HOARE LEA

# Avalon House.
# London.
# Barings Real Estate.

**SUSTAINABILITY**
WHOLE LIFE CARBON AND CIRCULAR ECONOMY STATEMENT

REVISION 01 – 31 MAY 2024

## Audit sheet.

| Rev. | Date | Description of change / purpose of issue | Prepared | Reviewed | Authorised |
|---|---|---|---|---|---|
| 00 | 23/05/2024 | Draft issue for review | W. Belfield | I. Christodoulou | T. Spurrier |
| 01 | 31/05/2024 | Issue for planning | W. Belfield | I. Christodoulou | T. Spurrier |
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# Contents.

# Executive summary

This Whole Life Carbon and Circular Economy Statement has been prepared by Hoare Lea on behalf of Barings Real Estate (hereafter referred to as 'the applicant') in support of the planning application for Avalon House hereafter 'the Proposed Development') within the London Borough of Richmond.

The Proposed Development consists of:

*Remove the existing roof and erection of a roof extension at fourth floor and rear extensions to floors ground – four to accommodate additional commercial floorspace (Class E), provision of rear and rooftop terraced amenity spaces, alterations to the ground floor entrance, recladding and remodelling of the facade, landscaping improvements to the rear car parking area, provision of end of journey and cycle parking facilities, associated building servicing and sustainability improvements, and other associated works.*

Figure 1: Image of the Proposed Development (Source: Anomaly)

### Scope

This report sets out the strategic approach to whole life carbon and the circular economy implemented by the project. The statement focuses on the work carried out to define a strategic approach to circular economy principles for the project and identify high level strategic opportunities early in the development process as well as outline whole life carbon targets for the development.

## Avalon House whole life carbon and circular economy strategies

The Proposed Development will follow best practice principles in design and construction with the overarching aims of reducing material usage, minimising waste, and embedding longevity, flexibility and adaptability.

Key examples of how these principles have been incorporated into the design are provided below:

**Material reuse or minimisation**

- The existing sub-structure will be retained in full.
- Of the existing superstructure 100% will be retained.
- For Building services, the risers have been designed to allow for prefabrication off site and they will have the same strategy on the majority of the floors to minimise waste.

**Design for adaptability and flexibility**

- The new structural form is robust and will permit significant future interventions to be considered without need for demolition.
- The structure is designed for floor loading which allows for future flexibility of the floorplate whilst reflecting the primary intention of using the space for office purposes.

**Design for disassembly**

- Specification of new materials in line with circular economy principles to facilitate their future re-use, e.g., hard stamping of structural steelwork to identify material grade and strength
- There is the potential for applying some modular construction elements which would minimise disruption and noise during construction work, and also provide routes for effective disassembly.

**Design for longevity**

- The structure is to be designed for at least a 60-year life span. Assessment of the extreme weather actions including flooding will be reviewed as a part of the design and incorporated.
- Specifications will demand subcontractor adherence to relevant industry standard sustainability schemes, e.g., BCSA Sustainability Charter, therefore providing robust components.
- Services are being designed in line with the current standards. Metallic services will be used as a preference to provide durability and better resilience for change in conditions.

# 1. Introduction

This Whole Life Carbon and Circular Economy Statement has been prepared by Hoare Lea on behalf of Barings Real Estate (hereafter referred to as 'the applicant') in support of the planning application for the Avalon House Development (hereafter 'the Proposed Development') within the London Borough of Richmond. The main function of the Proposed Development is for offices.

## 1.1 Description of development

The Site comprises a three-storey commercial office building known as 'Avalon House' constructed in the early 2000's and accommodates 3,076sqm (GIA) of Commercial (Class E) floorspace. The building comprises of ground and first as brick/stone massing, the existing third and large roof extents are clad in a grey metal. To the rear the roof has a dormer which is where the current plant is located. The 'entrance' bay is expressed with a semicircular extrusion which pops up and creates a useable meeting space at fourth floor.

The building is a multi-tenanted office building, with a shared central reception and core facilities accessed from the primary pedestrian entrance from Lower Mortlake Road.

Barings have tasked the design team to evaluate a range of design options guided by these principles, with achieving best in class sustainability metrics and enhanced biophilia being at the heart of the scheme. This has included reviewing whether additional massing can be provided at roof level and to the rear, improving the overall design quality of the façade through a new cladding system, considering how end user wellbeing, wellness and end of journey facilities can be provided, and also ensuring the building is energy efficient, sustainable and resilient through refurbishment works.

The Applicant wishes for the scheme to be known as 'The Greenhouse' and become an exemplar for how to approach a sustainable retrofit and repositioning of commercial assets in the London Borough of Richmond-upon-Thames.

The design approach for the Site has been based on a detailed series of design workshops which have included input from architectural, daylight and sunlight, structural, MEP and sustainability, and town planning specialists, which have determined that the best way to achieve the Applicant's objectives are through retrofitting, refurbishing, and extending the building.

The description of the proposed development is as follows:

*Remove the existing roof and erection of a roof extension at fourth floor and rear extensions to floors ground – four to accommodate additional commercial floorspace (Class E), provision of rear and rooftop terraced amenity spaces, alterations to the ground floor entrance, recladding and remodelling of the façade, landscaping improvements to the rear carparking area, provision of end of journey and cycle parking facilities, associated building servicing and sustainability improvements, and other associated works.*

Table 1 shows the existing and proposed areas.

Table 1 Area Schedule

| Use | Existing sq. m (GIA) | Proposed sq. m (GIA) | Net Change sq. m (GIA) |
|---|---|---|---|
| Commercial (Class E) | 3,076 | 4,068 | +992 |
| TOTAL | 3,076 | 4,068 | +992 |

## 1.2 Whole life carbon and circular economy strategy process

The following process has been successfully followed in developing this strategy:

- Working with all key stakeholders, an overall sustainability vision for the development has been defined and agreed.
- The sustainability strategy, based on the five capitals framework, defines the project vision, themes and intended outcomes. Circular economy aspects are captured within both natural and physical capital.
- Circular economy principles have been reviewed by the project team as part of this process, specifically in relation to the physical capital.
- Sustainability certification is also being pursued, in the form of BREEAM assessment of the site. A BREEAM pre-assessment exercise has been undertaken via workshops in conjunction with the project team. This exercise has assisted in more detailed consideration of specific targets for these elements of the scheme.
- Additional workshops will be held during the detailed design stages to explore further opportunities to incorporate key Circular Economy principles into aspects of the design, procurement and construction process.
- As the proposals move toward the construction stage, early engagement will be sought with contractors to assist in refining strategies for delivery. Initial documentation that has been/will be prepared to aid this are:
  - An audit has been undertaken for the development to gauge which elements of the existing structures and hardstanding on site can be retained, reused, reclaimed or recycled.
  - A Sustainable Procurement Plan will be developed, setting out aims and targets for procuring products sustainably and locally where feasible.
- Robust data collection plans will be implemented through design and construction to facilitate ongoing monitoring against intended outcomes.
- Given the scale of the development and the likely nature of the construction programme over several years, it is expected that the strategies and approach will evolve over time.

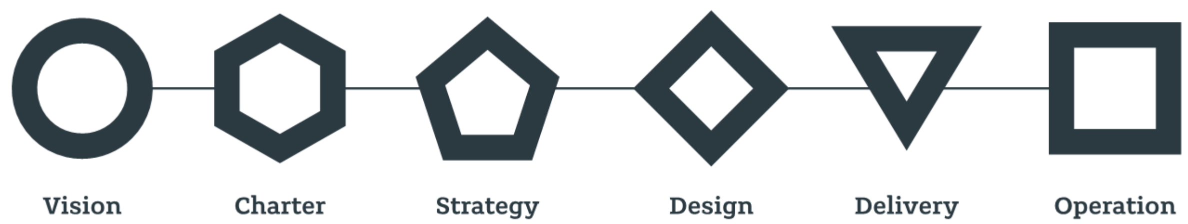



Figure 2: Sustainability Strategy – Delivery Phase (Inception to Completion)

## 2. Circular economy strategy

### 2.1 Circular economy targets

Following review of local policy, BREEAM requirements and industry best practice targets, subsequent engagement with the project team, the following project Circular Economy targets have been established for the project:

Table 2 Circular economy targets for the proposed development.

| Focus Area: | KPI: | London Plan Target: | Project Target: | How will performance against this metric be secured through design, implementation, and monitoring? |
|---|---|---|---|---|
| Demolition waste materials (non-hazardous) | Diversion from landfill for reuse, recycling or recovery. | 95% | ≥97% (by weight) | Pre-refurbishment audit to be carried out by which will be provided to the main contractor to ensure the strip-out waste follows the guidance in the report. |
| Excavation waste materials | Minimum of 95% diverted from landfill for beneficial reuse. | 95% | N/A (no excavation proposed) | |
| Construction waste materials | Minimum of 95% diverted from landfill for reuse, recycling or recovery. | 95% | ≥95% | The construction waste requirements and targets will be provided to the contractor. |
| Municipal waste | Minimum 65% recycling rate by 2030. | 65% | ≥65% | Waste storage details and recyclable values can be found in the Delivery and Servicing Management Plan. Details of these values with a possible further requirement will be confirmed at RIBA Stages 3 and 4. |
| Recycled content | Minimum 20% of the building material elements to be comprised of recycled or reused content. | 20% | ≥20%* | Recycled content requirements will be detailed in tender documentation and confirmed during detailed design RIBA Stage 3 and 4. At this stage a minimum overall percentage of 20% is targeted, but this is expected to be improved upon during detailed design and following workshops and discussions with the supply chain. |

## 2.2 Circular economy decision tree

Circular Economy considerations have formed a key part of the approach to sustainability for the project. It is recognised that in order to implement Circular Economy principles most effectively, it is helpful to explore strategic opportunities as early in the development process as possible. Considerations around resource efficiency, material circularity and ethical sourcing are a critical element of the overarching approach to sustainability. It is acknowledged that the approach to circular economy will evolve as the design evolves, or in response to wider considerations and feedback from the GLA or other stakeholders. The edited decision tree below shows the recommended design strategy at this stage.

