

CAMBRIDGE ROAD ESTATE – PLANNING APPLICATION 20/02942/FUL

CIRCULAR ECONOMY STATEMENT - APRIL 2021

****UPDATED DOCUMENT****

This document has not been updated since April 2021 and replaces the Circular Economy Statement that originally formed part of the Sustainable Design Construction Statement submitted in November 2022



HODKINSON



**Circular Economy
Statement**

Cambridge Road (RBK) LLP

Cambridge Road Estate

Final

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Our emphasis is to provide innovative and cost-effective solutions that respond to increasing demands for quality and construction efficiency.

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Definitions

The following definitions will assist in reading this Circular Economy Statement:

Adaptability (Design for) – Designed to meet the needs of the present, but with consideration of how those needs might change in the future and designed for change in the form of periodic remodelling including alterations or replacement of non-structural parts.

Circular Economy – “A circular economy is one that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles” - Ellen MacArthur Foundation.

Embodied carbon – The carbon that is released in the manufacturing, production, and transportation of our building materials.

Flexibility (Design for) – Designed to balance the needs of the present with how those needs will change in the future and designed for change through frequent reconfiguring including reconfiguration of non-structural parts.

Longevity (Design for) - Tailored to well-defined, long term needs while being durable and resilient or able to cope with change with little modification/no replacement of parts due to its ‘loose fit’, generous proportions and readiness for alternative technologies, different ways of living or working and a changing climate.

Operational Carbon – The carbon load created using energy to heat and power a building.

RIBA Stages – The Royal Institute of British Architects (RIBA) stages organise the process of briefing, designing, constructing, maintaining, operation and using building projects into a number of key stages.

Recoverability (Design for) – Designed to be deconstructed and reused or recycled on a part by part basis due to neither modules nor a kit of parts being desirable, feasible or viable and/or a limited future market as a result of unusual parts, dimensions or specifications.

Reusability (Design for) – Designed to be redeployed as modules or reused as a kit of parts on one or more different sites while minimising any servicing and maximising the size of the future market by using high-demand, standard dimensions and specifications

Executive Summary

The purpose of this Circular Economy Statement is to demonstrate that the proposed development at Cambridge Road Estate, by Cambridge Road (RBK) LLP in the Royal Borough of Kingston Upon Thames has considered the following circular economy principles:

- > Conserve resources and source ethically;
- > Design to eliminate waste (and for ease of maintenance);
- > Manage waste sustainably and at the highest value.

The ~~targets~~ commitments below have been set to ensure that changes are made at a strategic level in order to ensure that the core principles of Circular Economy are adopted:

- > A minimum of 95% of non-hazardous waste is to be recycled or reused;
- > Monitor energy, water and waste during construction;
- > Materials with recycled and reused content will be included, where feasible, within products and materials selected;
- > 100% of timber used on site, including timber used in the construction phase, will be sourced from sustainable forestry sources (e.g. PEFC and FSC);
- > Both non-residential and residential units will be designed to meet long-term occupant needs, be robust, durable, and resilient to climate change;
- > The site ~~will endeavour~~ commit to ~~meeting~~ the Greater London Authority target of 95% reuse/ recycling/ recovery during any demolition works. At least 95% of any excavation waste will be put to beneficial use;
- > Both non-residential and residential units will be provided with access to a refuse store, supporting the separate collection of dry recyclables (mixed plastics, metals, glass, card and paper) and food waste;
- > All residential apartments are to be provided with adequate space for both refuse and recycling, including food waste.
- > Both non-residential and residential units will be provided with a user guide to promote the principles of circular economy.

Further different strategic approaches that can be adopted and how they could be incorporated have also been outlined in the report and will support a circular economy approach for the development.

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1. INTRODUCTION

- 1.1** This Circular Economy Statement has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development.
- 1.2** The development has considered the following circular economy principles:
- > Conserve resources and source ethically;
 - > Design to eliminate waste (and for ease of maintenance);
 - > Manage waste sustainably and at the highest value;
- 1.3** The above assessment has been undertaken at RIBA stages 2-3 and will be submitted as part of the hybrid planning application, to the Royal Borough of Kingston upon Thames. The development summarised in this application concerns:
- > *“Hybrid Outline Planning Application for a mixed use development, including demolition of existing buildings and erection of up to 2,170 residential units (Use Class C3), 290sqm of flexible office floorspace (Use Class E), 1,395sqm of flexible retail/commercial floorspace (Use Class E/Sui Generis), 1,250sqm community floorspace (Use Class F2), new publicly accessible open space and associated access, servicing, landscaping and works.*
 - > *Detailed permission is sought for access, layout, scale, appearance and landscaping of Phase 1 for erection of 452 residential units (Use Class C3), 1,250sqm community floorspace (Use Class F2), 290sqm of flexible office floorspace (Use Class E), 395sqm of flexible retail/commercial floorspace (Use Class E/Sui Generis), new publicly accessible open space and associated access, servicing, parking, landscaping works including tree removal, refuse/recycling and bicycle storage, energy centre and works (“the Proposed Development”).”*
- 1.4** The aim of circular economy is to retain the value of materials and resources indefinitely, with no residual waste at all.
- 1.5** The following consultant reports have been referred to while developing this statement:
- > Design and Access Statement, Patel Taylor
 - > Energy Strategy, Hodkinson Consultancy
 - > Sustainability Statement, Hodkinson Consultancy
 - > Environmental Impact Assessment, Barton Wilmore

2. POLICY AND REGULATIONS

2.1 This chapter highlights the policies and regulations which are relevant to the proposed Cambridge Road Estate development.

Adopted London Plan (2021)

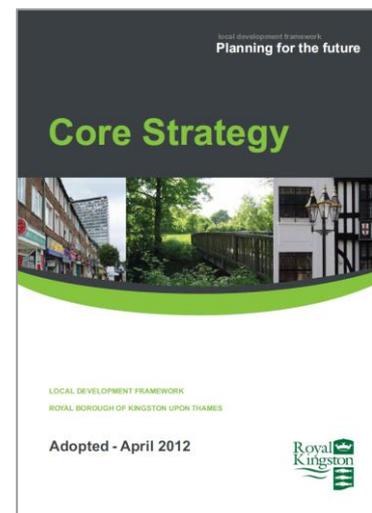
2.2 The London Plan sets out an integrated economic, environmental, transport and social framework for the development of London. The following policies are considered relevant to the proposed development and this Statement:

> **Policy SI7 Reducing Waste and supporting the Circular Economy.**

- A. Waste reduction, increases in material re-use and recycling, and reductions in waste going for disposal will be achieved by:
 - 1. Promoting 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. Encouraging waste minimisation and waste avoidance through the reuse of materials and using fewer resources in the production and distribution of products
 - 3. Designing developments with adequate and easily accessible storage space that supports 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 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 to support recycling and re-use
 - 5. How much waste the proposal is expected to generate, and how and where the waste will be handled.
 - 6. How performance will be monitored and reported.

Local Policy: Royal Borough of Kingston Upon Thames

- 2.3 The Royal Borough of Kingston Upon Thames' Core Strategy document was adopted in April 2012. The following policies are considered relevant to this Statement:
- 2.4 **Policy CS1 – Climate Change Mitigation:** All development must be designed and built to make the most efficient use of resources, reduce its lifecycle impact on the environment and contribute to climate change mitigation and adaptation by:
- > Reducing CO₂ emissions during construction and throughout the lifetime of the development;
 - > Building to the highest sustainable design and construction standards;
 - > Minimising water consumption;
 - > Using sustainable materials;
 - > Reducing levels of pollution, air, water noise and light; and
 - > Planning for increased flood risk.



Guidance Documents

- 2.5 Preliminary guidance has been released by the Greater London Authority (GLA) “*Circular Economy Statement Guidance Pre-Consultation Draft*”, issued in April 2020. It outlines guidance on Circular Economy statements that should accompany all referable planning applications in line with the recently published new London Plan Policy SI 7.
- 2.6 The guidance notes that Circular Economy Statements should be submitted at three stages:
- > **Outline/pre-application (RIBA Stage 1/2)** - Draft Circular Economy Statement with a focus on the strategic approach;
 - > **Full application (RIBA Stage 2/3)** - Detailed Circular Economy Statement outlining how the principles will be addressed through detailed design.
 - > **Post-completion stages (RIBA Stage 5/6)** - Post-Planning Updates should outline the progress in meeting the targets and commitment can be provided during the construction process.
- 2.7 As the proposed Cambridge Road Estate development is at RIBA 2/3 with a hybrid application being submitted, a detailed Circular Economy Statement will be produced.
- 2.8 In addition, the following guidance is available to apply circular economy principles to projects:

- > 'BS 8001:2017 – Framework for Implementing the Principles of the Circular Economy' by British Standards Institution, May 2017.
- > 'Designing for a Circularity - Primer' by GLA, October 2019.
- > 'Circular Economy Guidance for Construction Clients' by UK Green Building Council (UKGBC), April 2019.

