Hayes Digital Park Masterplan

# Whole Life Carbon Assessment

March 2025

Prepared on behalf of Colt Data Centre Services

| Quality management | | | |
|---|---|---|---|
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# 1 Introduction

## 1.1 The Proposed Development

1.1.1 This RIBA Stage 2 Whole Life Carbon Assessment (WLCA) is submitted on behalf of Colt Data Centre Services in support of the hybrid planning application for circa 40,000 square metres of data centre floorspaces, at Beaconsfield Road, Hayes (the 'proposed development'). This HIA accompanies the following development proposal:

*"Hybrid planning application for a four-phased redevelopment to deliver a data centre campus comprising of:*

*Phase 1 – Full planning permission for (a) a data centre building (b) energy, power, and water infrastructure (c) site access and internal roads including a vehicular and pedestrian link between Uxbridge Road and Bullsbrook Road (d) site security arrangements and security fencing (e) hard and soft, green and blue, infrastructure and (f) other ancillary and auxiliary forms of development;*

*Phase 2 – Outline planning permission for (a) an Innovation Hub (b) hard and soft, green and blue, infrastructure and (c) other ancillary and auxiliary forms of development;*

*Phase 3 - Outline planning permission for (a) a data centre building (b) energy, power, and water infrastructure (c) internal roads (d) site security arrangements and security fencing (e) hard and soft, green and blue, infrastructure and (f) other ancillary and auxiliary forms of development; and*

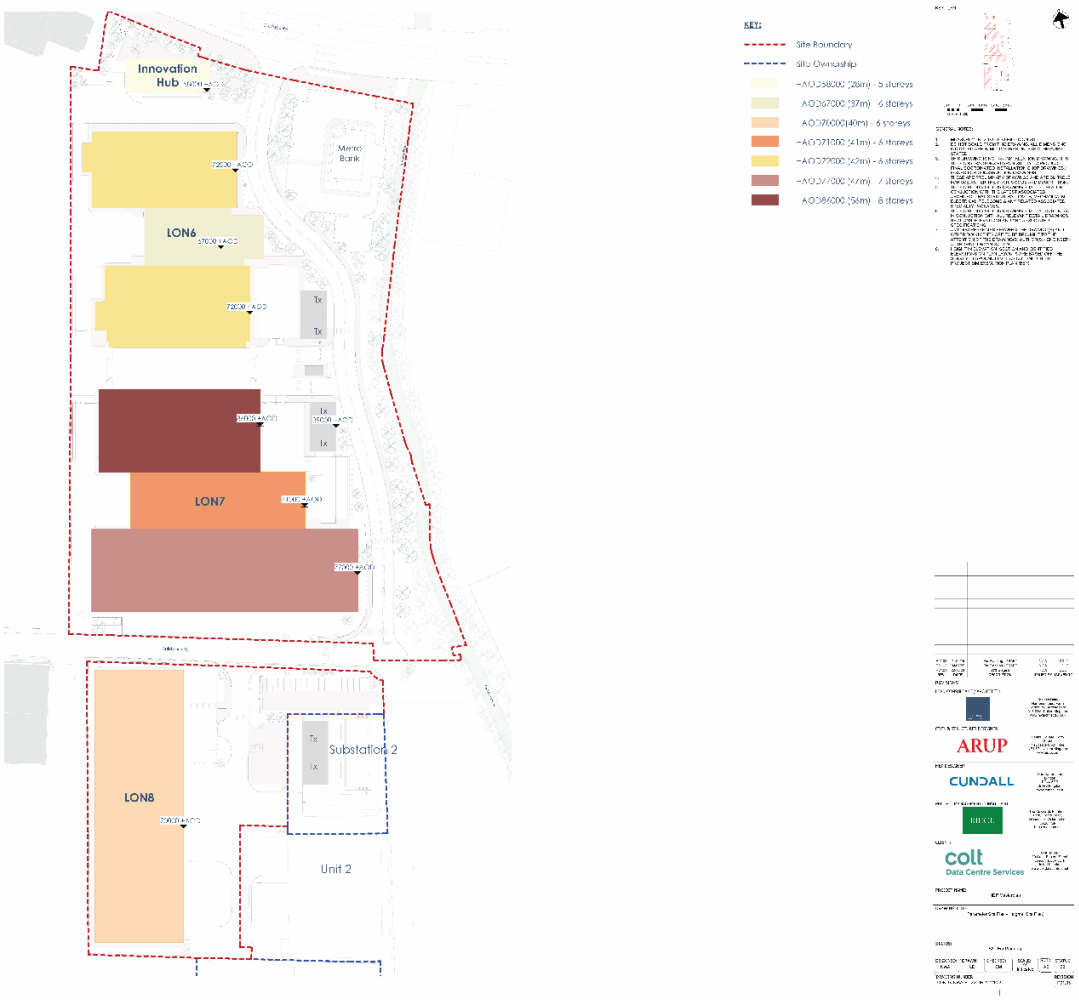
*Phase 4 - Outline planning permission for (a) a data centre building (b) energy, power, and water infrastructure (c) internal roads (d) site security arrangements and security fencing (e) hard and soft, green and blue, infrastructure and (f) other ancillary and auxiliary forms of development.."*

