



**HODKINSON**



**Whole Life Cycle  
Carbon Emissions  
Assessment**

Highgate Care Limited

# **Mary Feilding Guild Care Home**

Final

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BEng (Hons), MSc  
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## DOCUMENT CONTROL RECORD

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## Executive Summary

This Whole Life Cycle Carbon Emissions (WLCCE) Assessment for the proposed development at ‘Former’ Mary Feilding Guild Care home, located at 103-107 North Hill, has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development, appointed by Highgate Care Limited.

The proposed development is described “the demolition of all of the existing buildings and the redevelopment to provide a new nursing and convalescence home of 70 beds and integral support facilities, together with a well-being and physiotherapy centre.”

National Building Regulations and the Mayor’s net zero-carbon target for new development account for a building’s operational carbon emissions. As methods and approaches for reducing operational emissions have become better understood, and as targets have become more stringent, these emissions are now beginning to make up a declining proportion of a development’s carbon emissions. Attention now needs to turn to WLCCE to incorporate embodied carbon emissions, enabling a better understanding of the environmental impact of the proposed development.

This WLCCE assessment is being undertaken in compliance with London Plan 2021 SI 2 “*Minimising Greenhouse Gas Emissions*” policy, the methodology has followed the principles of BS EN 15978 and has used both the GLA guidance and RICS as the methodology for assessment. This has been facilitated through the use of GLA approved One Click LCA software. This assessment is considered to be the Stage 1 submission.

WLCCE are the carbon emissions resulting from the construction and the use of a building over its entire life, through four stages described as life-cycle modules, shown in Figure i below;

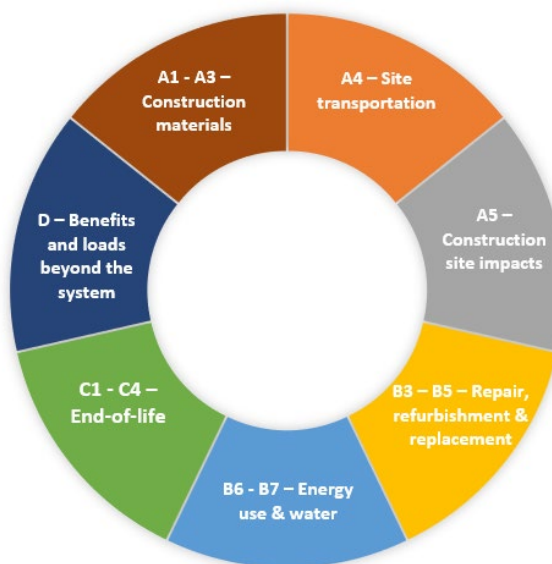


Figure i: Life cycle modules

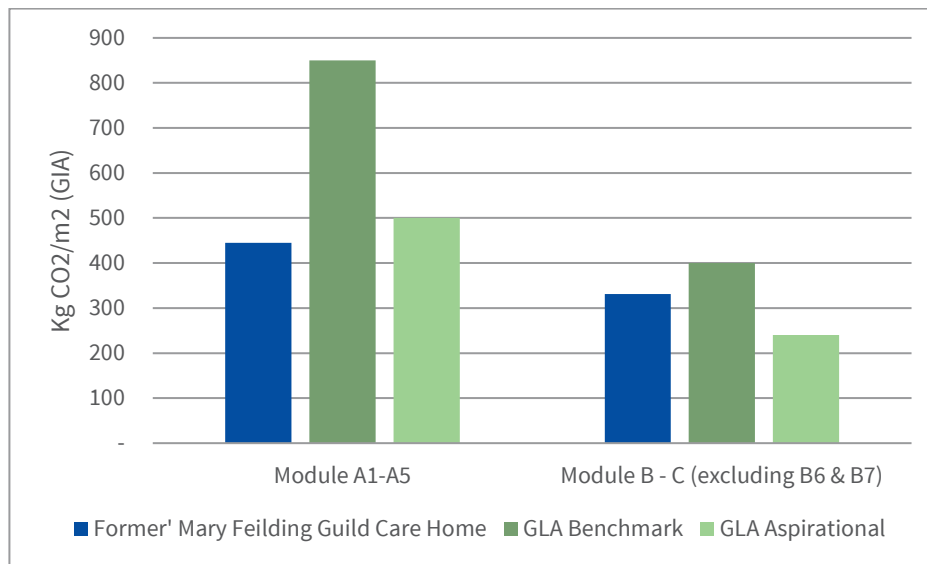
They capture a building's operational carbon emissions from both regulated and unregulated energy use, as well as its embodied carbon emissions. Embodied emissions are those associated with raw material extraction, manufacture and transport of building materials, construction and the emissions associated with maintenance, repair, and replacement as well as dismantling, demolition, and eventual material disposal. The assessment provides a picture of a building's carbon impact on the environment.