BREEAM

2.9 The commercial areas of the proposed Cambridge Road Estate development, will be assessed to target a minimum of BREEAM 'Excellent' rating under the New Construction 2018 scheme, thus representing a high level of sustainable design and construction. A full BREEAM Pre-Assessment has been presented in Appendix A of the Sustainability Statement.

2.10 Implementing a circular economy approach can support achieving the following credits:

- > **Waste 01 Construction Waste Management** – Aims to reduce construction waste by encouraging reuse, recovery, and best practice waste management practices to minimise waste going to landfill. The pre-demolition audit of existing buildings takes place, to identify where existing buildings, structures or hard surfaces may be reused as part of the planned project. It ensures procedures are in place for sorting construction waste into waste groups. Encourages circular routes for construction waste;
- > **Waste 03 Operational Waste** (mandatory credit for BREEAM 'Excellent') – Encourages the recycling of operational waste through the provision of dedicated storage facilities and space. Highlights the importance to provide sufficient storage areas within the building to reflect the recyclable waste streams that are generated and then collected by the local waste authority;
- > **Waste 05 Adaptation to Climate Change** – Encourages to take measures to mitigate the impact of extreme weather conditions arising from climate change over the lifespan of the building. Requires an assessment of structural and fabric resilience to extreme weather conditions arising from projected climate change, with mitigation where feasible. Reduces likelihood of needing to replace products and materials due to damage or poor functionality resulting from changing climate conditions;
- > **Waste 06 Design for Disassembly and Adaptability** – Aims to avoid unnecessary materials use, cost and disruption arising from the need for future adaptation works as a result of changing functional demands and to maximise the ability to reclaim and reuse materials at final demolition in line with the principles of a circular economy;
- > **Materials 01 Environmental Impacts from Construction Products** – Building and Life Cycle Assessment (LCA) – This encourages the use of reused / recycled / reclaimed and reusable /

recyclable / durable / adaptable materials, products and systems in the building services and superstructure reduces life cycle impacts;

- > **Materials 05 Designing for Durability and Resilience** – Aims to reduce the need to repair and replace materials resulting from damage to exposed elements of the building and landscape. It requires protecting vulnerable and exposed parts of the building from damage and material degradation, thus increasing longevity and resilience of building components, resulting in fewer resources required for repairs and refurbishment; and,
- > **Materials 06 Material Efficiency** - Aims to avoid unnecessary material use arising from over specification without compromising structural stability, durability, or the service life of the building. Targets and reporting on opportunities and methods to optimise the use of materials, at various stages of design and construction will be required. It will be necessary to develop and record the implementation of material efficiency at various stages of design construction. Targets and actual material efficiencies achieved will need to be reported. Less over-specification means that there is less wastage of materials and reduced overall demand.

3. DEVELOPMENT OVERVIEW

Site Location

- 3.1** The proposed development site at Cambridge Road Estate in the Royal Borough of Kingston upon Thames is approximately 9 hectares and is located to the immediate south of the A2043 Cambridge Road and Hawks Road, as shown in Figure 1 below.

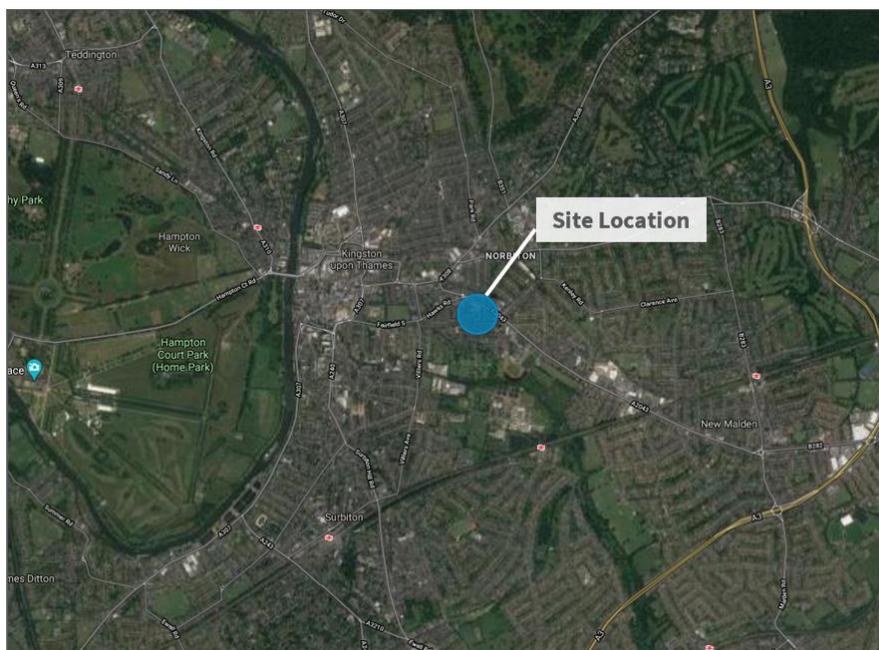


Figure 1: Site Location – © Map data Google

3.2 The land use in the immediate vicinity of the site is predominantly residential and of a domestic suburban character and scale. Cambridge Road Estates was built in the 1970s and currently comprises 832 residential homes; Hawks Road Clinic within the northwest of the site; The Bull and Bush Hotel within the west of the site; and Piper Community Hall within the south of the site. The site also includes small formal and informal play spaces and ground level car parking areas.

Proposed Development

3.3 The proposed development is described as follows:

“Hybrid Outline Planning Application for a mixed use development, including demolition of existing buildings and erection of up to 2,170 residential units (Use Class C3), 290sqm of flexible office floorspace (Use Class E), 1,395sqm of flexible retail/commercial floorspace (Use Class E/Sui Generis), 1,250sqm community floorspace (Use Class F2), new publicly accessible open space and associated access, servicing, landscaping and works.

Detailed permission is sought for access, layout, scale, appearance and landscaping of Phase 1 for erection of 452 residential units (Use Class C3), 1,250sqm community floorspace (Use Class F2), 290sqm of flexible office floorspace (Use Class E), 395sqm of flexible retail/commercial floorspace (Use Class E/Sui Generis), new publicly accessible open space and associated access, servicing, parking, landscaping works including tree removal, refuse/recycling and bicycle storage, energy centre and works (“the Proposed Development”).

3.4 The total masterplan GIA for the residential units is 215,140sqm. At this stage of the design, it is intended that the proposed structure will be a concrete frame. Figure 2 below illustrates the proposed development layout.



Figure 2: Proposed Masterplan Layout (Patel Taylor, October 2020)

4. CIRCULAR ECONOMY PRINCIPLES

- 4.1** A circular economy is defined in the recently adopted London Plan Policy SI7 ‘Reducing Waste and Supporting the Circular Economy’ 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.
- 4.2** In contrast to a linear economy (take, make, dispose), a circular economy keeps products and materials circulating through the system at their highest value for as long as possible, through re-use, recycling, refurbishment, and remanufacturing.
- 4.3** The end goal is to retain the value of materials and resources indefinitely, with no residual waste at all. This is possible but will require a fundamental change in the way that buildings are designed, built, operated, and deconstructed.
- 4.4** Applying circular economy thinking to the built environment is complex, with many overlapping issues and trade-offs to consider. However, there are some core guiding principles that promote a regenerative and restorative whole systems approach that should be applied on every project. These are as follows:

1. Conserve resources and source ethically;

- > Minimise the quantities of materials used
- > Minimise the quantities of other resources used
- > Specify and source materials and other resources responsibly and sustainably

2. Design to eliminate waste (and for ease of maintenance);

- > Design for longevity, adaptability or flexibility and reusability or recoverability
- > Design out construction, demolition, excavation, and municipal waste arising

3. Manage waste sustainably and at the highest value;

- > Manage demolition waste
- > Manage excavation waste
- > Manage construction waste
- > Manage municipal waste

5. Adoption of these three core principles on developments would significantly reduce the amount of raw and new materials required for the proposed Cambridge Road Estate development. Alongside this, a reduction in vehicle movements, air pollution, noise and greenhouse gas emissions would also be beneficial. The developer could benefit from cost savings through the reduction in materials required, if this was undertaken.

6. CIRCULAR ECONOMY ASPIRATIONS

- 6.1 Circular economy considerations have formed a key part of the Sustainability Strategy for the Cambridge Road Estate development, given the scale of the development, and the client's wider sustainability aspirations.

- 6.2 Considerations around resource efficiency and responsible procurement have been considered within the sustainability strategy from the early stages.

- 6.3 It is proposed that the developer will engage Countryside Properties as its Construction Manager. Countryside will ensure that the development at Cambridge Road Estate, achieves the goals and targets set out in the company's sustainability strategy and policies to ensure that development is delivered in an environmentally responsible, ethical, safe and sustainable manner.



