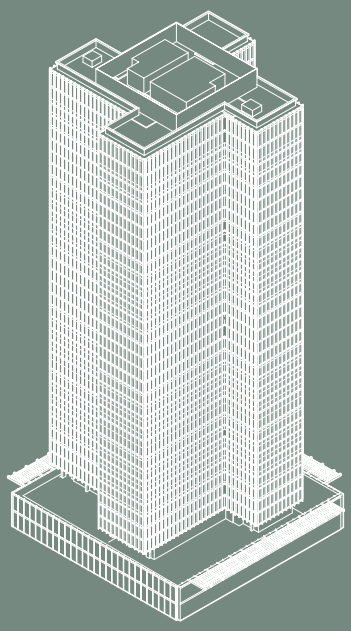


EUSTON TOWER

Feasibility Study Volume Zero
Summary of the Feasibility Study

November 2023

British Land

Issue: November 2023
Rev: A

Contents

1.1 Introduction

Euston Tower is an existing 36-storey tall building standing on the northern edge of central London, situated in the south-west of the London Borough of Camden.

Located on the corner of Euston Road and Hampstead Road, at the top of Tottenham Court Road, the tower shares a busy intersection with the UCL Hospital campus and is directly opposite Warren Street Station. The current tower has a prominent presence, given its status as the tallest building in the Borough aside from the nearby BT Tower, and as such acts as a physical landmark for London Euston, Euston Square, and Warren Street stations as well as wayfinding for the wider neighbourhood.

Completed in 1970, Euston Tower was designed in the "International Style" of architecture popular at the time. Above a two-storey glazed podium, the tower has a pinwheel plan form, clad in aluminium-framed curtain walling with green reflective tinted glazing. It was designed to provide cellular office accommodation typical of the period and formed part of a wider masterplan known as The Euston Centre. Euston Tower is the last remaining building of the masterplan, and stands on the eastern edge of the pedestrianised Regent's Place Campus.

Since its completion, other than tenant fit-outs it has undergone a minor refurbishment with the addition of secondary glazing to all floors in the 1990s, but beyond this its external form and facade remain as originally constructed. Gradually the existing tower has been vacated, and since 2021, with the exception of the retail floorspace at grade level, the building is vacant.

Figure 1.1 Euston Tower in 2022 seen from Tottenham Court Road

1.2 Project Vision

British Land's vision is to create a world leading science, technology and innovation building and public realm for Camden and the Knowledge Quarter that inspires, connects and creates opportunities for local people and businesses.

This will be achieved by:

- Transforming the existing Euston Tower ensuring it is fit for the future by adopting cutting-edge sustainability targets and reusing, recycling, and offsetting, where necessary, to reach net zero at completion and in operation.
- Putting social impact at the heart of the project from the start and ensuring that communities play a key role in shaping new spaces which meet local needs.
- Creating pioneering workspaces in the Knowledge Quarter for businesses of all sizes to prosper, including flexible incubator and accelerator spaces, to support start-ups, scale-ups and knowledge sharing.
- Ensuring that the future use of Euston Tower is built upon identified need and contributes to a thriving local, regional and national economy for our ever-changing world.
- Reimagining the public spaces of Regent's Place Campus, creating safe, inclusive, connected and sustainable spaces for Camden's communities.
- Contributing towards meeting Camden's housing needs.

A Brief History of Euston Tower

1970
Euston Tower designed in 1960s, completed in 1970

1990s
Secondary, internal glazing system added

2010s-2021
No more than 70% occupied, vacant possession achieved of all upper floors achieved in April 2021

Today
Building vacant and stripped out (except retail tenants at grade level)

Figure 1.2 Timeline of key milestones in the history of Euston Tower

1.3 Overview of the Feasibility Study

To deliver on the project vision, the disused building needs to be brought back to life in an environmentally-responsible way. Because constructing and running buildings contributes significantly to the UK's carbon emissions and waste footprint, retaining and reusing existing building elements can help to cut emissions and waste by reducing the amount of new construction required.

Accordingly, the starting point for the redevelopment was a thorough investigation into the current condition of the existing Euston Tower, and an exploration into the opportunities for how parts of the existing building could best be retained and reused, while transforming it into a building fit for the future.

These investigations and explorations are comprehensively and transparently detailed in a document known as the Feasibility Study, comprising the following volumes:

- Volume Zero: Summary of the Feasibility Study
- Volume One: Assessing the Existing Building
- Volume Two: Pathways to Alternative Uses
- Volume Three: Options for Retention and Extension.

The purpose of this document is to provide a short summary of the Feasibility Study and its conclusions in simple English. Where the reader desires more detail, they are directed to Volumes One, Two, and Three, which are publicly accessible as part of a full planning application to the London Borough of Camden. Refer to the *Feasibility Study prepared by GXN dated December 2023*.

Figure 1.3 Three volumes of this feasibility study and the summary document (this document)

1.4 The Feasibility Study Process

The Feasibility Study process began in February 2022, and there has been constant dialogue and review with Camden Council during this time. This dialogue has involved several workshops and presentations with Camden Council, as well as site visits to better understand the existing building.