The following table outlines the assumptions made within this WLCCE assessment:

**Table i: WLCCE assumptions**

| <b>Data</b>                                | <b>Data source</b>                                                                                                                                                                                                      |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Material types and volumes (A1-A3)</b>  | Where possible, material types were taken from elevation drawings and floor plans, provided by the applicant. Otherwise, Carbon Designer in One Click was used to estimate material volumes based on the building area. |
| <b>Transport data (A4)</b>                 | Default values provided by One Click.                                                                                                                                                                                   |
| <b>Construction site impacts (A5)</b>      | Construction value provided by applicant and baseline target provided by BRE.                                                                                                                                           |
| <b>Repair and Replacement data (B3-B4)</b> | Default values provided by RICS and One Click EPD database for products inputted into software.                                                                                                                         |
| <b>Refurbishment (B5)</b>                  | At present One Click does not have ways to consider B5 emissions. However, based on the information provided for B3 and B4 it is likely that these have emissions have been accounted for.                              |
| <b>Operational energy (B6)</b>             | Regulated and unregulated annual energy consumption values obtained from the energy strategy provided by Hodkinson Consultancy (December, 2022)                                                                         |
| <b>Operational water (B7)</b>              | Water consumption based on Building Regulations Part G 'Enhanced Consumption' of 110 l/pp/d and multiplied by the intended full occupancy of the development (residential).                                             |
| <b>End of life (C1-C4)</b>                 | Default values provided by One Click based on the information within the EPD database. Note that One Click reports all module C emissions as one figure, it is not yet able to split them across C1-C4.                 |
| <b>Building areas</b>                      | Building areas provided by the applicant to be 6,411 m <sup>2</sup> (GIA)                                                                                                                                               |
| <b>Number of occupants</b>                 | 70 occupants, as taken from the floor plans provided by DWA Architects.                                                                                                                                                 |
| <b>Assessment period</b>                   | 60 years                                                                                                                                                                                                                |

Based on the information provided to date, through the Stage One assessment, the total carbon emissions are expected to be **776 kgCO<sub>2</sub>/m<sup>2</sup> GIA over 60 years.**



**Figure ii: Total kgCO<sub>2</sub> /m<sup>2</sup> Gross Internal Floor Area (GIA) performance compared to GLA Benchmarks**

By accounting for decarbonisation of UK grid electricity the emissions from module B6 Operational energy is reduced by 20%, confirming the importance of considering grid decarbonisation when completing carbon emission assessments, especially for unregulated energy.

A series of high-level considerations have also been made. These could be considered as the design progresses to ensure that WLCCE are reduced as much as possible, at present these have not been accounted for in the design.

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## 1. INTRODUCTION

- 1.1** This Whole Life Cycle Carbon Emissions (WLCCE) Assessment for the proposed development at ‘Former’ Mary Feilding Guild Care home, located at 103-107 North Hill, has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development, appointed by Highgate Care Limited.
- 1.2** National Building Regulations and the Mayor’s net zero-carbon target for new development account for a building’s operational carbon emissions. As methods and approaches for reducing operational emissions have become better understood, and as targets have become more stringent, these emissions are now beginning to make up a declining proportion of a development’s carbon emissions. Attention now needs to turn to WLCCE to incorporate embodied carbon emissions, enabling a better understanding of the environmental impact of the proposed development.
- 1.3** WLCCE assessments should be conducted at three stages, as stated in the GLA guidance. This is an initial assessment for Stage One, based on the information available to date which will need to be updated as the project progresses.
- 1.4** The assessment of the proposed development endeavours to help the design team understand, at concept design stage, the lifetime consequences of their design decisions. This report should be read in conjunction with the ‘GLA Whole Life Carbon Assessment Template’ within **Appendix A**.

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## 2. DEVELOPMENT OVERVIEW

### Site Location

- 2.1** The proposed development site at ‘Former’ Mary Feilding Guild Care Home, 103-107 North Hill, in the London Borough of Haringey is located at Highgate, London N6 4DP, as shown in Figure 1 overleaf.