- 6.4 Although not directly related to circular economy, the vision set by Countryside encompass the general principals surrounding circular economy, these are as follows:

- > **Waste** – In 2019 Countryside improved their waste management monitoring and reporting using the Building Research Establishment (BRE) SmartWaste reporting tool. Countryside produced 6.9 tonnes per 100m² of developed area in 2019 compared to 7.7 tonnes per 100m² in 2018, a reduction of 10% on the previous year, of which 97.5% and 99.4%, respectively, was diverted from landfill.
- > **Resource use** – Countryside will continue to work more closely with supply chains and contractors to improve waste management and reduction. Engaging with supply chain is essential in working towards a more circular economy and will enable them to:
 - > Minimise resource use;

- > Identify technologies that enable us to source more sustainable materials, reduce resource use and any resulting waste;
 - > Reduce vehicle movements to and from site; and,
 - > Reduce our production of waste and increase the reuse and recycling of materials.
- > **Modular** – In 2019, Countryside opened a modular timber panel factory in Warrington to service our northern and West Midlands regions with a total capacity of 1,500 units per annum. A second factory in 2020 may be opened to assist with demand for their products.
- > **Water** – Countryside monitor site water consumptions. Site water consumptions decreased for the third year in a row to 22,816m³ for 2019, compared to 33,414m³ in 2018. This is also a reduction in the normalised water consumption to 0.04m³ per m² (2018: 0.08m³ per m²). Low-flow fittings within new properties are installed, and show homes have details of water-saving actions that customers can take when they occupy our properties.

7. APPROACH TO CIRCULAR ECONOMY

Strategic Design Making

- 7.1 For circular principles to be successful, it requires a whole building approach. These principles need to be proactively considered throughout specification, design, procurement, construction, and operation. This includes collaborating with supply chains to explore and develop solutions which implement these principles and realise the benefits.
- 7.2 Post planning, the developer will consider at a strategic level further opportunities to adopt, where feasible, a circular economy approach. Such opportunities have been suggested in Appendix A2 (table 2) and will be discussed during workshops with the design team throughout the design development process.
- 7.3 Whilst not exhaustive, the targets set in Table 1 provide an example of circular economy measures that could be implemented, and the suggested targets associated with them.

Table 1: Strategic Approach

	Steering Approach	Target	Supporting Analysis
Circular economy approach for the new development at Cambridge Road Estate		Work towards <5% 'special' components across standardised and/or modular designs.	-
		Design to standard dimensions where possible to enable pre-fabrication	-
	Minimise construction waste	No more than 6.5 tonnes per 100m ² of non-hazardous waste (excluding demolition and excavation waste) to be achieved	Site Waste Management Plan BREEAM Waste 01 – <i>Construction Waste Management</i>
		At least 95% of non-hazardous waste is to be diverted from landfill.	
	Monitor water, energy and waste during construction.	BREEAM Management 03 – <i>Construction Site Impacts</i>	
	Design with adaptability and longevity in mind	Commercial spaces will be designed with an open plan layout to enable easy future adaptability for different use types. Residential units will be designed to meet long-term needs, be robust, durable and resilient to climate change. The design will use a 'building in layers' approach to allow different elements to be disassembled from the main structure.	BREEAM Waste 05 – <i>Adaptation to Climate Change</i> BREEAM Waste 06 – <i>Disassembly and Adaptability</i>

	Steering Approach	Target	Supporting Analysis
	Source materials sustainably	<p>Prioritise use of materials with low embodied carbon and materials with recycled content, where feasible.</p> <p>100% of timber used on site, including timber used in the construction phase will be sourced from sustainable forestry sources (e.g. PEFC and FSC).</p> <p>At least 20% of the total value of materials will seek to be derived from recycled and reused content in the products and materials selected.</p>	<p>BREEAM Materials 03 – <i>Responsible Sourcing of Construction Products</i></p> <p>Whole Life Cycle Assessment</p>
		Endeavour to specify at least 20 products with Environmental Product Declarations.	BREEAM Materials 02 – <i>Environmental Product Declarations</i>
Circular economy approach for the existing site	Demolish and maximise re-use/recycling of existing building components on site.	<p>Demolition of the existing buildings on the site will occur as they have been deemed not suitable for refurbishment or repurposing.</p> <p>95% of non-hazardous demolition waste to be diverted from landfill through reuse, recycling, and recovery will be targeted, where possible.</p>	<p>Pre-demolition Audits</p> <p>Site Waste Management Plan</p>
Circular economy approach for municipal waste during operation	Occupant municipal waste (Commercial and residential)	<p>Provide infrastructure for sharing of resources between members of the building community.</p> <p>All commercial units are to be provided with access to refuse stores at ground level.</p> <p>Dedicated residential waste and recycling facilities will be provided in line with Royal Borough of Kingston Council guidelines</p>	BREEAM Waste 03 – <i>Operational Waste</i>

Steering Approach	Target	Supporting Analysis
	Provide meter and submeter water and energy use (incl. smart meters) during operation to allow for monitoring of usage	BREEAM Water 02 – <i>Water Monitoring</i> BREEAM Energy 02 – <i>Energy Monitoring</i>
	Waste targets as follows: <ul style="list-style-type: none"> - 75% recycling rates for non-residential uses by 2030; - 50% recycling rates for residential apartments will be achieved by 2030; - Municipal waste recycling target of 65% by 2030; - Zero biodegradable or recyclable waste to landfill by 2026. 	Home user guides; Tenancy/Occupancy Agreements

7.5 Further approaches that can be adopted and how they could be incorporated are listed below.

Conserve Resources

Sustainable Procurement

- 7.6 In accordance with BREEAM Mat 03 requirements, Countryside are expected to follow their Sustainable Procurement Policy which ensures that new building materials are selected to ensure that they minimise environmental impact and have low embodied energy – from manufacture, transportation and operational stages, through to eventual demolition and disposal.
- 7.7 Where feasible, the main building materials will be responsibly and legally sourced from manufacturers with environmental management systems and/or responsible sourcing credentials, such as BES 6001. In addition, products with a recognised environmental product declaration (EPD) should be specified where possible.
- 7.8 At least 20% of the total value of materials used, where feasible, will be derived from recycled and reused content in the products and materials selected, in accordance with published GLA Circular Economy Guidance Pre-Consultation Draft and WRAP recommendations.

- 7.9 Where appropriate, timber used on site, including timber used in the construction phase, such as hoarding, fencing and scaffolding, will be sourced from sustainable forestry sources (e.g. PEFC and FSC).

Material Recovery

- 7.10 The existing site comprises 832 residential homes built in the 1960's and 1970's. Post planning, on contractor appointment, a detailed pre-demolition audit will be undertaken to determine opportunities for reusing existing materials and / or components. Any existing materials on site would then be reviewed to determine if they meet the required functionality of the new buildings and landscape design. Where no such opportunities exist, good practice measures can be taken in the demolition to ensure maximum recovery of materials through recycling. All elements from the deconstruction phase that cannot be reused on site can be sent to organisations for onward use wherever feasible.
- 7.11 Products that have recycled content, low embodied energy and can be re-used/ recycled/ refilled/ recharged or reconditioned will be considered by Countryside where possible.

Whole Life Carbon

- 7.12 Engagement with the design team has been undertaken to address the end-of-life strategy for the material. Initial building material formation has been made available to understand future life. This information has been used to initiate a Whole Life Cycle Carbon Emissions (WLCCE) Assessment.
- 7.13 Initial results are positive and early recommendations have been included in a standalone report.
- 7.14 The WLCCE assessment will enable BREEAM certification credits (MAT01) to be achieved for the non-residential elements of the proposed masterplan, and will consider, for RIBA stage 2-4, the design for superstructure, substructure, and core services.
- 7.15 A brief end-of-life strategy will be developed at detailed design to demonstrate how the building materials, components and products could be disassembled and reused at the end of their useful life. At least 20% of materials will seek to include reused and recycled content. This will be confirmed in the Bill of Materials (including kg/m²); to be provided within the post construction report. [A draft Bill of Materials has been provided in Appendix A4 with estimated quantities.](#)

Minimised Material Use

- 7.16 Where appropriate, the proposed development will seek to adopt a design approach that focuses on material resource efficiency so that less material is used in the design (e.g., lean design), and / or less waste is produced in the construction process, without compromising the design concept. These can include, but are not limited to, the following:

- > Considerations to the sizing and number of piles within the foundations to optimise and reduce material usage.
- > Where feasible, different piling solutions will also be explored e.g., driven piles are a sustainable solution as no spoil is produced so no waste is sent to landfill;
- > General arrangements and services layout options to be reviewed to allow minimal amount of mechanical and electrical pipework required where possible.
- > Use materials with recycled content and reclaimed material over new and remanufactured components over new, where feasible.
- > Considerations to leasing short lived components and procure Products as a Service (PAAS).