In April 2023, Camden Council appointed third-party experts to conduct a technical review on their behalf. The full study has undergone review by the appointed third-party assessor, and their report has been issued to Camden.

1.5 Building Regulations and the Office Market

Designed in the 1960s and constructed in 1970, Euston Tower was designed to provide cellular office accommodation typical of the time. With changes in working patterns and sustainability, it now falls short of the expectations of a modern office building.

Some of these shortcomings are regulatory — elements of the existing building that do not comply with current building regulations and/or requirements of current planning policy, and some of these are market expectations — elements that do not meet the requirements of a modern, central London office building.

Underpinning this shift is a regulatory environment that is more mature with regards to life safety (especially fire) and energy performance. Similarly a more recent focus on broader sustainability (e.g. embodied carbon, circular economy) and wellness has led to both planning policy and guidance, and a consequent market expectation for these considerations to be embedded within any high quality scheme.

The following summarises the existing building's non-compliance with key Building Regulations:

- **Approved Document B (fire safety)**
  The existing tower falls short of current fire safety standards, with items ranging from inadequate structural fire resistance and compartment slab fire stopping provisions, to lack of automatic sprinkler systems and dedicated fire fighting lifts. These requirements must be addressed to meet current fire safety standards.
- **Approved Document F (ventilation)**
  The existing servicing equipment of Euston Tower, complete with its riser provision, do not support the increased ventilation (fresh air) requirements to meet the current regulations.
- **Approved Document L (conservation of fuel and power (i.e. energy performance)**
  The existing facade performance and central plant of Euston Tower do not support the operational energy performance required to meet the current regulations.

A thorough market research exercise was conducted by CBRE in December 2022, exploring office occupier preferences and requirements in the Central London office market.

Based on the *CBRE annual Europe, Middle East, and Africa (EMEA) Occupier Survey*, the most in-demand building feature was identified as "flexible open space", a feature the existing tower cannot offer as is.

Clear ceiling height was identified as another key occupier preference. By analysing 726 leasing deals conducted in Central London in the ten year period between 2012 and 2022, it was clear that occupiers lease spaces with clear ceiling heights of 2.6m or higher.

This height cannot be achieved with the existing floor levels at Euston Tower (refer to Section 1.7). Of the 726 leasing deals analysed, only five (<1%) had ceiling heights that could reasonably be achieved with the existing floor levels at Euston Tower.

1.6 The Existing Building Condition and Operation (Volume One)

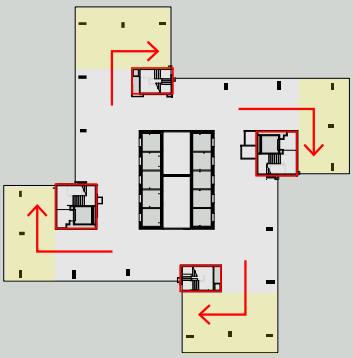
Several surveys and assessments were conducted to better understand the condition of the existing building, its ability to meet the requirements of current Building Regulations, how it functions as a modern office building, and how the existing building could be adapted.

The following summarises the findings:

- The existing concrete structure is generally in reasonable condition with good strength, and is suitable for continued use.
- The existing facade (the exterior skin of a building) is the same cladding installed during the original construction, save for the lower two storeys. It is well-beyond its working lifespan, and does not meet current Building Regulations for fire or energy performance.
- Building services are the systems installed in buildings to make them comfortable, functional, efficient, and safe. Building services include installations such as: heating, cooling, ventilation, lifts, electrical installations, fire sprinklers, and fire alarms. Most of the existing services have already been removed because they were well-beyond their working lifespan, and would not meet the required energy performance or fresh air requirements.
- The existing building doesn't comply with current Building Regulations for fire safety, and would therefore need major changes to make it safe and suitable for modern users. This would include adding measures such as: sprinkler protection throughout the building, mechanical smoke ventilation, dedicated firefighting lifts, fire protection to the floor slabs.
- The layout of the floors was designed for cellular offices popular at the time of construction. The result is that the existing layouts do not work well for modern, open-plan offices, as they are disconnected and hard to navigate.
- The height between the existing storeys (floor to floor height) is low for a modern office building. This means it is difficult to fit the building services needed for a modern, sustainable office within this height.
- The existing structural system is idiosyncratic. It comprises a central core and four satellite cores for stability, with a mix of ribbed floor slabs, flat floor slabs, and a beam running around the perimeter. The result is that the building structure is difficult to adapt efficiently without removing significant portions of the floor slabs.
- A history of vacancy, with no more than 70% occupancy since the early 2010s. Together with the CBRE market analysis, this indicates the need to re-imagine Euston Tower for the next generation.

