CAMBRIDGE ROAD ESTATE – PLANNING APPLICATION 20/02942/FUL

WHOLE LIFE CYCLE ASSESSMENT - OCTOBER 2021

UPDATED DOCUMENT

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Whole Life Cycle Carbon Emissions Assessment

Cambridge Road (RBK) LLP

Cambridge Road Estate

Final

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ABOUT HODKINSON CONSULTANCY

Our team of technical specialists offer advanced levels of expertise and experience to our clients. We have a wide experience of the construction and development industry and tailor teams to suit each individual project.

We are able to advise at all stages of projects from planning applications to handover.

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

Executive Summary

The purpose of this Whole Life Cycle Carbon Emissions (WLCCE) assessment is to demonstrate that the proposed Cambridge Road Estate development by Cambridge Road (RBK) LLP in the Royal Borough of Kingston upon Thames, has taken actions to reduce embodied carbon where possible. This is an initial assessment based on the best available information to date.

The hybrid planning application comprises Plots B, C and E (Detailed) and Plots A, D, F-H, J-N and Q (Outline) – both are included in this assessment.

Whole Life-Cycle Carbon (WLC) emissions are the carbon emissions resulting from the construction and the use of a building over its entire life, including its demolition and disposal. They capture a building's operational carbon emissions from both regulated and unregulated energy use, as well as its embodied carbon emissions, i.e. those associated with raw material extraction, manufacture and transport of building materials, construction and the emissions associated with maintenance, repair and replacement as well as dismantling, demolition and eventual material disposal. It provides a picture of a building's carbon impact on the environment

At this stage of the design a baseline energy model of embodied carbon has been created using generic data and estimates the total carbon emissions to be **580 kg CO_2e/ m^2 GIA** over 60 years, this however does not account for the operational energy and water use, as per GLA requirements. When these are included, the total emissions are **939 kgCO_2/m^2 GIA over 60 years.**

The proposed development is exceeding the WLC Benchmark set by the GLA for all modules and further exceeds the Aspirational Benchmark for modules A1-A5, thus demonstrating a sustainable design.

A set of high-level observations are set out in the report which could be considered at detailed design stage. As the GLA guidance is not yet adopted, or the associated methodology consulted upon, these serve to inform the design team on best practice in the design.

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1. INTRODUCTION

1.1 This Whole Life Cycle Carbon Emissions (WLCCE) Assessment has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development, appointed by Cambridge Road (RBK) LLP.

1.2 The purpose of a WLLCE assessment is to demonstrate that the proposed development at Cambridge Road Estate in the Royal Borough of Kingston upon Thames, has taken actions to reduce embodied carbon where possible. This is an initial assessment based on the best available information to date.

1.3 This assessment will aim to help the design team understand, at concept design stage, the lifetime consequences of their design decisions.

2. POLICY AND REGULATIONS

Intend to Publish London Plan (2019)

2.1 The Panel of Inspectors report into the draft London Plan was published in October 2019. The Mayor considered the Inspectors' recommendations and, in December 2019, issued to the Secretary of State the Intend to Publish London Plan. The Secretary of State responded to this in March 2020 and the Mayor is now considering the Secretary of State's response and taking the steps to finalise the plan.

2.2 The following policies are proposed in the Intend to Publish London Plan are considered relevant to the proposed development and this Statement:

2.3 **Policy SI 2 Minimising Greenhouse Gas Emissions, states:**

'Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions:

Operational carbon emissions will make up a declining proportion of a development's whole life-cycle carbon emissions as operational carbon targets become more stringent. To fully capture a development's carbon impact, a whole life-cycle approach is needed to capture its unregulated emissions (i.e. those associated with cooking and small appliances), its embodied emissions (i.e. those associated with raw material extraction, manufacture and transport of building materials and construction) and emissions associated with maintenance, repair and replacement as well as

dismantling, demolition and eventual material disposal). Whole life-cycle carbon emission assessments are therefore required for development proposals referable to the Mayor. Major non-referable development should calculate unregulated emissions and are encouraged to undertake whole life-cycle carbon assessments. The approach to whole life-cycle carbon emissions assessments, including when they should take place, what they should contain and how information should be reported, will be set out in guidance'.

2.4 The above policy explains that referable schemes, submitted following adoption of the new London Plan will be required to carry out a WLCCE assessment. The methodology for demonstrating compliance is out in draft and will be consulted upon on following publication of the new London Plan. The draft highlights that project could be required to report at pre-application, planning and post-completion stages.

2.5 This assessment would form a part of the concept design and inform the design and material choices through the course of the project rather than appear as an afterthought later in the design.

