O2 Masterplan Site, Finchley Road

Sustainability Statement

Version 1, January 2022

Prepared for LS (Finchley Road) Limited by Buro Happold

Landsec

Revision	Description	Issued by	Date	Checked
P01	Final Document	JB	31/01/22	JG, SM

https://burohappold.sharepoint.com/sites/048201/02_Documents/04_Reports/Planning Submission/Sustainability Statement/220128 Final Issued/220131_O2 Finchley Road_Sustainability Statement_For legal review _P06.docx

Report Disclaimer

This Report was prepared by Buro Happold Limited ("BH") for the sole benefit, use, and information of Landsec for Planning Submission. BH assumes no liability or responsibility for any reliance placed on this Report by any third party for any actions taken by any third party in reliance of the information contained herein. BH's responsibility regarding the contents of the Report shall be limited to the purpose for which the Report was produced and shall be subject to the express contract terms with Landsec. The Report shall not be construed as investment or financial advice. The findings of this Report are based on the available information as set out in this Report.

author	**Jon Gregg, Josephine Benthall & Loic Weisser**
date	**31/01/2022**
approved	**Smith Mordak**
signature	
date	**31/01/2022**

..

Contents

1 Introduction

This Sustainability Statement has been prepared by Buro Happold on behalf of LS (Finchley Road) Limited ('the Applicant') in support of an application made part in detail and part in outline ('the Application') for the demolition and redevelopment of land encompassing the O2 Centre and associated car park, Homebase store, car showrooms and Builder's Merchant ('the site') within the London Borough of Camden ('LBC').

Full details and scope of the Applications are described in the submitted Planning Statement, prepared by Gerald Eve LLP.

The purpose of this sustainability statement is to outline the sustainability objectives and deliverables for the design, construction and operation of the project, including the legislative requirements for the site and stakeholders involved. The sustainability statement as outlined within this document addresses the approach to detailed matters governed by national policy and guidance, GLA London Plan and the LBC Local Plan.

This report sets out the sustainability and strategy for the proposed development. It includes the following elements and sections:

- Sustainability Strategy Overview
- Whole Life Carbon of new build
- O2 Deconstruction and Whole Life Carbon scenarios
- BREEAM Strategy

1.1 Development Description

Application for Planning Permission:

> *"Part full and part outline planning permission comprising the following:*
>
> ***Detailed planning permission*** *for Development Plots N3-E, N4, and N5 including demolition of existing above ground structures and associated works, and for residential development (Class C3) and commercial, business and service (Class E) uses in Development Plot N3-E, residential development (Class C3) and local community (Class F2) and commercial, business and service (Class E) uses in Development Plot N4, and residential development (Use Class C3) and commercial, business and service uses (Class E) uses in Development Plot N5 together with all landscaping, public realm, cycle parking and disabled car parking, highway works and infrastructure within and associated with those Development Plots.*
>
> ***Outline planning permission*** *for Development Plots N1, N2, N3, N6, N7 ,S1 and S8 including the demolition of all existing structures and redevelopment to include residential development (Class C3) commercial, business and service uses (Class E), sui generis leisure uses (including cinema and drinking establishments) together with all landscaping, public realm, cycle parking and disabled car parking, highway works and infrastructure within and associated with those Development Plots."*

The proposed development consists of the works which form a hybrid planning application for the demolition and redevelopment of land encompassing the O2 Centre and associated car park, Homebase store, car showrooms and a Builder's Merchant.

Plot breakdown

The application will be a hybrid application and will include the following elements:

Detailed Proposals – Plots N3-E, N4 and N5.
Outline Proposals – Plots N1,N2,N3,N6,N7,S1 and S8

1.2 Site Context

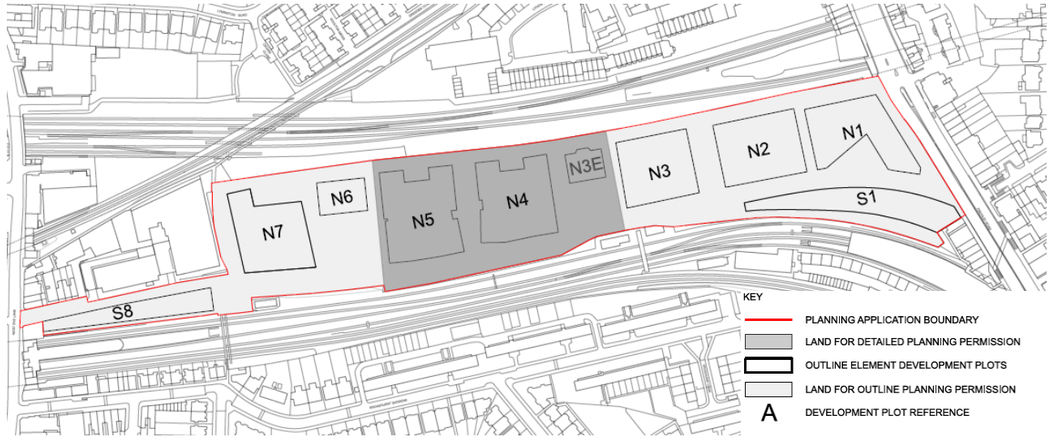


Figure 1-1 Existing site and redline boundary and detailed and outline elements

The site is an outstanding mixed-use regeneration opportunity of Borough and London wide significance by virtue of its size, strategic and sustainable location, and the ability for comprehensive development to provide considerable placemaking and other significant public benefits that would not otherwise be possible.

The current position at the site represents an underutilisation of land in terms of the benefits that could be realised, and against the backdrop of an acute housing shortage, at the Borough, London and National level. The expansive car park is a particularly inefficient use of land and is not consistent with national, regional and local policy objectives on sustainability as it encourages car-borne travel. The Homebase Store, the car showrooms and the builder's merchant are also relatively low-density land uses for such a well-connected and central location between two Town Centres.

The O2 Centre shopping centre is an inward-looking retail and leisure destination, dominated by single transaction car based trips. It has very limited high street frontage and this is poorly activated. Its design and the site's topography mean that pedestrian permeability and east west linkages across the site are very poor. The public experience of the high street environment onto Finchley Road is considered sub-standard.

Internally, the O2 Centre is consuming high quantities of energy and reaching a point of obsolescence with the current accommodation failing to meet modern retail and leisure market expectations. The internal space is inefficient, dominated by a large atrium space, pedestrian walkway and first floor gallery that suffers from poor footfall. Consequently, the Centre has seen a number of critical occupiers fail over the last few years. Current occupied uses are dominated by a handful of

large format stores that could be re-provided for in a more inclusive and integrated town centre format. The existing design means there are limited opportunities to make significant adaptations to meet these new retailer trends.

In summary the Centre is outdated and provides poor accommodation suffering from constraints which include:

- Inefficient and outdated floorplates;
- A dated and inefficient façade that does not positively contribute to the streetscape;
- Sustainability credentials that do not meet the requirements of modern commercial buildings (e.g. operational energy performance, inefficient use of space and car-centric design); and
- A ground floor configuration that provides little in the way of ground floor activation and animation of the Town Centre.

Given this context, deconstruction of all existing buildings and a comprehensive residential-led, mixed-use redevelopment scheme is proposed. The Applicant has carefully considered the potential to retain the O2 Centre as part of a wider scheme. However, the nature of the building means that it effectively blocks the Finchley Road frontage and limits permeability and accessibility through the site which is a key objective of planning policy and of the Applicant in terms of building a cohesive new neighbourhood and successful place-making. In addition, as set out above the building has very limited flexibility for adaptation to create a modern town centre environment and to meet current and future retailer and leisure operator needs. It also has poor sustainability credentials as set out within this statement.

In making the decision to redevelop rather than to refurbish the building, the carbon profile of each option has been assessed in Section 14.

1.3 Development sustainability vision

The O2 Centre and associated car park, Homebase store, car showrooms, and Builder's Merchant occupy a large site between Finchley Road and West End Lane. It's a hugely important part of the local area that we know isn't being utilised to its full potential.

The ambition for the site vision is that it will be:

"A place that integrates and connects the communities of Finchley Road and West Hampstead. A new neighbourhood that reflects Camden's unique culture and provides something for everyone – a mix of homes where people can stay and grow; jobs and local opportunities; shops, restaurants, leisure and community facilities; and new green public spaces to relax with friends and family."

The design team's brief is to create a new neighbourhood that:

- Is a seamless connection between Finchley Road and West End Lane;
- Has the green spaces and public realm that we know the area desperately needs;
- Has the shops, homes, leisure and community facilities that this part of Camden wants and needs;
- Creates jobs and opportunities for local people;
- Has its own identity and style but feels very much like this part of north London;
- Has something for everyone whether that's a new home, a favourite shop, or a new playground to explore;
- Is safe, secure and open to all.

1.4 Sustainability headlines

Sustainability is baked into the core of everything that Landsec does. Landsec create places that make lasting positive contributions to communities and the planet. To Landsec, sustainability means anticipating and responding to the evolving needs of their customers, communities, partners and employees. It creates innovative spaces of enduring value where people can thrive now and in the future, keeping environmental and social issues at the core of everything it does.

Through this strategy a series of design, construction and operational commitments are made and listed below:

Building Design

- Fabric First approach, exploring passive design optimisations and energy efficiency measures;
- All-electric strategy – Electric heat pumps to meet all heating, cooling and hot water demands (i.e no combustion on site);
- Optimised solar photovoltaics aligned with rooftop plan, ecology and amenity requirements and aspirations;
- Internal environments to be designed to ensure comfort and resilience to climate change. Homes to be resilient to climate change and designed to balance:
    - Energy performance
    - Provide good internal daylighting levels
    - Minimise overheating risk taking into account future climate change
- The remaining regulated carbon emissions to be offset at £2,850/tonne CO_2, paid to LBC for each phase to facilitate local carbon reduction projects.
- BREEAM Certification (Internationally recognised sustainability standard for buildings) New Construction 2018 to an 'Excellent' standard for commercial spaces; and
- Embodied carbon of new build to be designed targeting the GLA aspirational targets, <500 $kgCO_2/m^2$ GIA (modules A1-A5), reducing over time as future phases are brought forward.

Material reuse and circular economy

Multiple targets have been set within the application regarding material retention, reuse, and recycling.

- Firstly, overall site wide targets have been set as following:
    - Excavation waste, Demolition waste and Construction waste - Minimum 95% (by tonnage) to beneficial use/diversion from landfill in line with policy and BREEAM.
- Secondary targets are set for the deconstruction of the O2 centre. These are based around the embodied carbon of the existing building materials. Targets have been set to retain/reuse or recycle the most carbon intensive elements on site. % of embodied carbon break down as follows:
    - Minimum target: >50% of the embodied carbon of the O2 centre retained, reused or recycled on site. Analysis at later stages will look to increase this further where possible.
    - Further detail is outlined in the Sustainability Statement and Circular Economy, which can be found in Section 11 and in the accompanying Circular Economy Statement submitted as part of the application.

Water use and Sustainable Urban Drainage

- Water efficient fittings & design solutions, to reduce internal water consumption below 105 l/person/day;
- Holistic storm water management strategy built into the natural environment, including;
    - ~5,700m^2 of green roofs across the site;
    - Permeable paving;
    - Swales, rain gardens and bioretention strips in landscaped areas; and
    - Tanked storage as a last step.
- Run off volumes to be <50% of the existing site rate.

Biodiversity and landscape design

- Site massing designed around maximising daylight to public realm;
- >50% public realm space across the site;
- ~165% increase in biodiversity net gain;
- Circular economy principles built into landscape design through on-site material reuse from existing O2 centre and Homebase; and
- Community gardens in public realm, for stewardship by residents and local groups.

Sustainable transport

- Site wide sustainable transport strategy to encourage healthy lifestyles;
- Segregation of vehicular access and pedestrian routes through site, to increase safety and ensure a pleasant walking environment for families;
- Dedicated cycle routes for ease of commuter access;
- Through ease of access to public transport, cycle routes, and 20% active and 80% passive residential electric car charging points;
- Bus stop to be provided at new community green, next to new health care centre, allowing for ease of access to key areas of the site.

1.5 Sustainability Masterplan Overview

The image below pulls out some of the sustainability headlines across the masterplan, highlighting the holistic overarching approach that has been taken of the outline and detailed planning application. Supporting and more in-depth information can be found in the following sections 4-12 of this Sustainability Statement.

All electric strategy to deliver heat across the site without combustion achieving a carbon reduction of 67% and improving local air quality

50% of the site now public realm. Roofs, Swales & Rain Gardens have been embedded into the design to limit risk of flooding, reducing run-off by 50%

Overheating risk mitigated through architectural and MEP design for current and future climate scenarios

Open courtyards to maximise daylight to homes and public realm

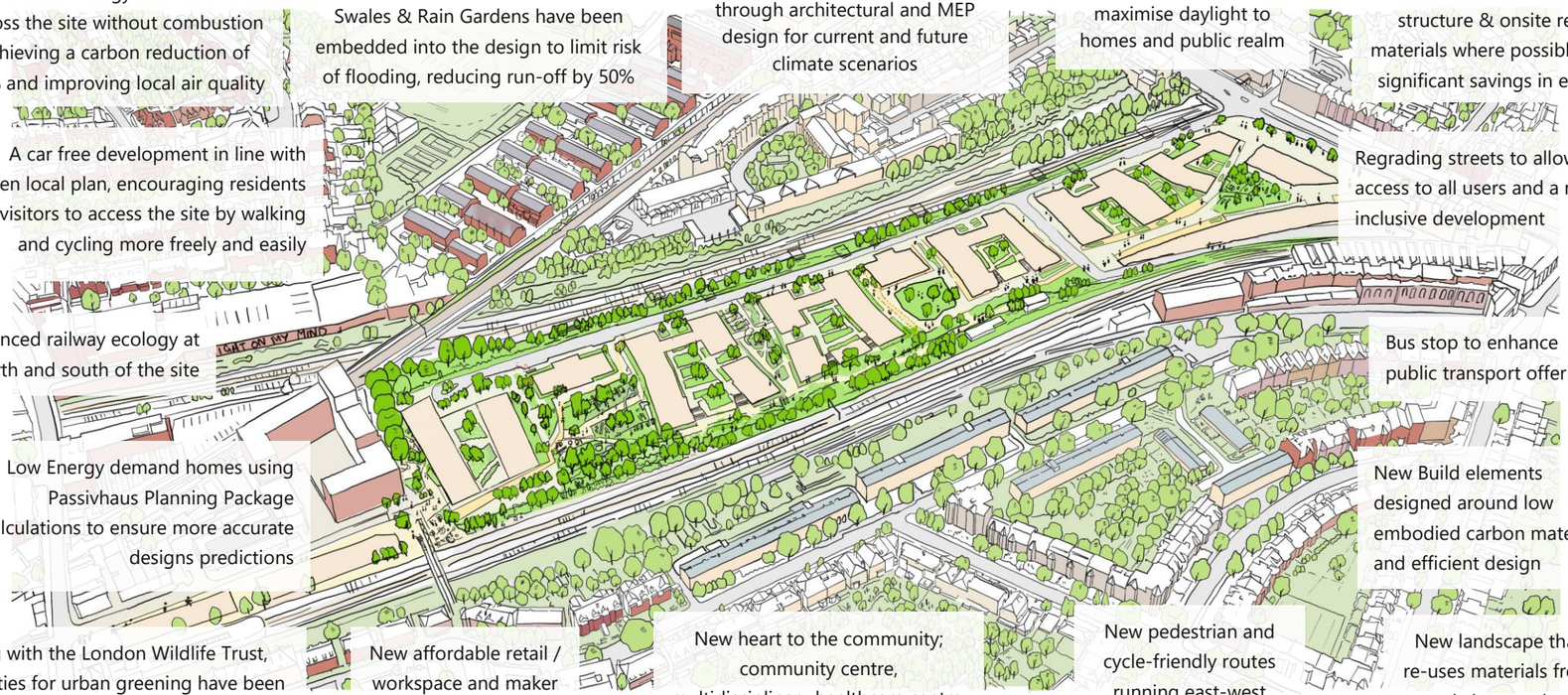
Retention of O2 basement structure & onsite reuse of materials where possible, making significant savings in embodied

A car free development in line with Camden local plan, encouraging residents and visitors to access the site by walking and cycling more freely and easily

Regrading streets to allow for access to all users and a more inclusive development

Enhanced railway ecology at north and south of the site

Bus stop to enhance public transport offering



Low Energy demand homes using Passivhaus Planning Package calculations to ensure more accurate designs predictions

New Build elements designed around low embodied carbon materials and efficient design

Working with the London Wildlife Trust, opportunities for urban greening have been maximised, and a Biodiversity Net Gain of ~165% will been achieved

New affordable retail / workspace and maker spaces

New heart to the community; community centre, multidisciplinary healthcare centre, workspace and playspace

New pedestrian and cycle-friendly routes running east-west across the site

New landscape that re-uses materials from existing on-site buildings

2 Planning Policies

The proposed development has been developed in compliance with the following regulatory and policy standards:

- National Planning Policy Framework and Guidance;
- Building Regulations 2013 Part L;
- Greater London Authority (GLA) London Plan 2021,
- Energy Planning, GLA guidance on preparing energy assessments, 2020;
- Camden Local Plan 2017;
- Fortune Green & West Hampstead Neighbourhood Plan: Adopted September 2015; and
- to achieve a BREEAM 'Excellent' certification for non-residential/commercial use classes.

2.1 Policy background

Strategic planning in London is a shared responsibility of the Mayor of London, London Boroughs and the Corporation of the City of London. The London Plan (2021)is the spatial development strategy for London, produced by the Greater London Authority on behalf of the Mayor of London. Every London Borough Local Plan must be in general conformity with the London Plan. The site is located in the London Borough of Camden and as such is subject to their planning policy and guidance. For sustainability, a key guidance document is the London Borough of Camden Local Plan, as illustrated in Figure 2-1.

2.2 Overview of existing policy

The Paris Agreement is a major international climate action agreement to which the UK is signatory. The 196 countries under the agreement have committed to limit global warming to 2°C over pre-industrial levels, and aim to safely adapt to any consequences of climate change. The UK ratified this in 2016.

This agreement has led the UK Government to commit to Net Zero Carbon by 2050. This may define the direction of future policy, consumer behaviours and innovation. However, the National Planning Policy Framework (NPPF) still dictates local authority policy. The NPPF consolidates previously issued documents called Planning Policy Statements (PPS) and Planning Policy Guidance Notes (PPG). A greater focus is now placed on the dissemination of energy policy within regional development frameworks.

The NPPF's planning guidance relating to energy and sustainability is set out in section 14: and relates to "meeting the challenge of climate change, flooding and coastal change". This requires local authorities to set sustainability targets and ambitions. NPPF does however stipulate that no Local authority can enforce a policy that is not currently technically feasible or economically viable. An evidence base is required to set new policy in line with NPPF guidance.

The London Plan (2021) was published by the Mayor in March 2021. The London Plan 2021 is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. The Plan is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital. Borough's Local Plans must be in 'general conformity' with the London Plan, ensuring that the planning system for London operates in a joined-up way and reflects the overall strategy for how London can develop sustainably, which the London Plan sets out.

The London Borough of Camden have major policy documents relevant to the site. The Core Strategy Development Plan Document, which was published in June 2011, is now outdated and has been replaced by the Camden Local Plan 2017. In addition to this, in 2019 Camden announced a Climate Emergency and from that they have undertaken a Citizen's Assembly and developed an ambitious five-year programme of projects and activities for the council's operations, called Camden Climate Action Plan 2020-2025. See: https://news.camden.gov.uk/camden-approves-ambitious-five-year-climate-action-plan/. Furthermore Camden's 2025 Vision document sets out their vision for the borough in 2025, falling into 5 key calls to action. These span across economic, social and environmental issues relevant to the borough with the aim of creating a place that works for everyone, and where everybody has a voice.

Within these policy documents sit a suite of supplementary planning docs which provide material considerations for planning decisions. All these policy documents have looked to inform the sustainability strategy and KPIs set for the development.