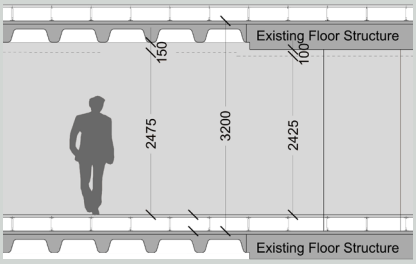
Existing Building Limitations

Building Regulations Non-compliances

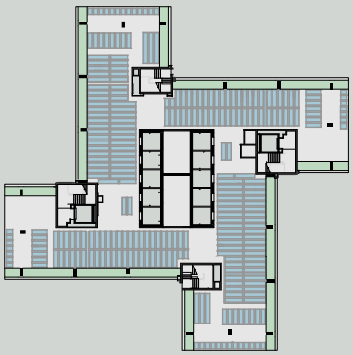


Disconnected Floor Layouts

Aged and Inefficient Equipment and Materials



Low Floor to Floor Height



Unadaptable Structure

History of Vacancy

Figure 1.4 The existing building exhibits several fundamental limitations

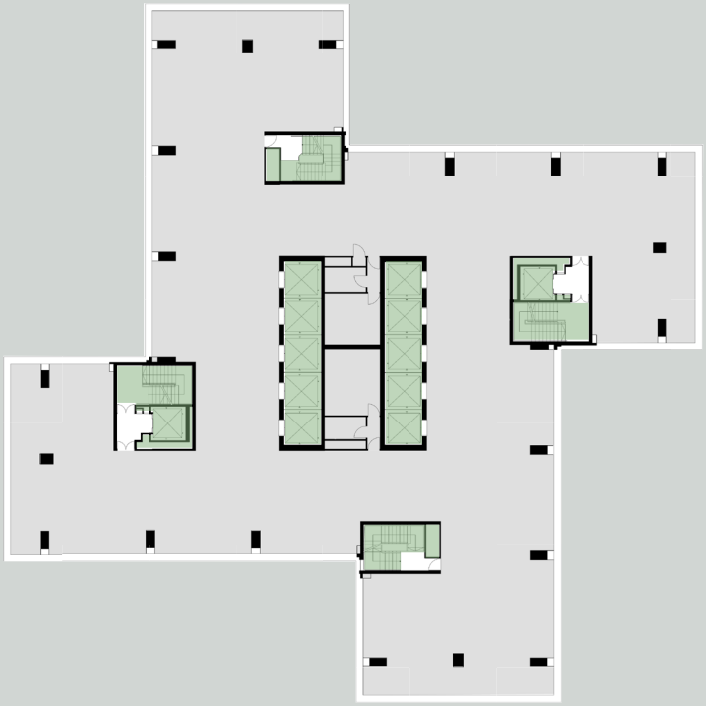
1.7 Refurbishing the Existing Building for Office Use (Volume One)

Major alterations are needed to transform the existing building into one that is compliant with current Building Regulations and attractive to modern office users. Three of the top six most in-demand features to modern users were "flexible open space", "indoor air quality", and "sustainable building features and operations", as identified in the *CBRE annual Europe, Middle East, and Africa (EMEA) Occupier Survey*. In order to facilitate this in the existing building, these alternations include generally: new service risers (penetrations in the floors to distribute building services vertically throughout the building), new firefighting and goods lifts, and new space for the equipment needed for modern, energy-efficient building services.

Most of these alterations result in substantial impacts on the existing structure. Where new penetrations in the floors are required, the resulting impact on the structure is exaggerated because, rather than removing only the size of the hole required, entire zones need of existing floor slab need to be removed.

The resulting, upgraded floor layout is shown in Figure 1.5. The efficiency of the floor layout (the ratio of the area usable as an office compared to the overall area) is approximately 67%. This is low compared to a modern office building which would achieve 75-80% efficiency. The upgrades in this option also do not solve the disconnected layout which is exacerbated by the position of the existing cores (the vertical space used for lifts, stairs, and building services). Practically this layout limits the building to single-tenant floors only, which places a significant constraint on the letting strategy.

Existing Floorplate



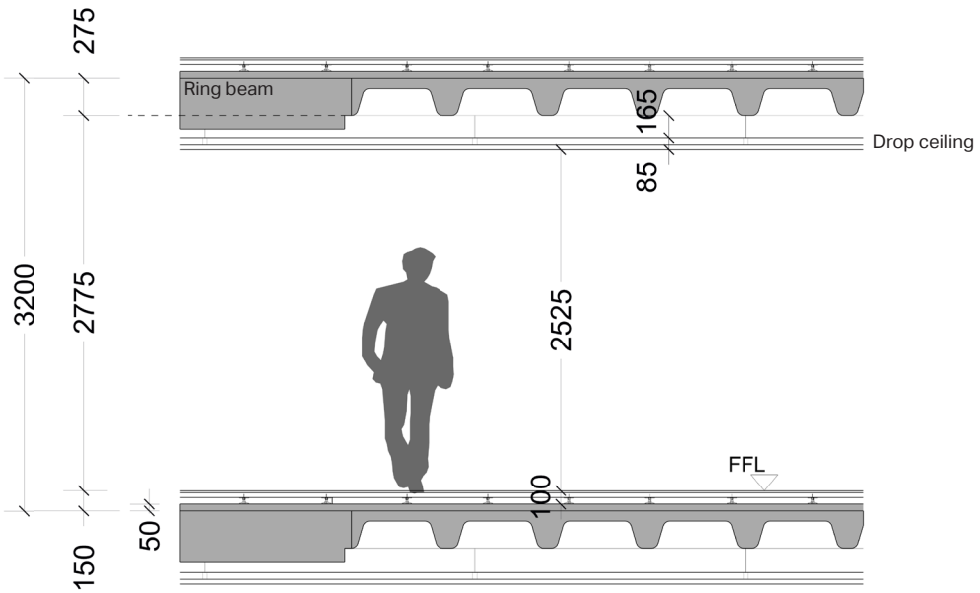
Upgraded Floorplate

Figure 1.5 Diagram showing erosion of floor slab due to upgrades to meet current Building Regulations