Local Policy: Royal Borough of Kingston Upon Thames

2.6 The Royal Borough of Kingston Upon Thames' Core Strategy document was adopted in April 2012. The following policies are considered relevant to this Statement:

2.7 **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 CO_2 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.

2.8 **Policy DM1 – Sustainable Design and Construction Standards**: The Council will require all new residential developments to achieve successively higher levels of the Code for Sustainable Homes Level category for energy/CO_2. New development should minimise air, noise and contaminated land impacts in line with industry best practice. Development proposals for contaminated land should include remediation measures. The Council will promote good carbon management by monitoring CO_2 emissions to ensure the development is operated within the CO_2 emissions standards of the as-built specification and those outlined within the Council's Sustainable Design

and Construction SPD. Measures to ensure these standards are maintained will be monitored by the Council.

2.9 Where appropriate, other new build developments over 500 m^2 are encouraged to achieve higher levels of the appropriate BREEAM standard.

2.10 Since the publication of the Royal Borough of Kingston Upon Thames' Core Strategy Document in April 2012, the Code for Sustainable Homes was formally wound down following a technical housing standard review. This was announced by the Ministerial Statement by Rt. Honourable Eric Pickles on 25th March 2015 and the Government withdrew the Code for Sustainable Homes on 22nd April 2015.

Guidance Documents

2.11 Preliminary guidance has been released by the Greater London *Authority "Whole Life-Cycle Carbon Assessments guidance – April 2020".* It outlines how to prepare a WLCCE assessment which should accompany all referable planning applications in line with London Plan Policy SI 2. This document is currently out for consultation but has been used and referenced throughout this assessment.

2.12 In addition, the following guidance is available to conduct assessments:

> **BS EN 15978:2011 -** *Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method.*

> **ISO 14040:2006 -** *Environmental management — Life cycle assessment — Principles and framework.*

> **RICS Professional Statement Whole life carbon assessment: 2017 -** *Whole life carbon assessment for the built environment.*

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.

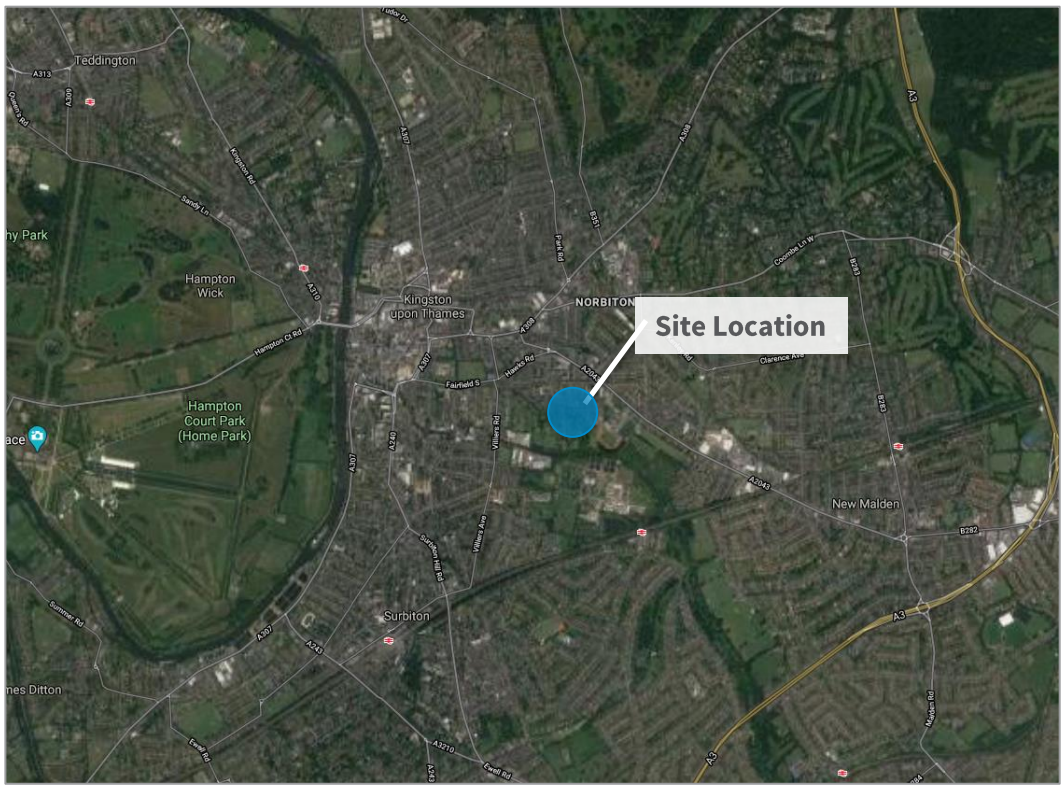

Figure 1: Site Location – Map data © 2020 Google

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 late 1960s and early 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 Figure 2 below illustrates the proposed masterplan layout.