**GLA CE decision tree for existing buildings**

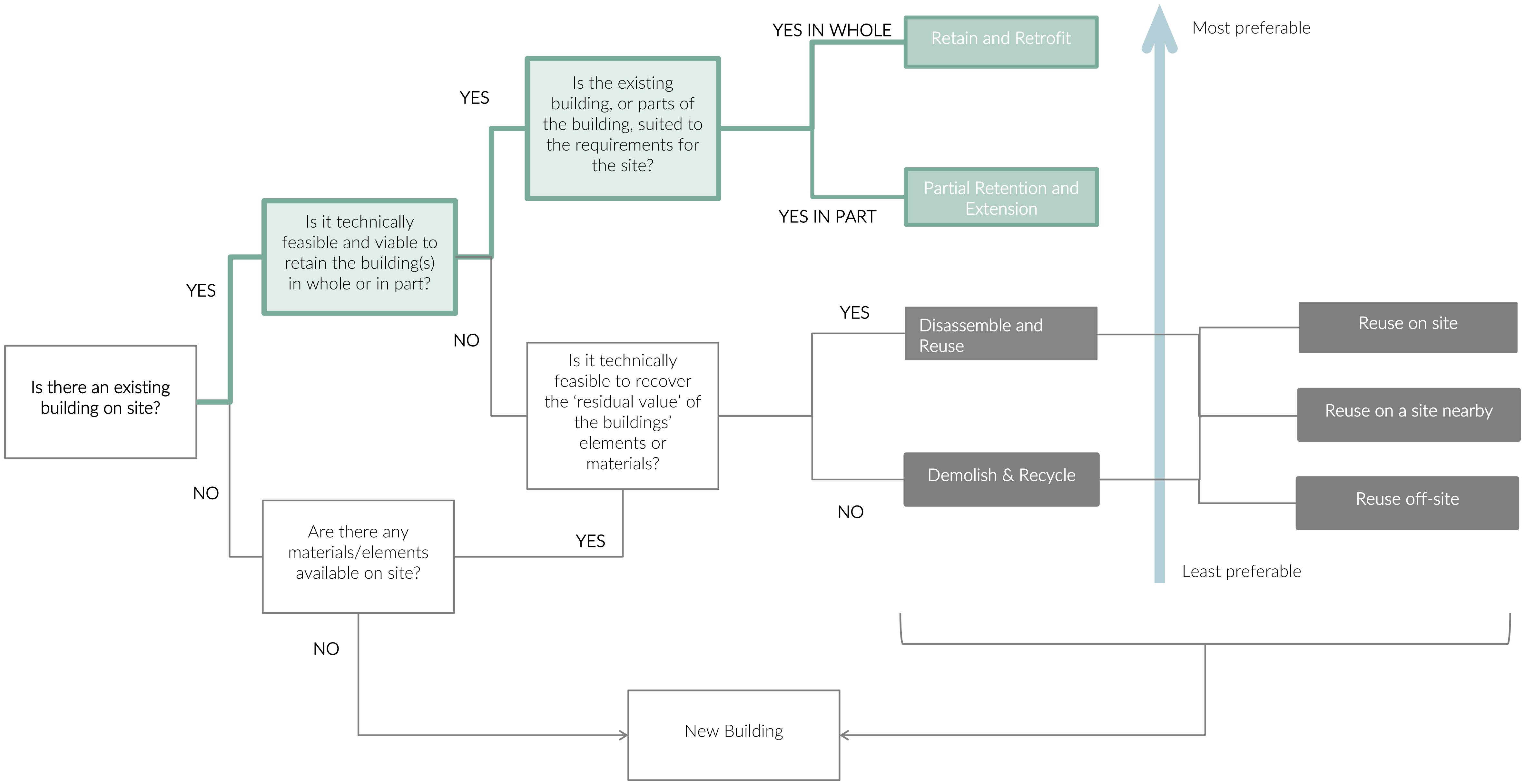



Figure 3 Project specific decision tree for choosing the most appropriate Circular Economy strategy – existing buildings.

### 2.3 New building layer strategy

The circular economy strategy for the new building layers addresses the following design approaches, split out into each layer as indicated on Figure 4. Each layer has been considered along the decision tree for the most appropriate pathways. However, regardless of the pathway taken, all developments should consider the following circular economy design principles: Design out waste; Design for flexibility; Design for adaptability; Design for disassembly; Design for material reuse/ recycling; Design for longevity.

The following strategies have been applied to the new build elements.

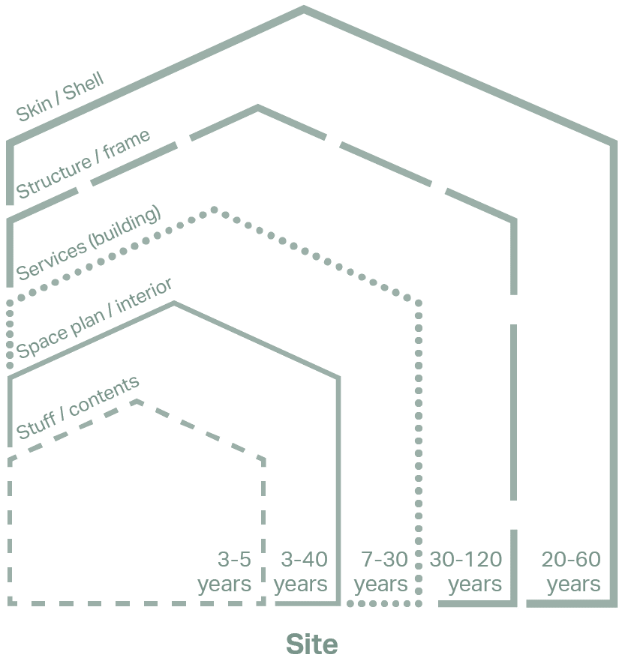
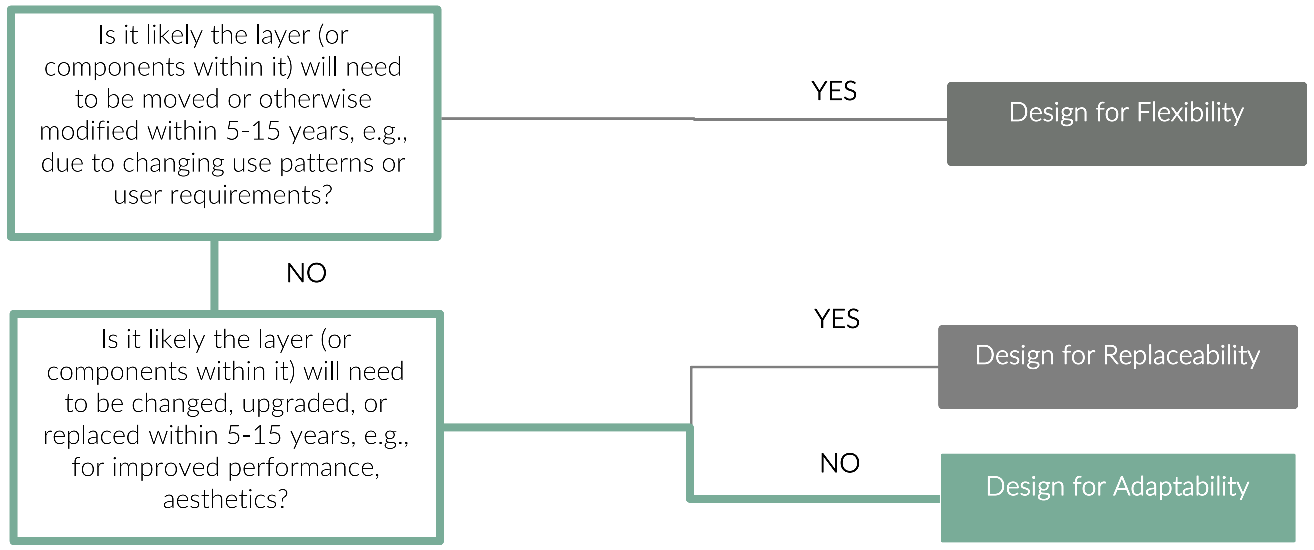



Figure 4: Building Layers and Standard Lifespans (Source: GLA)