7.17 When applying the above, early engagement, complete transparency and visibility throughout the supply chain is encouraged.

Design to Eliminate Waste

Designing for Longevity

7.18 Protecting materials from degradation due to environmental conditions, adopting passive design strategies to provide resilience, and sizing systems to cope with future climate scenarios should be considered from the offset.

7.19 The proposed development will seek to design with longevity in mind. Suitable durability and protection measures will be incorporated in vulnerable parts of the internal and external building so as to minimise the frequency of replacing materials and therefore optimising material use. Potential measures may include:

- > Column protection, bollards and barriers to delivery and service areas to protect buildings and boundary walls from potential vehicular damage;
- > Hard-wearing floor and wall finishes (e.g. protection rails to walls of corridors);
- > Non-porous, durable surfaces constructed of corrosion resistant materials, where relevant;
- > Roof coverings and/or green roofs;
- > Kick plates or impact protections on doors, in addition to door stoppers to prevent door handles damaging walls.

7.20 Considerations will be given to producing a climate change adaptation strategy, in accordance with BREEAM guidelines, which would comprise of a systematic risk assessment to identify and evaluate

the impacts arising from climate change on the buildings at Cambridge Road Estate, over their projected life-cycle.

- 7.21** Measures will be undertaken to minimise the main hazards considered significant to the proposed development e.g., solar radiation/heatwaves, precipitation/surface water flooding and drought.
- 7.22** Designing a robust frame to enable changes in building use, for example design loads could be considered.

Design for offsite construction

- 7.23** Offsite construction and manufacturing will also be considered. The benefits of offsite factory production in the construction industry are well documented and include the potential to considerably reduce waste especially when factory manufactured elements and components are used extensively.
- 7.24** Its application also has the potential to significantly change the operations onsite, reducing the amount of trades and site activities and changing the construction process into one of a rapid assembly of parts that can provide many environmental, commercial and social benefits.

Standardisation or Modularisation

- 7.25** Considerations for standardised elements or modular designs for materials and products that enable a reduction in construction waste and easier reuse in next life, will be prioritised, where feasible.
- 7.26** Examples of such items that can be modular and/or fabricated offsite include suspended ceiling systems, bathroom pods, utility pods and balconies. It should be noted current limitations in incorporating larger modular construction elements include the lack of availability to source high quality, aesthetically pleasing design in modules, in addition to difficulties in transporting and handling modules.
- 7.27** Elements should use standardised design formats to enable future reuse, e.g. no bespoke cutting of materials as this can make replacements difficult to obtain.

Designing for Assembly, Disassembly and Recoverability

- 7.28** Creation of a materials inventory could be considered for the entire building that includes a detailed breakdown of all building elements that sets out the constituents of each product and material, the structural loadings, and the ability for each material to be reused and/or recycled.
- 7.29** Consideration to designing the building systems and components in layers to enable the ability to remove, adjust or replace of some elements is feasible, particularly for areas where different components have different life spans and maintenance needs.

- 7.30** A disassembly guide could be developed to address techniques for prolonging the life of the building and reducing operational construction, demolition and excavation waste.
- 7.31** Materials could have the option to be taken apart through mechanical and reversible fixings to allow for future reuse. Permanent fixing of products, such as by glue and cement mortar, will be avoided where feasible, to enable end of life deconstruction and salvage of building elements. Fixings will be easily accessible, where possible, for disassembly. A completed material end of life scenario table has been included as part of the WLCCE report.
- 7.32** The lifespan of internal fixtures is often over-estimated which leads to significant waste. Components that are likely to have a shorter lifespan could either be made of biological materials which can be returned to the biosphere (for example breather board) or designed to be returned to the manufacturer.
- 7.33** Materials such as plasterboards, furniture, lighting, floor finishes (e.g. carpets, etc.) with a planned short life span will be prioritised to be selected with manufacturers with take back schemes or that are procured through a service agreement.
- 7.34** Unnecessary toxic treatments and finishes will be avoided where possible. In addition, finishes that can contaminate the substrate in a way that they are no longer reusable will be avoided unless they serve a specific purpose.
- 7.35** At this stage the Bill of Materials is not yet available and will instead be provided during the post construction assessment. In accordance with GLA guidance, the Bill of Materials will include kg/m² for the proposed new development and will target a benchmark of 20% reused or recycled content, where feasible.

Designing for Adaptability or Flexibility

- 7.36** The BREEAM Wst 06 'functional adaptability' credit is likely to be targeted to avoid unnecessary materials use, cost and disruption arising from the need for future adaptation works. These changes could be required as a result of changing functional demands and to maximise the ability to reclaim and reuse materials at final demolition in line with the principles of a Circular Economy.
- 7.37** Designing for adaptability and flexibility could be considered in the design to ensure the built asset can cope with a diversity of scenarios, e.g. flexible planning, location of cores and adequate floor to ceiling heights.
- 7.38** The development will seek to ensuring that the mechanical and electrical design of the commercial areas is zoned to allow for future changes in layout.

Managing Waste

Estimated Waste from Construction

- 7.39** At this stage, no detailed bill of quantities for building material has been confirmed for the proposed revised development. The appointed demolition and enabling works contractors should segregate all materials prior to off-site removal to a designated transfer facility. Wherever possible, re-use and recycling of arisings and materials will be required and monitored.
- 7.40** In line with Countryside's company sustainability vision and objectives, waste arising from the construction of buildings at the proposed development will be calculated in line with BRE guidelines (BRE SmartWaste) and approximately 6.5 tonnes per 100m² of non-hazardous waste will be targeted, where appropriate.
- 7.41** As part of their commitment to divert construction waste from landfill, Countryside Properties will endeavour to regularly monitor and record the site's waste reduction performance. This will be compared against a target benchmark where at least 85% (by volume) of non-hazardous waste is to be diverted from landfill.

Site Waste Management

- 7.42** The reduction of construction waste not only minimises environmental impacts through ensuring the responsible use of resources and waste disposal but can also significantly reduce construction costs for the developer.
- 7.43** Post planning, a detailed Site Waste Management Strategy can be prepared, in accordance with BREEAM guidelines, to confirm the hierarchy of waste management and will be adopted in accordance with national policy requirements.
- 7.44** The waste management methods will include preparation for reuse and material recovery. The scale of the site lends itself to store materials and manage construction so that vehicle movements off-site can be minimised.
- 7.45** Space taken by storage of new materials will be avoided, wherever feasible. Frequently used items will be placed in easy to access areas. This will increase efficiency and minimise wastage due to damage. Prolonged storage of materials on site will be avoided, where possible, and implementation of 'just in time' deliveries will be encouraged.
- 7.46** Options also include using waste materials found on site and recycling / recovering them into an alternative form that can be used for any construction purposes (for example crushing concrete for road construction material). By recycling onsite, carbon emissions associated with the proposed development are also reduced, rather than materials being taken away from the application site.

- 7.47** During the construction phase, materials recovered from any on-site works may works may be suitable for reuse on-site, reducing costs of transportation and procurement of virgin materials. This combined with considerate design practice, such as balancing any cut and fill of materials, will help to minimise construction waste in line with the waste hierarchy which seeks to eliminate, reduce, reuse, and recycle.
- 7.48** Reusable packing solutions with key product manufacturers will be explored at the earliest opportunity. Solutions may include flat pallets, bulk bags, steel stillages and returnable cable drums.
- 7.49** Minimise packaging through re-usable packaging options and mobile storage solutions that allow transferring materials to the work interface without packaging.
- 7.50** The location of the waste handling site that materials will be taken to, will vary dependent upon their specific make up, of which is yet to be confirmed. Notification of the likely destination of all waste streams (incl. beyond the Materials Recycling Facility) will be provided, including confirmation that the destination landfill(s) has/have the capacity to receive waste.
- 7.51** Waste facility sites in Willesden, Greenford and Enfield may be used amongst others as appropriate. Wherever possible, materials will be recycled and re-used either onsite, or provided for use elsewhere. Waste segregation will take place during construction as far as the site allows logistically to give the highest possible recycling rates.
- 7.52** As part of their commitment to divert construction waste from landfill, the contractor will be required to regularly monitor and record the site's waste reduction performance. This will be compared against a target benchmark where at least 95% (by volume) of non-hazardous construction and demolition waste is to be reused, recovered, or recycled. A [commitment to target a benchmark of 95% for potential excavation waste put to beneficial use](#) will also be set.
- 7.53** All relevant contractors will be required to monitor and investigate opportunities to minimise and reduce use of energy and water. The energy and water consumptions of the project will be monitored, either through sub-metering or reading utility bills, to allow comparison against best practice benchmarks and improvements made.