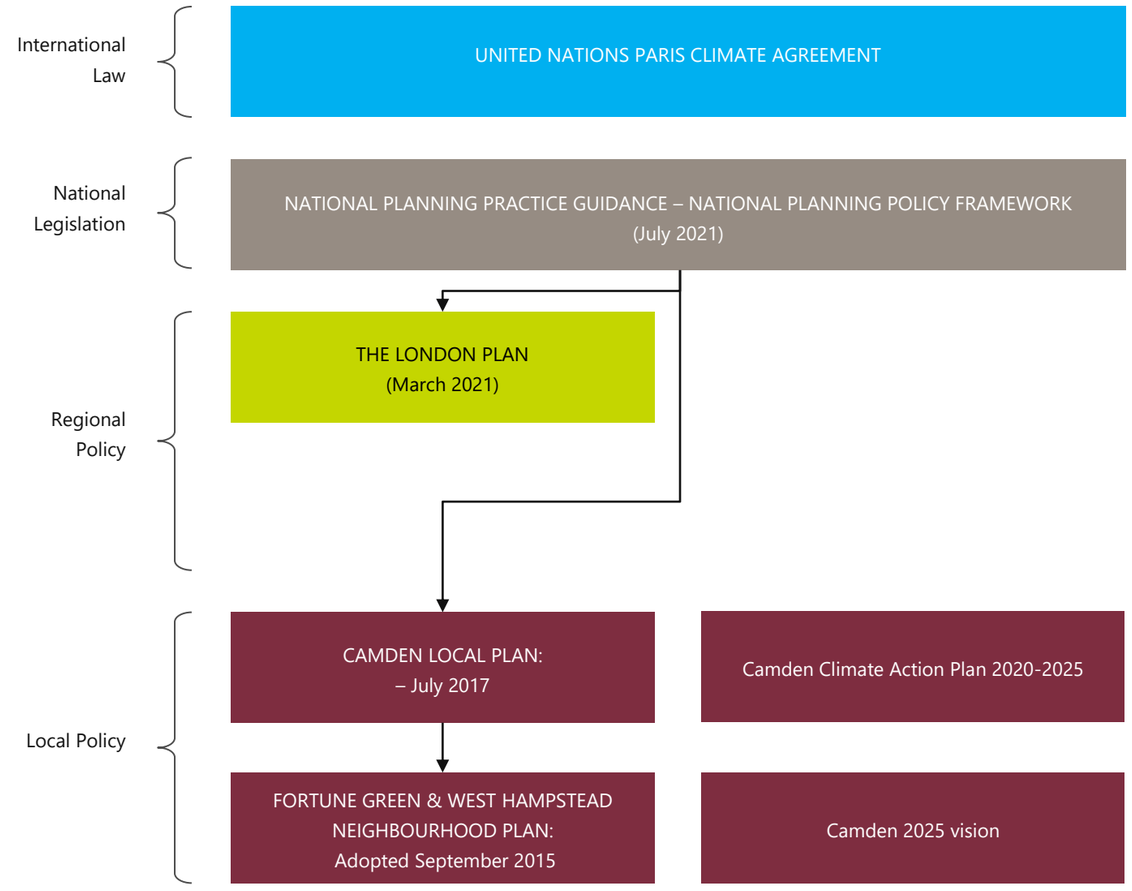


Figure 2-1 - Summary of planning policy frameworks international to local level

3 Sustainability Strategy Overview

The Sustainability strategy for the site has been developed holistically around 10 key themes to set ambitious targets for this new neighbourhood.

These 10 themes are outlined below, with each setting out what this theme means. There is significant overlap between the themes, and these are explored throughout the strategy. In this strategy, the Embodied Carbon and Circular Economy & Material Efficiency themes have been combined.

	**Operational Energy and Carbon** This means increasing energy efficiency, decarbonisation of energy, heat, and balancing any remaining emissions through carbon offsetting. This section looks to set targets that will drive down energy demand and carbon emissions in line with GLA Net Zero Carbon definitions. (See Section 4)		**Mobility & Active Travel** This means the masterplan is designed to minimise the use of private fossil fuel transport from the site visitors, residents and users. This is to be achieved by encouraging and increasing the use of public transport and sustainable forms of private transport, cycling, walking or non-emitting vehicles. (See Section 9)
	**Climate change resilience** This means ensuring the masterplan is prepared for and resilient to the shocks and stresses that may be anticipated with forecast changes in the future climate. This covers the topics outlined in the DEFRA UK Climate Change Risk Assessment 2017; and the GLA London Plan; Heat stress, food supply, Disease response, Natural Capital and Water stress and Flood risk. (See Section 5)		**Air Quality** This means reducing the impact the development has on the air quality of the wider community, from air pollutants, Nitrous Oxide, Carbon Monoxide, Carbon Dioxide, PM 2.5 and PM 10. It also aims to maximise positive air quality, providing clean air externally and internally across the site. (See Section 10)
	**Biodiversity** This means increasing the abundance and diversity of plant and animal species appropriate to local ecology. Having a positive impact on the biodiversity gain of the area as well as how the site users will positively engage with the site, through nature. (See Section 6)		**Embodied Carbon** This means reducing the emissions associated with the construction of the buildings. This includes targets from Cradle to Practical Completion, including supply chain emissions arising from the extraction of resources, manufacture of products, transportation and assembly of a building. The design considered the emissions associated to maintenance and replacement, developing strategies to minimise these through the life cycle. See the Circular economy statement for more detail. (See Section 11)
	**Water and surface water run-off** This means designing the masterplan to consume less potable water on-site, both inside the buildings and in public realm irrigation; through reducing demand and maximising recycling. It also means increasing the site resilience to surface water flooding. Both through reducing impact on the site and managing surface water run-off in a smarter way before discharging into the sewer. (See Section 7)		**Materials, circular economy & waste** This means reducing the amount of resources we use, increasing proportion of recycled content as well as the amount of materials reused and thinking about the end of life of products. The ultimate goal is to design out and minimise waste. (See Section 11)
	**Health, Safety and Wellbeing** This means improving the mental and physical wellbeing as well as safety of site visitors, site users, and site residents as well as the wider community. Ambition is to minimise impacts of external factors on health and wellbeing of site users as well as provide positive stimuli to allow site users to flourish in their daily lives. (See Section 8)		**Social value** This means unlocking value to the wider community through identifying opportunities throughout the design and construction process to improve health, wellbeing, resilience, and safety. These principles help reduce inequalities in health, education and social justice. (See Section 12)

4 Operational Energy and Carbon

This means increasing energy efficiency, decarbonisation of energy, heat and transport and balancing any remaining emissions through carbon offsetting. This section looks to set targets that will drive down energy demand and carbon emissions in line with GLA London Plan Net Zero Carbon Definitions and UK GBC Net Zero Carbon Buildings Framework Definition.

Table 4-1 Operational Energy and Carbon Policies

Policy
London Plan, Policy SI 2 Reduction in 'Lean' emissions by 10% for residential and 15% for non-residential (using Part L 2013 Building Regulations Modelling)
Camden Local Plan, Policy CC1 Section 8.7: Follow energy hierarchy so that proposals show how passive design measures reduce energy demand. Passivhaus design standards are *encouraged*. The application of these standards will need to be reviewed and outline if they are technically feasible or economically viable.
London Plan, Policy SI 2 Reduction in total regulated emissions by 35% with net zero requirements with the use of Borough offsetting schemes
Camden Local Plan, Policy CC1 Section 8.11: 20% carbon reduction from onsite renewable generation with monitoring of those systems
London Plan, Policy SI 3 Masterplans to ensure most effective energy supply options, allowing connection to future offsite heat networks
London Plan, Policy SI 2 Where zero-regulated operational carbon target cannot be fully achieved on-site, any shortfall should be provided through either cash in lieu payments or off-site. At price of £95/tonne for 30 years

A summary of the key development commitments for operational energy and carbon are outlined below. See the Energy Strategy document produced by Hoare Lea as part of this application, for more detail.

Table 4-2 Key development operational energy and carbon KPIs

Key Development KPIs
All-electric strategy to deliver heating, cooling and hot water demands (i.e. no on-site combustion)
13% regulated carbon reduction from energy efficiency measures alone ('Be Lean' – Residential) (Detailed Proposals) 17% regulated carbon reduction from energy efficiency measures alone ('Be Lean' – Non-Residential) (Detailed Proposals)
68% regulated carbon reduction ('Be Green' – Residential) 35% regulated carbon reduction ('Be Green' – Non-Residential)
645m2 of roof area for solar PV, reducing CO2 emissions by 2.6%
Zero Carbon through offsetting to local Camden decarbonisation projects.

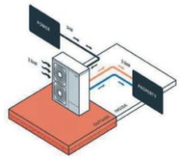
See the Energy Strategy for further details on the proposed operational energy and carbon strategy for the scheme.

Fabric first approach providing the most robust and effective measures for reducing CO2 emissions. Providing a development that is both comfortable for occupants and addresses issues such as fuel poverty through reduced running costs.

Maximised PV provision on the roofs to provide renewable energy on site

67% site wide carbon reduction over Part L baseline for detailed elements

All electric strategy from air source heat pumps per plot, to deliver heat across the site, making significant savings in carbon emissions and improving on-site air quality.



Plant space allocation at Roof Level

1. Satellite dishes and aerials
2. Air source heat pumps
3. Smoke extracts
4. PV panels

5 Climate Change Resilience

This means ensuring the masterplan is prepared for and resilient to the shocks and stresses that may be anticipated with forecast changes in the future climate. This section looks to set targets across topics outlined in the DEFRA UK Climate Change Risk Assessment 2017; including heat stress, food supply, disease response, natural capital and water stress and flood risk.

Table 5-1 Climate Change Resilience Policies

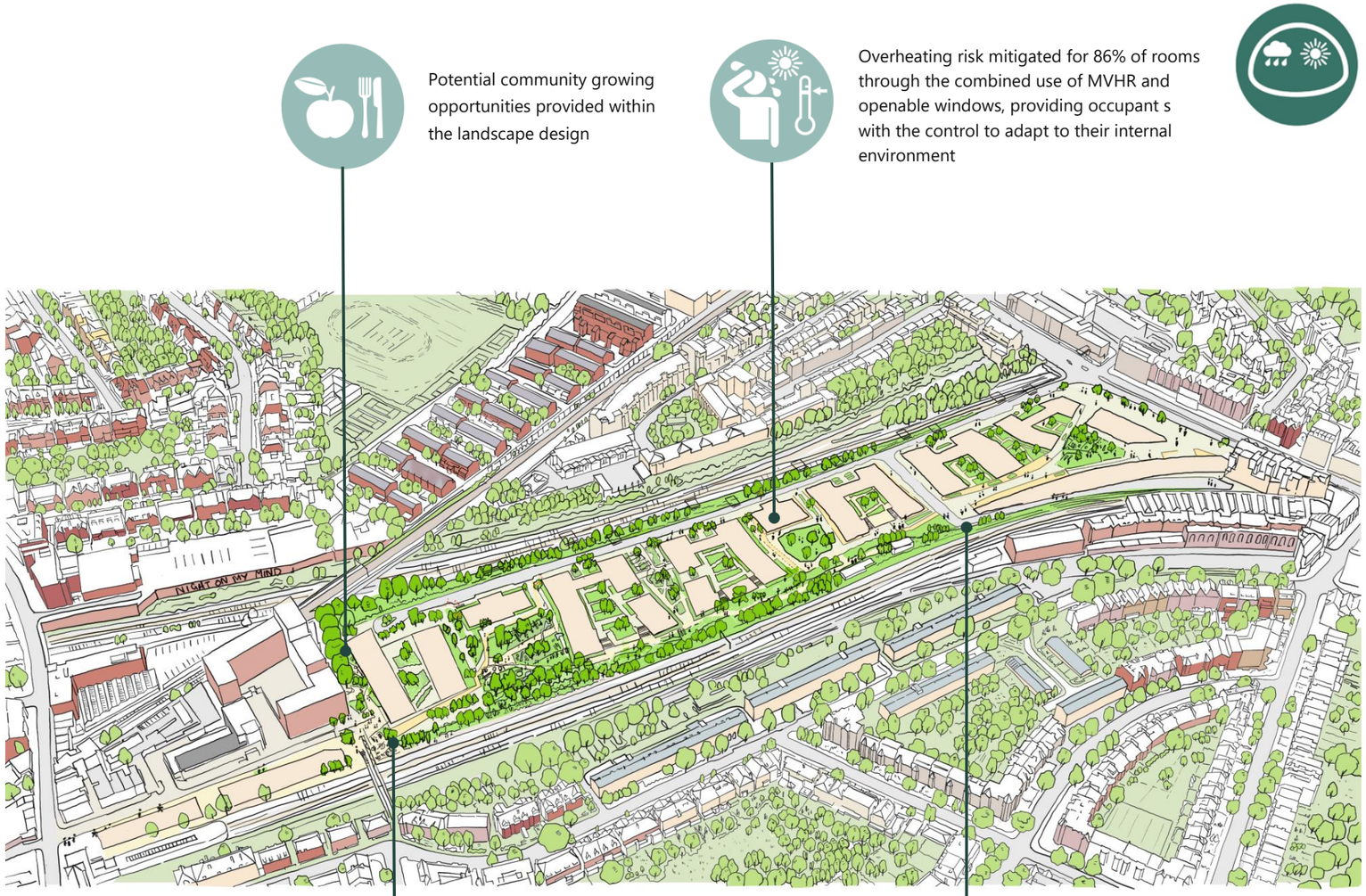
Policy
London Plan, Policy SI 4 Energy strategy to reduce risk of overheating following cooling hierarchy. TM59 methodology and TM49 for future climate
Camden Local Plan, Policy CC2 Adopt measures to reduce impact of urban and dwelling overheating, including application of the cooling hierarchy. Dynamic thermal modelling to demonstrate the risk of overheating has been mitigated.
London Plan, Policy G 8 To provide space for individual or communal food growing, where possible and appropriate.

A summary of the key development commitments for climate change resilience are outlined below.

Table 5-2 Key development operational energy and carbon KPIs

Key Development KPIs
Overheating Risk reduction strategies implanted in building design to meet CIBSE TM59 and BREEAM Hea04 requirements for current and future climate change scenarios to 2040.
Holistic SuDs strategy implemented with a 40% additional rain fall allowance for climate change
On-site food growing opportunities worked into landscape design
Outdoor, meeting/ retail/restaurant spaces in proposals to reduce risk of disease spread
Tree planting strategies designed to mitigate wind, provide shelter for visitors and shade through varied canopy heights and species selection

See the Energy Strategy, SudS, and Landscape strategies for further details on the proposed climate change resilience strategy for the scheme.



6 Biodiversity improvements

Within the context of the biodiversity crisis, increasing the abundance and diversity of plant and animal species appropriate to local ecology is one of the key areas for the O2 Finchley Road development. Landsec and East have worked with the London Wildlife Trust to improve on the biodiversity gain of the area as well as how the site users will positively engage with the site, through nature. The planning policies relevant to Biodiversity are outlined in Table 6-1 below.

Table 6-1 Biodiversity Policies

Policy
London Plan, Policy G 6 Developments should aim to secure net biodiversity gain
Camden Local Plan, Policy A3 Protect existing features of biodiversity value, and improve green corridors, assess opportunities to realise benefits for biodiversity
London Plan, Policy G 7 Existing tress of value retained. Additional trees to be planted with preference of large canopies. Tree replacement valuation method to use: CAVAT or i-Tree Eco or similar.
Camden Local Plan, Policy A3 incorporate additional trees and vegetation wherever possible.
London Plan, Policy G 5 Aim for and Urban Greening Factor of 0.4 in line with GLA London Plan
Camden Local Plan, Section 6.69 Opportunity to provide and/or enhance green corridors along railway lines

A summary of the key development commitments for biodiversity are outlined below.

Table 6-2 Key development biodiversity KPIs

Key Development KPIs
Biodiversity net gain of ~165% site wide
50% native species within the landscape design
Urban Greening Factor of 0.33 (for overall site)
~28.5% of total site to be Parks, squares and play space
~5,700m^2 of green roofs across the site

See the Ecological Appraisal, Arboricultural Impact Assessment, and Biodiversity Net Gain Assessment for further details on the proposed biodiversity strategy for the scheme.

There are minimal existing features of biodiversity value on site presenting a great opportunity for improvement and creation of green corridors

Other features include:

- Seasonal planting palette and habitats for a holistic all-year around landscape
- Inclusion of amenity grassland and 'run-over' grass crates as well as tall grass, wild grass and wildflowers
- Sustainable drainage and blue roofs across the site
- Seasonal swales
- Non-accessible biodiversity pockets to enhance ecological habitats

7 Water and Surface Water Run-off

This means designing the masterplan to consume less potable water on-site, both inside the buildings and in public realm irrigation; through reducing demand and maximising recycling. It also means increasing the site resilience to surface water flooding. Both through reducing impact on the site and managing surface water run-off in a smarter way before discharging into the sewer.

Table 7-1 Water and Surface Water Run-off policies

Policy
Camden Local Plan, Policy CC3 Residential: Incorporate water efficiency measures and achieve 105 litres per person per day (excluding external water use) Include a grey water and rainwater harvesting system unless it is not feasible or practical
London Plan, Policy SI 5 Commercial: achieve minimum of BREEAM 'excellent' standard for the 'Wat 01' water category or equivalent
Camden Local Plan, Policy CC3 5 litres per person per day for external water consumption and irrigation
London Plan, Policy SI 12 Use Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment
Camden Local Plan, Policy CC3 Consider the impact of development in areas at risk of flooding, and incorporate flood resilient measures
London Plan, Policy SI 13 Should aim to achieve green field run-off rates with a minimum requirement of 50% of the existing run off rate.
Camden Local Plan, Policy CC3 Avoid harm to the water environment and improve water quality

A summary of the key development commitments for water and surface water run-off are outlined below.

Table 7-2 Key development water and surface water run-off KPIs

Key Development KPIs
<105 l/p/d residential water consumption
Landscape design incorporating drought resistant planting and careful water management to reduce irrigation needs
Integrated SuDs strategy with natural landscaped areas, to reduce tanked storage.
~5,700m^2 of green roofs across the site
44% of the open space will include permeable areas or permeable paving
Run off rates <50% of existing site rate

See Flood Risk Assessment Report (104878-PEF-ZZ-ZZ-RP-D-100009) for detailed flood mitigation strategy and associated drawings.

Please refer to the landscaping strategy for permeable areas and associated drawings.

8 Health, Safety and Wellbeing

This means improving the mental and physical wellbeing of site visitors, site users, and site residents as well as the wider community. The ambition is to minimise the impacts of external factors on health and wellbeing of site users as well as providing positive stimuli to allow site users to flourish in their daily lives.

Table 8-1 Health and Wellbeing Policies - Buildings

Policy
London Plan, Policy D 6 Maximise dual aspect dwellings for benefits of passive ventilation, daylight and avoiding overheating. New and surrounding housing to have sufficient daylight and sunlight whilst avoiding overheating, minimising overshadowing, and maximise usability of outside amenity space
London Plan, Policy D 13 New noise-sensitive development including housing where possible to be separated from existing noise-generating businesses and uses
London Plan, Policy D 14 Improve and enhance acoustic environment and promoting appropriate soundscapes including Quiet Areas and spaces of relative tranquillity
Camden Local Plan, Policy A4 Noise attenuation measures to be provided to protect development sensitive to noise
Camden Local Plan, Policy A1 Acoustic report to be submitted in line with Council Amenity Guidance document
Camden Local Plan, Policy H8 Ensure sufficient supply of housing for vulnerable people. The council may seek affordable housing for vulnerable people as part of the affordable housing contribution from developments
Camden Local Plan, Policy C2 Community facilities and services will need to be developed and modernised to meet the change in needs of the community post-development i.e. the increase in school age children and pressures on local schools due to population growth of occupants

A summary of the key development commitments health and wellbeing are outlined below.