1.1.2 The Proposed Development can therefore be grouped into the following elements:

- A detailed planning application comprising:
  - one data centre up to 25,234 $m^2$ (hereby referred to as 'LON06'); and
- An outline planning application comprising:
  - a data centre up to 53,415 $m^2$ (hereby referred to as 'LON07');
  - a data centre up to 29,656 $m^2$ (hereby referred to as 'LON08'); and
  - an affordable workspace building up to 2,000 $m^2$ (referred to as the 'Innovation Hub').

1.1.3 Figure 1-1 illustrates the Proposed Development site. The Metro Bank building in the northeast corner of the site will be retained.

**Figure 1-1: Parameter Site Plan**




## 1.2 Site Description

1.2.1 The Proposed Development is located within the administrative area of the London Borough of Hillingdon (LBH). The site and its immediate surroundings are subject to a number of extant planning permissions, the details of which are outlined below for context.

1.2.2 Colt secured planning permission from LBH in 2022 for the redevelopment of the former Trinity Data Centre, Veetec Building, and Tudor Works sites at Beaconsfield Road in Hayes to deliver two data centre buildings (referred to as 'LON04' and 'LON05') (alongside substation and tank rooms) which together provide more than 37,000 $m^2$ of floorspace (ref. 38421/APP/2021/4045).

1.2.3 Since the granting of planning permissions for Buildings 1 and 2 (ref. 38421/APP/2021/4045), Colt has acquired Heathrow Interchange and Hayes Bridge Retail Park. The southern boundary of Heathrow Interchange immediately abuts the northern boundary of the site that Colt is presently redeveloping.

1.2.4 The proposed site sits as part of a wider commercial area which is broadly bound to the north by Uxbridge Road, the west by Springfield Road (and Minet Country Park), to the east by the Yeading Brook, and to the south by Beaconsfield Road. The broader area comprises of a mix of commercial operations with retail uses located predominantly in the northern part and industrial, storage, and manufacturing operations across much of the central and southern areas.

1.2.5 The site consists of two distinct parts which together have a site area of approximately 4.4 ha but are separated from each other by Bullsbrook Road, an adopted highway which serves other premises within the wider commercial area.

1.2.6 On the northern side of Bullsbrook Road is Hayes Bridge Retail Park. The Hayes Bridge Retail Park consists of a terrace of seven retail units and a standalone commercial bank (Metro Bank) set around a central surface car park which is accessed from the Uxbridge Road. The majority of these units are vacant. There is a live plication to demolish Hayes Bridge Retail Park (ref. 1911/APP/2025/398). It is anticipated that demolition of units within the retail park (except for Metro Bank) will take place whilst this application is being considered.

1.2.7 To the south of Bullsbrook Road and Hayes Bridge Retail Park is Heathrow Interchange. Heathrow Interchange consists of a series of industrial units arranged into two parallel terraces which are orientated north-south and separated from each other by an open yard with parking and vehicle turning which is served by Bullsbrook Road. Each terrace is split into two units so that there are four units within Heathrow Interchange. A Prior Notification Application was submitted and approved for the demolition of Unit 1 (ref. 71554/APP/2024/2490) and it is envisaged that the unit will be demolished whilst this application is being considered. There is a live application for planning permission for a substation in this location (ref. 71554/APP/2025/47). Unit 2, the southern unit on the eastern terrace, is outside of Colt's ownership and is excluded from this application.

