Energy and Sustainability Statement

Charlton Brown Architecture & Interiors Limited

82 Fitzjohn's Avenue
Camden
London

SRE

Version	Revision	Date	Author	Reviewer	Project Manager
1	A	12.03.2021	Iain Turrell	Harrison Notter	Iain Turrell
1	B	16.03.2021	Iain Turrell	Iain Turrell	Iain Turrell
1	C	23.03.2021	Iain Turrell	-	Iain Turrell

The figures within this report may be based on indicative modelling and an assumed specification outlined within the relevant sections. Therefore, this modelling may not represent the as built emission or energy use of the Proposed Development and further modelling may need to be undertaken at detailed design stage to confirm precise performance figures. Please contact SRE should you have any questions, or should you wish further modelling to be undertaken post planning.

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Executive Summary

This Energy and Sustainability Statement has been written to demonstrate the overall sustainability measures in place for the Proposed Development at 82 Fitzjohn's Avenue, London.

The Energy strategy for the Proposed Development has been developed by following the GLA Energy Hierarchy of Lean, Clean, Green and Seen, local policy guidance, and guidance contained within the London Plan with regards to the Circular Economy[1] and Whole Life-Cycle Carbon Assessments[2].

Overall, the Proposed Development demonstrates compliance with the Energy Hierarchy, showing a >35% CO_2 emissions reduction over a Building Regulations Compliant design, with a >10% emissions reduction being achieved through fabric efficiency measures, and a >20% CO_2 emissions offset from on-site renewable energy – far exceeding the requirements of Local Policy.

In addition to the measures outlined within this report, a Whole Life Carbon Assessment (WLCA) has also been undertaken on the Proposed Development to determine the whole life carbon cost of the proposals, with full results shown within the supporting Whole Life Carbon Assessment which supports this application.

	CO_2 emissions (t/yr)	Improvement	Improvement over baseline
Baseline	32.10		
Lean	19.65	38.79%	38.79%
Clean	19.65	0.00%	38.79%
Green	11.12	43.41%	65.35%

Table 1 - Summary of regulated carbon dioxide savings

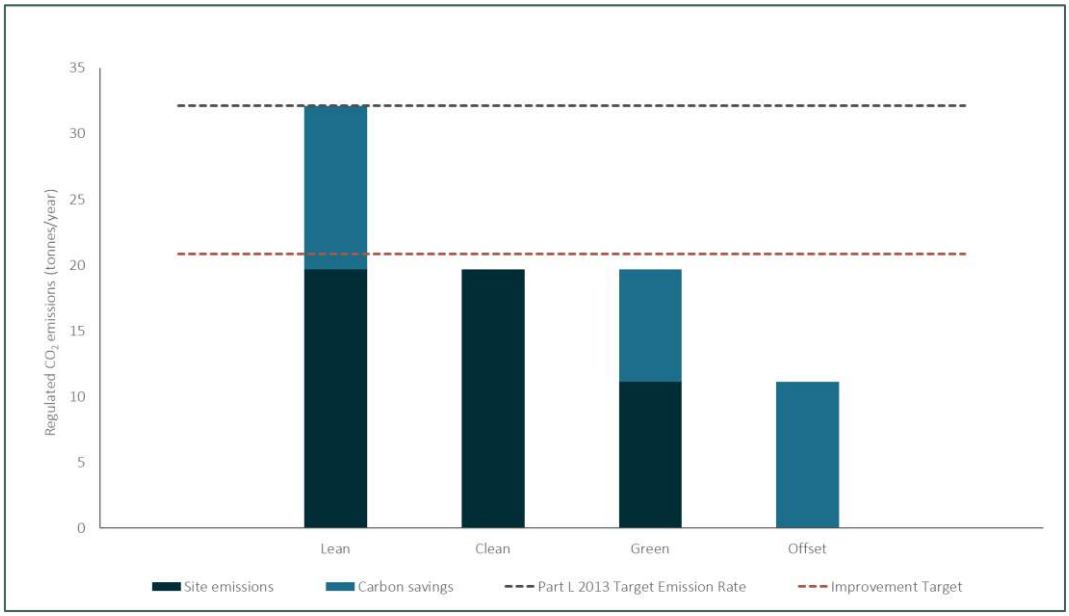


Figure 1 - Summary of regulated carbon dioxide savings

[1] Mayor of London: Circular Economy Statement Guidance (Draft for consultation, October 2020)
[2] Mayor of London: Whole Life-Cycle Carbon Assessments Guidance (Consultation Draft, October 2020)

Proposed Energy Strategy

- Passive and active design measures including:
  - >10% improvement from fabric efficiency measures
  - >20% CO_2 offset from Low/Zero Carbon technologies
  - Advanced temperature controls.
  - 100% low energy lighting.
  - Enhanced hot water storge.
  - Enhanced building fabric.
  - Reduced building permeability.
- Air Source Heat Pump to provide heating and cooling via fan coil units.

