Circular Economy Statement

Britannia Street Car Park

January 2025

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Circular Economy Statement

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Client Name:	Curlew Developments London Limited
Produced:	Ensphere Group Ltd
Document Reference:	23-E049-016

Quality Assurance Approval Status

This document has been prepared and checked in accordance with Ensphere Group Ltd.'s Quality Management System.

Issue:	Version:	Prepared:	Reviewed:	Approved:	Date:
Final	1	Danielle Cawley	Pete Jeavons	Pete Jeavons	January 2025

Report Outline

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Executive Summary

This Statement presents the circular economy strategic approaches and aspirations for a proposed development at Britannia Street Car Park, London, WC1X 9BP.

The proposals are for the redevelopment of an existing brownfield site for Purpose-Built Student Accommodation in addition to community floorspace.

Consideration has been given to the most appropriate Circular Economy strategic approaches based on the nature and predicted lifespan of the development.

The application of Circular Economy philosophy to the built environment is complex with issues overlapping and trade-offs to consider. Nevertheless, a balanced approach has been sought in line with the overarching commitments to sustainable design and construction.

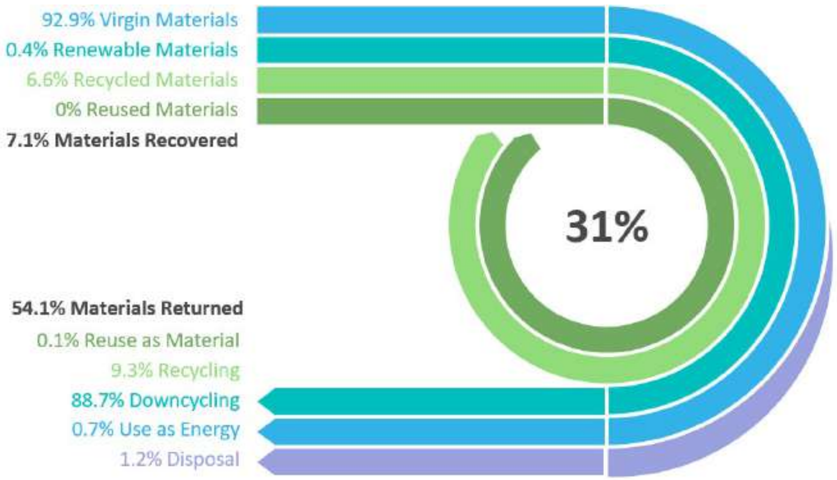

Figure ES.1 – Building Circularity (Reproduced from OneClick LCA Results)

The aspiration to implement measures that go beyond standard practice will continue to be considered as the design progresses through regular workshops with the design team and during the construction process.

A range of commitments are proposed; and these will be managed and recorded through a range of documentation including a Sustainable Procurement Plan, Site Waste Management Plan, Building User Guide and Operational Waste Management Plan.

Key commitments for the scheme include:

- Design for adaptability and flexibility, using materials that have high durability for longevity.
- Maximising use of reused and recycled materials within the design.
  - Aiming for 50% reclaimed steel across structural frame and >25% cement replacement (recycled product or GGBS).
  - Best endeavours will be made to allow the scheme to align with GLA guidance of reusing/recycling at least 20% by value of materials.
- Diversion of demolition and construction waste from landfill by converting elements and materials for alternative use.
  - Aiming for 95% reuse/recycling/recovery of construction and demolition waste, as well as targeting 95% beneficial use of excavation waste.
- Efficient construction and operational waste management via accessible, dedicated areas for segregated waste volumes.
  - The development will aim to recycle 65% of municipal waste by 2030, in accordance with the London Plan policy target.

Overall, the design for the scheme will account for the overarching values of the Circular Economy including conserving resources, designing to eliminate waste and managing waste sustainably.

1. Introduction

Ensphere Group Ltd was commissioned by Curlew Developments London Limited to produce a Circular Economy Statement for a proposed development at Britannia Street Car Park, London, WC1X 9BP.

Site and Surroundings

The application site (the 'Site'), which is 0.1 hectares in size, is located in the Kings Cross Ward of the London Borough of Camden, bounded by Britannia Street to the north; the three storey 'Help Musicians Building' and six storey Derby Lodge buildings to the east; Wicklow Street to the south; and by London Underground railway lines (in a cutting) to the west. The Thames Link railway line also runs in a shallow tunnel beneath the western half of the Site.

The Site comprises undeveloped hardstanding in use as a public car park and includes a ventilation shaft linked to the Thames Link railway tunnel running below the Site.

The area surrounding the Site was historically industrial and residential in nature with the Site itself having previously been occupied by a 3-storey warehouse. While the area generally retains its historic built from, forming part of the Kings Cross St Pancras Conservation Area, over time the areas industrial uses have been replaced by office, creative and additional residential uses (including student accommodation). Building heights in the area generally range from two to six storeys, while the consented redevelopment of the nearby Royal National Throat, Nose and Ear Hospital (located to the south-west of the Site) permits the delivery of building up to 13 storeys tall.

The Site benefits from a high PTAL rating of 6b ('Excellent'), Kings Cross and St Pancras Railway and Underground Stations are located within 370 metres / 7-minute walk from the Site. There are also a number of bus stops within close proximity, with bus stops located at Grays Inn Road and Kings Cross Road.

Given the Sites proximity to various Universities including Central Saint Martins, Aga Khan University Institute, University of London & UCL within short walking and cycling distance of the Site, and its location within the 'Knowledge Quarter', the Site is an ideal location for students.

Proposed Development

The proposals are for the redevelopment of an existing brownfield site for Purpose-Built Student Accommodation in addition to community floorspace.

For this Circular Economy Assessment, the spatial boundary is consistent with the red-line site boundary presented in support of the planning application. This is shown in the figure below as well as Appendix A, with detailed drawings submitted separately as part of the application.

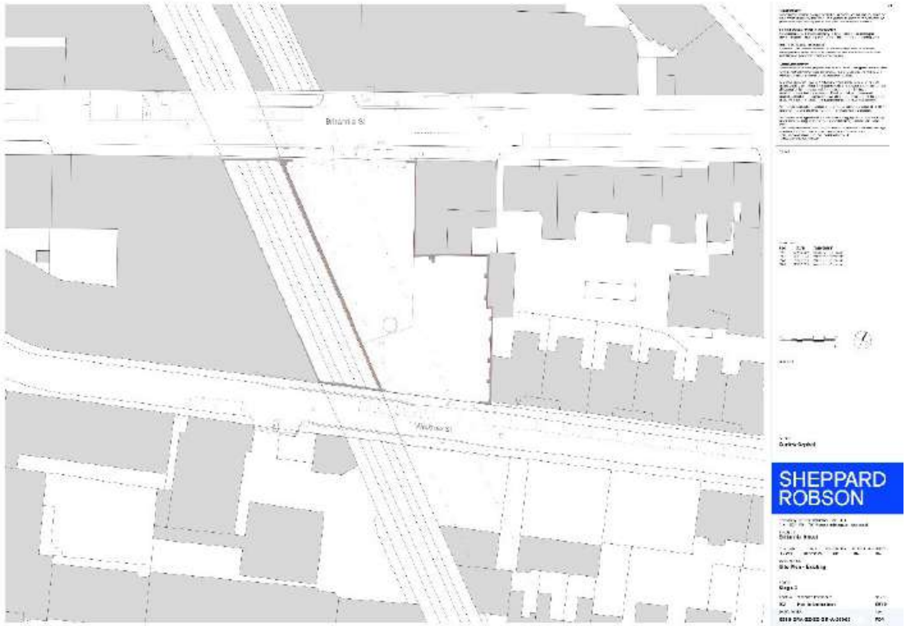

Figure 1.1 – Site Red Line Boundary (Produced by Sheppard Robson)

Report Objective

The objective of the Circular Economy Statement is to demonstrate how the proposed development will incorporate circular economy measures into all aspects of the design, construction and operation process.

The purpose being to ensure schemes:

- Consider strategies to facilitate the transition towards a circular built environment.
- Report against numerical targets that will facilitate monitoring of waste and recycling.
- Recognise opportunities to benefit from greater efficiencies that can help save resources, materials, and money.

2. Planning Context

The circular economy principles and waste are referenced throughout planning policy, with consideration given to relevant local policies and guidance, as per summarised in this section.

Figure 2.1 – Tiers of Key Relevant Planning Policy

National Context

National Planning Policy Framework (2023)

The National Planning Policy Framework (NPPF) was updated in December 2023. Paragraph 7 of the revised NPPF include reference to the following:

> *"The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs."*

Minimising emissions and waste are listed as part of the "environmental objective" in relation to achieving sustainable development.

National Planning Policy for Waste

The National Planning Policy for Waste sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management.

It includes reference to the Waste Hierarchy, which is presented in the figure below.

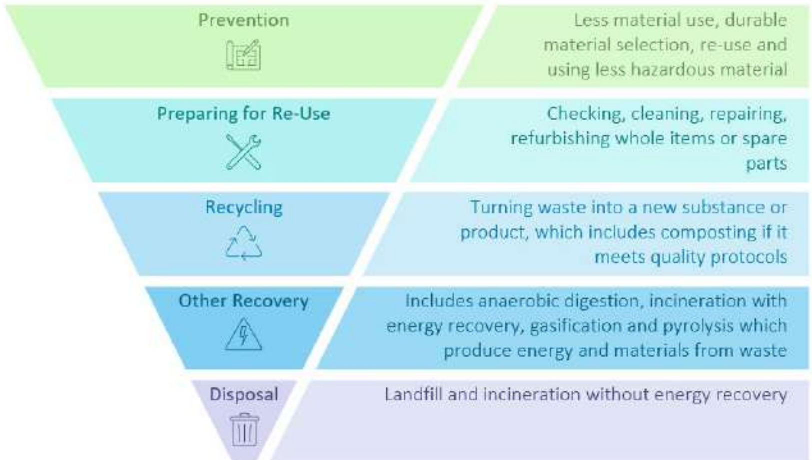

Figure 2.2 – The Waste Hierarchy (Adapted from the 'Waste Management Plan for England' 2013)

The document sets out detailed waste planning policies. It should be read in conjunction with the National Planning Policy Framework, the Waste Management Plan for England and National Policy Statements for Waste Water and Hazardous Waste, or any successor documents. All local planning authorities should have regard to its policies when discharging their responsibilities to the extent that they are appropriate to waste management.

The document states that planning should ensure the design and layout of new residential and commercial development and other infrastructure complements sustainable waste management, including the provision of appropriate storage and segregation facilities.

London Context

London Plan (2021)

The London Plan is a broad plan setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The Plan introducing the concept of "Circular Economy", defining it as:

> *"An economic model in which resources are kept in use at the highest level possible for as long as possible in order to maximise value and reduce waste, moving away from the traditional linear economic model of 'make, use, dispose'."*

Policies considered pertinent the Circular Economy are listed below:

- Policy GG5 (Growing a Good Economy) - those involved in planning and development must recognise and promote the benefits of a transition to a low carbon circular economy to strengthen London's economic success.
- Policy GG6 (Increasing Efficiency and Resilience) - those involved in planning and development must seek to improve energy efficiency and support the move towards a low carbon circular economy.
- Policy D3 (Optimising Site Capacity Through the Design-led Approach) - Development proposals should aim for high sustainability standards and take into account the principles of the circular economy.
- Policy SI7 (Reducing Waste and Supporting the Circular Economy) – requires applications to promote circular economy outcomes and aim to be net zero-waste. Requires submission of a Circular Economy Statement with referable applications.

London Plan Guidance – Circular Economy Statements (2022)

This guidance document explains how to prepare a Circular Economy Statement to accompany strategic planning applications referred to the Mayor as set out in London Plan Policy SI7.

London Plan Policy SI 7 requires a Circular Economy Statement to be submitted for referable applications to demonstrate 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, how much waste the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy as well as how performance will be monitored and reported.

North London Waste Plan (Adopted 2022)

The North London Waste Plan (NLWP) has been prepared jointly by the seven North London Boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest. The NLWP's purposes is to ensure there will be adequate provision of suitable land and to provide policies for waste development.

Local Context

Camden Local Plan (July 2017)

The Local Plan sets out the planning policies, site allocations and land designations Borough-wide and is the central document in the Borough's Development Plan.

The following policies are considered relevant to this report:

- Policy D1 (Design) – includes a requirement for development to be sustainable with regards to design and construction, incorporating best practice in resource management and climate change mitigation and adaptation.
- Policy CC1 (Climate Change Mitigation) – promotes zero carbon development, consideration of the Energy Hierarchy (encouraging connection to District Energy Networks), reduced reliance on transport by car and resource efficiency.
- Policy CC5 (Waste) – developments need to include facilities for the storage and collection of waste and recycling, in line with Council waste targets.

Camden Planning Guidance – Energy Efficiency & Adaptation (January 2021)

This document was adopted on 15 January 2021 following statutory consultation and replaces the Energy efficiency and adaptations CPG (March 2019), which replaced the CPG3 Sustainability (July 2015).

This guidance provides information on key energy and resource issues within the borough and supports Local Plan Policies CC1 Climate change mitigation and CC2 Adapting to climate change.

- Includes requirements concerning credits under certain BREEAM categories (60% energy, 60% water and 40% materials); and reference to a 20% carbon reduction target using renewables.
- Where developments are likely to be at risk of overheating applicants will be required to complete dynamic thermal modelling to demonstrate that any risk to overheating has been mitigated.
- The document also has a section on reuse and optimising resource efficiency, stating that a Condition and Feasibility Study should be undertaken to understand the reuse potential of the existing building for any development proposing substantial demolition. Taking into account the condition of the existing building and feasibility of re-use, the refit, refurbish, substantial refurbishment and extension, reclaim and recycle hierarchy should be used to explore all potential options of an existing site.

3. Circular Economy Principles and Design Approach

Defining Circular Economy

London Plan Policy SI 7 defines a circular economy (CE) as:

> "…one where materials are retained in use at their highest value for as long as possible and are then reused or recycled, leaving a minimum of residual waste."

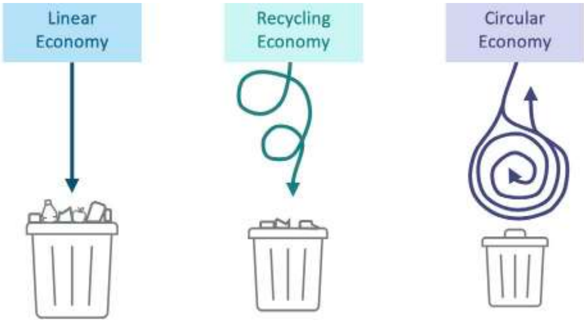

Figure 3.1 – CE model, compared to the linear and recycling economies (reproduced from Circular Flanders)

Circular Economy Principles

The principles of circular economy follow the waste hierarchy (described in the previous section) as they prioritise the minimisation and prevention of waste. The circular economy principles as per detailed in the London Plan and associated guidance are summarised as follows:

1. building in layers – where different layers should be independent, accessible and removable whilst maintaining their value to enable replacement, reuse, and recycling where possible.
2. designing out waste – ensuring that measures to reduce waste are planned throughout the various project phases from the start.
3. designing for longevity – avoiding premature end of life for all components through considering maintenance and durability.
4. designing for adaptability or flexibility – to allow the building to be easily altered to prolong its life to enable different uses or patterns of use, catering to the changing needs of occupants. Adaptability relates more to building structural changes, whereas flexibility links more to floorplates.
5. designing for disassembly - to facilitate reuse or recycling, this allow the building and its components to be taken apart with minimal damage.
6. using systems, elements or materials that can be reused and recycled in line with the waste hierarchy.