1.2.8 Further, there is a live application to demolish Units 3 and 4 of Heathrow Interchange (ref. 71554/APP/2025/466). This application is likely to be approved and demolition to take place prior to the determination of the hybrid application.

## 1.3 Approach

1.3.1 This WLCA has been undertaken using One Click LCA and in accordance with BS EN 15978 and the RICS Professional Statement: Whole Life Carbon assessment for the built environment, 1st edition 2017.

1.3.2 WLCA use the following modules for assessment:

| | |
|---|---|
| Module A1-A5 | Product sourcing and construction stage |
| Module B1-B7 | Use stage |
| Module C1-C4 | End of life stage |
| Module D | Benefits and loads beyond the system boundary |

1.3.3 Workshops were undertaken during RIBA Stages 0-2 to develop the sustainability strategy for the Proposed Development. As noted above, LON04 and LON05 are located immediately adjacent to the Proposed Development and secured planning permission by Colt in 2022. As such, the sustainability strategy, and hence the approach taken to minimise carbon emissions, draws

directly from the sustainability strategy developed during the design and development of LON04 and LON05.

1.3.4 Input data within the WLCA comprises the following:

- Specific quantities and specifications of materials and structures, scaled to each building of the hybrid scheme from the LON04 and LON05 cost plan;
- Responses to specific information requests from consultants; and,
- Where not available, default figures were generated through OneClick Carbon Designer software based on building size.

1.3.5 The floorspace stated in section 1.1 refers to the gross external area (GEA). As is common in datacentre buildings, a significant portion of the energy centres and data halls of which they are comprised fall outside of the thermal line. GEA includes perimeter wall thickness and external projections, and hence, is deemed the most appropriate measure of floorspace to be used in this WLCA. This approach is in line with RICS WLCA guidance[1].

[1] RICS (2024): Whole life carbon assessment for the built environment, 2nd edition, September 2024, Version 3, issued August 2024. [Online]. Available at: https://www.rics.org/content/dam/ricsglobal/documents/standards/Whole_life_carbon_assessment_PS_Sept23.pdf accessed 10/03/2025

# 2 Policy and Legislative Context

2.1.1 This section presents the national and local legislative and policy requirements pertinent to the assessment of whole life carbon. There is a great deal of legislation and policy which concerns climate change, energy, transport, the built environment and management of the natural environment in general, which is not exhaustively listed here; this summary instead focuses on aspects of legislation or policy where these matters intersect to be of most relevance to the Proposed Development.

## 2.2 National Policy and Guidance

### National Planning Policy Framework

2.2.1 The National Planning Policy Framework (NPPF)[2] sets out the planning policies for England.

2.2.2 The revised National Planning Policy Framework (NPPF) 2024[3] states with regard to climate change that the core planning principle of the NPPF is that the planning system should:

> *"…support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure."* (paragraph 161).

### London Plan

2.2.3 The London Plan contains planning policies relevant to all development within London. With respect to the Proposed Development and this WLCA, Policy SI 2 Minimising greenhouse gas emissions states that major development should, amongst other things, *"calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions."*

### London Plan Guidance: Whole Life-Cycle Carbon Assessments

2.2.4 The London Plan Guidance: Whole Life-Cycle Carbon Assessments[4] provides guidance to applicants on how to undertaken a WLCA for developments which are referable to the Mayor. It notes that planning applicants are required to calculate operational and embodied carbon emissions and demonstrate how they can be reduced as part of a WLCA.