Table 8-2 Key development health and wellbeing KPIs - Buildings

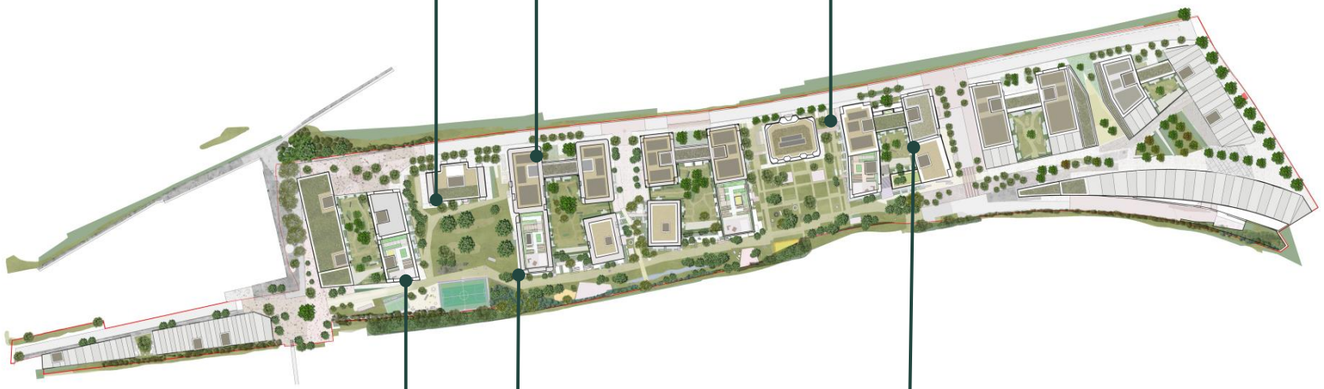
Key Development KPIs
90% of the low-cost rent units, are dual aspect dwelling in detailed elements
Providing ~19,500 sqm of community floor space, including new health centre
35% affordable housing with 60% Low-Cost Rent and 40% Intermediate by habitable room. In line with Policy H7 (Affordable Housing Tenure) of the London Plan (2021).
Scheme to include new multi-disciplinary health centre.
Mechanical ventilation included to manage overheating risk when acoustic conditions require.

Buildings

Massing maximises number of dual aspect homes in detailed application to take advantage of opportunities of daylighting and passive ventilation opportunities.

Meeting optimum indoor acoustic requirements in line with AVO guidance to balance risks across acoustics, ventilation, and overheating

Internal layouts and masterplan facilities designed to encourage physical activity in line with WELL standards through active frontages and exterior active design, cycling and pedestrian routes



Overheating risk mitigated for 86% of rooms through the combined use of MVHR and openable windows, providing occupant s with the control to adapt to their internal environment

Providing ~19,500 sqm of community/ commercial floor space, including a new health centre

Achieve highest standards of inclusive and accessible design. Including for residents who were previously homeless, families, younger and older generations

Table 8-3 Health and Wellbeing Policies – Public Realm

Policy
London Plan, Policy G 6 Developments which reduce deficiencies in access to nature should be considered positively
Camden Local Plan, Policy A3 Increase engagement with nature
London Plan, Policy D 5 Achieve highest standards of accessible and inclusive design, inclusive design statement to be included within Design and Access Statement, ensured involvement of local communities in panning polices
London Plan, Policy G 8 Provide land for food growing to support creation of a healthier food environment

A summary of the key development commitments health and wellbeing are outlined below.

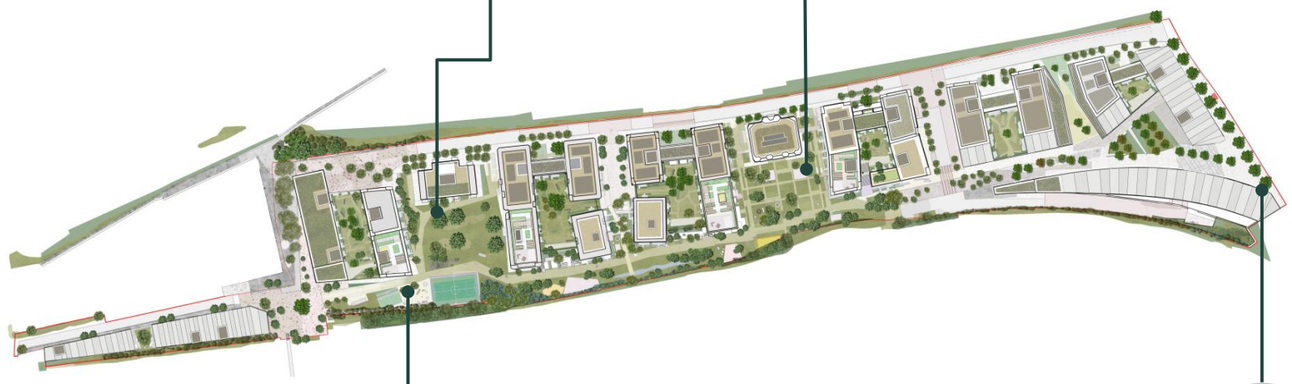
Table 8-4 Key development health and wellbeing KPIs – Public Realm

Key Development KPIs
Areas in public gardens for community food growing spaces
Increase in greening on site equating to an UGF of 0.33
Employment opportunities in construction and end-use playing a significant factor in making it easier to pursue a healthy lifestyle.
The scheme to increase access to nature and green spaces.
Dedicated play space ensuring open, inclusive provision for all children.

Public realm

Increased green space and interaction with nature through integrating social prescribing opportunities, outlined in the NHS Social Prescribing Framework,

Patchwork approach to community garden square to allow for local stewardship for public realm.



A welcoming safe environment created through security measures such as vehicular access and movement control, surveillance of key areas, public realm lighting for active and natural surveillance, and operational security management

Dedicated play space provided across the site for children ages 0-4 years old, 5-11 years old, and youth spaces including a non-standard MUGA on the southern edge of the site, ensuring open and inclusive provision for all children

9 Mobility & Active Travel

This means the masterplan is designed to minimise the use of private fossil fuel transport from the site visitors, residents, deliveries and users. This is to be achieved by encouraging and increasing the use of public transport and sustainable forms of private transport, cycling, walking or non-emitting vehicles.

Table 9-1 Mobility Policies

Policy
Camden Local Plan, Policy T2 All new developments to be car free
London Plan, Policy T 5 Cycling provision: 1 space per studio or 1-bedroom dwelling 1.5 spaces per 2-person 1-bedroom dwelling 2 spaces per all other dwellings Non-residential spaces in line with Table 10.2 in London Plan
London Plan, Policy T 6 parking spaces to have infrastructure for electric vehicles 20% active charging and 80% passive charging

A summary of the key development commitments for mobility are outlined below.

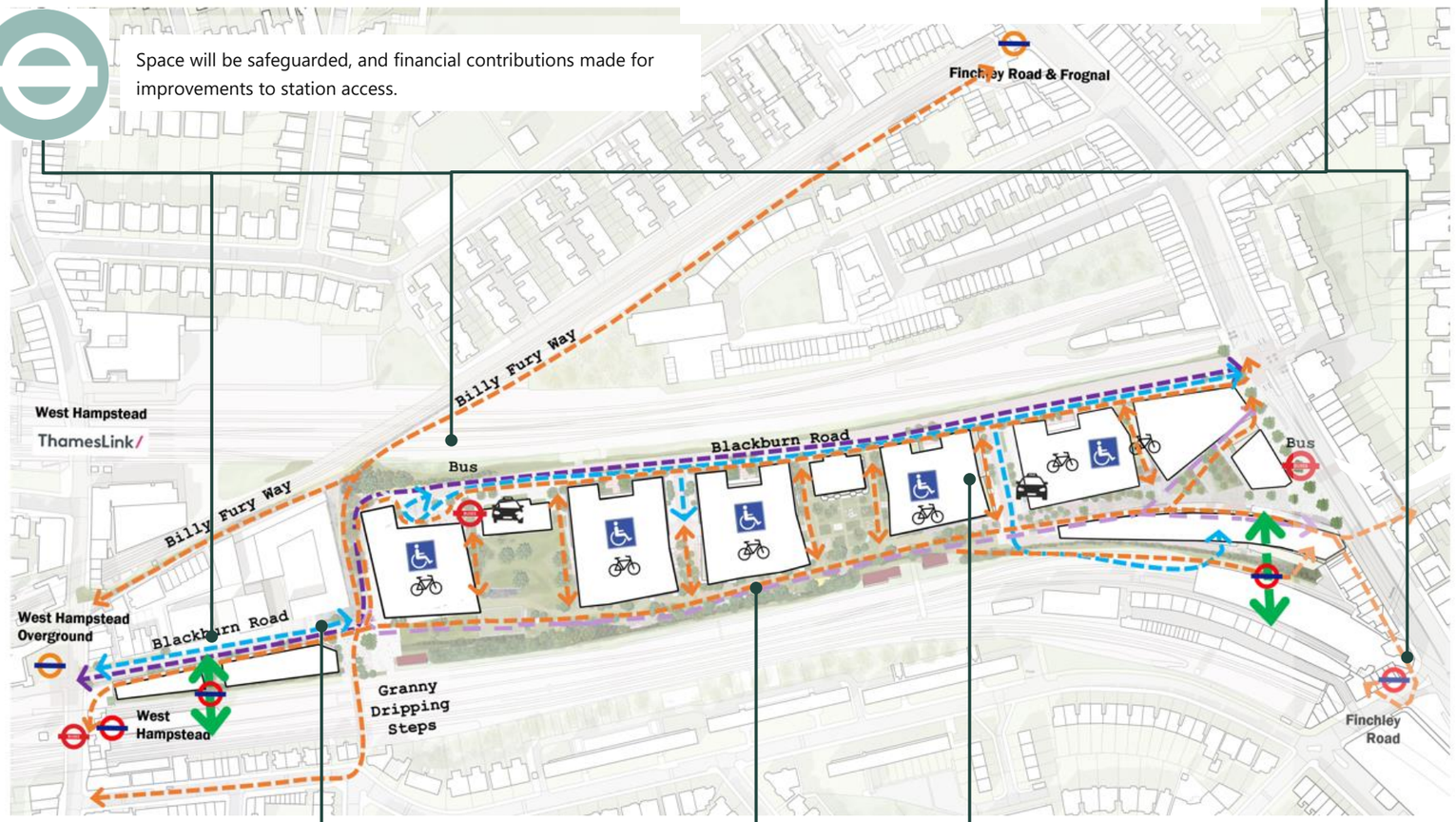
Table 9-2 Key development mobility KPIs

Key Development KPIs
Car free development (no on-site parking for residents, apart from blue badge)
3% of homes to have blue badge parking on site
Segregated vehicular access from pedestrian routes
Dedicated cycle routes
Significant cycle storage across the site for residents and visitors
Dedicated pedestrian access from West End lane to Finchley Road
20% active, 80% passive residential electric car charging points
PTAL rating of 6 for the majority of the site
Detailed plots have 1064 long-stay cycle parking spaces and 100 short-stay cycle parking spaces, with the outline elements meeting London Plan policy.
Pick-up and drop-off points made available within the site for occasions when taxi or private hire vehicle access is required.

The proposed development will be largely car free in line with Camden local plan, allowing for residents and visitors to access the site by walking and cycling more freely.

The Public Transport Accessibility Level (PTAL) of the proposed development scores 6a and 6b across the whole site, reflecting the highest levels of accessibility possible, and the great connections provided via London buses, underground and overground lines

Space will be safeguarded, and financial contributions made for improvements to station access.



A new east-west step-free pedestrian and cycle-only route will be created through the southern part of the site linking the western part of Blackburn Road with Finchley Road. Increasing the permeability and enabling access to commercial units and onwards access to other key destinations in the area.

Parking only for blue badge holders. 20% of car parking spaces will have electric vehicle charging points from the outset with all remaining having passive provision for the future

10 Air Quality

This means reducing the impact the development has on the air quality of the wider community, from air pollutants, Nitrous Oxide, Carbon Monoxide, Carbon Dioxide, PM 2.5 and PM 10. It also aims to maximise positive air quality, providing clean air externally and internally across the site.

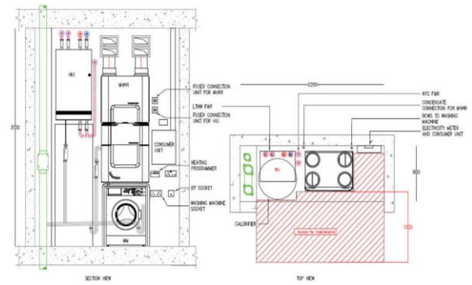
Table 10-1 Air Quality Policies

Policy
Camden Clean Air Action Plan 2019-2022 Comply with Non-Road Mobile Machinery Low Emission Zone (NRMM) and reduce emissions from the demolition and construction of buildings
Camden Local Plan, Policy CC4 Air Quality Assessment required with any negative impacts mitigated for construction and earthworks
London Plan, Policy SI 1 Seek and deliver further improvements to air quality. Be at least 'Air Quality Neutral' and to show how proposals have considered ways to maximise benefits to local air quality, and b) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.
London Plan, Policy SI 1 Environmental Impact Statement to consider how local air quality across Masterplan can be improved including what design features will be put in place.

A summary of the key development commitments for air quality are outlined below.

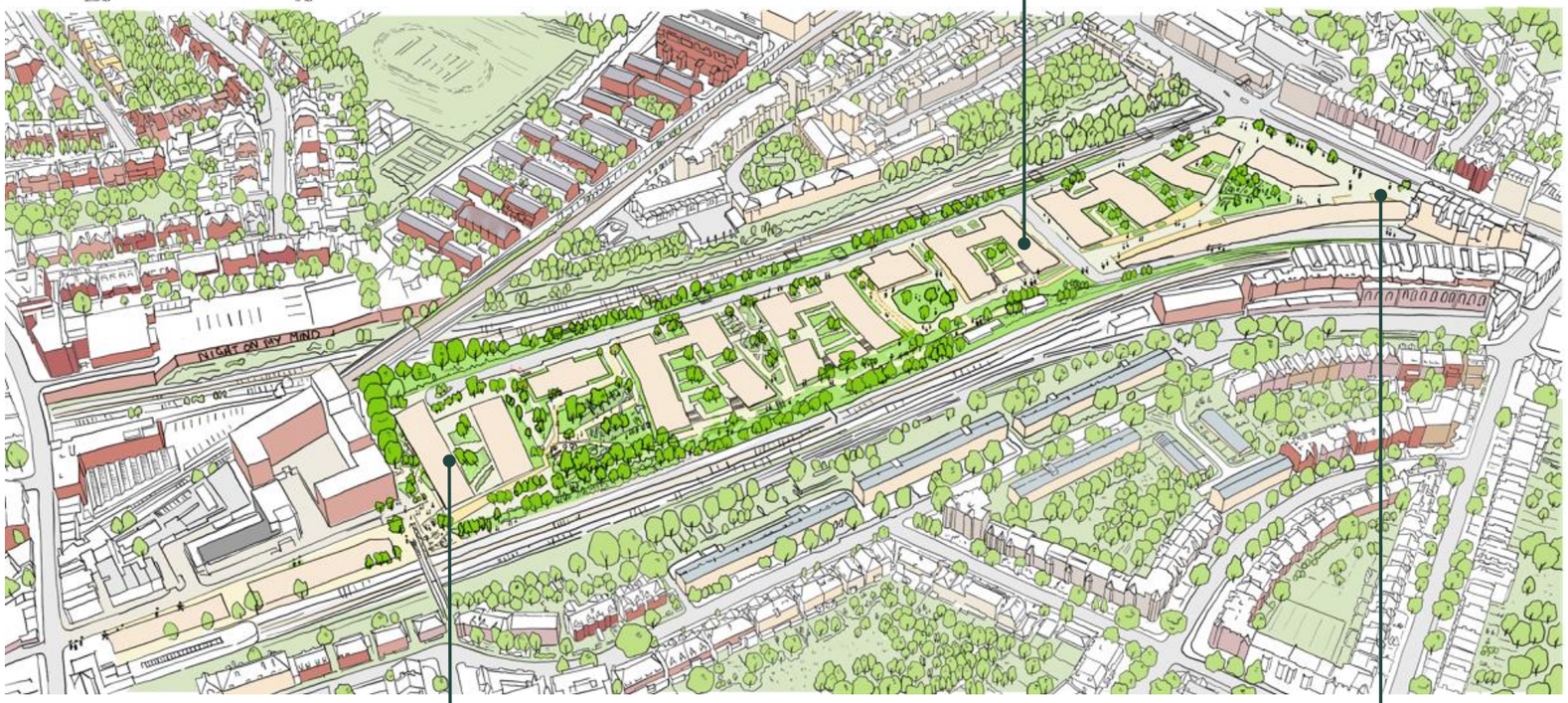
Table 10-2 Key development air quality KPIs

Key Development KPIs
An all-electric energy strategy ensuring good local air quality ensuring an air quality neutral site.
Car-free development reducing vehicle movements on site and on local roads, resulting in reduced emissions on-site.
Ventilation strategy combining MVHR and openable windows to allow for purge ventilation providing occupants with control over their internal environments.
Contractors will be required to connect to electricity grid for onsite energy use avoiding diesel, minimising emissions from onsite machinery.
New open and green spaces across the site acting as green lungs for the community.
During construction recommendations and mitigation measures will be put in place to minimise impacts on air quality from demolition and construction works. Including adoption of a Construction Management Plan (CMP), and Construction Logistics Plan (CLP).



Ventilation provided by MVHR units for all homes, to provide background fresh air without the need to open windows. System filters incoming air to provide cleaner air all year round.

No combustion on site, and contractors will need to connect to electricity as soon as possible on site to minimise emissions from on site machinery



Car-free development reducing emissions on-site from combustion of fossil fuel, and encourage the increased use of public transport

All electric strategy to deliver heat across the site, making significant savings in carbon emissions

11 Embodied Carbon, Circular Economy, Material Efficiency & Waste

Embodied Carbon means reducing the emissions associated with the construction of the buildings. This includes targets from Cradle to Practical Completion, including supply chain emissions arising from extraction of resources, manufacture of products, transportation, and assembly of a building. The design considers the emissions associated with maintenance and replacement, developing strategies to minimise these through the life cycle. See the Circular Economy Statement for more detail.

Circular Economy and material efficiency means we reduce the amounts of resources we use, increasing the proportion of recycled content as well as the amounts of materials reused and thinking about the end of life of products. The ultimate goal is to design out waste, keeping products in use so that nothing goes to waste.

