CIRCULAR ECONOMY STATEMENT

330 Gray's Inn Road

Produced by XCO2 for 330 Gray's Inn Road Ltd

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EXECUTIVE SUMMARY

This section provides a non-technical summary of the circular economy approach and commitments for the proposed development at 330 Gray's Inn Road in the London Borough of Camden.

OUTLINE OF DEVELOPMENT

A submission for variation of Condition 2, 18, 31, 41 and 54 of planning permission ref 202/553/P is proposed for the 'Redevelopment of the former Royal National Throat, Nose and Ear Hospital site.

A Circular Economy Statement was submitted for the previously consented scheme. This Circular Economy statement has been fully updated to reflect amendments to the previously consented scheme and has been produced in line with the Greater London Authority's updated guidance on Circular Economy Statements, published in March 2022.

CIRCULAR ECONOMY PRINCIPLES

This report is structured around the six Circular Economy (CE) principles, which are outlined in the GLA's guidance on Circular Economy Statements (2022). These principles should be a fundamental part of the design process and are as follows:

1. Building in Layers;
2. Designing out Waste;
3. Designing for Longevity;
4. Designing for Adaptability or Flexibility;
5. Designing for Disassembly;
6. Using Systems, Elements or Materials that can be Reused or Recycled.

The circular economy design approaches adopted for the proposed development are also outlined within this report. The design approaches adopted directly support the implementation of the six CE principles.

CIRCULAR ECONOMY TEMPLATE

This report should be read in conjunction with the attached Circular Economy Spreadsheet which includes the following information:

- Circular Economy Design Approaches
- Circular Economy Design Principles by Building Layer
- Bill of Materials (upon WLC completion)
- Recycling and Waste Reporting Table
- A Summary of Circular Economy Targets

IMPLEMENTATION APPROACH

This report will be reviewed throughout the project, at the relevant stages, alongside the following corresponding reports, submitted at the application stage:

- Energy Strategy
- Sustainability Statement (including BREEAM Pre-Assessment)
- Whole Life Carbon Assessment
- Flood Risk Assessment and Drainage Strategy
- Overheating Assessment
- Operational Waste Management Plan
- Pre-Demolition Waste Audit Report

At post-planning stage, the following reports are expected to be produced to inform the detailed design for areas of the development being assessed under BREEAM.

- Material Efficiency Report
- Climate Change Adaptation Strategy
- Design for Disassembly & Adaptability Report
- Designing for Durability and Resilience
- Material Durability and Resilience Report

A Site Waste Management Plan will be produced on appointment of the Principal Contractor and prior to commencement of construction works on site. The plan will be reviewed throughout the construction stages and updated where required.

The applicant is committed to reporting progress in line with GLA requirements, at post-completion stage.

INTRODUCTION

This section introduces the key principles that a circular built environment should adopt; provides a brief description of the development; summarises the process followed to produce this document; and outlines the project's circular economy aspirations.

This report has been produced to address Policy D3 'Optimising site capacity through the design led approach' and Policy SI7 'Reducing waste and supporting the Circular Economy', within the London Plan. A full review of the relevant planning policy framework can be found within Appendix A.

CIRCULAR ECONOMY PRINCIPLES

> *Transitioning to a circular economy offers significant opportunities for meeting the needs of a growing population and reducing the adverse impacts on the environment, by re-thinking the way that we design our homes and buildings and consume resources.*[1]

A circular economy is a new economic model that stands in opposition to the current linear economy. Within a linear economy, materials are mined, manufactured used and thrown away. A circular economy seeks to keep resources in use and retain their value (Figure 1).

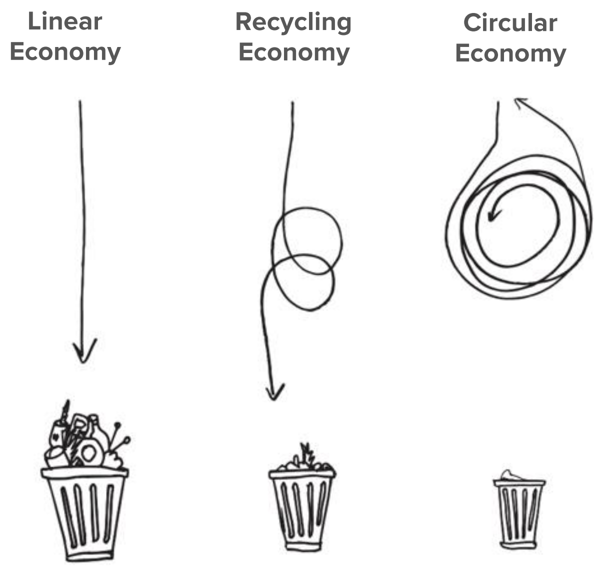


Figure 1: Linear, recycling and circular economic models (Circular Flanders)

The built environment sector is the largest user of materials and generator of waste in the economy. In London alone the sector accounts for 54% of waste and consumes 400 million tonnes of material each year. There are clear environmental benefits to adopting a circular economy approach in the building environment, including sending less waste to landfill and reducing the use of virgin materials. However, there are also social and economic benefits.

By implementing circular economy principles developers can protect their business against the rising costs of materials and waste disposal.

[1] 'Design for a Circular Economy: Primer' (Greater London Authority)

LWARB estimates that if circular economy principles are successfully adopted it could contribute between £3 billion and £5 billion in growth for London by 2036 and create as many as 12,000 new jobs.[1]

REPORT STRUCTURE

This report is structured in accordance with the following core guiding principles and commitments, as identified in the GLA's 'Circular Economy Statement: Guidance':

1. **Building in Layers**: Ensuring that different parts of the building are accessible and can be maintained and replaced where necessary.
2. **Designing Out Waste**: Ensuring that waste reduction is planned in from project inception to completion, including consideration of standardised components, modular build, and reuse of secondary products and materials.
3. **Designing for Longevity**.
4. **Designing for Adaptability or Flexibility**
5. **Designing for Disassembly**
6. **Using Systems, Elements or Materials that can be Reused and Recycled.**

These core circular economy principles are compared against current practice in Figure 2.

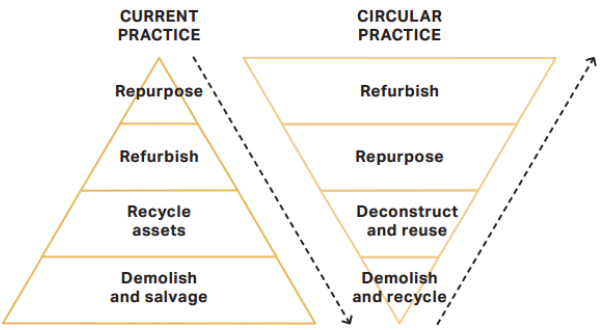


Figure 2: Current practice compared to circular practice (GLA)

DESCRIPTION OF THE DEVELOPMENT

A submission for variation of Condition 2, 18, 31, 41 and 54 of planning permission ref 202/553/P is proposed for the 'Redevelopment of the former Royal National Throat, Nose and Ear Hospital site.

The proposed scheme comprises Retention of 330 Gray's Inn Road and a two storey extension above for use as hotel (5 above ground storeys in total), demolition of all other buildings, the erection of a part 13 part 9 storey building plus upper and lower ground floors (maximum height of 15 storeys) for use as a hotel (including a cafe and restaurant); covered courtyard; external terraces; erection of a 7 storey building plus upper and lower ground floors (maximum height of 9 storeys) for use as office together with terraces; erection of a 10 storey building plus upper and lower ground floors (maximum height of 12 storeys) for use as residential on Wicklow Street and office space at lower ground and basement floors; erection of a 5 storey building plus upper and lower ground floors (maximum height of 7 storeys) for use as residential on Swinton Street and associated residential amenity space; together with a gymnasium; new basement; rooftop and basement plant; servicing; cycle storage and facilities; refuse storage; landscaping and other ancillary and associated works.

The proposed design amendments include:

- Increased basement beneath the residential blocks to temporarily house the UCL Ear Institute during the second phase of construction;
- Omission of basements below Wicklow Courtyard;
- Changes to the layout of basement areas originally proposed below the office block to temporarily house the UCL Ear Institute during the second phase of construction;
- Changes to the layout of landscaped areas;
- Changes to the plant strategy, including plant size and location;
- A small reduction to hotel areas, affecting BoH and support facilities only;
- Removal of gymnasium and replacement with gymnasium/Class E.

The red line boundary of the full site is outlined in Figure 3. A 3D visualisation of the proposed development from Gray's Inn Road is contained within Figure 4.

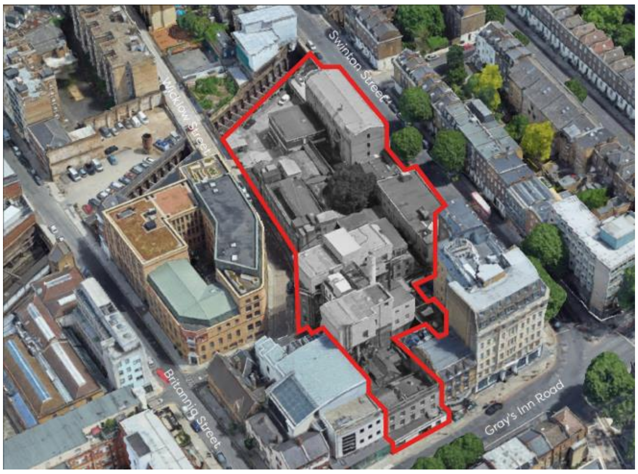


Figure 3: Red line boundary of the existing site


Figure 4: A 3D visualisation of the proposed scheme from Gray's Inn Road

The consented versus proposed arrangement of uses are displayed on Figure 6 and **Error! Reference source not found.** respectively.

Figure 5: Consented arrangement of uses

Figure 6: Proposed arrangement of uses

The areas for the proposed scheme are displayed in Table 1.

Table 1: Proposed areas

Level/Use Class	GIA (sqm)	NIA (sqm)
Ear Institute	3,945	2,280
Hotel (Class C1)	8,328	4,666
Office/Lab Enabled (Class E)	12,548 + 544	8,831 + 273
Lab Enabled/Gym (Class E)	2,890	1,819
Residential (Class C3)	7,452	5,099

METHOD STATEMENT

This Circular Economy statement has been developed in line with GLA policy and outlines the design team's aspirations to align with the principles of a circular economy.

Prior to the development of this statement, a Circular Economy workshop was held with key members of the design team, where circular economy principles and aspirations were discussed. Workshop minutes can be found in Appendix B.

Further workshops will be held at the next design stages to monitor the project's progress in reaching the goals summarised in the 'Circular Economy Aspirations' section of this report.

Post construction reporting will be delivered in line with GLA requirements.

It is also important to consider the fact the proposed development is targeting a rating of Excellent for non-domestic areas of the development under BREEAM New Construction 2018 Shell and Core. The development has been divided into the following areas for the purposes of the BREEAM assessment:

Gym: Assembly and Leisure

Hotel: Other: Residential Institution (Short Term Stay)

Office and Laboratory: Office

Within each of the BREEAM pre-assessments, there is an emphasis on targeting credits within the Materials and Waste sections which will further support alignment with the principles of the Circular Economy with considerations made in relation to material efficiency and durability, pre-demolition requirements, waste and recycling targets and operational waste management as part of the BREEAM process.

SUPPLEMENTARY DOCUMENTS

This report will be reviewed throughout all project stages, alongside the following corresponding reports from planning stage:

- Energy Strategy
- Sustainability Statement (including BREEAM Pre-Assessment)
- Whole Life Carbon Assessment
- Flood Risk Assessment and Drainage Strategy
- Overheating Assessment
- Operational Waste Management Plan
- Pre-Demolition Waste Audit Report

At post-planning stage, the following reports are expected to be produced to inform the detailed design for areas of the development being assessed under BREEAM.

- Material Efficiency Report
- Climate Change Adaptation Strategy
- Design for Disassembly & Adaptability Report
- Designing for Durability and Resilience
- Material Durability and Resilience Report

A Site Waste Management Plan will be produced on appointment of the Principal Contractor and prior to commencement of construction works on site. The plan will be reviewed throughout the construction stages and updated where required.

As outlined in these reports, the development has been designed in line with the relevant sustainability policies within the London Plan and the London Borough of Camden. This reflects the client and design team's aspirations in delivering a sustainable development of high quality.

Additionally, this report should be read in conjunction with the attached Circular Economy Spreadsheet which includes the following information:

- Circular Economy Design Approaches

- Circular Economy Design Principles by Building Layer
- Bill of Materials
- Recycling and Waste Reporting Table
- A Summary of Circular Economy Targets

CIRCULAR ECONOMY ASPIRATIONS

The project team for the proposed development interpret circular economy in the following way:

- Source materials responsibly
- Design for durability and resilience
- Implement measures to optimise material use
- Carry out a pre-demolition waste audit
- Implement waste minimisation targets during demolition and construction
- Ensure there is sufficient space for storage and segregation of operational waste
- Design a flexible and adaptable building

CIRCULAR ECONOMY DESIGN APPROACHES

The circular economy design approaches support the implementation of the 6 circular economy principles.

Decision trees contained within the Circular Economy Guidance document set out a hierarchy of CE design approaches for developments, with specific design approaches set out for sites with buildings already on site.

It should be noted that CE design approaches are not mutually exclusive and that multiple approaches are expected to be adopted for each project. Different design approaches will be required for different building layers, for example.

