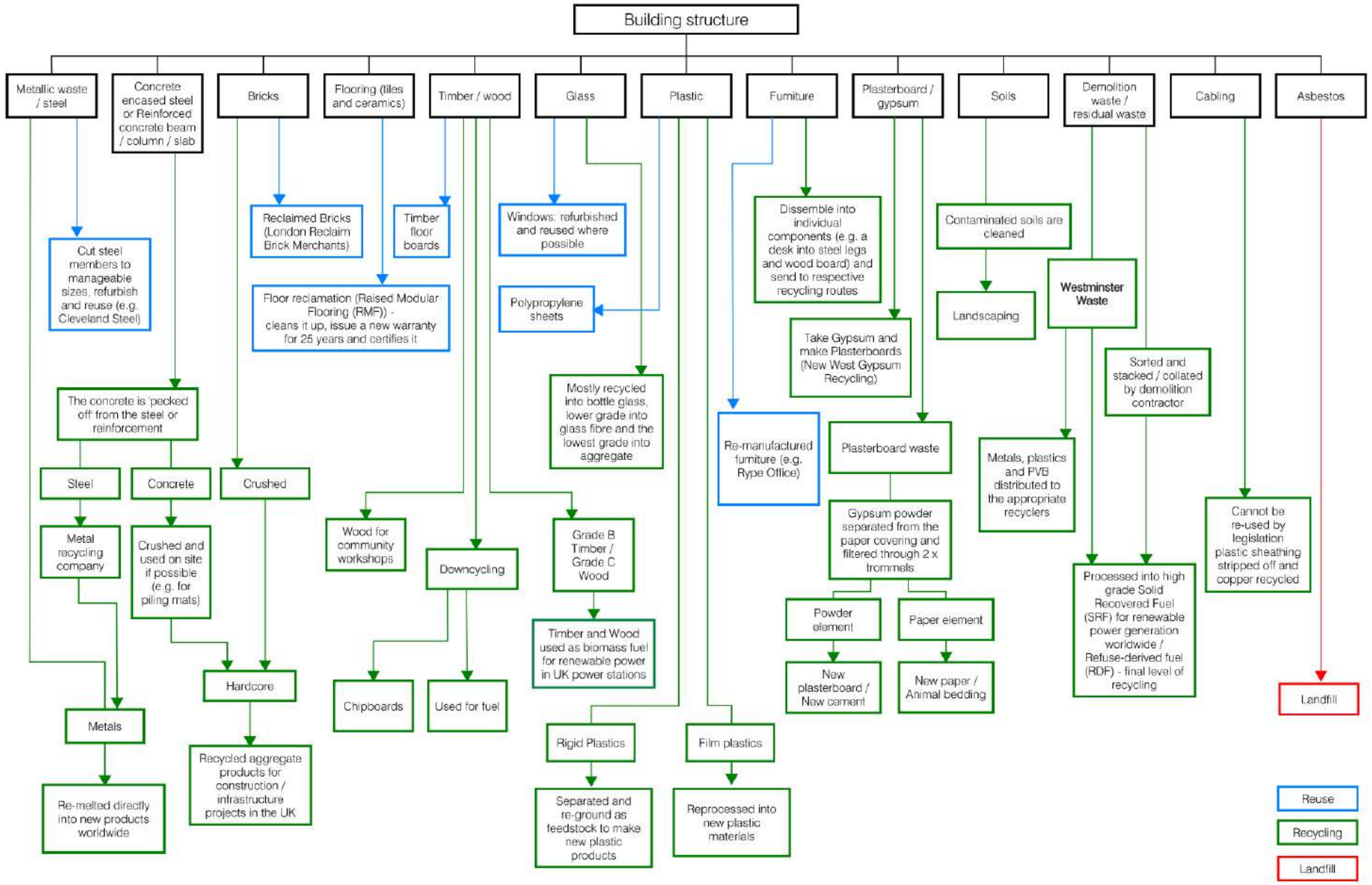



*Figure 37: Waste processing routes (developed based on demolition contractor interviews undertaken during a research project part funded by Grosvenor in early 2021*

## 6.5 Concrete

In most cases, it will not be possible to reuse concrete elements in their current form. To facilitate reuse concrete should be separated from other waste materials and crushed to produce recycled concrete aggregate. This process will also enable the reclamation and recycling of steel reinforcement.

From a carbon perspective it is only beneficial to reuse concrete if it is transported short distances. Transporting concrete is very energy intensive; if concrete (for example crushed aggregate or salvaged precast planks) needs to be transported long distances, it is usually more carbon-intensive than the manufacture of new concrete. More creative reuse options could be explored (for example, cutting concrete into kerbing, coping stones or lintels).

Concrete elements that cannot be reused should be separated from other waste materials and crushed to produce recycled concrete aggregate. This process will also enable the reclamation and recycling of steel reinforcement. Site applications for recycled concrete aggregate include:

- Base course and binder course mixtures for bitumen bound materials;
- Pipe bedding;
- Unbound mixtures for sub-base;
- Capping; and,
- Embankments and fill.