Operational Waste

- 7.54** Waste reduction during the operational phase is also being considered for opportunities in implementing waste mitigation measures for the potential impacts arising during the operation of the development to ensure that such measures are consistent with both national and local waste policies and targets.
- 7.55** The Waste Hierarchy strategy in accordance with the London Plan will be used to ensure that waste is reduced or reused prior to being put out for recycling or refuse collection. The waste hierarchy establishes waste management options according to what is best for the environment. It places

great importance on preventing waste in the first place. When waste is created it prioritises preparing it for re-use, then recycling, recovery and lastly disposal (e.g. landfill).

- 7.56** The proposed development will provide easily accessible waste and recycling facilities in accordance with Policy 5.17 of the London Plan to minimise and manage waste. Waste storage provisions have been calculated using British Standard 5906:2005 for both residential and non-domestic uses.
- 7.57** Adequate storage is to be provided in communal stores, where both recyclable and non-recyclable waste can be stored in accordance with Royal Borough of Kingston upon Thames Council's waste collection service. High profile signage will be provided, where feasible, to encourage correct use of the recycling service.
- 7.58** Each residential unit will be provided with a segregated waste bin, to enable the separation of mixed dry recycling and food waste from refuse. Residents may also have the option to pay for a subscription garden waste collection service from Kingston Council.
- 7.59** For commercial spaces specifically, the BREEAM Wst 03 'Operational Waste' criteria will be followed to ensure adequate provision of dedicated storage facilities for a building's operational-related recyclable waste streams is provided, so that this waste is diverted from landfill or incineration. This space will meet the following BREEAM requirements:
- > Bins will be clearly labelled to assist with waste segregation, storage and collection;
 - > The stores will be accessible to building occupants and facilities operators; and,
 - > The storage will be of a capacity that is appropriate to the building's type, size and predicted volumes of waste.
- 7.60** Refuse stores for general waste and recycling are to be located adjacent to each communal entrance and within 15m of a refuse truck, for ease of collection. Doors to refuse stores are to be accessed externally, to avoid contamination of smells within residential lobbies. Louvred, 1200mm wide, service doors have been used to both mitigate smells and provide clear widths for refuse collection. Doors are to be within 30m of all shared residential entrances, in accordance with Approved Document H.
- 7.61** Bin stores have been sized in accordance with Royal Borough of Kingston Upon Thames' Residential Design SPD, and a mix of eurobin sizes used to accommodate Royal Borough of Kingston Upon Thames' recycling requirements. Ground floor homes will have dedicated bin stores in compliance with Local Authority guidance, with kerbside collection. Operational waste the proposal is expected to generate is demonstrated in Appendix A3. The schedule excludes ground floor homes which have use of independent refuse stores located outside the homes, such as the maisonettes and houses on building E. Each of these homes have external storage (shown in figures 3 and 4) with space for *1no. 240L general refuse, 1no. 23L food waste and 1no. 180L recycling bin.*

- 7.62** Refuse vehicles will require access to the entire perimeter of Plot E, and west and east of Plot's C and B. Therefore, the landscape strategy has carefully incorporated routes for bin lorries within the green landscapes of Piper Way and residential neighbourhood street of Washington Avenue. In Piper Way, wide pavements provide clear routes and turning radii for bin lorries, whilst planting, bollards and sinuous routes discourage and restrict car access.
- 7.63** A dedicated commercial refuse store is located within Building C2, to house Community Centre and commercial refuse and recycling.
- 7.64** Figures 3 and 4 overleaf, illustrate access and locations of refuse stores for Plots B, E and O.
- 7.65** Operational waste, post construction, will be regularly monitored by the Council/its appointed Management Co. The development is committed to meet the Mayor's 65% target for municipal waste recycling by 2030 and will strive to ensure no biodegradable or recyclable waste is sent to landfill by 2026, once the proposed developments at Cambridge Road Estate is operational.
- 7.66** Through good practice measures, occupants will be encouraged to reduce and prevent waste. Building/Home user guides and information packs will be provided to residents and building users about how the waste segregation and recycling scheme operates. The information will also include details on waste prevention schemes within the Royal Borough of Kingston upon Thames area, such as:
- > Royal Borough of Kingston upon Thames Reuse and Recycling Centres - Reuse and recycling centres allow residents to dispose of a wide range of reusable and recyclable items for free;
 - > Community RePaint – UK wide paint reuse network that aims to collect leftover paint and redistribute it to benefit individuals, families, charities and communities in need at an affordable cost.
 - > Freecycle Network; and Freegle – are networks that aims to increase reuse and reduce landfill by offering a free online based service where people can give away and ask for things that would otherwise be thrown away.

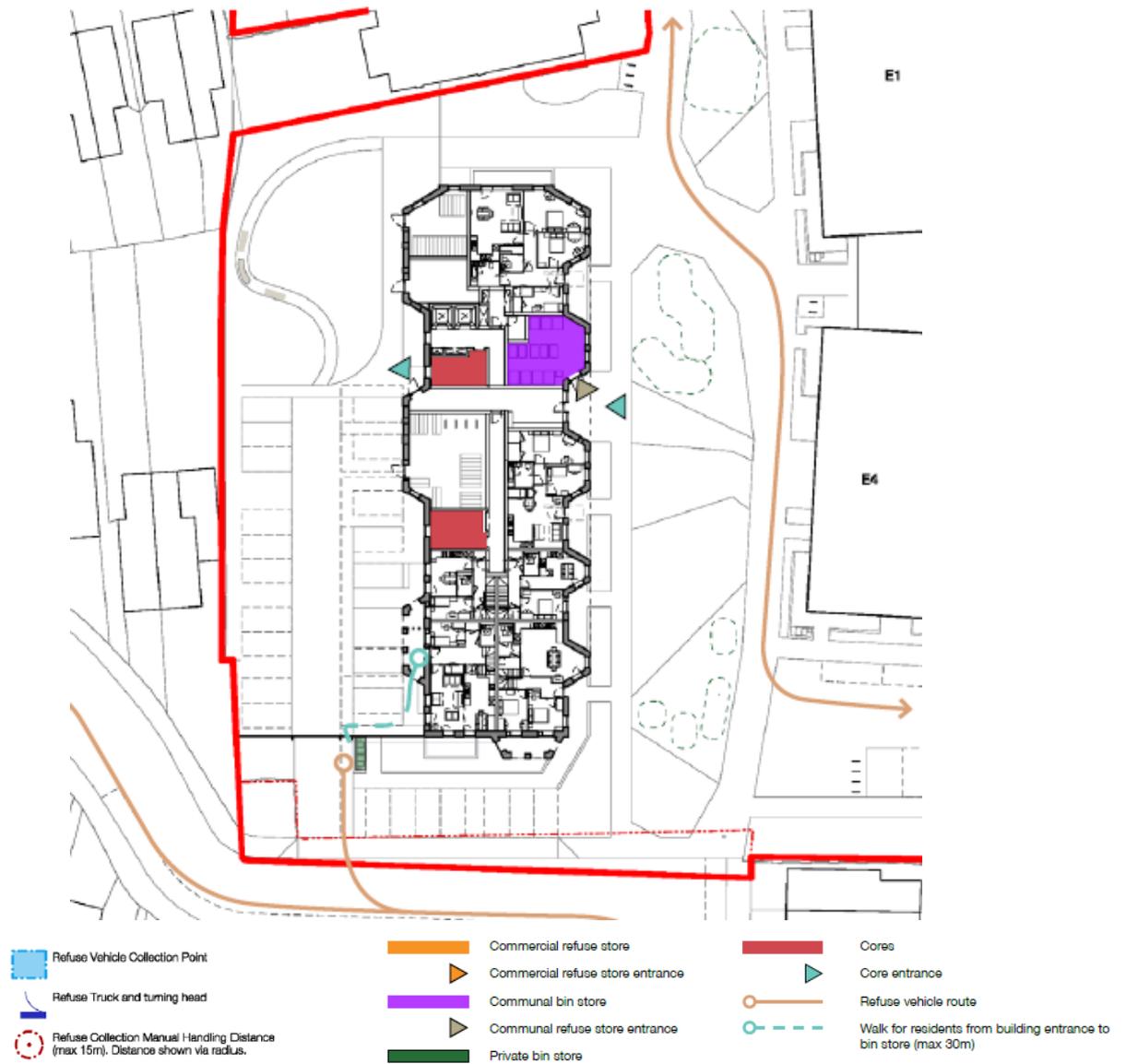


Figure 3: Refuse servicing diagram for Plot B (Patel Taylor Architects, 2020)



Figure 4: Refuse servicing diagram for Plot E [left] and Plot O [right] (Patel Taylor Architects, 2020)

- 7.67** The proposed development will ensure no biodegradable or recycle waste is sent to landfill once the proposed development is operational. A recycling rate of 75% will be targeted for businesses by the development by 2030.
- 7.68** All food waste will be collected by South London Waste Partnership (SLWP) and taken to Sutton (Beddington Lane) or Kingston (Villiers Road) where it is bulked before being transported in HGVs to an anaerobic digestion facility in Chertsey, Surrey. Paper and card for recycling will be taken Croydon (Stubbs Mead Depot) or Kingston (Villiers Road) where it is bulked before being transported in HGVs to paper mills across the UK; like the UPM Paper Mill in Shotton, north Wales, or the DS Smith paper mill in Kemsley, Kent.
- 7.69** Plastic, glass, cans and cartons will be collected by SLWP and taken to Kingston (Villiers Road), Sutton (Beddington Lane) or Croydon (Endeavour Way) where it is bulked before being transported in HGVs to a recycling sorting facility.
- 7.70** Garden waste will be collected by SLWP and taken to Sutton (Beddington Lane) and Kingston (Villiers Road) where it is bulked before being transported by HGVs to one of seven composting facilities located in East Sussex (Isfield, Lewes), West Sussex (Chichester, Crawley, Tangmere), Kent (Swanley) and Essex (Colchester). They are operated by four specialist companies: KPS Composting Services, The Woodhorn Group, Tamar Organics and Birch Airfield Composting Services. They will be processed and turned into high quality, peat-free compost and soil conditioning products.
- 7.71** General waste will be collected by SLWP and taken to a local 'energy from waste' facility, operated by Viridor, in Beddington, Sutton.