	CO_2 emissions (t/yr)	Improvement over Baseline
Green	11.12	65.35%

Table 2 - Green emissions summary

Introduction

1.0 Introduction

This Sustainability Strategy has been written by SRE on behalf of Charlton Brown Architecture and Interiors Limited (The Architect) to demonstrate the sustainability measures incorporated into the design of the renovation and extension of the residential dwelling at 82 Fitzjohn's Avenue, London (the Proposed Development), located within the London Borough of Camden.

The Proposed Development will deliver lower energy and water use, lower carbon emissions and lower operational costs than a Building Regulations Compliant design through a 'fabric first' approach to the building design in line with best practice. The site will also be assessed in accordance with the 'Whole Life Carbon Assessment for the Built Environment' by RICS, and will incorporate Circular Economy principles within the overall construction process, procurement and design.

The Site currently consists of a residential dwelling which has been extended numerous times over the years and is a mix of architectural styles and construction quality as a result - many of which are in a poor state of repair. The Proposed Development consists of the part removal of the existing structures – all of which were extensions to the original house on the site – and the extension of the original house to form a modern residential dwelling of 860m^2.

Elements of the original dwelling on the site are to be retained, with extensions to be constructed to a high quality of architectural design, with finishes and design elements which complement and enhance the existing, retained property.

Overall, the Proposed Development aims to retain and enhance the existing structure – which is of architectural interest – and extend and enhance the living conditions to provide longer term sustainable, efficient residential accommodation.

Figure 2 - South Elevation of the Proposed Development (Charlton Brown Architecture & Interiors)

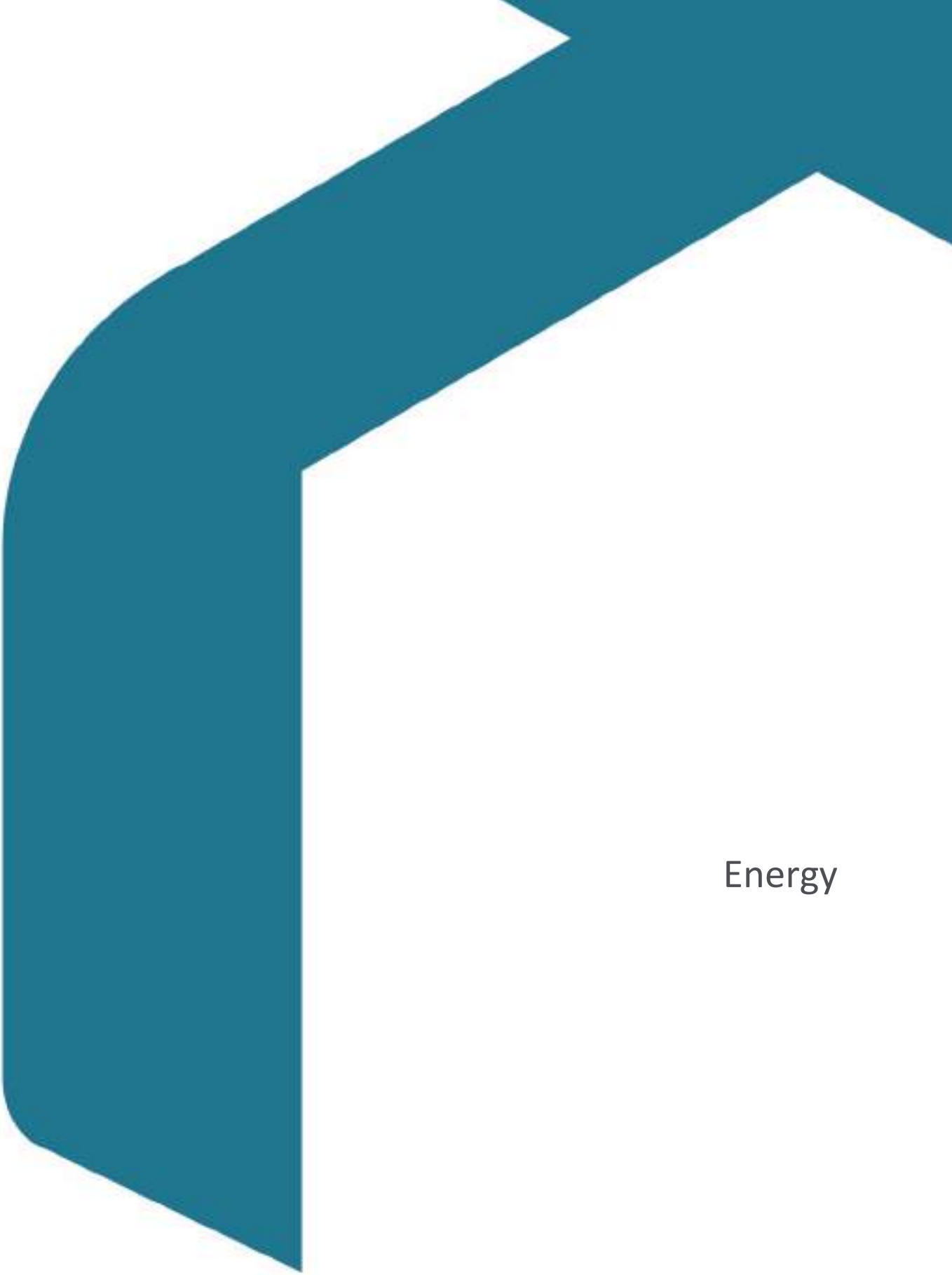
Planning Policy	Requirement
The London Plan (2015)	Policy 5.2 Equivalent to 40% reduction over Building Regulations Part L2A 2010 (35% over BRegs 2013)
The (draft) New London Plan (2019) (not yet adopted)	Policy S12 How the zero-carbon emissions target will be met within the framework of the energy hierarchy
	Policy S12 A minimum on-site reduction of 35% with at least 15% through energy efficiency measures alone
	Policy S14 Limit internal heat gain through the cooling hierarchy
London Borough of Camden Local Plan	Policy CC1: Climate Change Mitigation The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. We will: a) promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy; b) require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met; c) ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks; d) support and encourage sensitive energy efficiency improvements to existing buildings; e) require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and f) expect all developments to optimise resource efficiency. For decentralised energy networks, we will promote decentralised energy by: g) working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them; h) protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and i) requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network. To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.