## 6.6 Finishes

There were no finishes on site at the time of writing, except for small sections of plaster. The areas of the building that still have finishes are the Nationwide branch and the Busaba Thai restaurant at ground and basement level, which will continue operating and are out of the scope of this report.

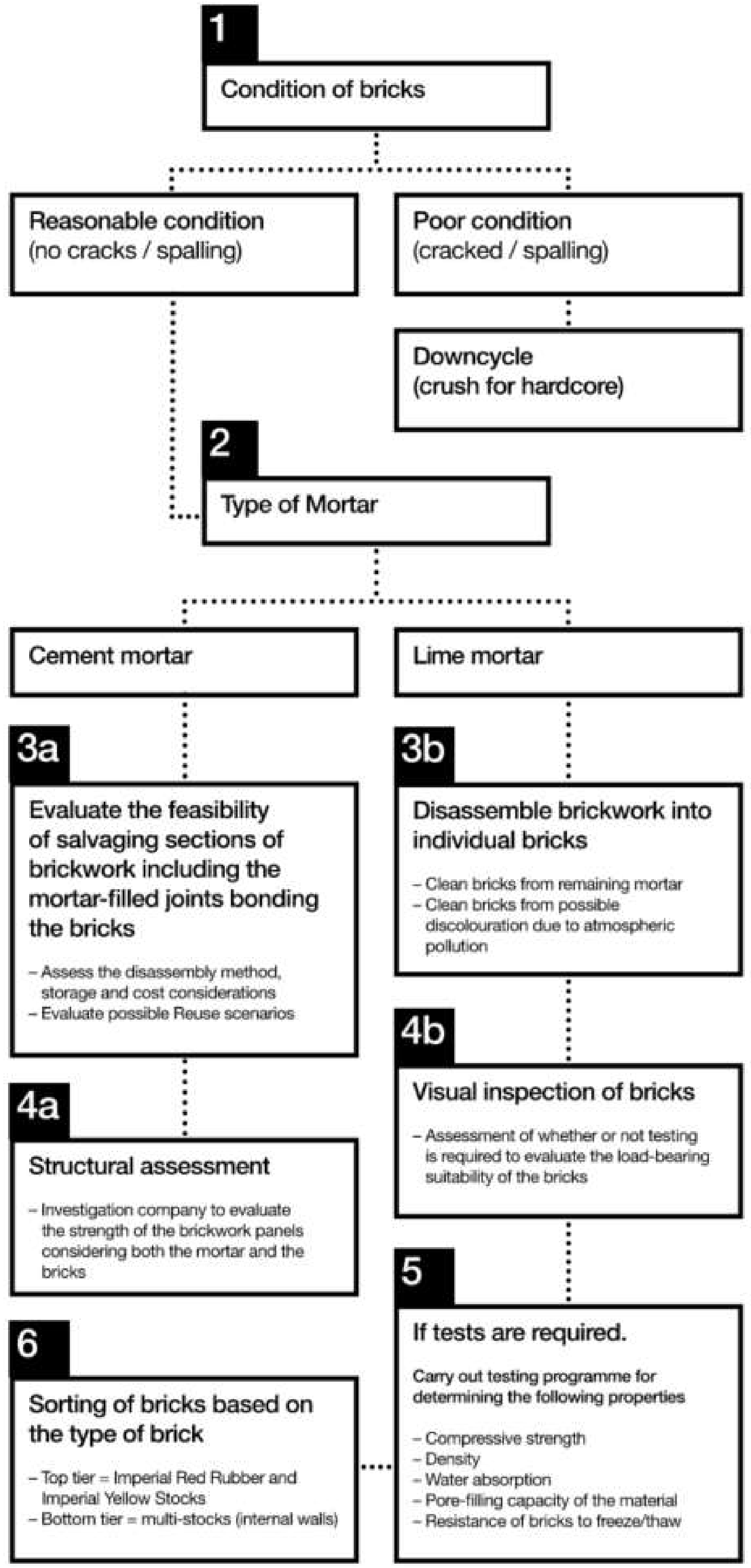



*Figure 38: Brick reuse and recycling process*

# 7. Reuse and recycling targets

## 7.1 Diversion of resources from landfill

The development will be required to comply with London Plan Policy SI 7 (reducing waste and supporting the circular economy) which includes the following requirements:

- Zero biodegradable or recyclable waste to be sent to landfill by 2026; and,
- At least 95% of construction and demolition waste diverted from landfill.

The above corresponds to BREEAM UK RFO 2014 ‘exemplary level’ benchmarks.

Diversion from landfill includes:

- Reusing the material on site (in situ or for new applications);
- Reusing the material on other sites;
- Community reuse and recycling;
- Salvaging or reclaiming the material for reuse;
- Returning material to the supplier via a ‘take-back’ scheme;
- Direct recycling of materials via a specialist material reprocessor or recycler;
- Recovery of the material from site by an approved waste management contractor and recycled or sent for energy recovery; and,
- Utilising waste in exempt or permitted applications (not landfill).

It is recommended that all waste is sorted into separate waste groups either on-site or through a licenced contractor for recovery.