This section begins by determining the design approaches adopted for this development, before focusing on how these will be adhered to and how they will support the delivery of the six circular economy principles and, in particular, the following:

- Designing for Longevity
- Designing for Adaptability or Flexibility
- Designing for Disassembly

APPROACH FOR EXISTING STRUCTURES/BUILDINGS

Until recently, the site housed the Royal National Throat, Nose and Ear hospital (RNTNE). The hospital was vacated in 2020 and moved to a new location. As shown in Figure 7, the site includes a number of existing structures and buildings:

1. Original RNTNE Hospital Building (1875 – 1878)
2. Hospital Extension (1906)
3. Ward Building (1916 – 1929)
4. Entrance Screen Wall (1906 – 1929)
5. Nurses Home (1935)
6. 1st Floor Structure Above Screen Wall
7. Single Storey Metal Extension
8. Audiology Centre

The CE design approaches for the existing structures on site has been guided by the decision tree shown in Figure 8. As noted previously, CE design approaches are not mutually exclusive and multiple approaches are expected to be adopted for each project (see Table 2).

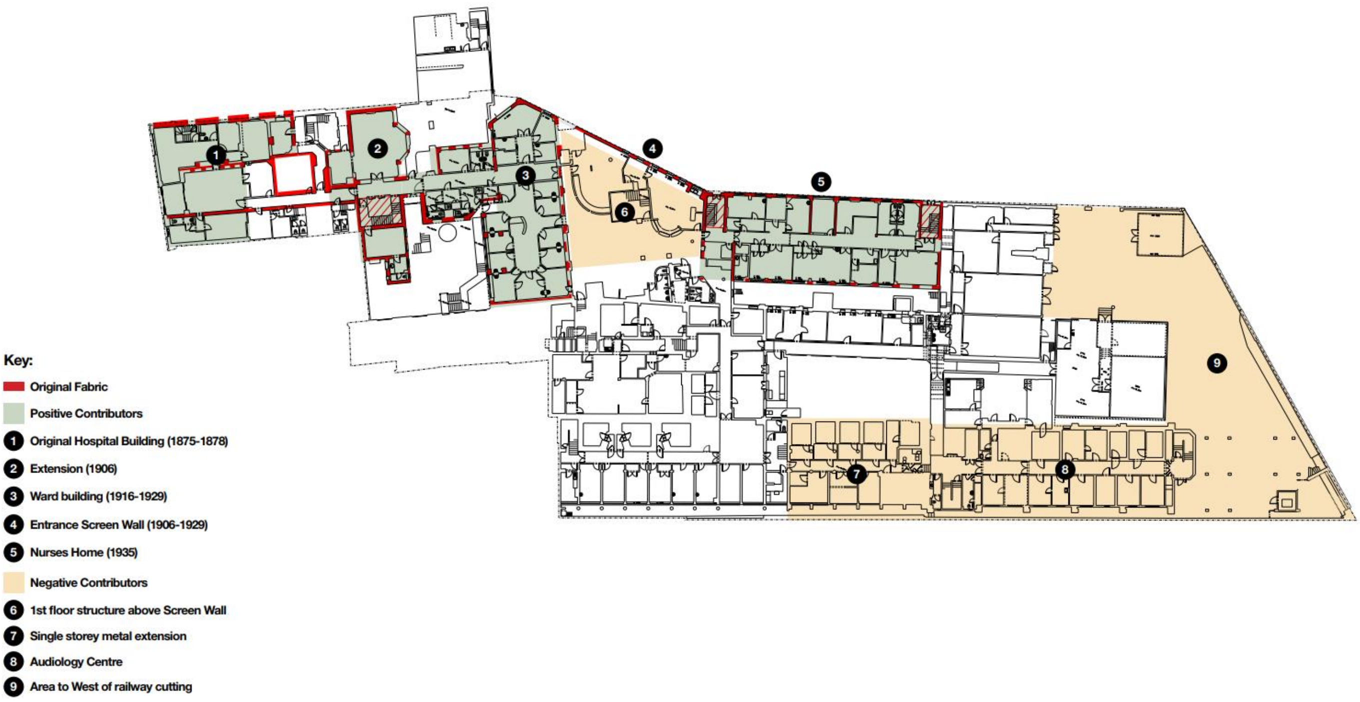


Figure 7: Existing buildings on site

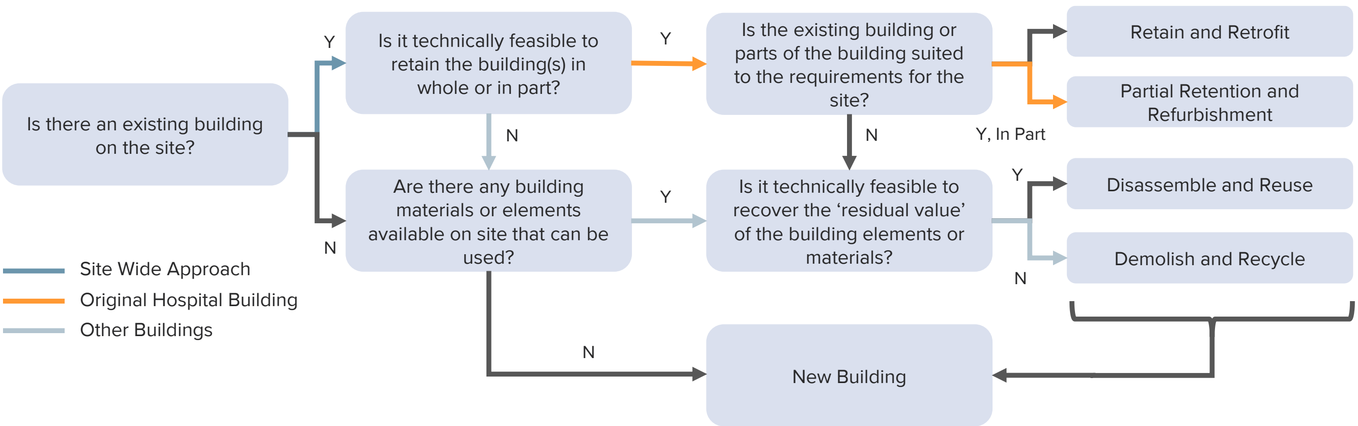


Figure 8: Circular economy decision tree for the existing site in line with GLA CE Guidance

Table 2: Circular Economy Design Approach for the original hospital building at 330 Gray's Inn Road

	Circular Economy Adopted Design Approach: Existing Site
Building	**Original RNTNE Hospital Building (1875 – 1878)**
Design Approach	Partial Retention and Refurbishment
Strategic Response	The original hospital building on Gray's Inn Road will be retained and refurbished as part of the proposed works. The existing façade, ground floor, upper floors and structure will be retained and reused.

Table 3: Circular Economy Design Approach for all other buildings at 330 Gray's Inn Road

	Circular Economy Adopted Design Approach: Existing Site
Building	**Hospital Extension, Ward Building, Entrance Screen Wall, Nurses Home, 1st Floor Structure Above Screen Wall, Single Storey Metal Extension, Audiology Centre**
Design Approach	Demolish and Recycle
Strategic Response	The hospital site was developed in an ad-hoc manner over the last 145 years. Consequently, many of the existing structures on site are not fit for purpose, for several reasons as outlined below. A strategy of demolish and recycle will therefore be pursued for all buildings aside from the original RNTNE Hospital building, which will be retained. **Structural Suitability of Existing Buildings** In many cases, the associated uplift in loadings required to deliver the additional use classes, as proposed, would not be possible via retention of the existing structures. Other buildings on site show limitations on the existing structural capacity of the buildings to accommodate rooftop extensions and underpinning for a connected basement (both of which are required in order for the scheme to be commercially viable). There is no record information on piles for these buildings and it is therefore difficult to assess the extent to which existing piles could be re-used. However, options for re-use of the existing piles/other foundation elements will be explored at detailed design stage as a mechanism to reduce the quantity of new concrete that will need to be brought to site **Designing for Acoustic Constraints** The Noise Assessment has identified noise pollution issues at the site. Mitigation measures will be incorporated to ensure that the proposed buildings can provide a suitable internal environment to the building users. Acoustic glazing and mechanical ventilation will be implemented as part of the mitigation measures within the proposed development, which could not be effectively incorporated if the buildings were retained. **Accessibility** Escape stairs and an external lift has been 'bolted' onto the Ward building extension to the hospital since it has been originally constructed in 1916.

	Retention of the existing buildings will result in accessibility concerns related to the provision of accessible lifts and escape stairs that are compliant with current building regulations, and to meet expectations of the commercial tenants the developer is looking to target. Notable changes to the internal arrangements of the building will be required to enable the development to be fully accessible. The proposed scheme represents the best opportunity to integrate accessibility into the buildings. **Building Fabric** If existing buildings were retained and refurbished significant additional internal thermal insulation would be required to ensure that these buildings exceed the minimum thermal performance stated in Building Regulations Approved Document Part L. Improving the existing thermal fabric raises significant risk of interstitial condensation. The existing fabric is naturally breathable, meaning water vapour moves freely through the fabric. Adding insulation will change this and internal insulation will make the wall colder which could mean water to condensate inside the wall, behind the insulation eventually leading to damp problems. The type of insulation has also been considered. Breathable materials can be used to reduce the likelihood of these problems; however, they usually have a lower thermal conductivity and a greater thickness is therefore required. This would have a strong impact on detailing and will also reduce the internal floor area. Furthermore, the external wall has existing connections to floors and walls. This increases the risk of thermal bridging as the internal insulation cannot be installed consistently; thermal bridging in existing buildings can be difficult to rectify, and interstitial condensation within the envelope may be detrimental to existing steelwork. In addition to the above, it is also worth noting that in considering the strategy for the existing site, heritage and whole life cycle carbon have been considered. **Heritage Considerations** Although the site is located within sub-area 4 of the Kings Cross Conservation Area, none of the existing buildings are listed. A Heritage Assessment was conducted for the previous planning application which identified that: • The nurses' home and main hospital building [ward building], which are prominent from street level, and identified as positive by the Council, are not of architectural interest in the view of the Heritage Consultant, and any positive contribution to the conservation area could be made as well or better by a replacement building. • The ward building, in particular, is unremarkable in its detail and much altered today. • The Princess Louise extension and ward building, while remnants from the early phases of the hospital, have been compromised in themselves and their retention would compromise the redevelopment of the Site to a degree that is disproportionate in respect of their very limited interest. • The remaining buildings on site (not listed above) have been identified as either neutral (i.e. of no particular architectural merit) or negative contributors (i.e. having a negative effect on the conservation areas' character and appearance). There is, therefore, no historic or architectural justification for retaining the buildings proposed to be demolished on site.

APPROACH FOR NEW ELEMENTS OVER THE LIFETIME OF THE DEVELOPMENT

The adopted design approach for new structures on site has been summarised within this section.

The adopted design approach to circular economy differs for the different areas of the development (see Figure 9). The approaches have been guided by the decision tree shown in Figure 10.

As noted previously, the design approaches adopted directly support the implementation of the six CE principles. Further detail on how the design approaches proposed support the implementation of the six CE principles and in particular the below principles is outlined in the relevant sub-sections below.

- Designing for Longevity
- Designing for Adaptability or Flexibility
- Designing for Disassembly

Table 4 outlines the design approaches proposed for the different building uses, alongside an explanation of why each approach has been adopted.

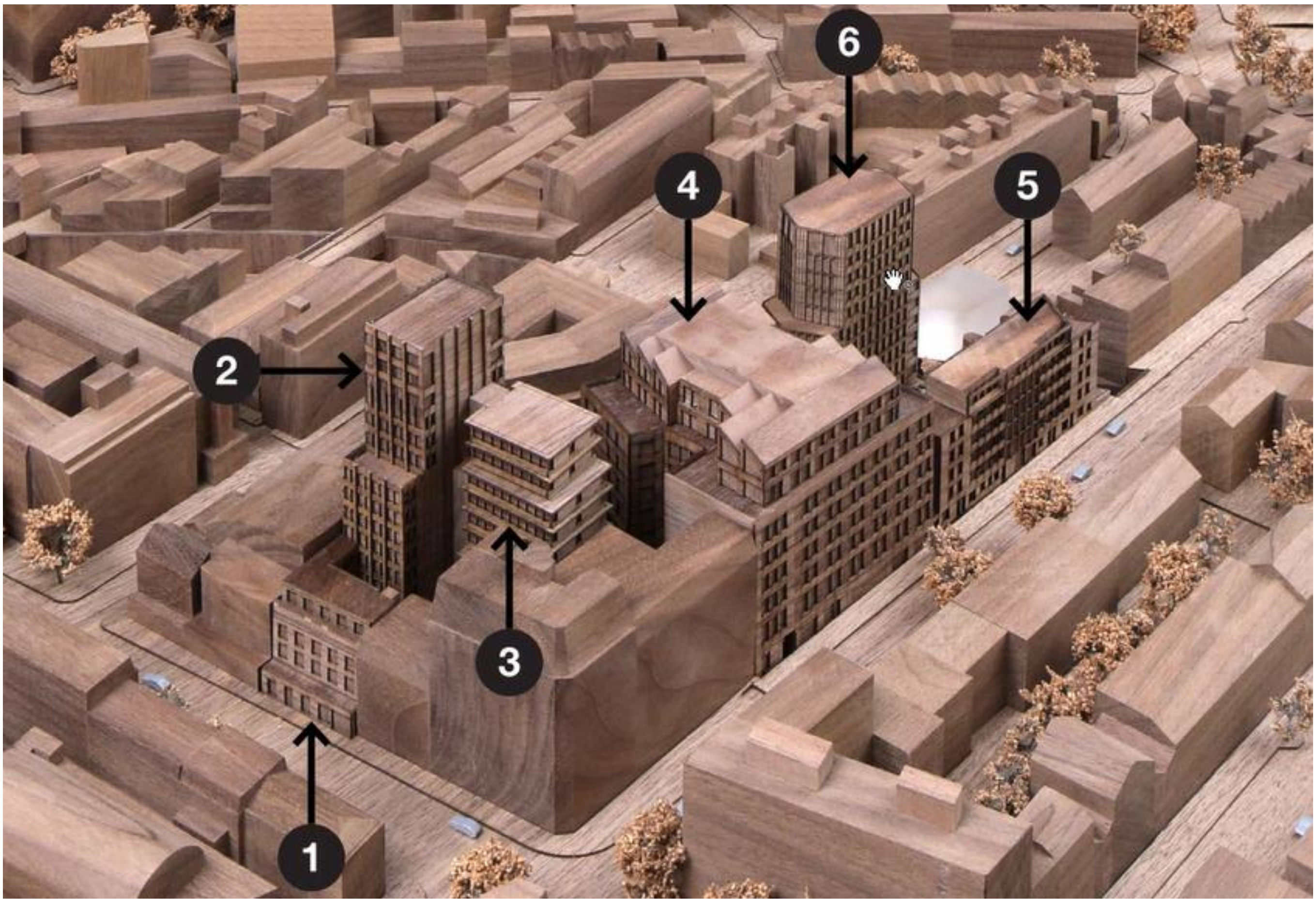


Figure 9: The blocks proposed at 330 Gray's Inn Road (1: Existing Building (hotel including hotel lobby, café and restaurant), 2 and 3: Hotel (hotel bedrooms), 4: Office, 5 and 6: Residential)