**Figure 1: Site Location. Map data © 2021 Google**

- 2.2** The site measures 0.374 hectares (0.9 acres) and it is occupied by a series of five interlinked buildings which wrap around the site in an L shape. The current Mary Feilding Guild Care Home is a registered care home for the elderly. The building has the main frontage on to North Hill to the east and a back entrance with parking spaces on to View Road to the south-east.

## **Proposed Development**

- 2.3** The proposed development is described as follows:

*"Demolition of existing buildings and redevelopment to provide a new care home (Class C2 - Residential Institution), together with a well-being and physiotherapy centre. The proposed care home includes up to 70 bedrooms, a hydrotherapy pool, steam room, sauna, gym, treatment/medical rooms, hairdressing and beauty salon, restaurant, cafe, lounge, bar, well-being shop, general shop, car and cycle parking, refuse/recycling storage, mechanical and electrical plant, landscaping and associated works."*

2.4 Figure 2 below illustrates the ground floor layout.



Figure 2: Proposed Ground Floor Layout (DWA Architects, November 2021)

## 3. POLICY AND REGULATIONS

### Regional Policy: The London Plan

#### London Plan (2021)

- 3.1 This development is not referable to the Mayor of London, however, is defined as a ‘major’ development by Haringey Council on account of its size and hence has been encouraged to undertake a WLCCE assessment.
- 3.2 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 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’.*

## **Guidance Documents**

- 3.3** Guidance has been released by the Greater London Authority “*Whole Life-Cycle Carbon Assessments guidance – October 2020*”. It outlines how to prepare a WLCCE assessment which should accompany all referable planning applications in line with London Plan Policy SI 2 “*Minimising Greenhouse Gas Emissions*”. This document is now out of consultation but is yet to be formally approved. It has however been used and referenced throughout this assessment.
- 3.4** In addition to the GLA guidance the RICS Professional Statement Whole life carbon assessment (2017) was also used.
- 3.5** The above documents are used to complete the WLCCE assessment, further planning reports submitted alongside this report will also be used and/or referenced within this assessment, including:
  - > Energy Strategy, Hodkinson (December, 2022)

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## **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 to quantify the WLCCE 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 London Plan has introduced 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;
  - > **Embodied carbon** is the carbon that is released in the manufacturing, production, and transportation of the building materials used.
- 4.3** In addition to the two metrics above there are additional life cycle stages that are considered during WLCCE assessments, these include demolition, end of life and refurbishment/replacement cycles.
- 4.4** The two metrics (operational and embodied) and the additional life cycle stages, as noted above, have been included in this WLCCE assessment as per GLA guidance.
- 4.5** Undertaking a WLCCE assessment provides a full overview of the material and construction of a building using science-based metrics whilst also identifying the overall best combined opportunities for reducing lifetime emissions, and also helps to avoid any unintended consequences of focusing on operational emissions alone.

## Methodology

- 4.6** WLCCE assessments are sensitive to changes in design and specification and therefore detailed design will impact the results as the scheme progress. As noted in the GLA guidance, WLCCE assessments should be conducted at the following stages in order to maximise design efficiencies:
- > Pre application;
  - > Stage 1 submission (RIBA 2/3);
  - > Post construction (RIBA 6).
- 4.7** Two sets of emission figures are required for both the Stage 1 submission and the post construction submission, the first set based on the current status of the electricity grid and the second set based on the expected decarbonisation of the electricity grid. An overview of these emissions can be seen in the GLA spreadsheet in **Appendix A**.
- 4.8** This assessment is considered to be the Stage 1 submission and has been completed for the proposed development using energy calculations from Hodkinson Consultancy.
- 4.9** A set of WLCCE benchmarks have been developed by the GLA in which applicants are required to compare against their own results as part of the assessment and which the GLA will refer to in its

review of these assessments. An ‘aspirational’ set of benchmarks have also been devised for applicants that wish to go further. Both sets of benchmarks are included in this assessment are being reported on.

## Study Period

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

## Operational Carbon

- 4.11** 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) for residential units; 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).
- 4.12** Both of the above elements have been accounted for in this WLCCE assessment, these were provided by the calculations energy calculations from Hodkinson Consultancy (December, 2022). For clarity, as unregulated energy demands are largely reliant on the behaviour of occupants, they have been considered a fixed entity in the calculations in accordance with the guidance.