Table 3: Building layer summary (Source: GLA)

| Building layer | Summary and constituent elements |
|---|---|
| Site | The geographical location, context, external works, earth works and landscaping. |
| Skin/shell e.g., façade | The layer keeping out water, wind, heat, cold, direct sunlight, and noise. Includes exterior surfaces such as the roof, siding, sheathing and windows. This layer includes the façade (front or face of a building).<br>This layer often has biggest impact on long- term durability, occupant comfort and building-energy performance. |
| Structure/ structural frame/ superstructure | Load-bearing elements above plinth including roof-supporting structure. Generally, it is the longest-lasting building element. Insulation and services may be embedded here. |
| Substructure | Excavations, foundations, basements, and ground floors. |
| Services (building) | Installations to ensure comfort, practicality, accessibility, and safety, including plumbing, heating, cooling, ventilation, and electrics.<br>Distribution systems can be hard to change. |
| Space/space plan/interior/ interior space | The layout, internal walls and partitions, ceilings, floors, surface finishes, fixtures, doors, fitted furniture. Changeable without changing structure, services, or skin. |
| Stuff/contents | Anything that could fall if the building was turned upside down. Not permanent, easily movable, most frequently changed by occupant, e.g., appliances, lamps, electronics, furniture, art. |
| Construction materials | Any temporary installations/works/materials, packaging and equipment. |

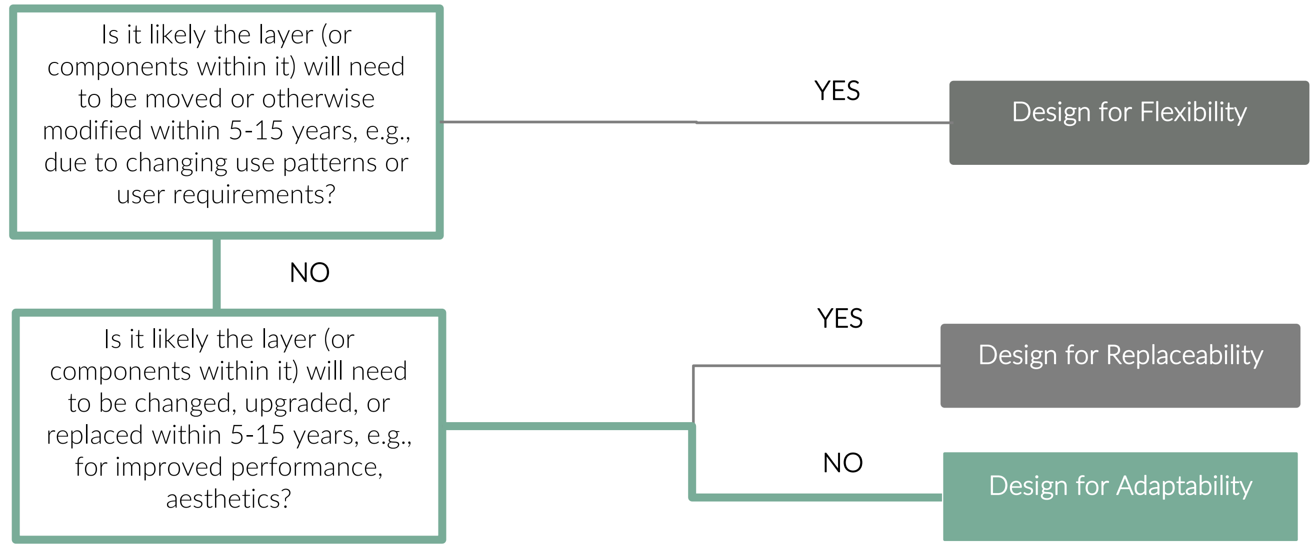
### Skin/Shell




New Building Circular Economy Design Approaches implemented:

| | |
|---|---|
| Component of material reuse | The existing facade on will be retained with refurbishment. |
| Adaptability | The façade system is unitised, thereby designing in adaptability by allowing each unit to be changed or replaced throughout the life of the building, without any widespread intervention to the façade. |
| Flexibility | The façade system is unitised, thereby designing in flexibility by allowing each unit to be changed or replaced throughout the life of the building, without any widespread intervention to the façade. |
| Replaceability | The façade system is unitised, thereby designing in replaceability disassembly by allowing each unit to be changed or replaced throughout the life of the building, without any widespread intervention to the façade. |
| Disassembly | The façade system is unitised, thereby designing in disassembly by allowing each unit to be changed or replaced throughout the life of the building, without any widespread intervention to the façade. |

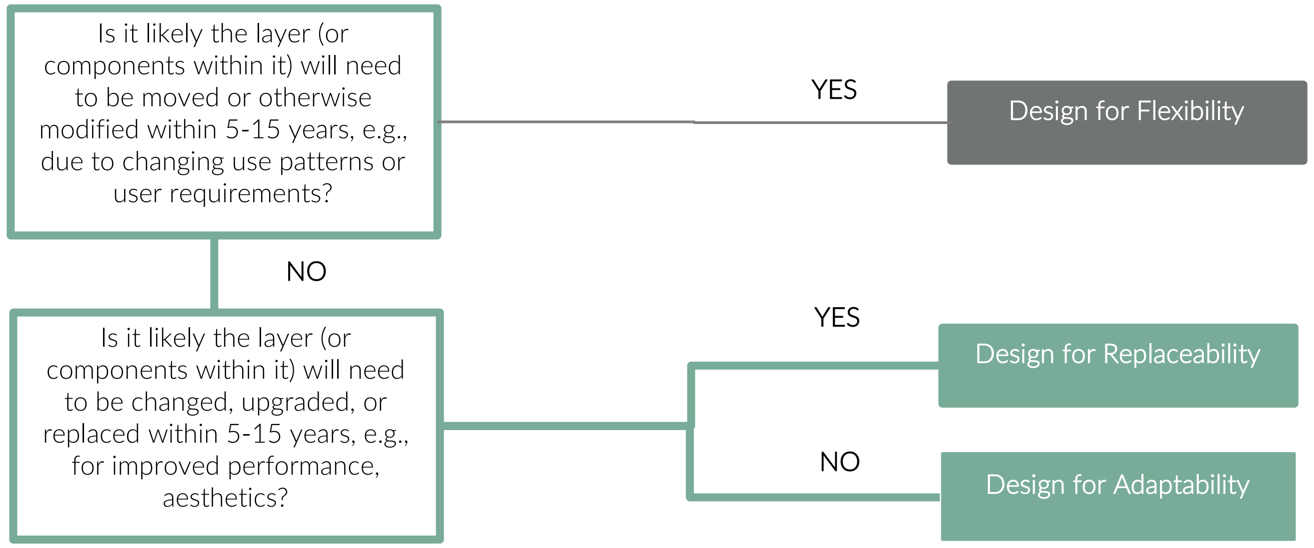
### Structure/Frame




New Building Circular Economy Design Approaches implemented:

| | |
|---|---|
| Component of material reuse | 100% of the existing substructure will be retained along with 100% of the existing superstructure.<br><br>Specification of new materials in line with circular economy principles to facilitate their future re-use, e.g., utilisation of the National Steelwork Specification 7th Edition with clauses guiding the use of reclaimed structural steel sections and requiring hard stamping of structural steelwork to identify material grade and strength |
| Adaptability | The new structural form is robust and will permit significant future interventions to be considered without need for demolition. |
| Flexibility | The structure is designed for floor loading which allows for future flexibility of the floorplate whilst reflecting the primary intention of using the space for office purposes. |
| Disassembly | There is the potential for applying some modular construction elements which would minimise disruption and noise during construction work, and also provide routes for effective disassembly |
| Longevity | The structure is to be designed for at least a 60-year life span. Assessment of the extreme weather actions including flooding will be reviewed as a part of the design and incorporated. |