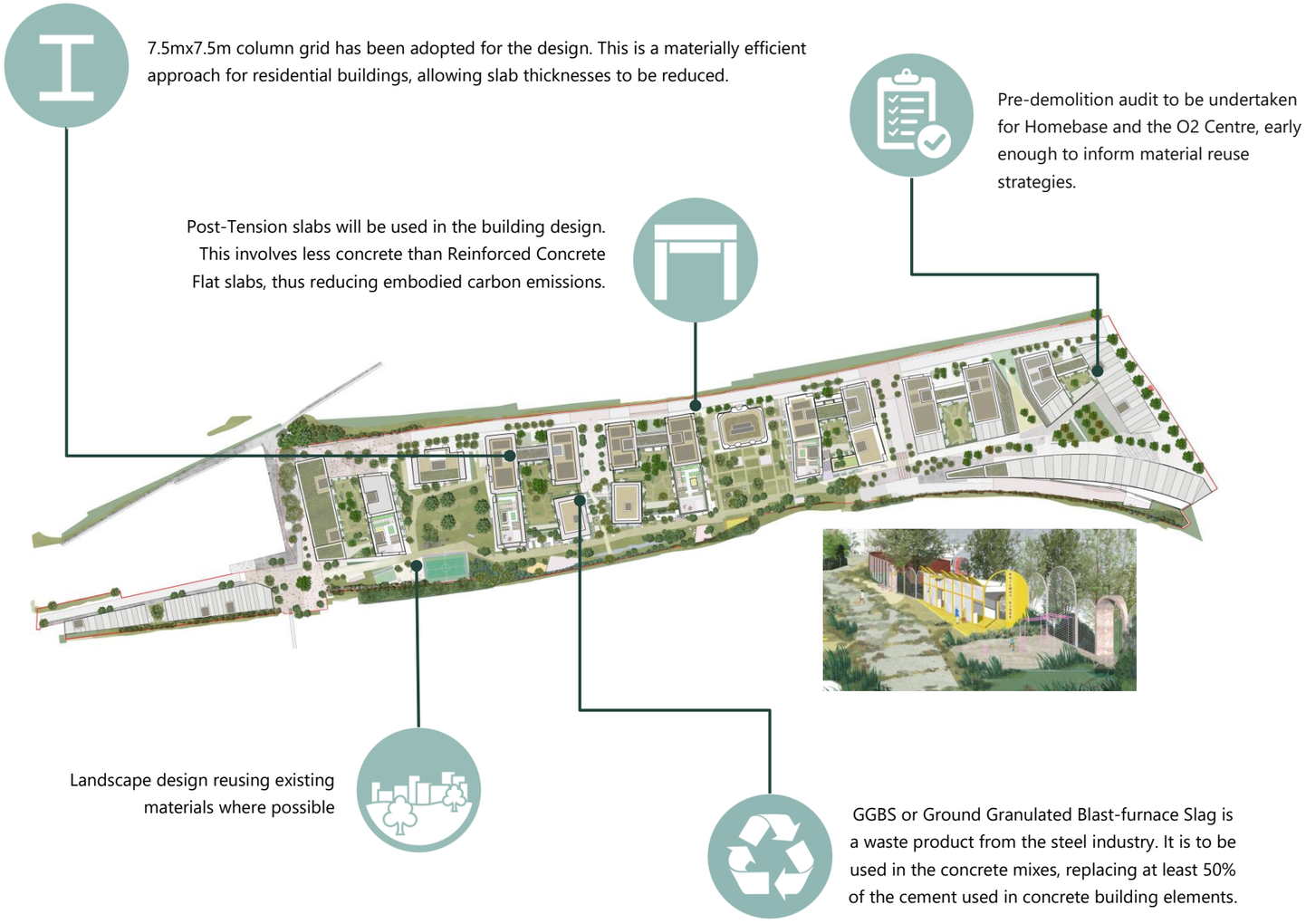
Table 11-1 Embodied Carbon, Circular Economy, Material Efficiency & Waste Policies

Policy
London Plan, Policy SI 2 (F): Whole Life Carbon Assessment Calculate and reduce whole life-cycle carbon (WLC) emissions
London Plan, Policy SI 7 Undertake a Circular economy statement pre-applying with updates at pre-commencement in line with GLA guidance. Updates to be made at each Reserved Matters Application.

A summary of the key development commitments for embodied carbon, circular economy & material efficiency are outlined below.

Table 11-2 Key development embodied carbon, circular economy & material efficiency KPIs

Key Development KPIs
Embodied carbon targets to be set in line with the Landsec Net Zero Carbon Strategy. This will reduce over time as future phases are brought forward. Detailed plots currently close to aligning with these targets as well as GLA 2030 aspiration targets. See Section 13 for further information.
Overall site wide targets for excavation waste, demolition waste and construction waste - Minimum 95% (by tonnage) to beneficial use/diversion from landfill in line with policy and BREEAM
Onsite retention and reuse of deconstruction material from Homebase and O2. Minimum target: >50% of the embodied carbon of the O2 centre retained, reused or recycled on site.
Stretch target: >70% of the embodied carbon of the O2 centre retained, reused or recycled on-site or near site (i.e. within London). Elements used offsite to be reused/recycled for 'useful' purposes, rather than recycling to base materials.
Minimum ambition to supply all new building elements with 20% reused material, in line with GLA Circular Economy requirements.
Pre-demolition audit to be undertaken for the Homebase at pre-commencement and for the O2 centre at the time of future RMA submissions.
Site waste to be managed in line with the Site Waste Management Plan
Residential operational waste storage to be provide sufficient capacity for the following weekly, dwelling waste generation rates: • 120 L general waste storage • 140 L mixed dry recycling • 23 L food waste The development is to also provide a flexible space to allow for changes in future needs and adapt to changes in demand.
Each group of residential cores will be provided with 7.5m² of bulky waste storage.



12 Social Value

This means unlocking value to the wider community through identifying opportunities throughout the design and construction process to improve health, wellbeing, resilience, and safety. These principles help reduce inequalities in health, education and social justice.

Table 12-1 Social Value Policies

Policy
London Plan (2021) Policy H4 (Delivering Affordable Housing): 50% of all new homes to be affordable
London Plan (2021) Policy H6 (Delivering Affordable Housing): Threshold approach to affordable housing: 30% of affordable homes should be low-cost rent (London Affordable Rent of Social Rent), 30% Intermediate, and 40% to be agreed with the borough based on identified need.
Camden 2025 Call to action 1: everyone in Camden should have a place they call home No one sleeping on the street Create mixed and integrated communities
Camden 2025 Call to action 2: Growth in LBC should be strong and inclusive – everyone should be able to access the work that is right for them
Camden 2025 Call to action 3: should be safe, strong and open and everyone should be able to contribute to their community
Camden 2025 Call to action 4: Camden should be clean, vibrant and sustainable place Parks and open spaces will be exciting, welcoming and safe Fortune Green & West Hampstead NP: Local residents should be involved in the management of existing and new green/open spaces
Camden 2025 Call to action 5: Should be able to live a healthy and independent life Safe homes and safe parks and open spaces

A summary of the key development commitments for social value are outlined below.

Table 12-2 Key development social value KPIs

Key Development KPIs
35% Affordable Housing (by habitable room and GIA floorspace)
Provision of new health centre, community floor space and creche
Delivery of public realm across over 50% of the total site including landscaped public realm, play spaces, natural green spaces, and community gardens
A public art strategy and public events programme – curation and delivery to be secured through the Estate Management Plan
Long-term commitment by the Applicant to act as a steward for the site including its services secured through the Estate Management Plan and Community Charter

See the O2 Social Value Framework and Affordable Housing Statement for further details on the proposed social value strategy for the scheme.

35% Affordable Housing, of which 60% will be low-cost rent and 40% intermediate

Public realm across 50% of the total site including landscaped public realm, play spaces, natural green spaces

Providing ~19,500 sqm of community/ commercial floor space, including a new health centre

Public art strategy and Public events programme with the curation and delivery to be secured through the Estate Management Plan

13 Whole Life Carbon of new development

As per the GLA London Plan Policy SI 2, 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. This section outlines the expected Whole Life carbon emissions as per the guidance.

At this stage of the design, limited information is available on product specification. As a result, a Whole Life Carbon Assessment was undertaken, using OneClick LCA with:

1. Building specific inputs where known
2. OneClickLCA inputs used where unknown;
3. Further gaps filled with industry data or previous Landsec and Buro Happold studies
    a. Internal walls and doors
    b. FFE
    c. MEP
    d. Roof coverings
    e. Internal finishes
    f. Element lifespans
    g. Façade material constructions

13.1 Introduction

This section details the initial whole life-cycle carbon assessment of the Proposed Development in accordance with the British Standard BS EN15978:2011 (Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method), and the RICS Professional Statement 'Whole life carbon assessment for the built environment 2017'. Furthermore, the guidance set out by the Mayor of London – Whole Life-Cycle Carbon Assessments guidance – Pre-consultation draft (April 2020) was adopted for this assessment.

Life Cycle Assessment is a standardized methodology for assessing the environmental impacts of a product or system, which considers its entire life cycle, from raw materials extraction, through product manufacturing, to the use of the product and the end of life treatment and disposal. In the case of this study the examined product is the Proposed Development. This OneClick LCA study complies with elements of the BREEAM NC 2018 requirements and thus can be used for the pursuit of the design options appraisal credits during the Concept Design Stage for the superstructure, substructure and the Life Cycle Cost comparison credit. All calculations were performed using One Click LCA tool. The software has been approved by BRE for the options appraisal credits in Mat 01 for BREEAM NC 2018.

13.2 Embodied Carbon Background

Whole life-cycle carbon emissions are the total greenhouse gas emissions arising from a development over its lifetime, from the emissions associated with raw material extraction, the manufacture and transport of building materials, to installation/ construction, operation, maintenance and eventual material disposal.

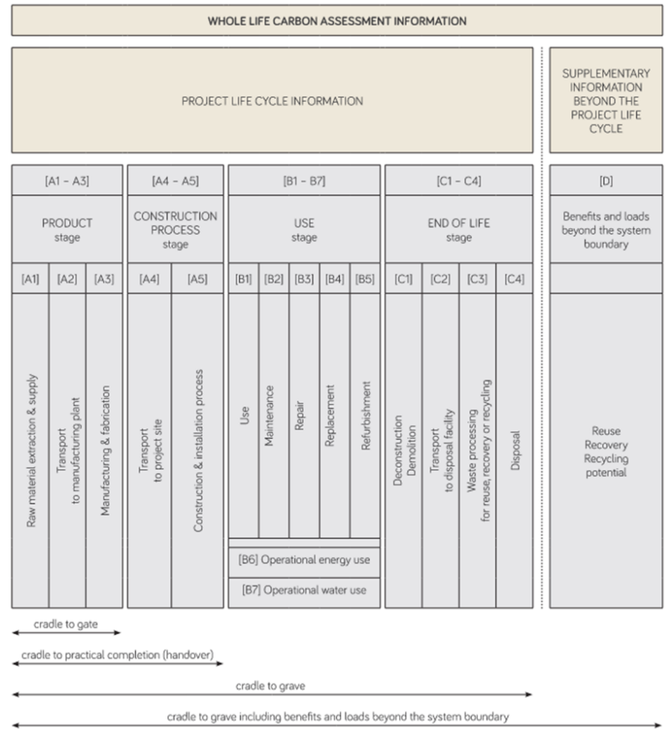
Operational carbon emissions will make up a declining proportion of a development's whole life carbon emissions as operational carbon targets become more stringent. To fully capture a development's carbon impact, a whole life-cycle approach is needed to capture its unregulated emissions (i.e. those associated 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 and eventual deconstruction and material disposal).

Development proposals referable to the Mayor of London 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. (London Plan Policy SI2)

To provide a holistic view of the Global Warming Potential (GWP), the whole life carbon assessment accounts for all components relating to the project during all life stages.

Embodied Carbon emissions are attributed to four main categories taken from BS EN 15978. The categories are:

- Product Stages (module A1 to A3): The carbon emissions generated at this stage arise from extracting the raw materials from the ground, their transport to a point of manufacture and then the primary energy used (and the associated carbon impacts that arise) from transforming the raw materials into construction products.
- Construction (module A4 to A5): These carbon impacts arise from transporting the construction products to site, and their subsequent processing and assembly into the building.
- In-Use Stages (module B1 to B5): This covers a wide range of sources from the embodied carbon emissions associated with the operation of the building, including the materials used during maintenance, replacement and refurbishment.
- End of Life Stages (module C1 to C4): The eventual deconstruction and disposal of the existing building at the end of its life takes account of the on-site activities of the demolition contractors. No 'credit' is taken for any future carbon benefit associated with the reuse or recycling of a material into new products.



13.3 Approach

13.3.1 Collation of data

The assessment required collation of the most up-to date and representative data available during this stage of design for the masterplan elements being submitted for detailed planning. For the O2 Finchley Road development, this considers Plots N3E, N4 and N5, as well as the hard landscaping works across the site. This process involved the collection of data from the design team and cost consultants on their latest designs and specifications, as well as the use of benchmarks, previous Buro Happold project experience and industry guidance where this information was not available.

The remaining elements of the masterplan, which are to be submitted for outline planning, did not have the detailed material quantities required for such an assessment. The whole life carbon quantities were therefore derived through the use of benchmarks taken from Appendix 2 in the GLA Whole-Life Carbon Assessments Guidance (April 2020) document. Where certain use types present in the development proposal were not available as benchmarks (e.g. car parks & service yards), the retail benchmark was used to represent these.

13.3.2 LCA scope and service life

The following life cycle stages were included in this assessment according to EN 15804:

- A1-A3 Manufacturing of construction materials
- A4 Transportation to site
- A5 Site works
- B1-B5 Maintenance and material replacements
- B6-B7 Operational energy and water use
- C1-C4 Deconstruction
- D Reuse, recovery and recycling potential (not included in totals)

Building elements

The study conducted on Plots N3-E, N4, N5 and External Works (detailed), included the following building elements:

Element	Sub-element	In scope	Out of scope
Demolition/ Facilitating works		Formwork	Demolition of existing structures
Substructure		Included	-
Superstructure	Frame	Included	-
	Upper floors	Included	-
	Roof	Included	-
	Stairs	Included	-
	External wall	Included	-
	Windows and external doors	Included	-
	Internal walls and partitions	Included	-
External works		Hard Landscaping materials & associated subbases	External furniture and fixtures
Services		Included	-
Internal finishes		Included	-
Fittings, furnishing and equipment		Included	-
Construction Works		Included	-

13.3.3 LCA software

The software used in this study was One Click LCA. The software has been third party verified for compliancy with the following LCA standards: EN 15978, ISO 21931–1 and ISO 21929, and data requirements of ISO 14040 and EN 15804.

13.3.4 Baseline building

The baseline building was based on the Mayor of London's Whole Life-Cycle Carbon Assessments guidance's WLC benchmarks and the relevant tables are depicted in the figures below. The use typology selected was 'Apartment buildings & hotels', to be compared with Plots N3-E, N4 and N5 (detailed). These are mixed use buildings however the non-residential areas only constitute the ground floors and therefore the design and structural loading is defined for a residential building.

	Hilson Moran (no data)		etool average		One Click average (113 buildings)		Cundall average (6 buildings)					
	Apartment buildings & hotel		Apartment buildings & hotel		Apartment buildings & hotel		Apartment buildings & hotel		Apartment/hotel WLC benchmarks		Apartment/hotel aspirational WLC benchmarks	
	Carbon at Completion (A1-A5)	Carbon Over Life Cycle	Carbon at Completion (A1-A5)	Carbon Over Life Cycle	Carbon at Completion (A1-A5)	Carbon Over Life Cycle	Carbon at Completion (A1-A5)	Carbon Over Life Cycle	Carbon at Completion (A1-A5)	Carbon Over Life Cycle	Carbon at Completion (A1-A5)	Carbon Over Life Cycle
Substructure	-	-	541	416	440	60	218	21	750 to 850 kg CO_2e/m^2 GIA	300 to 400 kg CO_2e/m^2 GIA	450 to 500 kg CO_2e/m^2 GIA	180 to 240 kg CO_2e/m^2 GIA
Superstructure							484	139				
Finishes							61	65				
FFE							9	10				
Services							96	102				
External works							12	8				
Total	-	-	541	416	440	60	880	346				

Figure 13-1 WLC benchmarks (excluding modules B6, B7 and D) – Apartment buildings & hotels, source: Mayor of London's Whole Life-Cycle Carbon Assessments Guidance Document

13.3.5 Assumptions

The following are key assumptions made during the life cycle assessment conducted for the detailed elements of the O2 Finchley Road development.

Building Element	Assumption
Foundations & Lowest floors	Based on latest structural design information
Ground slabs	
Floor slabs	Based on latest structural design information
Columns	Based on latest structural design information
Load bearing int walls	Based on latest structural design information
Balconies	Quantities taken from Cost Plan. A Generic EPD was used to represent these in OneClick LCA.
Staircases	Based on latest structural design information
External walls	Quantities taken from Cost Plan. General façade compositions produced by Buro Happold were used to represent these in OneClick LCA.
Windows	Quantities taken from Cost Plan.
External doors	Quantities taken from Cost Plan.
Roof slab	Based on latest structural design information
Roofs	Quantities taken from Cost Plan. General roof compositions produced by Buro Happold were used to represent these in OneClick LCA. The calculations assumed 50% of roof area to be occupied by Green Roofs and the remaining 50% to be occupied by general paved roof space.

Internal walls	Quantities taken from Cost Plan. General internal wall and partitions compositions produced by Buro Happold were used to represent these in OneClick LCA.
Floor finishes	Quantities taken from Cost Plan. General finish types were selected by Buro Happold to represent these in OneClick LCA. TBC at later stages of design.
Ceiling finishes	
Wall finishes	
GFA (m^2)	Quantities taken from Cost Plan.
Building lifespan	60 years *(in line with best practice guidance)*

13.3.6 Options appraisal

The LCA undertaken for the Proposed Development, additionally comprised an options appraisal process in line with the BREEAM 2018 New Construction MAT01 methodology. This process required the review of different designs for superstructure, substructure and hard landscaping. The variation in the options comprised mainly of material changes rather than major updates to design, although differences in element dimensions, as a result of certain material changes, were considered. This process provides reasoning from an embodied carbon standpoint as to why certain strategies were selected ahead of others for the development.

The different options considered are listed below.

Substructure

- Option 1: Post-Tension Slab Structure
- Option 2: Reinforced Concrete Flat Slab Structure
- Option 3: Post-Tension Waffle Slab Structure
- Option 4: Post-Tension Ribbed Slab Structure
- Option 5: Composite Metal Deck Structure

Substructure & Hard Landscaping

- Option 1: Post-Tension Slab Substructure
- Option 2: Reinforced Concrete Flat Slab Substructure
- Option 3: Post-Tension Waffle Slab Substructure
- Option 4: Post-Tension Ribbed Slab Substructure
- Option 5: Composite Metal Deck Substructure

The ambition of this process is to identify where substantial savings in embodied carbon can be made and how this can be integrated within the developments' design.

13.4 Results

13.4.1 Overall Development

The following table shows the outcomes from the Whole Life-Cycle Carbon Assessment for the entire O2 Finchley Road development. This includes both the plots being submitted for detailed and outline planning, as well as the Hard Landscaping within the development.

Table 13-1 Estimated WLC emissions of the detailed & outline planning elements

Estimated WLC emissions (Detailed & Outline elements)					
	Module A1-A5	**Module B1-B5**	**Module B6-B7**	**Module C1-C4**	**Module D**
TOTAL kg CO_2e	104,120,176 kg CO2e	81,297,313 kg CO2e	132,869,886 kg CO2e	1,676,509 kg CO2e	-37,707,590 kg CO2e
TOTAL kg CO_2e/m^2 GIA	548 kg CO2e/m2 GIA	428 kg CO2e/m2 GIA	700 kg CO2e/m2 GIA	9 kg CO2e/m2 GIA	-199 kg CO2e/m2 GIA

13.4.2 Outline Elements

The following table details the outcomes from the Whole Life-Cycle Carbon Assessment for the O2 Finchley Road, Outline elements only. This includes the following plots:

- N1-A,B & C
- N2-A & B
- S1-A,B,C & D
- N3-A,B,C & D
- N6
- N7-A & B
- S7

Due to the lack of detailed project design information currently available for these elements, the results derived for the detailed plots were scaled to calculate an estimated embodied carbon emissions figure, associated to these plots. This will be updated when these plots are submitted as part of a RMA.

Table 13-2 Estimated WLC emissions of the proposed building

Estimated WLC emissions (Outline elements)					
	Module A1-A5	**Module B1-B5**	**Module B6-B7**	**Module C1-C4**	**Module D**
TOTAL kg CO_2e	72,518,626 kg CO2e	56,696,849 kg CO2e	92,663,627 kg CO2e	1,169,200 kg CO2e	-26,297,321 kg CO2e
TOTAL kg CO_2e/m^2 GIA	548 kg CO2e/m2 GIA	428 kg CO2e/m2 GIA	700 kg CO2e/m2 GIA	9 kg CO2e/m2 GIA	-199 kg CO2e/m2 GIA

13.4.3 Detailed Elements

The following table details the outcomes from the Whole Life-Cycle Carbon Assessment for the O2 Finchley Road, Detailed elements only. This includes Plots N3E, N4, N5 and Hard Landscaping.