	Policy CC2: Adapting to climate change a) The Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as: the protection of existing green spaces and promoting new appropriate green infrastructure; b) not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems; c) incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and d) measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy. Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement. Sustainable design and construction measures The Council will promote and measure sustainable design and construction by: e) ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation; f) encourage new build residential development to use the Home Quality Mark and Passivhaus design standards; g) encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and h) expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.
Camden Planning Guidance – Energy Efficiency and Adaption (March 2019)	General Guidance from the London Borough of Camden on the preparation of Energy Statements for Planning, the requirements needing to be met, and the information required to be displayed.

Table 3 - Summary of local planning policy requirements

In accordance with the Camden Planning Guidance – Energy Efficiency and Adaption (March 2019) document, the Proposed Development is deemed to be a 'medium' residential refurbishment. The Proposed Development is required to achieve the *"Greatest possible reduction – meeting Part L1B for retained thermal elements"* and a *"20% CO_2 reduction from onsite renewables (after all other energy efficiency measures have been incorporated)"*

In addition, the Proposed Development will demonstrate a high level of sustainability through the use of sustainable construction techniques, site management and procurement procedures and through the re-use of the existing building fabric of architectural interest and genuinely usable state.



Energy

2.0 Energy

2.1 Method

The Proposed Development will implement energy improvements in line with the Mayor of London's Energy Hierarchy[3], through seeking to be:

Lean

Minimise the overall environmental impact and energy use through energy efficiency measures

Clean

Ensure that energy systems on-site (heat & power) are efficient & produce minimal CO_2 emissions

Green

Implement suitable technologies to provide renewable and emission free energy sources

Seen

Incorporate monitoring through SMART metering and accessible displays

CO_2 Conversion Factors (Table 4) have been taken from Building Regulations 2013 as these are the current Building Regulations to which buildings within the UK must meet. In line with the London Plan, conversion to the new 'SAP 10' emissions figures for each stage of the energy hierarchy are shown within the Appendices.

	CO_2 Conversion Factor ($kgCO_2/kWh$)
Electricity (mains)	0.519
Electricity (offset)	-0.519
Gas (mains)	0.216
Heating Oil	0.298
Wood Pellets	0.039
Woodchip	0.016

Table 4 - CO_2 conversion factors by energy source

The energy modelling for the Proposed Development has been calculated using SAP software in accordance with Building Regulations 2013 Part L1B.

[3]The London Plan: https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/london-plan-2021

The notional building provides the energy baseline and is the exact size and shape of the Proposed Development but is based on existing and notional U-values and heating specifications outlined in Approved Document L and the Domestic Building Services Compliance Guide.