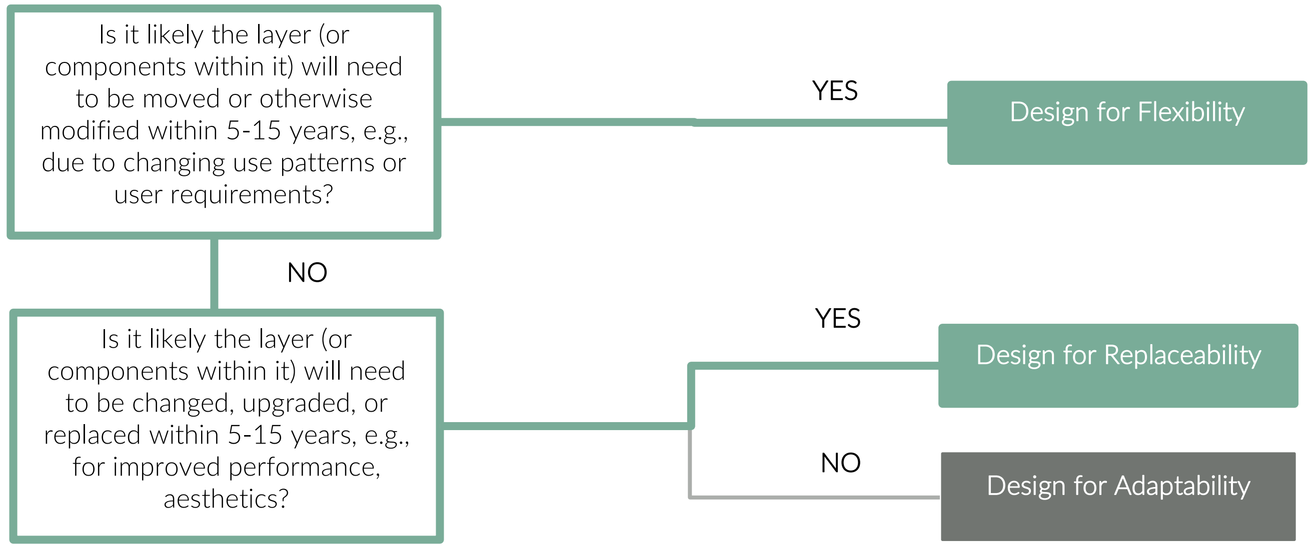
**Services (building)**




New Building Circular Economy Design Approaches implemented:

| | |
|---|---|
| Adaptability | The risers also provide connections with isolation valves on each floor to allow tenants to easily change the space and that minimise alterations to the primary network. |
| Flexibility | The risers have been designed in line with the BCO guidance which will give flexibility to the floor plate usage.<br>Each office floorplate will be divided into appropriate servicing zones, in line with British Council for Offices (BCO) standards. In order to maximise the flexibility of the tenant fit-out installation, zones will be further sub-divided into sub-zones enabling installation of meeting rooms with minimal impact on adjacent zones. |
| Replaceability | A plant replacement strategy has been developed which identifies a site wide strategy for major plant replacement.<br>Where possible, plant and services will be modular to allow for items to be broken down to assist in replacing or reconfiguration |
| Longevity | Services are being designed in line with the current standards. Metallic services will be used to provide durability and better resilience for change in condition.<br><br>The building services risers will be fully accessible for cleaning and maintenance at each accessible level. They will also be provided with a mesh flooring instead of concrete which will minimise embodied carbon and enable the floor to be removed to ease maintenance and disassembly. |

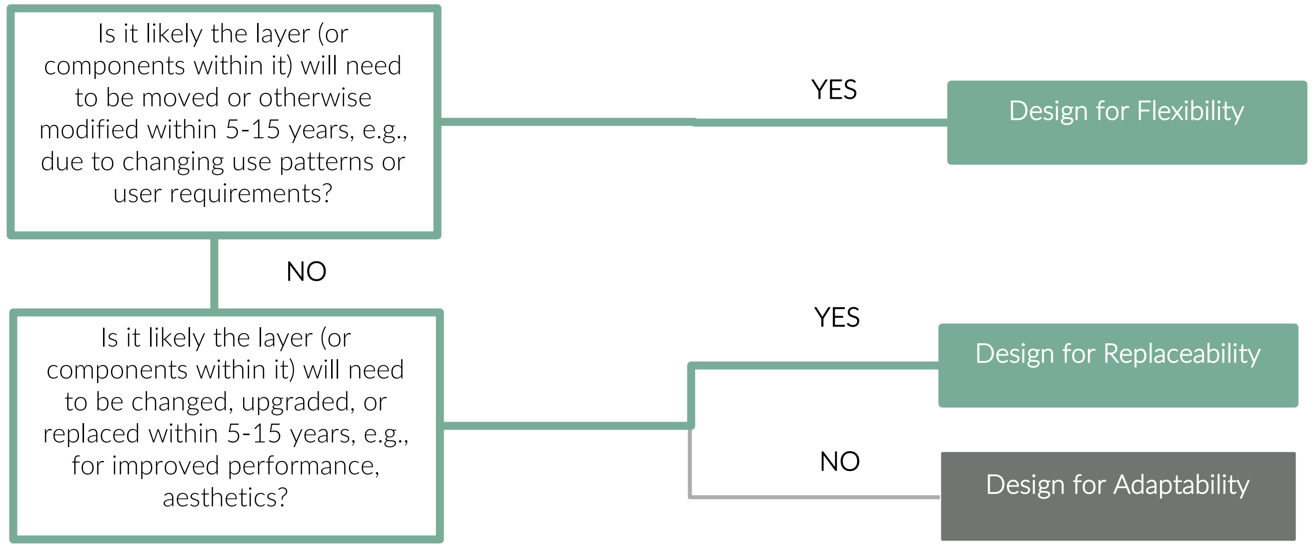
**Space Plan/Interior**




New Building Circular Economy Design Approaches implemented:

| | |
|---|---|
| Flexibility | The floor plates have been designed to allow for subdivision enabling flexibility in number of tenants and work spaces. |
| Replaceability | Interior design is to be developed during detailed design stages and will consider the replaceability of materials. |
| Disassembly | Interior design is to be developed during detailed design stages and will consider the disassembly of materials. |
| Longevity | Specifications will demand subcontractor adherence to relevant industry standard sustainability schemes, e.g., BCSA Sustainability Charter, therefore providing robust components. |

**Stuff/Contents**




New Building Circular Economy Design Approaches implemented

| | |
|---|---|
| Component of material reuse | Interior design is to be developed during detailed design stages and will look to maximise material reuse. |
| Adaptability | Interior design is to be developed during detailed design stages and will look to enable adaptability. |
| Flexibility | The floorplates of the offices will be designed to shell and core only, with no finishes, allowing incoming tenants to fit-out these spaces to accommodate their specific needs |
| Replaceability | Interior design is to be developed during detailed design stages and will consider the replaceability of materials. |
| Disassembly | Interior design is to be developed during detailed design stages and will consider the disassembly of materials. |
| Longevity | Specifications will demand subcontractor adherence to relevant industry standard sustainability schemes, e.g., BCSA Sustainability Charter, therefore providing robust components |

## 2.4 Waste strategy

**Waste during demolition, strip out and construction**

Waste management during both the demolition, strip out and construction periods will be undertaken in accordance with the project Environmental Statement for managing the environmental impact from enabling and construction. A pre-refurbishment audit will be conducted and will identify the expected waste which would arise as a result of demolition and deconstruction activities required to be undertaken as part of the development.

Waste management procedures and documentation information will be covered within the Demolition & Site Waste Management Plan (D&SWMP) prepared by the contractor, identifying the types and quantities of waste produced during every stage of the project, as well as opportunities to reduce, reuse and recycle construction process waste.

A waste hierarchy approach will be followed with the intention first to minimise waste generation, followed by reuse or recycling off-site.

It is highly recommended that to maximise the reuse and recycling of materials that the following materials are segregated on site:

- Concrete
- Steel
- Plasterboard
- Carpet tiles
- Metal work
- Stone
- Timber
- Glass
- Ceiling tiles
- Any potentially hazardous waste

Any materials arising from demolition/s trip-out which are being reused or recycled on or off-site, or recycled, will need to be stored appropriately until such time. Materials will be reused or recycled on-site as a preferred option.

Where materials cannot be reused or recycled on-site, the Contractor will identify opportunities for potential reuse off-site, and consult the pre-refurbishment audit for most appropriate scheme to use. Any materials to be reclaimed / reused will be done so in accordance with the Waste & Resources Action Programme (WRAP) protocol. As such materials requiring off-site disposal will be classified within the D&SWMP.

Contractor energy use on and off-site will be minimised where possible:

- Using alternatives to diesel/petrol powered equipment;
- Incorporating sources of renewable energy, to offset the use of main utilities;
- Selecting and specifying energy efficiency plant and equipment; and
- Implementing staff training for initiatives to turn off plant and equipment when not in use.

The energy consumption of the project will be monitored, through submetering or reading of utility bills, to allow comparison against best practice benchmarks, and improved where possible.

As part of understanding the impact of the demolition/ strip-out and construction periods the Construction Environment Management Plan will illustrate indicative construction vehicle routes.

In addition, vehicle routes to recommended demolition waste processing plants will be indicated, with a focus of these to be located within Greater London, minimising vehicle distances to travel, and such impacts of these vehicles on the surrounding environment.

**Waste during operation**

The existing refuse store located adjacent to the car park outside of the existing barrier. Figure 5 below shows the location of the refuse store. It is envisaged that the same refuse vehicle will collect from the site as occurs now. Swept path analysis showing how a typical LBRuT refuse vehicle can collect in this area without issue is provided in Appendix A1. The proposed waste storage requirements would also comply with BREEAM.

The frequency of collections will remain the same as the small uplift in office space is not anticipated to require an additional collection.