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[2] DLUHC (2024): The National Planning Policy Framework. [Online]. Available at: https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf, accessed 10/03/2025

[3] DLUHC (2024): National Planning Policy Framework. [Online] Available at: https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf, accessed 11/03/2025

[4] Greater London Authority (2022): London Plan Guidance: Whole Life-Cycle Carbon Assessments. [Online]. Available at: https://www.london.gov.uk/sites/default/files/lpg_-_wlca_guidance.pdf, accessed 10/03/2025

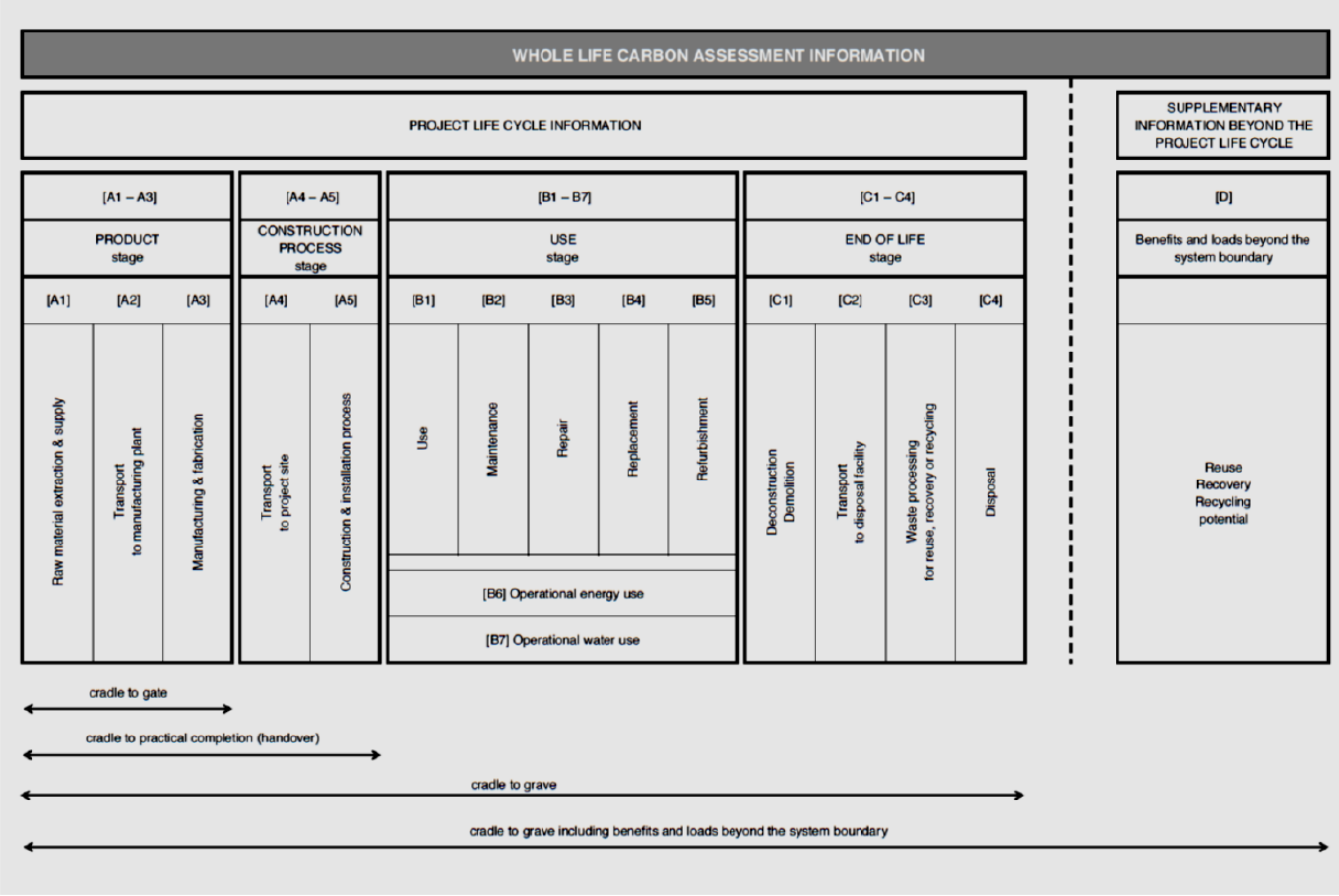
# 3 Scope of Works

## 3.1 WLCA Scope

3.1.1 WLC emissions are the total 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 - that is, emissions associated with raw material extraction, the manufacture and transport of building materials, and construction; and the emissions associated with maintenance, repair and replacement, as well as dismantling, demolition and eventual material disposal. A WLCA also includes an assessment of the potential savings from the reuse or recycling of components after the end of a building's useful life. It provides a true picture of a building's carbon impact on the environment.