Recycling Waste Reporting Form

7.72 The recycling and waste metrics reporting will be provided by the main contractor, once appointed. This will be agreed with the project manager and a site waste management plan, which will contain improved estimates for figures shown in Table 3.

Table 3: Recycling and Waste Reporting – Construction and Municipal Waste

		Excavation Waste	Demolition Waste	Construction Waste	Municipal Waste
Total Estimate (t/m² GIA)		0.55 (119,400m ³)	0.22 (47,600m ³)	0.38 (82,000m ³)	6,500 t/annum
% reused on or off site		>95%	>95%	>95%	>65%
% recycled or composted, on or off site					
% not reused or recycled	% to landfill	0	Max 5%	Max 5%	Max 35% and no recyclable or compostable waste
	% to other management (e.g. incineration)	0	Max 5%	Max 5%	

Plans for Implementation

7.73 Considerations for circular economy implementation will be required through active engagement with key stakeholders at each stage, of which include (but not limited to):

- > Principal Contractor and Sub-contractors (when appointed);
- > Project Architect (Patel Taylor Architects);
- > Civil and Structural Engineers (CTP LLP); and,
- > Client/Developer (Countryside Partnership).

7.74 A brief plan of implementation (short, medium, and long term) and action list was compiled as a result of the initial Circular Economy and Whole Life Cycle Carbon Emissions workshop (meeting minutes of which can be found in Appendix A1). Key actions of which included:

- > Existing site investigation to identify materials feasible for reuse or retention within the proposed development;
- > Identify materials and products with recycled content, including investigating potential recycled aggregate % calculations or use of GGBS as a cement replacement in concrete;
- > Consultant reports to include and keep circular economy principles in mind (e.g., Design and Access Statements, Operational Waste Strategy Documents, etc).

7.75 Such requirements, along with the projects strategic approach to implementing circular economy principles, will be included in tendering specifications to contractors, ensuring responsibilities in line with these aspirations are embedded from the earliest opportunity.

End of Life Strategy

7.76 Although the proposed development is still at an early design phase, engagement with the design team has been undertaken to address the end-of-life strategy for the building materials and components.

7.77 Once the principal contractor is appointed, and the design is progressed and develops to specify exact materials and products, the end-of-life scenarios for the building will become more detailed as a result. The main aim is to extend the lifetime of the building through careful design and specification through the measures listed herein.

7.78 Once appointed, the contractor will also be required to produce a disassembly manual that provides guidance on which materials, elements or components can be reused, recycled or composted. Where possible, the disassembly manual will include a Building Information Model (BIM) to ensure information can be easily accessible and updated where relevant.

8. CONCLUSION

- 8.1** The purpose of this Circular Economy statement is to demonstrate that the proposed Cambridge Road Estate development by Cambridge Road (RBK) LLP in the Royal Borough of Kingston Upon Thames has considered the circular economy principles to minimise embodied carbon and operate with a circular economy, maximising the value extracted from materials and prioritising the reuse and recycling of materials.
- 8.2** The statement takes into consideration circular economy principles to:
- > Minimise embodied carbon;
 - > Operate with a circular economy;
 - > Maximising the value extracted from materials; and,
 - > Prioritising the reuse and recycling of materials.
- 8.3** The aim of circular economy is to retain the value of materials and resources indefinitely, with no residual waste at all. This is possible but will require a fundamental change in the way that buildings are designed, built, operated, and deconstructed.
- 8.4** A series of targets have been proposed in this Circular Economy Statement, identifying and applying these approaches during concept design will enable them to be incorporated as part of the development brief and will help facilitate a circular economy approach.
- 8.5** A Post Construction Completion Report is to be provided at project completion. This will seek to set out the predicted and actual performance against all numerical targets and provide updated versions of the items covered in Table 1 and Table 2 (Appendix A2). The following reports will be provided and included in the Post Construction Completion Report:
- > Detailed pre-demolition audit and Site Waste Management Plan (when contractor is appointed);
 - > Cut and Fill Calculations & Material Options Assessment
 - > Reused or Recycled Content Calculations
 - > Scenario Modelling demonstrating adaptability
 - > Lean Design Options Appraisal
 - > Building Weight Calculations (load take-down)
 - > Bill of Materials and Detailed Recycling and Waste Reporting Table

APPENDICES

Appendix A1 - Meeting Minutes

CAMBRIDGE ROAD ESTATE CIRCULAR ECONOMY AND LIFE CYCLE ASSESSMENT APPROACH

Introduction

This document sets out the options to be evaluated, as part of the life cycle assessment (LCA), following embodied carbon discussions with the design team. This document also describes initial discussions on circular economy principles to be considered for the proposed development at Cambridge Road Estate.

LCA and circular economy implementation is required at this stage to comply with GLA planning requirement, specifically to adhere to Policies SI 2 & SI 7, of the recently adopted new London Plan.

Key Stakeholders / Design Team Members

- Nick Ellis – Patel Taylor Architects (PTA)
- Roger Meyer – Patel Taylor Architects (PTA)
- Mark Ludlow – Countryside Partnership (CP)
- Greg Pitt – Barton Willmore (BW)
- Maihul Varsani – Hodkinson Consultancy (HC)
- Zeta Watkins - Hodkinson Consultancy (HC)

Points of Discussion & Options Summary

Embodied Carbon and LCA

The following table summarise the options to be evaluated following discussions on the importance of embodied carbon and are set by the building element.

Item	Implementation
Embodied Carbon and LCA	
Introduction and Context Embodied carbon and LCA analysis are required to understand the position with regards to sustainability and help identify the carbon that will be released from the proposed development at Watling Gardens, both in terms of potential demolition works, construction and over the life-cycle of the building.	CP
Compliance against GLA policy requirements is required and demonstrated via a Whole Life Cycle Carbon Emissions Statement, to be submitted at planning.	HC
Development Brief The land use in the immediate vicinity of the site is predominantly residential and of a domestic suburban character and scale. Cambridge Road Estates was built in the 1970s and currently comprises 832 residential homes; Hawks Road Clinic within the northwest of the site; The Bull and Bush Hotel within the west of the site; and Piper Community Hall within the south of the site. The site also includes small formal and informal play spaces and ground level car parking areas	CP PTA

<p>The proposed development comprises of the following: A mixed use development, including demolition of existing buildings and erection of up to 2,170 residential units (Use Class C3), 290sqm of flexible office floorspace (Use Class E), 1,395sqm of flexible retail/commercial floorspace (Use Class E/Sui Generis), 1,250sqm community floorspace (Use Class F2), new publicly accessible open space and associated access, servicing, landscaping and works.</p> <p>Erection of 452 residential units (Use Class C3), 1,250sqm community floorspace (Use Class F2), 290sqm of flexible office floorspace (Use Class E), 395sqm of flexible retail/commercial floorspace (Use Class E/Sui Generis), new publicly accessible open space and associated access, servicing, parking, landscaping works including tree removal, refuse/recycling and bicycle storage, energy centre and works</p>	PTA
<p>Considerations on Material Use / Efficiency Where practical, new building materials should be sourced locally to reduce transportation pollution and support the local economy. New materials should be selected based on their environmental impact and responsible suppliers will be used where possible.</p> <p>A detailed pre-demolition audit will be undertaken post planning. Options are to be explored on extent of material from existing site for use in the new development. Examples include utilising demolished masonry and concrete for reuse, once crushed, for back fill, particularly for landscaped areas.</p> <p>Considerations for material option with recycled content are to be review. Possible examples include steel, plasterboards and paint. The use of recycled and/or secondary aggregates will be considered for structural elements. Further investigations required.</p> <p>Passive design strategies and principles will be considered in the energy strategy to minimise operational energy demand.</p>	<p>CP</p> <p>CP</p> <p>CP / PTA</p> <p>HC</p>
<p>Next Steps</p> <p>Agree timescales for addressing points made above. Continue regular engagement through design phases noting guidance from WRAP, LETI, GLA, etc.</p>	All