To implement Circular Economy principles most effectively, high level strategic opportunities have been explored early in the development process. As part of the proposal design process, several sustainability-focused workshops conducted with the client and key project team members including the architect, MEP consultant and structural engineer to ensure that sustainability is core to the scheme design and that a holistic approach is adopted for the development. As well as whole life carbon, these discussions have also considered the circular economy principles including resource efficiency and sustainable sourcing, as well maximising the longevity of the development.

Circular Economy Design Approaches

CE design approaches are not mutually exclusive. It is an expectation that multiple approaches will be adopted for each project, development aspect, layers or uses, particularly for larger developments.

Design Approaches for Existing Structures / Buildings

The GLA CES Guidance provides a "decision tree" for developments proposals to follow to inform the design process. Where conducted, pre-redevelopment and pre-demolition audits, as well as the Whole Life Carbon Assessment should help guide this and ensure alignment. Justification is needed for the approach selected, particularly if it is lower down the hierarchy, although it is noted in the guidance that there may be alternative planning reasons which may override the process presented below (such as heritage considerations).

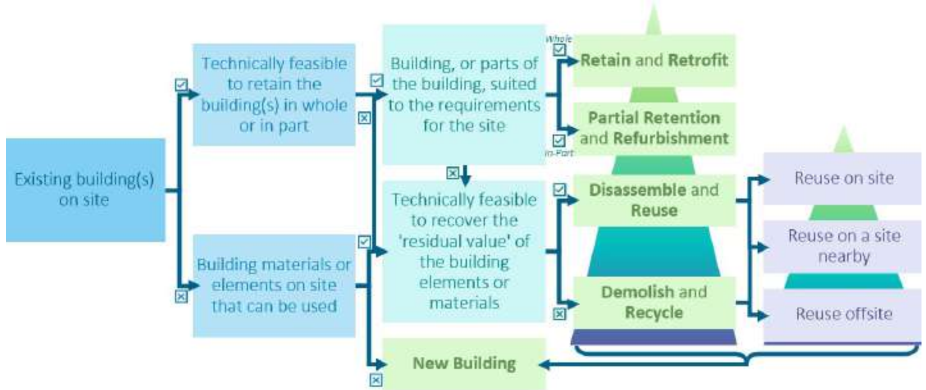

Figure 3.2 – Decision tree for design approaches for existing structures/buildings (reproduced from the London Plan CES Guidance)

Pre-redevelopment and pre-demolition audits can help to determine whether existing buildings, components and materials can be retained, refurbished, or incorporated into the new development, and detail how any demolition materials that do arise will be managed.

For the site assessed in this report, there are no existing buildings and materials are limited to the undeveloped hardstanding in use as a public car park. Given there are no existing buildings on site, the pre-redevelopment and pre-demolition audits were not considered required and options in line with the decision tree are similarly reduced. A new building is proposed, however any won materials, such as the existing hardstanding, will aim to be reused on site. The approach taken is summarised in Table 3.1.

Table 3.1 – CE Design Approaches for the Existing Site/Structures

Approach	Adopted Strategic Design Approach for the Existing Site / Structures
Retain and Retrofit	This approach prioritises the retention of building fabric, with the building refurbished for the same or new uses through restoring, refinishing, retrofitting and future-proofing. Given there are no existing buildings on site, this is not applicable to this project.
Partial Retention and Refurbishment	This approach aims to retain carbon-heavy aspects of the building, with replacement of some elements of the building. Given there are no existing buildings on site, this is not applicable to this project.
Disassemble and Reuse	This approach allows for sections of a building to be disassembled to enable their direct reuse ideally on the site or, where this is not possible, off site (with nearby sites preferred). If reuse is not possible, materials may be carefully and selectively separated for processing and recycling into new elements, materials and objects. Existing materials are limited to the undeveloped hardstanding. The type of hardstanding makes it difficult to disassemble the element in whole or part. Nevertheless, the hardstanding can be crushed for reuse in the proposed development (such as within the foundations).
Demolish and Recycle	Traditional demolition, with elements and materials processed into new elements, materials and objects for use on the site or on another site. As above, existing materials are limited to the undeveloped hardstanding and in line with the waste hierarchy the hardstanding can be crushed for reuse in the proposed development (such as within the foundations or landscaping design). Good practice measures will be adopted to maximise recovery of any won materials via reuse, reclamation or recycling. This will involve effective material segregation, appropriate storage and monitoring waste flows, as well as partnering with local organisations where feasible to direct elements for onward reuse, if unable to be incorporated on site.

Design Approaches for New Developments

The adopted design approach to circular economy for the new structures on site has been guided by the decision tree shown below and the applicable CE design approaches. The proposed development is intended to be long-lasting with minimal change over its life span and as such it has been designed to meet the principles of longevity, satisfying the potential needs of the user whilst being durable and resilient against a changing climate. Nevertheless, the proposals also aim to be adaptable and flexible to alternative uses should this be necessary in the future.

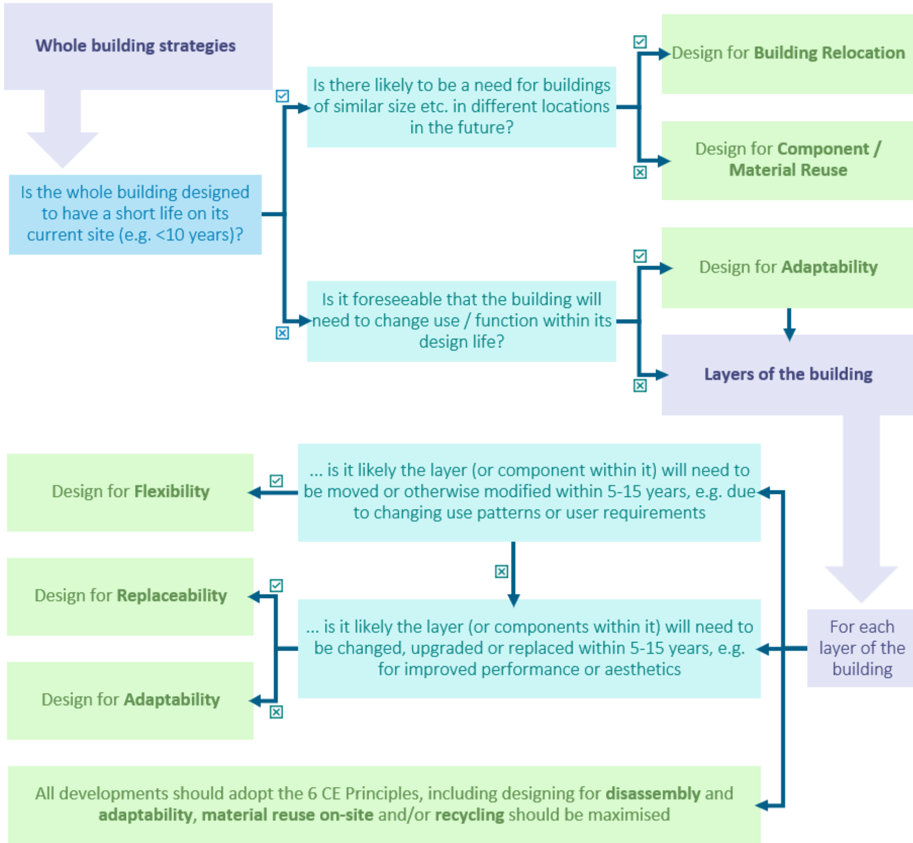

Figure 3.3 – Decision tree for design approaches for new buildings, infrastructure and layers over the lifetime of development (reproduced from the London Plan CES Guidance)

The strategic approach to design is summarised in Table 3.2 which explains how the principles of circular economy have been integrated into the design of the new development which comprises Purpose-Built Student Accommodation in addition to community floorspace.

Table 3.2 – CE Design Approaches for New Buildings

Approach	Strategic Design Approach for the Proposed Development
Building Relocation	For this development, the design is cantilevered to maximise use of the site area whilst catering for the constraints relating to the Thames Link railway tunnel running below the Site. Therefore, relocating to a different site, either by moving as a whole or disassembling into large modules will likely be difficult due to the scale of the proposed building and potential structural issues. Nevertheless, this aspect will be further considered as the design progresses.
Component or Material Reuse	Efforts will be made to maximise use of reused or recycled materials by opting for materials with higher recycled content and reusing existing materials on site. Thus, best endeavours will be made to allow the scheme to align with GLA guidance of reusing/recycling at least 20% by value of materials. Reclaimed products and those with a higher recycled content will be sought where available, with preference given to materials that can also be sourced locally. Current targets include aiming for 50% reclaimed steel across structural frame and using 25% GGBS (or other cement replacement alternatives). The materials used will be responsibly sourced, with suppliers being used that are able to provide BES6001 certification and ISO14001, where possible. All timber and timber-based products should be sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of forestry Certification (PEFC) source. It is anticipated that the main contractor will have in place a Sustainable Procurement Plan to aid this process. It is expected that all waste will be managed in accordance with the waste hierarchy. Throughout the lifetime of the building, the same principles will apply as building elements reach their end of life. An Operational Waste Management Plan will be in place to manage waste arisings and encourage reuse/recycling across the scheme. Similarly in handover information, details will be provided as to how key components of the building can be managed at the highest level, prioritising reuse and recycling.
Adaptability	The adaptability of the floorplan design has been considered. Opportunities for adaptation of the PBSA to care-home, hotel or co-living spaces have been explored and documented in the Design and Access Statement. These would require works to the internal structure and will need to be considerate of relevant design policy. The proposed development is also being assessed under the BREEAM New Construction scheme, with credits targeted under Wst06 (Design for Disassembly and Adaptability).
Flexibility	The spaces are designed for flexible uses to allow reconfiguration of non-structural parts. For instance, complex party wall arrangements will be kept to a minimum where possible. The Design and Access Statement shows the flexibility for a range of floor levels depending on the building type and user requirements.
Replaceability	The building elements/materials will be designed and selected to facilitate easy removal and upgrade. Standardised components and sizing across the scheme will be specified where possible to enable this process.
Disassembly	The building will be designed for disassembly, where possible, to maximise material recovery in the future and reduce the quantity of materials wasted. Consideration has been given as to how the building materials, components and products will be disassembled and reused at the end of their useful life. Across the project, preference will therefore be given to mechanical fixings rather than adhesives or cements where feasible to allow for deconstruction and reuse of individual components. As part of the BREEAM certification, credits have been targeted under Wst06 (Design for Disassembly and Adaptability).
Longevity	Longevity will be key in material selection for the structure and skin and, to a lesser extent, services, space and stuff (although other factors may dominate here). This approach will require the balancing of priorities between potentially competing factors (e.g., embodied carbon vs recyclability). Elements will be chosen based on the long-term needs, maintenance requirements and durability. A preference will be given to more resilient material products with longer lifespans to reduce the need for replacement. To reduce the need to repair and replace materials, suitable resilience and protection measures will be adopted, particularly for parts of the building vulnerable to damage due to high usage or where elements are exposed and therefore at risk of degradation due to environmental factors. This will include measures such as kickplates on doors, hard-wearing and easily washable floor finishes as well as wall protection in areas of high pedestrian traffic in key circulation areas. As part of the BREEAM New Construction certification, credits are targeted under Mat05 (Designing for Durability and Resilience), Wst05 (Adaption to Climate Change) and Wst06 (Design for Disassembly and Adaptability).

4. Circular Economy Principles by Building Layer

The building in layers framework has been implemented in the design of proposed development whereby, the building or development is understood through its 'layers' with each layer having its own life cycle, life span, and relevant CE design approaches and solutions.

In line with the London Plan CES Guidance, to support reuse and recycling, where possible, the different layers should be independent, accessible and removable whilst maintaining their value. This is particularly key for layers that may need more frequent replacement.

The building layers and equivalent building elements are summarised as follows:

- Site - geographical location, context, external works, earth works and landscaping.
- Skin / Shell – includes the façade and other exterior surfaces such as the roof, siding, sheathing and windows. This layer is typically most significant for long-term durability, occupant comfort and building-energy performance as it keeps out water, wind, heat, cold, direct sunlight and noise.
- Structure / Frame – Load-bearing elements above the ground including roof-supporting structure. This layer is generally the most long-lasting.
- Substructure – Excavations, foundations, basements and ground floors.
- Services (Building) – Includes plumbing, heating, cooling, ventilation and electric installations, ensuring comfort, practicality, accessibility and safety. Distribution systems can be hard to change.
- Space Plan / Interior – The layout, internal walls and partitions, ceilings, floors, surface finishes, fixtures, doors, fitted furniture. These elements can be changeable without altering structure, services or skin.
- Stuff / Contents – Anything that could fall if the building was turned upside down, and therefore includes items that are 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.

The CE design approaches are applicable to each layer depending on its function and expected lifespan, with Table 4.1 detailing how these have been embedded across the building layers of the proposed development. The commitments listed below are only those that hold the greatest opportunities, representing the strongest commitments that go above and beyond standard practice.

This should also be read in conjunction with the Whole Life Carbon Assessment submitted as part of the application as consideration is also given to the carbon emissions associated with the building design and material specification. A balance has thus been sought to ensure high circularity whilst minimising life cycle emissions.