2.2 The Existing Building

By way of a comparison, an initial model has been created within the SAP 2012 software of the current building based on the performance of the existing fabric, heating systems etc. This is not used as part of the energy hierarchy as the existing building is a different size and layout to the Proposed Development but is shown here to offer a comparison of the existing building with that proposed.

	CO_2 emissions (t/yr)
Existing Building	37.03

Table 5 – Existing Building CO_2 emissions

2.3 The Baseline Scenario

As part of L1B calculations, a 'Notional' building is created using the minimum U-values and performance standards as outlined within Approved Document L1B. For the purposes of this assessment, the Notional Model is based on the retention and enhancement of the existing building fabric to meet minimum L1B standards, and extension of the property to provide the same floor space as the current design proposals. This is the most appropriate and robust method of representing the energy hierarchy for this scheme.

	CO_2 emissions (t/yr)
Baseline	32.10

Table 6 - Baseline CO_2 emissions

2.4 LEAN – Demand Reduction

The lean scenario can achieve a 38.79% reduction in CO_2 emissions using passive and active design measures, over the Baseline scenario.

	CO_2 emissions (t/yr)	Improvement
Baseline	32.10	
Lean	19.65	38.79%

Table 7 - Lean CO_2 emissions and improvement over Baseline

2.4.1 Passive Design Measures

Passive design measures are those which are inherent within the proposed design and construction and are not reliant on additional, active technologies to provide energy efficiency improvement.

The new building elements have been positioned within the site to maximise solar gain where this has been possible within the constraints of the site. The large south facing façade of the east wing certainly helps in this regard.

All glazed areas of the building will have elements of shading provided by the building form or internal curtains/blinds. The building orientation and design – with a predominantly south facing aspect - will maximise

natural light and positive solar gains. Glazing on the north elevation is limited as far as practicable to minimise overall heat loss. Solar gains will be further controlled through Low E glazing for all new glazing installations.

The new elements are generally to be of traditional masonry construction and will be very well insulated with a low infiltration rate. Proposed U-values are provided within

Newly Constructed Elements	Notional Compliance (U-value)	Proposed (U-value)
External Walls	0.28	0.13
Ground Floor	0.22	0.09
Roof	0.16	0.11 – 0.10
Windows and rooflights	1.60	1.60 – 0.80
External Doors	1.80	1.00
Air Tightness @ 50 N/m2	15 (m3/hr/m2)	10 (m3/hr/m2)
Thermal Bridge	Default	Default

Table 8. The overall building should have a medium thermal mass, balancing the provision high energy efficiency and limiting potential overheating during the peak summer months.

Newly Constructed Elements	Notional Compliance (U-value)	Proposed (U-value)
External Walls	0.28	0.13
Ground Floor	0.22	0.09
Roof	0.16	0.11 – 0.10
Windows and rooflights	1.60	1.60 – 0.80
External Doors	1.80	1.00
Air Tightness @ 50 N/m^2	15 ($m^3/hr/m^2$)	10 ($m^3/hr/m^2$)
Thermal Bridge	Default	Default

Table 8 - Fabric energy efficiencies

2.4.2 Active Design Measures

Active efficiency measures are those which are not only inherent to the overall construction of the dwelling but work to increase the efficiency of the site through the installation of energy efficient technologies and equipment.

The Proposed Development will utilise 100% low energy/LED lighting in excess of Building Regulation requirements. All external lighting will be positioned to avoid excessive light pollution and be supported by PIR/daylight sensor and time controls with a maximum lamp capacity of 150W (equivalent) for essential security lighting.

A high efficiency natural gas boiler has been proposed within this Lean scenario in line with the Energy Hierarchy and the current heating system on the site. The addition of time, temperature and zone controls allow the control of individual zones/rooms throughout the building, reducing waste and increasing the efficiency of the system as a whole.

A suitably sized (500l), well insulated hot water cylinder is also proposed at this stage.

In modern air-tight buildings, careful consideration needs to be given to the specification of ventilation systems to ensure moisture is removed and ventilation standards are met to ensure a healthy standard of internal air.

Extract ventilation is provided to all wet-rooms throughout the Proposed Development in line with Building Regulations Part F requirements. Ventilation to the habitable spaces is assumed at this stage to be provided by trickle ventilators within the window units.

2.4.3 Cooling

The cooling hierarchy has been used to ensure that passive building design has been optimised to reduce the cooling load for the Proposed Development.

