

Brunel Walk Redevelopment and Turner Avenue Estate Improvements

Sustainability Statement

05 October 2022

Brunel Walk, Haringey, N15 5HQ and Turner Avenue Estate, Haringey, N15 5DG

BRUNEL WALK REDEVELOPMENT AND TURNER AVENUE ESTATE IMPROVEMENTS

SUSTAINABILITY STATEMENT

Quality Assurance Page

Issue	Date	Prepared By	Checked By	Approved By	Remarks
P01	22/08/2022	Mr W. Newall	Mr R. Denteh	Mr. R. Wilkes	Draft Issue
P02	14/09/2022	Mr W. Newall	Mr R. Denteh	Mr. R. Wilkes	Draft Issue
P03	03/10/2022	Mr W. Newall	Mr R. Denteh	Mr. R. Wilkes	Draft Issue
P04	05/10/2022	Mr W. Newall	Mr R. Denteh	Mr. R. Wilkes	Issue for Planning



Figure 1: CGI of the proposed development from Kirkton Road

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Appendix A.1 – Whole Life Carbon Assessment

1 EXECUTIVE SUMMARY

This Sustainability Statement has been prepared by Meinhardt on behalf of London Borough of Haringey ('the Applicant') in support of an application for full planning permission for the Brunel Walk redevelopment and Turner Avenue Estate improvements. . The proposals involve the redevelopment of Brunel Walk to provide 45 new Council rent homes in four buildings ranging from 3 to 4-storeys high including 39 apartments and 6 maisonettes, provision of associated amenity and play space, cycle and refuse/recycling stores and 4 wheelchair parking spaces, and reconfiguration and enhancement of existing parking areas and outdoor communal areas and play spaces on the Turner Avenue Estate.

The proposed statement addresses the key issues relating to sustainable design and construction including water use, drainage, flood risk, pollution, air quality, noise and vibration, materials, waste, transport, management, health and well-being and energy and overheating.

Sustainability is an integral part of the proposed development design, with each section of the sustainability strategy (section 5) demonstrating how the scheme satisfies national, regional and local planning guidance in relation to sustainability and climate change mitigation/adaption.

The strategy also details how the proposed development responds to the Mayor's Whole Life Carbon Assessment (WLCA) Planning Guidance.

The WLCA has considered embodied and regulated operational energy use of the proposed development, commencing from a "cleared flat site" in accordance with RICS guidelines.

The overall results show that the Proposed Development will have a cradle to grave emission of 3,824,739 tonnes CO₂e. The results of the assessment have been compared to the WLC benchmarks specified in the GLA guidance for apartments as this is deemed the most suitable building type to be used for comparison. For the full assessment please refer to appendix A.1.



Figure 2: CGI of the proposed development from Kirkton Road (Block D)

2 INTRODUCTION

2.1 This Application

This Sustainability Statement has been prepared by Meinhardt on behalf of London Borough of Haringey ('the Applicant') in support of an application for full planning permission for the Brunel Walk redevelopment and Turner Avenue Estate improvements ('the Site'). . The proposals involve the redevelopment of Brunel Walk to provide 45 new Council rent homes in four buildings ranging from 3 to 4-storeys high including 39 apartments and 6 maisonettes. Provision of associated amenity and play space, cycle and refuse/recycling stores and 4 wheelchair parking spaces. Reconfiguration and enhancement of existing parking areas and outdoor communal areas and play spaces on the Turner Avenue Estate.

The purpose of this Sustainability Strategy report is to demonstrate how the scheme satisfies national, regional and local planning guidance in relation to sustainability and climate change mitigation/adaption.

This report should be read in conjunction with the other documents related to the application, including;-

- Planning Statement
- Design and Access Statement
- Affordable Housing Statement
- Landscape Strategy
- Preliminary Ecological Appraisal (PEA) and Biodiversity Survey Report
- Infrastructure Impact Assessment
- Land Contamination Statement
- Environmental Statement
- Transport Assessment
- Framework Travel Plan
- Delivery and Servicing Plan
- Draft Construction Environmental Management Plan
- Waste Management Strategy
- Fire Statement
- Flood Risk Assessment and Drainage Strategy
- Statement of Community Involvement
- Energy and Overheating Assessment

2.2 The Project Team

Client:	London Borough of Haringey
Planning consultant:	London Borough of Haringey
Architect:	KC+A architects
Landscape architect:	Oobe
Employers Agent:	Madlins
Energy & sustainability:	Meinhardt (UK) Limited

MEP consultant:	Meinhardt (UK) Limited
Transport consultant:	RGP
Civil & structural engineer:	Meinhardt (UK) Limited
Ecology:	EPR Ltd
Geotechnical Investigations (Desktop):	Meinhardt (UK) Limited
Air quality consultants:	ACCON UK Limited
Acoustic consultant:	Max Fordham
Archaeology:	Hayden's
Daylight and sunlight:	Right of Light Consulting
Topographic, Elevational& Utilities:	SES

3 SCHEME OVERVIEW

3.1 Site and Surroundings

The site is located within the Tottenham Green area to the south east of the Borough. It stretches east to west, immediately south of the Turner Avenue Estate and is accessed via Kirkton Road at its eastern end. It is very close to West Green Road to the north with its local shops and easy access to buses. Seven Sisters Underground and overground are the nearest train stations, under half a mile away (8-minute walk) with further option slightly further such as Tottenham Hale overground and tube station to the east and Turnpike Lane tube station to the west.

The nearest primary school is Seven Sisters Primary School. The college at Haringey is located 0.6 miles to the east whilst Park View Secondary School is less than a mile away to the west of the site.

Downhills Park is approximately a 12-minute walk away as well as Chestnuts Park a similar distance, both located to the west of the site. Brunswick Road Open Space is closer by and is a short 6 minute walk from the site being under 500m away.

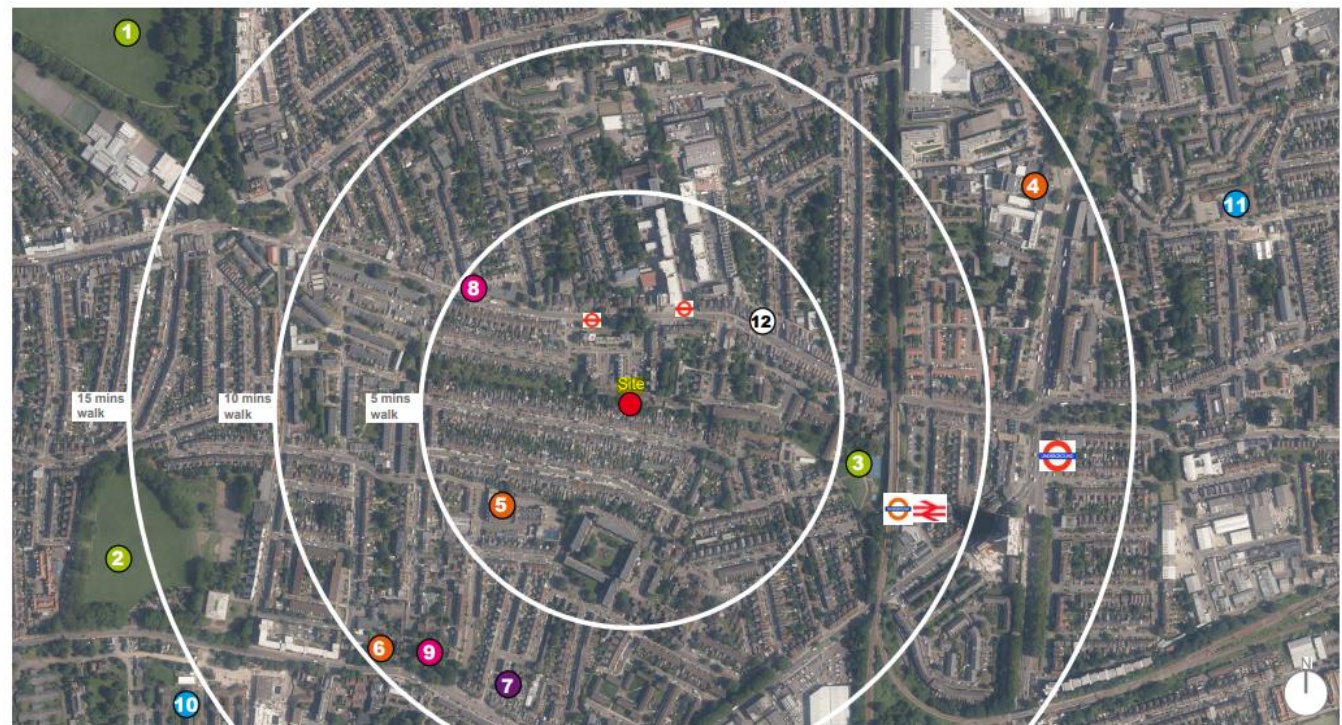


Figure 3: Aerial View of Existing Site

The site is close to but not within the Clyde Circus Conservation Area to the north. It is seen as a backland location with available frontage onto Kirkton Road and Elmar Road but can be seen from Turner Avenue. Although some are poorly maintained or have received incongruous external treatments, the attractive terracing to Kirkton Road, Elmar Road and West Green Road (including the Clyde Circus Conservation area) provide attractive reference to character and detailing. These include stone sills and headers, brick or stone banding to

help proportion and detail the facade, recessed entrance, the use of brick, stucco/stone mouldings and vertical fenestration creating a rhythm to the facade.

3.2 The Proposed Development

The Proposed Development comprises will provide 45 new Council rent homes in four buildings ranging from 3 to 4-storeys high including 39 apartments and 6 maisonettes. Provision of associated amenity and play space, cycle and refuse/recycling stores and 4 wheelchair parking spaces. Reconfiguration and enhancement of existing parking areas and outdoor communal areas and play spaces on the Turner Avenue Estate.

The proposal seeks to re-organise the existing parking provision for the Turner Avenue Estate and to provide improvements to the public realm and connectivity throughout the area. Within Turner Avenue Estate the layout of existing parking areas that provided 29 spaces have been rationalised and the parking integrated into a pedestrian priority areas. However, in total 29 parking spaces including the 3 wheelchair spaces have been re-provided in order to meet existing demand on the estate. No car parking associated with the Turner Avenue Estate would be lost following the proposals.



Figure 4: Location Site Plan

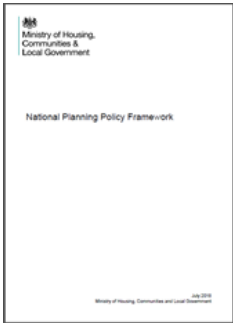
Extensive public realm and landscape improvements to the wider Turner Avenue Estate are proposed as part of the scheme. These include rationalising existing parking areas to create a more pedestrian focused environment and additional green space. New and improved children's play areas, buffer planting to ground floor homes and additional tree planting. New shared private gardens are proposed.

The proposal has adopted a fabric first approach with efficiently designed building envelopes and improved u-values and a high air tightness. It is proposed to utilise a green roof and use renewable technologies including PVs and air source heat pumps.

4 PLANNING POLICY

4.1 National

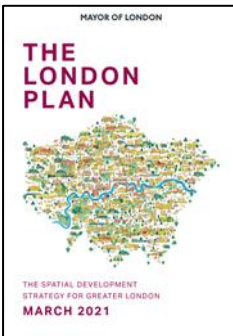
4.1.1 National Planning Policy Framework (2021)



The National Planning Policy Framework (NPPF) set out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. Identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. National planning Practice Guidance provides comprehensive coverage of all required policies.

4.2 Regional

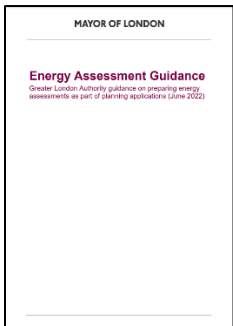
4.2.1 The London Plan (2021)



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.

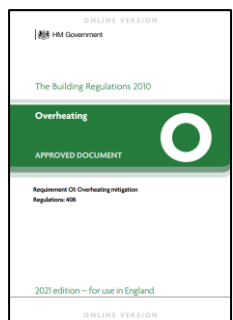
4.2.2 Energy Assessment Guidance (2022)



This guidance document explains how to prepare an energy assessment to accompany strategic planning applications referred to the Mayor.

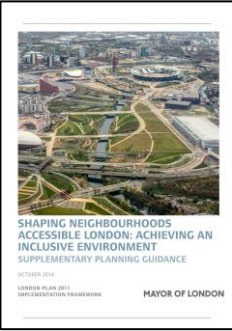
The purpose of an energy assessment is to demonstrate that the proposed climate change mitigation measures comply with London Plan energy policies, including the energy hierarchy. It also ensures energy remains an integral part of the development's design and evolution.

4.2.3 Building Regulations: Part O (2021)



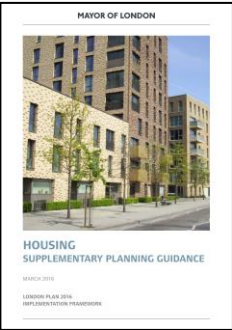
This Approved Document covers the overheating mitigation requirements of the building regulations as set out in Part O of Schedule 1 to the Building Regulations and in a number of specific building regulations. Technical guidance is contained in Approved Document O. Approved Document O applies to new residential buildings.