Table 13-3 Estimated WLC emissions of the proposed building

Estimated WLC emissions (Detailed elements)					
	Module A1-A5	**Module B1-B5**	**Module B6-B7**	**Module C1-C4**	**Module D**
TOTAL kg CO_2e	31,601,550 kg CO2e	24,600,464 kg CO2e	40,206,259 kg CO2e	507,310 kg CO2e	-11,410,269 kg CO2e
TOTAL kg CO_2e/m^2 GIA	550 kg CO2e/m2 GIA	428 kg CO2e/m2 GIA	700 kg CO2e/m2 GIA	9 kg CO2e/m2 GIA	-199 kg CO2e/m2 GIA

13.5 Results comparison to benchmark

As part of the GLA's WLCA guidance, benchmarks for current and aspirational performance have been set. The current benchmarks have been based on project assessments by Cundall and Targeting Zero, and have been cross referenced with data provided from Etool, OneClick LCA and Hilson Moran. The aspirational targets are based on a 40% reduction, which is in line with the World Green Building Council's target to achieve a 40% reduction in WLC emissions by 2030. It is recommended that these are used as a guide by applicants, with projects achieving higher results than those listed in the benchmarks being recommended to improve on current design strategies. The following section reviews the results of the site areas being submitted for detailed planning, compared to both the current and aspirational targets set for 'Apartments/Hotels' by the GLA.

To compare the WLC estimation results to the benchmark, modules A1-A5 and modules B-C (excluding B6 & B7) are compared with their respective breakdown of typical development's emissions by building element. The breakdown of the baseline modules is shown in the figure below.

Apartment/hotel

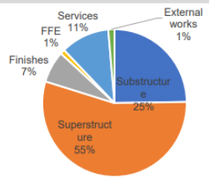
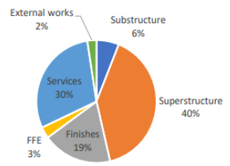
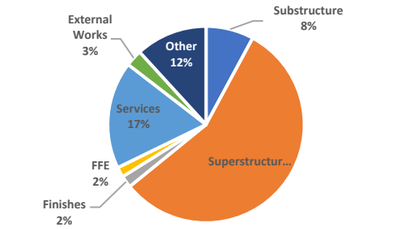
	WLC benchmark	Aspirational WLC benchmark	Breakdown of a typical development's emissions by building element category
Modules A1-A5	750 to 850 kg CO_2e/m^2 GIA	450 to 500 kg CO_2e/m^2 GIA	
Modules B – C (excluding B6 & B7)	300 to 400 kg CO_2e/m^2 GIA	180 to 240 kg CO_2e/m^2 GIA	

Figure 13-2 WLC benchmarks with the breakdown of building elements for modules A1-A5 and B-C (excluding B6 & B7)

In modules A1-A5 the largest embodied carbon contributors are the superstructure and substructure of the building with 55% and 25%, respectively. For modules B-C (excluding the operational energy and water use) the largest emission contributors are the superstructure and services with 40% and 30%, respectively.

The results for the proposed building's embodied carbon (modules A1-A5) Table 13-4 and Table 13-5 for B-C (exc. B6 & B7) are given in Table 13-4.

Table 13-4 WLC results with the breakdown of building elements for modules A1-A5

Building elements	WLC emissions total kg CO_2e	WLC emissions Total kg CO_2e/m^2 GIA	Modules A1-A5
Substructure	2,491,548 kg CO_2e	43 kg CO_2e/m^2 GIA	
Superstructure	17,779,314 kg CO_2e	309 kg CO_2e/m^2 GIA	
Finishes	621,369 kg CO_2e	11 kg CO_2e/m^2 GIA	
FFE	528,192 kg CO_2e	9 kg CO_2e/m^2 GIA	
Services	5,583,616 kg CO_2e	97 kg CO_2e/m^2 GIA	
External Works	870,790 kg CO_2e	15 kg CO_2e/m^2 GIA	
Other	4,597,512 kg CO_2e	65 kg CO_2e/m^2 GIA	
Total	31,601,550 kg CO_2e	550 kg CO_2e/m^2 GIA	

The modules A1-A5 embodied carbon rate of the O2 Finchley Road development are lower than the benchmark figures proposed results. The average 550 kg CO_2e/m^2 figure for the development is just slightly above the range proposed as aspirational targets by the GLA (450-500 kg CO_2e/m^2). These figures are the result of efficient structural design and low carbon interventions specified in the latest structural engineering proposals. These include the use of a 7.5mx7.5m structural grid which was found to be an efficient system for residential buildings, allowing for the reduction in slab depths and results in reduced concrete and steel reinforcement used in the design.

The design has also considered the use of Post-Tensioned slabs as opposed to a reinforced concrete Flat-Slab solution. This is also a more efficient system with regards embodied carbon because, despite using slightly more steel, the overall savings in concrete volume are significant enough to reduce the associated embodied emissions.

The last strategy adopted in the current detailed structural design is the use of GGBS. GGBS (Ground Granulated Blast-furnace Slag) is a waste product of the steel industry and can be used as an alternative to cement in concrete mixes. This reduces embodied carbon associated with the concrete used and when this is applied over an entire concrete frame building, the embodied carbon savings are significant. The structural design specifications have proposed the use of 50% GGBS content within the concrete mixes of the majority of concrete elements, which will substantially lower embodied carbon emissions.

The benchmarks identify the major contributors to be the superstructure (~55%), the substructure (~25%), services (~11%) and the finishes (~7%). The results observed for the O2 Finchley Road development show similar proportions in the breakdown of the results, with the superstructure also contributing ~56% and the services contributing ~17%. Both the substructure (~8%) and the finishes (~2%) are substantially lower than what is set out in the GLA guidance benchmarks. The substructure achieves this through the omission of a basement, as well as high recycled steel reinforcement rates and high GGBS content within both the piles and the lowest floor slab. Detailed design information is limited for the internal finishes for Plots N3E , N4 and N5 at this stage of design, so high level assumptions were made regarding carpet and paintwork finishes. It is expected that as the design develops, this figure will increase and become more aligned with the GLA benchmark guidance.

Table 13-5 WLC results with the breakdown of building elements for modules B-C (excluding B6 & B7)

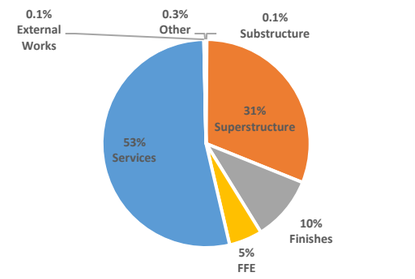
Building elements	WLC emissions total kg CO_2e	WLC emissions Total kg CO_2e/m^2 GIA	Modules B-C (excluding B6 & B7)
Substructure	31,581 kg CO_2e	0.5 kg CO_2e/m^2 GIA	
Superstructure	7,777,249 kg CO_2e	135 kg CO_2e/m^2 GIA	
Finishes	2,531,674 kg CO_2e	44 kg CO_2e/m^2 GIA	
FFE	1,296,786 kg CO_2e	23 kg CO_2e/m^2 GIA	
Services	13,386,561 kg CO_2e	233 kg CO_2e/m^2 GIA	
External Works	13,937 kg CO_2e	0.2 kg CO_2e/m^2 GIA	
Other	69,985 kg CO_2e	1.2 kg CO_2e/m^2 GIA	
Total	25,107,773 kg CO_2e	437 kg CO_2e/m^2 GIA	

Table 13-5 shows the WLC emissions for modules B-C of the proposed development to be 437 kgCO_2e/m^2, which is similar in magnitude to the baseline benchmark proposed by the GLA. The breakdown of this figure identifies some major variations to the baseline building breakdown. The substructure represents just ~0.1% of the B-C emissions in the O2 Finchley Road buildings. This is due to the longevity of the concrete installed as piles and for the lower floor slab, which means that they do not need to replaced or maintained throughout the life of the building.

The opposite is true for the building services, which require replacement regularly throughout the building's lifespan. This is one reason why it contributes the greatest portion of the B-C module emissions. The impact of refrigerant leakages on B1 (Use) emissions over the 60 year assumed lifespan is another reason for the high B-C value for the MEP.

13.5.1 Comparison of Detailed Plots

The following table breaks down the results of the three plots being submitted as part of the detailed portion of the planning application (N3E, N4 and N5). The differences in whole life carbon are assessed to identify strategies that have resulted in reduced embodied carbon emissions and can therefore be used as guidance for the future detailed design of the remaining plots currently considered within the outline portion of the planning application.

The table give an 'External Works Allowance' which is a value that represents the embodied carbon associated to the detailed hard landscaping elements of the masterplan, pro-rataed per m^2 of GIA.

Table 13-6 Estimated WLC emissions of Plots N3E, N4 & N5 (Detailed)

Estimated A1-A5 Embodied Carbon Emissions (Detailed elements)				
		Plot N3E *kg CO_2e/m^2 GIA*	**Plot N4** *kg CO_2e/m^2 GIA*	**Plot N5** *kg CO_2e/m^2 GIA*
Substructure		40	45	42
Superstructure	**Frame**	52	44	49
	Floors	65	70	63
	Roof	5	9	9
	Internal Walls & Doors	50	55	58
	Stairs & Ramps	1	1	1
	Façade	159	124	130
Internal Finishes		12	11	11
MEP		109	93	99
FFE		11	9	9
Formwork		34	32	33
Construction Works		33	31	34
External Works Allowance		5	5	5
Total		**577**	**528**	**543**

All three buildings achieve A1-A5 embodied carbon results that are just above the 'Aspirational' target set by the GLA. The detailed plots are between ~6-15% above the target, see Table 13-6.

A major difference in the design embodied carbon values is captured within the façade. Plot N3E has a substantially higher embodied carbon for its' façade, per m^2 GIA, than its counterparts. This is likely due to increased façade area resulting from the bay windows selected for the N3E façade.

There are slight differences also seen in the MEP and Floor Slab results. The MEP variations are due to economies of scale with regards to dwelling numbers and overall floor area, as they all adopt the same heating, ventilation and general servicing strategies. The Floor Slabs however show variation due to the slab thicknesses proposed in the three buildings. Due design requirements varying slightly due to the changes in floor plates between the plots, the structural design of N4 has a larger slab area of thicknesses greater than 225mm than either of the other buildings. This has resulted in a higher embodied carbon value due to the increased quantity of concrete and rebar specified.

The remaining building elements show a relative consistency on a per m^2 GIA basis, which is due to their use of similar strategies in their designs.

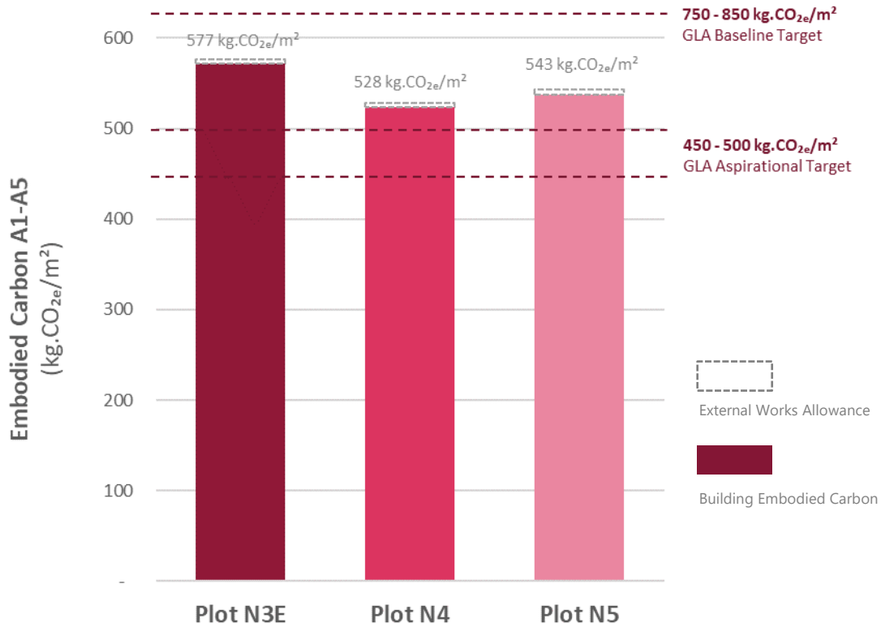


Figure 13-3 Detailed Buildings Plot Embodied Carbon Comparison

13.5.2 Options appraisal

As part of the process to reduce the whole life carbon emissions of the project, an options appraisal was undertaken on the structural elements of the detailed plots. It has reviewed the embodied carbon of 5 substantially differing superstructure and 5 substructure designs. The outcomes of these Whole Life-Cycle Carbon Assessments identified that the PT Waffle Slab provided the most efficient superstructure and therefore the lowest superstructure embodied carbon.

Superstructure

Figure 13-4 shows the results of the RIBA Stage 2 BREEAM Mat01 Superstructure Optioneering study. The options selected related to the choice of floor slab, which in turn impacted the concrete and steel volumes in the other structural elements such as the columns, beams and walls. The impact of the choice of floor slab on the superstructure and substructure has been captured within this assessment.

The results show that Option 5 'Composite Metal Deck on Downstand Beams' was the option with the highest embodied carbon. This is primarily due to the increased volume of steel required for this option, as opposed to concrete. Option 5 has a significantly greater reuse potential at end of life, as the steel elements can be unbolted and reused, however the high initial embodied carbon outweighs the expected savings this would incur.

Options 1 to 4 are all concrete framed options and are much more alike in total embodied carbon. . Option 1 'PT Slab' was the option chosen for the project, and the fact that is it showed a significant improvement on Option 2 'RC Flat Slab'

was a contributing factor to its success. Although Option 3 'PT Waffle Slab' and Option 4 'PT Ribbed Slab' had a lower embodied carbon in comparison to the floor slab option chosen for Plots N3E, N4 and N5. They were not selected on the grounds of buildability and structural depth. Furthermore penetrations for ductwork and other services within waffle slabs and ribbed slabs are typically limited to the thinner areas of the slabs, and so can begin to dictate the space planning of the apartments below.

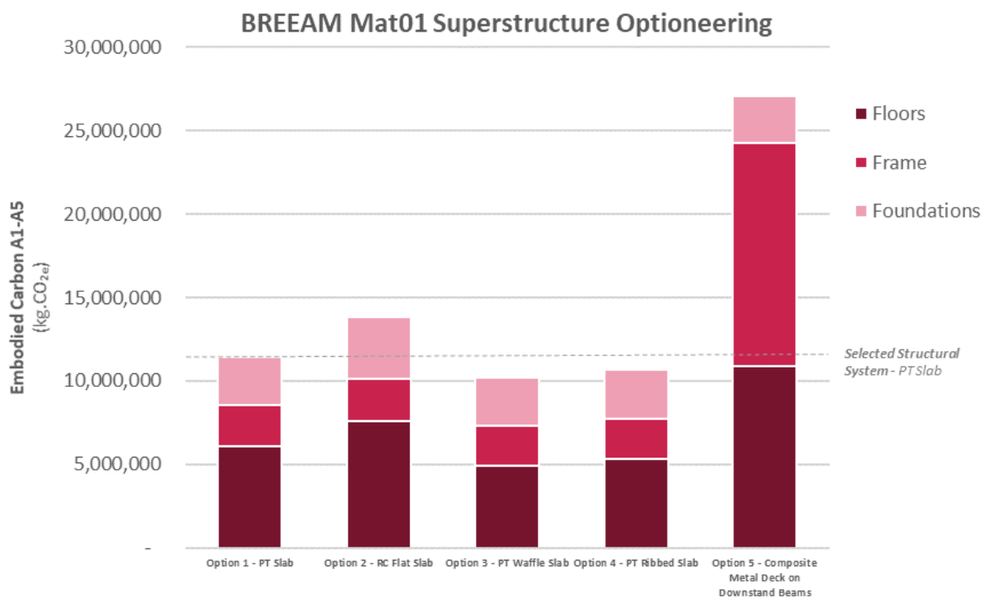


Figure 13-4 BREEAM Mat01 Superstructure Optioneering

Substructure

The BREEAM Mat01 credits include an optioneering study of various substructure and hard landscaping options. Similarly to the superstructure, five of these design options have been assessed for the substructure. These relate to the changes required as a result of various to the superstructure weights.

Figure 13-5 shows that there is little variation in the embodied carbon emissions associated to the various substructure designs. The RC Flat slab superstructure option incurs the greatest loading requirements on the substructure and so therefore has the highest impact substructure design. The three PT slab options have similar substructure impacts due to the similarity in their superstructure weights. In contrast to the superstructure results, the composite deck option has the lowest embodied impact when comparing substructures. This is due to the overall superstructure loading for this design being lower, with the hybrid frame option weighing less than the purely concrete alternatives.

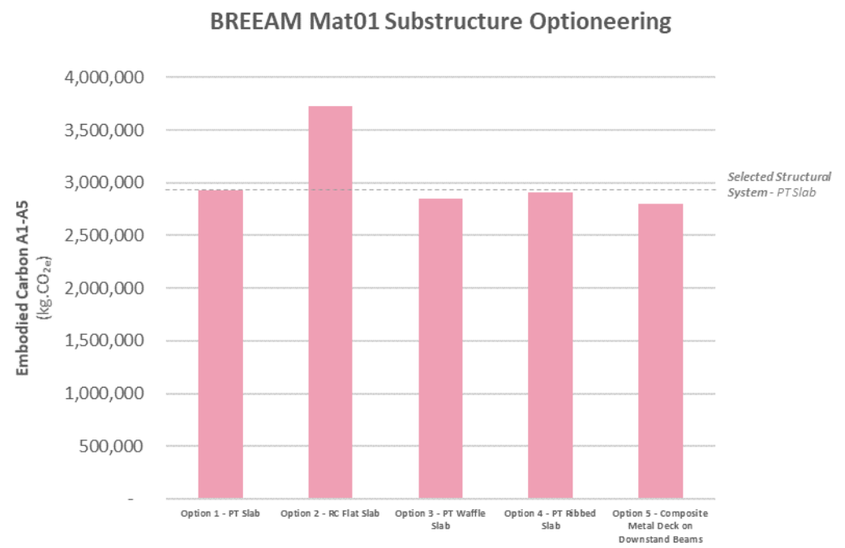


Figure 13-5 BREEAM Mat01 Substructure Optioneering

13.6 Summary

The applicant has assessed the WLC emissions associated with the proposed development. The approach taken was in line with the GLA's guidance and used detailed design information, where available, for the plots being submitted for detailed planning and benchmark figures for those being submitted under the outline application.

The results for the detailed areas of the site, which included plots N3E, N4 and N5, as well as the External Works of the site, produced an overall average result of 550 kg.CO_{2e}/m^2 GIA. This means the scheme is currently only just exceeding the GLA WLC aspirational benchmark for Apartments/Hotels, and is far below the benchmark given for 2020. This suggests the current design is in a good position at this stage, however strategies to improve on the current figures will be explored at later stages, with the aim to achieve the aspirational benchmark set by the GLA.

Through the design process undertaken thus far, multiple options have been assessed for various building elements. Section 13.5.2 details the structural options appraisal undertaken. The significant savings to the sub and super structure achieved when selecting a PT Slab over a RC Flat Slab influenced the decision to adopt such a design for the three plots submitted under the detailed planning application. Further strategies to reduce the WLC of these areas will be undertaken at future stages, with similar processes to be implemented for other building elements.

14 The O2 Centre and Whole Life Carbon scenarios

The redevelopment of the O2 Centre is last in the current phasing plan (see Figure 14-1), and so there is an opportunity to enter into discussions with the relevant stakeholders to ensure that the most appropriate uses are found for the different structural and façade elements. Being part of the final phase in the scheme, the deconstruction and following works are not expected to be undertaken for several years. Due to the uncertainty around potential future technologies and processes, the analysis undertaken in this section was conducted under the assumption that works would take place during the present day. Therefore, the impacts of strategies detailed may not perfectly reflect those to be expected when the O2 centre redevelopment works are undertaken in the future.