All contractors involved in the project (including enabling works, site clearance, demolition works and main construction contract) will be required to collect waste data including:

- Total quantity of waste generated for each key waste group ($m^3$ and/or kg);
- Percentage of waste diverted from landfill;
- Waste collection tickets confirming end destination of all waste arising from demolition works;
- Evidence that waste has been sorted and segregated either on-site or off-site by a licenced contractor; and,
- Evidence of waste contractor’s licence to operate.

This information should be made available to the BREEAM assessor. Failure to collect this data may result in loss of BREEAM credits.

## 7.2 Other targets

To maximise BREEAM UK RFO 2014 credits the development will be required to implement and meet a target for total construction waste generated by the construction works. This target should be set by the main contractor (in line with the targeted BREEAM credits) and monitored throughout construction.

# 8. Conclusions

## 8.1 Key waste groups

The most significant waste streams predicted to arise from the demolition works are:

- Masonry – 836 tonnes;
- Concrete – 749 tonnes;
- Timber – 26.7 tonnes;
- Metals – 74.4 tonnes;
- Glass – 15.7 tonnes; and,
- Stone – 28 tonnes.

It should be noted that the priority should be to reuse the building materials in their entirety, either for alternative uses or to sell on.

However, if this is not possible, it is recommended that concrete is crushed and stockpiled for reuse elsewhere. Crushed concrete can be used in a range of applications, most notably as sub-base for roads, footpaths, and other hard landscaping. It may also be possible to cut concrete to form kerbs and lintels. If all the waste material cannot be used on site, then it should be sent to an alternative site to be used.

Metal components should be reused where possible on a new development.

Plaster and plasterboard (where not contaminated with asbestos) should be sent to a specialist recycling facility such as Plasterboard Recycling.

Timber items such as the floor joists, roof beams and purlins, and the internal doors should be carefully stripped out and then reused on another development.

## 8.2 Circular reuse

Construction, demolition, and excavation represents 64% of total annual UK waste. Although a large proportion of this waste is diverted from landfill, most building components are recycled or downcycled, which in turn reduces their value. By reusing existing buildings and the materials held within them we can keep these circulating at their highest value and prevent the need to source new manufactured materials and reduce the amount of energy (and carbon) expended on recycling processes.

*Table 6: Reuse and recycling targets*

| Material | % reuse | % recycled/ diverted from landfill |
|---|---|---|
| **Concrete** | 50 | 50 |
| **Metal** | 25 | 75 |
| **Masonry** | 50 | 50 |
| **Stone** | 50 | 50 |
| **Plaster & Plasterboard** | 0 | 100 |
| **Timber** | 25 | 75 |

Throughout the report reuse and recycling routes have been presented for all major non-hazardous materials. This report has identified the following items as being potentially suitable for reuse.

- Timber joists, beams, purlins and flooring;
- Bricks;
- Natural stone.

It is also important that any proposed new development is designed to facilitate future adaptability and disassembly. A key aim of the development should be to ensure the building remains in use for as long as possible and that key building elements can be repaired and refurbished in-situ.

The following materials should be diverted from landfill and either recycled or reused on the proposed development through reuse or temporary structure during the development:

- Concrete;
- Glass;
- Plasterboard;
- Timber; and,
- Metals.

The following recommendations may assist in maximising recycling:

- Engage with demolition contractor(s) and understand their proposals for waste management;
- Set aside an area on site for storage and segregation of salvaged items;
- Advertise specific salvage items for free on www.salvoweb.com. Salvo also operate a demolition alert service on their website which serves to bring forthcoming products to the attention of potential buyers or users;
- Contact local architectural salvage merchants about specific items; and,
- Ensure that salvaged items are removed and stored in such a way that all components remain together (e.g. doors in their frames).