An increased ceiling or floor zone is required to accommodate the modern, energy-efficient building services required for improved energy performance. By studying upgrade options, it was shown that this is challenging to fit within the height between the existing storeys of 3.2m, while at the same time delivering the clear ceiling height expected for an office building of this class (upwards of 2.6m as evidenced by the CBRE market analysis conducted in December 2022). The resulting clear ceiling height is 2.38 – 2.48m depending on the upgrade strategy pursued, which would be unattractive to occupiers and significantly challenge the letting strategy for the building.

With the interventions required to bring the building up to current standards, the disconnected floor layout, and the constrained floor to floor height, the resulting spaces would not be suitable for the Central London office market. This is especially the case given the quantum of space at Euston Tower, and is backed up by the CBRE market analysis conducted in December 2022. The extent of the upgrades required and the quality of the offices delivered would make viability challenging, and the resulting offices would be difficult to lease.

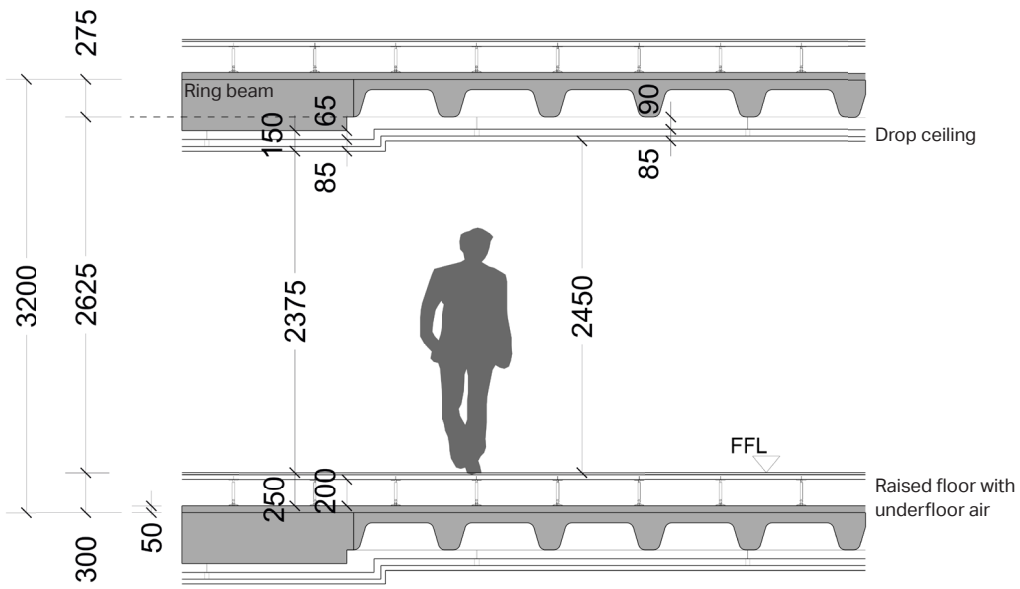
Existing Condition



Existing Condition
The 100mm raised floor is not enough space for modern services. The 250mm ceiling depth is minimal since services are located at the perimeter. To make room for modern services, the depth of the floor and ceiling would need to increase. The minimal ceiling build-up and services zone under the ring beam will require compromises in the fitout.

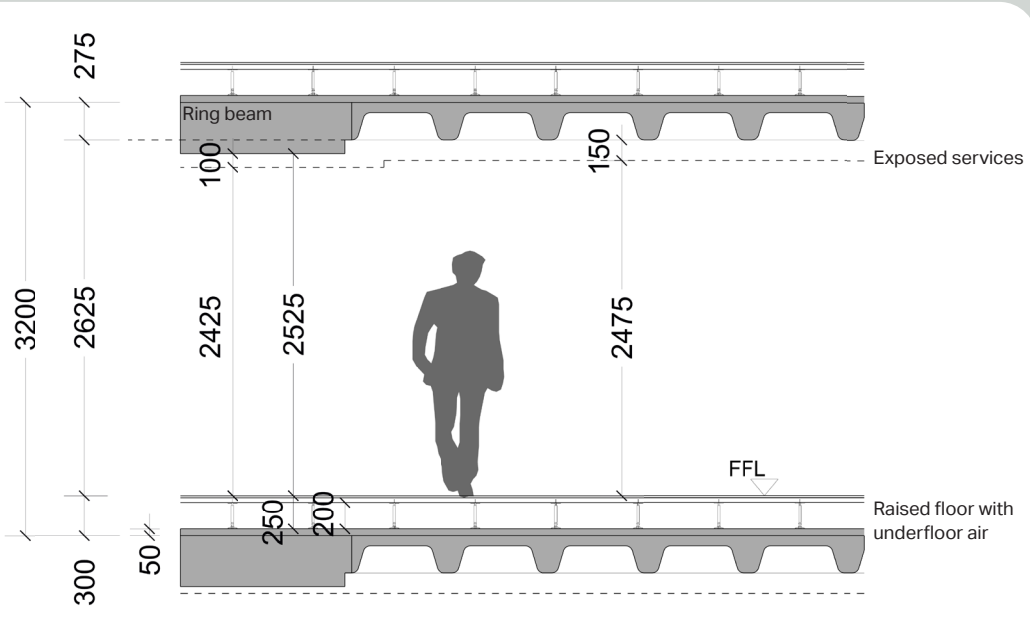
Figure 1.6 Existing floor to ceiling height (above) and selected modernisation options (overleaf)