3.1.2 A WLC assessment needs to cover the entirety of modules A, B, C and D, rather than just the minimum requirements identified in the RICS guidance. Figure 3-1 outlines what is captured under each module.

**Figure 3-1: Life-Cycle Modules**




3.1.3 Table lists the building elements included and excluded in the WLCA model.

| Building Element Category | Building element | Included |
|---|---|---|
| Demolition | 0.1 Toxic/Hazardous/Contaminated Material treatment | n/a |
| | 0.2 Major Demolition Works | Y[a] |
| 0 – Facilitating works | 0.3 Temporary enabling works | Y |
| | 0.4 Specialist groundworks | Y |
| 1 – Substructure | 1.1 Substructure | Y |
| | 2.1 Frame | Y |
| | 2.2 Upper floors incl. balconies | Y |
| | 2.3 Roof | Y |
| | 2.4 Stairs and ramps | Y |
| | 2.5 External walls | Y |
| | 2.6 Windows and external doors | Y |
| | 2.7 Internal walls and partitions | Y |
| | 2.8 Internal doors | Y |
| 3 – Finishes | 3.1 Wall finishes | Y |
| | 3.2 Floor finishes | Y |
| | 3.3 Ceiling finishes | Y |
| 4 – Fittings, furnishings and equipment (FF&E) | 4.1 FF&E | Y[b] |
| 5 – Building services/MEP | 5.1-5.4 Building services | Y |
| 6 – Prefabricated buildings and building units | 6.1 Prefabricated buildings and building units | Y |
| 7 – Work to existing building | 7.1 Minor demolition and alteration works | n/a |
| 8 – External works | 8.1 Site preparation works | Y |
| | 8.2 Roads, paths, pavings and surfacings | Y |
| | 8.3 Soft landscaping, planting and irrigation systems | Y |
| | 8.4 Fencing, railings and walls | Y |
| | 8.5 External fixtures | Y |
| | 8.6 External drainage | Y |
| | 8.7 External services | Y |
| | 8.8 Minor building works and ancillary buildings | n/a |

a- This is assessed separately in the GLA WLCA reporting template

b- The data centre is being built to a Shell & Core (Category A) fit out. As such, items related to Category B fit out, including servers and IT equipment, which will be specific to the needs of the tenants of the datacentre are excluded from the assessment scope in line with GLA guidelines.

## 3.2 Environment Data Sources

3.2.1 OneClick LCA[5] was used to undertake this WLCA. The tool supports the CML[6] impact assessment database and methodology (2002-2012 or newer) and all assessed impact categories. All the datasets in the tool follow the EN 15804 standard. The software is fully compliant with the EN 15978 standard. One Click LCA has been third party verified by the Instytut Techniki Bodowlanej (ITB) for compliance with the following LCA standards: EN 15978, ISO 21931–1 and ISO 21929, and data requirements of ISO 14040 and EN 15804.

[5] OneClick LCA (2025) 'The sustainability platform for construction and manufacturing' [Online]. Available at: https://oneclicklca.com/en-gb/, accessed 17/01/2025

[6] CML is the University of Leiden's Institute of Environmental Sciences

# 4 Inputs

## 4.1 Energy Consumption

4.1.1 The Energy Statement accompanying the planning application details how operational energy use has been minimised.

4.1.2 The operational energy figure used for this WLCA has been calculated in accordance with TM54. The CIBSE TM54 analysis was undertaken based on a tailored planning stage Part L 2021 Vol. 2 model and industry benchmarks to estimate regulated and unregulated energy. The model under the TM54 methodology utilises available design information including in-operation profile of the building. The model results include calculations for the annual energy associated with not only the regulated elements but also the unregulated elements such as IT equipment, lifts, refrigeration systems, external lighting, CCTV etc where applicable.

4.1.3 The following quantities have been provided from the Cundall energy model, which are presented within the 'GLA Carbon Emissions Reporting Spreadsheet' and the 'BRUKL Output Document' for each element of the scheme and have been reproduced in Table 4-1. The energy demand values have been assessed in terms of the whole life carbon using OneClick's dataset for UK specific electricity mixes.