## 8.3 Next steps

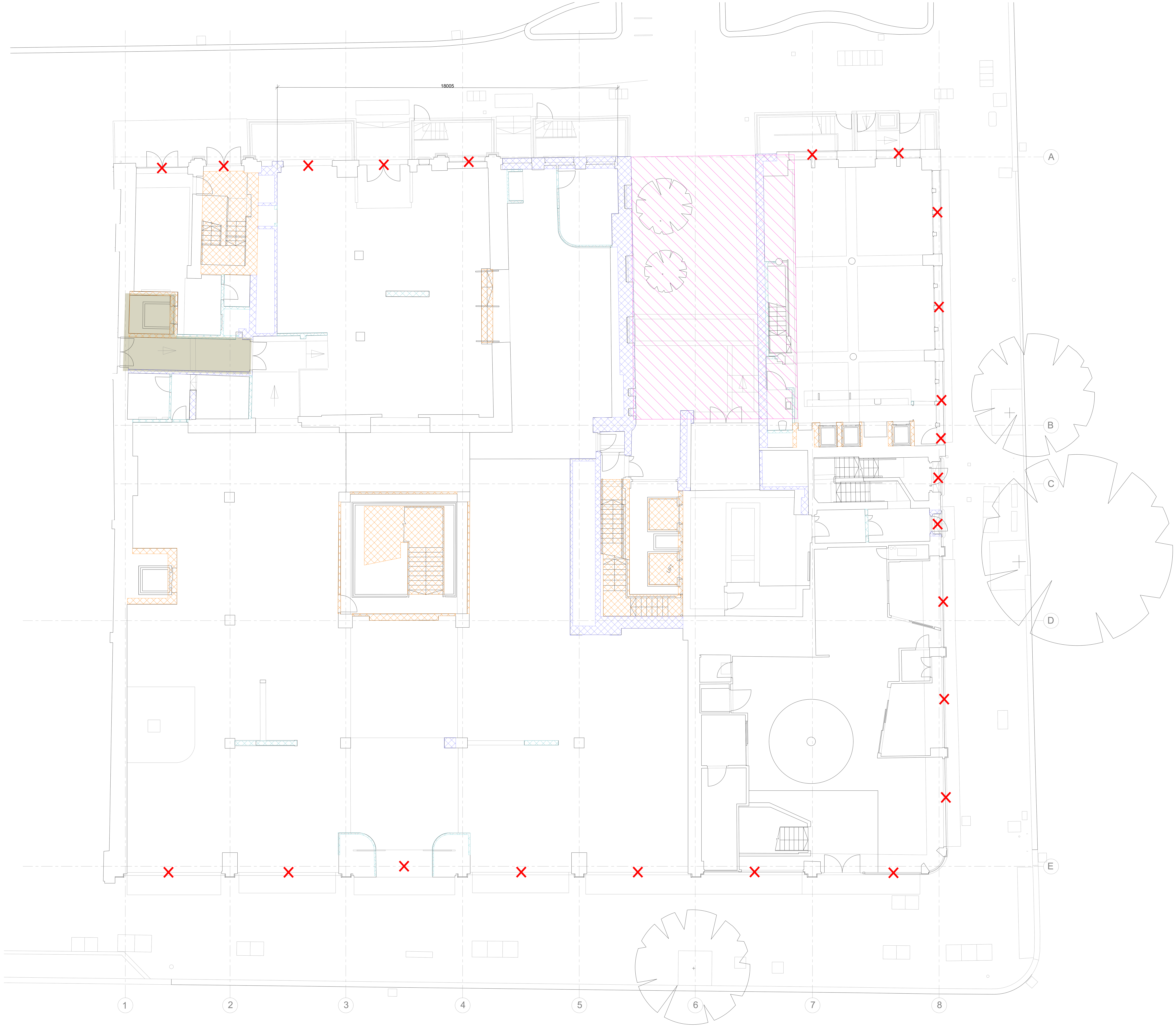
It is recommended that the following steps are taken during RIBA Stage 3 to firm up on the potential for reuse of the materials identified in 8.2.

- Contact glass partition manufacturers / suppliers to confirm whether they would be interested in receiving the windows from the buildings for reuse either on site or elsewhere;
- Consider ways in which existing timber elements could be incorporated into the proposed scheme;
- Consider ways in which existing steel elements could be incorporated into the proposed scheme;
- Liaise with a demolition contractor to discuss a plan for crushing of the existing concrete frames and how / where this will be reused; and,
- Contact stone / roof suppliers to confirm they would be interested in receiving the roof slates whether these cannot be reused on site.

Elliott Wood

# Appendices

# Appendix A – Demolition Drawings




**NOTES:**

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- All levels indicated as height above Ordinance Survey
- Datum taken from survey. To be confirmed.
- All dimensions subject to a tolerance of +/-5mm.
- All details are indicative and should be reviewed against contractors selected supplier / manufacturer / system. Any variations are to be advised to and approved by the Contract Administrator prior to commencement on site.

KEY

- Strip Out works back to primary structure. Primary structure and external envelop to be retained.
- Slab to be demolished
- Area lift/stair to be removed
- Walls to be demolished
- Partition walls to be demolished
- Roof demolition
- Removal of windows / doors
- Not included in scope

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DWG 70 GA Demolitions
Ground Floor Plan
Proposed Demolition Breakdown