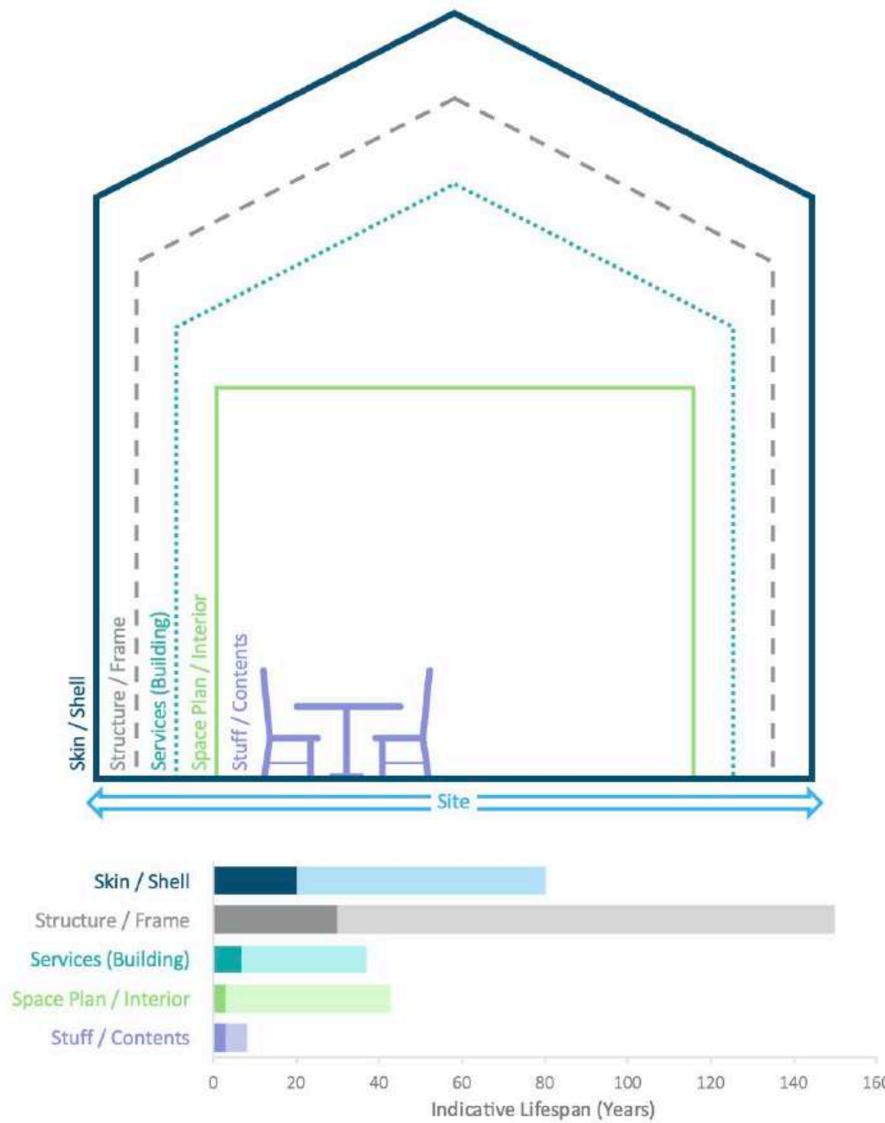

Figure 4.1 – Building Layers and their Indicative Lifespan Range (adapted from the London Plan CES Guidance)

Table 4.1 – Circular Economy Design Principles by Building Layer

		Site	Substructure	Superstructure	Shell/Skin	Services	Space	Stuff	Construction Stuff
Designing Out Waste	Module A – Product Sourcing and Construction Stage	A Whole Life Carbon Assessment has been undertaken to reduce embodied carbon emissions. This has been conducted in conjunction with the CE assessment to ensure a balance is achieved between potentially competing factors (such as a material upfront carbon vs recyclability). Massing optimisation studies have been undertaken to ensure an efficient use of the site and overall building form, helping to also minimise materials required. Aiming for best practice construction resource efficiency, targeting $\leq 3.4m^3$ or ≤3.2 tonnes per $100m^2$ of the gross internal floor area for construction waste. This will be managed through the Site Waste Management Plan. Contractor is expected to develop and implement a site specific Sustainable Procurement Plan to ensure materials sourced locally and those that are reuse or recycled are prioritised.	Maximise efficiency through design value engineering whilst being considerate of site constraints. This aims to reduce the quantity of materials used in the construction process, minimising waste, carbon emissions and cost (see also Whole Life Carbon Assessment submitted with the application). A lightweight structure is being used to reduce foundation structural requirements and thus materials needed. Reclaimed products and those with a higher recycled content will be sought where available. Reuse of existing site materials (e.g. hardstanding to be crushed and used in the foundations where possible). This is expected to be managed through the contractor's Sustainable Procurement Plan.	Optimisation of the building form to increase efficiency where possible to reduce need for additional materials. 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. Reclaimed products and those with a higher recycled content will be sought where available, with preference given to materials that can also be sourced locally as well as materials that are easily recyclable at end of life. Current targets include 50% reclaimed steel across the structural frame and using 25% GGBS (or other cement replacement alternatives).	The design aims to use repetitive sizing throughout the scheme for elements such as windows, to help with standardisation and reuse of components at end of life, whilst maintaining architectural character. Adopting lean design principles, with consideration also given to other factors such as daylighting and thermal comfort. Prefabricated items, or those assembled off-site, will be installed, where possible. Thermal efficiency as well as fire resistance will be important considerations during material selection, however efforts will be made to avoid over-specification and thus material wastage.	The development will be future-proofed for district energy through a centralised distribution system. This aims to reduce the extent of system modifications needed in the future and will allow for easy access, maintenance and replacement of equipment installed. System selection will be considerate of factors such as the efficiency of the component, recycled content and recyclability, as well as refrigerant used. The aim is to reduce material wastage whilst being considerate of operational emissions (e.g. refrigerant global warming potential). Prefabricated items, or those assembled off-site, will be installed, where possible.	Products with high recycled content will be specified, providing needs are met (e.g. non-combustible, structurally sound etc.). This is expected to be managed through the contractor's Sustainable Procurement Plan. The aim will also be to maximise responsible sourcing credits under BREEAM, with priority given to certified products such as those under the BES 6001 standard. Specification of standard bathroom fittings or bathroom pods across the scheme for consistency and to minimise wastages. Durability of products, particularly in high traffic / vulnerable areas, will be a priority during the specification process. Prefabricated items, or those assembled off-site, will be installed where possible.	Use of reused and/or recycled products will be prioritised where possible. This is expected to be managed through the contractor's Sustainable Procurement Plan. Durability of products will also be a key factor to consider during the specification process.	Collaboration with suppliers is intended to minimise packaging for construction deliveries and promoting re-use. If available, takeback schemes will be utilised for any surplus materials and/or packaging. Any temporary structures will also be reused from other sites where possibles. Just-in-time delivery will be employed to minimise material wastage. Careful site management and storage of materials will help to prevent damage and in turn wastage. The contractor is expected to develop and implement a Resource Management Plan in order to ensure the waste hierarchy is followed and suitable procedures are in place.
	Module B – In-Use Stage	A Whole Life Carbon Assessment has been undertaken to reduce emissions across the life cycle of the development including operational carbon emissions.	The substructure will be designed with potential adaptability scenarios in mind to facilitate different use types in the future without changes to the	The building form, glazing proportions and proposed constructions aim to minimise heat losses, maximise daylight and ensure good acoustics whilst maintaining adequate thermal comfort levels	By incorporating a simplified facade system, this ensures that components are easily accessed and maintained. Proposed design features such as	Renewable energy generation via roof mounted photovoltaics, and use of air source heat pumps for heating will allow the energy strategy to become net zero overtime, in line with the national grid	Finishes are to be hard wearing and low maintenance to lengthen repair and replacement cycles, as well as reduce management resources.	Efficient and durable fittings are to be installed where appropriate to prevent having to replace and refit due to damages or loss of function.	

		Refuse storage location and sizing considerate of easy access for building users and management facilities, as well as potential future occupier needs.	foundation structural requirements.	for building users. Lean design principles have been adopted and balanced with the above factors to avoid unnecessary material use but at the same time also optimising in use performance.	shading have been tested early in the design process to ensure optimal daylighting and thermal comfort conditions, in turn reducing energy demands.	decarbonisation (see Energy Statement for targets). Detailed M&E studies will be conducted to ensure energy systems meet expected demand, whilst reducing over specification. The design is also future-proofed for district energy. Efficient systems and controls are to be installed on both heating and water services in order to reduce and manage demand on resources.	Protective measures will also be installed in order to improve durability.	Mechanical fixings of the fittings are to be considered to allow easy replacement if needed.	
	Module C – End-of-Life Stage	A Whole Life Carbon Assessment has been undertaken to reduce emissions across the life cycle, including consideration of the potential end-of-life scenarios for building components. In this CES, more detailed strategies are provided to enable building materials and components to be disassembled and reused at the end of their useful life.	The substructure is designed for longevity, however both the steel and concrete components will have the potential to be re-used and recycled at the end of the service life.	Priority will be given to materials that can be re-used and recycled at end-of-life. For instance, steel is used in the building frame which has a high recovery and reuse potential.	Using 'off-the-shelf' products for the façade system reduces the reliance on bespoke products, expanding the possibilities of sustainable supply and creates an opportunity for these standard components to be reused at the end-of-life of this development.	Equipment and systems can be reused across other client-owned buildings. Preference will be given to mechanical fixtures for key servicing components and equipment where possible to allow for easy disassembly and reuse.	Where possible, finishes and fittings will selected and installed to facilitate removal at end of life in line with the designing for disassembly priority.	Preference for mechanical fixtures to allow for easy disassembly and reuse.	Collaboration with suppliers is intended to minimise packaging for construction deliveries and promoting re-use. If available, takeback schemes will be utilised for any surplus materials and/or packaging. Any temporary structures will also be reused from other sites where possibles.
	Module D – Benefits and Loads Beyond the System Boundary	A Whole Life Carbon Assessment has been undertaken to reduce emissions across the life cycle, including analysis of Module D impacts.	For the concrete structural elements, this will be designed to be long-lasting, helping it to be re-used and re-purposed. At the end-of-life, the concrete can then be recycled as aggregates.	Given the majority of the proposed structure uses steel, there is a high potential to recover and reuse this element, as well as recycle the steel into new products.	Unrecyclable composites will be avoided where possible to allow for easy reuse.	With preference given to mechanical fixings and disassembly options, this will allow for high reuse.	The flexibility and adaptability of the building design and spaces will enable multiple uses and increased longevity of the components used, thus avoiding unnecessary wastage.	Products will be selected with consideration to reuse and recycling potential. With preference given to mechanical fixings and disassembly options, this will allow for high reuse.	If available, takeback schemes will be utilised for any surplus materials and/or packaging. Any temporary structures will also be reused from other sites where possibles.
Designing for Longevity		A Whole Life Carbon Assessment has been undertaken to reduce emissions over the development lifecycle. This analysis includes	Substructure to be designed to last longer than 60 years.	Structure to be designed to last longer than 60 years. The floorplan allows for multifunctional spaces	Where possible, the building will be set back slightly where it fronts Britannia and Wicklow Street to help protect	Services are to be designed to last between 20 and 60 years (dependent on the resource). Providing services with a range of	Use of the site area has been optimised to provide a sustainable development, and the building is designed to	Specification of longer-lasting components and products, designing for repairability.	Contractor to review opportunities during preconstruction supply chain engagement.

	replacement and repair requirements under Module B, which aim to be reduced future through specification of more durable and resilient materials, products and systems.		that can be adapted to alternative uses to ensure key building components with higher embodied carbon are maintained.	the façade from damage. Materials selected will aim to be durable and resilient to a changing climate. The use of standardised components will also enable easy replacement.	capacities to adapt to changes in demands over time. Futureproofing of the system to district energy via a centralised network will also help to ensure the system is long-lasting.	allow it to be adapted easily to changes in use. Hard-wearing and easily washable floor and wall finishes in heavily used circulation areas are proposed (such as in the corridors, main entrance and amenity areas). Wall protection, door kick plates and robust stair trims will also help to minimise risk of damage.		
Designing for Adaptability or Flexibility	Handover information will be provided and stored for the building which should contain details of how the building can be adapted to other uses, including details of load-bearing elements etc.	The substructure will be designed with potential adaptability scenarios in mind to facilitate different use types in the future without changes to the foundation structural requirements.	The flexibility and adaptability of the floorplan design has been considered. The building is designed with a grid frame structure which favours future adaption to other uses (see Design and Access Statement for more details).	By incorporating a simplified facade system, this ensures that the consistent glazing arrangement will favour the easy adaptability of the spaces.	The design of the energy centre and M&E services allow for ease of access and replacement. The development will also be future-proofed for district energy through the centralised system. The energy systems will be designed to accommodate peak energy demands and future needs of the building - including potential use changes.	Uniform floor layout patterns will allow flexibility for spaces to be amended if required throughout the building.		Contractor to review opportunities during preconstruction supply chain engagement.
Designing for Disassembly	The 'building in layers' approach has helped to guide the design which aims to allow elements to be removed from the main structure. Handover information will be provided and stored for the building to enable disassembly and maximised reuse.		Bolted lightweight steel frame connections to allow for it to be dismantled, although this may be limited where any concrete is attached.	Façade design allows for efficient maintenance and for future replacement given standardisation. Where possible, glazing and façade elements to be installed in a way to facilitate removal.	Preference for mechanical fixtures for key servicing components and equipment where possible to allow for easy disassembly and reuse.	Bathroom pods could be designed to allow for disassembly. Where possible, finishes and fittings will selected and installed to facilitate removal at end of life. Allow for easy access to help with expected disassembly.	Preference for mechanical fixtures to allow for easy disassembly and reuse.	Contractor to review opportunities during preconstruction supply chain engagement.
Using Systems, Elements or Materials that can be Re-Used and Recycled		Structural stability is leading factor in terms of the substructure design, however the steel and cement used will likely be able to be re-cycled at end-of-life.	Structural stability is leading factor in terms of the superstructure design, however the steel and cement used will likely be able to be re-cycled at end-of-life.	Consistent repeating window sizes and detail throughout to allow for the potential re-use of window modules.	Potential for reuse across client's portfolio of buildings and other local developments.	Doors, plasterboard, and certain finishes will be able to be reused and/or recycled at end-of-life. If this is not possible, it will be managed in line with the waste hierarchy.	The sourcing process of materials and products will aim to ensure that they appropriate for their use, durable and low maintenance, easily replaceable but also reusable/recyclable.	Potential for reuse across client's portfolio of buildings and other local developments.

5. Assessment Methodology and Bill of Materials

This report aligns with the Whole Life Carbon Assessment submitted in support of the application, with the same modelling process using the identical Bill of Materials and end-of-life scenarios. The Whole Life Carbon Assessment was calculated using the One Click LCA software, utilising the RICS 1st Edition supported LCA calculation tool.

Data detailing the measurements of building elements were taken from the "Order of Cost Estimate - Stage 2" produced by 100 Acre London Limited for the scheme. These measurements of building elements were inserted into One Click LCA, providing the appropriate material quantities for the assessment. This process was assisted by architectural drawings, material assumption schedules, as well as the IES VE 2024 model which was used to calculate quantities for materials not given in the Cost Plan, such as doors and internal walls. Information on MEP items was also provided from WSP. This should therefore represent at least 95% of each building element category, relative to the details available at this stage.

Building materials were then attached to the appropriate building elements based on available information in the documentation provided. It should be noted that the availability of construction data and material options in the One Click LCA tool limit the selection of possible material specifications therefore closest matching Environment Product Declarations (EPDs) were selected where appropriate. Most technical specifications for products were not available at this stage and therefore generic data, representative of standard, market average specifications have been used where no specific material details are available.

As per the RICS PS, to ensure baseline consistency, certain default specifications and recycled content assumptions for main building materials based on UK average industry standard practice were employed where detailed information was not available. The following table summarises the building materials assumptions.