Selected Modernisation Options



Modernising Option 3a

Another option is to have minimal services in the ceiling (lighting, sprinklers) and to provide a taller raised floor with underfloor air. Floor trunking is not desired as it limits flexibility. Clear height is 2,375mm, below BCO recommendation, over an extensive area of the floor plate. The minimal ceiling build-up and services zone shown would be subject to detailed co-ordination and integration of the services as well as require compromises in the fitout. This option assumes 4 no. air handling units (AHUs) per floor. Fewer AHUs results in a taller raised floor.



Modernising Option 3b

Another strategy is to expose the ceiling with sprinklers, lighting, etc. This may not be to every tenants liking. The raised floor provides underfloor air. A minimum 100mm services zone results in a compromised servicing strategy, though less so than in modernising option 3a. There is an option to step the services up to achieve a clear height of 2,475mm to underside of services, though this would only be possible under the ribbed areas of slab.

1.8 Alternative Uses for the Existing Building (Volume Two)

Notwithstanding the strong policy position which protects against losing existing office space, the following alternative uses were studied for the existing building:

- **Commercial developments**
  - Commercial office only (Volume One)
  - Commercial office with laboratory (life sciences / innovation)
- **Residential-led mixed use**
  - Residential with commercial office
  - Residential with laboratory
  - Residential with hotel
- **Hotel/Student Housing developments**
  - Hotel only
  - Hotel with student housing.

For each use a thorough technical assessment was undertaken, and regardless of use, the same primary issues identified in the existing building assessment (building regulations, fire safety, performance) need to be addressed before the building can be brought back to life.

As for offices, the existing structural loading capacity was shown to be sufficient for any of the alternative uses, with the exception of laboratories which require more extensive structure. However, the dynamic response of the structure (how much it vibrates at a microscopic scale) was shown to be more challenging, especially for uses with bedrooms where users are more likely to be sensitive to vibrations.

Fire safety was identified as a challenge for mixed-uses. In addition to providing dual fire escapes, each separate use requires independent firefighting provisions and fire escape routes. Practically this precludes combining more than two distinct uses, as the efficiency of the floor layout (the ratio of the area usable compared to the overall area) would be severely eroded with the additional space required for the independent fire safety requirements.

The ceiling zone required to accommodate modern, energy-efficient building services for residential use was challenging to fit within the height between the existing storeys of 3.2m, while delivering the clear ceiling heights recommended by The London Plan Policy D6, and the Mayor of London's Housing Design Standards published in June 2023.

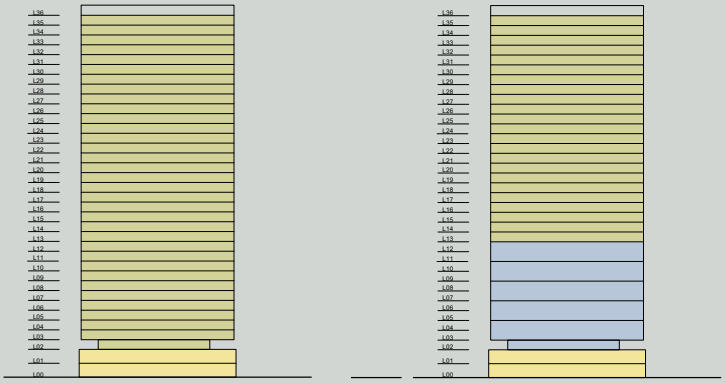
It was also shown that this junction of Euston Road and Hampstead Road is not ideal for residential accommodation, due to the poor air quality and the noisy environment on the junction. An Air Quality Assessment was undertaken and recommended against having openable windows in the lower portion of the tower, which makes delivering good quality residential apartments in this area difficult. Similarly, the noisy environment, due to the 24-hour road noise and the nearby A&E department, is not suited to noise sensitive uses like residential, hotel, and student accommodation.