**Table 4-1: Estimated energy demand of the scheme**

| Building | Total Energy Demand (kWh/annum) | Regulated Energy Demand (kWh/annum) | Unregulated Energy Demand (kWh/annum) |
|---|---|---|---|
| LON06 | 324,057,842 | 4,819,964 | 319,237,878 |
| LON07 | 568,394,044 | 8,942,272 | 559,451,772 |
| LON08 | 268,033,915 | 5,003,902 | 263,030,013 |
| Innovation Hub | 286,054 | 42,583 | 243,470 |

Reproduced from GLA Carbon Emissions Reporting Spreadsheet and BRUKL Output Document for each respective building

## 4.2 Water Usage

4.2.1 As noted within the Water Cycle Strategy, LON06, LON07 and LON08 of the Proposed Development are targeting a minimum of 3 credits for the Wat 01 BREEAM credit, which is to be assessed under the BREEAM Data Centres 2010 tool.

4.2.2 To achieve this, the flow rates and WC flush volumes outlined in Table 4-2 are proposed.

**Table 4-2: Proposed maximum flow rates and flush volumes for the datacentre buildings**

| Fixture | Proposed Water Consumption Figure |
|---|---|
| WCs | 4.5 L |
| Showers | 9 L/min |
| Wash-hand basin taps | 6 L/min |

Reproduced from the Water Cycle Strategy

4.2.3 Likewise the Innovation Hub will target a minimum of 3 credits for the Wat 01 BREEAM credit. As it is not a data centre building, the Innovation Hub will be assessed under BREEAM New Construction v6.

4.2.4 To achieve this, the flow rates and WC flush volumes outlined in Table 4-3 are proposed.

**Table 4-3: Proposed maximum flow rates and flush volumes for the Innovation Hub**

| Fixture | Proposed Water Consumption Figure |
|---|---|
| WCs | 4.5 L |
| Showers | 9 L/min |
| Wash-hand basin taps | 6 L/min |
| Kitchen taps | 6 L/min |
| Urinals | 1.5 L/bowl/hr |

Reproduced from the Water Cycle Strategy

4.2.5 Supplementing the above, it is proposed that 100% of the WC flushing water will be provided by recovered rainwater. Rainwater will be collected from the roof and stored in a dedicated rainwater harvesting tank via a filter. This will also provide some attenuation for the building and reduce the rate of wastewater entering the Thames Water wastewater infrastructure. Rainwater harvesting for use on-site reduces the energy required to treat and pump municipal water, which reduces operational carbon emissions.

4.2.6 Further, water loss is proposed to be minimised through the installation of a leak detection system, which will monitor leaks between the Affinity Water streety utility water meter and the internal site water meter. The two meters will be linked via a Building Management System to monitor any leaks. In addition, Solenoid valves will be fitted to the boosted cold-water service to each toilet area in the building. The valves will be linked to PIR occupancy sensors to automatically turn off the boosted cold-water supply to the toilet area when there are no occupants present.

4.2.7 Taking into account of all of the above, the LON06 is projected to require 739 $m^3$ per year of freshwater consumption, with 687 $m^3$ per year going to wastewater.

4.2.8 This has been scaled to the various elements of the outline scheme by floor area. The resultant freshwater consumption and wastewater generation values are presented in Table 4-4. These were used for the WLCA for the outline scheme.

**Table 4-4: Estimated water consumption and wastewater generation of the outline scheme**

| Building | Water Consumption ($m^3$/annum) | Wastewater ($m^3$/annum) |
|---|---|---|
| LON07 | 1564 | 1454 |
| LON08 | 868 | 807 |
| Innovation Hub | 59 | 54 |

## 4.3 Construction Site Operations

4.3.1 In line with EN15978, the site impacts from construction works are reported in the A5 module. As stage project specific information is not available, a climate zone average scenario has been included based on the total floor area.

## 4.4 Emissions and Removals (B1)

4.4.1 Annual and 'End of Life' Refrigerant leakage rates have been included according to the proposed air-cooled chillers, which use the R1234ze refrigerant, which has a relatively low GWP of 7. Each chiller has a refrigerant charge of 258 kg. For LON06, there are 24 chillers, which gives a total of 6,192 kg of refrigerant. The project engineers have advised that an annual leakage rate of 3.5% should be used in line with CIBSE TM65.