4.2.4 Shaping Neighbourhoods: Accessible London SPG (2014)



The Accessible London SPG provides advice to boroughs, developers, designers and planning applicants on implementing inclusive design principles effectively and on creating an accessible environment in London, with particular emphasis on the access requirements of disabled and older people.

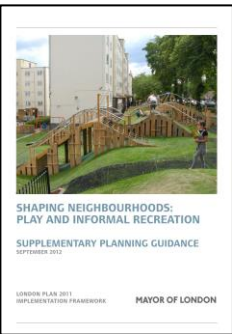
4.2.5 Housing SPG (2016)



This supplementary Planning Guidance (SPG) provides guidance on the implementation of housing policies in the 2015 London Plan and the 2016 Minor Alterations to the Plan (MALP).

The guidance covers housing supply, housing quality, housing choice, viability appraisals, investment and existing housing stock, social infrastructure, and mixed use/large developments.

4.2.6 Shaping Neighbourhoods: Play and Informal Recreation SPG (2012)



The Play and Informal Recreation SPG provides more detailed guidance relating to the implementation of London Plan Policy 3.6 and a range of policies on shaping neighbourhoods.

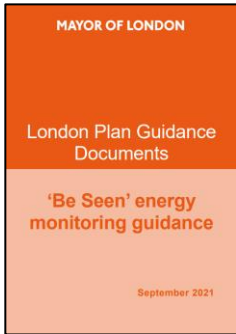
4.2.7 Social Infrastructure SPG (2015)



The Social Infrastructure SPG provides guidance to support London Plan Policy 3.16 on the Protection and Enhancement of Social Infrastructure, as well as policies 3.17 Health and Social Care Facilities, 3.18 Education Facilities and 3.19 Sports Facilities.

It particularly focuses on those elements of social infrastructure that face the biggest strategic challenges— specifically health, education, sport, faith and burials.

4.2.8 'Be Seen' Energy Monitoring Guidance



This guidance explains the process that needs to be followed to comply with the 'Be Seen' post-construction monitoring requirement of Policy SI2 of the new London Plan.

The collected data will help the GLA and local authorities better understand how London Plan policies are being applied to new developments, it will provide useful insights to the performance gap and will drive improved building performance.

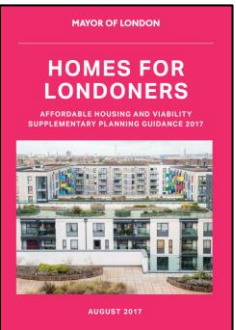
4.2.9 The Control of Dust and Emissions During Construction and Demolition SPG (2014)



This document provides more detailed guidance on the implementation of all relevant policies in the London Plan and the Mayor's Air Quality Strategy.

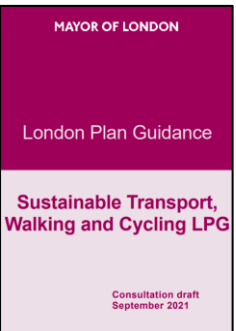
It sets out the methodology for assessing the air quality impacts of construction and demolition in London and identifies good practice for mitigating and managing air quality impacts, with the overarching aim of protecting public health and the environment.

4.2.10 Affordable Housing and Viability SPG (2017)



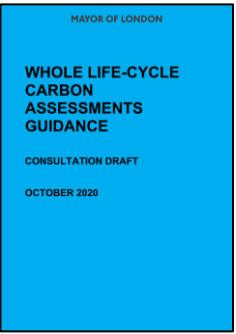
This supplementary planning guidance (SPG) focuses on affordable housing and viability. It includes four distinct parts: background and approach; the threshold approach to viability assessments; detailed guidance on viability assessments; and a specific approach to Build to Rent schemes.

4.2.11 Sustainable Transport Walk and Cycling LPG (Draft for Consultation)



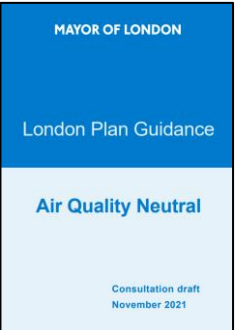
This guidance uses the terms safeguarding and protection to refer to the general approach of preventing development that would conflict with the operation and necessary expansion of London's transport networks.

4.2.12 Whole Life-Cycle Carbon Assessments Guidance (Draft for Consultation)



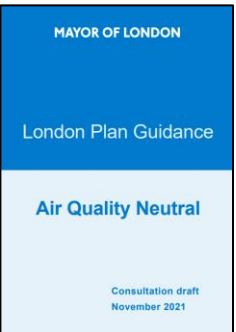
This guidance explains how to calculate WLC emissions and the information that needs to be submitted to comply with the policy. It also includes information on design principles and WLC benchmarks to aid planning applicants in designing buildings that have low operational carbon and low embodied carbon.

4.2.13 Air Quality Positive (Draft for Consultation)



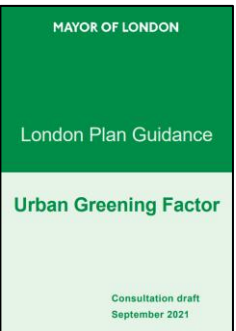
The Air Quality Positive guide is intended to maximise the benefits to local air quality in and around a development site or masterplan area and minimise exposure to existing sources of poor air quality. It requires planners, designers, architects and air quality experts to show what measures have been taken during the design stages to achieve the best possible outcomes for air quality.

4.2.14 Air Quality Neutral (Draft for Consultation)



'Air Quality Neutral' is a term for developments that do not contribute to air pollution beyond allowable benchmarks. The benchmarks, set out in this guidance, are based on research and evidence carried out by building and transport consultants.

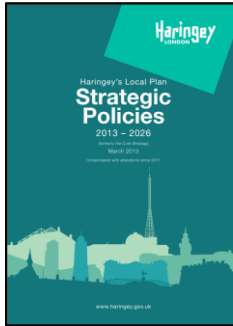
4.2.15 Urban Greening Factor Guidance (Draft for Consultation)



The Urban Greening Factor is a tool to evaluate the quality and quantity of urban greening. It enables major developments to demonstrate how they have included urban greening as a fundamental element of site and building design in order to meet London Plan Policy G5 Urban greening.

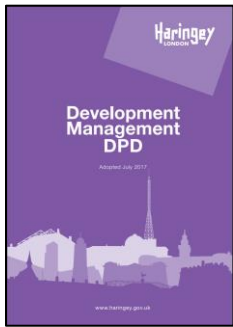
4.3 Local

4.3.1 Haringeys Local Plan: Strategic Policies 2013-2026



Haringey's Local Plan: Strategic Policies was adopted by the council in 2013, to replace the Unitary Development Plan (UDP) - with subsequent alterations adopted on the 24 July 2017. The purpose of the document is to set out the long term vision of how Haringey should develop by 2026 and sets out the council's strategy for achieving that vision including high-level strategic policies used in determining planning applications.

4.3.2 Development Management DPD (2017)



The council has prepared a Development Management Development Plan Document (DPD) which sets out planning policies to help determine which developments are granted planning permission in Haringey. It was adopted by the council on the 24 July 2017.

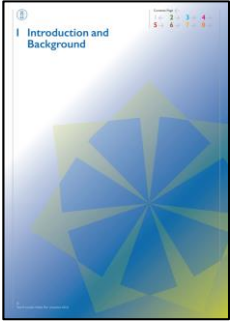
4.3.3 Sustainable Design & Construction SPD (2013)



The Sustainable Design and Construction Supplementary Planning Document (SPD), was adopted in February 2013. The document supports the Local Plan: Strategic Policies (adopted March 2013).

The SPD can be found in the attached files section below. The SPD is considered in determining planning applications. It does not create new policy but complements the Local Plan and brings together policy requirements and guidance from national, regional and local planning framework that promote sustainable buildings.

4.3.4 North London Waste Plan (2022)

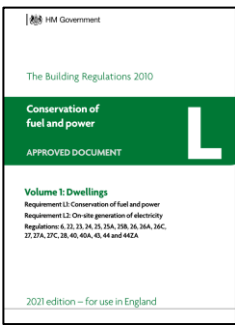


The 7 North London boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest have prepared a joint Waste Plan. It was adopted by Haringey Council on 18 July 2022.

The Waste Plan identifies a range of suitable sites for the management of all North London's waste up to 2031, and includes policies and guidelines for determining planning applications for waste developments.

4.4 Other Relevant Documentation

4.4.1 Building Regulations: Part L (2021)

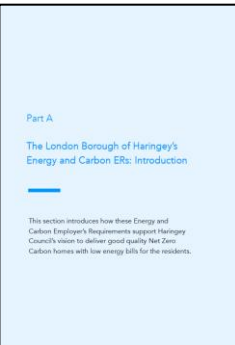


The Building Regulations set out the statutory standards that developments are to meet. Part L covers energy efficiency requirements.

An updated Building Regulations Part L was published in December 2021 that will deliver a 30% reduction in carbon emissions for domestic buildings and a 27% reduction for non-domestic, when introduced in June 2022.

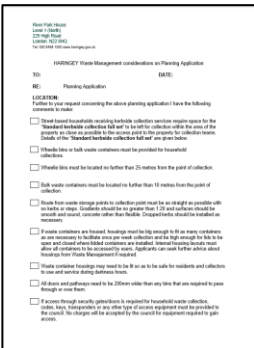
Further consultation is expected on the new Future Homes Standard and Future Buildings Standard which are intended to be introduced in 2025.

4.4.2 The London Borough of Haringey's Energy and Carbon ERs



This section introduces how these Energy and Carbon Employer's Requirements support Haringey Council's vision to deliver good quality Net Zero Carbon homes with low energy bills for the residents.

4.4.3 Haringey Waste Management Considerations on Planning Applications



This document includes the requirements with regards to waste management and storage, as well as detailing waste container types sizes and applications.

5 SUSTAINABILITY STRATEGY

5.1 Whole Life Carbon

A Whole Life Carbon Assessment (WLCA) has been carried out to demonstrate the embodied and operational carbon emissions for the proposed development.

The aim of this assessment is to model the whole life carbon impact of the proposed design in accordance with RICS Guidance and GLA Sustainability Guidance, using SAP and OneClick LCA software.

The assessment has considered embodied and regulated operational energy use of the proposed development, commencing from a “cleared flat site” in accordance with RICS guidelines.

The overall results show that the Proposed Development will have a cradle to grave emission of 3,824,739 tonnes CO₂e.

The results of the assessment have been compared to the WLC benchmarks specified in the GLA guidance for apartments as this is deemed the most suitable building type to be used for comparison.

The results in the Table below show that the carbon emissions associated with modules A1-A5 and modules B-C are below the WLC benchmark specified in the GLA guidance.

Module	Brunel Walk	GLA Baseline WLC Benchmark	GLA Aspirational WLC benchmark
Modules A1-A5	433 kgCO ₂ e/m ²	750 to 850 kgCO ₂ e/m ²	450 to 500 kgCO ₂ e/m ²
Modules B-C (excluding B6 & B7)	314kgCO ₂ e/m ²	300 to 400 kgCO ₂ e/m ²	180 to 240 kgCO ₂ e/m ²

Table 1: WLCA Emission Results compared to GLA benchmarks

The full assessment is provided in Appendix A.1.

5.2 Water

5.2.1 Water Efficiency

Water is becoming an increasingly scarce resource, with new development generating a growing demand. To meet increased demand new water sources and associated infrastructure need to be in place.

London and the South-East is one of the UK’s water stressed areas where demand is rapidly outgrowing supply. Freshwater consumption of the proposed development will be reduced through water efficiency.

In accordance with the optional requirement of Building Regulation Part G, in the apartments the proposed development will aim to reduce average internal potable water consumption to 105 litres per person per day plus 5 litres per person per day for external use, which equates to approximately two thirds of the London average, however final consumption will largely depend on the occupants behaviours.

This will be achieved through the provision of efficient water fittings throughout the development, including aerated shower heads and taps (also helping to reduce hot water demand), dual flush toilets, and low water consumption appliances where provided, as outlined below:

Fitting	Flow Rate
WC	6 / 3 litre dual flush
Bath	160 litres capacity to overflow
WHB Taps	4 litres/minute aerating tap
Shower	8 litres/minute
Kitchen Taps	5 litre/minute
Washing Machine	8.17 litres/kg
Dishwasher	1.25 litres/place setting

Table 2: Proposed residential water fittings

Domestic water supplies will be separately metered using smart meters to allow residents and the local water authority to easily monitor water consumption.

5.3 Flood Risk Assessment

Please refer to Meinhardt’s Flood Risk Assessment and Drainage Strategy report for full details of the flood risk assessment carried out for the proposed development, which is summarised below.

The Environment Agency (EA) flood prediction maps show that the site is located in Flood Zone 1. The proposed buildings usage is classified as ‘More Vulnerable’ in the NPPF which is suitable for the construction within Flood Zone 1 and therefore passes the sequential test outlined in the NPPF guidance.

Following the assessment within the FRA, the site is deemed to be at low risk of flooding from all sources of flooding and will not increase the risk of flooding off site. Although the site is located in a Critical Drainage Area, the online surface water flood maps indicate that surface water flooding is concentrated along the eastern part of the site, where the proposed new dwelling is raised above existing flood levels, additionally the surface water drainage strategy will ensure surface water is reduced off site to greenfield rates and designed to cater for the 1:100 year + 40% Climate change event and therefore there will be no detrimental impact off site. Therefore, no additional flood mitigation measures (such as flood barriers) have been proposed for the development.