Table 5.1 – One Click LCA Building Materials Specified

RICS Category	Resource	Quantity (kg)
1.1.1.Standard foundations	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	147,168
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	318,888
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	15,330
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	26,780
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	442,526
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	30,692
1.1.3.Lowest floor construction	Resilient and vibration-damping underlay, Lnw = 28 dB, 5 mm, 5.6 kg/m2, Minigran (POLYMAXITALIA S.r.l.)	3,000
	Insulating vapour control layer and air barrier, 0.148 kg/m2, Protect VC Foil Ultra (Building Product Design Ltd)	130
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	510,000
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	440,000
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	23,496
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	20,680
	Stone wool insulation panels, L=0.037 W/mK, R=2.63 m2k/W, 100 mm, 3.3 kg/m2, 33 kg/m3, Lambda=0.037 W/(m.K), FLEXI 1200x600x100 (ROCKWOOL, UK plant)	3,003
	Precast concrete ground beam, 2400 kg/m3 (British Precast)	72,000
2.1.1.Steel frames	Galvanized steel stud framing profiles per m2 (air gap included), UD and CD profiles included, wing width: 6 mm, flange width:50 mm, steel thicnkess:0.6 mm (23 gauge), 450 mm spacing, 2.4 kg/m2 (One Click LCA)	5,400
	Structural steel profiles, generic, 20% recycled content, I, H, U, L, and T sections, S235, S275 and S355	39,000
	Structural steel profiles, generic, 20% recycled content, I, H, U, L, and T sections, S235, S275 and S355	32,000
	Structural steel profiles, generic, 20% recycled content, I, H, U, L, and T sections, S235, S275 and S355	51,000
	Steel hollow sections (CFRHS, CFCHS, HFRHS, HFCHS), 7850 kg/m3 (Norstal Steel Structure S.R.L.)	9,000

2.1.4.Concrete frames	Formwork concrete elements for floor slabs, 127 kg/m2, Gamme PREDALLE BA RECTOR BAS CARBONE de 50 mm d`épaisseur (RECTOR LESAGE SAS)	1,186,434
	Integrated formwork precast concrete wall, excluding the filling concrete, 200 mm, 245.9 kg/m2, C40/50, XA2 CEM I (SPURGIN LEONHART)	52,000
	Integrated formwork precast concrete wall, excluding the filling concrete, 200 mm, 245.9 kg/m2, C40/50, XA2 CEM I (SPURGIN LEONHART)	836,060
	Integrated formwork precast concrete wall, excluding the filling concrete, 200 mm, 245.9 kg/m2, C40/50, XA2 CEM I (SPURGIN LEONHART)	230,000
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	43,200
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	806,400
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	297,600
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	57,600
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	1,120,800
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	3,000
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	61,000
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	37,000
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	3,840
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	79,000
2.2.1.Floors	Galvanized profiled steel decking, for composite floor slabs/decks, 1.2 mm sheet thickness, 15.11 kg/m2, ComFlor® 80+ 1.20mm (Tata Steel Europe, Tata Steel International (2021))	40,000
	Stone wool insulation panels, L=0.037 W/mK, R=2.63 m2k/W, 100 mm, 3.3 kg/m2, 33 kg/m3, Lambda=0.037 W/(m.K), FLEXI 1200x600x100 (ROCKWOOL, UK plant)	6,900

	Stone wool insulation panels, L=0.037 W/mK, R=2.63 m2k/W, 100 mm, 3.3 kg/m2, 33 kg/m3, Lambda=0.037 W/(m.K), FLEXI 1200x600x100 (ROCKWOOL, UK plant)	8,712
	XPS insulation board, 0.033 W/mK, 31 kg/m3, Floorboard Standard, Laminating Board, Upstand Board (Polyfoam XPS Ltd (2021))	5,000
2.3.2.Roof coverings	Multi layer waterproofing system with flexible sheets for roofing, mechanically fastened, European average, 3.8 (top) + 3.0 (bottom) mm, 4.9 (top) + 3.7 (bottom) kg/m2 (BMI Group, IKO, Imperbel, Perwez, Soprema, Imperalum, Danosa, Derivados Asfálticos Normalizados, Technonicol, Axter, Binné & Sohn, KG, Georg Börner Chemisches Werk für Dach- und Bautenschutz, C. Hasse & Sohn Inh. E. Rädecke, Mogat-Werke Adolf Böving, Paul Bauder, Copernit, General Membrane, Imper Italia, Index, Matco, Polyglass, Valli Zabban, Katepal, Isola (2021))	7,000
	Cement screed, EN15804+A2, ref. year 2022	196,080
	Vapour control layer for roof, ceiling and wall systems, 0.15 mm, 1715 g/m2, AirGuard® Air & Vapour Control Layer 5816X (DuPont de Nemours)	140
	Plywood board, 490.6 kg/m3, EN15804+A2, ref. year 2021	8,000
	Drainage layer for green roofs from pozzolona and conifer bark, biogenic CO2 not subtracted (for CML), 971 kg/m3, Couche de drainage SOPRALITHE Z (SOPREMA SAS)	16,000
	Green roof system, biogenic CO2 not subtracted (for CML), 21.54 kg/m2, Procédé de végétalisation des toitures Vertige classique. (VERTIGE INTERNATIONAL)	8,000
	Stone wool building panel for façade cladding, roof detailing soffits and fascias, 3050x1250 mm, Durable ProtectPlus (ROCKPANEL)	54
	Stone wool insulation for ETICS and flat roofs, R=1 m2K/W, L=0.044 W/mK, 44 mm, 0.97 kg/m2, 22 kg/m3, Lambda=0.044 W/(m.K) (Rockwool)	4,700
	Geotextile from polypropylene, 300 g/m2 (MDEGD)	110
2.3.6.Roof features	Lightweight concrete block, with expanded clay aggregate, generic, 650 kg/m3 (40.6 lbs/ft3), 18 kg/block (39.7 lbs/block), 0.5x0.3x0.185 mm (0.019x0.012x0.007 in)	21,000
	Aluminium sheet, generic, 0% recycled content, average European aluminium manufacturing technology (One Click LCA)	792
	Aluminium die-cast parts, 2700 kg/m3, EN15804+A1, ref. year 2018	3
	Aluminium wire rod for electrical applications, Aluminium Wire rod - series 6000 (TRIMET France)	16
	Red brick, average production, UK, 215 mm x 102.5 mm x 65 mm, 2.13 kg/unit, 1485 kg/m3 (Brick Development Association (BDA) Ltd (2019))	21,000

	Gypsum plaster, 1100 kg/m3 (Bundesverband der Gipsindustrie)	530
	Galvanized steel railing for supporting partitions or plasterboard, 0.415 kg/m, Fourrure F47, Fourrure F45, Fourrure MOB, Fourrure CD 60, Fourrure F60 OMEGA, Fourrure FL55, Entretoise F47. (KNAUF)	0
	Steel sheet hot dip galvanized, 2-20 mm, 7840 kg/m3, EN15804+A1, ref. year 2018	127
	Plasterboard hatch door, for attic access, with aluminium frame, 13.14 kg/m2, Trappe de visite en cadre aluminium - plaque de plâtre (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	39
	Masonry mortar/facing wall mortar/mortar with special properties, 1500 kg/m3, EPD coverage: >1500 kg/m3 (IWM)	390
	Masonry mortar/facing wall mortar/mortar with special properties, 1500 kg/m3, EPD coverage: >1500 kg/m3 (IWM)	130
	Flush metal enclosure with door, 23.1 kg/unit, 401449 + 401459 Ref door : 401441/401451, 401442/401452 , 401443/401453, 401447/401457, 401448 401458, 401449/401459 (LEGRAND)	2
	Precast concrete paver, 60 mm, 135.78 kg/m2 (CENTRE D`ETUDES ET DE RECHERCHES DE L`INDUSTRIE DU BÉTON)	48
	Corrugated plastic pipes, 0.138 kg/m, FFKuS-EM-F-105 co2ntrol (Fränkische Rohrwerke Gebr. Kirchner GmbH & Co.)	10
	Polyethylene vapour barrier membrane, 0.15 mm, 0.14 kg/m2 (One Click LCA)	23
	EPDM waterproofing membrane, 1.5 mm, 1.95 kg/m2 (One Click LCA)	310
	Gypsum plaster board, regular, generic, 6.5-25 mm (0.25-0.98 in), 10.725 kg/m2 (2.20 lbs/ft2) (for 12.5 mm/0.49 in), 858 kg/m3 (53.6 lbs/ft3)	1,700
	Gas pipe protection channel from stainless steel, largeur 90 mm, 1.4kg/m, Goulotte de protection en acier inox pour conduite de gaz se situant à une hauteur inférieure à 2m (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	35
	Stone wool insulation panels, unfaced, generic, L = 0.037 W/mK, R = 2.70 m2K/W (15 ft2°Fh/BTU), 150 kg/m3 (9.36 lbs/ft3) (applicable for densities: 100-150 kg/m3 (6.24-9.36 lbs/ft3)), Lambda=0.037 W/(m.K)	3,600
	Automatic air vent, 0.63kg, Purgeur d´air (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	1
2.4.1.Stair and ramp structures	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	67,000
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	2,805

	Stainless steel handrail, diam. 45mm, Donnee par default (MDEGD)	138
2.5.1.External enclosing walls above ground level	Aluminium rainscreen cladding for façade, 7.953 kg/m2, Vantage® MF Mechanical Fix Rainscreen System (BTS Facades & Fabrications)	10,000
	Solar shading and facade system, 36.83 kg/m, Infiniti (Maple Façades Ltd.)	31,000
	Single skin wall from bricks, including mortar, with Mortar 1:4 cement:sand mix (Using CEM I cement)	310,000
	Concrete masonry unit (CMU), 250 mm x 587 mm x 190 mm, 3 Mpa, 650 kg/m3, Leca® Sulblock (Leca International)	21,000
	Medium-density fibreboard (MDF), 650 kg/m3 (Norbord)	1,500
	Glass wool insulation for external wall structures, unfaced, L=0.033 W/mK, R=3 m2K/W, 100 mm, 2.52 kg/m2, 25.2 kg/m3, Lambda=0.033 W/(m.K), Trestenderplate 33 (Knauf Insulation)	7,600
	Gypsum plaster, 1100 kg/m3 (Bundesverband der Gipsindustrie)	9,900
	Galvanized steel stud framing profiles per m2 (air gap included), UD and CD profiles included, wing width: 6 mm, flange width:50 mm, steel thicnkess:0.6 mm (23 gauge), 600 mm spacing, 1.6 kg/m2 (One Click LCA)	4,800
	Hot-dip galvanized perforated steel panels for buildings and data centers, 17.3 kg/m2 (Maple Façades Ltd.)	2,900
	Mortar, 2000 kg/m3, EN15804+A2, ref. year 2021	2,520
	Low alkali micro concrete, Renderoc LA60 (Fosroc)	5,376
	Gypsum plaster board, regular, 10% recycled gypsum, 6.5-25 mm (0.25-0.98 in), 10.725 kg/m2 (2.20 lbs/ft2) (for 12.5 mm/0.49 in), 858 kg/m3 (53.6 lbs/ft3)	1,900
	Gypsum plasterboard, fire and sound resistant, 12.5 mm, 11.1 kg/m2, L=0.25 W/mK, Fire resistance class: A2-s1,d0, Lambda=0.25 W/(m.K), Gyproc SoundBloc (Saint-Gobain Construction Products t/a British Gypsum)	33,000
	Stone wool (mineral wool) insulation, unfaced, L = 0.031 W/mK, R = 1 m2K/W, 31mm, 1.86 kg/m2, 60 kg/m3, (Range: 51-65kg/m3), 50% slag content (One Click LCA)	310
2.6.1.External Windows	Aluminium curtain walling, 2700 kg/m3 (GAA)	160
	Aluminium frame window double-glazed, operable(tilt and turn), 0% recycled aluminium, 1.48 m x 2.18 m, 25.3 kg/m2 (One Click LCA)	10,000
2.6.2.External doors	Aluminium frame sliding patio door, double-glazed, 40% recycled aluminium, 3 m x 2.18 m, 43.77 kg/m2 (One Click LCA)	980
	Aluminium entrance door, 26.5 kg/m2 (One Click LCA)	900