In addition to the issues outlined above, the resulting floor layouts for residential, hotel, and student accommodation are compromised due to the following:

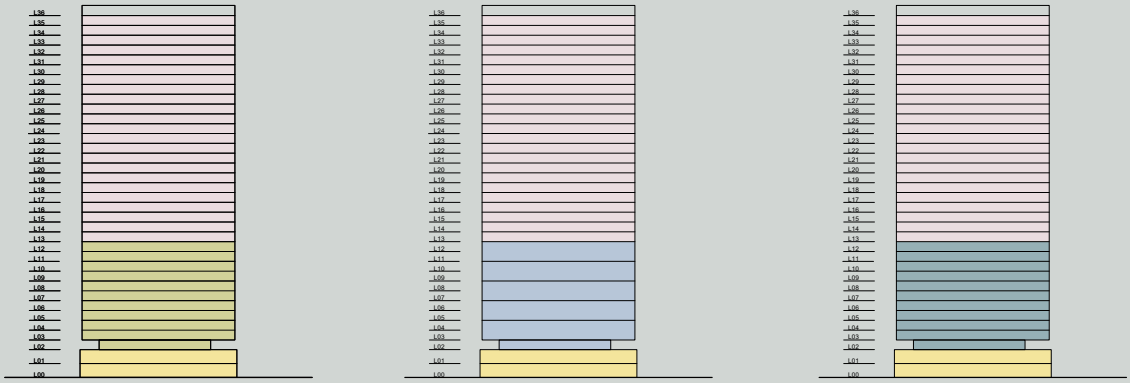
- Several single-aspect units (and some north-only facing meaning they never get direct sun)
- Some self-shaded units due to overshadowing from the shape of the existing building
- Several narrow inefficient units with lots of wasteful circulation space
- In some cases, long corridors with no daylight
- No outdoor private amenity due to wind conditions.

Ultimately it was shown that none of these alternative uses were ideal, and if pursued, would generally result in low quality, compromised accommodation that doesn't meet the Mayor of London's current guidelines, and would be challenging to deliver cost-effectively.

COMMERCIAL-LED DEVELOPMENTS



RESIDENTIAL-LED DEVELOPMENTS



HOTEL / STUDENT HOUSING DEVELOPMENTS

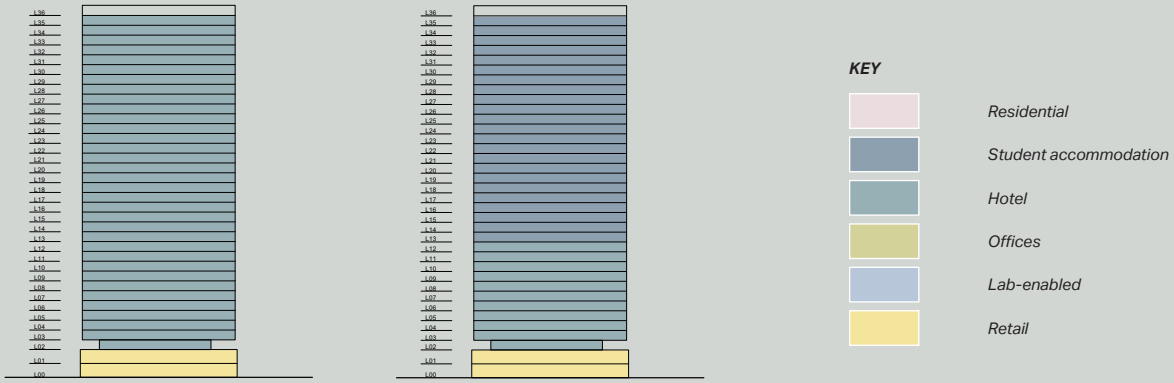


Figure 1.7 Stacking diagrams for use cases explored in Volume Two of the feasibility study

1.9 Options for Retention and Extension (Volume Three)

It was agreed that the best use of the existing building was continued commercial use, based on the findings of Volume Two of the Feasibility Study. The following options were studied for delivering the project vision, generating additional value, while retaining as much of the existing building as possible:

- **Major Refurbishment**
- **Retention and Partial Extension (Max Retention)**
- **Retention and Extension ("Full" Retention)**
- **Partial Retention and Extension (Disassemble and Reuse)**
  - Retain consecutive slabs (office)
  - Retain consecutive slabs (office and lab-enabled)
  - Retain interstitial slabs (office)
  - Retain interstitial slabs (office and lab-enabled)
  - Retain the core
- **New Build.**

For each option a thorough technical and design assessment was undertaken. The assessments considered: how much of the existing building could be retained (in terms of material and carbon emissions), the quality of the resulting floor layouts (it has to be attractive to a modern user), future flexibility and adaptability (the tower must be fit for the future), and health & safety (it must be buildable in the safest way possible).

Daylighting levels were assessed, and it was shown that the areas of well-daylit space reduce materially when the size of the floor is extended, even by a small amount. The reduction in well-daylit space is alleviated by increasing the floor to floor height (height between storeys). Increasing the existing floor to floor height to deliver more well-daylit space is necessary to create the high quality spaces that are attractive to the large tenants, who are essential to a successful letting strategy for a building of this scale, and to deliver on the environment the Knowledge Quarter is seeking to foster.

Whole Life-cycle Carbon Assessments (WLCAs) were conducted for selected options with varying degrees of existing building retention (refer to summary overleaf). For each option, these assessments estimated the total carbon emissions (considering deconstruction, construction, and operation of the buildings) anticipated to be emitted over the building's lifetime. The Retain the Core option has the lowest estimated whole life-cycle carbon emissions, when compared with the other options that resolve the floor to floor height issues previously described. This is in spite of the Retain the Core Option retaining 31% (by volume) of the existing structure compared to 42% (by volume) for the Retain Interstitial Slabs option.