Overall, the scheme complies with National and local policy requirements in terms of flood risk by ensuring areas where surface water flooding is known, FFL for residential dwellings are raised above this predicted flood level to mitigate this risk. All other forms of flooding is deemed low risk.

5.4 Foul and Surface Water Drainage Strategy

The proposed new build development will increase the impermeable area within the Brunel Walk development, however surface water will be attenuated as close to Greenfield runoff rates as reasonably practicable, as per the Sustainable Urban Drainage Systems (SuDS) Non-Statutory Technical Standards and London Borough of Haringey (LBH) requirements. The site will reduce surface water to a rate of 2.5 l/s for the 1 in 100 year plus climate change rainfall event. This provides a 92.2% betterment on the existing 1 in 1 year peak discharge rate and a 98.0% improvement on the existing 1 in 100 year peak discharge rate. The scheme achieves this by providing SuDS in the form of blue/green roofs on all buildings, as well as rain gardens and traditional below ground attenuation.

Thames Water have been consulted on the surface water discharge rate and foul water discharge rate for the new development and have agreed this is a suitable rate and the associated sewers can cater for these flows.

For the wider Turner Estate, the proposed landscaping scheme as indicated with reference to drawing “5350-OOB-ZZ-00-DR-L-0050_P02” from the landscape architect (Oobe) provides new areas of permeable paving which in turn will aid in any reductions of surface water runoff from the Turner Estate which has the further benefit of reducing surface water rates from the development as a whole.

Overall the scheme complies with National and local policy requirements in terms of SuDS and drainage by providing SuDS features and reducing surface water runoff rates.

For further information refer to Meinhardt's Below Ground Drainage Strategy report.

5.5 Noise and Vibration

An unattended noise survey was undertaken on site between the Friday 24th and Tuesday 28th of September 2021 to determine typical mean ambient (LAeq) and background (LA90) sound levels in the vicinity of Brunel Walk.

Based on survey measurements, the proposed adopted representative background sound levels (as per BS 4142 methodology) were determined as 42 dBA (day) and 38 dBA (night). Haringey Council generally requires that plant noise is limited to a level 10 dB below background (although this is taken on a case by case basis). It is proposed that plant noise limits of 32 dBA (day) and 30 dBA (night) are applied – the night time level being only 8 dB below background but still representing a very low level.

Acoustic ratings of the glazing elements (i.e. windows and doors) have been recommended to deliver required BS 8233:2014 internal noise levels, (with windows closed and normal background ventilation provided by MVHR) meaning ambient noise levels will be suitable for the proposed residents.

Due to generally low ambient noise levels (the long-term survey returning 49 dBA LAeq,16hr and 46 dBA LAeq,8hr), opening windows for increased ventilation and overheating mitigation is considered acceptable. With respect to ProPG and AVO Guide assessments, the site is considered no worse than the 'Low' risk category. An assessment with respect to the recently introduced Building Regulations Approved Document O Overheating, shows that the scheme is expected to be in line with the noise expectations mentioned in Approved Document O.

Outdoor amenity spaces, such as the surrounding grounds and balconies, will typically have mean daytime ambient noise levels of ≤55 dBA, and as such are considered appropriate conditions in an urban context under BS 8233 methodology.

In conclusion, the site is considered appropriate for residential use- for both pre-existing and proposed residents. Please refer to the Noise Impact Assessment by Max Fordham for more details.

5.6 Air Quality

5.6.1 Air Quality Assessment

The construction dust risk assessment has concluded that the closest of the surrounding sensitive receptors are considered to be placed within the low to medium-risk category prior to Best Practice mitigation measures. However, with following best practice mitigation guidance, which are outlined in the Air Quality Neutral Assessment Report, those receptors previously categorised as medium risk would be re-categorised as low risk, and those previously categorised as low risk would be re-categorised to negligible.

During the operation phase, the Breeze Roads modelling predicts that there will be no exceedances of the nitrogen dioxide or particulate matter objectives at the sensitive development receptors on the proposed development site.

As the development will be car-free, there is not anticipated to be an increase in vehicle movements as a result of the development, and therefore no impacts have been modelled.

For more information refer to Accon's Air Quality Neutral Assessment report.

5.6.2 Air Quality Neutral Assessment

In order to determine whether the development is 'Air Quality Neutral' the building and transport emissions associated with the development were compared to Building and Transport Emissions Benchmarks outlined in

accordance with the requirements of the Sustainable Design and Construction Supplementary Planning Guidance (SPG) accompanying the London Plan, and an associated Planning Guidance Update.

As there will be no predicted increases in vehicle movements, and the heating and power will come from ASHP and WSHP (which produce no emissions) there will be a predicted total difference of -118.5kg per year for NOx and -4.4kg per year for PM10. Accordingly, the development is classified as Air Quality Neutral.

For more information refer to Accon's Air Quality Neutral Assessment report.

5.7 Materials

5.7.1 Sustainable Materials

A sustainable procurement plan will be developed to ensure that sustainable materials are used in the proposed development. Elements including walls, roofing, floors, windows, kitchens, insulation, and landscaping materials, will be selected with a BRE Green Guide rating of A to C where possible.

100% of non-reclaimed timber for basic building and finishing elements will be FSC certified.

A specific review will be carried out to determine the opportunities to maximise use of recycled/secondary aggregates in non-structural elements.

Development partners and their contractors will be encouraged to ensure that the products, materials and services they procure are responsibly sourced.

Wherever possible, insulation materials will be used which have zero Ozone Depletion Potential (ODP) and a Global Warming Potential (GWP) of 5 or less.

5.7.2 Recycled Aggregates

Recycled aggregate will be considered for use within non-structural concrete elements within the landscaping scheme. Due to inconsistencies in recycled aggregate size and quality, they will not be accepted for the structural frames.

5.8 Waste

5.8.1 Construction Waste

Site waste will be managed on site through a Construction Management Plan which will emphasise the need to minimise waste leaving site and the reuse of materials on the site in line with the waste hierarchy. Waste from the site will be managed via a certified waste contractor and will be monitored through best practice site management procedures.

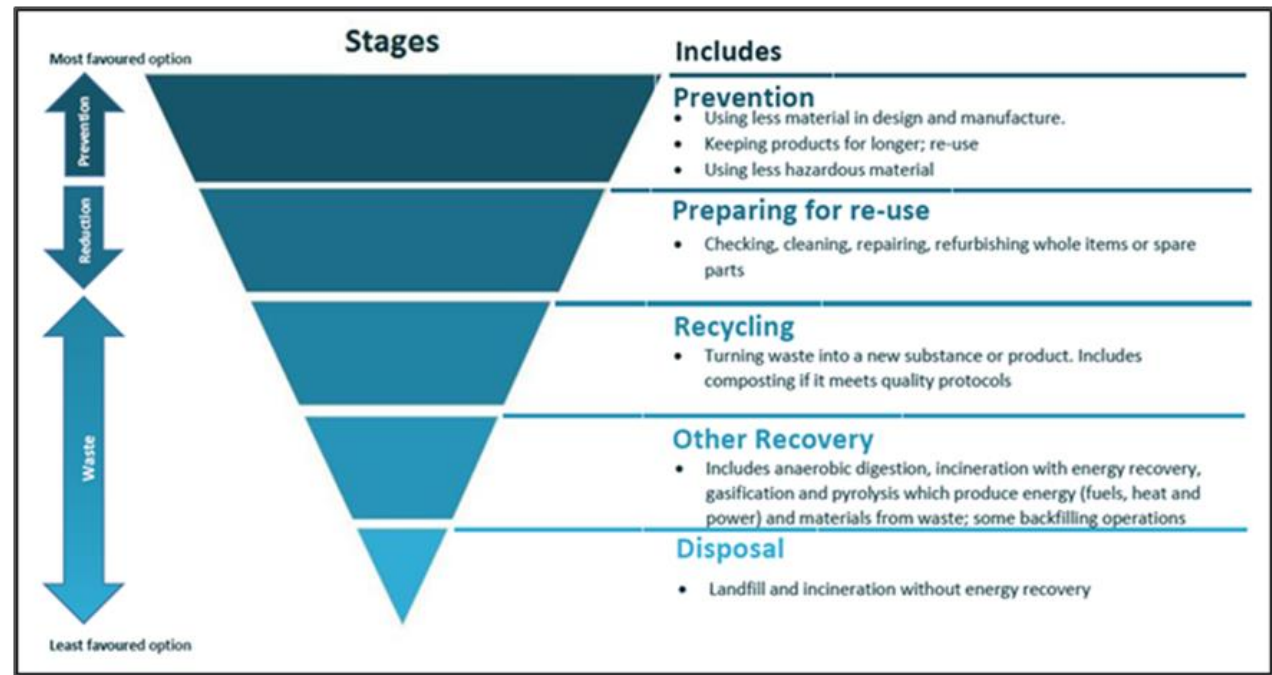


Figure 5: The Waste Hierarchy

All waste on site will be managed in accordance with the waste hierarchy, with 0% of biodegradable and/or recyclable material being sent to landfill.

Where waste must be removed from site and this is not re-usable, this will be managed through a licenced waste contractor with the following benchmarks for diversion from landfill being targeted as an absolute minimum in line with Best Practice.

Type of Waste	Volume	Tonnage
Non-Demolition	85%	90%
Demolition	85%	95%
Excavation	95%	95%

Table 3: Diversion from Landfill Benchmarks

Quantity of waste diverted from landfill will be in accordance with the Table above as a minimum, with the overall aim that the development will be net zero waste, with all waste either being re-used on site or recycled via a licenced waste contractor.

5.8.2 Operational Waste

Flexible and easily accessible space for segregating and storing waste for collection, recycling and reuse will be provided to promote recycling.

The provision of information on the ability of occupants to recycle items is shown to strongly increase recycling uptake. Therefore, information on the waste bins provided, what can be placed in each bin, where larger items can be taken and when, will be provided to residents to inform their waste decisions during the operational phase of the development.

5.9 Ecology

Ecological surveys completed include a Preliminary Ecological Appraisal, building inspection for bat suitability, ground level tree assessment for bat suitability, and bat emergence surveys.

Internationally designated sites within 2km include Lee Valley Special Protection Area and Lee Valley Ramsar site. The potential for significant impacts on internationally designated sites arising from allocation SS3 was considered in the Habitats Regulations Assessment (HRA) for the Tottenham Area Action Plan (TAAP). The

HRA concluded that the TAAP policies would not result in a likely significant effect on any internationally designated site and that conclusion is confirmed in this report. Significant negative impacts on nationally and locally designated sites are also unlikely in view of a lack of impact pathway or due to the relative separation distances between the development site and designated sites.

Habitats within the site are built up areas and grasslands and are on within zone of influence importance only.

The Brunel Walk buildings have low bat roosting suitability. The Turner Avenue buildings have negligible bat roosting suitability. One moderate suitability tree and three low suitability trees were recorded. No bat roosts were identified in on-site buildings or trees during subsequent evening emergence surveys. The bat assemblage is of local importance.

The following mitigation measures will be implemented:

- Works to tree with low and moderate bat suitability will be completed sensitively under a safe working method statement.
- Construction activities will be controlled by a Construction Environmental Management Plan (CEMP) to avoid impacts on the bat assemblage.
- A sensitive operational phase lighting strategy will be developed to enable bat to continue to use parts of the site post-development.
- A landscape and ecology Management plan will be developed to maximise the biodiversity benefits provided by new landscaping.

The proposals will deliver a biodiversity net gain of 23.3%.

Subject to the implementation of the impact avoidance, mitigation and compensation measures set out below, the Proposed Development will not have any significant negative residual effects on important ecological features and will conform to all applicable nature conservation related legislation and policy.

For more information refer to EPR's ecological appraisal report.

5.10 Transport Assessment

The Transport Assessment (TA), prepared by RGP, considers the highway and transport planning implications associated with a proposed residential redevelopment at Brunel Walk, Haringey, N15 5DG. This TA provides a full Healthy Streets assessment, in line with TfL requirements and aspirations.

The TA demonstrates the following:

- The site is located at Brunel Walk within South Tottenham which is a residential cul-de-sac comprising 35 residential flats and 1 house. Brunel Walk is a private route which connects users between Elmar Road to the west and Lomond Close / Kirkton Road / Braemar Road to the east of the site. There are 6 car parking spaces accessed via Braemar Road which are allocated to dwellings at the eastern part of the site;
- There are significant opportunities for journeys to be undertaken via active or sustainable modes of transport, owing to the site's good access to local facilities on foot and by cycle as well as good PTAL rating;
- The development proposals comprise the redevelopment of the site in order to provide 45 residential flats comprising a mix of 1-3 bedroom units;
- The proposals would operate as a car-free development, owing to the site's high PTAL. Two disabled parking bays would be provided from Braemar Road to the east of the site, in accordance with the London Plan (2021) standards. The proposals also seek to offer improvements to the public realm and connectivity throughout the local area, including improved parking and access arrangements associated with the Turner Avenue Estate. The proposals would re-provide all existing parking associated with the estate in order to meet existing parking demands;
- Sufficient cycle parking would be provided for each residential block, in line with the London Plan (2021) standards and the LCDS;

(vi) Communal cycle storage hangers will be provided for use by existing residents;

(vii) The public realm works would deliver an improved delivery and servicing strategy for the site, due to the constrained access at the site. Each residential block would be provided with sufficient bin storage provision, in line with local design standards and guidance. The proposals would therefore offer a significant improvement in terms of the existing refuse collection arrangements for the site;

(viii) In order to facilitate the improved access arrangements and connectivity, parts of the public highway would need to be ‘stopped up’ and the application/process would be run in parallel with this planning application;

(ix) The proposed residential redevelopment would provide a net gain of 9 residential units. The proposals are anticipated to generate a net increase of 74 two-way person trips by all modes over the course of a typical day, including 16 two-way person trips during the morning peak hour and 10 additional two-way person trips during the evening peak hour;

(x) The majority of additional trips would comprise public transport users or walking trips, owing to the car-free nature of the proposals and the accessible location of the site, which would be comfortably accommodated by the extensive public transport network.