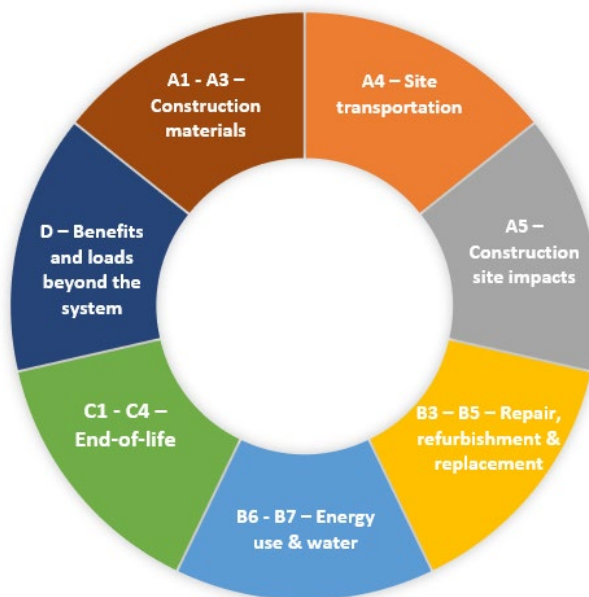
## Energy calculations

- 4.13** The estimated annual energy demand of the development has been calculated using Simplified Building Energy Model (SBEM) software, developed using the National Calculation Method (NCM 2013 Edition).
- 4.14** SBEM calculates the Regulated energy demands associated with hot water, space heating and fixed electrical items, as well as the unregulated energy demands.
- 4.15** The results from the SBEM calculations are entered in the GLA’s Carbon Emissions Reporting Spreadsheet, to convert the energy demands from current carbon factors into SAP 10.0 carbon factors. This approach is in line with the GLA Energy Assessment Guidance.

## Embodied Carbon

### One Click LCA

- 4.16** OneClick LCA is the software that has been used to conduct the WLCCE assessment. This is a web based piece of design software for buildings and infrastructure approved for use by the GLA.
- 4.17** OneClick LCA 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.
- 4.18** The life cycle stages (or modules) included within the WLCCE assessment as standard are shown in Figure 3 below.



**Figure 3: Life cycle stages**

- 4.19** At this stage it is not expected that all the information will be available. Where this is the case, One Click has been used. As the design develops, we will update and refine the tool to reflect the quantity and types of materials being used.

### Construction Impacts

- 4.20** In addition to embodied carbon in the materials used for construction, greenhouse gas (GHG) emissions will be created by transportation of materials to site and operation of onsite plant and

machinery. Guidance from RICs indicates 1.4 tonnes of CO<sub>2</sub>e per £100,000 of project value, this is further referenced and approved by the BRE.

- 4.21** The project value has been provided by the Applicant, which would result in construction transport GHG emissions of **151 tonnes of CO<sub>2</sub>e**.

## Potable Water Use

- 4.22** The carbon impact associated with water use during the operation of the proposed development is also required to be reported, in accordance with the RICS guidance. Water consumption is based on Building Regulations Part G ‘enhanced consumption’ of 110 litres/per person/per day (including external water use) and multiplied by the intended full occupancy of the development annually.
- 4.23** 70 occupants have been estimated using the number of bedrooms, as provided by the applicant. This gives an estimated **annual water consumption of 6,411 m<sup>3</sup>** for the entire development for 60 years.

## Carbon Sequestration

- 4.24** Sequestered carbon in timber has been included in the WLCCE assessment as all timber is assumed to be sustainably sourced.

## Data Sources

- 4.25** 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:

**Table 1: Data Sources**

| Data                                       | Data source                                                                                                                                                                                                         |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Material types and volumes (A1-A3)</b>  | Where possible, material types were taken from elevations and floor plans, provided by the applicant. Otherwise, Carbon Designer in One Click LCA was used to estimate material volumes based on the building area. |
| <b>Transport data (A4)</b>                 | Default values provided by One Click.                                                                                                                                                                               |
| <b>Construction site impacts (A5)</b>      | Construction value provided by applicant and baseline provided by BRE.                                                                                                                                              |
| <b>Repair and Replacement data (B3-B4)</b> | Default values provided by RICS and One Click EPD database for products inputted into software.                                                                                                                     |