2.6.Windows and external doors	Door lock, European average (ARGE)	200
2.7.1.Walls and Partitions	Glass wool insulation panels, unfaced, generic, L = 0.031 W/mK, R = 3.23 m2K/W (18 ft2°Fh/BTU), 25 kg/m3 (1.56 lbs/ft3), (applicable for densities: 0-25 kg/m3 (0-1.56 lbs/ft3)), Lambda=0.031 W/(m.K)	14,000
	Gypsum plaster board, regular, generic, 6.5-25 mm (0.25-0.98 in), 10.725 kg/m2 (2.20 lbs/ft2) (for 12.5 mm/0.49 in), 858 kg/m3 (53.6 lbs/ft3)	91,000
	Gypsum plaster board, regular, generic, 6.5-25 mm (0.25-0.98 in), 10.725 kg/m2 (2.20 lbs/ft2) (for 12.5 mm/0.49 in), 858 kg/m3 (53.6 lbs/ft3)	91,000
	Structural steel profiles, generic, 20% recycled content, I, H, U, L, and T sections, S235, S275 and S355	16,753
2.7.2.Balustrades and handrails	PVC railings, for external use, H = 1 m, 8.12 kg/m, Garde corps en PVC [usage extérieur] (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	690
2.8.Internal doors	Wooden internal door excluding frame, unglazed, 0.762mx1.981m, 7.75 kg/m2 (JELD-WEN)	3,600
3.1.Wall finishes	Emulsion matt paint for interior use, 0.174 kg/m2, 1.39 kg/l, Diamond Matt (Dulux Trade)	1,400
	Emulsion matt paint for interior use, 0.174 kg/m2, 1.39 kg/l, Diamond Matt (Dulux Trade)	710
3.2.Floor finishes	Self-levelling screed for commercial and domestic building floors, 1 mm, 2.23 kg/m2, Gyvlon® XTR, XTR SP, XTR FD E2C (Anhydritec)	4,100
	Tufted carpet tile with nylon 6.6 pile material, 1.8 kg/m2, maximum surface pile weight 400 g/m2 (One Click LCA)	190
	Self-levelling screed, 1 mm, 2.16 kg/m2, Gyvlon® ECO, ECO SP, ECO FD E2C (Anhydritec)	2,500
	Foam backed vinyl (PVC) flooring rolls and planks, 2.64 kg/m2, L = 0.25 W/mK, Acoustic attenuation = 13 dB, Lambda=0.25 W/(m.K), Gerflor SA : Taralay Premium confort Taraldal Tarastep Taralay sécurité confort Taralay element confort Forbo Flooring Systems : Sarlon marche complète Complete step Primeo modal Vinyl pro dalles Sarlon quartz Sarlon sparkling Sarlon tech 17dB Sarlon 17dB (KALEI)	2,800
	Luxury vinyl flooring tile, 5 mm, 8 kg/m2, wear layer: 0.5 mm (One Click LCA)	1,600
	Ceramic tiles, glazed, for floor application, 10 mm, 27.263 kg/m2, 2200 kg/m3	7,300
3.3.Ceiling finishes	Emulsion matt paint for interior use, 0.174 kg/m2, 1.39 kg/l, Diamond Matt (Dulux Trade)	360
3.Internal finishes	Moulded torus/ogee shaped profile from medium density fiberboard (MDF), 4.4x144x18 mm, 1.944 kg/m, Skirting Torus/Ogee Profile (Staircraft Group Ltd)	9,400
4.Fittings, furnishings and equipment	Lockers, 41 kg/unit, MonoBlocTM & CLK (Bisley)	246
	Wooden desk and drawer units, 73.4 kg/unit (Bisley)	73
	Stainless steel bicycle rack, 1.3 kg/unit, Ratelier à vélo - DONNEE ENVIRONNEMENTALE PAR DEFAUT (MINISTERE DE L'ENVIRONNEMENT, DE L'ENERGIE ET DE LA MER - MINISTERE DU LOGEMENT ET DE L´HABITAT DURABLE)	57
	Student desk with plywood worktop and steel legs, W: 700 mm, L: 500 mm, 13 kg/unit (One Click LCA)	1,573
	Student chair from plywood and steel, 14 kg/unit (One Click LCA)	1,694
	Wooden bed frames, 1240x1950 mm, 72.4 kg/unit (Bisley)	8,800
	Kitchen cabinet, H: 900 mm, D: 600 mm, W: 600 mm, 44 kg/unit (One Click LCA)	10,648
5.1.Sanitary installations	Kitchen mixer, 1.65 kg/unit (GROHE AG)	200
	Washbasin mixer tap, 0.98-1.33 kg/unit, Nautic (Villeroy & Boch Gustavsberg AB, Sweden)	124
	Ceramic toilet set, 26.93 kg/unit (Ideal Standard International)	3,300
	Ceramic bathroom washbasin, 16.7 kg/unit, 850 × 460 × 150 mm (One Click LCA)	2,100
	Ceramic shower tray, 33.3 kg/unit, 900 × 900 × 80 mm (One Click LCA)	4,100
	Sink from polyester resin reinforced with fiberglass, 5.77 kg/unit, Evier en matériau de synthèse [Long. 860 mm Larg. 500 mm Haut. 185 mm] (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	700
5.10.Lift and conveyor installations/systems	Passenger elevator car , electrical controls, counter weight, drive and motor of traction (cable) type, 630 kg (8 persons) load capacity, 1.0 m/s speed, 1587.7 kg/unit (USE ONLY WITH Elevator hoistway) (One Click LCA)	4,800
	Elevator hoistway with floor door per floor, traction (cable) type, 251.36 kg/unit (USE ONLY WITH Passenger elevator car) (One Click LCA)	750
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 20% fly ash content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	291,000
	Ready-mix concrete, normal-strength, generic, C30/37 (4400/5400 PSI), 10% (typical) recycled binders in cement (300 kg/m3 / 18.72 lbs/ft3)	291,000
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	12,125
	Drinking water supply piping network, per m2 GIFA (residential buildings)	1,200

5.4.Water installations	Sewage water drainage piping network, per m2 GIFA (residential buildings)	850
	Irrigation system, 1.42 kg/unit, Tête d`arrosage pour système d`arrosage (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	3
5.6.2.Local heating	Outdoor unit for air/air heat pump, P=33.6 kW, 207 kg/unit (One Click LCA)	1,656
5.6.Space heating and Airconditioning	Air handling unit, with heat recovery through plate heat exchanger, 10 000 m3/h (5885.8 ft3/min), 1256 kg/unit (2769 lbs/unit)	1,500
	Ventilation ducting, per m linear, D: 63 mm (2.48 in)	1,300
	District heat distribution center, per 1kW	1,400
	Heat distribution piping network, per m2 heated area, all building types	860
5.8.3.Lighting installations	Fluorescent lamp, T5-14W, 0.05 kg/unit, EN15804+A1, ref. year 2018	1
	Emergency evacuation lighting, 0.604 kg/unit, 0 The environmenal data is representative of the following products : <cat.number list> (LEGRAND)	70
	Fluorescent lamp, T8-18W, 0.07 kg/unit, EN15804+A1, ref. year 2018	42
	Indoor luminescent ceiling light, linear, P=20W, Encastrés intérieurs linéaires pour éclairage tertiaire (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	2,600
	LED lighting, P = 40W, Réglette LED (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	170
	Indoor pendant lights, painted black (1 side), 1000 dia, 2,54 kg/unit, Ulu Half Paint, black (1 side) (David Trubridge Limited (2020))	47
5.8.5.Local electricity generation systems	Photovoltaic monocrystalline panel, per m2, 14.5 kg/m2, 224 Wp (One Click LCA)	1,160
5.8.Electrical installations	Electricity distribution system, cabling and central, for all building types, per m2 GFA	18,315
5.Services	Pendent fire sprinkler for residential buildings, K-factor: 4.9, max working pressure: 12 bar (175 psi), thread size: 1/2 in (12.7 mm) NPT, 90 g/unit, 3.2% Recycled material (One Click LCA)	11
8.2.1.Roads, paths and pavings	Facing bricks, clay pavers and brick slips, 900-2500 kg/m3 (Bauen mit Backstein Zweischalige Wand Marketing)	15,810
	Sand, compacted dry density, 1682 kg/m3	7,821
	Aggregate (crushed gravel), generic, dry bulk density, 1600 kg/m3	24,800
8.External Works	Aluminium traffic signs, 13.30 kg/m2 (Euroskilt AS)	266

Efforts will be made to maximise use of reused or recycled materials further by opting for materials with higher recycled content and reusing existing materials on site, for example, demolition waste will be used in the construction of foundations (if possible). Thus, best endeavours will be made to allow the scheme to align with GLA guidance of reusing/recycling at least 20% by value of materials.

In the context of the proposed development, the Applicant is seeking to decouple economic activity from the consumption of finite resources by recognising and attaching value to sustainable design as part of its product offering.

Modular construction methods were considered during the early design stage, due to potential benefits of minimised waste arisings, heightened reuse potential and future building flexibility. However, during the evaluation exercise, modular construction was not considered suitable given the constraints of the existing site and specific structural requirements of the proposals, with the scale of the proposal not well aligned with volumetric modular construction. Structural simplification and optimisation to reduce material loads has been the aim of the current design, which is driven by the optimisation of the site and structural requirements, especially given the constraints of the site necessitating sufficient steel structure in the core to counterbalance the cantilevered lightweight frame towards the rail line.

Additional options which could be explored through the detailed design stage are outlined below, demonstrating the project's commitment to go beyond standard practice.

- Prefabricated bathroom pods to minimise construction related waste. Bathroom pods could also be designed to allow for disassembly.
- Sourcing of materials locally and ideally reused materials where available.
- Existing hardstanding materials crushed to aggregate for use in foundations and ground floor slab.
- Further structural simplification and optimisation to reduce material loads.
- Maximising recycled content in superstructure where possible e.g., aiming for 50% reclaimed steel across structural frame and targeting >25% cement replacement (recycled product or GGBS).
- Maximising renewable energy use in production materials where possible including aluminium
- Repeating window detail and sizes throughout scheme suitable for use with prefabricated facade systems minimising waste through off site construction methods.
- Community engagement as part of the contractor's CCS certification – could include local schools talk on recycling, donation of waste material for school garden etc.
- Maximising renewable energy use in production materials where possible including aluminium
- Selection of durable and resilient materials to increase longevity of the proposals.

6. Circular Economy Results

The following presents the project's circularity metrics, as per calculated by the One Click LCA 'Building Circularity GLA' tool.

Table 6.1 – Building Circularity – Bill of Materials

Category	Material Quantity (kg)	Material Intensity (kg/m² GIA)	Estimated Reuseable Materials (kg/m²)	Estimated Recyclable Materials (kg/m²)
1 Substructure	2,134,187.43	461.45		460.02
2.1 Superstructure: Frame	5,057,002.24	1,093.41		1,093.41
2.2 Superstructure: Upper Floors	65,060.96	14.07		9.30
2.3 Superstructure: Roof	321,139.30	69.44		58.34
2.4 Superstructure: Stairs and Ramps	72,761.80	15.73		15.73
2.5 Superstructure: External Walls	469,567.78	101.53		96.88
2.6 Superstructure: Windows and External doors	12,252.00	2.65		2.65
2.7 Superstructure: Internal Walls and Partitions	237,865.85	51.43		48.01
2.8 Superstructure: Internal doors	3,600.00	0.78		
3 Finishes	34,223.80	7.40		3.35
4 Fittings, furnishings & equipment	24,013.79	5.19		0.01
5 Services (MEP)	665,675.09	143.93		141.11
8 External works	49,507.75	10.70	1.69	9.01
0 Unclassified / Other				
Total	9,146,857.79	1,977.70	1.69	1,937.82

Table 6.2 – Building Circularity – Materials Recovered

Category	Total Tonnes	Virgin Tonnes	Renewable Tonnes	Recycled Tonnes	Reused Tonnes
Construction materials	8,782	8,157	38	587	0
Earth masses, asphalt and stones	57	57	0	0	0
Construction site – material waste	308	274	4	30	0
Material replacement and refurbishment	721	5391	97	85	0
Total	9,868	9,027	139	702	0

Table 6.3 – Building Circularity – Materials Returned

Category	Reuse Tonnes	Recycling Tonnes	Downcycling Tonnes	Use as Energy Tonnes	Disposal Tonnes
Construction materials	0	824	7,817	59	83
Earth masses, asphalt and stones	8	0	25	0	24
Construction site – material wastage	0	55	241	5	6
Material replacement and refurbishment	0	284	203	132	102
Total	8	1,163	8,287	196	214

Table 6.4 – Building Circularity – Key Material Group

Category	Total Tonnes	Virgin %	Materials Recovered %	Disposal %	Downcycling and use as energy %	Recycling and reuse as material %	Materials Returned %	Circularity %
Concrete	7,252	98	2		100		50	26
Metals	559	30	70			100	100	85
Bricks and ceramics	354	100	0		100		50	25
Gypsum-based	440	97	3	2	48	50	74	38
Insulation	54	53	47	91	9		5	26
Glass								
Wood and biogenic	19	0	100		100		50	75
Earth masses and asphalt	57	100	0	42	44	14	36	18
Other materials	104	68	32	22	34	44	61	46

7. Recycling and Waste Reporting

The anticipated waste arisings have been considered in the context of those originating from construction, demolition & excavation; and those emanating from the operation of the site.

Anticipated Demolition, Excavation & Construction Waste Arisings

Demolition

The existing hardstanding will require demolition as part the redevelopment works. Where feasible, the recovered materials from the demolition process will be used as part of the sub-base across the site.

Given the minimal demolition works, a site-specific Pre-Demolition Audit was not considered required. The existing hardstanding comprises an area of circa 1,000 m^2. Using One Click LCA and a generic EPD for asphalt concrete surface course, circa 88 tonnes is expected to be associated with the hardstanding. Based on the total GIA given in the area schedule of 4,625 m^2, the total tonnes of demolition waste generated per square meter is therefore estimated to be around 0.019 tonnes.

Excavation

Excavation works are limited for the site due to the location of the tunnel beneath the site and given no basement is proposed, with the development designed to largely align with street levels. Using the Cost Plan submitted with the application, approximately 546 m^3 of material is expected from the excavation.

To obtain the weight of excavation, the value taken from the Cost Plan has been converted from cubic meters to tonnes by multiplying the net quantity by the bulk density for soils and stones (1.06)[1]. As a high-level estimate, waste from excavation is therefore expected to be in the order of 579 tonnes. Based on the total GIA given in the area schedule of 4,625 m^2, the total tonnes of demolition waste generated per square meter is therefore estimated to be around 0.13 tonnes.

Construction

A calculation of waste from construction has been undertaken using the data provided by the One Click LCA tool.

Assuming the default wastage values for the materials specified, the total construction wastage for the site equates to ~ 307.82 tonnes. Based on the total GIA given in the area schedule of 4,625 m^2, the total tonnes of demolition waste generated per square meter is therefore estimated to be around 0.066 tonnes.

Demolition, Excavation & Construction Waste Management

As well as considering opportunities to minimise the use of resources and design to eliminate waste, the development must also be able to manage any waste that does arise. Waste will be managed in accordance with the waste hierarchy, and it is expected that a significant portion of the anticipated waste arisings will be diverted from landfill, and where possible, reused and recycled onsite.

In England, the recovery rate from non-hazardous construction and demolition waste was estimated at 92.6% in 2020[2]. The development will aim to meet as a minimum, the London Plan policy targets of:

- 95% reuse/recycling/recovery of construction and demolition waste.
- 95% beneficial use of excavation waste.

The breakdown of how the development expects to meet these targets are presented in the figures below.

Figure 7.1 – Targeted Demolition Waste Management Routes

[1] SEPA *(UK Density Conversion Factors for Waste data developed by the Environment Agency for the 1998/99 commercial and industrial waste survey in England and have since been used across the UK by all of the Agencies including SEPA)* (https://www.sepa.org.uk/media/163323/uk-conversion-factors-for-waste.xlsx) Accessed on 07/06/24

[2] DEFRA, 2024 (https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste)

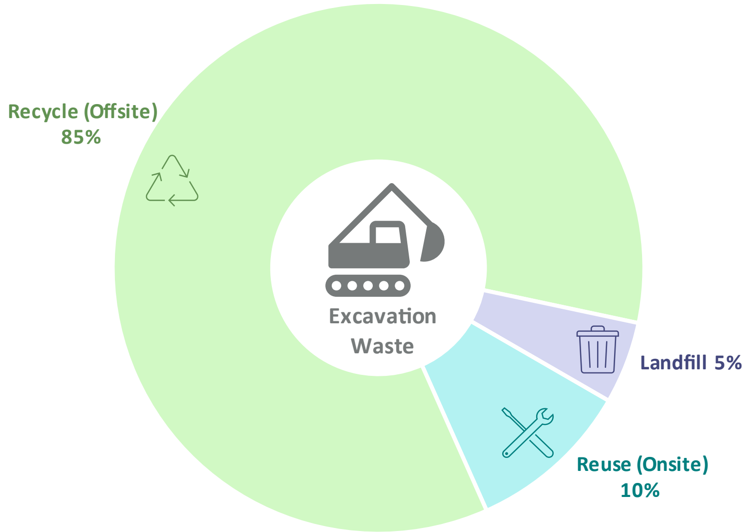

Figure 7.2 – Targeted Excavation Waste Management Routes

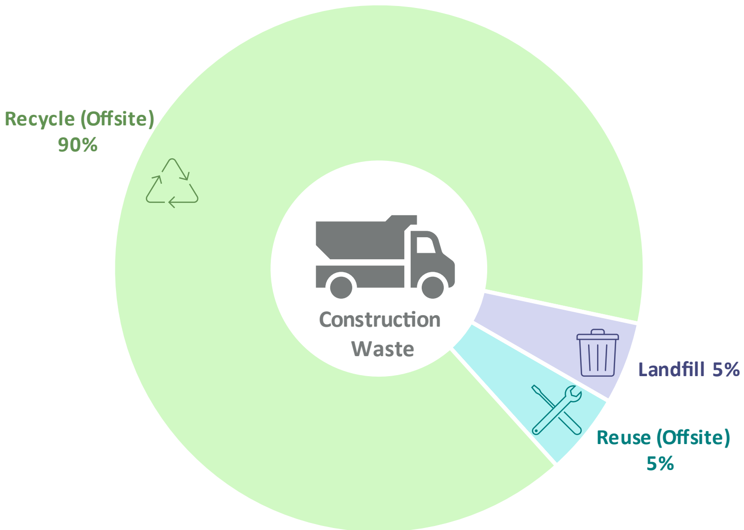

Figure 7.3 – Targeted Construction Waste Management Routes

It is expected that any developer would seek to actively manage waste arisings due to economic incentives and will ensure a Site Waste Management Plan (SWMP) is in place. This will be used to manage waste arisings during the construction phase, including the targets and procedures for the diversion of material from landfill.