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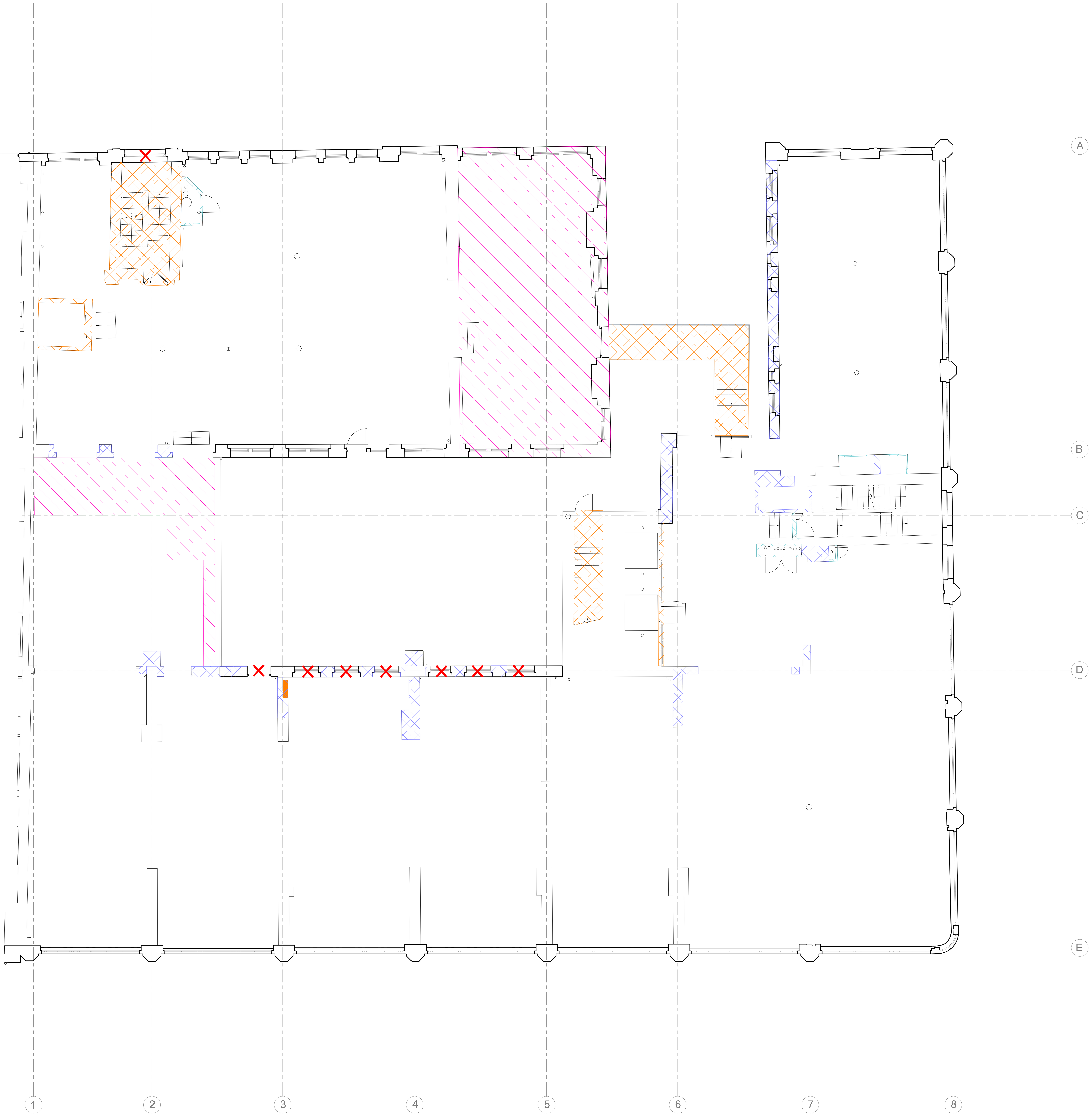


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First Floor Plan
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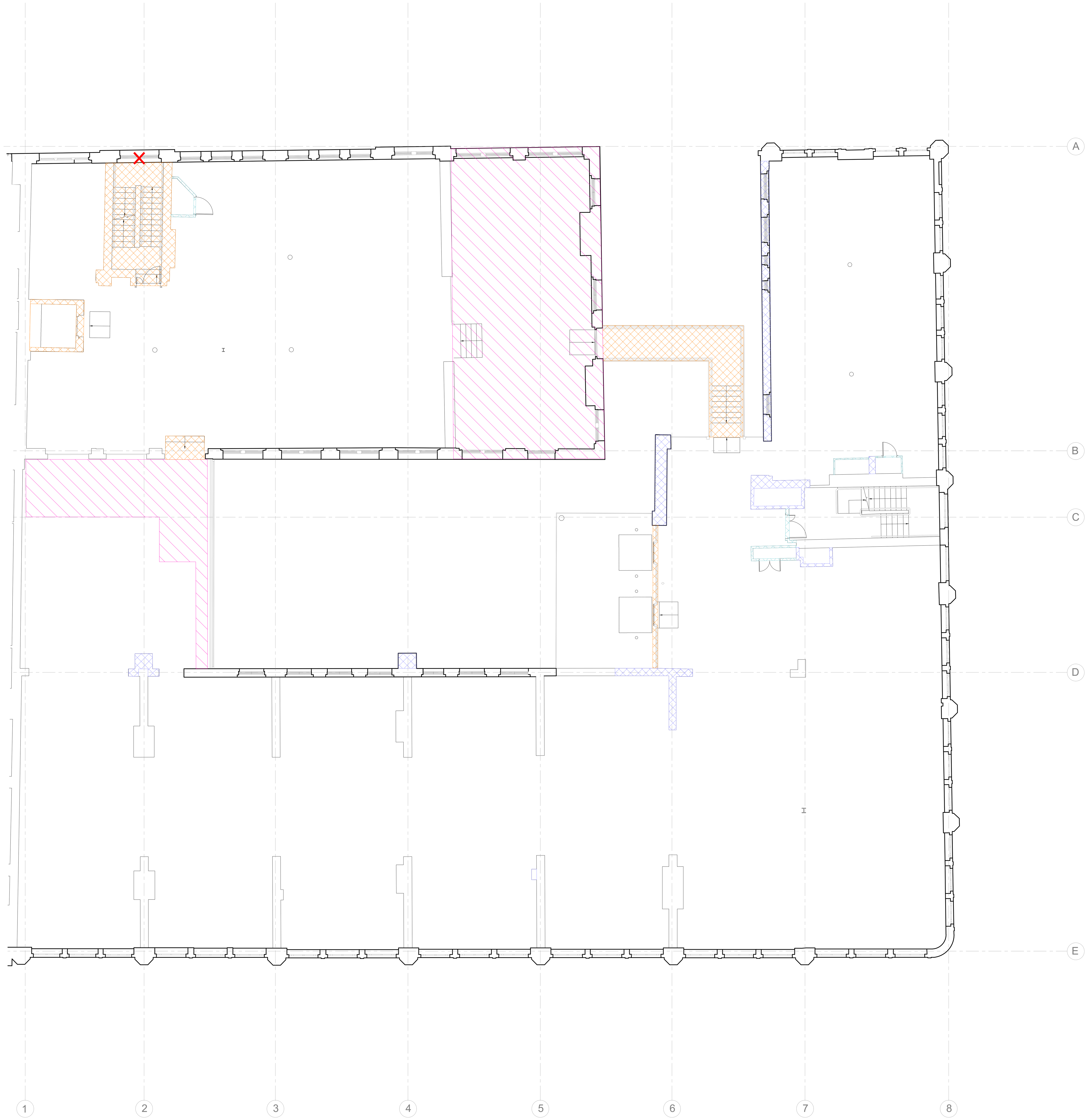