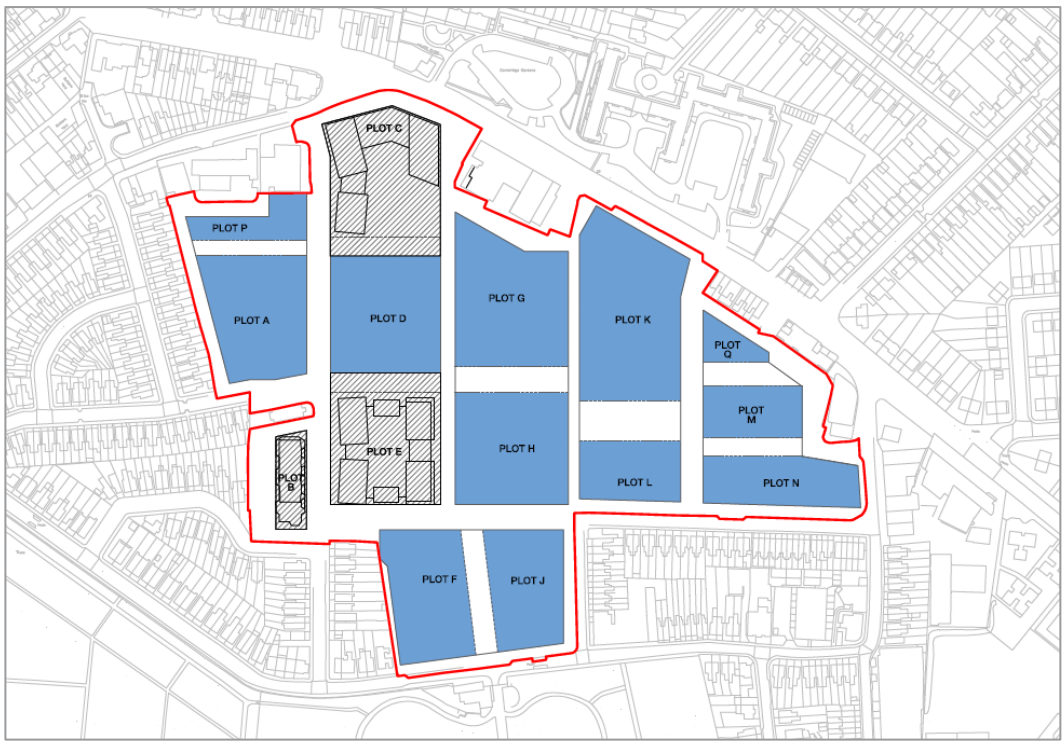

Figure 2: Proposed Masterplan Layout – Patel Taylor (October 2020)

BREEAM

3.5 BREEAM New Construction 2018 is being used to assess the commercial units. This is an assessment method to ensure best environmental practice is incorporated in the planning, design, construction and operation of commercial buildings and the wider built environment.

3.6 There are specific credits within BREEAM that aim to reduce the burden on the environment from construction products by recognising and encouraging measures to optimise construction product consumption efficiency and the selection of products with a low environmental impact (including embodied carbon), over the life cycle of the building.

3.7 It is anticipated that the BREEAM assessment for the shell only commercial units will seek to achieve these credits.

4. WHOLE LIFE CYCLE CARBON EMISSIONS ASSESSMENT

4.1 Undertaking WLCCE assessments is a way to fully understand and minimise the carbon emissions associated with building designs over the entire life cycle of the building. This will be done at the proposed development in order to quantify the carbon dioxide emissions that will be released from the proposed development, considering not only operational and embodied emissions but also demolition, construction, and refurbishment/replacement cycles.

4.2 The new draft London Plan has proposed a requirement for all new referable developments to calculate and reduce WLCCE, this is both embodied and operational carbon:

> **Operational carbon** is the energy required to heat and power a building during use;

> **Embodied carbon** is the carbon that is released in the manufacturing, production, and transportation and construction of the building materials used.

4.3 In addition to the two metrics above there are additional life cycle stages that are considered during WLLCE assessments, these include demolition, end of life and refurbishment/replacement cycles.

4.4 The two metrics (operation and embodied) and the additional life cycle stages, as noted above, have been included in this but additional information will be required as the design progresses to ensure the assessment can give valuable results.