Reuse and recycling will be prioritised from start to finish, ideally using materials onsite before offsite management is considered. Furthermore, whenever possible, to help reduce the number of trips and optimise transport operations, vehicles delivering materials to the Site will leave with waste.

A number of measures will also be explored to re-use material on Site. For instance, the piling matt might be formed of deconstructed site material from the existing site where possible (see Sections 3 to 5 for further actions to be explored). Given there are no existing buildings on the existing site, an independent pre-demolition audit is not considered required to manage demolition waste and maximise reuse/reclamation.

Certain manufactures offer take-back schemes for recycling products, including plasterboard and glass cullet. Such schemes will be considered when waste does arise, to ensure it is managed in accordance with the waste hierarchy.

Anticipated Operational Waste Arisings

Consideration has also been given to anticipated waste arisings associated with the operation of the buildings.

Using the latest accommodation schedule, an estimated 121 people are anticipated to reside in the student rooms. This assumes maximum occupancy numbers in regards to the schedule of accommodation. Using this figure and the 2022 average waste arising per person of 377 kg[3], an estimated 45.5 tonnes of waste arisings can be expected annually.

Operational Waste Management

The recycling rate for waste from households in England was 43.4% in 2022, decreasing from 45.5% in 2019.

The UK Government's Circular Economy Package[4] sets a target to recycle 65% of municipal waste by 2035 and to have no more than 10% municipal waste going to landfill by 2035.

The development will aim to recycle 65% of municipal waste by 2030, in accordance with the London Plan policy target. To facilitate these recycling rates, suitable storage will be located within the development (please see the refuse storage plan appended for details). The refuse strategy will be designed to meet Camden Council and the North London Waste Plan management guidelines, as well as in accordance with

[3] DEFRA, 2024 (https://www.gov.uk/government/statistics/local-authority-collected-waste-management-annual-results/local-authority-collected-waste-management-annual-results-202223)

[4] DEFRA & DAERA, 2020 (https://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement)

the London Plan and BREEAM guidance. This includes the provision of separate containers for dry recycling, food waste and general waste.

Refuse storage will be of adequate size and easily accessible for building users. Communal storage facilities will be provided on the ground floor, with access from Britannia Street. Storage for mixed/recyclable waste will also be provided within the kitchen spaces of the individual units. The Fresh Student Management Plan for the development confirms that residents will be responsible for putting their waste in the bin store.

The waste management operatives will be able to access the communal bin storage area with a direct transfer from storage to the waste collection vehicle (please refer to the Framework Delivery and Servicing Management Plan produced by Mayer Brown in support of the application for more details of the refuse strategy).

Figure 7.4 – Targeted Operational Waste Management Routes

As per detailed in the "Framework Delivery and Servicing Management Plan" produced by Mayer Brown in support of the application, a total capacity of 80 litres per room is required as per BS5906, with recycling and general waste to be split on an approximate 50/50 basis. For the total number of student units, which is equivalent to 121 dwellings, the total volume required is 9,680 litres. Camden guidance identifies that circa 8% of waste would be food and thus, the following waste storage provisions can be expected:

- General waste = 4,453 litres
- Recycling = 4,453 litres
- Food waste = 774 litres

Refuse collection frequency is expected to be more than once a week to reduce onsite refuse storage requirements.

Minimising Operational Waste

The development will also seek to reduce waste during the operational phase of the building. Information packs on recycling and waste prevention good practice measures should be given to new residents and any staff to encourage the correct use of the waste facilities provided on site and help achieve the development's waste targets. This should be maximised through clear signage (where possible) within the waste store provided on-site to assist the building occupiers in segregating waste correctly.

Community initiatives can be important in influencing a persons' behaviour and thus are essential in promoting a more circular economic lifestyle. The possibility of supporting and implementing community initiatives on site should be considered for the development where feasible, focusing primarily on household waste during the building's occupation. For example, the information packs provided to residents could include details on waste prevention schemes and resources within the Camden area. One community initiative includes online reuse groups, which provides a recycling network for people to donate and buy unwanted items in the local area. There are also organisations that allow Camden residents to get rewards for reducing, reusing and recycling waste. The student management team will work to actively promote recycling and the use of specialist banks for clothing and other recyclables to avoid as much refuse going to landfill as possible.

Several charity shops are located within a mile of the proposed development, with many situated around Angel tube station. These services give occupants of the development an alternative method to discard of unwanted items and allow others in the community to reuse them, thus contributing to a circular economy.

It is understood that waste and recycling levels will be monitored to identify trends and allow the necessary action to be taken when falling below targets. Waste transfer notes and relevant documentation will be sought where available, and a record will be kept tracking waste quantities.

Recycling and Waste Reporting Summary

Estimated arisings calculated above are summarised in the Recycling and Waste Reporting table of the accompanying GLA CES Template, as well as the targeted diversion rates. Since it is still early stages and the contactors, supply chain, occupiers etc. have yet to be decided/confirmed, the Project will make best endeavours to achieve these diversion rates. The targets and anticipated arisings will be confirmed in the final Site Waste Management Plan and Operational Waste Management Plan once the design is finalised and the full project team has been determined.

8. End-of-Life Strategy

This section describes the strategy for how the proposal'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.

As detailed throughout this report, material durability will be a strategic consideration in the design and material selection of the proposed development to lengthen the lifetime of the building and key components.

Building information concerning material selections and specification will form part of the hand-over documentation to help ensure easy disassembly, as well as maximise recovery and reuse where possible. Material passporting could be used to help store this information to ensure it is user friendly and kept up to date, which may include details like certifications, warranty, Environmental Product Declarations (EPDs) or other requirements.

Consideration has been given as to how the building materials, components and products will be disassembled and reused at the end of their useful life. The design of the structure with a rationalised grid, repetitive façade design and standardised glazing areas will enable an easier replacement and removal processes for key material elements, with the aim of simplifying the end-of-life disassembly strategy. As the design develops and product specifications are decided, the end-of-life strategy will be further optimised. For example, through conversations with the Architect, the following actions are being taken into account and will be confirmed at the detailed design stage:

- Detailing where possible to focus on demountable layers with mechanical fixings rather than bonding.
- Standard window and door sizes to allow for a wider range of recoverable systems and materials.
- Consolidation of MEP systems into core units/risers to minimise crossover runs for easier replacement/recovery and disassembly.
- Maximise use of recyclable materials and avoid application of any coatings that may impede this.
- Pre-fabricated bathroom pods with ability to be disassembled in modular units for reuse.
- Specification of high-quality, low carbon and non-toxic materials to increase opportunities for reuse and reduce occupational hazards.

Specific end-of-life strategies will vary depending upon the nature of the material and are expected to include:

- Steel and glass elements disassembled and reused, where possible, or recycled.
- Concrete / brick / stone crushed to aggregate (sub-base layers)
- Plastic based material incineration
- Cement / mortar used in a backfill
- Gypsum recycling
- Products and services reclaimed or recycled

A significant proportion of the building material is likely to be concrete. Whilst this material can be used as a sub-base layer, a key challenge facing the construction industry will be whether there are better alternative means of recovering this material. It is anticipated that the materials sector will undergo significant transformation over forthcoming years, and it would be sensible to re-evaluate options again at the appropriate time as there may be better options at this point to improve the circularity.

It is anticipated that a deconstruction strategy will be developed to maximise recovery potential of materials and components at the highest level of quality.

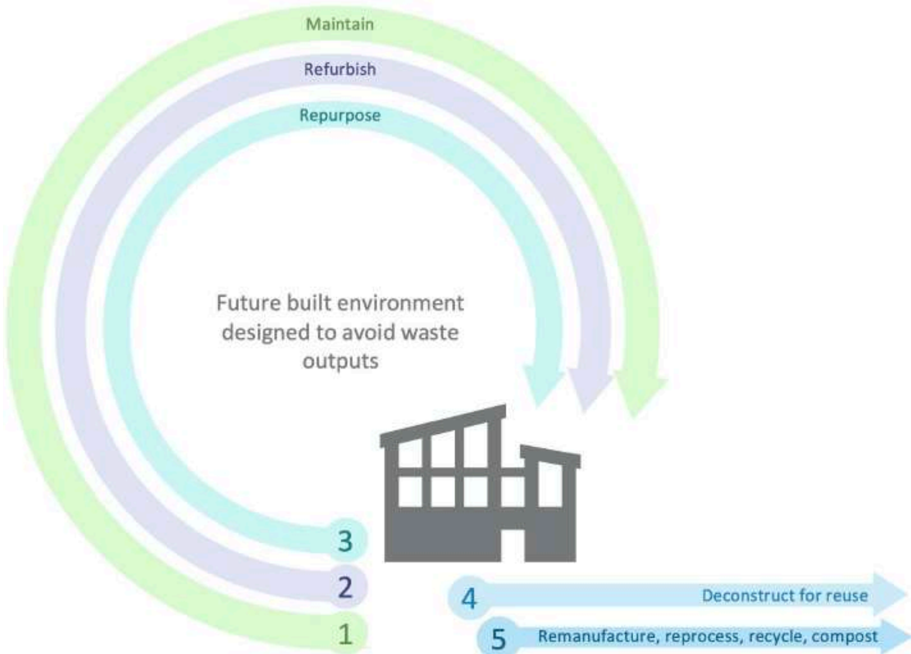

Figure 8.1 – Material Flow Priorities for the Future Built Environment (Figure Adapted from LETI Circular Economy Pager)

9. Plans for Implementation, Monitoring and Reporting

Plans for Implementation

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

Table 9.1 – The Plan for Implementation

Target (What)	Responsibility (Who)	Action (How)	Timescale (When)
Manage waste sustainably and at the highest value during demolition, excavation and construction (targeting 95% diversion from landfill as a minimum)	Pre-demolition consultant, contractor and architect	Implement a Site Waste Management Plan (SWMP) to ensure waste is managed appropriately, prioritising reuse of materials/ elements where possible. Contractor to work with architect to determine feasibility of reusing existing materials on site on the basis that it will reduce disposal costs and improve the circularity of the development proposals. Nominate an individual on site to record quantities of waste being produced and monitor performance against the 95% diversion from landfill target. Waste transfer notes should be obtained where available.	Detailed SWMP by end of RIBA Stage 4B (following appointment of the contractor)
Minimise the quantities of materials used	Principal designer (architect) and contractor	As part of the efforts to conserve resources, the design will be reviewed to ensure that material quantities are optimised. This will be particularly relevant in the context of the structural design whereby foundations and frame constitute a very significant part of the overall bill of materials. There will be a need to consider (and potentially balance) other factors, such embodied carbon targets, as these will also be driving the materials strategy. Where possible the design will be refined, firming up quantity estimates and materials selected in line with circular economy commitments. The objectives and opportunities listed in the 'Lean Design Options Appraisal' in appended should be incorporated into the scheme, where feasible. Further measures should also be explored throughout the technical design stage. The circular economy modelling will be revisited and updated to track progress against targets.	RIBA Stage 4B (following the appointment of the contractor)
Designing to eliminate waste, maximising sustainably sourced and recycled materials (aspiration for at least 20% of the building material elements to be comprised of recycled or reused content)	Principal designer (architect) and contractor	The elimination of waste will be an objective to be targeted through careful procurement (i.e., only procuring the necessary quantity of materials), and ensuring the selection of building elements that are demonstrably more robust and therefore requiring reduced maintenance, repair and replacement. Contractor to look into options for sourcing materials and other resources sustainably when deciding supply chain. A Sustainable Procurement Plan will be developed accordingly, with priority given to local sources and materials with recycled or reused content. Concrete with a higher proportion of recycled binders or GGBS content to be used, where feasible.	RIBA Stage 4B (following the appointment of the contractor)
Minimising waste on site	Contractor	Site introduction should include guidance on how to reduce waste on site, as well as information on sustainable waste management. Aiming for best practice construction resource efficiency, targeting ≤3.4m^3 or ≤3.2 tonnes per 100m^2 of the gross internal floor area for construction waste. This will be managed through the SWMP. Procedures for sorting, reusing and recycling construction waste into defined waste groups should be given in the SWMP and adhered to during construction. Regular site meetings should be organised throughout construction to update the team on progress against the waste targets and discuss further measures where required.	During construction (RIBA Stage 5)
Manage waste sustainably and at the highest value during operation (aiming for a 65% recycling rate as a minimum by 2030)	Waste management team	The conservation of resources through the operation of the building will be the responsibility of the end users, however, this will be encouraged through the provision of suitable educational information (e.g., Building User Guide) which should include information on waste management. A dedicated space for the segregation, storage, and collection of the recyclable waste streams. Containers will be of a suitable size, number and type given the likely waste arisings. Monitor operational waste arisings in accordance with the building specific Operational Waste Management Plan.	Post construction (RIBA Stage 6)

10. Summary

This Circular Economy Statement provides an overview as to how the proposed scheme has set strategic approach goals in the context of the design and construction considerations.

A review of the GLA's and local Council's planning policies has identified a number of requirements relating to the Circular Economy, in particular London Plan Policy SI7 (Reducing waste and supporting the circular economy), which requires applicants to submit a Circular Economy Statement.

The application of Circular Economy philosophy to the built environment is complex with issues overlapping and trade-offs to consider. Nevertheless, a balanced approach has been sought in line with the overarching commitments to sustainable design and construction. The aspiration to implement measures that go beyond standard practice will continue to be considered as the design progresses through regular workshops with the design team and during the construction process. A range of commitments are proposed; and these will be managed and recorded through a range of documentation. Key commitments include:

- Design for adaptability and flexibility, using materials that have high durability for longevity.
- Diversion of demolition and construction waste from landfill by converting elements and materials for alternative use.
- Efficient construction and operational waste management via accessible, dedicated areas for segregated waste volumes.