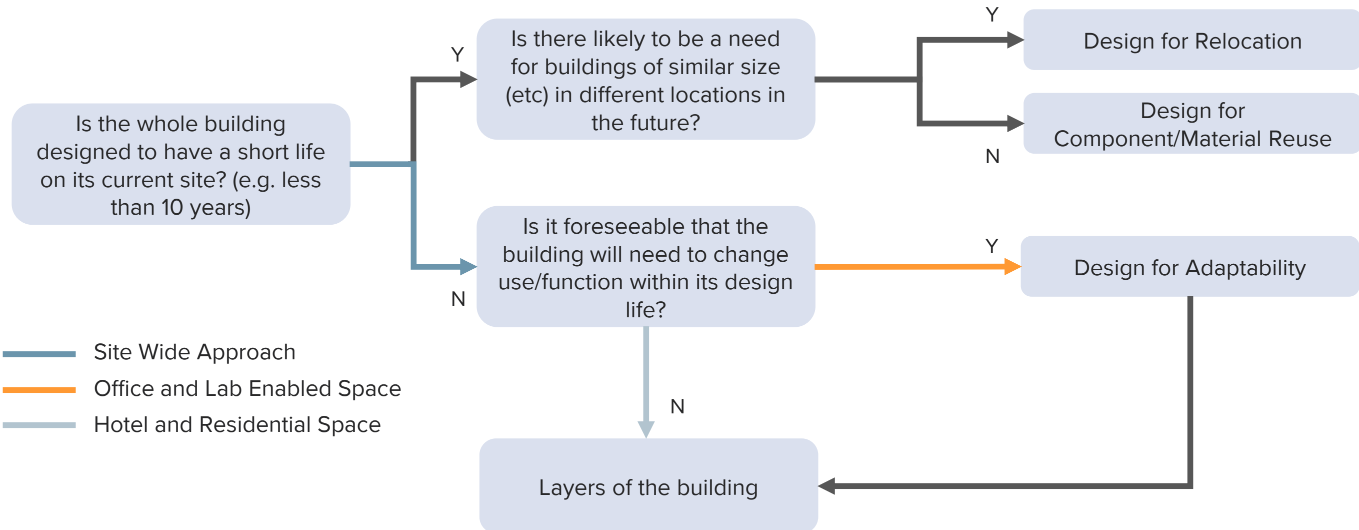


Figure 10: Circular economy decision tree for the proposed development in line with GLA CE Guidance

Table 4: Circular Economy Design Approach for the New Development at 330 Gray's Inn Road

Circular Economy Adopted Design Approach: New Development				
Building		**Hotel**	**Residential Blocks**	**Office and Laboratory Space (Located Below Residential and Office Blocks)**
Adopted Design Approach for Whole Building		Disassembly and Adaptability, Material Reuse On-Site and/or Recycling Maximised		
Adopted Design Approach for Layers	Skin/Shell	Design for Adaptability		Design for Adaptability
	Structure/Frame	Design for Adaptability		
	Services (Building)	Design for Replaceability		
	Space Plan/Interior	Design for Replaceability		
	Stuff/Contents	Design for Replaceability		
Explanation/ Supporting Narrative		These buildings have been designed with a long lifespan and therefore 'Design for Relocation' and 'Component/Material Reuse are not relevant to this development. The building's structure will be designed with an indicative design life of 50 years and the envelope with an indicative design life of 60 years. It is not foreseeable that the building will need to change use/function within its design life. In any case, certain layers of the building may require changing or upgrading within 5 – 15 years for improved performance/ aesthetics. Not all layers will require this, therefore a strategy of 'Design for Replaceability' or 'Design for Adaptability' will be adopted, depending upon the layer. For further information on how these approaches will be adopted, please refer to the relevant tables below. The building design will consider all six circular economy principles and, as part of this, will be designed to facilitate disassembly at end of life.		A significant proportion of the development will comprise office and lab enabled space. Whilst these spaces will be designed with an expected lifetime of at least 60 years, it is foreseeable that these areas will need to change use/function within their design life and to this end, will be designed with adaptability. A UDL allowance has been made for partitions meaning the partition layout can be changed in future. The partitions are non-structural so they can be removed in future if required. The spaces will be able to cater for a variety of businesses and will allow easy conversion to and from laboratory uses. As part of the revised scheme, additional lab enabled space is proposed to be located below the office block and residential blocks. This is proposed to enable the UCL Ear Institute to temporarily relocate from their current site at 332 – 336 Gray's Inn Road during the second phase of construction, to ensure the noise and vibrations created by the construction of the hotel does not impact the sensitive research being conducted. It is proposed that following construction, UCL will relocate to their current site. Whilst the future tenants of this space may require a laboratory, this is not guaranteed and therefore an approach of designing for adaptability will be taken to ensure these spaces, as well as the wider office spaces, can be easily adapted to the needs of future building occupants. It will be possible to reconfigure the UCL space to suit the needs of other occupants requiring office and/or laboratory space. Alternatively, it could be possible to convert the space into other uses if required in future, such as gym space, an events space and/or gallery space, for example. It should be noted that if a strategy of retain and refurbish were to be proposed site wide, there would be notable constraints with regards to the level of adaptability that could be offered by the development. Where in the near/medium future a new building usage is required due to potential change in building demand, there will likely to be a need of major refurbishment/re-build to meet the future use, rather than the possibility of being able to adapt to the change in use with minor adjustments, which will be more readily achieved by the proposed scheme. The reduced adaptability and flexibility of the existing buildings both create constraints in the buildings' suitability to meet the commercial expectations of non-domestic tenants.

Circular Economy Adopted Design Approach: New Development		
		The proposed scheme is considered to have notably better adaptability and longevity compared to alternative refurbishment strategies.

BUILDING IN LAYERS

Principle 1 outlines the importance of ensuring different parts of the building are accessible and can be maintained and replaced where necessary.

As far as possible, an approach of 'building in layers' will be followed. This is the approach whereby building elements and components with different lifecycles, lifespans form independent layers. These independent layers will be accessible and removable, whilst maintaining their value, where possible, to support reuse and recycling. This will ensure that those layers with shorter lifespans can be replaced without damage to layers with longer lifespans.

Figure 11 provides an outline of the different building layers and their indicative lifespans.

To support reuse and recycling, the different layers should be independent, accessible and removable whilst maintaining their value, where possible. Especially for layers that may need more frequent replacement, such as building services and internal fitouts.

Different Circular Economy design approaches will be applicable to each layer depending on its function and expected lifespan.

An approach of building in layers is proposed for the hotel, residential and office spaces at 330 Gray's Inn Road, with differing circular economy approaches proposed for each layer depending on its function and expected lifespan. In evidence of this, the following sections of the report make reference to the individual building layers when outlining the proposed CE approaches.

A summary of the building layers has been provided below[2]:

Site: The site works comprises the external works, earth works and landscaping.

Skin/Shell e.g. Façade: This layer includes the façade, as well as other exterior surfaces such as the roof, siding, sheathing and windows.

Superstructure: This comprises the load bearing elements above the plinth and includes the roof-supporting structure. Insulation and services may be embedded in the superstructure.

Services: This includes plumbing, heating, cooling, ventilation and electrics.

Space: Comprises elements that can be changed without changing the structure, services or skin, including the layout, internal walls and partitions, ceilings, floors, surface finishes, fixtures, doors and fitted furniture.

Stuff/Contents: This is essentially anything that could fall if the building was turned upside down.

Construction Materials: Temporary installations/ works, materials, packaging and equipment.

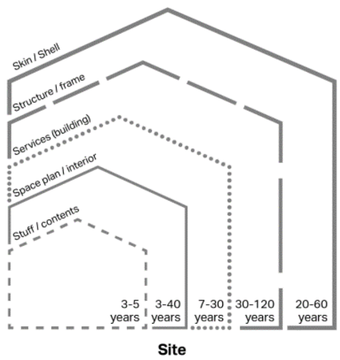


Figure 11: Building Layers. Source: GLA Circular Economy Statement Guidance (Illustrative Lifespans)

[2] Greater London Authority. (2022). London Plan Guidance: Circular Economy Statements. Available At: https://www.london.gov.uk/sites/default/files/circular_economy_statements_lpg.pdf

DESIGNING OUT WASTE

Principle 2 concerns the need to ensure waste production is planned in from project inception to completion and the importance of considering measures such as standardised components, modular build and reuse of secondary products and materials.

In addition to the principle of building in layers itself, a range of measures have been proposed to minimise the quantities of materials used within each layer.

BS EN 15978 and RICS PS set out stages in the life of a typical project, described as life-cycle modules:

- Module A1-A5: Product sourcing and construction stage
- Module B1-B7: Usage stage
- Module C1-C14: End of life stage
- Module D: Benefits and loads beyond the system boundary

Each stage addresses the principles of using resources efficiently throughout the design stages of a construction project. The aim is to plan, as far as possible, and to use available materials as efficiently as possible in order to minimise the resources used in construction.

Table 5 is focused on the product sourcing and construction stage (Module A1 – A5).

Following this, Table 5 focuses on the usage stage (Module B1 – B7) and Table 6 on the end-of life stage. Finally, benefits and loads beyond the system boundary are considered in Table 7.

Table 5: Strategies Proposed to Minimise the Quantities of Materials Over the Product Sourcing and Construction Stage (Module A1 – A5)

Building Layer	MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE
Site	**Minimising the Quantities of Materials Used** As outlined in detail in Table 3 above, it has been determined that there is no scope for retaining/reusing the majority of existing buildings on site. The existing buildings on site, with the exception of the Original RNTNE Hospital Building (1875 – 1878), will therefore be demolished. **Minimising the Quantities of Other Resources Used** The proposed development regenerates a brownfield site, helping to optimise London's limited resources. **Managing Demolition Waste** In line with the GLA's target, the demolition contractor will be required to ensure that at least 95% of all demolition waste is either recycled directly on site or processed for off-site reuse and recycling. Demolition will be guided by the pre-demolition waste audit (for further details, including estimated waste quantities, please refer to the pre-demolition waste audit submitted in support of this application). Demolition works are likely to take place in two phases: soft strip and structural demolition. Soft strip is the removal of non-structural elements, including the safe removal of asbestos within the existing building by a specialist contractor. Structural demolition includes removal of the concrete frame, and masonry. It is not anticipated that soft strip demolition works will yield any waste that can be salvaged and reused in the new building. The structural demolition works will, however, create waste streams that can be reused within the proposed scheme or recycled, in line with the GLA's target. Where possible, materials from the structural demolition works will be used within the proposed development. For example, it is proposed that reused brick and stone setts from the demolition of the existing site will be reused in the landscape design, within the railway garden. Further opportunities for reuse of materials will be explored at detailed design stage. In addition, there is potential for brickwork/concrete from the demolished buildings to be crushed on-site and reused for piling mat. This would reduce the quantity of new material that would otherwise have to be procured for this purpose. However, as highlighted in the pre-demolition audit, there are potential acoustic/air quality concerns with this approach. High value materials such as metalwork and glass will likely be segregated and graded on-site and removed by appropriately licenced contractors and recycled as far as possible. Items in good condition that are not suitable for use on site such as furniture and sanitary ware will be offered to local charities/reclamation facilities, as far as possible. Where this is not possible, these items will be broken into their constituent parts and recycled as far as possible. For further detail, please refer to the pre-demolition audit. To ensure that any potential risks are minimised whilst maximising recovery, reuse and recycling, a range of measures will be implemented including, but not limited to: • Colour coding and signposting of skips to reduce the risk of cross contamination. • Covering of skips to prevent dust and debris blowing about the site and immediate environment. • Not permitting the burning of waste or unwanted materials on-site. • Sealing and securely storing all potentially hazardous materials, including chemicals, cleaning agents, solvents and solvent containing products when not in use. • Packaging and storing food waste from the welfare facilities on-site to reduce the risk of infestation by pests or vermin.