4.5 Undertaking a WLCCE assessment provides a full overview of the material and building environmental impacts of a building using science-based metrics (e.g. Global Warming Potential). It also identifies the overall best combined opportunities for reducing lifetime emissions, and also helps to avoid any unintended consequences of focusing on operational emissions alone.

4.6 A low carbon building is one that optimises the use of resources both to build it and to use it over its lifetime. The assessment will help the design team understand, at design stage, the lifetime consequences of their design decisions. This promotes durability, resource efficiency, reuse, and future adaptability, all of which contribute to life-time carbon reductions.

5. METHODOLOGY

5.1 This is an initial assessment based on the best available information which will need to be updated as the project progresses. WLCCE assessments are sensitive to changes in design and specification and therefore detailed design will impact the results as the schemes progress.

5.2 As detailed information is not yet available a baseline figure has been determined through the use of a carbon designer tool available on One Click. The Carbon Designer tool allows very quick baseline building creation with minimal knowledge about the project and allows optioneering choices and their impacts easily. Based on this we can provided some high-level observations that could reduce the embodied emissions.

5.3 As the design progresses into the detail stages, the embodied emissions associated with the development can be developed and refined with bespoke recommendations made. In the interim, the estimated emissions associated with the operational energy of the development are reported, with metric of potential methods to alter these during detail design.

Operational Carbon

5.4 Operational energy is the inputted energy required for all heating and power needs. It can be split into two variants:

> **Regulated Emissions** - which are assessed using the Government's approved methodology for Building Regulations Part L compliance, the Standard Assessment Procedure (SAP); and

> **Unregulated Emissions** – energy use as a direct result of user behaviour. This includes cooking, white goods (fridges, washing machines etc), and plug in electrical loads (televisions, laptops, lamps etc).

5.5 Both of the above elements will be accounted for in this WLCCE assessment. For clarity, as unregulated energy demands are largely reliant on the behaviour of occupants, they have been considered a fixed entity in the calculations.

Residential

5.6 The estimated energy demand for the residential portion of the development has been calculated using the Standard Assessment Procedure 2012 methodology. SAP calculates the Regulated energy demand for residential dwellings.

5.7 SAP calculations have been carried out for representative dwelling types (for the detailed component of the development). These encompass ground, mid, and top floor flats and represent a fair aggregation of the expected unit mix of the development.

5.8 In order to calculate the energy demands across the entire scheme, the current accommodation schedule has been used to extrapolate the results from the modelled units. This has been done for both the detailed and outline parts of the application.

5.9 The Unregulated energy demands for the residential units have been calculated using the methodology outlined in the SAP 2012 document. This calculates the CO_2 emissions associated with appliances and cooking.

Non-Residential

5.10 The estimated energy demand for the non-residential elements of the development has been calculated using Simplified Building Energy Model (SBEM) software, using the National Calculation Method (NCM 2013 Edition). SBEM calculates the Regulated energy demands associated with hot water, space heating and fixed electrical items, as well as Unregulated energy demands.

5.11 Sample SBEM calculations have been carried out on example units of the expected use types for the Proposed Development. For the outline scheme, these are not fixed, but sample calculations have been extrapolated in order to gain energy demand estimates for the whole scheme. At present, these have not been included in the WLLCE assessment. The completion of the SBEM modelling is not likely to increase the operational carbon of the development as they are being constructed to a shell only specification.

Embodied Carbon

5.12 Embodied carbon is the sum of Green House Gas (GHG) emissions resulting from the mining, harvesting, processing, manufacturing, transportation, and installation of building materials.

One Click LCA

5.13 OneClick LCA is the software that has been used to conduct the WLCCE assessment. This is a web based approved tool for WLCCE assessments and design software for buildings and infrastructure. It consists of a large database of generic and average Life Cycle Indicator (LCI) data, and global Environmental Product Declaration (EPDs). The most suitable option for each material (where available) was chosen from the database in OneClick. The material LCI data has been chosen to be representative of the typical UK supply chain.

5.14 The OneClick LCA default values for distances travelled to site for the construction materials were used for each material item. More specific values will be used when the assessment is re-run once the design of the development has progressed further.

5.15 The following life cycle stages are included within the assessment as standard:

- **A1 - A3 –** This includes all construction materials;
- **A4 –** This includes all transportation to site;
- **A5 –** This includes all construction site impacts;
- **B3 – B5 –** This includes the repair, refurbishment, and replacement of building elements;
- **B6 - B7 –** This includes use the energy, and water;
- **C1 - C4 –** This includes the end of life scenarios for building elements.

5.16 As noted above, the One Click Carbon Designer tool has been used to determine the baseline embodied emissions as a building model is not yet available. As the design develops, we will update and refine the tool to reflect the quantity and types of materials being used.