Overall, it is demonstrated that the proposed residential redevelopment would certainly not offer an impact deemed ‘severe’, when considered in the context of the NPPF. Therefore, there are no impediments on highway or transport grounds that should prevent the granting of planning permission for the proposed redevelopment at Brunel Walk, Haringey or improvements to the Turner Avenue Estate.

5.11 Construction Logistics Plan

The Outline CLP, prepared by RGP, provides high level information on the proposed construction logistics and provides a considered approach to how the potential impact of construction related traffic would be minimised and mitigated against during both demolition and construction works.

The main objectives of this CLP are to:

- (i) Lower vehicle emissions associated with construction vehicles arriving and departing the site;
- (ii) Enhance safety – improved vehicle and road user safety around the site, given that the adjacent residential dwellings would remain operational, including the Turner Avenue Estate;
- (iii) Reduce congestion – reduced construction vehicle trips overall, especially in peak periods.

Table 20 below summarises the planned measures to fulfil these objectives. For more detailed information please refer to RGP’s Outline Construction Logistics Plan

Planned Measures Checklists	Committed	Proposed	Considered
Measures influencing construction vehicles and deliveries			
Safety and environmental standards and programmes	x		
Adherence to designated routes	x		
Delivery scheduling	x		
Re-timing for out of peak deliveries	x		
Re-timing for out of hours deliveries		x	
Use of holding areas and vehicle call off areas			x
Use of logistics and consolidation centres			x

Vehicle Choice			x
Measures to encourage sustainable Freight			
Freight by Water			x
Frighnt by Rail			x
Material Procurement Measures			
DfMA and off-site manufacture			x
Re-use of Materials on site		x	
Smart Procurement		x	
Other Measures			
Collaboration with other sites in the area	x		
Implement a Staff Travel Plan	x		
FORS	x		

Table 20: Planned Measures Checklist Table (TfL Guidance for Medium Impact Schemes)

5.12 Residential Travel Plan

The site is located at Brunel Walk within South Tottenham, there are significant opportunities for journeys to be undertaken via active or sustainable modes of transport, owing to the site’s good access to local facilities on foot and by cycle.

A Healthy Streets Assessment has been carried out which demonstrates that the key pedestrian routes exhibit the features required as part of the Healthy Streets toolkit. The site exhibits a range of 3 different PTALs relating to the linear nature of the site area from a 4-6a. in accordance with The London Plan 2021 the starting point for any car parking assessment must be the highest current or future PTAL for a development site, which is a 6a.

The development proposals comprise the redevelopment of the site in order to provide 45 residential units comprising a mix of 1-3 bedroom flats and mews houses. The proposals would operate as a car-free development, owing to the site’s high PTAL rating. 2 disabled parking bays would be provided from Braemar Road to the east of the site, in accordance with the London Plan (2021) standards. Cycle parking would also be provided for each residential block, in line with the London Plan (2021) standards and the LCDS, as well as cycle storage being provided for existing residents to encourage more sustainable forms of travel.

The proposals also offer improvements to the public realm and pedestrian/cycle connectivity throughout the local area, including improved parking and access arrangements associated with the Turner Avenue Estate. An on-street parking survey indicated that the existing parking provision within the Turner Avenue Estate is heavily utilised at present and so the proposals re-provide all existing parking associated with the estate in order to meet existing parking demands plus additional disabled parking bays.

The public realm works would also deliver an improved delivery and servicing strategy for the site, due to the constrained access at the site. Each residential block would be provided with sufficient bin storage provision, in line with local design standards and guidance.

In order to facilitate the improved access arrangements and connectivity, parts of the public highway in the Turner Avenue car parks would need to be ‘stopped up’ and the application/process is likely to be run in parallel with this planning application.

For more information refer to RGP's Travel Plan.

5.13 Construction Environmental Management Plan (CEMP)

A framework Construction Environmental Management Plan (CEMP) will be developed to to minimise, manage and/or mitigate the environmental effects of the works associated with the development.

The CEMP will detail the environmental management, and controls and safety procedures that will need to be adopted during the development of the Site, thereby providing a tool to ensure the successful management of the likely environmental effects as a result of the construction activities. The CEMP will seek to ensure that all enabling, demolition and construction works cause the minimum disruption to the local residents and members of the public.

The CEMP will include the following:-

- **Site Information:** including description of the Site, surrounding environment and proposed Development, as well as environmental management structure, roles and responsibilities;
- **Enabling, Demolition and Construction Information:** a description of the anticipated enabling, demolition and construction works based on the information available to date, anticipated programme, proposed working hours, details of haulage routes, equipment to be used, etc.;
- **Environmental Management and Control Measures:** potential environmental issues related to the enabling, demolition and construction works, details of the site inspection and audit programme, methods for managing environmental risks and reducing impacts, emergency procedures, waste and hazardous materials storage procedures, liaison with the local community, and specific project environmental procedures relating to waste and materials management, dust and air quality, noise and vibration, vehicles management, protection of water quality; and
- **Monitoring:** procedures for recording and reporting monitoring results and taking remedial action in the event of any non-compliance.

5.14 Health and Wellbeing

The development is aiming to create a high-quality built environment that supports the health, social and cultural well-being of its residents. Below are detailed some of the design principles that contribute to that aim:-

- Good levels of daylight and fresh air to apartments
- Dual aspect to maximise views and access to natural light
- Control of overheating to ensure comfortable temperatures in the apartments
- Sound insulation between and within apartments must meet the standards set in AD E
- Secure and well located residential cycle storage is provided in each residential building in line with London Plan. A variety of cycle stands are provided to accommodate residents with disabilities.
- Landscaped external amenity spaces for residents
- Accessibility to apartments and facilities are designed to ensure the development is suitable for those with physical impairments in accordance with the Equality Act.
- Easily Accessible recreational amenity space within the surrounding context.

5.15 Landscape Design

The Brunel Walk redevelopment and Turner Avenue Estate improvements scheme to create a high quality place that is safe, accessible and inviting, through the selection of high quality materials, furniture and planting. The wider estate landscape improvements aim to achieve the following:

- Create positive amenity space for residents to relax, socialise and play; 'Pocket gardens' located between the new residential building blocks A, B, C and D are more intimate in nature providing seating within a quiet and tranquil setting. Larger amenity spaces for use by the community are located near site entry points and car parks. These larger areas are characterised by generous seating, 'walk on the way' play equipment and new naturalistic planting using community involvement wherever possible.
- Ensure that the site retains a residential character yet is welcoming to the public and community.
- Restore the area as a place for community use which is accessible, inviting and safe;
- Maximise the use and function of the site so that no area is left feeling ambiguous or redundant;
- The transition between the semi-private; private spaces will be carefully considered in order to define ownership and ensure privacy for residents. Defensible planted buffers to gardens will be used to protect the privacy of occupants. Timber fences in conjunction with low garden hedges and planting strips will be used to define the edges to streets, car parks and communal paths.
- The predominance of existing hard landscape means there is little ecological value across the site with the exception of some mature trees which we will seek to retain where possible. This presents an opportunity to enhance the biodiversity and establish new habitats on the site. Planting, including native species, will contribute to greater biodiversity across the site

For more information refer the landscape design report by Oobe.

5.16 Energy and Overheating

The proposal has set a target of achieving net zero regulated carbon emissions. Taking a fabric first approach the design proposals are being developed in order to optimise the orientation, glazing proportion and distribution and the form factor of each of the buildings to minimise heat loss and maximise passive heat gain. At the same time the need for good levels of natural daylight and to mitigate against overheating have been taken into account. In addition, the U values and air tightness specified for the building envelope have been maximised within the constraints of the development. All these factors have been carefully balanced and optimised within the particular constraints relevant to this site.

Green energy strategies have been reviewed to provide options for low carbon technologies. Efficient Mechanical Ventilation with Heat Recovery is proposed to compliment the fabric first proposals and duct lengths to external walls have been minimised. Options such as ground source heat pumps were assessed against the energy demands of the scheme and viability. Air-to-water and water-to-water heat pumps are proposed in an ambient loop system to meet the schemes hot water and space heating demands. These will be supplemented with Photo Voltaic panels as a more effective use of roof space than solar hot water. Overall these green technologies will help contribute to an overall on-site reduction of 101% in regulated carbon dioxide emissions over Part L 2013.

Overheating will be mitigated via a number of methods including providing shading with balconies and brise soliel, optimising window sizes in sensitive locations, specifying glass with a lower heat emissivity (G value) and enabling natural ventilation to bedrooms at night in a secure way at ground floor. The development is shown to be full compliant with CIBSE TM59, with all apartments passing the DSY1 and 2 weather scenarios, and a significant proportion passing the DSY3 weather scenario.

For further information please refer to Meinhardt's Energy and Overheating Assessment.

6 CONCLUSION

Sustainability is an integral part of the proposed development design, and this report demonstrates how the scheme fully satisfies national, regional and local planning guidance in relation to sustainability and climate change mitigation/adaption.

The proposed strategy in relation to sustainable design and construction is detailed, and addresses the key issues such as certification, water use, drainage, flood risk, pollution, air quality, noise and vibration, materials, waste, transport, management, health and wellbeing, landscape design and energy and overheating.

The strategy also details how the proposed development responds to the Mayor's Whole Life Carbon Assessment Planning. The WLCA has considered embodied and regulated operational energy use of the proposed development, commencing from a "cleared flat site" in accordance with RICS guidelines.

The overall results show that the Proposed Development will have a cradle to grave emission of 3,824,739 tonnes CO₂e. The results of the assessment have been compared to the WLC benchmarks specified in the GLA guidance for apartments as this is deemed the most suitable building type to be used for comparison. For the full assessment please refer to appendix A.1

Appendix A.1 – Whole Life Carbon Assessment

A.1 Whole Life Carbon Assessment

This Whole Life Carbon Assessment (WLCA) has been carried out to demonstrate the embodied and operational carbon emissions for the proposed residential development at Brunel Walk, N15 5HQ

The aim of this assessment is to model the whole life carbon impact of the proposed design in accordance with RICS Guidance and GLA Sustainability Guidance.

The assessment evaluates the lifecycle carbon content of materials and M&E fittings of the site, over a 60-year lifespan. The assessment of the materials' carbon emissions also includes the replacement of certain items in line with industry standards.

The assessment has considered embodied and regulated operational energy use of the proposed development, commencing from a "cleared flat site" in accordance with RICS guidelines.

The overall results show that the Proposed Development will have a cradle to grave emission of 3,824,739 tonnes CO₂e.

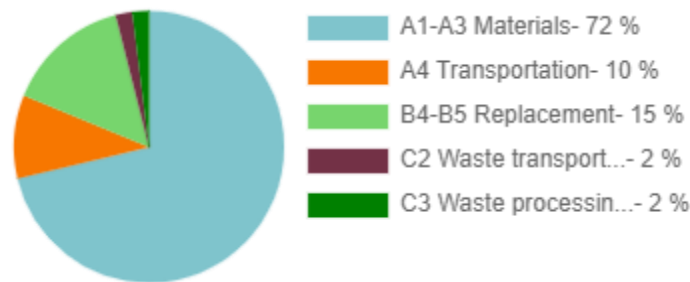


Figure A.1-1: Embodied Carbon by Life Cycle – OneClick LCA

A.1.1 Methodology and Standards

There are multiple definitions of Zero Carbon Development which can impact the method of reporting. For the purpose of this assessment, the following definition from the UK Green Building Council would be used.

Net Zero Carbon – Whole Life: "When the amount of carbon emissions associated with the building's embodied and operational impacts over the life of the building, including its disposal, are zero or negative"

Stroma FSAP and OneClick LCA software, the Whole Life Carbon Assessment (WLCA) has been undertaken in accordance with the 'RICS Whole Life Carbon Assessment for the Built Environment' (First Edition, November 2017) which outlines the process of WLCA, and what is, and what is not included. The aim of the RICS document is to provide clarity on the EN 15978: 2011 for the sustainability assessment of buildings and on the type of approach required within this methodology.

SAP models of the proposed residential dwellings have been constructed to ascertain predicted operational energy use (and associated carbon emissions) and, through the use of 'OneClick LCA' software, material quantities and embodied carbon associated with building elements have been analysed.

In line with the above guidance, the WLCA has been undertaken at RIBA Stage 2 (ie prior to RIBA Stage 4).