Building Layer	MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE
	• Conducting advanced building surveys prior to commencement of the soft strip works including an asbestos and hazardous materials survey, in accordance with the Hazardous Waste Regulations and the Control of Asbestos Regulations. Where materials cannot be recycled or re-used on site, the demolition contractor will refer to the London Waste Map to consider opportunities for using local sites to manage materials and waste. The demolition contractor will contact local waste facilities following their appointment to ensure that local landfill has capacity to receive any construction or demolition waste that will not be recycled. Demolition will be guided by the pre-demolition waste audit pre-demolition requirements, waste and recycling targets and operational waste management as part of the BREEAM process. For further information on how demolition waste will be minimised, please refer to the pre-demolition waste audit developed for this site and submitted in support of this application, and Table 5 of this report. The proposed scheme will be designed to utilise materials in an efficient manner; this process will be guided by a Material Efficiency Report, which will be produced for the development's BREEAM assessment. Material efficiency measures seek to optimise the use of materials within building design, procurement, construction, maintenance and end of life; and ultimately reduce the quantities of new materials used. BREEAM requirements state that this report is a live document that is updated at each stage of the project. The proposed scheme will utilise the following measures to ensure materials are use efficiently and minimise the quantities of new materials brought to site: • Design to standard materials dimensions to reduce off-cuts; • Utilise materials with a high recycled content; • Participate in take-back schemes; • Rationalise structural design to reduce the volume of structural materials; • Avoid over specification; • Optimise foundation design; • Utilise pre-assembled / pre-fabricated elements and/or off-site manufacture where possible. For example, it is currently proposed that a pre-cast concrete parapet will be used in the retained building, with pre-cast concrete panels to the rooftop extension. Pre-cast elements are also proposed across the new buildings, including pre-cast string coursing for the office building and elements of pre-cast concrete cladding on the residential blocks. The feasibility of pre-fabricated modular bathroom pods will also be explored. The Principal Contractor will review the pre-demolition waste audit and confirm that the following information is considered prior to demolition: • The estimated quantities of concrete waste arisings; • Identification of the key refurbishment / demolition materials; • Potential applications and any related issues for the reuse and recycling of the key demolition materials in accordance with the waste hierarchy.
Substructure	**Minimising the Quantities of Materials Used** As noted previously, in many cases, the associated uplift in loadings required to deliver the additional use classes, as proposed, would not be possible via retention of the existing structures. A strategy of demolish and recycle will therefore be pursued for all buildings aside from the original RNTNE Hospital building, which will be retained. There is no record information on piles for these buildings and it is therefore difficult to assess the extent to which existing piles could be re-used. However, options for re-use of the existing piles/other foundation elements will be explored at detailed design stage as a mechanism to reduce the quantity of new concrete that will need to be brought to site

<table>
<tr><th>Building Layer</th><th>MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE</th></tr>
<tr><td></td><td>Managing Excavation Waste
In order to enable the temporary relocation of the UCL Ear Institute to a location with sufficient distance to mitigate the impact of noise and vibrations which would adversely impact the research, additional basement space is required compared to the original application.
In consultation with the Ear Institute, a spatial organisation plan has been established which reviews the technical requirements of each department specific to the need for natural daylight, and the sensitivity to noise and vibration from the neighbouring railway cutting to the East of the site.
The spaces afforded by access to natural daylight are located at the ground and lower ground floor with roof lights into the garden above and from an open glazed wall and lightwell to the East. These spaces are also less sensitive to noise and vibration and can be located closer to the railway cutting.
The laboratory and plant spaces do not need access to natural light, and therefore are located lower in the basement levels. The entire basement space is acoustically separated from ground borne noise and vibration via a set of structural acoustic bearings with the basement perimeter walls also separated from the basement wall construction.
Steps will be taken to minimise the quantity of excavation waste generated from the additional excavation required, including opportunities for excavation waste to be used on-site or in other local construction projects/for other beneficial uses. These uses will be prioritised above sending waste to landfill, with the contractor required to ensure that 95% of excavation waste is diverted from landfill and that no topsoil is sent to landfill.</td></tr>
<tr><td>Superstructure</td><td>Minimising the Quantities of Materials Used
The proposed scheme has been designed to utilise materials in an efficient manner. Material efficiency measures seek to optimise the use of materials within building design, procurement, construction, maintenance, and end of life; and ultimately reduce the quantities of new materials used. This will be considered at each stage of the project.
Building elements have been selected to minimise environmental impact. At present, a range of measures are proposed to minimise resource requirements associated with the superstructure/shell/skin of the buildings proposed and reduce the quantity of new material brought to site including, but not limited to:
Design to standard materials dimensions to reduce off-cuts;
Utilise materials with a high recycled content;
Participate in take-back schemes;
Rationalise structural design to reduce the volume of structural materials;
Avoid over specification;
Optimise foundation design;
Utilise pre-assembled / pre-fabricated elements and/or off-site manufacture.
Estimates of key construction material quantities are outlined in the attached Circular Economy Spreadsheet.

Specifying and Sourcing Responsibly and Sustainably
Several credits related to responsible sourcing of materials have been targeted within the BREEAM pre-assessment. A summary of key credits targeted has been provided below. It should be highlighted that the targeting of credits within the pre-assessment does not necessarily mean that these actions will be taken forward in the detailed design.
Mat 01: Three credits have been targeted under Mat 01 within the BREEAM pre-assessment which requires LCAs to be conducted at various stages of the design using the BREEAM simplified building tool and opportunities for reducing environmental impacts to be identified via carrying out options appraisals.
Mat 03: In line with credits under this section, all timber must be FSC of PFEC certified and all major building materials will be required to carry a responsible sourcing certificate (either BES 6001 or ISO 14001). As many materials as possible must be BES 6001 certified - as a minimum this must include all</td></tr>
</table>

<table>
<tr><th>Building Layer</th><th>MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE</th></tr>
<tr><td></td><td>insulation, concrete, stone and clay-based materials. Additionally, the design team must use a Sustainable Procurement Plan to guide specification towards sustainable construction products. BREEAM requirements state that this must guide procurement throughout the project and include the following:

o Identification of risks and opportunities against a broad range of social, environmental and economic issues.
o Aims, objectives and targets to guide sustainable procurement activities.
o A strategic assessment of sustainably sourced materials available locally and nationally.
o A policy to procure materials locally where possible.
o Procedures to check and verify that the sustainable procurement plan is being implemented and adhered to (for example setting out measurement criteria, methodology and performance indicators to assess progress and demonstrate success).

• Mat 06: This credit relates to material efficiency and requires opportunities to optimise the use of materials in building design, procurement, construction, maintenance and end of life to be identified and appropriate measures to be implemented. In line with this credit, progress against targets must be reported against.

If hazardous waste materials are identified, a specific Hazardous Waste Management Plan will be developed, ensuring that it is minimised. All hazardous waste will be dealt with in accordance with relevant policy and guidance. An Asbestos Risk Register and Control of Substances Hazardous to Health (COSHH) report will also be prepared.
To meet the GLA's requirements a minimum 20% of the building material elements (by value) are to be comprised of recycled or reused content. There is no record information on piles for these buildings and it is therefore difficult to assess the extent to which existing piles could be re-used. However, options for re-use of the existing piles/other foundation elements will be explored at detailed design stage as a mechanism to reduce the quantity of new concrete that will need to be brought to site. The use of Recycled Concrete Aggregate (RCA), Recycled Masonry (RA) and industrial by–products such has China Clay Waste has been investigated. It has been recommended that up to 15% recycled aggregate could be used in the superstructure.
In addition to the above measures, cement will be replaced with low carbon cement replacements as far as possible, with GGBS to be specified up to 50% cement replacement on average, with potential to increase this proportion as the design is developed. It should be noted that utilising cement replacement will have an impact on structural loads and concrete curing time and, therefore, may not be suitable in every application.</td></tr>
<tr><td>Shell/skin</td><td>As per Superstructure
Minimising the Quantities of Other Resources Used
A 'fabric first' approach has been considered to reduce the energy demand and CO_2 emissions, with all elements targeting an improvement upon the Part L 2021 minimum standards using SAP10 carbon factors. For further information please refer to accompanying Energy Statement produced by XCO2 and submitted in support of this application.</td></tr>
<tr><td>Services</td><td>Minimising the Quantities of Other Resources Used
Operational energy use will be reduced as far as possible by implementing a 'fabric first' approach in line with the energy hierarchy. As part of the BREEAM pre-assessment, credit Ene 04.3 'Low and Zero Carbon Technologies' has been targeted which will involve an energy assessor completing a LZC feasibility study to establish the most appropriate energy sources for the development. It is currently proposed that the development will be low carbon, with heating, cooling and hot water to be provided by a hybrid system composed of Air Source Heat Pumps and Electric Boilers. In addition, PV is proposed on available roof space.
The proposed development will use water efficient fixtures and fittings to reduce water consumption. The development. is targeting potable water reduction equivalent to a 12.5% reduction compared to the BREEAM 'baseline' for credit Wat 01 for non-domestic uses and water consumption of less than 105 litres</td></tr>
</table>

<table>
<tr><th>Building Layer</th><th>MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE</th></tr>
<tr><td></td><td>per person per day for domestic uses in line with Policy SI 5 of the London Plan 2021. Further water-saving measure include installation of pulsed water meters and a building-wide water leak detection system.

The mechanical design will incorporate fittings to minimise operational water use whilst leak detection will be incorporated to the incoming water main.</td></tr>
<tr><td>Space</td><td>Minimising the Quantities of Materials Used

Measures are proposed to mitigate the impacts associated with the interior layout. Standard size materials will be used where possible as these are able to accommodate multiple uses, reuse and upgrading. Furthermore, standard types of connections will be used as these can be separated and reused more easily.

It is highly likely that modular elements will be included, although the full extent of these will be developed further at the next stage of design. For example, it is currently proposed that a pre-cast concrete parapet will be used in the retained building, with pre-cast concrete panels to the rooftop extension. Pre-cast elements are also proposed across the new buildings, including pre-cast string coursing for the office building and elements of pre-cast concrete cladding on the residential blocks. The feasibility of pre-fabricated modular bathroom pods will also be explored.

Modularity allows elements to be slotted together or taken apart to promote disassembly and flexible environments, as well as reducing construction waste. The feasibility of inclusion of modular elements will be evaluated post planning.</td></tr>
<tr><td>Stuff</td><td>Minimising the Quantities of Materials Used

Speculative finishes will be minimised and limited to reception/show areas or pre-agreed with tenants to avoid the installation of finishes that could be removed by future tenants. In the case of the UCL lab, equipment from the existing facility will be moved to the new facility to reduce the amount of new equipment associated with the proposed development.</td></tr>
<tr><td>Construction</td><td>Minimising the Quantities of Other Resources Used

During the construction stage the contractor will be required to set targets for energy and water use and to ensure measures are in place to minimise consumption of these resources, including:

• Use of alternatives to diesel / petrol powered equipment where possible;
• Incorporation of sources of renewable energy, to offset the use of main utilities;
• Selection and specification of energy efficient plant and equipment wherever viable; and
• Implementation of staff-based initiatives such as turning off plant and equipment when not in use, both onsite and within site offices.

Use of temporary site accommodation will be minimised as far as possible. Temporary cabins will be used while ground works and during construction of the reinforced concrete frame only. However, once the ground floor is complete site offices will be moved into this area.

Minimising the Quantities of Materials Used

Measures will be taken by the main contractor to reduce the amount of packaging used and to coordinate deliveries. This will include agreements with material suppliers to reduce the amount of packaging, to use reusable packaging or to participate in a packaging take-back scheme (e.g. bricks delivered on recycled pallets) and the implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which would increase the risk of their damage and disposal as waste. In addition, particular attention will be paid to material quantity requirements, to avoid over-ordering and generation of waste materials.

Managing Construction Waste

A Site Waste Management Plan will be produced on appointment of the Principal Contractor and prior to commencement of construction works on site. Within the SWMP, targets for total construction waste generation will be set. The Principal Contractor will be responsible for ensuring the SWMP is reviewed and updated accordingly at regular intervals, with progress against the targets monitored throughout the construction phase.</td></tr>
</table>

Building Layer	MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE
	In addition to the measures previously outlined within this report, the following measures will be investigated to facilitate the minimisation of waste generation: • Reusing the material on site; • Reusing the material on other sites; • Community reuse and recycling; • Salvaging or reclaiming the material for reuse; • Returning the material to the supplier via a 'take-back' scheme. At least 95% of construction waste will be reused, returned to supplier for recycling and/or recycled (i.e. diverted from landfill). In accordance with GLA requirements, the demolition and construction contractor will be required to maximise the proportion of recycled materials, including reclaimed aggregates. Although the vast majority of construction and deconstruction waste will be recycled, some waste will be sent to landfill. Construction waste will be separated into recyclable waste streams before removal from site for reuse or disposal. The disposal of all waste or other materials removed from the site will be in accordance with the requirements of the Environment Agency (EA), Control of Pollution Act 1974 (COPA), Environment Act 1995, Special Waste Regulations 1996 and the Duty of Care Regulations 2003. Where materials cannot be recycled or re-used on site, the contractor will aim to identify opportunities for potential re-use of materials off-site.
Summary	To meet GLA requirements, the proposed development is targeting the below reuse/recycling rates: • > 95% of demolition waste to be recycled; • > 95% excavation waste to be recycled; • > 95% of construction waste to be recycled; • > 20% recycled or reused content of building material elements. Measures to contribute to these reductions in waste to landfill include: • Reuse of materials from the demolition of the existing buildings in the landscape design. • Crushing of brickwork/concrete from the demolished buildings for reuse as piling mat, if found to be acceptable from an acoustic/air quality perspective. • Use of material efficiency measures to reduce the quantity of new materials procured including re-use of materials wherever feasible, segregation of waste at source where practical and re-use and recycling of materials off-site, where re-use on-site is not practical (e.g., through use of an offsite waste segregation facility and re-sale for direct re-use or re-processing). • A minimum of 20% of building material elements to be comprised of reused or recycled content. • Up to 50% GGBS replacement to be used in concrete (subject to further calculations and availability). • Construction waste generation target of 6.5t/100m^2 • Monitoring of energy and water use during construction • Standard window sizing with few different window types proposed across facades • Lightweight metal stud partition walls • Efficient building form • Common repeating details, including repetitive floor template to aid standardised construction and help to minimise construction waste. • Optimised column spacing • Production of a Site Waste Management Plan, which will be prepared in due course.