Recycling and Waste Reporting Form

Estimated arisings are summarised below as well as the targeted diversion rates. Since it is still early stages and the contactors, supply chain, occupiers etc. have yet to be decided/confirmed, the Project will make best endeavours to achieve these diversion rates. The targets and anticipated arisings will be confirmed in the final SWMP and OWMP once the design is finalised and the project team in terms of contractor etc. has been determined.

Table 10.1 – Demolition, Excavation & Construction Arisings (Anticpated)

	Total Tonnage	Tonnage /m² GIA	Diversion from Landfill		Residual	
			% reused or recycled onsite	% reused or recycled offsite	% to landfill	% to other management
Demolition	88	0.02	80	15	5	0
Excavation	579	0.12	10	85	5	0
Construction	308	0.07	0	95	5	0

Table 10.2 - Operational (Anticipated)

	Total Tonnage per Annum	Tonnage /m² GIA	Diversion from landfill		Residual	
			% reused	% recycled or composted	% to landfill	% to other management
Municipal	46	0.01	5	60	35	0

Circularity of Proposals

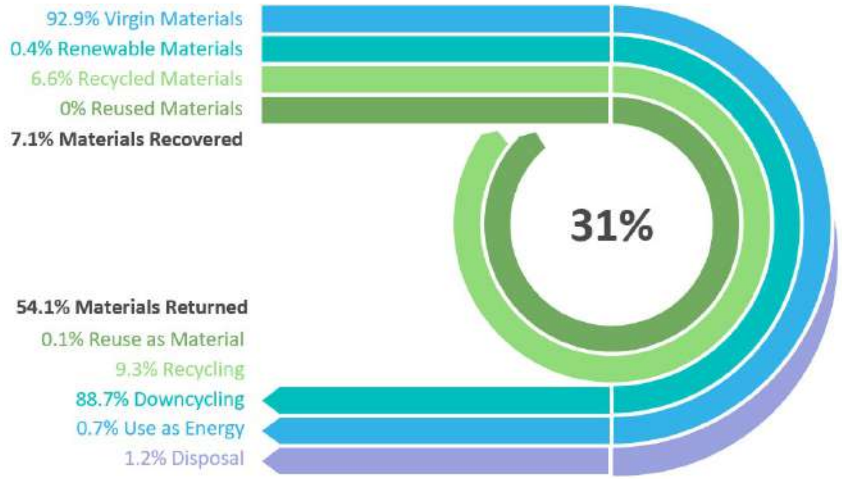

Figure 10.1 – Building Circularity (Reproduced from OneClick LCA Results)

Overall, the proposals for the scheme will account for the overarching values of Circular Economy including conserving resources, designing to eliminate waste and managing waste sustainably.

Monitoring and Reporting

The circular economy principles and proposed measures for maximising reuse and recycling of site materials will be revisited and updated to track progress against targets. A Circular Economy Post Completion Report will be provided once construction has finished to confirm performance against the numerical targets and indicate the actual waste volumes. Key achievements and lessons learnt will also be discussed where appropriate.

Appendices

A. Proposed Site Plan

Figure Appendix A.1 – Proposed Site Plan (Provided by Sheppard Robson)

B. Key Local Planning Policy Requirements

London Planning Policy Framework

Table Appendix B.1 – London Plan (2021)

Policy Reference	Details
Policy GG5 Growing a good economy	To conserve and enhance London's global economic competitiveness and ensure that economic success is shared amongst all Londoners, those involved in planning and development must: A. promote the strength and potential of the wider city region B. seek to ensure that London's economy diversifies and that the benefits of economic success are shared more equitably across London C. plan for sufficient employment and industrial space in the right locations to support economic development and regeneration D. ensure that sufficient high-quality and affordable housing, as well as physical and social infrastructure is provided to support London's growth E. ensure that London continues to provide leadership in innovation, research, policy and ideas, supporting its role as an international incubator and centre for learning F. promote and support London's rich heritage and cultural assets, and its role as a 24-hour city G. make the fullest use of London's existing and future public transport, walking and cycling network, as well as its network of town centres, to support agglomeration and economic activity H. recognise and promote the benefits of a transition to a low carbon circular economy to strengthen London's economic success.
Policy GG6 Increasing efficiency and resilience	To help London become a more efficient and resilient city, those involved in planning and development must: A. seek to improve energy efficiency and support the move towards a low carbon circular economy, contributing towards London becoming a zerocarbon city by 2050 B. ensure buildings and infrastructure are designed to adapt to a changing climate, making efficient use of water, reducing impacts from natural hazards like flooding and heatwaves, while mitigating and avoiding contributing to the urban heat island effect C. create a safe and secure environment which is resilient the impact of emergencies including fire and terrorism D. take an integrated and smart approach to the delivery of strategic and local infrastructure by ensuring that public, private, community and voluntary sectors plan and work together
Policy D3 Optimising site capacity through the design-led approach [extract]	[...] 13. aim for high sustainability standards (with reference to the policies within London Plan Chapters 8 and 9) and take into account the principles of the circular economy [...]
Policy SI 7 Reducing waste and supporting the circular economy	A. Resource conservation, waste reduction, increases in material reuse and recycling, and reductions in waste going for disposal will be achieved by the Mayor, waste planning authorities and industry working in collaboration to: 1) promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible 2) encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products 3) ensure that there is zero biodegradable or recyclable waste to landfill by 2026 4) meet or exceed the municipal waste recycling target of 65 per cent by 2030 5) meet or exceed the targets for each of the following waste and material streams: 6) construction and demolition – 95 per cent reuse/recycling/recovery 7) excavation – 95 per cent beneficial use 8) design developments with adequate, flexible, and easily accessible storage space and collection systems that support, as a minimum, the separate collection of dry recyclables (at least card, paper, mixed plastics, metals, glass) and food. B. Referable applications should promote circular economy outcomes and aim to be net zero-waste. A Circular Economy Statement should be submitted, to demonstrate: 1) how all materials arising from demolition and remediation works will be re-used and/or recycled 2) 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 3) opportunities for managing as much waste as possible on site 4) adequate and easily accessible storage space and collection systems to support recycling and re-use 5) how much waste the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy 6) how performance will be monitored and reported. C. Development Plans that apply circular economy principles and set local lower thresholds for the application of Circular Economy Statements for development proposals are supported.

Local Policy

Table Appendix B.2 – Camden Local Plan (July 2017)

Policy Reference	Details
Policy D1 Design [extract]	The Council will seek to secure high quality design in development. The Council will require that development: […] a. respects local context and character; b. preserves or enhances the historic environment and heritage assets in accordance with Policy D2 Heritage; c. is sustainable in design and construction, incorporating best practice in resource management and climate change mitigation and adaptation; d. is of sustainable and durable construction and adaptable to different activities and land uses; e. comprises details and materials that are of high quality and complement the local character; f. integrates well with the surrounding streets and open spaces, improving movement through the site and wider area with direct, accessible and easily recognisable routes and contributes positively to the street frontage; g. is inclusive and accessible for all; h. promotes health; i. is secure and designed to minimise crime and antisocial behaviour; j. responds to natural features and preserves gardens and other open space; k. incorporates high quality landscape design (including public art, where appropriate) and maximises opportunities for greening for example through planting of trees and other soft landscaping, l. incorporates outdoor amenity space; m. preserves strategic and local views; n. for housing, provides a high standard of accommodation; and o. carefully integrates building services equipment.is of sustainable and durable construction and adaptable to different activities and land uses; […]
Policy CC1 Climate Change Mitigation	The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. We will: a. Promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy; b. Require all major development to demonstrate how London Plan targets for carbon dioxide have been met; c. Ensure that the location of the development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks; d. Support and encourage sensitive energy efficiency improvements to existing buildings; e. Require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and f. Expect all developments to optimise resource efficiency. For decentralised energy networks, we will promote decentralised energy by: g. Working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them; h. Protecting existing decentralised energy networks (e.g. at Gower Street Bloomsbury, Kings Cross, Gospel Oak, and Somers Town) and safeguarding potential network routes; and i. Requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network. To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.
Policy CC5 Waste	The Council will seek to make Camden a low waste borough. We will: a. aim to reduce the amount of waste produced in the borough and increase recycling and the reuse of materials to meet the London Plan targets of 50% of household waste recycled/composted by 2020 and aspiring to achieve 60% by 2031; b. deal with North London's waste by working with our partner boroughs in North London to produce a Waste Plan, which will ensure that sufficient land is allocated to manage the amount of waste apportioned to the area in the London Plan; c. safeguard Camden's existing waste site at Regis Road unless a suitable compensatory waste site is provided that replaces the maximum throughput achievable at the existing site; and d. make sure that developments include facilities for the storage and collection of waste and recycling.

C. Lean Options Design Appraisal

This lean design options appraisal has been produced to consider how to avoid unnecessary material use arisings from over specification, without compromising structural stability, durability or the service life of the building. The aim of this is to:

- Reduce cost via optimising material use in building design.
- Encourage the reuse of existing materials and those with higher levels of recycled content.
- Promote greater understanding of alternative design and construction methods that result in lower material usage and waste levels.

Table Appendix C.1 – Lean Design Opportunities

Item	Opportunity	Actions to improve on Material Efficiency	Responsibility
1	Layout	The overall configuration of the building and internal layouts minimises structural wall and column locations to maximise future flexibility.	Architect, Structural Engineer
2	Core design simplification	The vertical core of the blocks (staircases & lifts) has been optimised to be more modular and align at each floor. Option for these to be installed using precast stairs or standardised steel sections.	Architect, Structural Engineer
3	To improve coordination efficiency	The fire engineer and acoustician will review partition acoustics and fire performance to ensure that the internal partition performance is not over-specified, avoiding any unnecessary material use.	Architect, Acoustic and Fire Engineers
4	To standardize design components	Standard window and façade panel sizes will be used as much as possible to reduce wastage from bespoke sized units.	Architect, Door Supplier
5	Façade design simplification	The façade approach is modular in nature to enable plentiful future internal configurations.	Architect
6	Consideration for future adaptability	The structure has been designed to give future flexibility in term of usage. Whilst this may increase material use initially, it permits future change of use without significant alterations to the building and thus increases the longevity of the development as well as the materials used.	Architect, Structural Engineer

D. Adaptability Appraisal & Scenario Modelling

Typical Arrangement

At the first floor dwellings are beneath the transfer deck and no longer constrained by the structural hangars. This allows for a different layout including insetting the facade towards both streets to articulate the entrances. The vertical structure is also more adaptable and rooms can be combined should accessible need exceed 5% provided in the basebuild.

20 no Studios of which 1 no is Accessible - 5% accessible across scheme

Adapted Arrangement

The diagram below illustrates rooms that would be combined to boost accessible bed spaces to 10%. This would result in a concurrent loss of bed spaces and Rooms to also revert to standard studios if the need diminished.

14 no Studios of which 7 no are Accessible - 10% accessible across scheme

1st Floor

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Figure Appendix D.1 – Flexibility Scenario Modelling (Provided by Sheppard Robson)

Site Constraints on Adaptation

The site's form, orientation and proximity to the railway means it is well suited to compact homes or sleeping accommodation such as a care-home, hotel or co-living spaces but is less suitable for traditional residential development.

Key moves to facilitate adaptation are noted on following pages and are indicative only as operators of both hotels and co-living will have specific requirements. Constraints, particularly in relation to housing, are expanded upon below and key actions for adaptation are outlined on the following pages.

Structure and Scale

The horizontal and inclined structure, including shear walls and hangers, limits the removal of walls on most floors. This east-west structural alignment is necessary due to the building's position over the Thameslink tunnel.

As a result, the largest practical compartment above ground is around 37m2, achievable by combining two studios. This size would only accommodate a residential studio compliant with NDSS standards.

While it may be possible to combine additional units on the east, each would need to be customized per unit and floor, leading to increased complexity in construction, fire protection, and layout design.

Rail and Amenity

TFL is unlikely to approve open balconies facing the railway, and screens for opening windows will likely be a permanent requirement. These restrictions make it challenging to offer high-quality private indoor or outdoor amenities with a strong sense of cohesion.

Outlook and Quality

Given the site's geometry and constraints, most spaces will face either east or west, with only two corner areas offering potential for dual-aspect layouts.

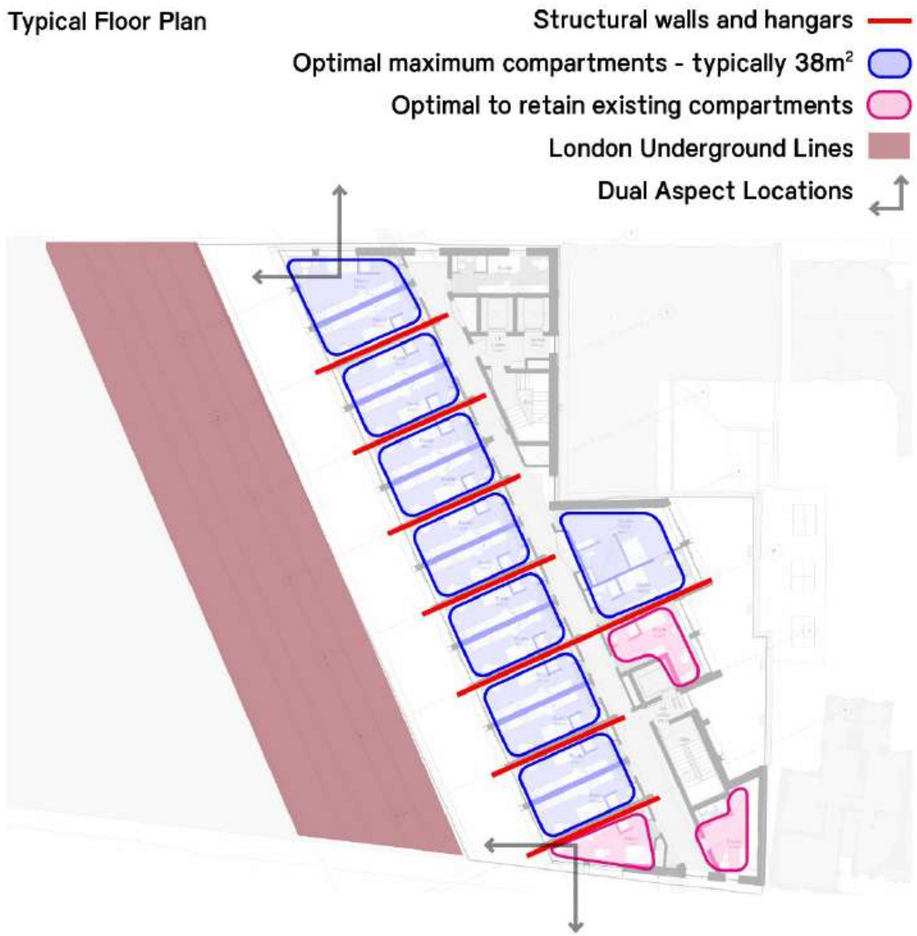

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Figure Appendix D.2 – Adaptability Discussion (Provided by Sheppard Robson)

Ground Floor

- 01 Communal and management spaces would need to adapt to the evolving needs of the care provider and community. This would likely include increased provision of both elements including new facilities such as a kitchen and therapeutic spaces.
- The constraints of the building will guide the level of support that is appropriate if adaptation is undertaken. For example the corridors with dead ends on upper levels may be less suitable for those with dementia.