| <b>Data</b>                    | <b>Data source</b>                                                                                                                                                                                      |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Refurbishment (B5)</b>      | At present One Click does not have ways to consider B5 emissions. However, based on the information provided for B3 and B4 it is likely that these have emissions have been accounted for.              |
| <b>Operational energy (B6)</b> | Regulated and unregulated annual energy consumption obtained from the energy strategy provided by Hodkinson Consultancy (December, 2022)                                                                |
| <b>Operational water (B7)</b>  | Water consumption based on Building Regulations Part G ‘Enhanced Consumption’ of 110 l/pp/d and multiplied by the intended full occupancy of the development (residential).                             |
| <b>End of life (C1-C4)</b>     | Default values provided by One Click based on the information within the EPD database. Note that One Click reports all module C emissions as one figure, it is not yet able to split them across C1-C4. |
| <b>Building areas</b>          | Building areas provided by the applicant to be 6,411 m <sup>2</sup> (GIA)                                                                                                                               |
| <b>Number of occupants</b>     | 70 occupants, as taken from the floor plans provided by DWA Architects.                                                                                                                                 |

**4.26** For clarity, all assumptions made within the WLCCE assessment have been noted within this report. The assessment and comments made throughout should be taken within the context of carbon and energy use only.

## 5. WHOLE LIFE CYCLE CARBON RESULTS

- 5.1 As noted above, this is an initial assessment based on the best available information which will need to be updated as the project progresses in line with GLA requirements.

### Benchmark Comparison

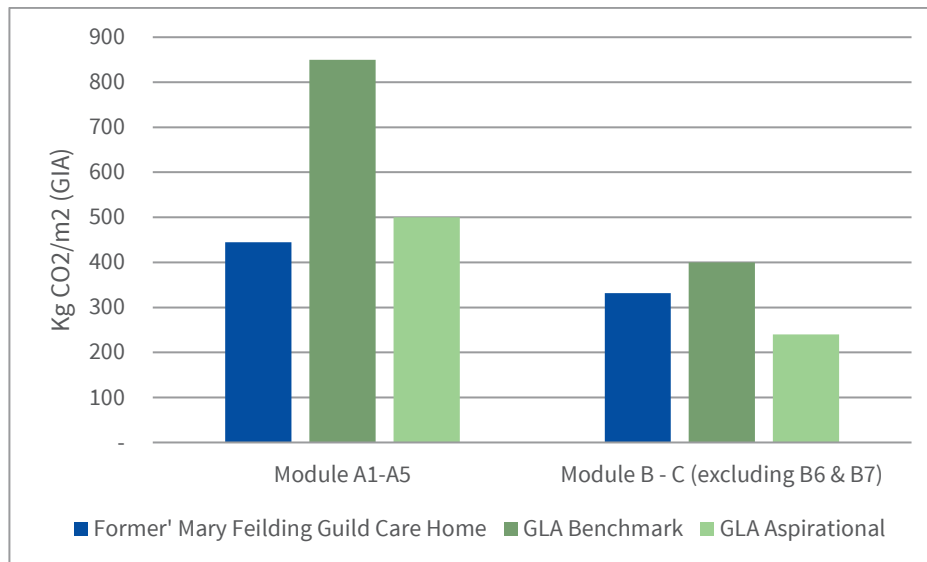
- 5.2 The results when compared to the GLA benchmark values, as noted in the GLA guidance note “*Whole Life-Cycle Carbon Assessments guidance –October 2020*” are shown in Table 2 below:

**Table 2: Whole Life Carbon Baseline (GLA Guidance)**

|                                        | Project kg CO <sub>2</sub> /m <sup>2</sup>       | WLC Benchmark                                      | Aspirational Benchmark                             |
|----------------------------------------|--------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
| Modules A1 – A5                        | <b>445 kg CO<sub>2</sub>e/ m<sup>2</sup> GIA</b> | 750 - 850 kg CO <sub>2</sub> e/ m <sup>2</sup> GIA | 450 - 500 kg CO <sub>2</sub> e/ m <sup>2</sup> GIA |
| Modules B – C<br>(excluding B6 and B7) | <b>331 kg CO<sub>2</sub>e/ m<sup>2</sup> GIA</b> | 300 - 400 kg CO <sub>2</sub> e/ m <sup>2</sup> GIA | 180 - 240 kg CO <sub>2</sub> e/ m <sup>2</sup> GIA |

\*Carbon sequestering has been included within A1-A5 at -8.22 kgCO<sub>2</sub>/m<sup>2</sup>