Building Layer	MODULE A1-A5 – PRODUCT SOURCING AND CONSTRUCTION STAGE
Challenges	To be reviewed and updated at the next project stage once a contractor has been appointed. Ground Investigation Report results Limited availability of manufacturers with certificates
Counter actions	To be reviewed and updated at the next project stage once a contractor has been appointed.
Plan to prove and quantify	• Pre Demolition Report • Site Waste Management Plan • Whole Life Cycle Assessment The following reports/information will be produced if credits targeted in the BREEAM Pre-Assessment are taken forward: • Mat 06 Material Efficiency Report • Mat 03.1 Sustainable Procurement Plan • Mat 03.2 Measuring Responsible Souring – Copies of EMS/BES etc Certificates • Ene 04.3 Low and Zero Carbon Technologies Report • Wst 01.2 Construction Resource Efficiency In addition, the following reports/information should be referenced: • Architectural Stage 2/3 information • Structural Stage 2/3 information • MEP Stage 2/3 information

Table 6: Strategies Proposed to Minimise the Quantities of Resources Using During Usage (Module B1 - B7)

Building Layer	MODULE B1 – B7 – USE STAGE
Site	
Substructure	The structural design of the hotel will allow for reconfiguration of the internal environment to accommodate changes in working practices and business models; for example, by allowing front of house areas to be reconfigured, and multiple smaller rooms to be combined into larger rooms. The design of the services within the proposed scheme considers accessibility to local services, such as local power and data infrastructure. This will allow for ease of maintenance as well as the potential to upgrade these services more easily at a future date if required. A significant proportion of the development will comprise office and lab enabled space. These spaces will be situated within the office block and in the basement areas below the office block and residential blocks. Whilst these spaces will be designed with an expected lifetime of at least 60 years, it is foreseeable that these areas will need to change use/function within their design life and to this end, in order to minimise the quantities of materials used during the usage stage, these spaces will be able to cater for a variety of businesses and will allow for easy conversion to and from laboratory uses. For example, an allowance is included in the building services design to ensure spaces can be adapted for lab use, larger floor to ceiling heights are proposed to accommodate the needs of laboratory machines and increased vibration resilience of the structure is proposed for sensitive equipment. If lab space is not required in future, it will be possible to reconfigure the UCL space to suit the needs of other occupants requiring office and alternative space. Alternatively, it could be possible to convert the space into other uses if required in future, such as gym space, an events space and/or gallery space, for example.
Superstructure	

<table>
<tr><th>Building Layer</th><th>MODULE B1 – B7 – USE STAGE</th></tr>
<tr><td></td><td></td></tr>
<tr><td>Shell/skin</td><td>As outlined in the accompanying Energy Strategy, the proposed development aims to reduce the energy demand by implementing the GLA Energy Hierarchy:

• Be Lean - Use less energy
• Be Clean - Supply energy efficiently
• Be Green - Use renewable energy
• Be Seen - Energy monitoring</td></tr>
<tr><td>Services</td><td>The proposed development will use water efficient fixtures and fittings to reduce water consumption. The development. is targeting potable water reduction equivalent to a 12.5% reduction compared to the BREEAM ‘baseline’ for credit Wat 01 in line with Policy SI 5 of the London Plan 2021. Sanitary fittings within each commercial unit will largely specified and installed by the prospective tenants. However, where sanitary fittings are to be specified by the developer/landlord, water efficient fittings will be included.

The mechanical design will incorporate fittings to minimize operational water use whilst leak detection will be incorporated to the incoming water main.

Flow control devices will be required to be installed to each WC zone within the development, as required to meet the requirements set out in Wat 02 Water Monitoring and Wat 03.1 Water leak Detection, provided these credits are carried forward in detailed design stage.

The design team will identify all unregulated water demands that could be realistically mitigated or reduced. Through either good practice design or specification, a meaningful reduction in the total water demand of the building will be made.

As noted previously, where possible, and the complexity and scale of the project must be considered here, building elements and components with different lifespans will form independent layers. This will ensure those layers with shorter lifespans can be replaced without damage to layers which have longer lifespans. This will include the following principal layers:

• Structure: Foundation and load-bearing elements
• Skin: Exterior surfaces
• Services
• Space: The interior layout
• Stuff: Furnishings and carpets

The design of the services within the proposed scheme considers accessibility to local services, such as local power and data infrastructure. This will allow for ease of maintenance as well as the potential to upgrade these services more easily at a future date if required. It will be possible to remove and replace all major items of plant without needed to demolish sections of wall or floor. Lifting beams and hoists will be incorporated into the design where necessary.

As part of the BREEAM pre-assessment credit Man04.4 was targeted. If this credit is taken forward, a non-technical Building User Guide shall be provided which will include information on the building and its environmental strategy, e.g. energy, overheating, water or waste efficiency policy or strategy, and how users should engage with and deliver the policy or strategy.</td></tr>
<tr><td>Space</td><td></td></tr>
<tr><td>Stuff</td><td>Managing Municipal Waste

An Operational Waste Management Plan (OWMP) has been developed for the site, which includes full details of the proposed management strategy for operational waste.

Separate waste storage areas will be provided for each building use (office and lab, hotel and residential). The waste stores are marked up on the plans below. Each bin store will include separate bins for the collection of dry mixed recyclables (paper, mixed plastics, metals, glass etc.) and general waste. The residential and hotel waste stores will include food bins to support the separate collection of food waste, prior to collection for composting. Further separation of waste streams could be accommodated in the future if required.</td></tr>
</table>

Building Layer	MODULE B1 – B7 – USE STAGE
	All waste stores will be easily accessible to both building users and FM teams. The bins proposed to be provided within each store are outlined below, alongside expected collection frequency. The proposed storage capacities will be reviewed at detailed design stage and all waste storage will be sized in accordance with local planning policy and BREEAM requirements. **Hospital/Office/Lab Enabled/Gym Waste** • 7 x 1,280 L mixed recycling bin collected weekly. • 4 x 1,280 L general waste bin collected weekly. • 3 x 500 L food waste bins collected weekly. Additional storage provision has also been made for the lab-enabled space inclusive of 12 m^2 chemical waste store and 12 m^2 clinical waste store. **Block A Residential Waste** • 2 x 1,280 L mixed recycling bin, collected twice per week. • 1 x 1280 L general waste bin collected twice per week. • 1 x 500 L food waste bin collected twice per week. • 7 m^3 other waste collection, twice per week (bulky waste, electricals and textiles). **Block B Residential Waste** • 2 x 1,280 L mixed recycling bin, collected twice per week. • 2 x 1280 L general waste bin collected twice per week. • 1 x 500 L food waste bin collected twice per week. • 10 m^3 other waste collection, twice per week (bulky waste, electricals and textiles). **Hotel Waste** • 2 x 1,280 L mixed recycling bin, collected twice per week. • 2 x 1280 L general waste bin collected twice per week. • 7 x 500 L food waste bin collected twice per week. The applicant is committed to achieving the municipal waste recycling target of 65% by 2030, as stipulated in Policy SI 7 of the Publication London Plan. The bin capacity for the hotel and office and lab spaces has been sized to enable future commercial tenants to achieve the Mayor's target for 75% of non-household waste to be recycled by 2030. The bin capacity for the residential spaces has been sized to enable future tenants to achieve the Mayor's target for 65% of municipal waste to be recycled 2030. For further information, please refer to the Operational Waste Management Plan submitted in support of this application. It should be noted that further measures for managing and reducing operational waste will be explored in more detail at the next design stage; these are dependent on the Local Authority recycling strategy and the waste contractors appointed by future tenants. A Delivery Servicing Management Plan has been produced which will ensure that waste can be removed in a safe, efficient and sustainable way.

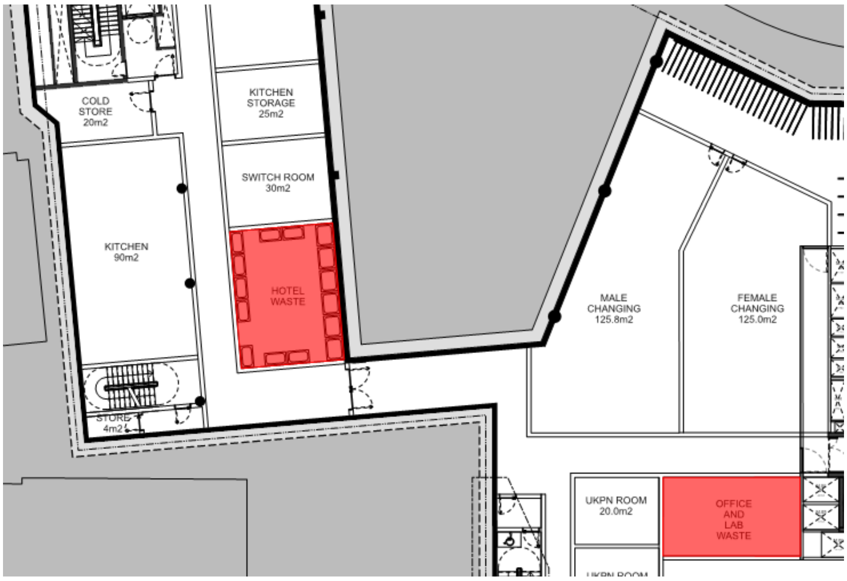


Figure 12: Hotel, Office and Lab Waste Stores

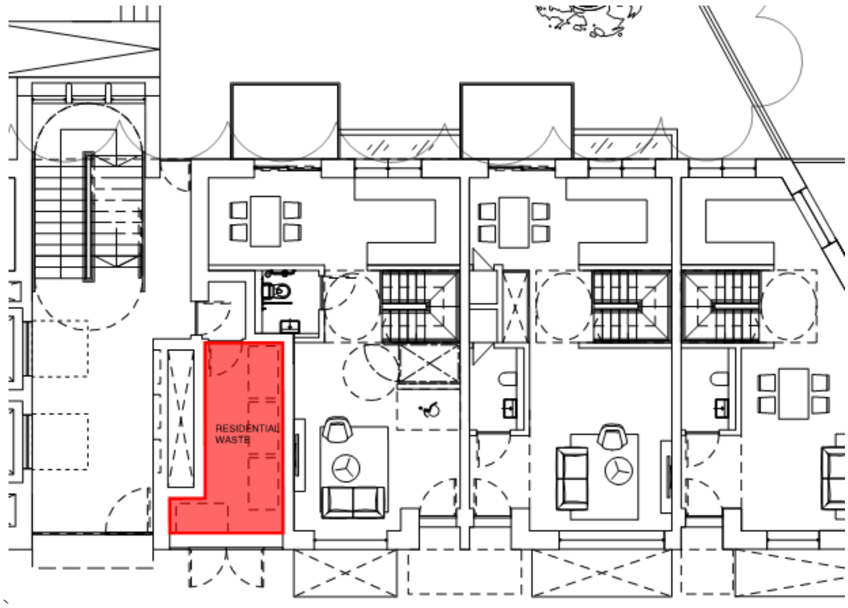


Figure 13: Block 5 Residential Waste Store

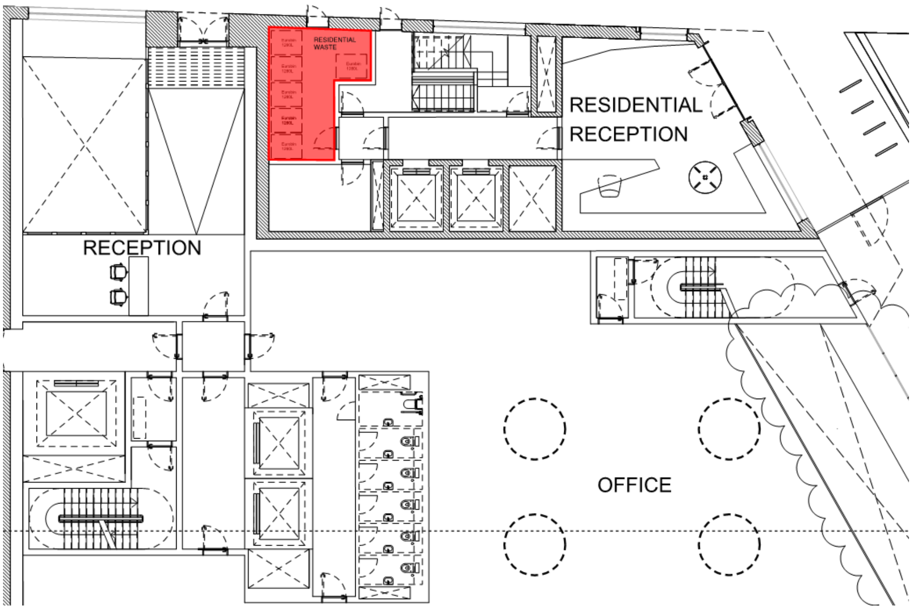
<table>
<tr><th>Building Layer</th><th>MODULE B1 – B7 – USE STAGE</th></tr>
<tr><td></td><td>


Figure 14: Block 6 Residential Waste Store

The principal contractor will follow the ‘Mayor’s Business Waste Management Strategy’ in order to reduce the amount of waste generated.