4.4.2 This has been scaled to the various elements of the outline scheme by floor area. The resultant freshwater consumption and wastewater generation values are presented in Table 4-5. These were used for the WLCA for the outline scheme. An annual leakage rate of 3.5% was also used.

**Table 4-5: Estimated refrigerant mass of the outline scheme**

| Building | No. Chillers | Refrigerant Charge/Chiller (kg) | Total Refrigerant (kg) |
|---|---|---|---|
| LON07 | 51 | 258 | 13,107 |
| LON08 | 28 | 258 | 7,277 |
| Innovation Hub | 2 | 258 | 491 |

4.4.3 Cementitious materials, such as concrete, cement and mortar, absorb carbon dioxide when exposed to air. This process is the chemical reversal of the cement production process calcination phase. The amount of carbon dioxide absorbed depends on exposure of the material, duration of the exposure as well as the initial amount of cement. Carbonisation of cementitious materials has not been included in this model.

## 4.5 Modules B2 & B3

4.5.1 Paragraph 2.5.12 of the London Plan Guidance: WLCA confirms that during the design stage, modules B2 and B3 will be more challenging to estimate. Therefore, an estimate of electricity used, multiplied by the expected number of days of planned maintenance each year can be applied.

### Module B2

4.5.2 Alternatively, for module B2 emissions:

- (1) a total figure of 10 $kgCO_2e/m^2$ gross internal area (GIA) may be used to cover all building element categories; or,
- (2) 1 per cent of modules A1-A5, whichever is greater.

4.5.3 As discussed earlier, GEA is used to represent the floor area for the purposes of this assessment and has also been used to determine B2 emissions. The calculated B2 emissions for each building element are presented in Table 4-6. This shows that method 1 produces the greater B2 emissions, hence these emissions have been used within this WLCA.

**Table 4-6: GEA and B2 emissions**

| Building | GEA ($m^2$) | B2 Emissions ($kgCO_2e$) Using Method 1 | B2 Emissions ($kgCO_2e$) Using Method 2 |
|---|---|---|---|
| LON06 | 25,235 | **252,350** | 240,084 |

| Building | GEA ($m^2$) | B2 Emissions ($kgCO_2e$) Using Method 1 | B2 Emissions ($kgCO_2e$) Using Method 2 |
|---|---|---|---|
| LON07 | 53,415 | **534,150** | 508,186 |
| LON08 | 29,656 | **296,560** | 282,145 |
| Innovation Hub | 2,000 | **20,000** | 19,038 |

## Module B3

4.5.4 For module B3 emissions, these may be estimated as 25 per cent of module B2, as per the RICS guidance. Using Method 1 to calculate B2 emissions, the B3 emissions have been calculated for each building of the hybrid scheme and are presented below.

**Table 4-7: Module B3 emissions**

| Building | B3 Emissions ($kgCO_2e$) |
|---|---|
| LON06 | 63,088 |
| LON07 | 133,538 |
| LON08 | 74,140 |
| Innovation Hub | 5,000 |

# 5 Results

5.1.1 The Proposed Development has been modelled using OneClick LCA software. Full details of the results can be found in the London Planning Guidance – WLCA Assessment Template which accompanies this report. The results of the WLCA for each building of the hybrid scheme are summarised in Table 5-1 to Table 5-4 below, compared with the office benchmark (although this is not comparable), as required by the GLA guidance.

**Table 5-1: Summary of LON06 results**

| LCA Module | WLC Benchmark ($kgCO_2e/m^2$) | Aspirational WLC Benchmark ($kgCO_2e/m^2$) | Proposed Development ($kgCO_2e/m^2$) |
|---|---|---|---|
| Modules A1-A5 (excluding sequestered carbon) | <950 | <600 | 951 |
| Modules B-C (excluding B6 & B7) | <450 | <370 | 790 |
| Modules A-C (excluding B6 & B7; including sequestered carbon) | <1,400 | <970 | 1,740 |

**Table 5-2: Summary of LON07 results**

| LCA Module | WLC Benchmark ($kgCO_2e/m^2$) | Aspirational WLC Benchmark ($kgCO_2e/m^2$) | Proposed Development ($kgCO_2e/m^2$) |
|---|---|---|---|
| Modules A1-A5 (excluding sequestered carbon) | <950 | <600 | 951 |
| Modules B-C (excluding B6 & B7) | <450 | <370 | 792 |
| Modules A-C (excluding B6 & B7; including sequestered carbon) | <1,400 | <970 | 1,742 |