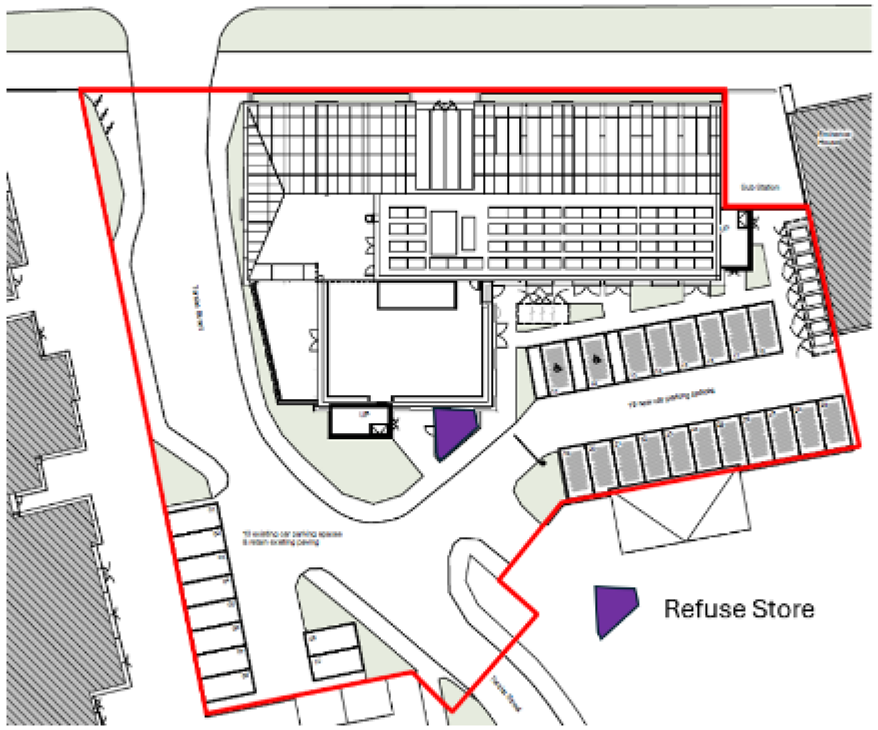



Figure 5 Proposed waste storage layout (Source: Iceni)

## 2.5 End-of-life strategy

A detailed end-of-life strategy will be produced prior to construction to describe how building materials, components and products can be disassembled and re-used at the end of their useful life. This will include how the information will be communicated to future building users. The end-of-life scenarios will align with the assumptions of lifespans and recyclability made in the bill of materials/ whole-life carbon assessment. The following will be set out:

- How the end-of-life strategy will be communicated with future building owners, managers and occupiers.
- How the building information will be stored during the building's life, e.g., through a BIM model or material passports, to facilitate disassembly and identify any key challenges.
- Additionally, plans for disassembling each building element/ layer, specification of materials and products that have been specifically designed for disassembly, or are certified as having met circularity criteria such as Cradle to Cradle certification.

The key priority of this development is to create a building that has an extended lifetime due to careful design and specification to ensure flexibility and adaptation. The design also aims to ensure that if the building is to be deconstructed at a later date that there is a clear process to follow.

The design of the building will seek to reduce material demands and enable building materials, components, and products to be disassembled and reused at the end of their useful life.

Design for disassembly will also be explored for interior fit-out elements at later stages of the design to allow for ease of replacement and facilitate material recovery at the end-of-life of the building. Further, the design will look to consider efficient design solutions including increasing the utilisation factor of structural members; designing to standard material dimensions to reduce off-cuts and waste on site and allow for future reuse; and removing redundant materials from the design.

This approach, alongside on-going monitoring of energy, water, and transportation, will subsequently result in less of a demand being required for required resources. Finally, the scheme will be designed to accommodate an adaptable, flexible, and reusable design in the future, accommodating to potential change in use building services, as well as building user demands.

In support of the end-of-life strategy, documentation, will be made readily available by the design team (incl. Building User Guides (BUG), Building adaptability and disassembly guide) for the building occupants, tenants, and FM team in order to inform them on the end of strategy, disassembly, future reuse, waste avoidance and waste reduction principles which have been adopted and incorporated into the base build. These documents will also include the building drawings as well as manufacturer guidance. This information will facilitate the building occupiers in understanding how the building elements work, and appropriate management methods to adhere too. Table 2 summaries the design principle and the end-of life strategy for key building components of the proposed development.

Table 4 Summary of End-of-life strategies for key building component

| Building component | Design principle | End-of-life strategy |
|---|---|---|
| Substructure and Superstructure | Designing for longevity and adaptability | Building re-use/change in use; deconstruction and material reuse and/or recycling.<br><br>The building's open and flexible design will allow for future changes in use to a range of commercial spaces and for different tenants. Materials such as concrete, bricks, glass, steel, and other metals can be recovered at end-of-life for reuse and/or recycling.<br><br>The new structural form is robust and will permit significant future interventions to be considered without need for demolition. |
| Facade | Design for longevity, disassembly, replaceability, adaptability | Material and component recovery, reuse and/or recycling.<br><br>Standardised design and mechanical fixings will be preferred where possible to enable this. |
| Interior fit-out | Material efficiency; Design for Disassembly and maintainability | Material and component recovery, reuse and/or recycling.<br><br>Use of durable and demountable interior fit-out will allow for components and materials to be recovered and reused on-site. Alternatively, the option to share reusable materials with other buildings and charities can also be explored. |

| Building component | Design principle | End-of-life strategy |
|---|---|---|
| Building services | Efficient design; Design for longevity and maintainability | Refurbishment, reuse and/or component and material recovery and recycling.<br><br>The building services will be designed and maintained to prolong their expected service life. The risers have been designed to allow for prefabrication off site and therefore support disassembly. Ease of access and independence of building services will enable building services to be replaced without major disruptions to the building. |

## 2.6 Plans for implementation

During the design stage the commitments and targets outlined in this report will be subject to on-going review by the majority of the design team members. Key responsibility has been summarised within each of the principles, outlining how they plan to progress forward with each principle and ensure the aspects are captured within the final build design. It will be the responsibility of the Sustainability consultant to lead the conversation on Circular Economy and the principles within the design, this will be documented and monitored via updated proforma templates, drawings, and correspondence.

Evidence will be collected to demonstrate how the development has and will perform throughout its life cycle.

- Evidence of audits.
- Written agreements or correspondence.
- Final SWMP and or RMP.
- Drawings or photos.
- Specifications.
- Bill of Materials.

In the long-term appropriate documentation, will be made readily available by the design team (incl. Building User Guides (BUG), Building adaptability and disassembly guide) for the building occupants, tenants, and FM team in order to inform them on the end of strategy, disassembly, future reuse, waste avoidance and waste reduction principles which have been adopted and incorporated into the base build.

Table 5 Outline plan for implementation

| RIBA stage | Action | Responsibility | Evidence | Status: |
|---|---|---|---|---|
| 0-1 | – Set broad objective for circular economy aspirations | Client; Project Manager; Design team; Sustainability consultant. | – Project Brief<br>– Design team meeting minutes<br>– Design and Access statement. | Completed |
| | – Assess current site undertake pre-demolition/ pre-refurbishment audit | Client; Project Manager; Demolition contractor | – Pre-refurbishment audit report | To be completed during Stage 2 with support from Contractor. |
| | – Develop objectives with specific metrics | Client; Project Manager; Design team; Sustainability consultant. | – Circular Economy statement<br>– BREEAM pre-assessment | Completed |
| 2-3 | – Hold workshop to investigate circular economy alternative approach | Client; Project Manager; design team including architects, structure engineers, façade designer; waste consultant; cost consultants, sustainability consultant; | – Circular Economy statement<br>– Meetings<br>– Design development drawings and reports<br>– Site waste management Plan<br>– Resource Management Plan<br>– Operational Waste Management Plan | In progress<br><br>SWMP/RMP to be completed during Stage 2 with support from Contractor. |
| | – Agree opportunities, commitments, and metrics/ targets. | | | |
| 4 | – Include metrics as clauses within procurement packages | Client; Project Manager; Contractor; Design team; Sustainability consultant. | – Tender documents and specifications<br>– Contractor and supply chain written agreements | To be commenced |
| | – Monitor design against metrics, continue to engage with suppliers | | – Detailed design drawings and reports<br>– Design specifications<br>– Value engineering studies<br>– Cost Plan/Bill of Quantities<br>– Supply chain interaction correspondence evidence | |
| 5 | – Monitor metrics with contractor and supply chain | Client; Project Manager; Contractor | – Procurement receipts/invoices<br>– Waste receipts<br>– Site photos<br>– Technical specification documents and drawings. | |
| | – Continue to investigate alternative materials/products | Client; Project Manager; Contractor; Design team; Sustainability consultant. | – Design team, Contractor, and supply chain correspondence evidence.<br>– Material optioneering reviews. | |

| RIBA stage | Action | Responsibility | Evidence | Status: |
|---|---|---|---|---|
| 6 | – Review success against objectives | Client; Project Manager; Contractor; Sustainability consultant. | – Procurement receipts/invoices<br>– Waste receipts<br>– Site photos<br>– Performance and test certificates<br>– Technical specification documents and drawings. | |
| | – Post completion circular economy statement and reporting | | - As built information<br>- Services commissioning and testing<br>- Building User Guides (BUG)<br>- Building adaptability and disassembly guide<br>- Site photos<br>- Post completion circular economy statement | |

# 3. Whole life carbon strategy

### 3.1 Introduction.

This section provides a summary of the anticipated Whole Life Carbon (WLC) performance for the Proposed Development. The WLC is defined as 'those carbon emissions resulting from the construction and the use of a building over its entire life, including its demolition and disposal.' This captures the operational carbon emissions from both regulated and unregulated energy use, as well as the upfront and embodied carbon emissions, i.e. those associated with raw material extraction, manufacture and transport of building materials, construction and the emissions associated with maintenance, repair and replacement as well as dismantling, demolition and eventual material disposal.