A Building User Guide will be produced for each block. The detail to be included within this with respect to operational waste recycling will be explored in further detail during the detailed design stage and may include:

How occupants across the site will be helped to access and use deposit points to reduce, reuse and recycle as much as possible;
How, when and where occupiers should store and deposit recyclables and dispose of waste; what resources;
Information which will be made available (e.g. clear signage, printed and online noticeboards, in-home storage, resident induction) and how the sharing and reuse of materials could be promoted.

</td></tr>
<tr><td>Construction</td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Summary</td><td>
The structural design of the hotel will allow for reconfiguration of the internal environment to accommodate changes in working practices and business models; for example.

Where possible, building elements and components with different lifespans will form independent layers. This will ensure those layers with shorter lifespans can be replaced without damage to layers which have longer lifespans.

In the design and specification of building services, measures have been taken to reduce energy and water consumption.

The bin capacity for the hotel and office and lab spaces has been sized to enable future commercial tenants to achieve the Mayor’s target for 75% of non-household waste to be recycled by 2030. The bin capacity for the residential spaces has been sized to enable future tenants to achieve the Mayor’s target for 65% of municipal waste to be recycled 2030.
</td></tr>
<tr><td>Challenges</td><td>To be reviewed and updated at the next project stage once a contractor has been appointed.</td></tr>
<tr><td>Counter actions</td><td>To be reviewed and updated at the next project stage once a contractor has been appointed.</td></tr>
</table>

Building Layer	MODULE B1 – B7 – USE STAGE
Plan to prove and quantify	The following reports/information will be produced if credits targeted in the BREEAM Pre-Assessment are taken forward: • Man 04.4 Building User Guide • Wst 03 Operational Waste Management Strategy (to be prepared in line with the hotel operator's waste management policy.) In addition, the following action will be taken: • Operational energy and water targets will be implemented; • The contractor will appoint nominated individual to monitor construction energy and water use; • A Plant Replacement Strategy will be developed and implemented; • The Servicing and Delivery Management Plan will be implemented.

Table 7: Strategies Proposed to Minimise Waste at the End of Life Stage (Module C1 – C4)

Building Layer	MODULE C1-C4 – END OF LIFE STAGE
Site	
Substructure	The proposed development has been designed for repurpose and independent replacement of individual elements, due to their design life periods, as the majority of building elements have a service life < 60 years and will be replaced at least once over the building's lifespan. An approach of 'building in layers' is proposed to ensure that layers with shorter lifespans can be replaced without damage to layers which have longer life spans. The following principles will be implemented in order to ensure materials can be recovered in as high a value state as possible at end of life: • Durability • Design for Disassembly • Material Passports • Layer Independence • Standardisation
Superstructure	
Shell/skin	
Services	
Space	
Stuff	
Construction	
Summary	The building's structure will be designed with an indicative design life of 50 years. The building's envelope will be designed for a minimum 60 years for the finished primary cladding system and 30 years for secondary components. However, it is anticipated that the building's lifespan will greatly exceed 60 years.
Challenges	To be reviewed and updated at the next project stage once a contractor has been appointed.
Counter actions	To be reviewed and updated at the next project stage once a contractor has been appointed.
Plan to prove and quantify	Whole Life Carbon Assessment

Table 8: Consideration of Benefits and Loads Beyond the System Boundary for the Proposed Development

Building Layer	MODULE D - BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Site	
Substructure	

<table>
<tr><th>Building Layer</th><th>MODULE D - BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY</th></tr>
<tr><td>Superstructure</td><td rowspan="5">Regarding secondary materials, secondary fuels or secondary products resulting from reuse, recycling and energy recovery that take place beyond the system boundary for both products and buildings are addressed in the Whole life Carbon assessment.

It is important to highlight the potential role of ‘Material Passports’. Material Passports (MP) are (digital) sets of data describing defined characteristics of materials and components in products and systems that give them value of present use, recovery, and reuse[3].

Material passports are generally agreed to include some or all of the following categories of material and product information types:

• Physical, chemical, and biological Properties
• Material health (including VOC content)
• Unique product and system identifiers
• Design and production information
• Transportation and logistics
• Construction methods
• Use and operate phase
• Disassembly and reversibility methods
• Reuse and recycling information

The Applicant and design team fully support the concept of material passports. However, at the time of writing there is no standardised methodology for implementing materials passports, although work is currently being done in this field.

The possibility of utilising material passports will be investigated further at the next design stage; it may, for example, be possible to capture and store information about key building elements, to facilitate future reuse at end of life. This will depend largely on whether BIM will be implemented from Stage 4 onwards and whether an as-built model will be a key deliverable for the main contractor. This has not yet been determined by the client.

It is widely agreed that BIM is required in order to be able to implement materials passports, due to the data management processes needed to ensure this information is stored correctly and in a usable format.</td></tr>
<tr><td>Shell/skin</td></tr>
<tr><td>Services</td></tr>
<tr><td>Space</td></tr>
<tr><td>Stuff</td></tr>
<tr><td>Construction</td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Summary</td><td>The WLC makes it possible to quantify the reuse, recovery and recycling potential of a building or product.</td></tr>
<tr><td>Challenges</td><td>To be reviewed and updated at the next project stage once a contractor has been appointed.</td></tr>
<tr><td>Counter actions</td><td>To be reviewed and updated at the next project stage once a contractor has been appointed.</td></tr>
<tr><td>Plan to prove and quantify</td><td>Whole Life Carbon Assessment</td></tr>
</table>

[3] ‘Materials Passports – Best Practice’, 2019, Heinrich and Lang

DESIGNING FOR LONGEVITY

This section outlines strategies that will be employed in line with Principle 3, Designing for Longevity.

Designing for longevity is focused on design to avoid a premature end of life for all components through consideration of maintenance and durability.

Table 9 below outlines strategies that will be employed in line with the principle of designing for longevity. **Error! Reference source not found.** outlines the a pproaches proposed to designing for longevity across the different building layers (where applicable).

Table 9: Proposed Approaches to Designing for Longevity Across Building Layers

Building Layer	DESIGN FOR LONGEVITY
Site	The project has been designed to accommodate/mitigate the effects of climate change; a flood risk assessment has been carried out to determine current and future flood risk (including an allowance for climate change). On-site attenuation has been designed to accommodate increased surface water run-off resulting from climate change. The development will be designed to mitigate the risk of overheating resulting from climate change. Durable materials will be specified in all areas that are subject to high pedestrian movement, and/or trolley/vehicle movement. This will extend the lifespan building materials, in particular those that are exposed, thereby reducing the need for replacement over the building's lifecycle.
Substructure	The proposed scheme has been designed to adapt to and mitigate the effects of climate change, specifically in terms of overheating, flood risks and changing weather patterns. For example, the basement has been designed to allow for future changes in groundwater level and the structure has been designed for greater wind speeds and snow loading to account for climate change. To mitigate the effects of climate change and resulting overheating risks, the development has followed the cooling hierarchy principles as a means of reducing the amount of solar and internal gains as a first step to maintaining comfortable internal temperatures. Please refer to the Overheating Assessment appended to the Energy Statement for further detail. Provided the BREEAM Wst 05 credit, is targeted as outlined in the pre-assessment, an Adaptation to Climate Change report will be produced to reduce the need for future adaptation, maintenance and disruption associated with responding to climate change and extreme weather events. The exposed parts of the building will be protected from material degradation. As part of BREEAM credit Mat 05 Designing for durability and resilience, key exposed building elements will be identified, and protection measures will be implemented in the design to limit degradation due environmental factors. Measures are to be implemented to protect finishes internally and externally.
Superstructure	
Shell/skin	
Services	A plant replacement strategy has been developed to ensure that building services equipment can be replaced when required (at end of life) without damage to building fabric or structure. It will be possible to remove and replace all major items of plant without needed to demolish sections of wall or floor. Lifting beams and hoists will be incorporated into the design where necessary. Plant will be located either externally (e.g., condenser units) or within the ground floor plant room. The plant rooms will be accessible. It will be possible to disassemble larger items of plant – for example the water tank, which will be installed in sections.
Space	The surface materials shall be designed to be durable and easy to maintain, particularly for areas that will be subjected to high levels of occupant movement, for example communal corridors in the hotel block will be commercial grade, with hard wearing coverings, and core areas/circulation areas and entrance areas of the office blocks will be robust and hard wearing. Further consideration will be given to durability in the detailed specification. Beyond this, measures are to be implemented to protect finishes internally and externally.
Stuff	Speculative finishes will be minimised and limited to reception/show areas or pre-agreed with tenants to avoid the installation of finishes that could be removed by future tenants.

Building Layer	DESIGN FOR LONGEVITY
Construction	
Summary	The building will be designed to avoid a premature end of life for all components. Minimising speculative finishes and limiting these to reception/show areas unless pre-agreed with tenants to avoid the installation of finishes that could be removed by future tenants. Where finishes are specified, durability will be considered. Designing for climate change scenarios
Challenges	To be reviewed and updated at the next project stage once a contractor has been appointed.
Counter actions	To be reviewed and updated at the next project stage once a contractor has been appointed.
Plan to prove and quantify	Wst 05 Adaptation to Climate Change Report Implementing Overheating, Flood Risk Assessment Drainage Strategy recommendations Plant Replacement Strategy

DESIGNING FOR ADAPTABILITY OR FLEXIBILITY

This section outlines strategies that will be employed in line with Principle 4, Designing for Adaptability or Flexibility.

According to GLA guidance, Designing for Adaptability is defined as "a building that has been designed with thought of how it might be easily altered to prolong its life, for instance by alteration, addition or contraction, to suit new uses or patterns or use."

Designing for Flexibility is defined as "a building that has been designed to allow easy rearrangement of its internal fit-out and arrangement to suit the changing needs of occupant". The terms are often used interchangeably however, adaptability refers more to structural changes, whilst flexibility often relates to floor plates. Table 10 outlines the different approaches proposed for designing for adaptability or flexibility, across each building layer.

Table 10: Proposed Approaches to Designing for Adaptability or Flexibility Across Building Layers

Building Layer	DESIGN FOR ADAPTABILITY OR FLEXIBILITY
Site	The retention of all existing buildings at this site would likely pose a notable constraint with regards to the level of adaptability and flexibility that could be offered by the development. Where in the near/medium future a new building usage is required due to potential change in building demand, there will likely to be a need of major refurbishment/re-build to meet the future use, rather than the possibility of being able to adapt to the change in use with minor adjustments, which could be more readily achieved by the proposed scheme. The reduced adaptability and flexibility of the existing buildings both create constraints in the buildings' suitability to meet the commercial expectations of non-domestic tenants. The proposed scheme is considered to have notably better adaptability and flexibility compared to alternative refurbishment strategies.
Substructure	
Superstructure	The proposed scheme has been designed from the outset to serve multiple purposes, considering functional adaptability throughout the design stages.
Shell/skin	
Services	It will be possible to remove and replace major items of plant without needed to demolish sections of wall or floor. Local services will be adaptable to a range of uses.
Space	The structural design of the hotel will allow for reconfiguration of the internal environment to accommodate changes in working practices and business models; for example, by allowing front of house areas to be reconfigured, and multiple smaller rooms to be combined into larger rooms in the hotel block. The office accommodation is designed to be flexible and provide for a range of businesses and tenancy types. The office areas are large and open plan, organised around a central core, allowing the floorplate to be easily divided into one-, two-, three- or four-way splits (depending on the level). The design of the laboratory spaces will allow for easy conversion to and from laboratory uses. Recommendations or solutions based on the study during or prior to Concept Design, that aim to enable and facilitate disassembly and functional adaptation are to be developed. It is currently proposed that a UDL allowance will be made for partitions meaning the partition layout can be changed in future and partitions will be non-structural in at least selected areas of the site so that they can be removed in future if required.
Stuff	
Construction	Circular economy measures will be reviewed during construction to ensure that recommendations are implemented.
Summary	The building will be designed to be flexible and adaptable to multiple uses.

Building Layer	DESIGN FOR ADAPTABILITY OR FLEXIBILITY
Challenges	To be reviewed and updated at the next project stage once a contractor has been appointed.
Counter actions	To be reviewed and updated at the next project stage once a contractor has been appointed.
Plan to prove and quantify	Plant Replacement Strategy BREEAM Design for Functional Adaptability and Disassembly Report

DESIGNING FOR DISASSEMBLY

This section outlines strategies that will be employed in line with Principle 5, Designing for Disassembly.

According to GLA guidance, designing for Disassembly is defined as "[designing a building] to allow the building and its components to be taken apart with minimal damage to facilitate reuse or recycling". It is noted that if designed well, it should be possible to replace any component of a building.

Ease of disassembly is facilitated by principles allowing the building or parts of the building to be disassembled at the end of its life, or to be renovated rather than demolished, with individual components being used for other purposes. Table 11 outlines the different approaches proposed to design for disassembly across the different building layers.