Construction Impacts

5.17 In addition to embodied carbon in the materials used for construction, GHG emissions will be created by transportation of materials to site and operation of onsite plant and machinery. These emissions are typically materially smaller than embedded GHG emissions. Guidance from the Building Research Establishment (BRE) indicates 1,400 kg of CO_2e per £100,000 of project value.

5.18 The project value has been provided by the Applicant, which would result in construction transport GHG emissions of **7,840 tonnes of CO_2e.**

Study Period

5.19 The reference study period (RSP) for domestic projects is 60 years, this is based on the principles outlined in BS EN 15978: 2011, section 7.3 and the RICS guidance.

5.20 RSPs are fixed to enable comparability between whole life carbon results for different projects. It ensures that the assessment is representative of typical service life of different building elements.

Data Sources

5.21 The assessment has utilised multiple data sources described above and is based on the level of detail available at the current stage of design. The following data sources have been used to complete the WLCCE assessment:

Table 1: Data Sources

Data	Data source
Operational energy	SAP and SBEM Energy calculations – Hodkinson Consultancy
Construction site impacts	Project value provided by applicant and baseline target provided by BRE
Material types and volumes	Information provided by Patel Taylor on 22nd September 2020
Transport data	RICS guidance
Building areas	212,199m^2 taken from accommodation schedules

6. GENERAL OBSERVATIONS

Green Infrastructure

6.1 It is known that green roofs will be installed, these are considered effective in the reduction of CO_2 (when greater than 1000 m^2 in size) because of their ability to reduce energy consumption of buildings and sequester carbon in plants and substrate.

6.2 The installation of green roofs typically contains less embodied energy than that of traditional roof systems. Typical roof systems have an expected lifespan of 30 years (RICS Guidance), the implementation of a green roof extends the roof's lifetime beyond this.

6.3 The landscaping strategy is currently proposed to be a mix of both soft and hard landscaping as demonstrated in Figure 3. In order to reduce the embodied carbon of the hard landscaping any demolished concrete should be crushed on-site and potentially used a subbase to reduce the overall embodied carbon of the landscaping.

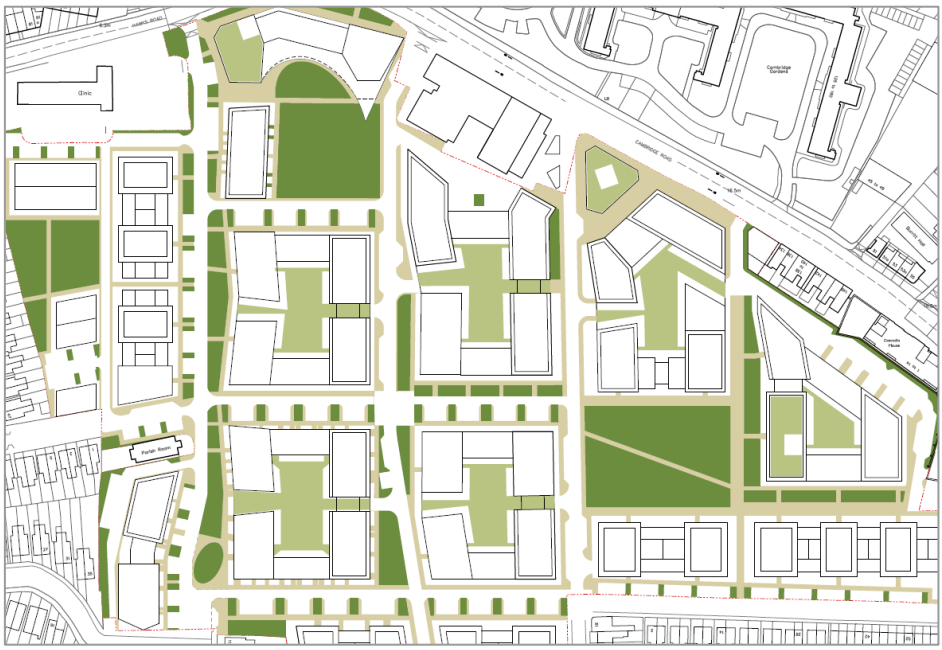

Figure 3: Hard and soft landscaping (Patel Taylor, 2020)

6.4 Plants and trees capture and store carbon dioxide emissions from the atmosphere, this is known as sequestering carbon dioxide emissions. The development proposal increases the available flora and fauna through a net increase trees and provision of green and brown roofs. Trees have been included within the One Click Assessment under the 'carbon sequestration' section.