On balance, the Retain the Core option is identified to be preferable. This is because it offers the best balance of structural retention, quality, flexibility (it does not bake in many of the limitations of the existing building), and adaptability (a floor system that could be adapted over time and disassembled easily at its eventual end of life). And it does so with a whole life-cycle carbon position that is the lowest of the options that deliver the quality of space which is necessary for the redevelopment of Euston Tower to be successful.

RETAIN THE CORE (PREFERRED OPTION)

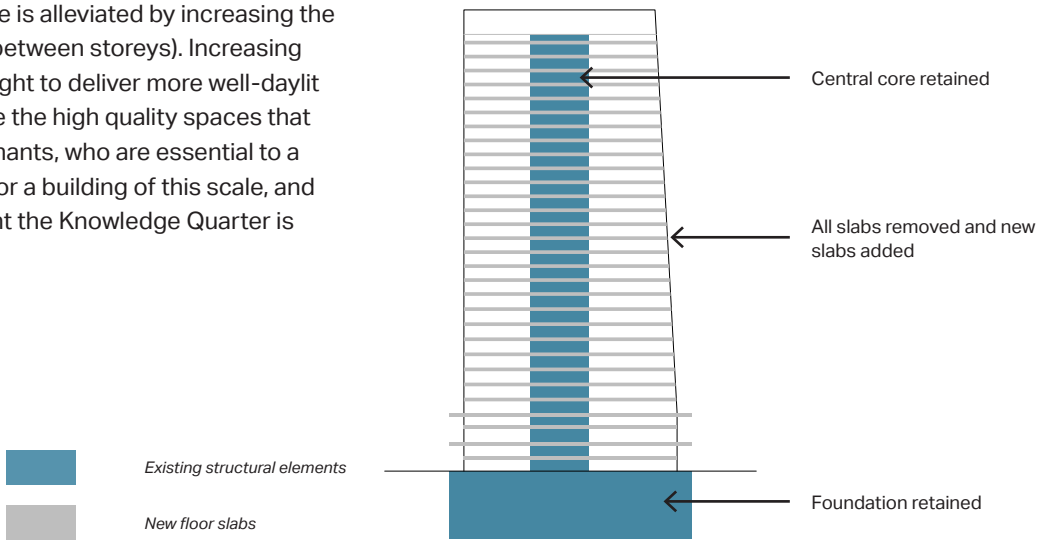


Figure 1.8 Diagrammatic section of Retain the Core which is the preferred option

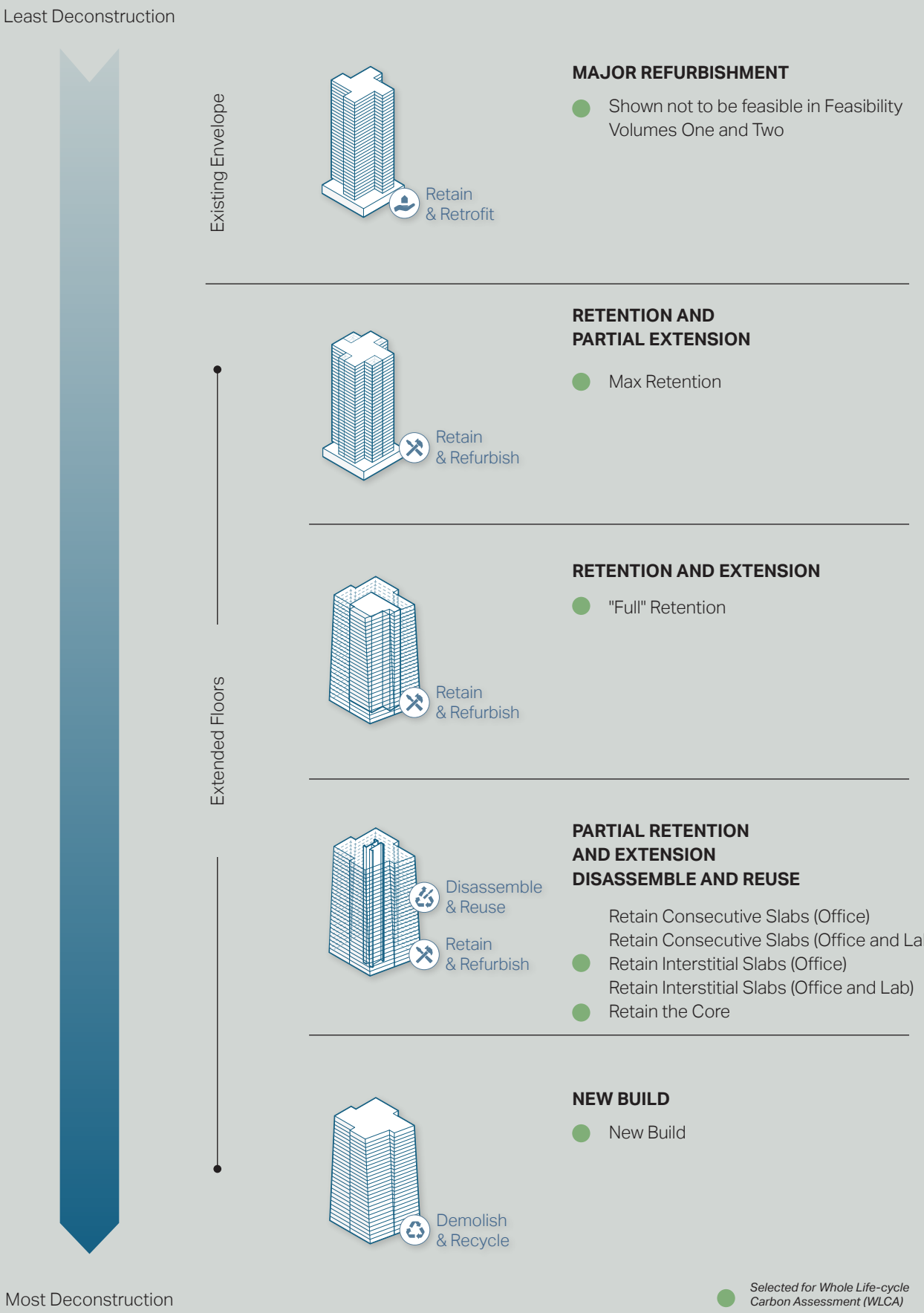
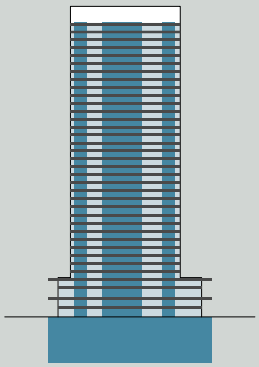
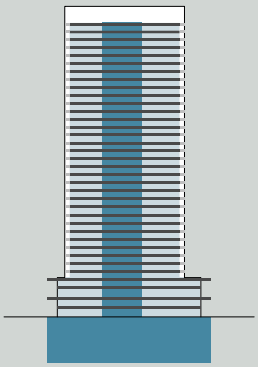