Table 11: Proposed Approaches to Designing for Disassembly Across Building Layers

Building Layer	DESIGN FOR DISASSEMBLY
Site	
Substructure	The proposed development has been designed for repurpose and independent replacement of individual elements, based on their design life periods as the majority of building elements have a service life < 60 years and will be replaced at least once over the building's lifespan. As noted previously, an approach of 'building in layers' is proposed to ensure that layers with shorter lifespans can be replaced without damage to layers which have longer life spans. Modularity allows elements to be slotted together or taken apart to promote disassembly. The feasibility of inclusion of modular elements will be evaluated post planning. Local services will be adaptable to a range of uses. Components and products will be designed and selected to allow for disassembly and reuse at the end of their useful life. Building Information will be stored to facilitate end of life strategy, disassembly, future reuse, waste avoidance, and waste reduction. Exposed and reversible connections will be utilised where possible to facilitate disassembly and ensure materials can be recovered in a high value state. Mechanical fixings will be prioritised over welded/chemical fixings to assist with deconstruction. Components and products will be designed and selected to allow for disassembly and reuse at the end of their useful life. Building Information will be stored to facilitate end of life strategy, disassembly, future reuse, waste avoidance, and waste reduction. It will be possible for materials to be recovered at the end of the buildings life including copper piping and wiring and all metal work. The project team will produce a Disassembly Guide summarising the measures that have been implemented to assist with disassembly at end of life. A Façade Replacement Strategy will also be produced to assist with removal and replacement of façade modules. It is highly likely that modular elements will be included, although the full extent of these will be developed further at the next stage of design. At present, it is likely that the office and hotel facades will utilise a unitised system of pre-fabricated elements. It also may be possible to use pre-fabricated modular bathroom pods. Modularity allows elements to be slotted together or taken apart to promote disassembly and flexible environments, as well as reducing construction waste. The feasibility of inclusion of modular elements will be evaluated post planning.
Superstructure	
Shell/skin	
Services	
Space	The key challenge to implementing design for disassembly and reuse relates to specific requirements for the fit out. This will be considered and addressed as the project progresses. The ease of disassembly and the functional adaptation potential of different design scenarios will be explored by the end of Concept Design. Recommendations will be made and solutions developed based on the study carried out during Concept Design, that will aim to enable and facilitate disassembly.
Stuff	
Construction	

Building Layer	DESIGN FOR DISASSEMBLY
Summary	The building will be designed to allow for disassembly.
Challenges	To be reviewed and updated at the next project stage once a contractor has been appointed.
Counter-actions	To be reviewed and updated at the next project stage once a contractor has been appointed.
Plan to prove and quantify	Architectural Specifications and Drawings Disassembly Guide Façade Replacement Strategy

END-OF-LIFE STRATEGY

This section describes the strategy for how the proposed scheme's design and construction will reduce material demands and enable building materials, components, and products to be disassembled and reused at the end of their useful life.

The proposed development has been designed for repurpose and independent replacement of individual elements, based on their design life periods.

The building has been designed with a long lifespan and therefore 'Design for Relocation' and 'Component/Material Reuse is not as relevant to this project. The building will be designed with an indicative design life of at least 60 years and it is not foreseeable that the building will need to change use/function within its design life. However, in the event that it does, the reinforced concrete structural frame will allow for adaptability and future retrofit/change of use due to open plan footprint, and would lend itself to other building uses such as offices or student accommodation for example. Information on the adaptability of the structure will be included within the Building User Guide. The following principles will be implemented in order to ensure materials can be recovered in as high a value state as possible at end of life.

DURABILITY

Durable materials will be specified in all areas that are subject to high pedestrian movement, and/or trolley/vehicle movement. This will extend the lifespan building materials, in particular those that are exposed, thereby reducing the need for replacement over the building's lifecycle.

This will be covered further in the Design for Durability and Resilience Report which has been produced in line with BREEAM requirements.

DESIGN FOR DISASSEMBLY

As noted previously, components and products will be designed and selected to allow for disassembly and reuse at the end of their useful life. Building Information will be stored to facilitate end of life strategy, disassembly, future reuse, waste avoidance, and waste reduction.

The key challenge to implementing design for disassembly and reuse relates to specific requirements for the fit out. This will be considered and addressed as the project progresses.

Ease of disassembly is facilitated by principles allowing the building or parts of the building to be disassembled at the end of its life, or to be renovated rather than demolished, with individual components being used for other purposes.

A range of measures will be considered in line with the principle of designing for disassembly including:

- Use of exposed and reversible connections where possible to facilitate disassembly and ensure materials can be recovered in a high value state.
- Use of standardised products and/or modular systems, where possible.
- Use of durable materials, as outlined previously.

The feasibility of recovering and reusing building elements at end of life will be explored at the next design stage. For example, it may be possible for materials to be reclaimed and reused directly in future projects. If this is not possible, material could be crushed and re-used as aggregate for future projects.

MATERIAL PASSPORTS

Material passports (MP) are (digital) sets of data describing defined characteristics of materials and components in products and systems that give them value of present use, recovery, and reuse[4].

Material passports are generally agreed to include some or all of the following information:

- Physical, chemical, and biological Properties
- Material health (including VOC content)
- Unique product and system identifiers
- Design and production information
- Transportation and logistics
- Construction methods
- Use and operate phase
- Disassembly and reversibility methods
- Reuse and recycling information

The Applicant and design team fully support the concept of material passports. However, at the time of writing there is no standardised methodology for implementing materials passports, although work is currently being done in this field.

The possibility of utilising material passports will be investigated further at the next design stage; it may, for example, be possible to capture and store information about key building elements, to facilitate future reuse at end of life. This will depend largely on whether BIM will be implemented from Stage 4 onwards, and whether an as-built model will be a key deliverable for the main contractor. This has not yet been determined by the client.

It widely agreed that BIM is required in order to be able to implement materials passports, due to the data management processes needed to ensure this information is stored correctly and in a usable format.

LAYER INDEPENDENCE

As outlined previously, building elements and components with different lifespans will form independent layers. This will ensure those layers with shorter lifespans can be replaced without damage to layers which have longer lifespans. This will include the following principal layers:

- Skin/Shell
- Substructure
- Services
- Space
- Stuff/Contents
- Construction Materials

STANDARDISATION

Standard-size materials will be used where possible as these are able to accommodate multiple uses, reuse and upgrading. Furthermore, standard types of connections will be used as these can be separated and reused more easily.

It is likely that modular elements will be included, although the full extent of these will be developed further at the next stage of design. At present, it is being explored the use of a unitised system of pre-fabricated elements for the façade and It also may be possible to use pre-fabricated modular bathroom pods.

Modularity allows elements to be slotted together or taken apart to promote disassembly and flexible environments, as well as reducing construction waste. The feasibility of inclusion of modular elements will be evaluated post planning.

[4] 'Materials Passports – Best Practice', 2019, Heinrich and Lang

SYSTEMS, MATERIALS THAT CAN BE REUSED OR RECYCLED

This section outlines strategies that will be employed in line with Principle 6, Using systems, elements or materials that can be reused and recycled.

This final principle supports the application of the waste hierarchy at the end of the building's lifetime. Using systems, elements or materials that can be reused and recycled will ultimately help in ensuring that waste is avoided, or at least reduced.

As in the previous section, the role of material passports is an important consideration here. Table 12 outlines the strategies proposed to promote the use of reusable or recyclable systems, elements or materials across each building layer.

Table 12: Strategies Proposed to Promote the Use of Reusable or Recyclable Systems, Elements or Materials

Building Layer	USING SYSTEMS, ELEMENTS OR MATERIALS THAT CAN BE REUSED OR RECYCLED
Site	
Substructure	Standard-size materials will be used where possible as these help to facilitate reuse. Building Information will be stored to facilitate end of life strategy, disassembly, future reuse, waste avoidance, and waste reduction. Exposed and reversible connections will be utilised where possible to facilitate disassembly and ensure materials can be recovered in a high value state. Standard types of connections will be used as these can be separated and reused more easily.
Superstructure	
Shell/skin	
Services	
Space	The key challenge to implementing design for disassembly and reuse relates to specific requirements for the fit out. This will be considered and addressed as the project progresses. The ease of disassembly and the functional adaptation potential of different design scenarios will be explored by the end of Concept Design. Recommendations will be made and solutions developed based on the study carried out during Concept Design, that aim to enable and facilitate disassembly.
Stuff	Components and products will be designed and selected to allow for disassembly and reuse at the end of their useful life. Building Information will be stored to facilitate end of life strategy, disassembly, future reuse, waste avoidance, and waste reduction.
Construction	Circular economy measures will be reviewed during construction to ensure that recommendations are implemented. As far as possible, steel products specified will be readily recoverable and recyclable. It is expected that structural steelwork used in the buildings will be up to 94% recoverable and 99% recyclable.
Summary	The building will be designed using systems, elements or materials that can be reused or recycled where possible.
Challenges	To be reviewed and updated at the next project stage once a contractor has been appointed.
Counter actions	To be reviewed and updated at the next project stage once a contractor has been appointed.
Plan to prove and quantify	Whole Life Carbon Assessment End of life Strategy

PLANS FOR IMPLEMENTATION

This section provides details how the short- and medium-term targets and commitments will be implemented, monitored and reported.

The plan outlined in Table 13 explains how short- and medium-term commitments will be implemented, monitored and reported. The applicant will produce a post completion report documenting actual performance against these targets. Where possible information has been provided on meeting longer-term targets; however, it is acknowledged that the majority of these will depend on collaboration with building occupiers/tenants.

Table 13: Circular Economy Commitments: Implementation Plan

Commitments/Targets	Action	Responsible party	Anticipated implementation date
Core Commitments/Targets			
At least 95% of all demolition waste will be reused, repurposed and/or recycled.	Review the pre-demolition waste audit to determine estimated quantities of concrete waste arisings. Contact local waste processing facilities to ensure that they have capacity to accept the estimated demolition waste. Put procedures in place for segregating and storing demolition waste prior to collection by a licenced waste contractor.	Demolition contractor	Prior to deconstruction works
At least 95% of all excavation waste will be diverted from landfill and put to beneficial use.	Procedures will be put in place for ensuring 95% of excavation waste is put to beneficial use.	Contractor (below grounds work)	Prior to excavation.
At least 95% of construction waste will be reused, returned to supplier for recycling and/or recycled. Aim for ≤ 6.5 tonnes of construction waste (excluding excavation waste) / 100 m^2 GIA	Put procedures in place for segregating and storing construction waste prior to collection by a licenced waste contractor.	Contractor	Prior to commencement of Stage 5.
Adequate facilities will be provided to enable allow occupiers to achieve the required 75% business waste target	Review design of bin stores to ensure they meet the following criteria: • Accommodate appropriate bins for segregation and storage of recyclable, compostable and general landfill waste as required. • Accessible to building users • Adequately sized for anticipated waste volumes • Clearly signed to assist with segregating and storing recyclable, compostable and general/landfill waste streams	Architect	Stage 3
	Adopt process for monitoring waste performance once the development is operational.	Client, tenant(s) & waste contractor	Post-planning once tenants are identified.

Commitments/Targets	Action	Responsible party	Anticipated implementation date
	Explore measures such as consolidated, smart logistics and community-led waste minimisation schemes for operational waste.	Client, architect, tenant(s) & waste contractor	Post-planning once tenants are identified.
The building will utilise an efficient form to minimise quantities of new materials. Material efficiency measures will optimise the use of materials within building design, procurement, construction, maintenance and end of life; and ultimately reduce the quantities of new materials used.	Review and update Material Efficiency report and implementation plan at RIBA Stage 3.	Architect / Sustainability Consultant	Post-planning but prior to commencement of Stage 3.
	Review and update Material Efficiency report and implementation plan at RIBA Stages 4.	Architect / Sustainability Consultant	Prior to commencement of Stage 4.
	Review and update Material Efficiency report at Stage 5.	Contractor	Prior to commencement of Stage 5.
The scheme utilises brownfield land.	No action required.		
The scheme will use the GLA's energy hierarchy to minimise operational energy use and has been designed to minimise water consumption.	Review energy modelling post-planning and ensure targets are being met.	Energy specialist	Post-planning, prior to completion of Stage 3.
	Review specification of water consuming equipment in the non-domestic portion of the development to ensure BREEAM water use targets are being met. Ensure pulsed water meters, water leak detection systems and local shut off to WC areas are included to limit water loss via leaks.	MEP	Prior to final specification of sanitaryware.
	Review specification of water efficient fittings to ensure water consumption is limited to less than 105 litres per person per day for domestic uses. Ensure pulsed water meters, water leak detection systems and local shut off to WC areas are included to limit water loss via leaks.	MEP	Prior to final specification of sanitaryware.
100% of timber FSC or PEFC certified; 100% concrete BES 6001 certified; where possible steel sourced from suppliers rated under the CARES Sustainable Constructional Steel Scheme. Other materials to be certified under an Environmental Management System (EMS) such as ISO 14001. Concrete to contain at least 40% recycled cement replacement (GGBS). Steel to contain high recycled content.	Produce Sustainable Procurement Plan outlining key material suppliers and corresponding responsible sourcing certifications.	Contractor	Prior to commencement of construction works.