6.5 Based on research papers by the Natural Environment Research Council Centre for Ecology and Hydrology (formerly Institute of Terrestrial Ecology) and referenced papers by The Royal Institution of Chartered Surveyors (RICS). The trees and green and brown roof proposed will sequester an additional ~26,000 $kgCO_2$.

Building Materials

6.6 The construction of the proposed development is likely to be reinforced concrete framed buildings. The efficient stacking of floor plates will allow for efficiency in design and mitigate the risk of over engineering and excessive material use.

Building Heights and Form

6.7 Apartment blocks up to 13 storeys high are proposed at Cambridge Road Estate. High-rise buildings, like those in this proposed development, gain efficiency in the ratio of envelope to gross floor area because while each floor will typically have a similar amount of façade, the environmental impact of the roof and ground floor is divided by the number of floors – the more floors the better in this respect.

6.8 The avoidance of overly complex building forms and junction designs across the site offers a more consistent and reliable standard of construction which will assist in air tightness and reducing the impact of heat loss through thermal bridges.

6.9 It is proposed that the developer will engage Countryside Properties as its Construction Manager. They have a track record of limiting and diverting waste to landfill. In 2018 they diverted 99.4% of the waste. This means materials are used efficiently. Where possible and safe to do so, recycled materials are used. These actions reduce the embodied energy of the development.

6.10 The Cambridge Road Estate will total around 2,170 new dwellings which is an increase over the existing number of dwellings on the development. This improves the efficiency of how the land is used. Efficient land use along with the developer's record on waste diversion will help to reduce the embodied energy associated with the development further.

Zero Carbon

6.11 As of 1st October 2016, London Plan Policy requires that all major residential developments are subject to an additional offset payment to meet a 100% reduction in Regulated CO_2 emissions to achieve the standard of Zero Carbon. This payment is made to the local borough's Carbon Offsetting Fund and is expected to be allocated to carbon reduction savings elsewhere in the borough.

6.12 As set out in the Energy Statement provided by Hodkinson Consultancy the site is meeting the Greater London Authority's (GLA) definition of Net Zero Carbon. Based on this, the operational emissions can be set as zero for the first thirty years when finalising the assessment once the design is more progressed.

7. WHOLE LIFE CYCLE CARBON RESULTS

Benchmark Comparison

7.1 The results when compared to the GLA benchmark values are shown in Table 2 below:

Table 2: Whole Life Carbon Baseline (GLA Guidance)

	Project kg CO_2/m^2 GIA	WLC Benchmark kg CO_2e/m^2 GIA	Aspirational Benchmark kg CO_2e/m^2 GIA
Modules A1 – A5	335	750 to 850	450 to 500
Modules B – C (excluding B6 and B7)	245	300 to 400	180 to 240

7.2 It must be noted that no benchmark has been set by the GLA for operational and energy use (life cycle stages B6-B7) due to insufficient data at present. The results for these have therefore been omitted from the totals above. The total is therefore **580 $kgCO_2/m^2$ GIA over 60 years.**

7.3 When these emissions are included in the calculation the total emissions are expected to be **939 $kgCO_2/m^2$ GIA over 60 years.**

7.4 It is important to note that baseline data (via the Carbon Designer) has been used for building elements and no services or external areas have been included in this iteration of the WLLCE assessment and therefore the comparison to the baseline above is not yet conclusive.

7.5 The proposed development is exceeding the WLC Benchmark set by the GLA for both categories and further exceeding the Aspirational Benchmark for modules A1-A5, demonstrating a sustainable design.

Results

7.6 Once all of the data (including the baseline data for embodied energy) was inputted into One Click LCA, the results for both the outline and detailed applications are as follows:

Table 3: One Click LCA Results

Category	Global warming potential	Total $kgCO_2e$ over 60 years
A1-A3	Construction Materials	64,004,592
A4	Transport	1,945,793
A5	Site operations	7,988,767
B3	Repair	18,688,036
B4	Replacement	27,919,517
B6–B7	Operational energy and water use	76,224,857
C1-C4	Re-use, recycling, or disposal	5,493,403
	Total	**202,264,965**

7.7 Preliminary SAP and SBEM modelling have allowed us to provide a good estimate of the predicted operational emissions associated with the proposed development.

7.8 As demonstrated in Figure 4 below, categories B6 and B7 (operational energy and operational water use) are the highest contributors to the overall emissions.