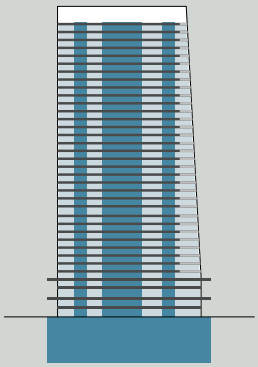
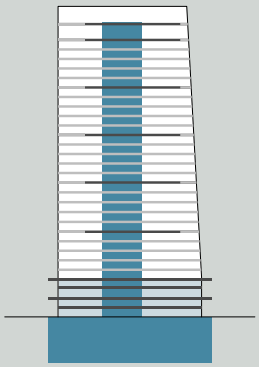
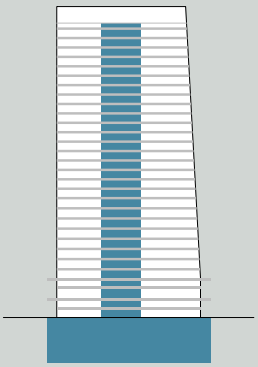
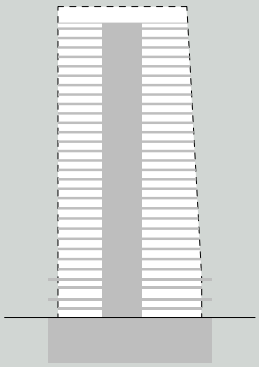
Figure 1.9 Overview of options studied

The matrix on this page summarises and compares the options selected for Whole Life-cycle Carbon Assessment (WLCA). More detail against each of these is presented within Volume Three of the Feasibility Study.





	Major Refurbishment	**Retention & Partial Extension -** Max Retention
Retained structure	89% (carbon) 90% (vol)	93% (carbon) 92% (vol)
Gross internal area (GIA)	56,588m^2	61,460 m^2
Upfront carbon [A1-A5]	23,340 tCO_2 412 kgCO_2e/m^2	26,277 tCO_2 429 kgCO_2e/m^2
Whole life-cycle carbon [A-C]	63,192 tCO_2 1,110 kgCO_2e/m^2	67,975 tCO_2 1,108 kgCO_2e/m^2
Energy use intensity (EUI)	104 kWhm^2/year	95 kWhm^2/year
Floor to floor height	3.2 m (office)	3.2 m (office)

Retention & Extension - "Full" Retention	**Partial Retention & Extension -** Retain Interstitial Slabs	**Partial Retention & Extension -** Retain the Core	**New Build**
			
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119,958 tCO_2 1,198 $kgCO_2e/m^2$	107,005 tCO_2 1,290 $kgCO_2e/m^2$	105,825 tCO_2 1,276 $kgCO_2e/m^2$	111,351 tCO_2 1,295 $kgCO_2e/m^2$
99 kWhm²/year	95 kWhm²/year	95 kWhm²/year	90 kWhm²/year
3.2 m (office)	3.84 - 3.98 m (office) 4.27 m (lab)	3.875 m (office) 4.250 m (lab)	3.875 m (office) 4.250 m (lab)

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