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Second Floor Plan
Proposed Demolition Breakdown

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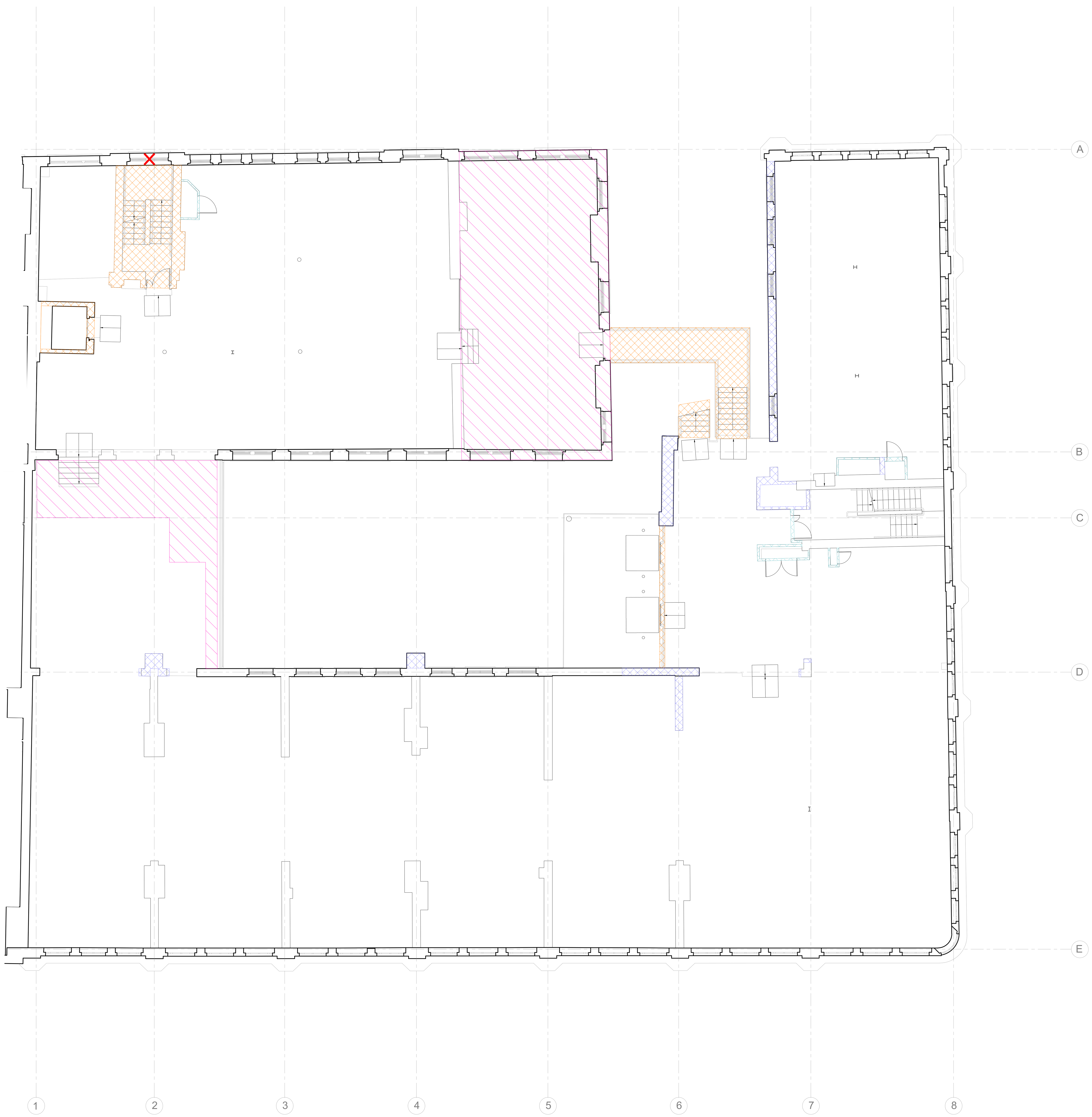


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KEY

Strip Out works back to primary structure. Primary structure and external envelop to be retained.