**Table 5-3: Summary of LON08 results**

| LCA Module | WLC Benchmark ($kgCO_2e/m^2$) | Aspirational WLC Benchmark ($kgCO_2e/m^2$) | Proposed Development ($kgCO_2e/m^2$) |
|---|---|---|---|
| Modules A1-A5 (excluding sequestered carbon) | <950 | <600 | 951 |
| Modules B-C (excluding B6 & B7) | <450 | <370 | 792 |
| Modules A-C (excluding B6 & B7; including sequestered carbon) | <1,400 | <970 | 1,742 |

**Table 5-4: Summary of Innovation Hub results**

| LCA Module | WLC Benchmark ($kgCO_2e/m^2$) | Aspirational WLC Benchmark ($kgCO_2e/m^2$) | Proposed Development ($kgCO_2e/m^2$) |
|---|---|---|---|
| Modules A1-A5 (excluding sequestered carbon) | <950 | <600 | 952 |
| Modules B-C (excluding B6 & B7) | <450 | <370 | 827 |
| Modules A-C (excluding B6 & B7; including sequestered carbon) | <1,400 | <970 | 1,778 |

5.1.2 Datacentres are not covered by the GLA benchmarks provided in Annex 2 of the LPG guidance. As a result, for the purposes of this assessment, the offices benchmark was selected as it is considered the most similar to the Proposed Development out of the available benchmarks. Notwithstanding the guidance requirements, the offices benchmark is not considered representative of datacentres, due to inherent design and use differences between offices and datacentres in terms of the extent of MEP to facilitate intensive computing, relative to a typical office, as well as the extended hours of operation as datacentres are operational for 24 hours per day, 7 days per week, compared to typical office operational hours. As a result, any comparison of carbon intensity of the Proposed Development to the benchmarks should be considered only as it is required by the LPG guidance.

# 6 Opportunities to Reduce Embodied Carbon

6.1.1 The following actions are decisions made by the design team to reduce the embodied carbon emissions in the RIBA Stage 2 design of the Proposed Development. The floor area used in these calculations is consistent with the approach undertaken throughout this WLCA. As previously mentioned, the strategy to reduce carbon emissions was informed by and replicated from that of LON04 and LON05. Hence, the actions to reduce embodied carbon during the development of LON04 and LON05 are the same employed during RIBA Stage 2 with respect to the Proposed Development. These are as follows:

- Use of Concrete with GGBS in Substructure;
- Use of Industry Average EPD for Concrete in Frame;
- Use of Industry Average EPD for Reinforcement Steel.

6.1.2 Opportunities to further reduce the development's WLCA emissions are:

- Use of concrete within GGBS in Frame
- Use of reinforcement steel and structural steel with higher recycled content.

# 7 Conclusion

7.1.1 A Whole Life Cycle Assessment in accordance with the GLA requirements (Whole life carbon guidance, March 2022) has been undertaken for the Proposed Development at Hayes Retail Park and Heathrow Interchange.

7.1.2 This has been completed with the aim of 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.

7.1.3 The WLCA has been run for the entire building envelope, in line with the GLA requirements. This has been based on materials data provided by the project design team for applicable building elements required by the GLA methodology at RIBA Stage 2.

7.1.4 This WLCA has assessed the following modules for the development:

| | |
|---|---|
| Module A1-A5 | Product sourcing and construction stage |
| Module B1-B7 | Use stage |
| Module C1-C4 | End of life stage |
| Module D | Benefits and loads beyond the system boundary |

7.1.5 As with the development of LON04 and LON05, the following actions have been taken by the project team to reduce the whole life-cycle carbon emissions and will be reviewed as the project and the design develops:

- Use of Concrete with GGBS in Substructure;
- Use of Industry Average EPD for Concrete in Frame;
- Use of Industry Average EPD for Reinforcement Steel.

7.1.6 The following actions have been identified as a further potential measures that will be considered in detailed design:

- Use of concrete within GGBS in Frame
- Use of reinforcement steel and structural steel with higher recycled content.