Item	Implementation
Circular Economy	
<p>Description of the Development As noted above.</p> <ul style="list-style-type: none"> ‘Proposed gross internal floor area to be verified.’ <p>HC to check and confirm with PTA</p>	HC

<p>Strategic Approach to Circular Economy</p> <ul style="list-style-type: none"> • <i>'A summary of the strategic approach to implementing circular economy principles for the proposed development to be presented as required in Table 1 of GLA's guidance, in addition to a supporting narrative.'</i> <p>HC to produce Table 1 highlighting approach</p>	<p>HC</p>
<p>Bill of Materials</p> <ul style="list-style-type: none"> • <i>'A Bill of Materials is required for the proposed development with confirmation that reused or recycled content will be 20%. The Bill of Materials should detail the estimated quantity of materials used in each layer of the building (kg), the material intensity (kg/m² GIA) and set targets for the minimum amount of recycled content to be used (% by value).'</i> <p>Bill of Materials to be provided for post construction report.</p>	<p>CP</p>
<p>Recycling and Waste Reporting</p> <ul style="list-style-type: none"> • <i>'Recycling and waste estimates are required detailing the total amount of waste/material to be generated during excavation, demolition, construction and operation.'</i> • <i>In order to be compliant, this must include clearly defined activities and targets relating to the following London Plan policy targets:</i> <ul style="list-style-type: none"> ○ <i>95% reuse, recycling/recovery of construction and demolition waste</i> ○ <i>95% beneficial use of excavation waste</i> ○ <i>65% recycling of municipal waste by 2030.'</i> <p>To be addressed in the Site Waste Management Plan and associated waste & construction management reports, where appropriate.</p>	<p>CP PTA</p>
<p>Operational Waste</p> <ul style="list-style-type: none"> • <i>'Estimated expected operational waste arising from the proposed development is to be provided and details of how the waste will be managed in accordance with the waste hierarchy.'</i> <p>Operational waste strategy to be provided.</p> <p>HC to review Royal Borough of Kingston Upon Thames waste policy and confirm if compliance with the waste hierarchy is achieved.</p> <ul style="list-style-type: none"> • <i>'Demonstrate the proposed development is designed with adequate, flexible, and easily accessible operational waste storage space and supports separate collection of dry recyclables and food waste.'</i> <p>Adequate facilities will be provided for domestic and construction related waste, including segregated bins for refuse and recycling. To be addressed in the Design & Access Statement where appropriate.</p> <ul style="list-style-type: none"> • <i>'It is required to confirm how the operational waste performance will be monitored and reported once the proposed development is operational. A commitment to ensure that there is zero biodegradable or recyclable waste to landfill by 2026. A commitment to ensure the municipal waste recycling target of</i> 	<p>CP PTA HC CP PTA</p>

<p><i>65% by 2030 is met or exceeded. It must be also demonstrated that 50% recycling rates for households will be achieved by 2030.'</i></p> <p>Occupants and building users will be provided with information (e.g. building/home user guide; tenant agreements) on waste management to encourage the targets listed above.</p>	<p>CP</p>
<p>End of Life Strategy</p> <ul style="list-style-type: none"> <i>A brief end of life strategy is required to demonstrate how the building materials, components and products will be disassembled and reused at the end of their useful life. Strategy for how the building materials, components and products will be disassembled and reused at the end of their useful life.'</i> <p>The above documentation will be included in the post construction report.</p>	<p>PTA HC</p>
<p>Additional Reports / Statements required:</p> <ul style="list-style-type: none"> <i>'A detailed pre-demolition is required to identify components of the building that can be retained / reused.</i> <i>Site Waste Management Plan / Resource Management Plan</i> <i>Cut and Fill Calculations & Material Options Assessment</i> <i>Reused or Recycled Content Calculations'</i> <i>'Scenario Modelling demonstrating adaptability'</i> <i>'Municipal / Operational Waste Strategy and associated drawings'</i> <p>The above documentation will be included in the post construction report.</p> <ul style="list-style-type: none"> <i>'Lean design options appraisal and Building weight calculation (load take-down)'</i> <p>Lean design options appraisal and building weight calculations will be provided at detailed design stage and included in the post construction report as this will be an ongoing process through value engineering workshops, etc.</p>	<p>All</p>

Appendix A2 – Summary of Key Commitments

	Site / Space / Stuff / building	Sub-structure	Super-structure	Shell/Skin	Services	Construction
Section A: Conserve resources - Focus on conserving materials and resources, and to source materials responsibly						
Minimising the quantities of materials used	A whole-life cycle carbon assessment is being undertaken to ensure a lean, low embodied carbon design is adopted, where feasible.					Exact dimension to be calculated and checked prior placing material orders to prevent over ordering.
	Post planning, a pre-demolition / pre-construction audit to be produced to maximise material recovery and reuse, where feasible. 20% of materials will seek to include reused and recycled content.		Where feasible, piled foundations will be prioritised over pad foundations for material optimisation		Connection to an existing district heat network is proposed	Offsite fabricated components will be utilised where feasible.
	The use of RAP (recycled asphalt planings) as a significant proportion of the aggregate input in landscaping could be considered. As well as avoiding the use of virgin aggregate this utilises the bitumen on the reused stone.					
Minimising the quantities of other resources used (energy, water, land)	In line with BREEAM Land Use and Ecology 01 – Site Selection, the proposed development will be entirely on previously developed land, avoiding land which has not been previously disturbed.	Where appropriate and feasible, key materials will be sourced from local suppliers to minimise transportation emissions			The development will target a 35% reduction in Regulated CO2 emissions through connection to an existing district heat network, energy efficiency measures and PV panels.	In accordance with the BREEAM guidelines set in Management 03, energy and water consumption will be monitored on a weekly basis. Targets to be set and progress reported on a monthly basis.

	Site / Space / Stuff / building	Sub-structure	Super-structure	Shell/Skin	Services	Construction
	<p>Water efficient sanitaryware will be specified to minimise potable water demands.</p> <p>Where provided, white goods will aim to be energy efficient with at least a B rating.</p>				Where possible, external lighting and any security lighting will be energy efficient and adequately controlled using PIR sensors, daylight cut-off sensors or time switches. This will ensure the conservation of energy when the lighting is not in use.	In accordance with the BREEAM guidelines set in Management 03, the monitoring and recording of data for the transport movements from the delivery of construction materials and construction waste from site will be undertaken. Targets for transportation movements and progress will be reported on a monthly basis.
Specifying and sourcing materials responsibly and sustainably	The appointed contractor will produce and follow a site specific Sustainable Procurement Plan which ensures that new building materials are selected to ensure that they minimise environmental impact and have low embodied energy – from manufacture, transportation and operational stages, through to eventual demolition and disposal.					
	Specification of construction products with an Environmental Product Declaration (EPD) will be prioritised where feasible/relevant					
	Major building elements to be sourced in accordance with BES6001					
	Products to be specified using performance criteria, rather than by brand or specification. For example, tensile and yield for steel and lux levels for lighting.	Considerations for opportunities to use secondary/recycled aggregates in accordance with BREEAM Waste 02 will be assessed at detailed design.				
	Specify materials with increased levels of recycled content where there is no impact on cost or performance	Steel with a high recycled content will be used where possible				

	Site / Space / Stuff / building	Sub-structure	Super-structure	Shell/Skin	Services	Construction
Section B: Design to eliminate waste – Includes designing to facilitate maintenance (therefore retaining materials and products in service for as long as possible), and through careful selection of construction techniques or procurement strategies						
Designing for reusability / recoverability / longevity / adaptability / flexibility	Drainage systems capacity and allowances for climate change have been accounted for in the drainage strategy. See the standalone Flood Risk and Drainage Strategy Report for more details.	Floor to ceiling height to be increased in commercial units to allow for future change of use	Vulnerable elements will be protected from damage. Protection measures will be incorporated to reduce damage to the building's fabric or materials in case of accidental or malicious damage occurring.	Hard-wearing and low-maintenance external cladding / roofing will be specified to limit replacement during building life.		
	Circulation capacity, fire strategy and means of escape are appropriate for different uses			Consider panelised construction, particularly for roofs and facades to permit final deconstruction on the ground.		
	No fixtures or fittings will be glued down wherever feasible to ease future disassembly and recovery. Absence of fitted furniture so rooms can be adapted for multiple purposes (e.g. bedroom/office/living room).					
	Connections and components to have high durability.					
Unnecessary toxic treatments and finishes will be avoided. Finishes that can contaminate the substrate in a way that they are no longer reusable will be avoided unless they serve a specific purpose.						