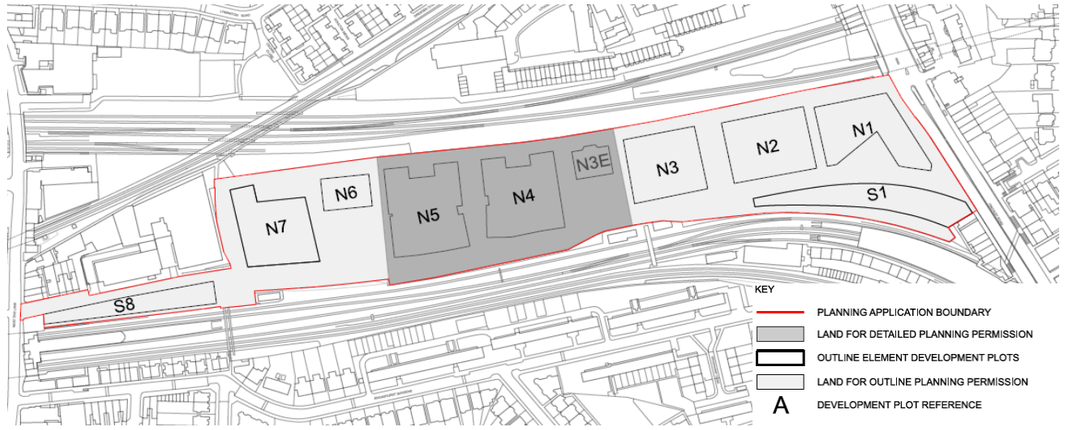


Figure 14-1 Drawing 19066-A(SK) 195 Option 55 Masterplan Existing Site Overlay & Phasing by AHMM

14.1 Planning policy

Within the context of the local planning policies and supplementary planning guidance, as outlined in Section 2.2, the West End Lane to Finchley Road, Draft supplementary Planning document, January 2021 states that the redevelopment, including with the demolition of the existing O2 centre, of this site could achieve:

- *higher quality outcomes for the site and community;*
- *integrate new development seamlessly with the wider area;*
- *deliver benefits in terms of new spaces; and*
- *Help allow for new walking routes.*

London Bough of Camden have declared a Climate Emergency, which, with support of policy, will encourage a drive to minimise WLC emissions and question the need for demolition works prior to the end of a structures' natural life.

The West End Lane to Finchley Road, Draft supplementary Planning document, January 2021 also states:

"Proposals involving substantial demolition and reconstruction should be fully justified in terms of the consideration of feasible and viable alternatives and optimisation of resources and energy use, in comparison with existing buildings, through a whole life carbon assessment."

14.1.1 Camden Planning Guidance – Energy Efficiency and Adaptation January 2021

The table within section 9.4 of Camden Planning Guidance document addressing Energy efficiency and adaption is designed to inform decision making prior to the pre-application of a scheme, providing a transparent and holistic approach to assessing options that deliver the best outcomes.

The following tables address the policy requirements considered by Camden Council when exploring opportunities for retention and refurbishment of existing buildings, along with a development response detailing the approaches taken to satisfy these or the inclusion of document references to where this information is available.

Table 14-1 Camden Planning Guidance Section 9.4

Camden Planning Guidance – Energy Efficiency and Adaptation January 2021			Development response
9.4	**Condition and feasibility studies (to understand the reuse potential of the existing building/s)**		
	Existing building uses	How well does the building function? Identify operational positives/negatives	See Appendix 11.1 Pre-application meeting and workshops, from the Design and Access Statement. Please also see the responses given within 'Table 14-2' which detail the design teams responses for refitting, refurbishing, and reclaiming/recycling the existing building.
		Existing user surveys to understand what works/ doesn't work in the building	
	Servicing	Summary of MEP servicing, thermal performance and efficiency for each building component	To be clarified at RMA stage
		Identify remaining lifespan of plant and discuss pros/cons of plant upgrade	
	Technical: review, with evidence and photos, of existing building, based on intrusive survey	Upgrades Required to comply with current legislation	
		A material inventory audit, including an estimate of embodied carbon	Please see Section 14 of this report to understand the quantities of material within the existing building. The estimated embodied carbon of the existing O2 Centre is 18263tonnes CO2e (A1-A5)
		Scaled section drawings showing slab depths, floor to ceiling dimensions etc.	Available on request to Landsec
		Loading capacity of structural frame, materials strength, pile testing	Please see Section 14 to understand the assumptions made for the material strengths and specifications.
		Energy performance of the façade	Assumptions to be included in the WLC report submitted, detailed to be clarified at RMA
		SBEM Energy Modelling	In-use energy benchmarks used as provided by Landsec
		Details of Air Tightness, thermal bridge modelling and condensation analysis in exploration of limits to fabric upgrade in existing building	Condition survey to be undertaken for RMA stage
		Future projections for carbon content of electric load should incorporate latest BEIS carbon factors	Operational energy/carbon has included grid decarbonisation in line with BEIS latest grid Carbon factors (2019)
	Site capacity	What is the best use of the site? And can optimal site capacity be achieved?	See the Design and access statement – planning pre-application re-cap in appendices, as this will communicate the requirements for residential properties and high quality public realm in the area.,

Table 14-2 Camden Planning Guidance - Section 9.6

Camden Planning Guidance – Energy Efficiency and Adaptation January 2021			Design Team Response/Action
9.6	**Refit**	This option retains the existing structure as is, it includes minor works, and the replacement of building services such as heating and insulation, to continue occupation of the building.	This option is not appropriate for the development, as some elements are nearing their natural end of life. Furthermore, the existing building design contains inefficient, outdated or inappropriate floor plates for current or potential future uses with limited street and ground floor activation, public realm and pedestrian permeability. The O2 centre does not align with current demands and is therefore an expected casualty of market obsolescence.
	Refurbish	Refurbishment should seek to significantly improve the service life of the existing building. This option provides an opportunity to retrofit the building to reduce carbon emissions and include sustainable adaptation measures.	This option is not appropriate for the development as, like many buildings with large retail footprints, it has been designed to be inward looking and does not lend itself to reuse for alternative uses due to its proportions and structural design. Furthermore, the existing ground floor configuration would not aid ground floor activation and animation of the Town Centre.
	Substantial refurbishment and extension	This option is similar to the above, but takes into consideration the need to optimise site capacity and alter the existing structure to meet future needs. This may involve significant changes to the façade (façade replacement) but should seek to retain as much of the existing building as possible reducing the need to use new materials and reduce the loss of embodied carbon in the existing structure. If this option includes partial reclaim and recycle the development proposal should include a pre-demolition audit, as specified below.	It is expected that a significant portion of the concrete substructure and superstructure will be retained and reused as basement and as retaining elements. Detail to be agreed with LBC at RMA.
	Reclaim and recycle	Where it is demonstrated to the Councils satisfaction, that the above options are not feasible the development proposal should include a pre-demolition audit identifying all materials within the building and documenting how they will be managed. The preference should be for re-use on site, then re-use off site, remanufacture or recycling. (Providing time in the project plan for selective deconstruction techniques and materials storage to maximise reuse). London Plan policy SI7 expects 95% of construction and demolition waste to be diverted from landfill Camden Planning Guidance | Energy efficiency and adaptation (reuse, recycle, recovery), and 95% of excavation waste to be put to beneficial use.	At RMA stage: • Pre-demolition audit to be commissioned • Material re-use and management strategy • Commit to 95% waste diverted from landfill
		At this option a Whole Life Carbon assessment (including embodied carbon) should be submitted, following the GLA draft SPG and including long term carbon factors (as set out in the GLA Whole Life Carbon SPG). • Specifically, the most recently available long-term Green Book projections from the Government should be used in preference to the National Grid source suggested in the current draft, as we view this is as the more established source. The fuel-specific carbon factors are given, to year 2100, in worksheet 'Conversion factors from fuel to CO2e' within the spreadsheet 'IAG spreadsheet toolkit for valuing changes in greenhouse gas emissions'. WLC assessment to be undertaken prior to any public consultation and results explained and included in design options.	See section 14.7 of this report for the whole life carbon assessment undertaken

14.2 Retention of Substructure and reuse of superstructure

Design work has been undertaken by the Structural Engineers, Pell Frischmann, to understand the feasibility of retention of the concrete super and substructure, and the reuse of some of the steel elements of the building.

A feasible level of retention and reuse, whilst meeting Camden's site redevelopment aspirations, has been considered. Pell Frischmann recommend the retention of the existing secant piled wall, and also highlighted the potential to reuse the existing piled foundations and concrete substructure through the use of an additional podium slab to transfer the loading from the new residential superstructures. Pell Frischmann also considered the reuse of the concrete ribbed slab at L01, which is believed to be acting as a permanent lateral restraint to the secant piled wall. There is an option to retain as much as possible of the L01 slab, subject to the resolution of the new ground floor finished levels. An assessment into the feasibility of doing so will be targeted at RMA stage. Furthermore, as the design is at RIBA Stage 2, further material testing and surveys will be required to identify the full extent of the existing structure that can be retained.

Ensuring the assessments into the feasibility and approach to retention and reuse of any structural elements is undertaken during any RMA stage, closer to the time of redevelopment, would allow the analysis to reflect the latest strategies and technologies available to do so, more accurately reflecting the possibilities available for material reuse.

14.3 Reuse of Facades

Limitations in information currently available for the O2 centre façade have meant that the figures relating to material reuse have been assumed. East, the Landscape architects, have been reviewing the potential for material reuse within the hard landscaping and play spaces (see the accompanying Circular economy statement, as part of this application, for further detail). They have assessed the O2 Centre façade and proposed potential reuse strategies for differing elements as per Figure 14-3. The feasibility of these will be reviewed at RMA stage.

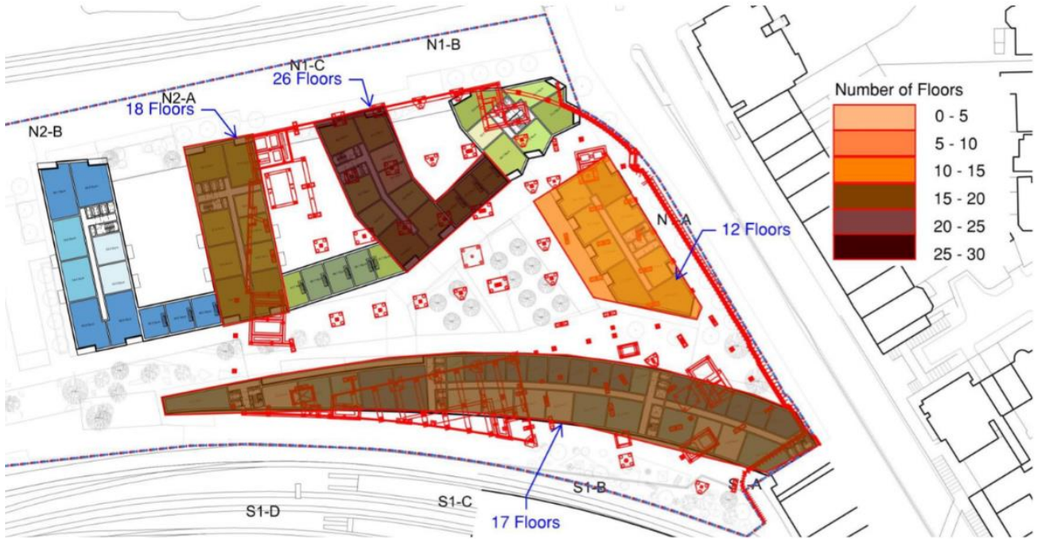


Figure 14-2 Existing O2 Centre Foundations Reuse (Image from Pell Frishmann – structural engineer)

Figure 14-3 Site potential for reuse from O2 centre façade

14.4 Total reuse potential

The level of reuse for the O2 centre, is expected to sit between the two strategies outlined in Table 14-3, depending on the appropriateness of the existing structure for reuse. This would equate to retaining approximately ~50% of the embodied carbon of the existing building. However final design and quantum will need to be confirmed at RMA stage, following more detailed analysis and investigation, as well as a better understanding of future technologies and deconstruction strategies available.

The table on the following page, outlines varying levels of deconstruction, retention, reuse and recycling on site. It also outlines the % of the embodied carbon of the building to be retained and re-used on site or recycled off-site, along with which elements of the building this corresponds to.

This assessment has been undertaken at a very high level for the O2 centre, which is not expected to come forward for 5-7 years. Over that time the O2 centre is expected to be reviewed with site investigations in further detail, further technical studies undertaken, and detailed pre-demo audits undertaken.

Targets have been set in this document for the for the deconstruction, retention, and reuse of the O2 centre. These are based around the embodied carbon of the existing building materials. Targets have been set to retain/reuse or recycle the most carbon intensive elements on site. % of embodied carbon break down as follows:

- **Minimum target: >50% of the embodied carbon** of the O2 centre retained, reused or recycled on site.
- **Stretch target: >70% of the embodied carbon** of the O2 centre retained, reused or recycled on-site or near site (i.e. within London). Elements used offsite to be reused/recycled for 'useful' purposes, rather than recycling to base materials.

Further detail is outlined in Section 4 of the Circular Economy statement and Section 14.6 of the Sustainability statement.

14.5 Data processing

To calculate the embodied carbon associated to the existing O2 Centre, Buro Happold have carried out an assessment of the as-built drawings provided to audit the materials used in the structure of the O2 Centre frame. A list of structural elements has been produced, which has then been used to input into the Embodied Carbon Calculation. Information was collated from desktop PDF reviews as no specifications or BIM models were available.

Assumptions and limitations

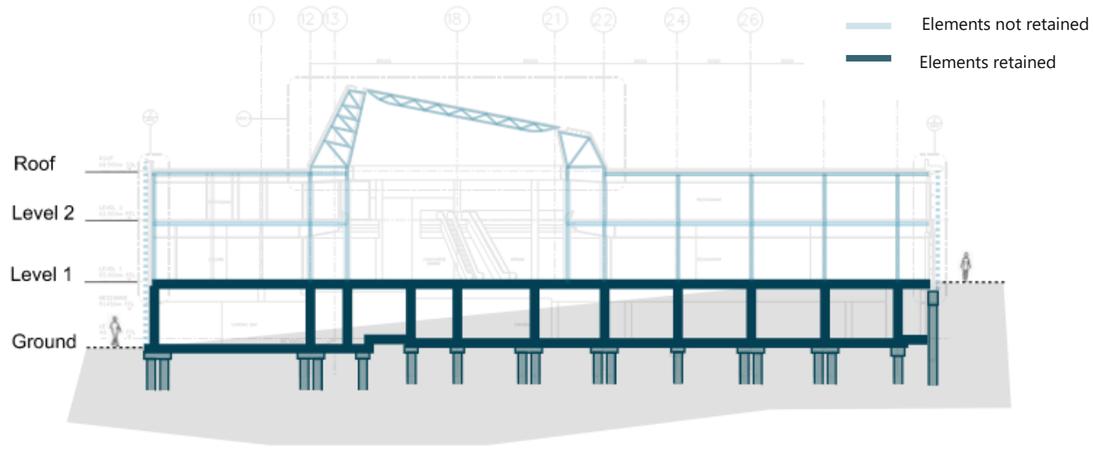
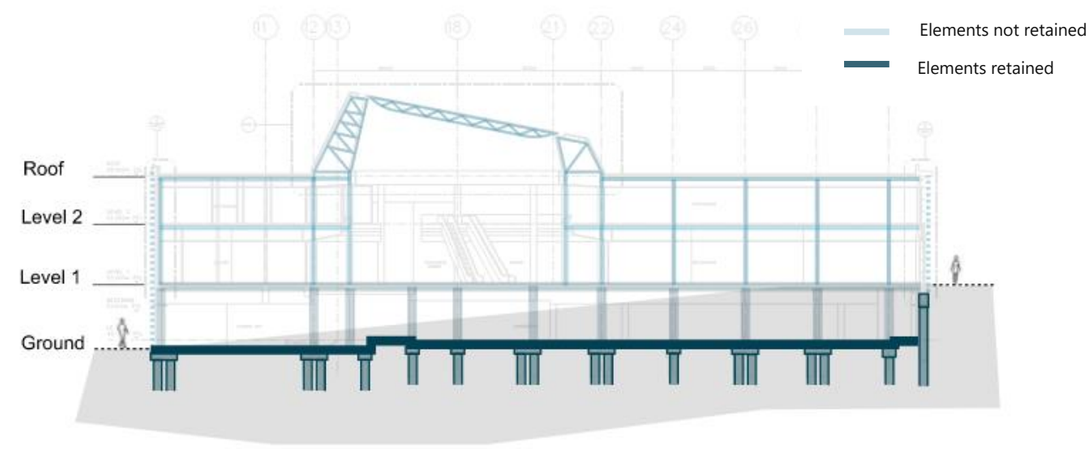
The following assumptions about the existing O2 centre structure have been made where record information was not available. These have been based on professional and market judgement:

- Only the main structural frame of the O2 centre has been included in the materials audit. The structures associated with the internal fit-out of the cinema, supermarket and other retail units have been omitted within the structural study but assumptions have been made within the whole life carbon analysis outlined in following sections.
- The façade is a combination of glazing, reconstituted stone panels, brickwork on blockwork panels, rusticated stone, metal-clad structural insulated panels, and metal cladding panels, as per the existing elevation drawings. The embodied carbon of these façade elements has been determined through liaison with our Buro Happold Facades team, the Buro Happold Sustainability Team, and calculations using One Click LCA & East assessment.
- The Concrete Specifications for the existing building are unavailable, so assumptions have been made about the concrete strengths and mixes used. We have based our assumptions on the strength references indicated in the drawings and have assumed a concrete strength of C35/45 typically throughout, with C40/50 used for the columns, which is typical for a building of that typology and age. For the concrete mixes, 25% GGBS was assumed. This was based on understanding of the market and typical concrete mix specifications at the time.
- UK sourced steel was assumed for the calculation.
- The finishes assumed on the steel elements were based on market and professional understanding of requirements.
- The geology of the local area, safe working loads and pile diameters from the available drawings were used to derive estimated pile lengths.
- Standard reinforcement estimates have been used for the different structural elements, which were then cross-checked against the reinforcement drawings for a few standard elements of that type.
- The study has been limited to the structure of the main building. Structures associated with landscaping, retention, rail and highways on the wider site have not been included.

As outlined previously, the strategies in Table 14-3 are proposed approaches for the deconstruction of the O2 centre. They are based on typical material retention strategies currently used in industry. They do not however consider future improvements in circular economy or advancements in technologies expected to occur before these works are undertaken. An example being that composite slabs are not currently assumed to be reused, as it can be destructive to separate the steel and concrete. However as new techniques, strategies and technologies are developed, this may become technically feasible by the late 2020s.

The two deconstruction strategies proposed below looked at general grouped approaches for structural building element retention (i.e. Substructure and Structure to Level 1 for Strategy 1 & Substructure for Strategy 2), which when assessed from an embodied carbon stand point, estimated savings of 64% and 42% for Strategies 1 and 2 respectively. These results then further informed the overall embodied carbon retention target, which is given as 50% of the entire existing building's embodied carbon, with a further ambition to include a stretch target at future phases of around 70%. These targets take into consideration the retention of other building elements, such as the façade, opposed to focusing solely on the structural elements, as is done in Table 14-3. Further investigation is required to determine the feasibility of these targets at RMA stages, as a better understanding of future technologies and deconstruction/reuse strategies will be available.