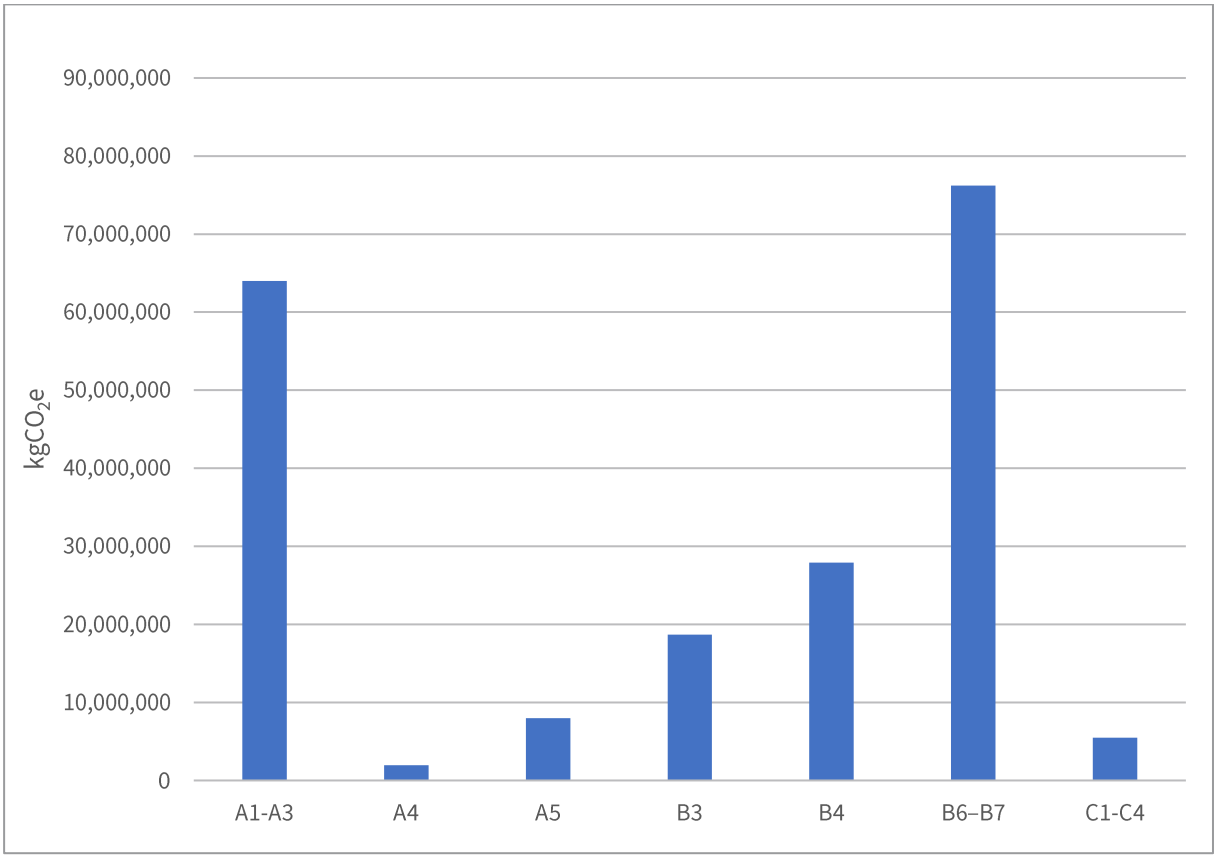

Figure 4: Total $kgCO_2e$ - Life Cycle Stages

7.9 The operational energy and water use (B6 and B7) make up 37.7% of the overall emissions for the proposed development whilst materials (A1 – A3) make up 31.6% of the overall emissions.

7.10 Of the materials used in the proposed development concrete is expected to emit the most $kgCO_2e$, followed by doors and windows and then metals. A more detailed breakdown is provided in Figure 5 below.