The current assessment presented in this report is based on a benchmark analysis of the Proposed Development, highlighting the anticipated baseline and aspirational performance.

A detailed assessment in line with the 2nd edition of the RICS Professional Statement (2023) 'Whole Life Carbon Assessment for the Built Environment', will be undertaken during the subsequent stages of design.

### 3.2 Background to Life Cycle Assessment and Embodied Carbon.

Global climate change is widely considered to be one of the most pressing challenges at a regional, national, and international level. Industrialisation has resulted in the use of refined and unrefined fossil fuels as an energy source and since the start of the industrial revolution, use of fossil fuels and their resultant release of carbon dioxide into the atmosphere has caused an exponential increase in the concentration of carbon dioxide and other pollutants that are generally agreed to result in increasing global average surface temperature.

It is outside the scope of this report to describe the wide-ranging impacts of climate change; however urgent action is required to limit carbon dioxide and limit the impacts of climate change.

Carbon emissions from operational use of buildings has been the subject of regulation for some time and has historically been the primary focus of reducing the impact of built environment projects. More recently, this focus has been expanded to also include carbon emission associated with the building materials themselves.

Some studies have historically suggested that 40-50% of the total carbon emissions for buildings over their lifetime are due to embodied carbon. With increasing energy efficiency within buildings and an increasingly decarbonised electricity supply, building operational carbon emission are being acknowledged to be rapidly reducing. As this occurs, the significance of embodied carbon emissions increases and the potential for reduction of overall carbon emissions through structural design choice and material selection becomes greater.

### 3.3 Whole Life Carbon Assessment Modules.

In order to standardise Whole Life Carbon Assessments, they are reported against a number of stages as defined in EN 15978; 7.4. These life cycle stages begin with raw material extraction, moving through product manufacture, transportation, and installation within a development, this continues into maintenance and use of a site during operation, and eventual material disposal at the end-of-life stage. These stages are grouped into three modules, A, B, and C, representing upfront, operational, and end-of-life carbon., as set out in Figure 6. Module D represents the circularity of products which are reused or recycled.

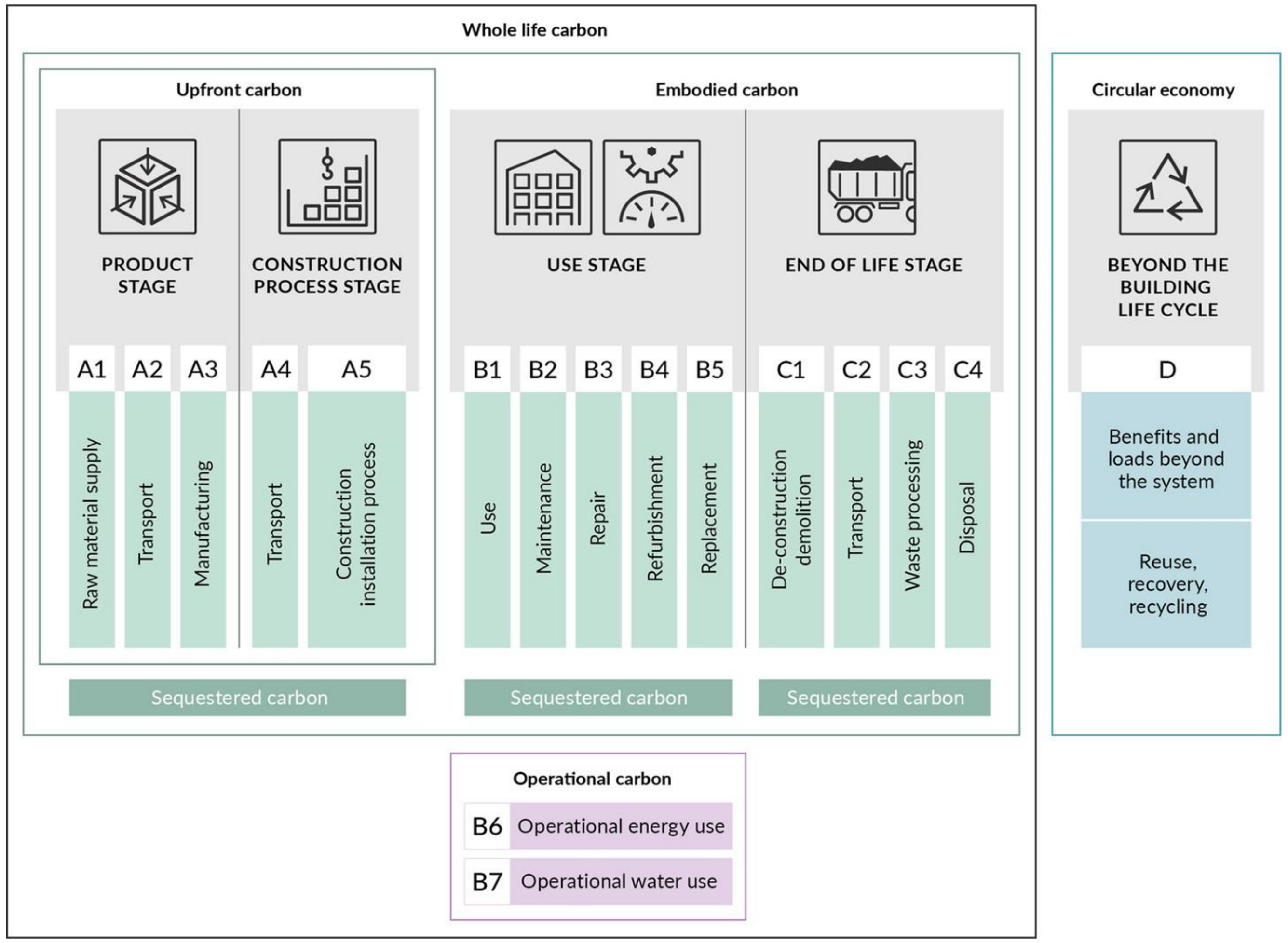



Figure 6: Whole life carbon modules and stages as defined by EN 15978; 7.4

## 3.5 Industry Guidance and Benchmarks.

**RICS whole life carbon.**
The RICS professional statement: Whole Life Carbon Assessment (WLC) for the Built Environment, released in 2017, seeks to standardise WLC assessment and enhance consistency in outputs by providing guidance on implementing the broad appraisal methodology set out in EN 15978: Sustainability of Construction Works. The Greater London Authority have adopted the RICS WLC methodology in their guidance methodology for Whole Life Carbon assessment of referable planning applications. An update to the RICS professional statement was released in September 2023 and is effective from 1st July 2024, superseding the previous version.

### 3.5.1.1 Upfront and Embodied Carbon Targets for Offices.

Industry standards have been produced by LETI, RIBA and the GLA, each providing targets/benchmarks for embodied carbon. These are presented in Figure 7, however, the scope of each differs slightly as follows:

- LETI targets relate to upfront carbon, i.e., building life cycle modules A1-A5.
- LETI targets related to the year of design.
- RIBA targets are the full embodied building life cycle, i.e., building life cycle modules A1-A5, B1-B5, C1-C4.
- RIBA targets are performance based and so relate to the years the buildings are completed.
- GLA benchmarks are broken down into lifecycle modules A1-A5 and B-C.

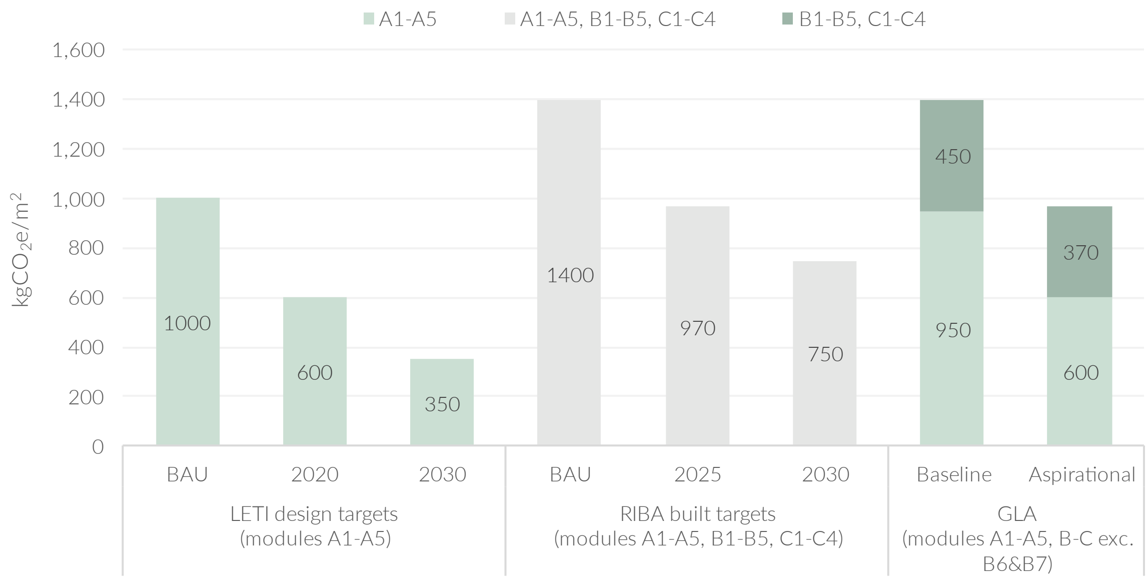



Figure 7: Embodied carbon targets for offices from LETI and RIBA (Source: RIBA Climate Challenge 2020 v2, LETI embodied carbon primer).