The following data has been used to formulate the WLCA model:

- OneClick LCA material & component database
- SAP modelling
- Drawings, plans, sections, elevations from Architects
- M&E Input

- Initial materials assumptions based on information provided by Architects
- Assumptions on structural information and information provided by structural engineers

The minimum requirements of the assessment, as listed within the RICS document, are outlined below:

Minimum requirements for whole life carbon assessment	
Building Parts to be included	1. Substructure 2. Superstructure
Life stages to be included	Product Stage (A1-A3) Construction Process Stage (A4-A5) Replacement Stage (B4) Operational Energy Use (B6)
Assessment Timing	At design stage – prior to technical design

Table A.1-1: Minimum requirements for whole life carbon assessment

The RICS Document states the following in relation to the baseline to which the LCA should take place. This is described as follows:

"New build projects assessed are considered to commence their development on a cleared, flat site for consistency purposes. Demolition works are often decoupled from new construction, hence the responsibility for any emissions arising from demolition is not necessarily solely attributable to the new build project. Therefore, all carbon emissions associated with works as listed under 'Demolition'.....should be reported separately and not aggregated with the rest of the project emissions. However, due to potential opportunities for recovery, reuse and recycling, and for improving the deconstruction and demolition process, pre-demolition assessments should be carried out where possible."

The scope and approach of this assessment is outlined below:

- Demolition Waste – demolition of the existing building on site is included
- Offset Measures – to be calculated and including/informing any on-site generation and potential GHG Offset.

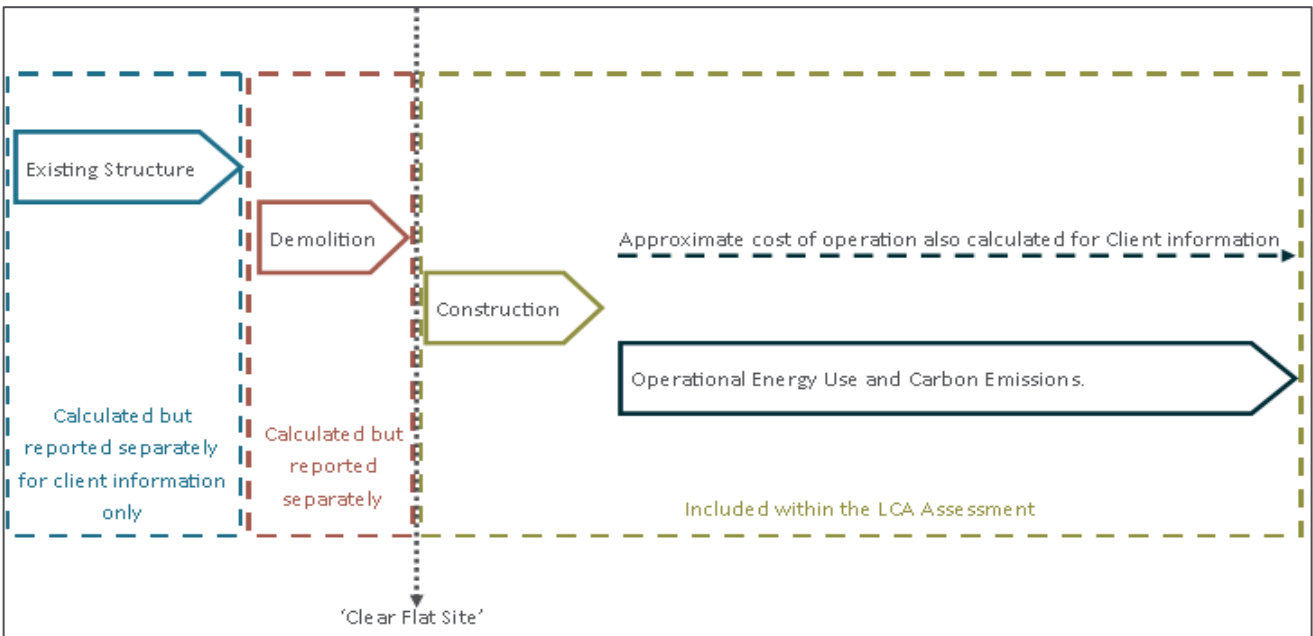


Figure A.1-2: Process of Assessment Diagram

Lifecycle Stages

The embodied carbon elements of the site included within this assessment are separated into the following sections:

Stage	Stage Identifier	Stage Name and Scope	Description
Product Stage	A1 – A3	Product Stage	Raw material to Product Completion
Construction Process Stage	A4 – A5	Construction Process Stage: Transport to site and construction installation process.	Transportation of goods to site and installation on-site
Use Stage	B1	In Use Emissions	Emissions arising during the life of the building from its components – such as the emissions from GHG and HFC blown insulation, which leeches over time.
	B2	Maintenance, cleaning, and associated works	Emissions associated with energy and products for maintenance
	B3	Repair Emissions	Reasonable allowance for repairing unpredictable damage over and above the standard maintenance regime.
	B4	Replacement Emissions	Emissions associated with the replacement of items within the building, in accordance with the standard expected lifespan.
	B6	Operational Energy Use	Emissions associated with the operation of the building through the operation of its technical systems over the life of the building.
	B7	Operational Water Use	Emissions associated with the water use during the operation of a building during its operational life.
End of Life Stage	C1	Deconstruction and Demolition Emissions	Emissions covered by all site activity required to dismantle, deconstruct and/or demolish the built asset
	C2	Transport Emissions	Transport emissions associated with the discarded items from site
	C3	Waste Processing for reuse, recovery, or recycling emissions	Processing emissions for waste arising from the demolition of the site when processing for recycling, reuse or recovery
	C4	Disposal Emissions	Emissions associated with the disposal of materials which are not being recycled and are to be disposed of.

Table A.1-2: Outline of all assessment elements covered by the WLCA

With regards to the above stages, the following approach has been taken:

Construction Stage

Construction activities on site have been informed by the ‘scope of work’ with calculations based on the building dimensions and the geographical location of the site. This, in turn, will inform the total energy use and associated carbon emissions of the proposed works. This is calculated within the OneClick LCA software.

Use Stage

Operational energy demands for the site have been based on SAP modelling inputs.

The ‘regulated’ (heating, cooling, lighting, ventilation) emissions are taken into account to accurately represent the scheme’s energy consumption and associated carbon emissions.

Unregulated energy includes small power, and any other energy uses not covered by the current Part L, and often difficult to predict and determine until very late on in the design process. Reasonable assumptions have been made based on usage patterns and appliances with a good standard of efficiency commonly available on the retail market.

Limitations

The assessment has been conducted as accurately as possible, with the utmost care taken to ensure that the modelling of materials reflect the proposed building, along with any retained and new hard landscaping onsite, as well as the systems and material installations proposed within the building specification of the works.

However, as with all early-stage assessments, the products used within this assessment may not exactly reflect those being installed on site at a later date. The changing of products will alter the embodied carbon information used within the LCA model, in addition to the mileage associated with transport to the site.

Mileage and the effect of travel has been assessed within the OneClick software, albeit at a default setting. The setting gives values for the transportation of goods as outlined in the Table below. These assumptions will be reviewed post completion in line with RICS guidance.

Transport Scenario	km by road*	km by sea**
Locally manufacturer e.g. Concrete, aggregate, earth	50	-
Nationally manufactured e.g. plasterboard, blockwork, insulation	300	-
European manufacturers e.g. CLT, façade modules, carpet	1,500	-
Globally manufactured e.g. specialist stone cladding	200	10,000
* Means of transport assumed as average rigid HGV with average laden – average laden as per BEIS carbon conversion factors. ** Means of transport assumed as average containership		

Table A.1-3: Default transport scenarios for UK projects

The replacement of building elements is also considered within the WLCA based on information within the RICS documentation. The lifespan of a product is generic and is based on the element type. This will therefore not represent actual building use, or the precise product selected. By way of an example, a product with a 10-year lifespan prediction, will need to be replaced 5 times through the 60-year lifespan – in addition to the first installation.

The lifespan of the products is based on the information contained within the Table below.

Building Part	Building Elements/Components	Expected Lifespan
Roof	Roof coverings	30 years
Superstructure	Internal partitioning and dry lining	30 years
Finishes	Wall finishes: render/paint	30/10 years respectively
	Floor finishes: raised access floor/finish layers	30/10 years respectively

Building Part	Building Elements/Components	Expected Lifespan
	Ceiling finishes: substrate/paint	20/10 years respectively
Furniture, fixings & Equipment	Loose furniture and fittings	10 years
Services/MEP	Heat source, e.g. boiler, calorifiers	20 years
	Space heating and air treatment	20 years
	Ductwork	20 years
	Electrical installations	30 years
	Lighting fittings	15 years
	Communications installations and controls	15 years
	Water and disposal installations	25 years
	Sanitaryware	20 years
	Lift and conveyor installations	20 years
Façade	Opaque modular cladding e.g., rain screens, panels	30 years
	Glazed cladding/curtain walling	35 years
	Windows and external doors	30 years

Table A.1-4: Assumed lifespan of materials

All assumptions made are included in Section A.1.7. These relate to specifications, inputs into OneClick and modelling software.

A.1.2 Results

Outcomes and Units

The units required to be used within the outputs for the WLCA are clearly defined by the RICS documentation. This is to ensure that the results can be compared to peer projects meaningfully and fairly. Therefore, the following normalisation units are utilised for the proposed building use at the site:

- Buildings; planning use classes D1-D2: kgCO₂e/m² of Net Internal Area

Outcomes per lifecycle stage

The embodied WLC for the Proposed scheme has been based on the full OneClick material component database and supporting information provided as listed in Section A.1.1 and results summarised within the Table below.

Module	Sitewide
A1-A5 Construction Process stage	2,062,612 kgCO ₂ e
B1-B7 Use Stage	1,675,192 kgCO ₂ e
C1-C4 End of Life stage	267,167 kgCO ₂ e
Total GWP (kgCO ₂ e) (inc. biogenic removals)	3,824,739 kgCO ₂ e
Total GWP (C3 usage, kgCO ₂ e/m ²)	804 kgCO ₂ e/m ²

Table A.1-5: WLCA Emission Results per Lifecycle Stage

Lifecycle stages B1 (Use phase), B2 (Maintenance), B3 (Repair) and B7 (Operational water use) have been included as part of the requirements under the New London Plan. As information on these lifecycle stages are not yet available at this stage, reasonable estimations have been made based on the assumptions listed in Section A.1.7.

The results of the assessment have been compared to the WLC benchmarks specified in the GLA guidance for apartments as this is deemed the most suitable building type to be used for comparison.

Projects with higher WLC emissions than the Baseline benchmarks are expected to examine how they can reduce WLC emissions and explain how and why any variations exist.

A further set of aspirational WLC benchmarks have been developed which are based on a 40% reduction in WLC emissions on the Baseline WLC benchmarks. This is based on the World Green Building Council's target to achieve a 40% reduction in WLC emissions by 2030. As of now, modules B6 (operational energy use), B7 (operational water use) and D (external impacts) have not been included in the benchmarks due to a lack of available data.

The results in the Table below show that the carbon emissions associated with modules A1-A5 (construction process stage) and B-C (use stage and end of life stage) are within the WLC benchmarks specified in the GLA guidance.

Module	Brunel Walk Point	GLA Baseline WLC Benchmark	GLA Aspirational WLC benchmark
Modules A1-A5	433 kgCO ₂ e/m ²	750 to 850 kgCO ₂ e/m ²	450 to 500 kgCO ₂ e/m ²
Modules B-C (excluding B6 & B7)	314 kgCO ₂ e/m ²	300 to 400 kgCO ₂ e/m ²	180 to 240 kgCO ₂ e/m ²

Table A.1-6: WLCA Emission Results compared to GLA benchmarks

It should be noted that the figures presented in the Table above are the result of a point-in-time assessment, based on the limited information available at the time of the assessment. As more quantities and details of the components become available, the WLCA model will need to be updated to capture the embodied carbon emissions for the development more accurately.

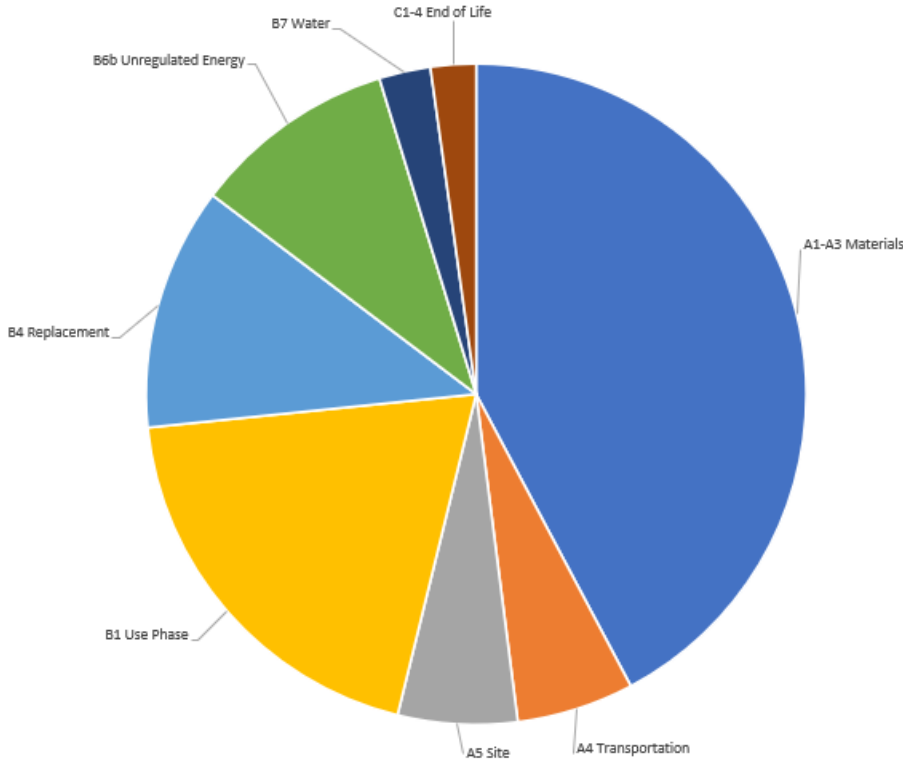


Figure A.1-3: Breakdown of Carbon Emissions by Lifecycle Stage

The Figure below shows that life cycle stage A1-A3, Materials & Product, accounts for the greatest quantities of carbon emissions, followed by B6a Regulated Energy. B6 regulated energy is not included as it has been offset by on site photovoltaics.