First Floor

- 11 A significant increase in amenity provision is likely to be desirable. We estimate this is likely to the include adaptation of the first floor with the loss of 20 bed spaces. The types of use and character of interiors are likely to deviate from PBSA but the building should allow retention of the longest life and highest value elements such as structure, skin and services.

Typical Floors

- 21 Additional on floor amenity or support is likely to be desirable. These living spaces could be distributed to serve half the beds each leaving up to 16 beds per floor.
- 22 The building is likely to be adapted by an operator familiar with this scale of bedroom to minimise adaptation. Small moves may however be potent. For example removal kitchenettes would make rooms more spacious allowing a larger bed with access from all sides.
- 23 Bedrooms could be combined to provide more generous homes for serving couples or less-abled users.

Elderly Care - More Support

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Figure Appendix D.3 – Adaptability Scenario Modelling – Elderly Care Example (Provided by Sheppard Robson)

Ground Floor

01 Communal and management spaces would need to adapt to the evolving needs of the community and operator whether it remains PBSA or changes use. Overall management strategies for co-living are likely similar but needs and quality will vary to the constituency and time.

02 A variety of scale of space are already provided allowing for a broad range of uses. Where spaces are more cellular we will seek to place structure to maximise the adaptability of partitions.

First Floor

11 Co-living typically has higher communal amenity requirements per bed. In order to meet a typical benchmark of around 5m^2 per bed room the western rooms at 1st floor could be consolidated into the amenity space. In order to safeguard this opportunity and adaptability we will try and concentrate structure along the corridor allowing for easy removal and movement of partitions.

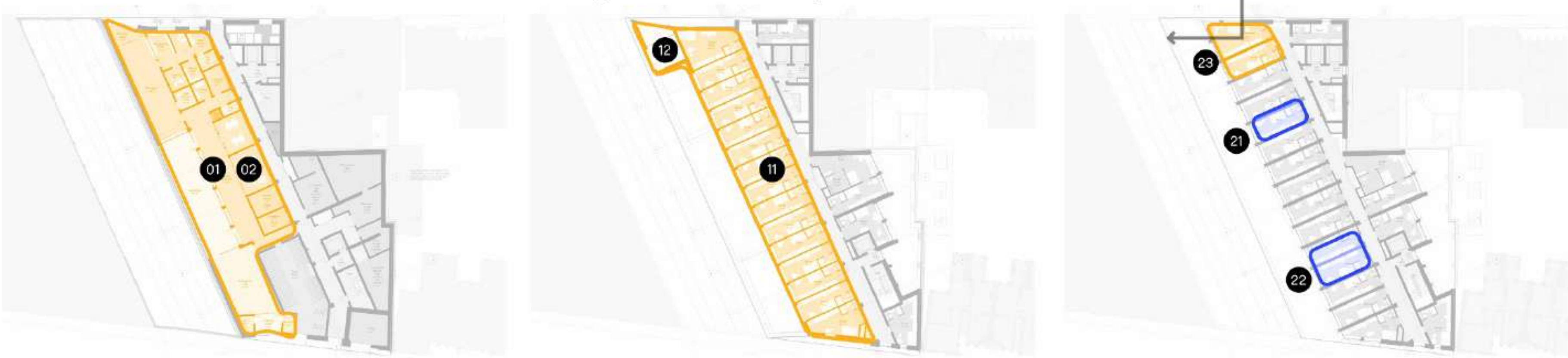
12 This space should ideally include new vertical connections to the ground floor amenity space which could be incorporated within the double height void near the reception.

Typical Floors

21 Generally bed spaces could be used directly as co-living studios. These would be at the lower end of scale for this sector so should be balanced by maximising amenity provision.

22 Pairs of rooms between the structure could be combined and adapted to other types, such as two-dios if required.

23 Bed spaces on each floor could be lost to provide more granular communal provision. Operators could converted individual dwellings or combine two to create larger spaces.



Co-Living - Longer Stay and Enhanced Amenity

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Figure Appendix D.4 – Adaptability Scenario Modelling – Co-Living Example (Provided by Sheppard Robson)

Ground Floor

- 01 Add linen store and increase luggage storage
- 02 Incorporate Hotel kitchen including services. This may occupy some of the bike store as cycle requirements are likely to reduce.
- 03 Adapt amenity to including enhanced public access to lounge, cafe, bar and courtyard.
- 04 Retain community space and utilise for events subject to availability.
- 05 Develop from-street servicing strategy with community, council and operator to cover higher intensity requirements.

First Floor

- 11 A linen store will be reuqired on each floor resulting in loss of 1 key/floor. This is best placed close to a lift and also to the east to reduce overlooking of our neighbours and to minimise the impact on the street.
- 12 Subject to operator needs additional amenity or support spaces could be integrated at first floor.
- 13 Refit of rooms should be minimised in accordance with operator requirements. MEP and riser requirements are likely to decrease due to the removal of kitchenettes so capping rather than creating new connections will be required.

Typical Floors

- 21 Add linen store on each floor resulting in loss of 1 key/floor.
- 22 Facade and servicing requirements are assumed to not deviate from student brief but will remain subject to ongoing maintenance cycles.
- 23 Opportunities to adapt conditions include refinement of roof level plant in response to operator or climatic change.

Hotel - More Public and Intensely Operated

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Figure Appendix D.5 – Adaptability Scenario Modelling – Hotel Example (Provided by Sheppard Robson)

E. Circular Economy Workshop Meeting Minutes

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Sustainability Workshop – WLC, CE and Energy Strategy Meeting Note (10/10/23)

Site: Britannia Street Car Park, London, WC1X 9BP

Meeting Organiser:	Ben Lovedale (Sheppard Robson)
Meeting Address:	Sheppard Robson, 77 Parkway, London NW1 7PU
Meeting Host:	Ensphere Group Ltd
Project Number:	23-E049
Applicant:	Curlew Developments London Limited
Invitees:	Ben Lovedale, Dan Burr, Oksana Hetman, Bruno Santos (Sheppard Robson) Pete Jeavons, Danielle Cawley (Ensphere) Greg Fox (Curlew) Bruno Alves (WSP)

Meeting Objective

To discuss the key issues relevant to the achievement of whole life carbon, circular economy and energy objectives for client review, as well as to highlight immediate actions.

Record of Discussion

Introductions

- Discussion as to whether the proposed scheme meets GLA referable criteria. London Plan targets and GLA WLC/CE requirements explained.

Existing Site

- Currently used as a small surface car park (no existing building).
- Potential to reuse hardstanding of the existing site – such as in the foundations or for mosaic on the roof terrace.
- Limited opportunities to reuse existing vent shaft on site.

Whole Life Carbon and Circular Economy Strategy

- Disassembly
  - Volumetric modular construction methods being explored – more structural requirements so may impact embodied carbon, but noted good for CE and build speed. Fire considerations with modular construction will also need to be determined.
  - MetSec frame option to also be explored.

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  - Façade – embodied carbon vs deconstruction balance – aluminium easier to reuse.
- Adaptability: Lightweight frame and site structural requirements makes adaptable design difficult. Likely co-living, hotel, care home etc compared to traditional residential.
- Local sourcing and employment considerations.
- Standard window sizes and stacked structure to simplify material requirements.
- Bathroom pods anticipated to be used.
- Long-lasting floor finishes are expected – Curlew to send specifications
- Review of circular economy measures and discussions on the specific commitments the project aims to implement that go beyond standard practice. *Ensphere to contact CW Architects for details.*
- Bin allocations for recycled and general waste to be confirmed. *Drawings to be provided by CW Architects once finalised.*

Energy Strategy

- New Part L and Part O requirements discussed – cannot assume blind as mitigation measure in the model.
- No DEN in proximity to site but futureproofing needed – centralised plant room expected with wet distribution.
- Decarbonising grid likely makes ASHP and PV a good solution with high environmental performance.
- Considering benefits of wastewater heat recovery – noted difficult in this type of building due to centralised system and circulation losses, also space constraints.
- Overheating risk – likely need comfort cooling as acoustic issues on site from trainline which will affect window openings - to be determined by model.
- Passive design measures should be explored – external shading to be proposed with set back windows. Modelling to be undertaken by Ensphere and daylighting consultant. Also discussed LETI guidance on window openings.
- Green roof needed for UGF. Ensphere detailed how GLA will expect bio-solar arrangement.
- TM54 modelling to be conducted as part of WLC assessment – scenarios discussed including hours of operation.
- Metering requirements for BREEAM and Be Seen.

Other Actions Discussed

- Other issues were summarised in the meeting including BREEAM targets and drainage.

Danielle Cawley
MANAGING CONSULTANT

2

F. Operational Refuse Storage Plan

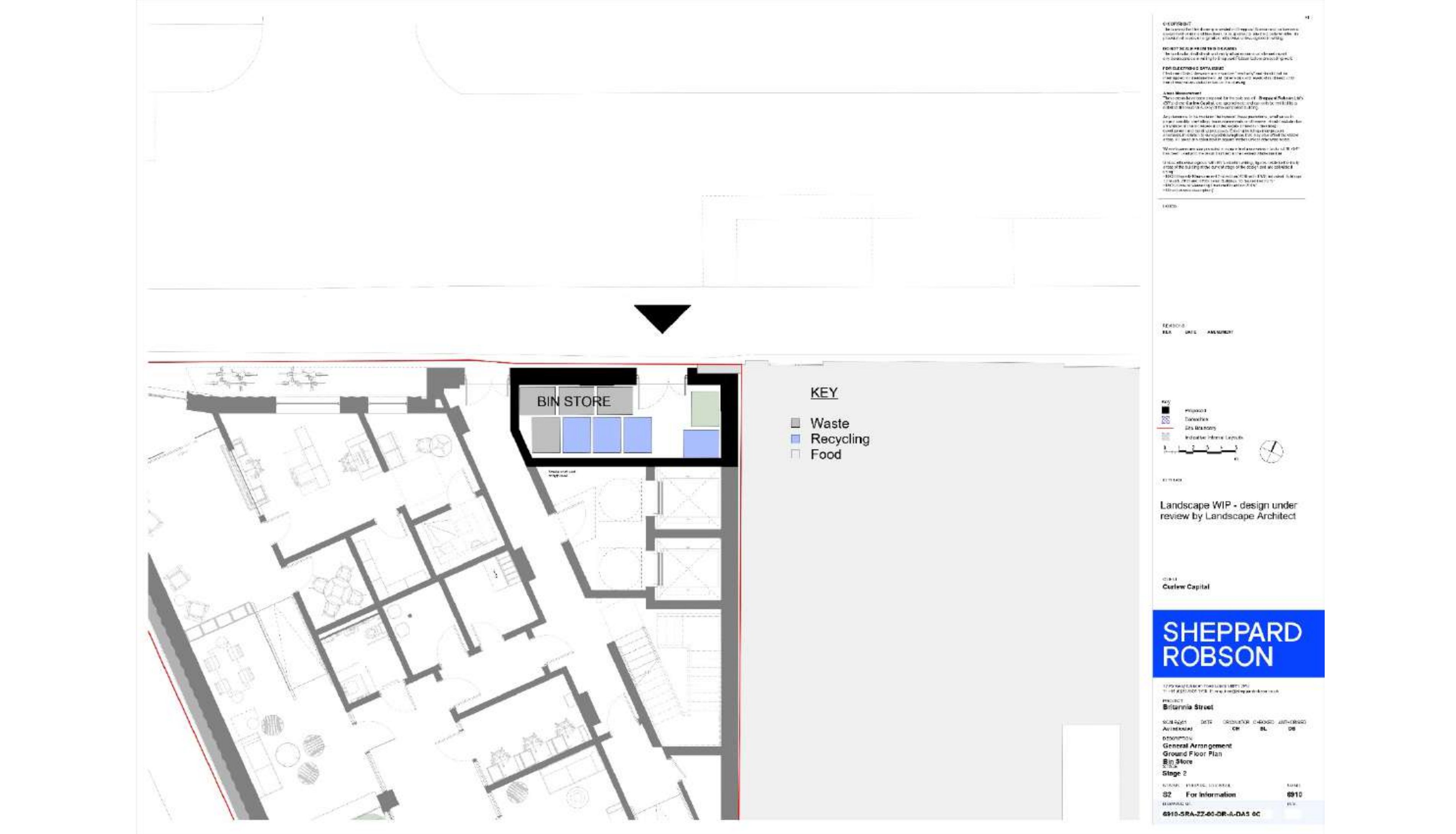

Figure Appendix D.1 – Refuse Storage Located at Ground Floor (Provided by Sheppard Robson)

G. Operational Waste Management Plan (Extract from Fresh 'Draft Student Management Plan')

4. Waste and Recycling Plan

The below section should be read in conjunction with the agreed Waste Management strategy for the site.

4.1 Overview

The management of waste can be expensive if not undertaken correctly, so we take a structured approach to minimise costs and environmental impact.

Residents will be responsible for putting their waste in the bin store. We will actively promote recycling and the use of specialist banks for clothing and other recyclables to avoid as much refuse going to landfill as possible.

Waste and recycling levels will be monitored, allowing us to identify trends and take corrective action when required.

Waste generated by residents will be stored within each studio or flat in refuse and recycling bins. It will be the responsibility of the residents to take their own refuse down to the ground floor main bin store using the lifts or staircase as and when required and place refuse in the wheeled Eurobins provided.

We minimise management staff handling of bins as this will add significant management costs. All waste and recycling is stored in a secure purpose built bin storage accessible from the ground floor.

4.2 Capacity

The bin stores at Britannia Street, have been designed to accommodate numerous wheeled Eurobins for mixed/recyclable and general waste.

4.3 Recycling

To assist in maximising the recycling and recovery of waste and thus minimise waste disposed to landfill, storage will be provided for mixed/recyclable waste within each studio and flat and also within the main bin store at ground floor level.

Recyclables including paper, cardboard, cans, plastics and bottles will be stored in a proportion of the bins provided. These will be clearly labelled to advise the occupants about what materials can be recycled in the mixed/recycle waste bins.

21

H. General Notes

The report is based on information available at the time of the writing and discussions with the client during any project meetings. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by Ensphere Group Ltd for inaccuracies in the data supplied by any other party.

The accuracy of the figures reported in this assessment is therefore commensurate with the data supplied. Some benchmark assumptions from the One Click LCA interface regarding quantity of materials and equipment were utilised in the absence of specific information for the assessed building. The emission estimates for the materials used are also dependent on the accuracy of the data sources in the One Click LCA software in terms of the EPDs selected, as well as the availability of product and manufacturer options.

The review of standards and other requirements does not constitute a detailed review. Its purpose is as a guide to provide the context for the development and to determine the likely requirements of assessment.

No site visits have been carried out, unless otherwise specified.

This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in guidance may necessitate a re-interpretation of the report in whole or in part after its original submission.

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