Slab to be demolished

Area lift/stair to be removed

Walls to be demolished

Partition walls to be demolished

Roof demolition

Removal of windows / doors

Not included in scope

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Third Floor Plan
Proposed Demolition Breakdown

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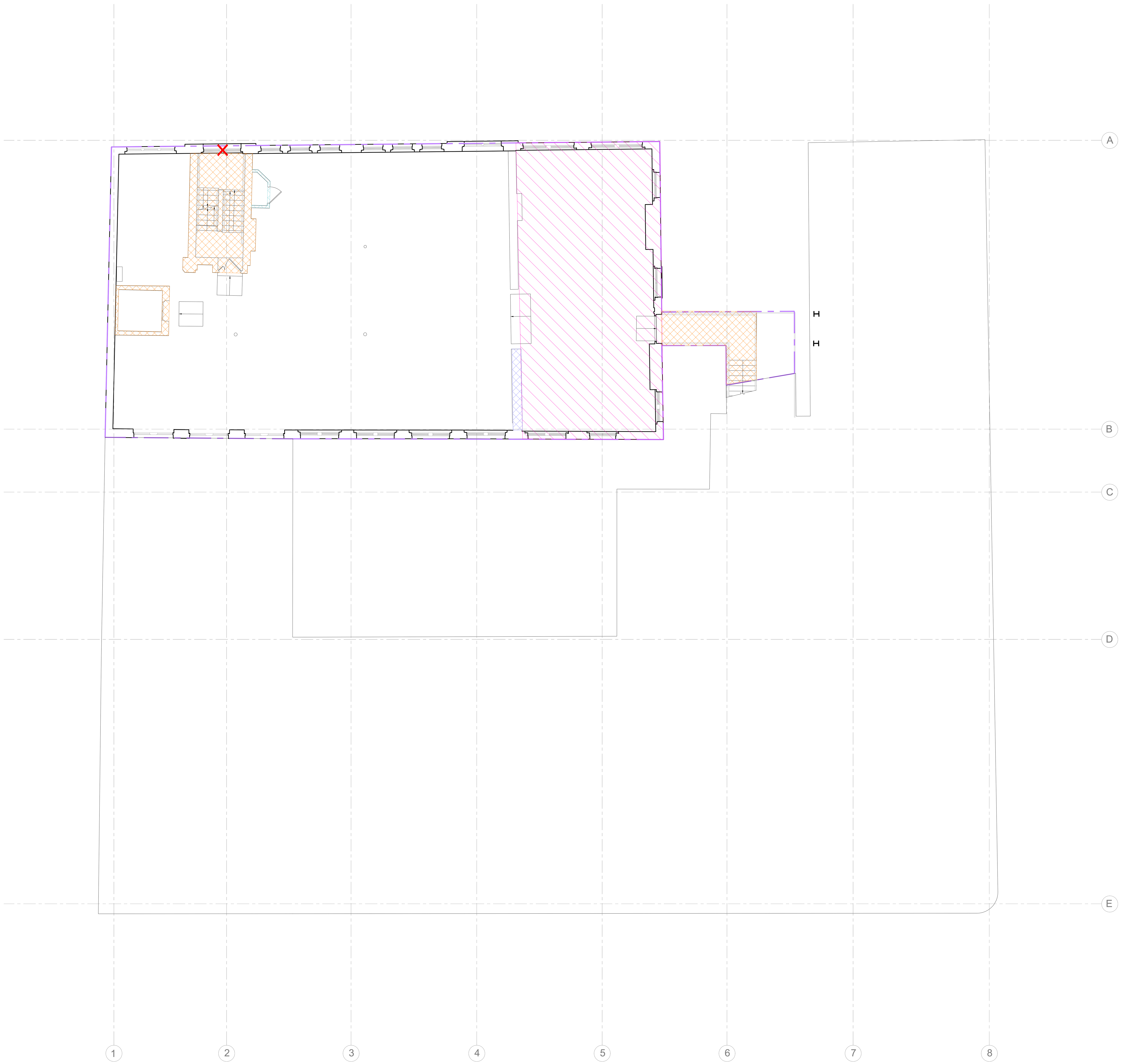


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- Partition walls to be demolished
- Roof demolition
- Removal of windows / doors
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DWG 70 GA Demolitions
Fourth Floor Plan
Proposed Demolition Breakdown

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JOB NO 2311 CLIENT Great Portland Estates