A.9.3 Most Contributing Building Elements & Materials

In order to capture a more detailed picture of carbon emissions related to A1-A3 lifecycle stages, the Figures below give a breakdown of the contribution of different building elements and materials to the overall total carbon emissions in the proposed scenario.

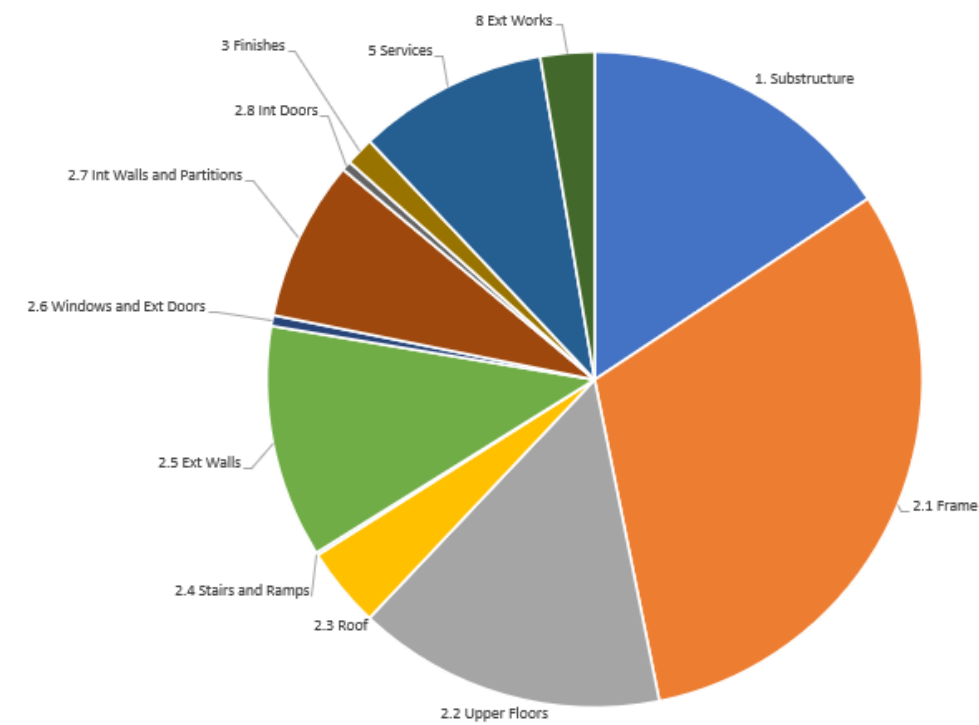


Figure A.1-4: Most Contributing Building Elements (A1-A3)

A.1.4 Operational Energy

Carbon emissions within the lifecycle stage B6a, Regulated Energy and B6b, Unregulated Energy, has a substantial contribution to the overall WLC performance of the scheme.

Reasonable estimation of the residential building's regulated and unregulated energy use have been input to the WLCA model to represent the regulated and unregulated energy use of the building.

Regulated energy includes energy use related to building services (heating, cooling, hot water, ventilation) and lighting, whereas unregulated energy load includes appliances and process loads based on intended usage. Both the regulated and unregulated energy make up the total operational energy use of the scheme.

Module	Energy demand (kWh/yr)
	Residential
Space heating	20,595
Hot water	23,948
Lighting	15,627
Auxiliary	7,213
Electricity generated by PVs	-71,309
Electricity for heat distribution	1,443
Total Regulated energy	-23,078
Total Unregulated electricity	27,388

Table A.1-7: Operational energy by end use of the residential and non-residential space

As can be observed above, hot water and space heating are the largest contributors to the residential operational energy use.

High efficiency LED lighting has been specified throughout the development to minimise the lighting energy demand.

The residential accommodation domestic hot water accounts for 35% of the overall site energy demand, so it is proposed to use air source heat pumps that are specifically designed to operate at high temperatures to maximise the efficiency in the production of domestic hot water.

High efficiency photovoltaics, with a total active area of 381.3m² are included in the development offsetting 101% of the regulated energy demand of the residential development.

The latest SAP10.1 profile which has a carbon factor of 0.14kgCO₂e/kWh has been used in the WLCA modelling in accordance with RICS requirements for new constructions to take into account the effect of anticipated future grid decarbonisation.

A.1.5 Decarbonisation scenario for materials manufacturing

Decarbonisation scenario for materials manufacturing has been included as per GLA requirements and included in Section A.1.7 under Assessment 2. The scenario assumes that 20% of material impacts in B2-5 and D stages is derived from electricity consumption. Electricity impact changes are calculated based on FES 2021 Report (Steady Progression scenario) and RICS equation. The base year for this calculation is set to be 2022. The scenario will adjust impacts for relevant stages, as per the GLA requirement.

However, Assessment 1 is used rather than Assessment 2 to inform this report, which represents the current grid scenario, as this encourages the current demand reduction as opposed to reliance on the decarbonisation of the grid.

A.1.6 Materials Assumptions and Potential Improvements

Carbon emissions within the lifecycle stage A1-A3, Materials and Product, has a significant impact on the WLC performance of the scheme. The following discusses some of the assumptions used in the WLCA modelling and the recommendations that can be explored to minimise the embodied carbon associated within stages A1-A3 of the WLCA.

Insulation

Where unspecified, the insulation used in floors, roof and external walls have been taken as rockwool insulation in accordance with RICS guidance.

Bricks

A large area of the walls are constructed using clay bricks, which have a higher embodied carbon content. As the design progresses, the team will explore less carbon intensive options, such as using reclaimed bricks or substituting clay bricks with concrete bricks

Concrete

Concrete's environmental impact can be reduced by replacing a proportion of the ordinary Portland Cement and sand content with recycled alternatives such as fly ash or ground granulated blast furnace slag (GGBS). A default RICS guidance with an allowance of 20% cement replacement has been included. As concrete makes up a large proportion of the embodied carbon, it is recommended that a minimum 20% cement replacement or better is considered.

Transportation

At this stage, the RICS recommended transport distances have been adopted. It is recommended that locally sourced materials with an EPD should be used where possible.

Waste Removal

Removal of waste has been taken into account as part of Stage D of the WLCA – This will offset the amount of embodied carbon in the scheme.

A.1.7 Carbon Reporting

Whole life carbon assessment, Greater London Authority (based on RICS guidance)

	Biogenic carbon (kg CO ₂ e)	A1-A3 Product Stage	A4 Transportation to site	A5 Site operations	B1 Use Phase	B2 Maintenance	B3 Repair	B4 Material replacement - materials	B5 Material refurbishment	B6 Operational Energy use - Regulated	B6 Operational Energy use - Unregulated	B7 Operational Water use	C1 Deconstruction / demolition	C2 Waste transportation	C3 Waste processing	C4 Waste disposal	TOTAL kg CO ₂ e	D External impacts (not included in totals)
0.1 Toxic Mat.																		
0.2 Demolition													16 102				16 102	
0.3 Supports																		
0.4 Groundworks																		
0.5 Diversion																		
1 Substructure	0	253 753	29 171	12 792			0							8 507	3 151	547	307 921	-40 336
2.1 Frame	0	503 472	33 484	21 890	-3 218		0							9 211	1 089		565 927	-103 908
2.2 Upper Floors	0	246 103	19 282	14 311			0	21 898	0					6 484	23 280	826	332 183	-46 864
2.3 Roof	0	63 986	30 340	2 371			0	14 213	0					1 260	5 077	51	117 327	-35 860
2.4 Stairs & Ramps	0	2 197	712	148			0							134	8		3 199	-807
2.5 Ext. Walls	0	185 504	41 323	12 256			0	15 975	0					2 099	239	70	257 487	-6 876
2.6 Windows & Ext. Doors	0	8 615	404	536			8 148	2 286	0					111	4		20 105	-4 910
2.7. Int. Walls & Partitions	0	128 145	33 729	9 797			0	26 961	0					3 883	413	59	202 966	-20 300
2.8 Int. Doors	-14 312	7 650	2 491	0			0	10 255	0					30	14 362	4	20 510	0
3 Finishes	0	22 723	5 686	3 796			0	30 196	0					1 668	54	35	64 187	-369
4 Fittings, furnishings & equipments																		
5 Services (MEP)	0	151 701	5 002	1 027	753 927	913	20 404	332 441	0	-34 712	382 884	95 886		918	81	17	1 710 488	-110 764
6 Prefabricated																		
7 Existing bldg																		
8 Ext. works	-166 922	42 982	19 897	145 335	-3 261		0							1 063	166 213		266 337	-34 386
Unclassified / Other																		
TOTAL kg CO ₂ e kg CO ₂ e	-180 234	1 616 829	221 523	224 280	747 447	913	26 551	454 223	0	-34 712	382 884	95 886	16 102	35 456	213 999	1 610	3 824 739	-404 490

	A1-A3 Product Stage	B1 Use Phase	B4 Material replacement - materials	B5 Material refurbishment
Mass of raw materials kg	9 778 782		1 579 372	0
Biogenic carbon storage kg CO ₂ e bio	36 027	144 207		

Project details		
Project name	Brunel Walk	
Planning application reference number (if applicable)		
Use Type	C3	
Brief description of the project	This development consists of four, four storey blocks to be used as council housing.	
GIA (m ²)	4757.88	
Authors (organisation or individuals)	Meinhardt Ltd	
Date of assessment		
Nationally recognised assessment method used	e.g. BS EN 15978, with additional guidance from RICS Professional Statement	
Reference study period (if not 60 years)		
Software tool used	OneClick LCA	
Source of carbon data for materials and products	FDES; EPD Acoustic Partition Roll (APR 1200) 75mm & 100mm Saint-Gobain ISOVER UK; EPD Asphalt; Tarmac CRH 2016, Single layer mechanically fastened fully torched modified bitumen roof waterproofing system, Bitumen Waterproofing Association; EPD ECOCEM GGBS CEMENT; EPD VOLA A/S; One Click LCA generic construction definitions; MDEGD_FDES; Oekobau.dat 2020-II; One Click LCA; EPD Generic Aggregate, Tarmac CRH 2016; EPD CONTRAFAM STRUCTURE 30/60; EPD Thistle BoardFinish and Thistle MultiFinish, ver.2; EPD 12.5mm Gyproc FireLine, ver. 2.0; Oekobau.dat 2017-I; EPD Boden-Ausgleich PCI Nivelliermasse unter Oberbelägen PCI Augsburg GmbH; EPD Xtratherm UK Ltd; UK average portland cement, Mineral products association (MPA) UK; EPD UK Manufactured 1 tonne of Generic Precast Concrete Paving Products (Blocks, Slabs, Channels and Kerbs) Produced by members of Interpave a product group of British Precast; EPD AgiliaTM Ready-mix Concrete Aggregate Industries UK Limited; ICE database August 2019, V3.0; EPD UK manufactured generic ready-mixed concrete Produced by members of the British Ready- Mixed Concrete Association (BRMCA) part of the Mineral Products Association (MPA); ICE database August 2019, V3.0; Environmental product declaration (EPD) report of fabricated steel products produced in the UK by Eco-Reinforcement members; Adjusted data based on the specifications of the Swedish Transport Administration (Trafikverket). Original quantities were specified by Birstaverken W3; EPD Stone Wool Thermal Insulation for buildings; EPD ROCKWOOL® stone wool product: FLEXI 1200x600x100; LCA inventory for sand quarry operation, Ecoinvent 2016; EPD Sanitary ceramic DURAVIT AG, Oekobau.dat 2017-I; NMD v2.3; EPD Supafil (0.034-0.036 W/mK) blown glass mineral wool insulation, Knauf Insulation (Northern Europe) 2014; LCA inventory for tap water production, conventional treatment (Europe without Switzerland), Ecoinvent 2016	
EPD database used	ecoinvent, GaBi, ELCD	

Estimated WLC emissions (Assessment 1)

N.B. This forms the WLC baseline for the development. The results from Assessment 1 below are automatically populated here.