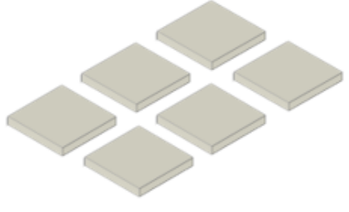
Table 14-3 Deconstruction Strategies for the existing O2 Centre

Deconstruction Strategy	Diagram	Amount retained as % of total tCO_2e	Advantages and Disadvantages of Strategy
Deconstruction Strategy 1 • Foundation and all concrete elements up to Level 1 retained • Materials from the façade and superstructure reused/recycled		**64%**	**Advantages** ✔ Minimal breaking out of concrete required, which is costly and time consuming ✔ Increased stability provided to existing secant wall compared to Deconstruction Strategy 2. Depending on the assessment, less temporary works will be required to support it. ✔ More structure is retained and so fewer new materials are required for the project overall, and less material needs to be removed from/stored on site for reuse **Disadvantages** ✘ Superstructure for L01 upwards will need to be designed with the capacity of the concrete elements in mind. If the loads exceed the capacity of the concrete elements, additional columns and/or transfer structures will be required to take loading to ground ✘ The installation of any additional piles (if required) will need detailed temporary works to ensure as much of the existing concrete structure is retained.
Deconstruction Strategy 2 • Foundation and ground floor retained, including basement • Materials from the façade and superstructure reused/recycled		**42%**	**Advantages** ✔ There is greater flexibility in the loading and geometry of the proposed superstructure as additional piles can be added with relative ease in comparison to Deconstruction Strategy 1. ✔ Construction activities have more freedom than with Deconstruction Strategy 1. **Disadvantages** ✘ More breaking out of concrete is required, which is costly and time consuming ✘ New material will be required for the superstructure from L00 to L01, furthermore additional time will be required for the design and construction of this new superstructure ✘ The existing secant wall is likely to require propping, which will have implications on the space available for site activities. Furthermore permissions and a dialogue between Highways England may be needed

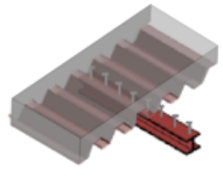
14.6 Materials Audit

A detailed review of the existing O2 centres' construction was undertaken using the building information available at the current time. This review identified several elements of the design, some of which there is potential to reuse. The below is a graphic depiction of the material quantities derived, in illustrative form. Further investigation into both the building elements within the centre and their respective conditions will need to be undertaken at later stages to fully understand what materials are available for reuse.

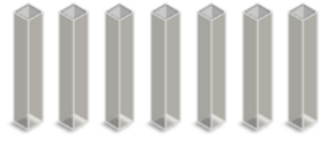
Concrete



Slab – 24950 tonnes



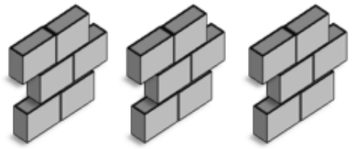
Composite Slab – 5120 tonnes



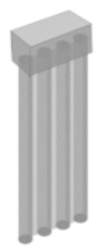
Columns – 2180 tonnes

Cores – 1660 tonnes

Foundation (piles, pile caps, ground beams) – 17925 tonnes



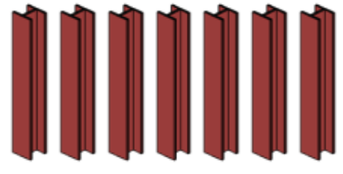
Blockwork – 285 tonnes (liner wall to contiguous retaining wall)



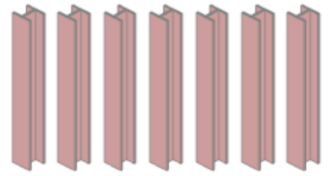
Contiguous piled wall – 10830 tonnes

Steel

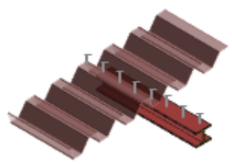
Trusses – 60 tonnes



Steel Columns – 290 tonnes



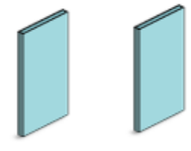
Secondary Steelwork –15 tonnes



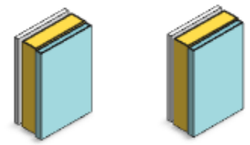
Composite beams – 610 tonnes

Facade

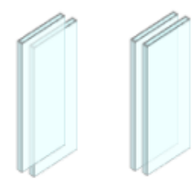
Reconstituted Stone – 250 tonnes



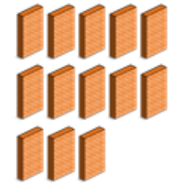
Metal Cladding – 7.5 tonnes



Metal SIPS – 79 tonnes



Glazing – 119 tonnes



Brickwork – 1410 tonnes

14.7 Whole Life Carbon Assessment

14.7.1 Assessment context

A Whole Life Carbon Assessments (WLCA) has been undertaken to compare the O2 centre emissions associated with three different scenarios over a period of 60 years. This timeframe has been selected as it aligns with the RICS best practice guidance on life-cycle carbon assessments.

Scenario 1 considers a 'Business As Usual' scenario, i.e. no changes to the existing site and Centre, apart from the immediate replacement of MEP equipment currently nearing end of life, and assumes continued normal operation for a period of 60 years;

Scenario 2 same as scenario 1 however accounts for a major refurbishment of the existing building after 30 years. This consider that the building is already ~30 years old and would require major works at this point in the future. This scenario does therefore look at both additional embodied emissions after 30 years, as well as the reduction in operational emissions;

Scenario 3 reflects the current masterplan proposal, which assumes the removal of the existing building to allow for a low energy residential development to be constructed. This includes Plots N2- A to B, N1-A to C and S1-A to D, as these plots are located where the O2 centre currently sits. This scenario accounts for the carbon debt associated with the embodied carbon of the existing O2 centre and includes this as a source of emissions in its' WLC calculation. The reduction in that debt from retention and on site reuse of materials from the existing building is also considered, with scenarios for reuse assumed at both 50% and 70% of the total embodied carbon.

The following areas have been used for the assessment across each scenario, these corelate to the plans shown. They have been provided by Landsec asset management team and the AHMM design.

Table 14-4 Area schedule for existing O2 centre and new development proposal

		Scenario 1	Scenario 2	Scenario 3
Landlord areas	m²	19,000.10		-
Retail/Commercial areas	m²	27,898.77		8,550
Supermarket	m²	Assumed in retail/commercial		-
Residential	m²	-		51,636
Total	m²	46,899		60,186

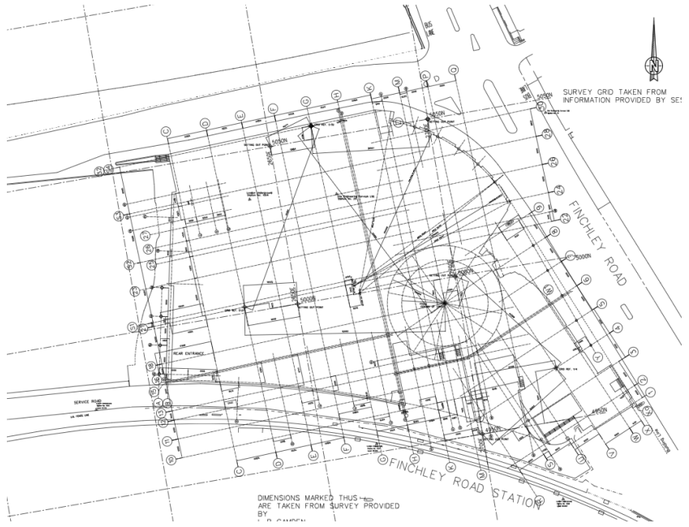


Figure 14-4 Roof plan of existing O2 centre

Figure 14-5 Roof plan of proposed new development's indicative scheme.

The WLCAs undertaken considered, for each scenario, multiple sources of carbon emissions. These were combined to derive an overall net carbon figure for each given scenario. The sources included the following:

- Embodied carbon emissions associated with A1-A5 (Cradle-to-gave) modules, as well as B-C (In Use and End-of-life) modules. These consider the emissions attributed to the initial construction process, as well as those associated with its' use, general maintenance and the final demolition;
- Operational carbon emissions associated with modules B6-B7, which represent the daily function of the site and the energy/water consumed by those using it.

- Carbon debt emissions have also been taken into account for scenario 3. As the building was built in 1996, if it were to be demolished in 2026, prior to reaching its' 60 lifespan, the owner of the building forgoes the use of a structure that would be functional for a further 30 years. Therefore, the inherited carbon debt would represent the embodied carbon of the materials not reused from the existing building, pro-rated to represent those 30-years that the owner has decided to forgo.

14.7.2 Assumptions and benchmarks

To undertake the three respective whole life carbon assessments, data was required for building material quantities, operational energy & water consumption, building element lifespans and end of life scenarios. The approaches used to collate this information are as follows:

- Material quantities for both the existing and new development proposal were derived by the Buro Happold structural engineering team. The existing building's original plans and drawings have been interrogated in order to derive the necessary structural material quantities, as well as general façade and roof areas. The quantities collated for the new development proposed in scenario 3 has been based on the latest design information available;
- RICS best practice guidance on life cycle carbon assessments dictated the building lifespan (60 years) to be used for this assessment, however it also dictated the lifespans attributed to each individual building elements (e.g. Façade – 30 years);
- Where certain data was unavailable, generic benchmarks have been used in their place to provide a realistic, hypothetical scenario for what the WLC, of the scenario in question, might look like. Benchmarks have been used both for embodied and operational carbon calculations where the data available was not deemed sufficient to carry out an accurate assessment. The table below details which benchmarks have been adopted, along with their sources; and
- The use of OneClick LCA software to analyse this building has meant that the assessment considers the project as if it were being built in present day, as opposed to in 1996. Variations are therefore expected from the actual embodied carbon of the existing site, including but not limited to the manufacture of various materials/products, the emissions associated with transportation, as well as the longevity or quality of the products/materials used.

Embodied Carbon Benchmarks

Table 14-5 Embodied carbon benchmarks used

Element	Benchmarks	Source
New Construction (Residential, Commercial & Landlord areas)	A1-A5: 400 kg.CO_{2e}/m^2 B-C: 180 kg.CO_{2e}/m^2	Landsec Pioneering Target, - expected improvements beyond the current performance of the detailed phases GLA Aspirational Target
Site Construction Works	30.34 kg.CO_{2e}/m^2	OneClick LCA and included in A1-A5 modules
Deconstruction & Demolition	3.4 kg.CO_{2e}/m^2	OneClick LCA and included in Carbon debt

Operational Energy Benchmarks

Scenario 2 initially uses the same benchmarks as scenario 1, however this reduces by ~30% after year 30.

Table 14-6 Operational energy benchmarks used

Scenario	Use Type	Electricity	Gas	Source
Scenario 1 - Existing	Landlord areas	54 kWh/m^2	44 kWh/m^2	Landsec asset management data
	Retail/Commercial areas	116 kWh/m^2	41 kWh/m^2	REEB 2019 benchmarks
Scenario 2 - Existing with Major refurbishment in 2051 **Post-major refurbishment in year 30*	Landlord areas	54 kWh/m^2	44 kWh/m^2	Landsec asset management data
	Retail/Commercial areas	116 kWh/m^2	41 kWh/m^2	REEB 2019 benchmarks
Scenario 3 - New Build Operational in 2030	Landlord areas	54 kWh/m^2	-	Landsec asset management data
	Retail/Commercial areas	116 kWh/m^2	41 kWh/m^2	REEB 2019 benchmarks
	Residential	40 kWh/m^2	-	Landsec Pioneering Target

14.7.3 Assessment Outcomes

Figure 14-6 outlines the resultant emissions over a 60 year time period. Four LCAs have been completed for the various scenarios to understand the embodied and operational carbon of each approach to development. It also outlines the savings and carbon debt associated to the deconstruction of the O2 centre with both >50% and >70% retention, reuse or recycling on-site.

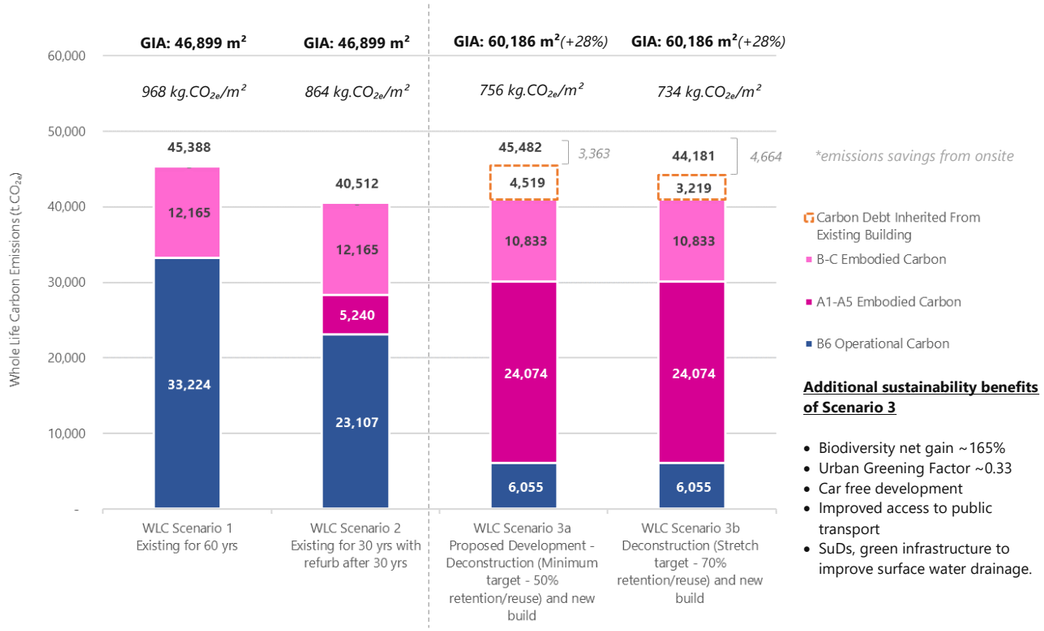


Figure 14-6 WLC comparison graph

Table 14-7 WLC comparison data

	Scenario 1 - Existing ($t.CO_{2e}$)	**Scenario 2 - Existing with Major refurbishment in 2051** ($t.CO_{2e}$)	**Scenario 3a – Proposed scenario: New Build Operational in 2030, assuming 50% retention** ($t.CO_{2e}$)	**Scenario 3b – Aspirational scenario: New Build Operational in 2030, assuming 50% retention** ($t.CO_{2e}$)
B6 Operational Carbon	33,224	23,107	6,055	6,055
A1-A5 Embodied Carbon	-	5,240	24,074	24,074
B-C Embodied Carbon	12,165	12,165	10,833	10,833
Carbon Debt Inherited	-	-	4,519	3,219
Net Whole Life Carbon	**45,388**	**40,512**	**45,482**	**44,181**
GIA (m^2)	*46,899*	*46,899*	*60,186*	*60,186*
WLC intensity ($kg.CO_{2e}/m^2$)	*968*	*864*	*756*	*734*

Scenario description	Business As Usual. Continued use of the existing building, with no variation or refurbishment.	Continuation of current use of the building for 30 years at which point a refurbishment to improve operational performance is undertaken.	Demolition of existing building and new construction of proposed scheme, offering improved space utilisation and wider sustainability benefits.	Demolition of existing building and new construction of proposed scheme, offering improved space utilisation and wider sustainability benefits.

14.7.4 Conclusions

Scenario 1, the retention of the existing building, performs extremely poorly from an operational standpoint when compared to the other scenarios. As shown in Figure 14-6, the B6 – Operational Carbon emissions are around five times that of a new build alternative, with a floor area ~28% less. This is the result of high operational energy demands associated with the existing O2 centre, as well as its fossil fuel reliance. This "do nothing" scenario is however not considered a viable scenario in reality, as the current layout of the O2 centre is constrained by:

- Inefficient and outdated floorplates;
- An inefficient façade that does not positively contribute to the streetscape;
- Sustainability credentials that do not meet the requirements of modern commercial buildings; and
- A ground floor configuration that provides little in the way of ground floor activation and animation of the Town Centre.

Scenario 2 considers a major refurbishment for retail and leisure uses at the end of the current O2 centre's life, which is assumed to improve the building's energy efficiency. This would result in additional embodied carbon emissions, totalling ~5,000t.CO_{2e} from the refurbishment. This results in a reduction to operational carbon demands to the extent that emissions are reduced over the 60-year period compared to Scenario 1. Whilst delivering the lowest WLC emissions, this Scenario retains the Centre in its current format for a further 30 years prior to refurbishment as new retail and leisure uses, with only minor replacements to building services and finishes occurring in the initial 30 years. It does not therefore address the issues and growing obsolescence of the Centre as set out above, with potentially wider social and sustainability implications.

Furthermore, what is not considered within the assessments for Scenarios 1 and 2 are the additional works that would realistically be required if the O2 centre were to be retained. For example, substantial interventions would be required to align with the West End Lane to Finchley Road Supplementary Planning Document. These would have significant carbon costs that have not been accounted for in this Scenario:

- An improved mixed use destination that would provide retail, leisure, working and community uses that attract local residents,
- An improved cycle and pedestrian entry route from Finchley Road, which would include improved crossing, wider footways, cycle lanes, greening and lighting,
- More active and engaging frontages, entrances and streetscapes on all public facing sides,
- A more open, clear and accessible route through the existing centre,
- A high quality urban public space, that successfully integrates the new and old buildings and is designed for people rather than cars,

Scenario 3 considers the proposed approach, which includes the partial deconstruction of the existing O2 centre and the construction of a new development. This scenario inherits the remaining carbon debt from the existing building and creates additional embodied carbon in the construction of the new development. However, it has significantly lower operational emissions than either of the two previous options due to modern energy efficiency measures and an all-electric, decarbonising supply. The proposal also takes into consideration the emissions saved through the reuse of elements from the existing O2 centre. This has been calculated for different target levels, with the minimum target assuming ~50% of the embodied carbon to be retained, whereas the stretch target increases this to ~70%.

Assuming the minimum reuse target, Scenario 3a in Figure 14-6, this approach contributes a comparable overall WLC emission to that of Scenario 1. If the stretch reuse target were achieved, Scenario 3b, the WLC emissions of this approach are lower than Scenario 1 and marginally greater than those shown in Scenario 2. To achieve this stretch target, 100% of the substructure, ~60% of the superstructure and ~90% of the façade embodied carbon would need to be retained. Whilst this is a stretch target, deconstruction of the O2 centre will be part of the latter phases of development. By this point strategies for material reuse and recycling are expected to be more mature and advanced than current methods. This will need to be considered further at the point of any RMA.

It should also be noted that from a holistic approach to sustainability, the carbon cost should not be read in isolation but weighed up against all the other sustainability credentials of the development – social and environmental. These could consist of anything from the biodiversity gains, land-use efficiency, or health and walkability aspects of a new proposal. Scenario 3 provides operational, public, and sustainability benefits which are not accounted for in a primarily quantitative comparison of WLC emissions. These include:

- A seamless connection between Finchley Road and West End Lane, that would enhance the vibrancy of the town centre and high street, whilst providing improved east west pedestrian and cycle routes,
- The removal of non-blue badge cars across the development, which would contribute significantly to reducing local emissions associated with vehicle fossil fuel consumption and drive improvements to local public and active transport networks,
- Provision of green spaces and public realm that the area currently lacks, substantially increasing the biodiversity by ~165% from the existing site and achieving a ~0.33 Urban greening factor,
- The proposed SuDs strategy (Sustainable Urban Drainage system) would significantly improve current surface water run off rates and the capability of the site and its surroundings to withstand future flooding events,
- By repurposing the current accommodation, which is no longer fit for purpose, and increasing usable floor area by ~28%, the proposal would provide the shops, homes, leisure and community facilities that the local area requires,
- The new development would support in the creation of jobs and opportunities for local people,
- It enables the development of an area with its own identity and style but that also integrates into the local area; And
- Provides a safe and secure place open to all.

The impact of the increase in useable floor area by ~28% has also been highlighted in the WLC intensity metric shown in

Table 14-7. This metric is commonly used to compare the impact of different design strategies on buildings of varying sizes. In the context of this study, it shows Scenarios 1 & 2 to have a significantly higher WLC intensity (~970 kg.CO_{2e}/m^2 & ~860 kg.CO_{2e}/m^2 respectively) than either of the two new construction options, Scenario 3a and 3b (~760 kg.CO_{2e}/m^2 & ~730 kg.CO_{2e}/m^2 respectively). This suggests that the deconstruction of the O2 centre and new construction on the site, as proposed for the scheme, would emit fewer emissions on a per m^2 of usable floor basis than the building retention strategies shown in Scenarios 1 & 2.