## 3.6 Methodology and Inputs.

This report presents estimates for the upfront carbon, embodied carbon and whole life carbon based on a benchmark analysis of the Proposed Development. A full Whole Life Carbon (WLC) assessment in line with the RICS professional statement will be developed during the subsequent stages of design.

**Upfront and embodied carbon.**
In March 2022, the Greater London Authority (GLA) published embodied carbon benchmarks for various building types. These benchmarks represent the anticipated performance for new builds as well as provide aspirational targets. They also break the emissions down by building element, for which the Proposed Development has been compared against. The GLA benchmarks for offices are shown in Table 7.

The Proposed Development includes a significant retention of the substructure and superstructure. In order to predict the performance of the Proposed Development, the level of retention vs new-build area has been used to apportion the GLA benchmarks accordingly.

The area schedule used to inform the assessment is shown in Table 6.

Table 6: Area schedule

| Element | Gross Internal Area (GIA) $m^2$ |
|---|---|
| Retained | 3,076 |
| Extension | 992 |
| Total area | 4,068 |
| Area of demolition | 0 |

Table 7: GLA Whole Life Carbon benchmarks for offices

| Element | GLA Benchmark ($kgCO_2e/m^2$) | | GLA Aspirational ($kgCO_2e/m^2$) | |
|---|---|---|---|---|
| | Upfront Carbon (A1-A5) | In Use Embodied Carbon (B1-B5, C1-C4) | Upfront Carbon (A1-A5) | In Use Embodied Carbon (B1-B5, C1-C4) |
| Substructure | 181 | 5 | 114 | 4 |
| Superstructure | 342 | 18 | 216 | 15 |
| Façade | 162 | 95 | 102 | 78 |
| Internal Finishes | 95 | 122 | 60 | 100 |
| FFE | 19 | 41 | 12 | 33 |
| Services/MEP | 133 | 158 | 84 | 130 |
| External Works | 19 | 14 | 12 | 11 |
| Total | 950 | 450 | 600 | 370 |

Baseline and aspirational targets for the Proposed Development have been established from the benchmarks in Table 7, when considering the following assumptions:

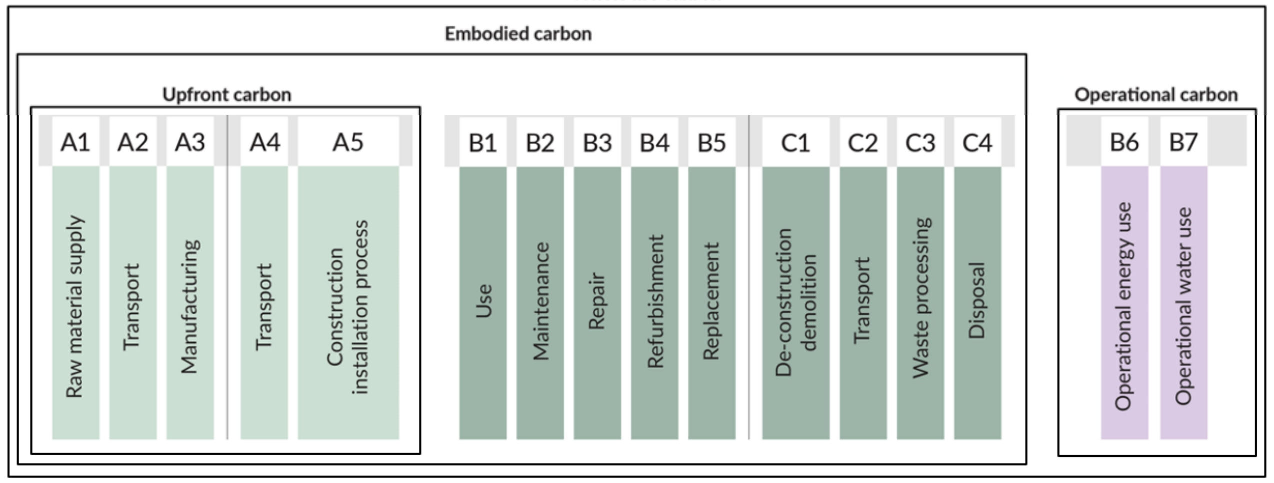
- The substructure is fully retained and therefore no new materials are needed for this element.
- The only new superstructure is within the extension on level 4.
- An allowance for construction site emissions has been added.

– Full replacement of the following elements: façade, internal finishes, fitting, furnishings & equipment (FFE), services and external works.

**Operational energy.**
The anticipated operational energy performance of the Proposed Development has been estimated using the RIBA 'Business As Usual' (BAU) consumption figure of 130 kWh/(m$^2$.year). This has been converted to carbon emissions over a 60-year study period using the FES Falling Short decarbonisation trajectory emission factors.

### 3.7 Whole life carbon results.

**Summary**
Using the GLA benchmarks, the baseline and aspirational performance of the Proposed Development has been estimated. Figure 8 demonstrates how these are broken down by life cycle module and Figure 9 provides a comparison against the available benchmarks. The performance surpasses the GLA benchmarks due to the significant retention of the substructure and superstructure.




| Plot | Upfront Carbon (A1-A5) kgCO2e/m$^2$ | Embodied Carbon (A1-A5, B1-B5, C1-C4) kgCO2e/m$^2$ | Whole Life Carbon (A1-A5, B1-B7, C1-C4) kgCO2e/m$^2$ |
|---|---|---|---|
| Baseline performance | **560** | **1,010** | **1,285** |
| Aspirational performance | **372** | **742** | **1,017** |

Figure 8: Whole life carbon breakdown by life cycle module of the baseline and aspirational performance of the Proposed Development.

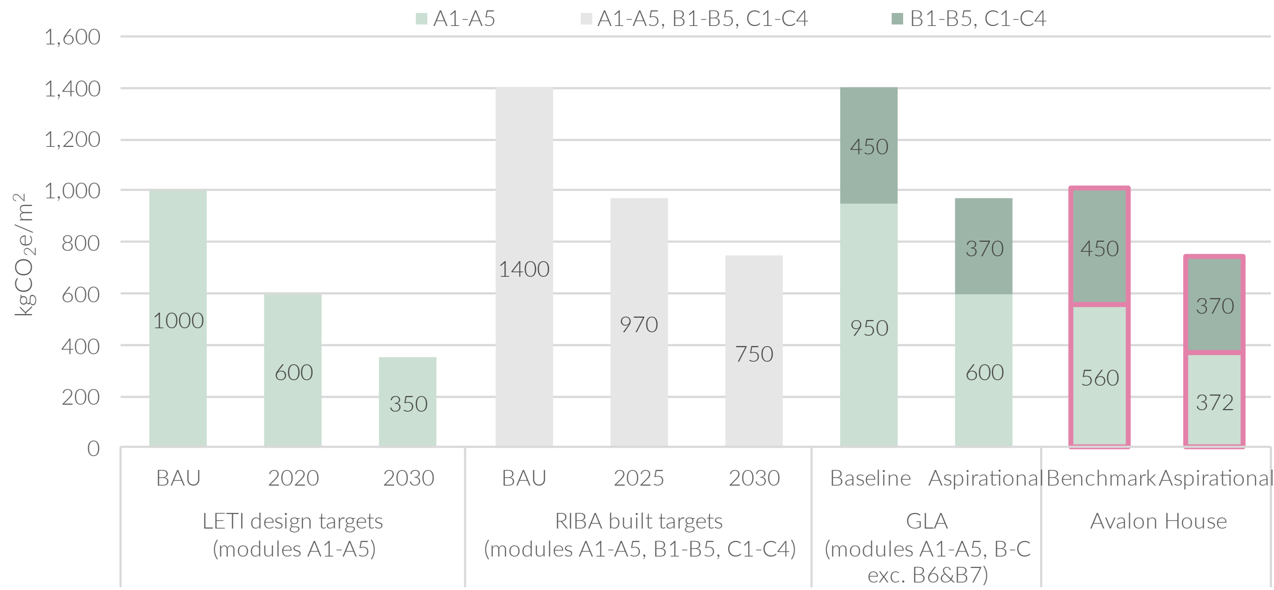



Figure 9: Comparison of the Proposed Development with benchmarks.

**Upfront carbon.**
Table 8 and Figure 10 provide a breakdown of the upfront carbon by building element. Both the baseline and aspirational performance are presented which will be used as targets for the development throughout the remainder of the design.