Commitments/Targets	Action	Responsible party	Anticipated implementation date
It will be possible to remove and replace all major items of plant without needed to demolish sections of wall or floor. Local services will be adaptable to a range of uses.	Review plant replacement strategy at RIBA Stage 3 to ensure all recommendations are being implemented.	Architect, Structural Engineer & MEP	Prior to completion of Stage 3.
The principal contractor will follow the UK Government's 'Waste Management Plan for England 2021', the 'Mayor's Municipal Waste Management Strategy - Rethinking Rubbish in London, and the 'Mayor's Business Waste Management Strategy' in order to reduce the amount of waste generated.	Set targets for maximum allowable construction waste and set procedures for achieving the recycling rates set out in points 15, 16 and 17 below.	Contractor	Prior to commencement of construction works (Stage 5).
A Site Waste Management Plan (SWMP).	Produce and review the Site Waste Management Plan to ensure the following actions are carried out: • A target benchmark for resource efficiency is set and adhered to • Procedures and commitments to minimise non-hazardous waste in line with the target benchmark are adopted • Procedures to minimise hazardous waste are adopted • A waste-minimisation target is set and details of waste minimisation actions to be undertaken are set out • Procedures to estimate, monitor, measures and report on hazardous and non-hazardous site waste and demolition waste, where relevant, arising from work carried out by the principal contractor and all subcontractors are outlined • All construction waste data is monitored on a monthly basis throughout the project and checked against what would be expected based on the stage of the project, invoices, etc., to validate completeness of waste reporting data • Procedures are identified to sort, reuse and recycle construction waste into defined waste groups, either on site or through a licensed external contractor • Procedures to review and update the plan are identified. The name or job title of the individual responsible for implementing the above.	Principal Contractor	Prior to commencement of construction works (Stage 5).
Commitments/Targets Above and Beyond Standard Practice			

Commitments/Targets	Action	Responsible party	Anticipated implementation date
Foundations and basement levels have been designed to facilitate a range of uses.	Review design of lower-levels at Stage 3 to ensure that adaptability of space is maintained. Review targets and recommendations within BREEAM Design for Functional Adaptability and Disassembly report to ensure all items are being achieved.	Architect & Structural Engineer	Prior to completion of Stage 3.
The structural design of the hotel will allow for reconfiguration of the internal environment to accommodate changes in working practices and business models.	Review design of superstructure and internal layouts to ensure that adaptability of space is maintained. Review targets and recommendations within BREEAM Design for Functional Adaptability and Disassembly report to ensure all items are being achieved.	Architect & Structural Engineer	Prior to completion of Stage 3.
The building has been designed to facilitate major refurbishment without compromising the structural design. Vulnerable parts of the building will be protected using durable finishes, raised curbs and bollards.	Review BREEAM Material Durability Report at RIBA Stage 3 to ensure all recommendations are being implemented.	Architect & Structural Engineer	Prior to completion of Stage 3.
Provide support to building users on how to use the building in the most energy efficient way.	Produce non-technical Building User Guide to inform users on how to operate the building efficiently with the original design intent. The Building User Guide will outline the adaptability statement.	Contractor	Prior to commencement of Stage 6.
The possibility of utilising pre-fabricated unitised façade elements will be explored.	Review façade design of office and hotel. Aim to maximise pre-fabricated modular/unitised elements.	Architect / Contractor / Façade Sub-Contractor	Stage 4
The possibility of using modular bathroom pods will be explored.	Review design of bathrooms/WCs in hotel and office to determine whether modular pods can be used.	Architect/MEP/ Contractor	Stage 4
Investigate measures to facilitate façade refurbishment and replacement.	Create Façade Replacement Strategy summarising measures to assist with façade replacement/refurbishment.	Architect / façade sub-contractor	Stage 4
Produce and issue Disassembly Guide.	Review design for disassembly measures and create summary document	Architect / contractor / sustainability consultant	Stage 4
Reuse of existing building components and systems will be maximised.	Where possible functional equipment of value will be donated/sold for reuse off-site, rather than sent to landfill.	Contractor	Prior to demolition works.
The contractor will be required to set targets for energy and water used during construction and put in place measures to minimise consumption of these resources.	Assign responsibility to an individual for monitoring, recording and reporting energy use, water consumption and transportation data resulting from all on-site construction processes throughout the build-programme.	Contractor	Prior to commencement of construction works.

Commitments/Targets	Action	Responsible party	Anticipated implementation date
	Set targets/KPIs for construction site energy use, water consumption and transport of materials and waste.	Contractor	Prior to commencement of construction works.
A systematic risk assessment will be carried out to identify and evaluate the impact of climate change on structural and fabric resilience.	Review BREEAM Climate Change Adaptation Strategy at RIBA Stage 3 to ensure all recommendations are being implemented.	Architect & Structural Engineer	Prior to completion of Stage 3.
Crushed concrete/brickwork from the demolition of the existing buildings to be reused on site where feasible thereby reducing the quantity of new aggregate that needs to be procured.	There is potential for brickwork/concrete from the demolished buildings to be crushed on-site and reused for piling mat. This would reduce the quantity of new material that would otherwise have to be procured for this purpose. However, as highlighted in the pre-demolition audit, there are potential acoustic/air quality concerns with this approach and as such, further investigation is required.		
Environmental Product Declaration (EPD)	Manufacturers with EPD certificates will be prioritised, with aim to specify at least 20 products with EPDs.	Contractor	Prior to commencement of construction works.
Promote Operational Waste Recycling	It is assumed the Facilities Management team will be responsible for monitoring the use of the waste facilities and reporting any problems to the building managers or the local council. Residents should be provided with educational material as part of their welcome pack and clear signage made available within each waste store to ensure occupiers understand how to segregate waste correctly and minimise contamination. The format of any annual monitoring and performance targets will need to be agreed with the relevant authorities. It is anticipated the scope of the information provided would include weight or volume data for each waste stream generated by the development.	Facilities Management Team	Post-planning once tenants are identified.
	The developer and building managers will be responsible for future consolidation, smart logistics and community-led waste minimisation schemes on site. This could be achieved through partnering with a charity to reuse bulky waste furniture instead of disposing of it / swap events / repair cafes etc / community food recycling / waste education.	Developer and Building Managers	Post-planning once tenants are identified.

APPENDIX A: POLICY FRAMEWORK

REGIONAL PLANNING POLICY (LONDON PLAN 2021)

The new London Plan has introduced several new policy requirements that consider circular economy principles.

Policy D3 'Optimising site capacity through the design led approach' and Policy SI7 'Reducing waste and supporting the Circular Economy' set clear policy objectives to:

- Create high quality buildings that consider practicality of use, flexibility, safety and building lifespan;
- Encourage the use of appropriate construction methods and robust materials;
- Take into account the principles of the circular economy and aim for high sustainability standards;
- Ensure that products and materials are retained at their highest value for as long as possible;
- Improve resource efficiency;
- Minimise waste (both during construction and building operation); and
- Meet or exceed the following targets:
    - Zero biodegradable/recyclable waste to landfill by 2026;
    - Business waste recycling target of 75% by 2030;
    - Reuse/recycling or recovery of 95% of construction and demolition waste;
    - The beneficial use of at least 95 per cent of excavation waste.

Policy SI7 requires developments that are referable to the Mayor of London to submit a Circular Economy Statement as part of a planning application; it states:

> *Referable applications should promote circular economy outcomes and aim to be net zero-waste. A Circular Economy Statement should be submitted, to demonstrate:*
> - *How all materials arising from demolition and remediation works will be re-used and/or recycled;*
> - *How the proposal's design and construction will reduce material demands and enable building materials, components and products to be disassembled and re-used at the end of their useful life;*
> - *Opportunities for managing as much waste as possible on site;*
> - *Adequate and easily accessible storage space and collection systems to support recycling and re-use;*
> - *How much waste the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy;*
> - *How performance will be monitored and reported.*

Policy SI7 encourages London boroughs to set their own lower local thresholds for Circular Economy Statements.

Circular Economy Statements must adhere to the minimum content requirements stated in 'Circular Economy Statement: Guidance Pre-Consultation Draft' in order to be considered 'compliant'.

Circular Economy Statements will be checked for:

- Completeness
- Technical validity
- Level of ambition

Furthermore, Policy SI7 states that referable applications must demonstrate how performance of the Circular Economy Statement will be monitored and reported, including confirmation of:

- What actually happened
- How this is different from what was planned
- What differed and what the key learnings were

UK GREEN BUILDING COUNCIL GUIDANCE

Although not planning policy, it is useful to consider the UK Green Building Council's (UKGBC) report on circular economy: 'Circular Economy Guidance for Construction Clients: How to Practically Apply Circular Economy Principles at the Project Brief Stage'. This sets out the following principles, which complement the regional and local planning policies:

- Reuse
    - Reuse the existing asset
    - Recover materials and products on site or from another site
    - Share materials or products for onward reuse
- Design buildings for optimisation
    - Design for longevity
    - Design for flexibility
    - Design for adaptability
    - Design for assembly, disassembly and recoverability
- Standardisation or modularisation
- Servitisation and leasing
- Design and construct responsibly
    - Use low impact new materials
    - Use recycled content or secondary material
    - Design out waste
    - Reduce construction impacts

APPENDIX B: WORKSHOP MINUTES

330 GRAY'S INN ROAD – MEETING MINUTES

DATE: 25/01/2023

LOCATION: Teams Meeting

MINUTES FROM: Circular Economy and WLC Workshop

ATTENDING:

- XCO2 – Sustainability Consultants
- AHMM - Architects
- Groveworld - Client
- WSP - Structural and Civil Engineers
- Steer – Transport and Waste Consultants

<table>
<tr><th>DETAILS</th><th>Action</th></tr>
<tr><td>WHOLE LIFE CARBON</td><td></td></tr>
<tr><td>

XCO2 gave an overview of WLC and the approach to WLC assessments. The below information was covered:

Outline of why embodied carbon is an important consideration.
Outline of operational and embodied carbon and how these make up whole life carbon emissions.
An overview of lifecycle stages and each module (A – D) was provided. An indication of the expected carbon emissions at each stage of the lifecycle was provided based on current standard practice and current best practice for different building types.

Cradle to Gate (A1 – A5)
In Use (B1 – B7)
End of Life Stage

An overview of relevant policies and guidance was provided, including an overview of the RICS guidelines. It was noted that 95% of project cost will need to be accounted for in the WLC assessment.
It was highlighted to the team that post construction reporting will need to be conducted.

XCO2 provided an overview of strategies that can be taken to reduce WLC emissions at each stage of the lifecycle and these were discussed with the project team.

An overview of case study projects was provided to help advise on measures that can be taken and the impact these can have.

</td><td>All</td></tr>
<tr><td>CIRCULAR ECONOMY</td><td></td></tr>
<tr><td>1. INTRODUCTION

Prior to the meeting, a key queries were circulated to relevant members of the design team. This outlined a range of potential measures that could be taken to support Circular Economy objectives.
In the discussion, these measures were discussed, and other measures proposed.

</td><td>All</td></tr>
<tr><td>2. STRATEGIC APPROACH

The strategic approach for the site was discussed in line with the different strategies provided within the GLA guidance.
It was determined that a strategy of partial retention and refurbishment will be pursued for the original hospital building, with an approach of demolish and recycle pursued for the remainder of the buildings at the site due to various constraints.
Opportunities for reuse of demolition materials were discussed, including potential for materials from the demolition of the existing building to be used within the landscape design. AHMM indicated that other opportunities for reuse of demolition materials have

</td><td>All</td></tr>
</table>

been explored and previous studies/discussion for reuse of materials on site will be shared to inform the Circular Economy statement. • It was highlighted that the strategies proposed for the new buildings will vary dependent upon the building layer. The approaches were discussed in detail and further information requested, for example, in relation to the lab space, opportunities for adaptability were discussed and the extent to which adaptability has already been discussed were raised. AHMM noted that adaptability studies for the lab space had been conducted and would be shared. In relation to the final building layer, 'Stuff/Contents', it was noted that speculative finishes will be minimised.	

3. KEY COMMITMENTS
• The key circular economy commitments and targets were discussed, in order to ensure relevant members of the design team were aware of the following targets:
  ○ 95% of demolition waste to be diverted from landfill.
  ○ 95% of excavation waste to be diverted from landfill.
  ○ 95% of construction waste to be diverted from landfill.
  ○ 65% municipal waste to be recycled by 2030.
  ○ 75% of business waste to be recycled or composted by 2030.
  ○ 20% of building materials to be comprised of reused or recycled content.
• The discussion focused on how performance against these metrics will be secured through design, implementation and monitoring. For example, in relation to the target for 20% of materials to be comprised of reused or recycled content, the structural design was discussed.
• Supplementary reports were discussed in relation to these targets, including pre-demolition audit, SWMP, cut and fill calculations and OWMS. It was highlighted that these would be required to support the submission.
  ○ GLA recommendations for pioneering OWMS were discussed and XCO2 noted that these would be shared with Steer for reference, following the workshop.
  ○ It was noted that draft reports would be shared with XCO2, once complete to feed into the Circular Economy Statement.
  ○ It was noted that cut and fill calculations would not be beneficial for this site.
	All

4. FURTHER INFORMATION
• The following information was requested from relevant members of the design team:
  ○ Total estimated demolition waste (tonnes) and proportion to be reused/recycled on/off site.
  ○ Total estimated excavation waste (tonnes) and proportion to be reused/recycled on/off site.
  ○ Total estimated construction waste (tonnes) and proportion to be reused/recycled on/off site.
 	
Estimated quantity of municipal waste (tonnes) and details of the waste storage areas proposed (sizing, location, anticipated quantities of operational waste etc.)
	All

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