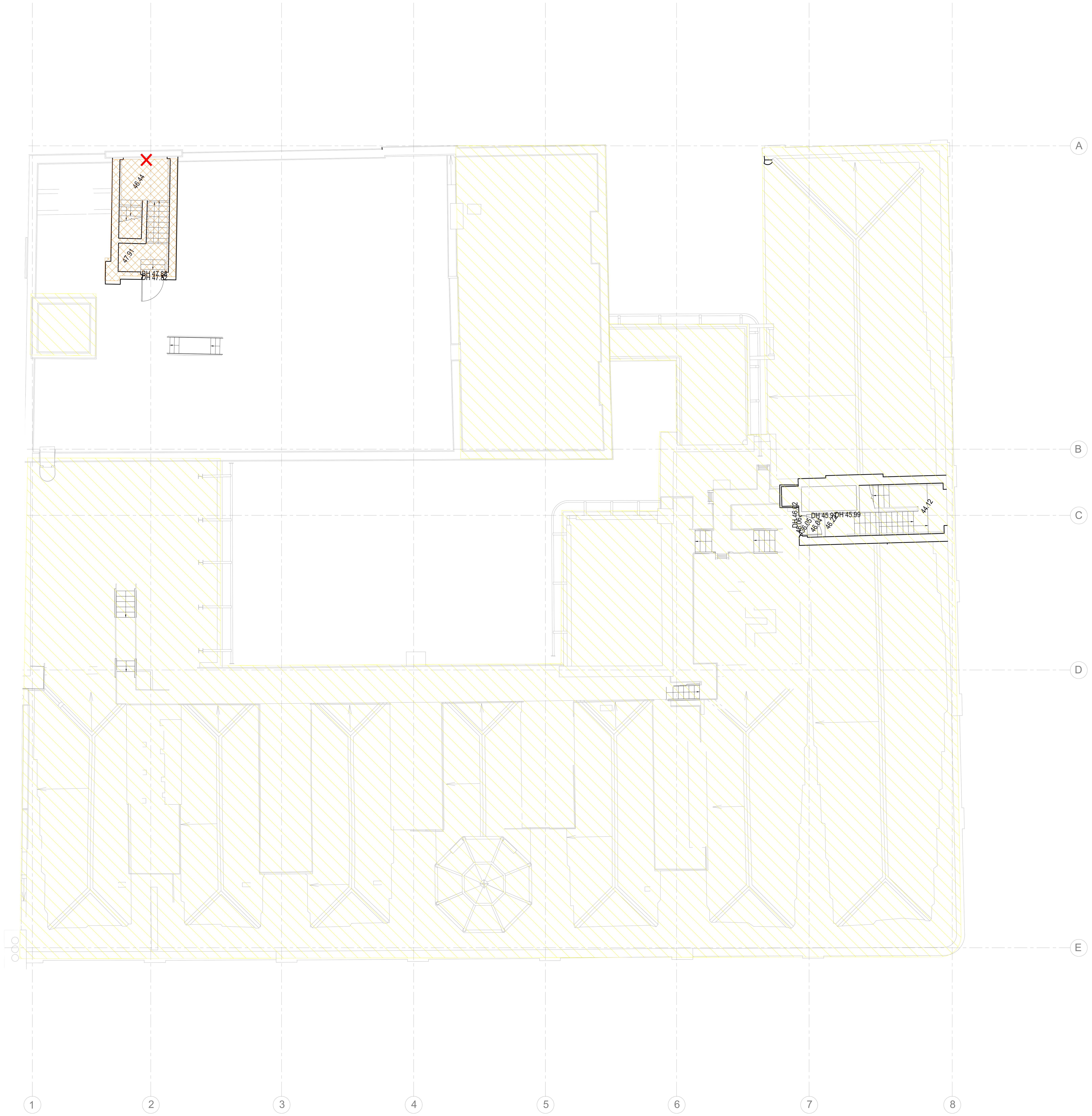
TITLE The Courtyard Building, London, WC1E 7EB

DWG 70 GA Demolitions
Basement Level
Proposed Demolition Breakdown

DRAWN SP | CHECKED SB | DATE 02/07/2024 | SCALE @ A1 1/100

| STATUS DESCRIPTION | STATUS CODE | REVISION |
|---|---|---|
| PLANNING SUBMISSION | PL01 | P01 |

DRAWING NUMBER
2311-EMR-Z00-B01-DR-A-70201




**NOTES:**

- Drawing based upon the formal survey information issue by Michael Gallie Surveys dated July 2022.
- All levels indicated as height above Ordinance Survey Datum taken from survey. To be confirmed.
- All dimensions subject to a tolerance of +/-5mm.
- All details are indicative and should be reviewed against contractors selected supplier / manufacturer / system. Any variations are to be advised to and approved by the Contract Administrator prior to commencement on site.

KEY

- Strip Out works back to primary structure. Primary structure and external envelop to be retained.
- Slab to be demolished
- Area lift/stair to be removed
- Walls to be demolished
- Partition walls to be demolished
- Roof demolition
- Removal of windows / doors
- Not included in scope

| DATE | STATUS | REVISION | DESCRIPTION |
|---|---|---|---|
| 02/07/2024 | S2 | PL01 | PLANNING SUBMISSION |

0 0.5m 1m 2.5m 5m



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JOB NO. 2311 | CLIENT Great Portland Estates

TITLE The Courtyard Building,
London, WC1E 7EB

DWG 70 GA Demolitions
Roof Level
Proposed Demolition Breakdown

DRAWN SP | CHECKED SB | DATE 02/07/2024 | SCALE @ A1 1/100

STATUS DESCRIPTION PLANNING SUBMISSION | STATUS CODE S2 | REVISION PL01

DRAWING NUMBER
2311-EMR-Z00-R01-DR-A-70207

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