Table 8: Upfront carbon breakdown by building element.

| Element | GLA Benchmark (kgCO2e/m$^2$) | | Avalon House (kgCO2e/m$^2$) | |
|---|---|---|---|---|
| | Benchmark | Aspirational | Benchmark | Aspirational |
| Substructure | 181 | 114 | 0 | 0 |
| Superstructure | 342 | 216 | 82 | 52 |
| Façade | 162 | 102 | 162 | 102 |
| Internal Finishes | 95 | 60 | 95 | 60 |
| FFE | 19 | 12 | 19 | 12 |
| Services/MEP | 133 | 84 | 133 | 84 |
| External Works | 19 | 12 | 19 | 12 |
| | 0 | 0 | 50 | 50 |
| Total | 950 | 600 | 560 | 372 |

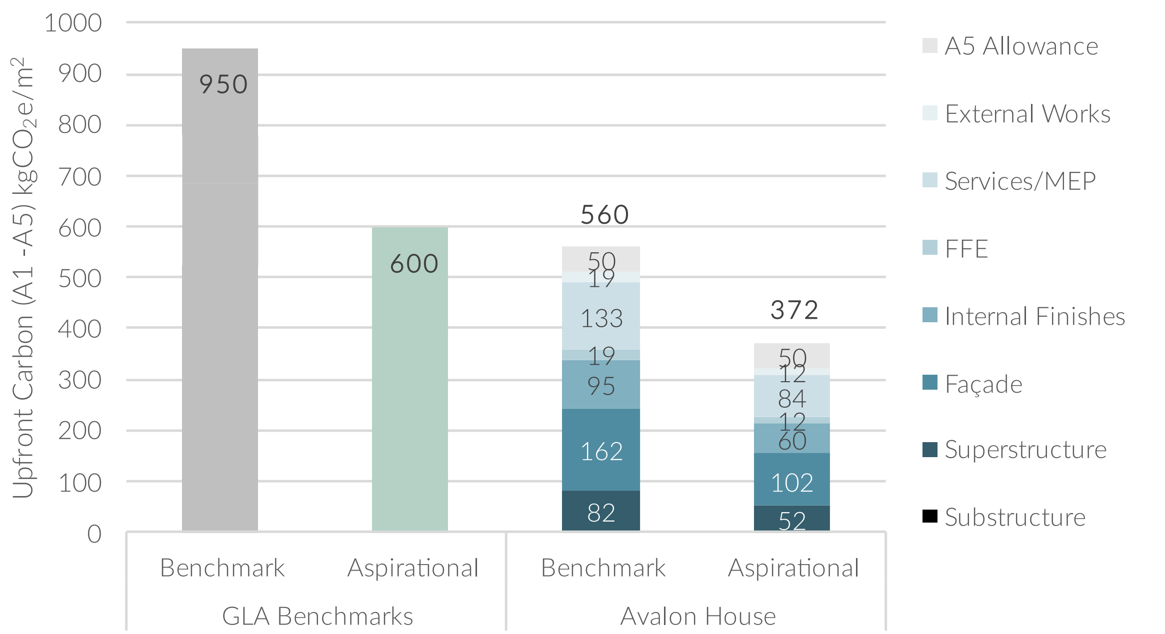



Figure 10: Upfront carbon baseline and aspirational performance of the Proposed Development comparison against benchmarks.

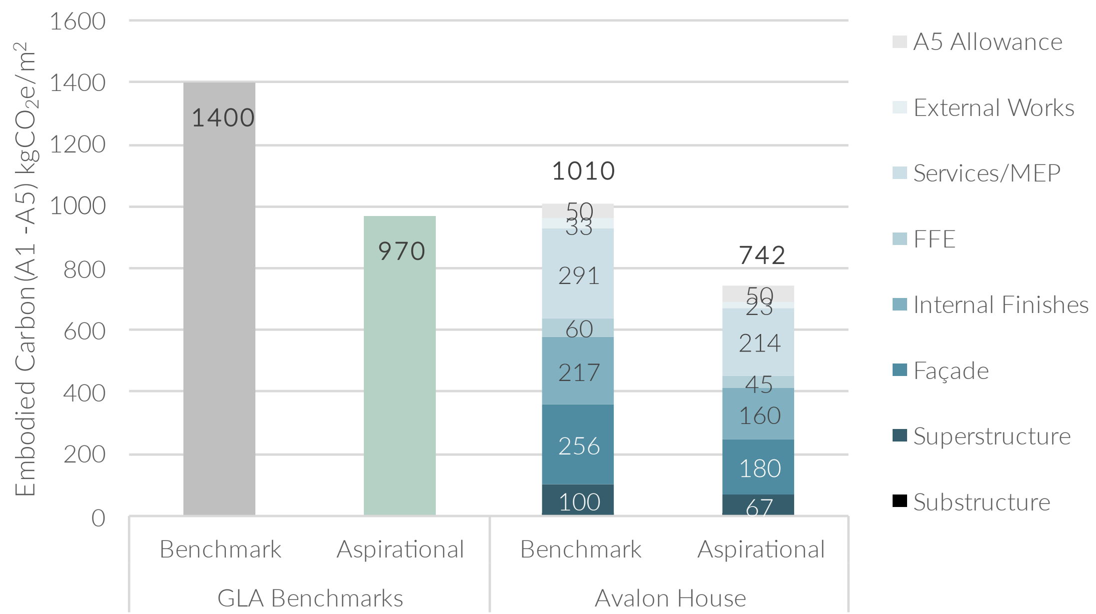



Figure 11: Embodied carbon baseline and aspirational performance of the Proposed Development comparison against benchmarks.

**Embodied carbon.**
Table 9 and Figure 11 present the anticipated embodied carbon performance of the Proposed Development. This now captures the carbon emissions over a 60-year operation of the building, excluding those from operational utility consumption.

Table 9: Embodied carbon breakdown by building element.

| Element | GLA Benchmark (kgCO₂e/m²) | | Avalon House (kgCO₂e/m²) | |
|---|---|---|---|---|
| | Benchmark | Aspirational | Benchmark | Aspirational |
| Substructure | 185 | 118 | 5 | 4 |
| Superstructure | 360 | 231 | 100 | 67 |
| Façade | 256 | 180 | 256 | 180 |
| Internal Finishes | 217 | 160 | 217 | 160 |
| FFE | 60 | 45 | 60 | 45 |
| Services/MEP | 291 | 214 | 291 | 214 |
| External Works | 33 | 23 | 33 | 23 |
| | 0 | 0 | 50 | 50 |
| Total | 1400 | 970 | 1010 | 742 |

**Whole life carbon.**
In Figure 12, the embodied carbon results have been coupled with the anticipated operational energy and water consumption of the Proposed Development to give the Whole Life Carbon results over a 60 year period.

The operational utility consumption has been estimated using the RIBA 'BAU' operational energy benchmark of 130 kWh/(m².year) and a water consumption of 55 lt/person/year from BSRIA rules of thumb.

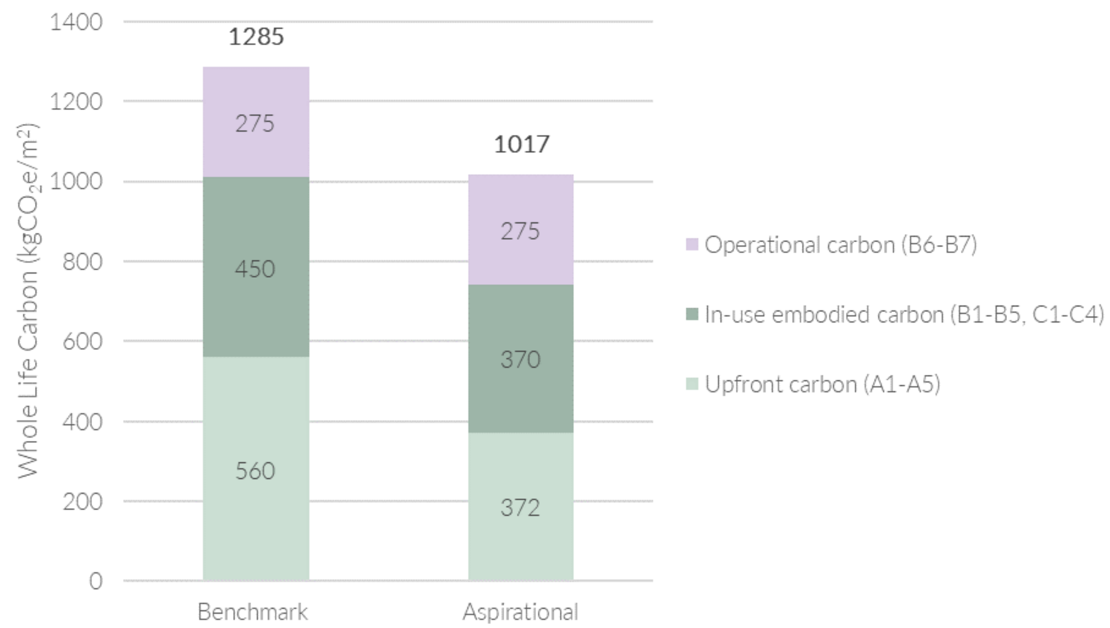



Figure 12: Estimated whole life carbon performance of the Proposed Development.

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