In conclusion, direct comparison between the three scenarios is difficult. The assessments do not account for other benefits associated with the proposed new construction and wider implications of retaining the existing O2 centre. The pure WLC assessment, Figure 14-6, shows that under a minimum retention target, Scenario 3a would marginally contribute the highest WLC emissions. This would improve on Scenario 1 if the stretch targets were met.

Importantly, the study does not take account of the growing obsolescence of the existing building, due its outdated and inefficient design, and works that would be associated with retention in order to integrate the building with the rest of the scheme and the local area.

It also fails to account for the significant sustainability benefits associated with the deconstruction of the O2 Centre, which look beyond the carbon emissions from the structures themselves to include the wider implications on the local area and its residents, the full impact of which cannot be captured within a WLC assessment.

15 BREEAM Strategy

15.1 Introduction to BREEAM

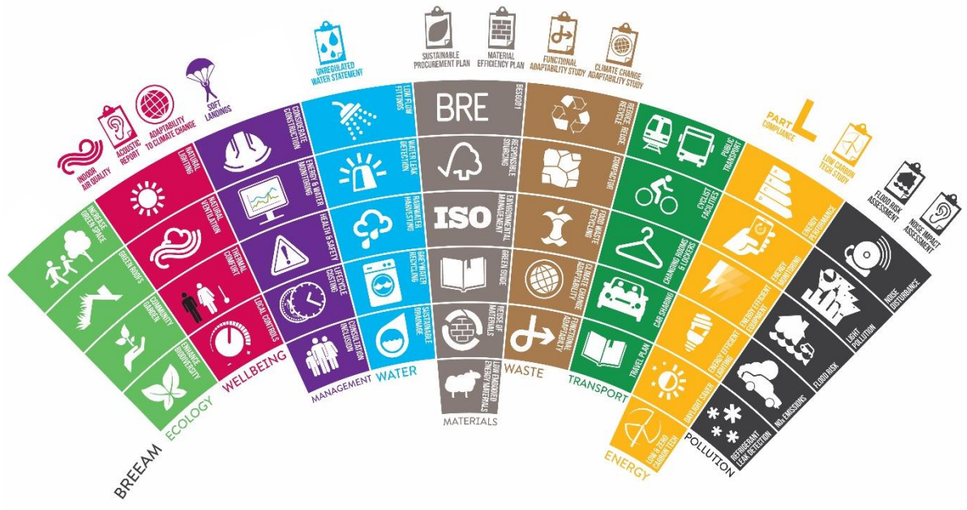


Figure 15-1 BREEAM Topics

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's first sustainability rating scheme for the built environment and has contributed much to the strong focus in the UK on sustainability in building design, construction and use. BREEAM is now an international standard that is locally adapted, operated and applied for non-residential developments.

Within BREEAM, ten categories of environmental impact are assessed, each covering a number of clearly defined issues. These issues seek to mitigate the impact of a new or refurbished building on the environment by setting performance-based criteria and benchmarks and a given number of credits is available for addressing each one.

Within each environmental performance category, there are a number of credits which developments are assessed against. Where evidence is provided demonstrating that the criteria of the credit have been met, the appropriate number of credits can be awarded. A weighting is applied to account for the varying importance of the different categories and then the category totals are added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent or Outstanding. The performance standard for each rating is summarised below in Table 2.1.

Table 2.1: BREEAM performance standards

BREEAM Rating	% Score
Outstanding	85 %
Excellent	70 %
Very Good	55 %
Good	45 %
Pass	30 %
Unclassified	<30 %

Certification is carried out at two stages as summarised below and in Figure 15-2:

- The **Design Stage assessment** and interim BREEAM rating confirms the proposed new building's performance at the design stage of the life cycle. Assessment and ideally certification will occur prior to the beginning of operations on-site. The BREEAM rating at this stage is labelled as 'interim' because it does not represent the building's final, new construction BREEAM performance; and
- The **Post Construction Stage assessment** and BREEAM rating confirms the final 'as built' performance of the building at the new construction stage of the life cycle. A final PCS assessment is completed and certified after practical completion of the building works.

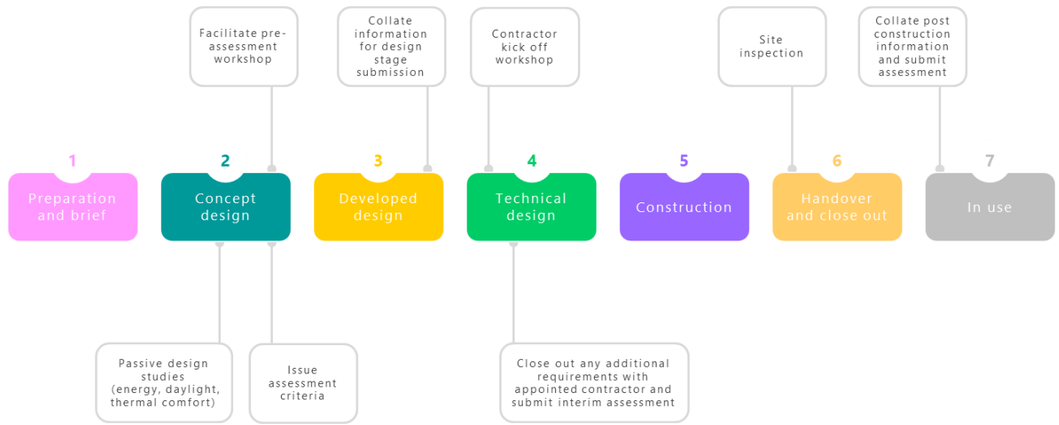


Figure 15-2 BREEAM assessment and certification stages

15.2 BREEAM New Construction 2018

BREEAM is the leading means of reviewing and improving the environmental performance of buildings and communities in the UK. Around every three to four years, BREEAM reviews its certification schemes to ensure they follow industry best practice and innovation. Typically achieving BREEAM 'Excellent' 2018 for shell only buildings is very challenging. A few of these are outlined below.

Issues specific to small shell only units:

- Hea 01 Views out and daylighting – These cannot typically not be achieved for small retail units as design of facades cannot compensate the low daylight levels in certain locations in a masterplan.
- Tra 02 Cycling facilities – Shell and core units are required to show how private changing, lockers and/or shower facilities can be provided for staff. Shell and core units by nature are typically too small to allow for extensive back of house facilities in each unit. The facilities would also need to be installed and fit out by the tenants with dedicated cycle stores. This can be achieved on larger standalone buildings, however very challenging for a group of retail units.

15.3 Stage dependent actions

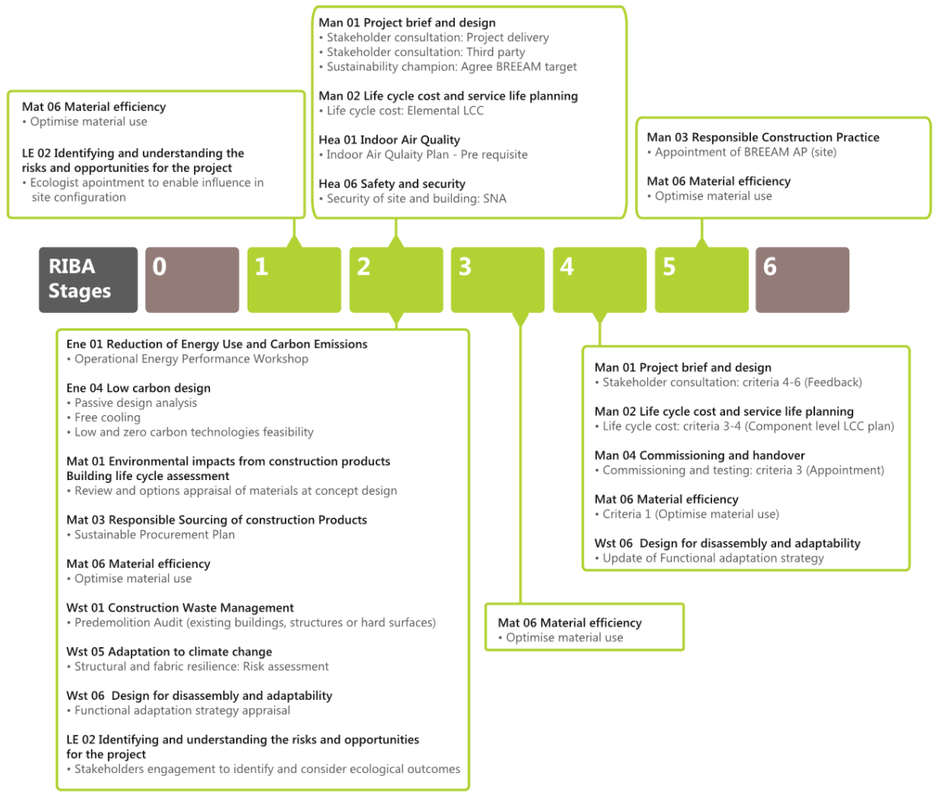


Figure 15-3 Stage dependent actions by RIBA Stage

There are a series of stage dependent requirements that need to be fulfilled if certain credits are to be targeted.

15.4 Minimum requirements for excellent

Table 15-1 outlines the minimum requirements for BREEAM Excellent certification, this shows that there are several requirements that are pre-requisite for Excellent certification. As a result, these are included within the required/assumed to be achieved within the pre-assessment results. Additional care and consideration should be made to these credits by the design team as certification will not be possible if one is not achieved.

Table 15-1 Minimum requirements for Excellent credits

ID	BREEAM Issue title	Excellent	Outstanding	Typical standard to be achieved
Man 03	Responsible construction management	1 credit	2 credits	Achieve all required construction management items / 6 additional items
Man 04	Commissioning-test schedule and responsibilities	1 credit	1 credit	Commissioning-test schedule and responsibilities
Man 04	Handover	Criterion 11	Criterion 11	Technical and non-technical Building User Guides developed prior to handover
Man 05	Commissioning-implementation	1 credit	1 credit	Commissioning implementation for 12 months
Ene 01	Reduction of CO_2 emissions	4 credits	6 credits	Equivalent Performance ratio EPR>0.4 / 0.6
Ene 01	Energy modelling and reporting	None	4 credits	Prediction of operational energy consumption modelling and reporting
Ene 02	Energy monitoring	1 credit	1 credit	Sub metering of major energy consuming systems
Wat 01	Water consumption	1 credit	2 credit	12.5% / 25% improvement in water usage over baseline
Wat 02	Water monitoring	Criterion 1	Criterion 1	Specification of water meter on mains supply
Mat 03	Responsible sourcing of materials	Criterion 1	Criterion 1	All timber is 'legally harvested and traded timber'
Wst 01	Project waste management	None	1 credit	Project waste management
Wst 03	Operational waste	None	1 credit	Dedicated space for recycling & segregating waste

15.5 Shell Only vs Full fit-out

The BREEAM New Construction version can be applied to fully fitted, shell only, and shell and core building projects. Camden's Local Plan Policy requires non-residential buildings in major developments to achieve a BREEAM rating of 'Excellent.'

As such this BREEAM pre-assessment has been undertaken to review the possible BREEAM certification level. The proposed development has a mixture of potential use types which will come under the BREEAM Shell Retail, as the commercial spaces will be shell only buildings with capped off services.

A shell only or shell and core building project is defined as one where the developer's scope of works is the design and construction of the base building only, leaving a range of construction and fit-out works to be completed before the building is able to be occupied. This may include some or all of the following elements: the structure, building envelope, core building systems including building servicing strategy and installations (such as HVAC) or plant support for installation of such systems and where present, fit-out of common areas.

The Shell and Core option of certification is available where the developer's scope of works covers shell works, external elements and hard and soft landscaping, plus core building services. Core building services relates to the installation of central or communal transportation systems, water systems, fit-out of common areas, central mechanical and electrical systems including HVAC, but without local fitting of systems within tenant areas. The systems will typically be centralised with capped off distribution to each tenanted area (for future connection as part of a tenant's fit-out works).

This does not include the full scope of a typical Category A fit-out, due to the fact that the specification of items such as ceiling finishes, raised floors and the zoning of local services above the lettable floor area and other Category A works are not typically finalised until the space undergoes final fit-out according to the tenant's specification and are liable to change. These items are, therefore, excluded from a shell and shell and core assessments undertaken for this scheme.

15.6 Site wide certification strategy

It is proposed that going forward, separate assessments of BREEAM New Construction 2018 for each use type are completed, all assumed to be Shell Only.

The current proposal would require a 'site-wide' approach to the retail assessment, within which residential amenity spaces are not included. This would allow for a single assessment to be submitted covering all commercial units. This will reduce certification and administration works; however, credit performance is based on the worst performing unit. Therefore this could potentially risk some of the credits. but ensure high quality across the development.

15.7 BREEAM Pre-assessment Summary

Pre-Assessment & Results

A BREEAM pre-assessment has been carried out for a non-specific shell only building type, using BREEAM 2018 New Construction, Shell Only, Sector: Retail, to identify the credit areas which are currently achievable, at risk and not currently targeted. The Pre-assessment sets out an indicative route to achieving the target but that the developer is not committing to any specific route to gain the BREEAM Excellent rating. However all these credits are not expected to be possible and the pool of credits reduced as the design progresses. These results are displayed in Figure 15-4.

The pre-assessment results indicate that the proposed development is on target to achieve a 'Excellent' rating providing that at least the credit areas identified as low risk (green) will be challenging. It should also be noted that all credit areas identified as "minimum standards for a BREEAM 'Excellent' rating" have been identified as low risk. Credit areas identified as in the "Unlikely" section (red) include credits that relate to those highlighted in Section 15.2 as particularly challenging for Shell Only assessments part of masterplans.

At this stage we have done a combined pre-assessment to assess the current performance of the site. We are currently on target for a score of 75%, which would certify the scheme as "Excellent" with a 5% buffer.

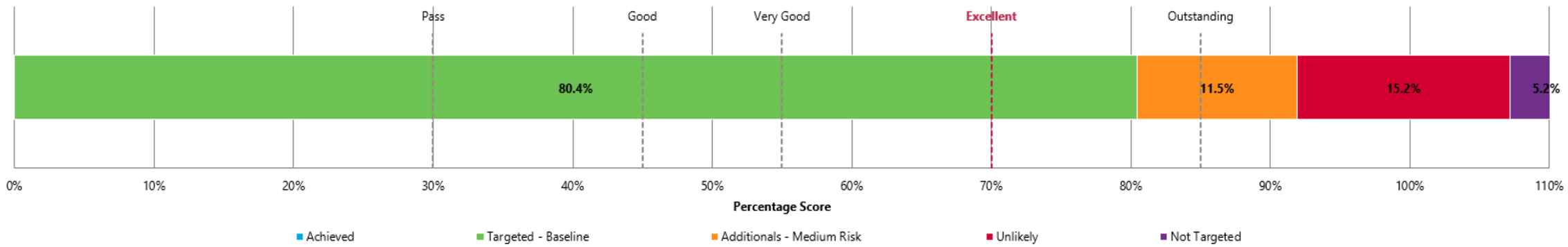


Figure 15-4 BREEAM pre-assessment results

16 Conclusions

16.1 Sustainability headlines

This Sustainability Statement has been developed on behalf of the Applicant in collaboration with the wider design team to create a cohesive, holistic, and overarching strategy for the site. It has been designed to respond to planning policies under the New London Plan and Camden Local Plan, as well as exceed the requirements in light of the climate emergency.

The vision for the site is ambitious and comprehensive so as to create a place that connects and supports the existing communities of Finchley Road and West Hampstead, providing something for everyone - a mix of homes where people can stay and grow; jobs and local opportunities; shops, restaurants, leisure and community facilities; and new green public spaces to relax with friends and family. With sustainability at the heart of the aspirations for the site, the commitments and key performance indicators are broad ranging and include the following:

Building Design

- Fabric first approach, exploring passive design optimisations and energy efficiency measures achieving a **13% regulated carbon reduction** from energy efficiency measures alone ('Be Lean') across the detailed plots across the site;
- All-electric strategy – Heat pumps to meet all heating, cooling and hot water demands (i.e no combustion on site); combined with roof top PV to achieve a **66% regulated carbon reduction** ('Be Green') across the detailed plots;
- **Optimised solar photovoltaics** aligned with rooftop plan, ecology and amenity requirements and aspirations;
- Internal environments to be designed to ensure **comfort and resilience to climate change**. Homes to be resilient to changing climates and designed to balance:
    - Energy performance
    - Provide good internal daylighting levels
    - Minimise overheating risk taking into account future climate change
- The remaining regulated carbon **emissions to be offset** at £2,850/tonne CO_2, paid to LBC for each phase to facilitate local carbon reduction projects.
- **BREEAM Certification** (Internationally recognised sustainability standard for buildings) New Construction 2018 to an **'Excellent'** standard for commercial spaces; and
- Embodied carbon of new build to be designed targeting the GLA aspirational targets, **<500 kgCO_2/m² GIA (modules A1-A5)**, reducing over time as future phases are brought forward.

Material reuse and circular economy

Multiple targets have been set within the application regarding material retention, reuse, and recycling.

- Firstly, overall site wide targets have been set as following:
    - Excavation waste, Demolition waste and Construction waste - **Minimum 95% (by tonnage)** to beneficial use/diversion from landfill in line with policy and BREEAM.
- Secondary targets are set for the deconstruction of the O2 centre. These are based around the embodied carbon of the existing building materials. Targets have been set to retain/reuse or recycle the most carbon intensive elements on site. % of embodied carbon break down as follows:
    - Minimum target**: >50% of the embodied carbon of the O2 centre retained**, **reused or recycled** on site, with a stretch target of 70%. Analysis at later stages will assess the feasibility of strategies to achieve more than 50% retention, reuse or recycling.

Further detail is outlined in the Sustainability Statement and **Circular Economy**, which can be found in Section 11 and in the accompanying Circular Economy Statement submitted as part of the application.

Water use and Sustainable Urban Drainage

- Water efficient fittings & design solutions, to reduce internal water consumption **below 105 l/person/day**;
- Holistic storm water management strategy built into the natural environment, including;
    - ~5,700m² of **green roofs** across the site;
    - Permeable paving;
    - **Swales, rain gardens** and bioretention strips in landscaped areas; and
    - Tanked storage as a last step.
- **Run off volumes to be <50%** of the existing site rate.

Biodiversity and landscape design

- Site massing designed around maximising daylight to public realm;
- >50% public realm space across the site;
- **~165% increase in biodiversity** net gain;
- **Circular economy principles** built into landscape design through on-site material reuse from existing O2 centre and Homebase; and
- **Community gardens** in public realm, for stewardship by residents and local groups.

Sustainable transport

- Site wide **sustainable transport strategy** to encourage healthy lifestyles;
- Segregation of vehicular access and pedestrian routes through site, to increase safety and ensure a pleasant walking environment for families;
- **Dedicated cycle routes** for ease of commuter access;
- Through ease of access to public transport, cycle routes, and 20% active and 80% passive residential **electric car charging points**;
- Bus stop to be provided at new community green, next to **new health care centre**, allowing for ease of access to key areas of the site.

This sustainability statement reflects the thorough and holistic appraisal that has been conducted for the site in collaboration with all the specialist consultants appointed by the applicant and in conjunction with all relevant stakeholders. The result is an ambitious overarching vision for the site that pushes beyond what is required for planning and delivers a scheme that achieves the best practice of sustainable development.

Click here to enter text.

Jon Gregg, Josephine Benthall & Loic Weisser
Buro Happold Limited
17 Newman Street
London
W1T 1PD
UK

T: +44 (0)207 927 9700
F: +44 (0)870 787 4145
Email: Josephine.Benthall@BuroHappold.com