	Site / Space / Stuff / building	Sub-structure	Super-structure	Shell/Skin	Services	Construction
			Adopt passive design strategies to provide resilience, size systems to cope with future climate scenarios.			
			For commercial areas, glazing ratios and sound insulation ratings are to be considered for different uses.			
Designing out construction, demolition, excavation, industrial and municipal waste arising	Using recycled sub-base from site works where possible		Standard sizes to be specified where possible.			Just in time delivery system to be implemented to ensure that a surplus of materials is not kept on site.
	Materials, components, and products to be sourced as part of a leasing / buy back scheme, where feasible					
	Design coordinated to avoid excess cutting and jointing of materials / components that generate waste					
	Where relevant, producing a site deconstruction strategy plan should be considered.					The subcontractor will be responsible for organising the take back of packaging waste, including pallets, where they can be re-used as a material as opposed to disposing as waste.
	Rooms in apartments are designed for multiple uses (e.g. office/bedroom/living room)					
Façade replacement or upgrade strategy should be developed						
Section C: Manage waste - Consider measures that can be taken to manage any waste that is generated, by increase reuse and recycling rates						
Demolition waste	A pre-demolition audit to be produced to maximise material recovery and reuse, where feasible. Prior to construction, Countryside Properties Plc will develop a Site Waste Management Plan which will establish ways of minimising waste at source, assess the use, re-use, and recycling of materials on and off-site and prevent illegal waste activities. This will be disseminated to all relevant personnel on					Community Wood Recycling (CWR) is a network of wood recycling social enterprises providing an efficient and cost-effective collection service for all types of waste wood.

	Site / Space / Stuff / building	Sub-structure	Super-structure	Shell/Skin	Services	Construction
	and off-site. Predicted and actual calculations of total non-hazardous waste arising will be estimated, monitored and recorded					
Excavation waste	Predicted and actual calculations of total non-hazardous excavation waste arising will be estimated, monitored and recorded and opportunities for use on site should be reviewed.					
Construction waste	Standard sizes will be specified where feasible, to enable future reuse, e.g. no bespoke cutting of materials as this can make replacements difficult to obtain.					
	As part of their commitment to divert construction waste from landfill, the appointed contractor will regularly monitor and record the site's waste reduction performance. This will be compared against a target benchmark where at least 85% (by volume) of non-hazardous waste is to be diverted from landfill.					
	Waste will be segregated on site and materials only to be delivered to site when needed, to prevent damage					
	<p>Contractors should explore reusable packaging solutions with key product manufacturers at the earliest opportunity. Solutions may include:</p> <p>Flat pallets: Wood pallets have the greatest potential for cutting emissions and reusable plastic pallets are better for waste reduction.</p> <p>Box pallets: High quality plastic folding box pallets reduces the need for disposable packaging.</p> <p>Steel stillages: Specialist steel A-frame stillages (carrying plate glass) can replace single trip pallets of non-standard sizes and associated protective disposable packaging. This could be extended to be used for other products such as dense cladding, heavy panels and frames.</p>					
Municipal and industrial waste (operational waste management)	The Royal Borough of Kingston Upon Thames website advises on recycling and aims to make recycling easier for residents. Details on accessing this information should be provided in any welcome packs.					
	Waste and recycling storage will be provided for residential units.					

Site / Space / Stuff / building	Sub-structure	Super-structure	Shell/Skin	Services	Construction
	Adequate and easily accessible storage is to be provided in communal stores located at ground floor level of each block, where both recyclable and non-recyclable waste can be stored in accordance with the Royal Borough of Kingston Upon Thames waste collection service				

■	Implemented in design
■	To be considered
■	Future considerations

Appendix A3 – Operational Waste Calculations

503 - Cycle and Refuse Tracker _Communal Refuse

Title: 503-PTA-PHI-XX-SH-A-7110
 Revision: P01
 Last Updated by: NE
 Date last updated: 17/02/2020

LANDFILL WASTE REQUIREMENTS

Number of flats	Capacity Required	PT summary
6	1100 litres	
9	1650 litres	every 3 units = 550 litres
12	2200 litres	

RECYCLING REQUIREMENTS

Number of flats	Capacity Required	TOTAL CAPACITY REQUIRED	240	360	820	TOTAL CAPACITY
1 to 16	4 x 240 litres	2 x 360 litres (plastic and card)	4	2	0	
16 to 22	5 x 360 litres	1 x 240 litres (food)	1	5	0	
23 to 48	5 x 820 litres	1 x 240 litres (food)	1	0	5	
estimates						
48 to 64 (23 to 48 values + 1 to 16 values)	6 x 820 litres + 1 x 240 litres	1 x 240 litres + 2 x 360 litres	6120	2	2	6
64 to 70 (23 to 48 values + 16 to 22 values)	7 x 820 litres + 1 x 240 litres	2 x 240 litres	6480	480	720	4920
71 to 96 (23 to 48 values + 16 to 22 values)	10 x 820 litres	2 x 240 litres	8680	3	0	7
				720	0	5740
				2	0	10
				480	0	8200

PHASE 1A

RECYCLING COLUMNS NEEDS MANUAL UPDATES - CHECK UNIT NUMBERS AGAINST RECYCLING REQUIREMENTS ABOVE

BUILDING E - Communal Refuse Areas

UNITS (Ex GF Units)		LANDFILL WASTE			RECYCLING			
Plot	Units	Units / 3	*550 litres	TOTAL LANDFILL	Approx Recycling	Recycling as per local authority schedule		
				1100 litre bins	litres (at half landfill)	240 litres	360 litres	820 litres
E1	51	17.0	9350	9	4675	2	2	6
E2	57	19.0	10450	10	5225	2	2	6
E3	50	16.7	9167	9	4583	2	2	6
E4	32	10.7	5867	6	2933	1	0	5
	190			34		7	6	23

BUILDING B - Communal Refuse Areas

UNITS (Ex GF units)		LANDFILL WASTE			RECYCLING			
Plot	Units	Units / 3	*550 litres	TOTAL LANDFILL	Approx Recycling	Recycling as per local authority schedule		
				1100 litre bins	litres (at half landfill)	240 litres	360 litres	820 litres
B1	42	14.0	7700	7	3850	1	0	5
B2		0.0	0	0	0			
	42			7		1	0	5

PHASE 1B

BUILDING C - Communal Refuse Areas

UNITS		LANDFILL WASTE			RECYCLING			
Plot	Units	Units / 3	*550 litres	TOTAL LANDFILL	Approx Recycling	Recycling as per local authority schedule		
				1100 litre bins	litres (at half landfill)	240 litres	360 litres	820 litres
C1	82	27.3	15033	14	7517	2	0	10
C2	75	25.0	13750	13	6875	2	0	10
C3	45	15.0	8250	8	4125	2	2	6
	202			35		6	2	26

Commercial units

Unites	areas	litres per sq m/ person	litres per week	Daily Collection	1100 Litre bins
Community Centre	1151		100	115100	16443
Retails	350		100	35000	5000
Workshop	326/6m2 per person *54		50	2700	

Appendix A4 – Bill of Materials (Estimated)

<u>Layer</u>	<u>Element</u>	<u>Material quantity (kg)</u>	<u>Material intensity (kg/m2 Gross Internal Area)</u>	<u>Recycled content (% by value)</u>	<u>Source of information</u>
<u>Structure</u>	<u>Foundation</u>	<u>15,490,080</u>	<u>72</u>	<u>Min. 20% ambition</u>	<u>Whole Life Cycle Assessment</u>
	<u>Structure</u>	<u>212,988,600</u>	<u>990</u>	<u>Min. 20% ambition</u>	
	<u>Concrete Frame</u>	<u>195,562,260</u>	<u>909</u>	<u>Min. 20% ambition</u>	
	<u>Mortar</u>	<u>1,075,700</u>	<u>5</u>	<u>Min. 20% ambition</u>	
	<u>Vertical Materials</u>	<u>35,282,960</u>	<u>164</u>	<u>Min. 20% ambition</u>	
	<u>Brick</u>	<u>10,111,580</u>	<u>47</u>	<u>Min. 20% ambition</u>	
<u>Shell/Skin</u>	<u>Finishes</u>	<u>20,008,020</u>	<u>93</u>	<u>Min. 20% ambition</u>	
	<u>Insulation</u>	<u>2,108,372</u>	<u>9.8</u>	<u>Min. 20% ambition</u>	
	<u>Gypsum & Plaster</u>	<u>9,035,880</u>	<u>42</u>	<u>Min. 20% ambition</u>	
	<u>Gypsum board</u>	<u>7,960,180</u>	<u>37</u>	<u>Min. 20% ambition</u>	
	<u>Glass</u>	<u>4,302,800</u>	<u>20</u>	<u>Min. 20% ambition</u>	