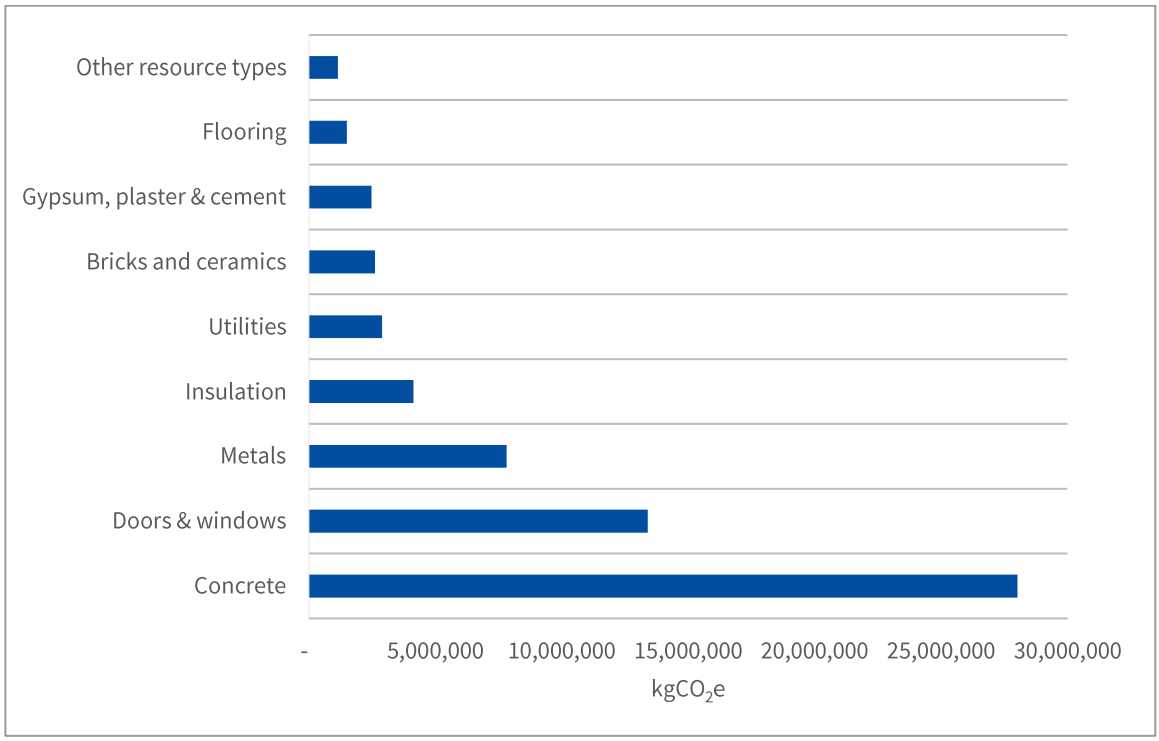

Figure 5: Total A1-A3 kgCO2e – Resource Types

8. HIGH LEVEL OBSERVATIONS

8.1 A set of high-level observations are set out below that could be considered as a part of the detail design post planning.

8.2 These are presented from the perspective of embodied carbon and life cycle only and must be considered alongside other design considerations by other members of the design team.

> To maximise the opportunities arising from the potential demolition of the existing site, **a pre-demolition audit** could be undertaken as part of the Construction Method Statement. This would identify and quantify the materials to encourage and maximise reuse and recycling.; for example, all demolished concrete can be crushed on-site and used onsite as hard core, fill, or in landscaping.

> The **future demolition and deconstruction** of the development could be considered at the design stage. Consideration to be given to ways to facilitate dismantling, such as keeping the use of welding to a minimum (although it is acknowledged this may not always be possible);

- Similarly, a **maintenance and repair schedule** could also be produced during the design life of the development to ensure that materials and pieces of equipment are able to remain in situ during their expected lifespan. This will minimise the need to replace and refurbish and reduce emissions under life cycle stages C1-C4.

- **Using concrete as a finish** can reduce the need for other finishing materials. In addition, exposed areas of concrete can optimise the thermal mass performance. Thermal mass, with adequate ventilation, can be used to control daytime peak temperatures of a space and therefore reduce or minimise the need for air-conditioning. The areas where this can be done would need to be carefully considered. The durability of concrete also offers further potential savings through a reduction in the need for maintenance and repair (compared to a painted finish for example).

- The transportation of materials from the manufacturing facility to the building site adds to the carbon of the development. **Buying from local sources** or **utilising off-site manufacturing processes** could help reduce the emissions produced during transportation. There is a balance to be struck between material transport and processes deployed in their manufacture. As such details on this cannot be known until the detailed design phase. This review would have impacts under life cycle A4, emissions from transportation to site.

- **Innovative cement mixes** are now increasingly available, using a mixture that is 95% ground granulated furnace slag (GGBS) and 5% as the activator can save up to 90% in emissions. This cement mixture could be investigated further for use at the appropriate stage, and if suitable could be used for building elements such as piles, floors, walls, and reinforced foundations. If implemented this could facilitate the reduction of life cycle stages A1-A3 (materials) quite significantly.

- The façade is under constant wear from the environment which can lead to frequent repairs and maintenance. By using **durable materials**, this not only reduces the cost and frequency of refurbishment but also reduces the use of material replacement and its associated carbon footprint.

9. CONCLUSION

9.1 The purpose of this Whole Life Cycle Carbon Emissions (WLCCE) assessment is to demonstrate that the proposed Cambridge Road Estate development by Cambridge Road (RBK) LLP in the Royal Borough of Kingston upon Thames, has taken actions to reduce embodied carbon where possible. This is an initial assessment based on the best available information to date.

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