	Module A1-A5	Module B1-B5	Module B6-B7	Module C1-C4	Module D
TOTAL kg CO ₂ e	1,882,378 kg CO ₂ e	1,231,135 kg CO ₂ e	444,058 kg CO ₂ e	267,168 kg CO ₂ e	-404,490 kg CO ₂ e
TOTAL kg CO ₂ e/m ² GIA	395.634	258.757	93.331	56.153	-85.015
Comparison with WLC benchmarks (see Appendix 2 of the guidance) if Assessment 1 was used to inform design decisions	[Explain the reasons for any divergences from WLC benchmarks, including against the WLC aspirational benchmarks]				

Estimated WLC emissions (Assessment 2)

N.B. The results from Assessment 2 below are automatically populated here.

	Module A1-A5	Module B1-B5	Module B6-B7	Module C1-C4	Module D
TOTAL kg CO ₂ e	1,882,378 kg CO ₂ e	1,148,270 kg CO ₂ e	444,058 kg CO ₂ e	267,168 kg CO ₂ e	-335,134 kg CO ₂ e
TOTAL kg CO ₂ e/m ² GIA	395.6338033	241.3407169	93.3310424	56.15278233	-70.43762348
Comparison with WLC benchmarks (see Appendix 2 of the guidance) if Assessment 2 was used to inform design decisions	[Explain the reasons for any divergences from WLC benchmarks, including against the WLC aspirational benchmarks. Please note that grid decarbonisation has not been accounted for in the benchmarks]				

	Action	WLC reduction (kg CO ₂ e/m ² GIA)
Summary of key actions to reduce whole life-cycle carbon emissions that have informed this assessment, including the WLC reductions	Significant on site renewable electricity generation resulting in negative regulated energy emissions	210kg CO ₂ e/m2
	UK produced bricks used	14.5kg CO2/m2

	Further potential opportunities	WLC reduction potential (kg CO ₂ e/m ² GIA)
Specify further opportunities to reduce the development's whole life-cycle carbon emissions, including the WLC reduction potential	Local steel rebar is used (if available)	2.4kg CO2/m2

Assessment 1 current status of the electricity grid

GWP POTENTIAL FOR ALL LIFE-CYCLE MODULES ¹ (kgCO ₂ e)		Sequestered (or biogenic) carbon (negative value) (kgCO ₂ e)	Product stage (kgCO ₂ e)	Construction process stage (kgCO ₂ e)	Use stage (kgCO ₂ e)								End of Life (EoL) stage (kgCO ₂ e)				TOTAL Modules A-C kgCO ₂ e	Benefits and loads beyond the system boundary (kgCO ₂ e)									
					Module A			Module B					Module C					Module D*									
			Building element category			[A1] to [A3]	[A4] ²	[A5]	[B1]	[B2]*	[B3]*	[B4]*	[B5]*	[B6]	[B7]	[C1]	[C2]		[C3]	[C4]							
0.1	Demolition: Toxic/Hazardous/Contaminated Material Treatment																0 kg CO ₂ e										
0.2	Major Demolition Works												16,102 kg CO ₂ e				16,102 kg CO ₂ e										
0.3	Temporary Support to Adjacent Structures																									0 kg CO ₂ e	
0.4	Specialist Ground Works																									0 kg CO ₂ e	
0.5	Temporary Diversion Works																									0 kg CO ₂ e	
1	Substructure	0 kg CO ₂ e	253,753 kg CO ₂ e	29,171 kg CO ₂ e	12,792 kg CO ₂ e				0 kg CO ₂ e						8,507 kg CO ₂ e	3,151 kg CO ₂ e	547 kg CO ₂ e	307,921 kg CO ₂ e	-40,336 kg CO ₂ e								
2.1	Superstructure: Frame	0 kg CO ₂ e	503,472 kg CO ₂ e	33,484 kg CO ₂ e	21,890 kg CO ₂ e	-3,218 kg CO ₂ e			0 kg CO ₂ e						9,211 kg CO ₂ e	1,089 kg CO ₂ e		565,927 kg CO ₂ e	-103,908 kg CO ₂ e								
2.2	Superstructure: Upper Floors	0 kg CO ₂ e	246,103 kg CO ₂ e	19,282 kg CO ₂ e	14,311 kg CO ₂ e				0 kg CO ₂ e	21,898 kg CO ₂ e	0 kg CO ₂ e				6,484 kg CO ₂ e	23,280 kg CO ₂ e	826 kg CO ₂ e	332,183 kg CO ₂ e	-45,864 kg CO ₂ e								
2.3	Superstructure: Roof	0 kg CO ₂ e	63,986 kg CO ₂ e	30,340 kg CO ₂ e	2,371 kg CO ₂ e				0 kg CO ₂ e	14,213 kg CO ₂ e	0 kg CO ₂ e				1,290 kg CO ₂ e	5,077 kg CO ₂ e	51 kg CO ₂ e	117,327 kg CO ₂ e	-35,980 kg CO ₂ e								
2.4	Superstructure: Stairs and Ramps	0 kg CO ₂ e	2,197 kg CO ₂ e	712 kg CO ₂ e	148 kg CO ₂ e				0 kg CO ₂ e						134 kg CO ₂ e	8 kg CO ₂ e		3,199 kg CO ₂ e	-807 kg CO ₂ e								
2.5	Superstructure: External Walls	0 kg CO ₂ e	185,504 kg CO ₂ e	41,323 kg CO ₂ e	12,256 kg CO ₂ e				0 kg CO ₂ e	15,975 kg CO ₂ e	0 kg CO ₂ e				2,099 kg CO ₂ e	239 kg CO ₂ e	70 kg CO ₂ e	257,467 kg CO ₂ e	-6,876 kg CO ₂ e								
2.6	Superstructure: Windows and External Doors	0 kg CO ₂ e	8,615 kg CO ₂ e	404 kg CO ₂ e	536 kg CO ₂ e				8,148 kg CO ₂ e	2,286 kg CO ₂ e	0 kg CO ₂ e				111 kg CO ₂ e	4 kg CO ₂ e		20,105 kg CO ₂ e	-4,910 kg CO ₂ e								
2.7	Superstructure: Internal Walls and Partitions	0 kg CO ₂ e	128,145 kg CO ₂ e	33,729 kg CO ₂ e	9,797 kg CO ₂ e				0 kg CO ₂ e	26,961 kg CO ₂ e	0 kg CO ₂ e				3,883 kg CO ₂ e	413 kg CO ₂ e	59 kg CO ₂ e	202,986 kg CO ₂ e	-20,300 kg CO ₂ e								
2.8	Superstructure: Internal Doors	-14,312 kg CO ₂ e	7,650 kg CO ₂ e	2,491 kg CO ₂ e	0 kg CO ₂ e				0 kg CO ₂ e	10,255 kg CO ₂ e	0 kg CO ₂ e				30 kg CO ₂ e	14,392 kg CO ₂ e	4 kg CO ₂ e	20,510 kg CO ₂ e	0 kg CO ₂ e								
3	Finishes	0 kg CO ₂ e	22,723 kg CO ₂ e	5,686 kg CO ₂ e	3,796 kg CO ₂ e				0 kg CO ₂ e	30,196 kg CO ₂ e	0 kg CO ₂ e				1,698 kg CO ₂ e	54 kg CO ₂ e	35 kg CO ₂ e	64,187 kg CO ₂ e	-359 kg CO ₂ e								
4	Fittings, furnishings & equipment																	0 kg CO ₂ e									
5	Services (MEP)	0 kg CO ₂ e	151,701 kg CO ₂ e	5,002 kg CO ₂ e	1,027 kg CO ₂ e	753,927 kg CO ₂ e	913 kg CO ₂ e	20,404 kg CO ₂ e	332,441 kg CO ₂ e	0 kg CO ₂ e	34,712 kg CO ₂ e	382,884 kg CO ₂ e	95,886 kg CO ₂ e		918 kg CO ₂ e	81 kg CO ₂ e	17 kg CO ₂ e	1,710,488 kg CO ₂ e	-110,764 kg CO ₂ e								
6	Prefabricated Buildings and Building Units																	0 kg CO ₂ e									
7	Work to Existing Building																	0 kg CO ₂ e									
8	External works	-165,922 kg CO ₂ e	42,982 kg CO ₂ e	19,897 kg CO ₂ e	145,335 kg CO ₂ e	-3,261 kg CO ₂ e			0 kg CO ₂ e						1,093 kg CO ₂ e	166,214 kg CO ₂ e		206,336 kg CO ₂ e	-34,386 kg CO ₂ e								
TOTAL kg CO ₂ e		-180,234 kg CO ₂ e	1,616,829 kg CO ₂ e	221,523 kg CO ₂ e	224,260 kg CO ₂ e	747,447 kg CO ₂ e	913 kg CO ₂ e	28,551 kg CO ₂ e	454,223 kg CO ₂ e	0 kg CO ₂ e	348,172 kg CO ₂ e		95,886 kg CO ₂ e	16,102 kg CO ₂ e	35,456 kg CO ₂ e	213,999 kg CO ₂ e	1,610 kg CO ₂ e	3,824,739 kg CO ₂ e	-404,490 kg CO ₂ e								
TOTAL - kg CO ₂ e/m ² GIA		-38 kg CO ₂ e/m ² GIA	340 kg CO ₂ e/m ² GIA	47 kg CO ₂ e/m ² GIA	47 kg CO ₂ e/m ² GIA	157 kg CO ₂ e/m ² GIA	0 kg CO ₂ e/m ² GIA	6 kg CO ₂ e/m ² GIA	95 kg CO ₂ e/m ² GIA	0 kg CO ₂ e/m ² GIA	73 kg CO ₂ e/m ² GIA		20 kg CO ₂ e/m ² GIA	3 kg CO ₂ e/m ² GIA	7 kg CO ₂ e/m ² GIA	45 kg CO ₂ e/m ² GIA	0 kg CO ₂ e/m ² GIA	804 kg CO ₂ e/m ² GIA	-85 kg CO ₂ e/m ² GIA								

Assessment 2 expected decarbonisation of the electricity grid

GWP POTENTIAL FOR ALL LIFE-CYCLE MODULES¹ (kgCO2e)		Sequestered (or biogenic) carbon (negative value) (kgCO2e)	Product stage (kgCO2e)	Construction process stage (kgCO2e)	Use stage (kgCO2e)								End of Life (EoL) stage (kgCO2e)				TOTAL Modules A-C kgCO2e	Benefits and loads beyond the system boundary (kgCO2e)								
Building element category			[A1] to [A3]	[A4]²	[A5]	[B1]	[B2]*	[B3]*	[B4]*	[B5]*	[B6]		[B7]	[C1]	[C2]	[C3]	[C4]		Module D*							
0.1	Demolition: Toxic/Hazardous/Contaminated Material Treatment																	0 kg CO2e								
0.2	Major Demolition Works													16,102 kg CO2e				16,102 kg CO2e								
0.3	Temporary Support to Adjacent Structures																								0 kg CO2e	
0.4	Specialist Ground Works																								0 kg CO2e	
0.5	Temporary Diversion Works																								0 kg CO2e	
1	Substructure	0 kg CO2e	253,753 kg CO2e	29,171 kg CO2e	12,792 kg CO2e			0 kg CO2e							8,507 kg CO2e	3,151 kg CO2e	547 kg CO2e	307,921 kg CO2e	-33,392 kg CO2e							
2.1	Superstructure: Frame	0 kg CO2e	503,472 kg CO2e	33,484 kg CO2e	21,890 kg CO2e	-3,218 kg CO2e		0 kg CO2e							9,211 kg CO2e	1,089 kg CO2e		565,927 kg CO2e	-86,022 kg CO2e							
2.2	Superstructure: Upper Floors	0 kg CO2e	246,103 kg CO2e	19,282 kg CO2e	14,311 kg CO2e			0 kg CO2e	17,978 kg CO2e	0 kg CO2e					6,484 kg CO2e	23,280 kg CO2e	826 kg CO2e	328,263 kg CO2e	-37,935 kg CO2e							
2.3	Superstructure: Roof	0 kg CO2e	63,986 kg CO2e	30,340 kg CO2e	2,371 kg CO2e			0 kg CO2e	11,668 kg CO2e	0 kg CO2e					1,290 kg CO2e	5,077 kg CO2e	51 kg CO2e	114,783 kg CO2e	-29,690 kg CO2e							
2.4	Superstructure: Stairs and Ramps	0 kg CO2e	2,197 kg CO2e	712 kg CO2e	148 kg CO2e			0 kg CO2e							134 kg CO2e	8 kg CO2e		3,199 kg CO2e	-670 kg CO2e							
2.5	Superstructure: External Walls	0 kg CO2e	185,504 kg CO2e	41,323 kg CO2e	12,256 kg CO2e			0 kg CO2e	13,115 kg CO2e	0 kg CO2e					2,099 kg CO2e	239 kg CO2e	70 kg CO2e	254,607 kg CO2e	-5,689 kg CO2e							
2.6	Superstructure: Windows and External Doors	0 kg CO2e	8,615 kg CO2e	404 kg CO2e	536 kg CO2e			6,917 kg CO2e	1,877 kg CO2e	0 kg CO2e					111 kg CO2e	4 kg CO2e		18,464 kg CO2e	-4,110 kg CO2e							
2.7	Superstructure: Internal Walls and Partitions	0 kg CO2e	128,145 kg CO2e	33,729 kg CO2e	9,797 kg CO2e			0 kg CO2e	22,182 kg CO2e	0 kg CO2e					3,883 kg CO2e	413 kg CO2e	59 kg CO2e	198,207 kg CO2e	-16,826 kg CO2e							
2.8	Superstructure: Internal Doors	-14,312 kg CO2e	7,650 kg CO2e	2,491 kg CO2e	0 kg CO2e			0 kg CO2e	8,419 kg CO2e	0 kg CO2e					30 kg CO2e	14,392 kg CO2e	4 kg CO2e	18,674 kg CO2e	0 kg CO2e							
3	Finishes	0 kg CO2e	22,723 kg CO2e	5,686 kg CO2e	3,796 kg CO2e			0 kg CO2e	24,790 kg CO2e	0 kg CO2e					1,698 kg CO2e	54 kg CO2e	35 kg CO2e	58,782 kg CO2e	-298 kg CO2e							
4	Fittings, furnishings & equipment																	0 kg CO2e								
5	Services (MEP)	0 kg CO2e	151,701 kg CO2e	5,002 kg CO2e	1,027 kg CO2e	753,927 kg CO2e	913 kg CO2e	17,231 kg CO2e	275,733 kg CO2e	0 kg CO2e				-34,712 kg CO2e	382,884 kg CO2e	95,886 kg CO2e		918 kg CO2e	81 kg CO2e	17 kg CO2e	1,650,608 kg CO2e	-91,621 kg CO2e				
6	Prefabricated Buildings and Building Units																		0 kg CO2e							
7	Work to Existing Building																	0 kg CO2e								
8	External works	-165,922 kg CO2e	42,982 kg CO2e	19,897 kg CO2e	145,335 kg CO2e	-3,261 kg CO2e		0 kg CO2e							1,093 kg CO2e	166,214 kg CO2e		206,336 kg CO2e	-28,880 kg CO2e							
TOTAL kg CO2e		-180,234 kg CO2e	1,616,829 kg CO2e	221,523 kg CO2e	224,260 kg CO2e	747,447 kg CO2e	913 kg CO2e	24,148 kg CO2e	375,762 kg CO2e	0 kg CO2e	348,172 kg CO2e		95,886 kg CO2e	16,102 kg CO2e	35,456 kg CO2e	213,999 kg CO2e	1,610 kg CO2e	3,741,874 kg CO2e	-335,134 kg CO2e							
TOTAL - kg CO2e/m2 GIA		-38 kg CO2e/m2 GIA	340 kg CO2e/m2 GIA	47 kg CO2e/m2 GIA	47 kg CO2e/m2 GIA	157 kg CO2e/m2 GIA	0 kg CO2e/m2 GIA	5 kg CO2e/m2 GIA	79 kg CO2e/m2 GIA	0 kg CO2e/m2 GIA	73 kg CO2e/m2 GIA		20 kg CO2e/m2 GIA	3 kg CO2e/m2 GIA	7 kg CO2e/m2 GIA	45 kg CO2e/m2 GIA	0 kg CO2e/m2 GIA	786 kg CO2e/m2 GIA	-70 kg CO2e/m2 GIA							