- 5.3 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.
- 5.4 The total emissions, as demonstrated above, based on the GLA guidance is therefore **776 kgCO<sub>2</sub>/m<sup>2</sup> GIA over 60 years**; 445 kgCO<sub>2</sub>/m<sup>2</sup> for modules A1-A5 and 331 kgCO<sub>2</sub>/m<sup>2</sup> for modules B – C. When operational energy and water emissions are included in the calculation above the total emissions are expected to be **2,983 kgCO<sub>2</sub>/m<sup>2</sup> GIA over 60 years**.
- 5.5 A set of WLCCE benchmarks have been developed by the GLA in which applicants are required to compare against their own results as part of the assessment and which the GLA will refer to in its review of these assessments. An ‘aspirational’ set of benchmarks have also been devised for applicants that wish to go further. Both sets of benchmarks are included in this assessment are being reported on.
- 5.6 The expected WLLCE are lower than the GLA WLC Aspirational Benchmark for modules A1-A5 and lower than the GLA WLC Benchmark for modules B-C (excluding B6 & B7) as shown in Figure 4 below.



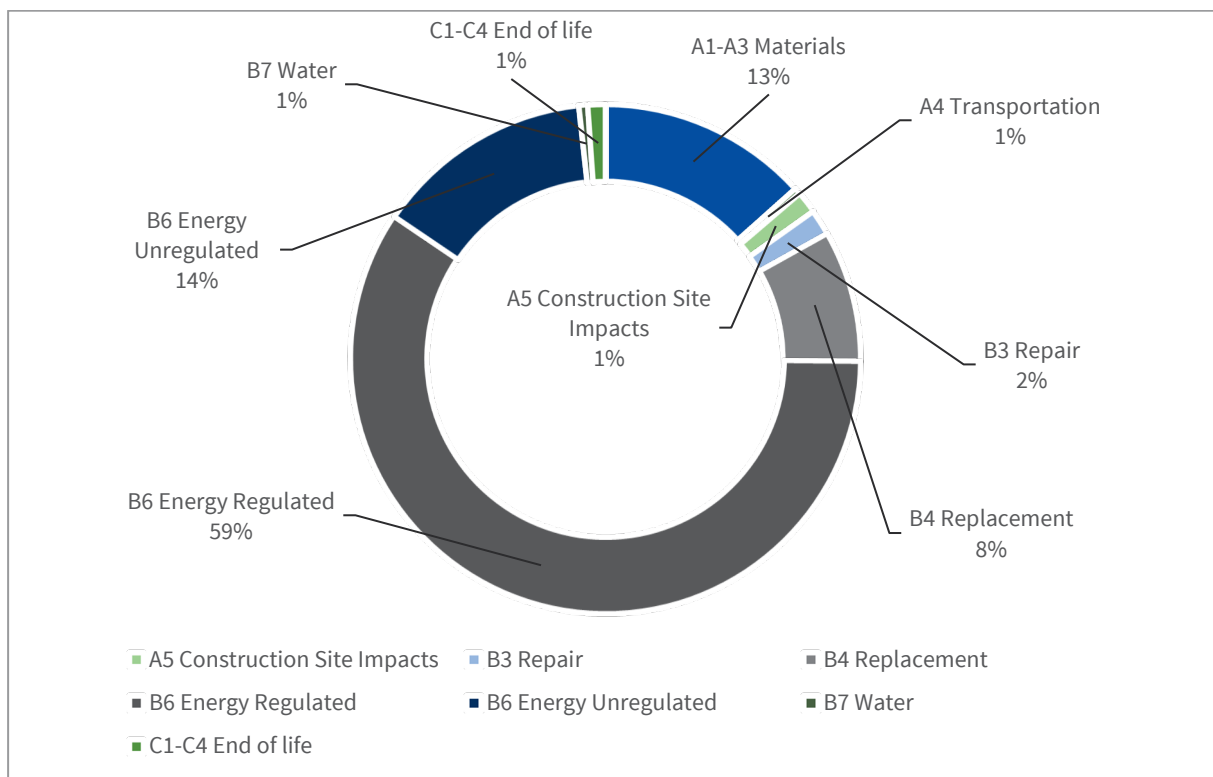
**Figure 4: Total kgCO<sub>2</sub>/m<sup>2</sup> GIA performance compared to GLA Benchmarks**

**5.7** These benchmarks will be subject to change as the WLCCE assessment gets updated in future. The full results are as follows:

**Table 3: Full WLCCE Results**

| Category     | Global warming potential  | Total kgCO <sub>2</sub> e over 60 years |
|--------------|---------------------------|-----------------------------------------|
| <b>A1-A3</b> | Construction Materials    | 2,561,774                               |
| <b>A4</b>    | Transport                 | 77,066                                  |
| <b>A5</b>    | Site operations           | 266,003                                 |
| <b>B2</b>    | Maintenance               | -                                       |
| <b>B3</b>    | Repair                    | 320,193                                 |
| <b>B4/B5</b> | Replacement/Refurbishment | 1,600,031                               |
| <b>B6</b>    | Operational energy use    | 14,028,287                              |
| <b>B7</b>    | Operational water use     | 116,756                                 |
| <b>C1-C4</b> | End of life               | 203,834                                 |
| <b>Total</b> |                           | <b>19,173,944</b>                       |
| <b>Other</b> | Carbon Sequestering       | -52,682                                 |
| <b>Total</b> |                           | <b>19,121,262</b>                       |

- 5.8** The above results demonstrate that **19,174 tonnes** are expected to be emitted over a 60-year period. The operational energy (B6) makes up 73.2% of the overall emissions for the proposed development; 59.3% for regulated energy use and 13.9% for unregulated use. The high proportion of WLC attributed to modules B6 and B7 is due to the building type; as a care home, each room can be considered to be a 'dwelling' with its own respective bathroom (for the purposes of this assessment only). This leads to high hot water and water consumption values.
- 5.9** Materials (A1 – A3) make up 13.5% of the overall emissions. This should be a key area in which focus is given to reduce embodied carbon. A focus on the materials being selected and reducing the quantities and mass of materials will be necessary in the next stage of the assessment.
- 5.10** 1.8% of emissions are a result from the transport of materials to site and construction stages (A4 and A5), whilst this is small in comparison to elements it is still important to reduce transport emissions through the local sourcing of materials and to reduce consumption of energy and water during consumption, where possible.
- 5.11** There are also impacts, with the in-use life-cycle module B1-B5 making up approximately 10.0% of all embodied carbon emissions. This is primarily due to materials that will need replacing over the 60 year study period.
- 5.12** An overview of the percentage share of kgCO<sub>2</sub>e by life cycle stage is shown in Figure 5 below.



**Figure 5: Percentage Share of Total kgCO<sub>2</sub>e - Life-cycle stages**

## Grid Decarbonisation

- 5.13** It is also important to consider the potential longer-term decarbonisation of the electricity grid and how this may impact on design decisions. The RICS WLCCE guidance and the GLA WLCCE assessment guidance documents refers to use of the ‘slow progression’ scenario from the latest Future Energy Scenarios (FES) developed by the National Grid and refers to the 2015 edition of FES.
- 5.14** Table 4 overleaf outlines how this changes the results for Operational Energy (Module B6) only. The percentage difference between the current state of the grid and the future grid can be seen in the final row.

**Table 4: Decarbonisation of the grid**

| Data                         | Total kgCO <sub>2</sub> e | Regulated Energy<br>(kgCO <sub>2</sub> e) | Unregulated Energy<br>(kgCO <sub>2</sub> e) |
|------------------------------|---------------------------|-------------------------------------------|---------------------------------------------|
| Current Building Regulations | 14,028,287                | 11,370,224                                | 2,658,063                                   |
| Future Energy Scenarios      | 11,161,478                | 9,723,779                                 | 1,437,699                                   |
| Difference in Emissions (%)  | 20% reduction             |                                           |                                             |

- 5.15** This is significant and confirms the importance of considering grid decarbonisation when completing carbon emission assessments on a whole life basis, especially for unregulated energy.

## Future Carbon Scenarios

- 5.16** One Click LCA does not yet have the capacity to take future CO<sub>2</sub> factors into account (except for B6). It must be noted that the factors that influence modules B1-B7 (e.g., replacement products) are dependent on the future residents of the development as they will be responsible for these.

## 6. OPPORTUNITIES

- 6.1** A set of opportunities are set out below that could be considered as a part of the detail design post planning to further reduce WLCCE. The opportunities presented below only account for reductions to carbon emissions. They are not considered as feasible options at this stage; they are opportunities that the design team could consider.
- 6.2** The potential embodied carbon savings if these recommendations were to be implemented are 172 kgCO<sub>2</sub>/m<sup>2</sup> GIA, as shown in Figure 6, below.

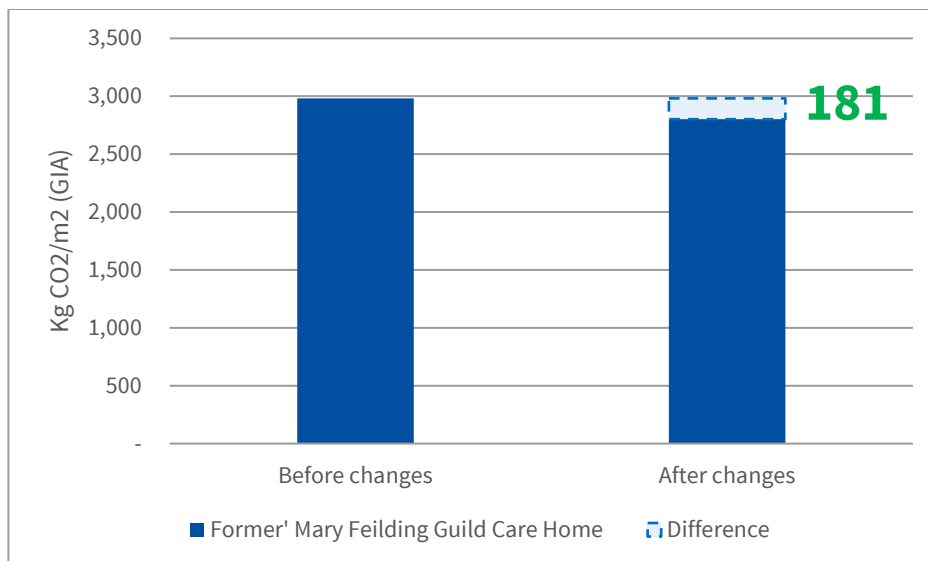


Figure 6: Potential embodied carbon savings from implementing recommended opportunities

### Reduced material use

- 6.3** 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. 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).
- 6.4** 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).
- 6.5** The façade is under constant wear from the environment which can lead to frequent repairs and maintenance. By using **durable materials** for the extension, this not only reduces the cost and frequency of refurbishment but also reduces the use of material replacement and its associated carbon footprint.

- 6.6 Similarly, **an extensive maintenance and repair schedule** could also be produced during the design life of the development to ensure that specific 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.

## Recycled materials

- 6.7 **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.
- 6.8 At **end-of-life concrete can be completely recycled**. After demolition, concrete can be processed and used as recycled aggregate in fresh concrete. If the site is intended for new construction the demolished concrete can be crushed on-site and used onsite as hard core, fill, or in landscaping.
- 6.9 Using **steel with high recycled content** for concrete reinforcement and stud assemblies greatly reduces its associated carbon emissions, leading to a significant reduction in A1-A3 emissions.

## Re use of materials

- 6.10 The Circular Economy statement produced by Hodkinson Consultancy (December, 2022) details the strategy for **recovery and reuse of materials**. The benefits of recovered materials have not been accounted for in the assessment at this stage due to uncertainty in the quantity of replacement materials. It is understood that this would be accounted in later versions of this WLCCE assessment.

## Sustainable procurement

- 6.11 In buildings with high glazing ratios, windows can make up a large proportion of the embodied carbon. **Specifying windows with EPDs to confirm low embodied carbon** can result in a significant embodied carbon reduction.
- 6.12 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.

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## 7. CONCLUSION

- 7.1** This Whole Life Cycle Carbon Emissions (WLCCE) Assessment for the proposed development at ‘Former’ Mary Feilding Guild Care home, located at 103-107 North Hill, has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development, appointed by Highgate Care Limited.
- 7.2** National Building Regulations and the Mayor’s net zero-carbon target for new development account for a building’s operational carbon emissions. As methods and approaches for reducing operational emissions have become better understood, and as targets have become more stringent, these emissions are now beginning to make up a declining proportion of a development’s carbon emissions. Attention now needs to turn to WLCCE to incorporate embodied carbon emissions, enabling a better understanding of the environmental impact of the proposed development.
- 7.3** Based on the information provided to date, through the Stage One assessment, the total carbon emissions are expected to be **776 kgCO<sub>2</sub>/m<sup>2</sup> GIA over 60 years**. The expected WLLCE are lower than the GLA WLC Aspirational Benchmark for modules A1-A5 and lower than the GLA WLC Benchmark for modules B-C.
- 7.4** By accounting for decarbonisation of UK grid electricity the emissions from module B6 Operational energy are reduced by 20%, confirming the importance of considering grid decarbonisation when completing carbon emission assessments, especially for unregulated energy.
- 7.5** A series of high-level considerations have also been made. These should be considered as the design progresses to ensure that WLCCE are reduced as much as possible, at present these have not been accounted for in the current design.

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## **8. APPENDICES**

### **Appendix A – GLA Spreadsheet**