RICS WLCA OneClick Inputs & Assumptions Summary

RICS Category	Element Description	Material Used	Qty	Unit
1. Foundations and substructure	Concrete Piling	Rammed concrete piling foundation for soft soils for m ² GFA, model: P270, pile length: 15 m, depth to bedrock: 15 m	1538.44	m ²
	Footing for Foundations	Footing foundations for soft soils (soft clay) per GFA, Includes: point and strip footings	1538.44	m ²
	Ground Floor - Sand	Sand, compacted dry density, 1682 kg/m ³	76.92	m ³
	Ground Floor – concrete binding layer	Ready-mix concrete, C 30/37, 2380 kg/m ³ (BRMCA)	76.92	m ³
	Ground Floor- concrete slab	HS2 baseline - Concrete - cast for in-situ applications, C40/50, 20% GGBS	384.61	m ³
	Ground Floor – non-combustible insulation	Unbonded, non-combustible blown glass wool/mineral wool insulation, 0.034-0.036 W/mK, 23-25 kg/m ³ , Supafil 34, Supafil Carbon Plus, Supafil Frame (Knauf)	1538.44	m ²
	Ground Floor – concrete	Ready-mix concrete, RC 28/35 (28/35 MPa), with Portland Limestone Cement (14% Limestone)	100	m ³
	Ground Floor – reinforcement steel	Reinforcement steel mesh (rebar), 10-40mm (BRC)	4663.2	m ²
	Ground Floor - cellcore	Polystyrene insulation (EPS) panels, L=0.038 W/mK, R=5.25m ² k/W, 200mm, 2.8 kg/m ² , 14 kg/m ³ , Lambda=0.038 W/(m.K), Therm ITEx Th38 SE (KNAUF)	2303.63	m ²
2. Vertical structures and façade	External Wall - Bricks	Single skin wall from bricks, including mortar, with Mortar 1:4 cement:sand mix	369.93	m ³
	External Wall - Insulation	Rock wool insulation panels, unfaced, generic, L = 0.035 W/mK, R = 2.89 m ² K/W (16 ft ² °Fh/BTU), 50 kg/m ³ (3.12 lbs/ft ³) (applicable for densities: 25-50 kg/m ³ (1.56-3.12 lbs/ft ³)), Lambda=0.0346 W/(m.K)	541.36	m ³
	External Wall – Cement sheathing boards	Fibre cement boards, 1300 kg/m ³ (81.16 lbs/ft ³)	43.31	m ³
	External Wall – Gypsum plasterboard	Gypsum plaster board, regular, generic, 6.5-25 mm (0.25-0.98 in), 10.725 kg/m ² (2.20 lbs/ft ²) (for 12.5 mm/0.49 in), 858 kg/m ³ (53.6 lbs/ft ³)	45.11	m ³
	External Wall – Gypsum finish plaster	Gypsum finish plaster for use on low-suction backgrounds, 1250 kg/m ³ , Thistle MultiFinish, Thistle BoardFinish (British Gypsum Saint Gobain (2021))	13,545.1	kg
	Load bearing columns	Ready-mix concrete, C32/40, 2332 kg/m ³ , Agilia (Aggregate Industries UK Limited)	1349.79	m ³

RICS Category	Element Description	Material Used	Qty	Unit
	Internal Wall – Reinforced concrete	Ready-mix concrete, General	301.5	m ³
	Internal Wall - Assembly	Concrete block wall assembly, incl. internal insulation and plaster coating, R > 5m ² .K/W	2088	m ²
3. Horizontal structures: beams, floors and roofs	Roof - Insulation	Rock wool insulation for ETICS and flat roofs, R=1 m ² K/W, L=0.044 W/mK, 44 mm, 0.97 kg/m ² , 22 kg/m ³ , Lambda=0.044 W/(m.K) (Rockwool)	441.77	m ³
	Roof - Acoustic insulation	Rock wool insulation panels, L=0.035 W/mK, R=4.29 m ² k/W, 150 mm, 9 kg/m ² , 60 kg/m ³ , Lambda=0.035 W/(m.K), Rainscreen Duo Slab 150mm (ROCKWOOL, UK plant)	59.7	m ³
	Roof - Plasterboard	Gypsum plasterboard, fire resistant, 12.5/15 mm, 843 kg/m ³ , A2 fire class, 10µ water vapour resistance, Gyproc FireLine (British Gypsum (2019))	14.92	m ³
	Roof – Concrete slabs	Hollow core concrete slabs, generic, C30/37 (4400/5400 PSI), 0% (typical) recycled binders in cement (300 kg/m ³ / 18.72 lbs/ft ³), incl. reinforcement	298.49	m ³
	Roof + balcony- Polymer	Bitumen-polymer membrane roofing, 1 layer, fully torched (EWA)	1412.97	m ²
	Roof + balcony – ply membrane	Single ply membrane from POCP (polyolefin copolymerisate binder)	2497.39	m ²
	Intermediate floor - Plasterboard	Gypsum plasterboard, fire resistant, 12.5/15 mm, 843 kg/m ³ , A2 fire class, 10µ water vapour resistance, Gyproc FireLine (British Gypsum (2019))	2303.63	m ²
	Intermediate floor – acoustic insulation	Acoustic partition roll insulation, unfaced, L = 0.043 W/mK, R = 2.3 m ² K/W, 100 mm, 1.2 kg/m ² , 12 kg/m ³ , (APR 1200) 100mm (Saint-Gobain ISOVER UK)	115.18	m ³
	Intermediate floor – concrete	HS2 - Concrete - cast for in-situ applications, C40/50, 20% GGBS	575.91	m ³
	Intermediate floor – insulation	PIR insulation boards, aluminium foil faced, <= 160 mm, L = 0.0215 W/mK, dens. = 32 kg/m ³ , Various products (Xtratherm)	2303.63	m ²
	Intermediate floor – latex levelling	Levelling compound, 1200 kg/m ³ , Nivelliermasse (PCI Augsburg)	2303.63	m ²
	Intermediate floor – acoustic separating layer	Acoustic ceiling panel, 13 mm, 3.37 kg/m ² , Armstrong Solara 13mm (KNAUF CEILING SOLUTIONS)	2303.63	m ²
4. Other structures and materials	Internal doors	Doors with wooden frame, interior, DONNEE PAR DEFAUT (DED)	600.5	m ²
	Balcony – cement fibre cladding pane	Fibre cement boards, 1300 kg/m ³ (81.16 lbs/ft ³)	218.9	m ²
	Balcony – concrete slab	Hollow core concrete slabs, generic, C30/37 (4400/5400 PSI), 0% (typical) recycled binders in cement (300 kg/m ³ / 18.72 lbs/ft ³), incl. reinforcement	43.78	m ³

RICS Category	Element Description	Material Used	Qty	Unit
	Balcony - assembly	Concrete balcony assembly, 200 mm	218.9	m ²
	Balcony – Ply membrane	Single ply membrane from POCP (polyolefin copolymerisate binder)	109.45	kg
	Stairs	Concrete assembly for stairs per one metre height	58.56	m
	Windows	Double glazing - no frame, 1 mm, ex cavity and ex frame	529.16	m ²
	Window Frames	Extruded aluminium profiles for window and door frames, generic, 80% recycled content, average world technology (One Click LCA 2022)	132.29	m ²
	External Doors	Extruded aluminium profiles for window and door frames, generic, 80% recycled content, average world technology (One Click LCA 2022)	68.86	m ²
5. External areas and site elements	Railing	Road safety railing, steel, concrete basisConcrete paving, 15.4 m2/m3, 96 units/m3, Andover Textured	16.2	m
	Timber Fence	Timber, Hardwood	12,474	kg
	Gates	Timber, Hardwood	1170	kg
	Paving	Precast concrete paving products, 2350 kg/m ³ (BPCF)Natural stone slab for exterior paving, 30 mm, 86.8 kg/m2, 2757 kg/m3	93.72	m ³
	Tarmac	Asphalt, average, -10 to 40 degC (Tarmac CRH)Wide planter, 1500 mm, 22.35 kg/unit, Studioscape modular system	549	m ²
ilding technology	Water to Water heat pumps in apts.	Heat pump 5.80 kW AIR / WATER providing heating for the individual house, Pompe à chaleur AIR/EAU assurant le chauffage en logement	45	units
	External Air Source Heat Pump	Reversible air/water heat pump for collective housing, 645.6 kg/unit, P=40-80 kW, DONNEE PAR DEFAUT (DED)Air/air heat pump, ducted, 95.2 kg/unit, P=5-10 kW,	8	units
	Solar Panels	Solar panel photovoltaic system, EU average	365.8	m ²
	Ventilation	Ventilation system for residential building, per m ² GFA	4757.88	m ²
	Toilets	Ceramic toilet, 19.6 kg/unit, - DURAVIT : Starck 3 (420009; 452709; 220209). Ceramic toilet, 19.6 kg/unit, - DURAVIT : Starck 3 (420009; 452709; 220209).	45	units
	Shower tray	Shower tray made of synthetic material, French average, Long. 90 cm Larg. 90 cm, DONNEE PAR DEFAUTCeramic shower tray, French average, DONNEE PAR DEFAUT (DED)	45	units
	Shower head	Brass fixtures, shower heads, 1.96 kg/piece, 080st – chromed brass	45	units
	Bathroom Sink	Sanitary ceramics, washbasins: 16.3 kg, bidets: 21.7 kg, toilets: 27.1 kg, urinals: 17.9 kg, kitchen sinks: 23.2 kg, cisterns: 12.4 kg Particleboard	733	kg

RICS Category	Element Description	Material Used	Qty	Unit
	LED lights	LED lighting, P = 40W, DONNEE PAR DEFAUT (DED)	900	unit
	Kitchen sink	Stainless steel sink, 5.57 kg/unit, DONNEE PAR DEFAUT (DED)Ceramic sink, French average, DONNEE PAR DEFAUT (DED)	45	units

OneClick Assumptions for Stages B1 and B7

Life Cycle Stage	Material Used
B1 (Use Phase)	Refrigerant leakages referenced based on BREEAM NC 2018 POL 01 Table 12.2,
B2 (Maintenance)	Electricity used has been assumed being included in the consumption of grid electricity Water used for cleaning has been assumed as 1 litre/person/day.
B3 (Repair)	An annual repair rate of 2% has been assumed for light fittings, and external windows.
B7 (Operational water use)	Estimated based on 105 litre/person/day based on the assumptions from MEP



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