Cooling Hierarchy	Potential Design Measures
Minimising internal heat generation through energy efficient design	All primary pipework to be insulated, therefore low system losses. High specification hot water cylinder installed with low heat loss. Low energy lighting throughout.
Reducing the amount of heat entering the building in summer	Low E glass windows and internal blinds are to be provided to minimize solar gain. All walls are to be well insulated.
Use of thermal mass and high ceilings to manage the heat within the building	Thermal mass is anticipated to be medium with ground floors and external walls being of 'massive' construction.
Passive Ventilation	Openable windows will be provided to all rooms and cross ventilation is possible.
Mechanical Ventilation	Standard extract ventilation is to be provided to wet rooms in line with Building Regulations Part F.

Table 9 - Design measures following the cooling hierarchy

Cooling has been included within the Lean scenario as a Client requirement. Within this scenario this is modelled as a split/multi-split system.

Cooling for the Proposed Development has been proposed within the current specification and in line with the London Borough of Camden Policy CC2: Adaption to Climate Change, dynamic modelling has been undertaken to show that the site will overheat without this being installed. Please see the supporting SRE Thermal Comfort Assessment in accordance with CIBSE TM59 for this scheme, which accompanies this application.

2.5 CLEAN – Heating Infrastructure

The Proposed Development is a single dwelling and is therefore not able to provide a communal based system.

In addition, the dwelling is not located near to an existing or proposed district heating main and therefore connection – or potential future connection – to such as system is not possible or technically viable.

District Heat Networks

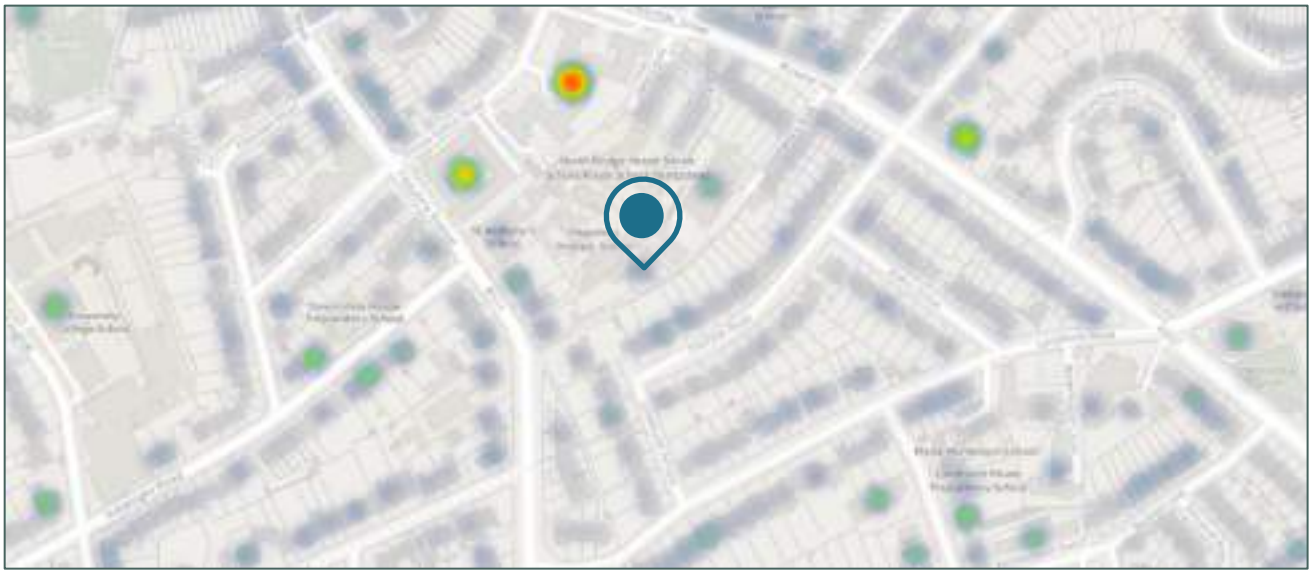


Figure 3 - London Heat Map (maps.london.gov.uk/heatmap/)

The London Heat Map shows that the Proposed Development is not within an area of high heat density and neither is there an existing heat network to connect to, nor is there one planned. Therefore, the potential use of a heat network has been discounted at this stage.

Communal Systems

The Proposed Development is a single dwelling and is therefore not able to provide a communal based system.

2.6 GREEN – Low Carbon and Renewable Energy

The addition of 'Green' technologies can provide a significant reduction in CO_2 emissions and enable the Proposed Development to meet the threshold of 35% improvement over Baseline emissions and a 20% reduction in CO_2 emissions from 'Green' technologies in line with local policy requirements.

	CO_2 emissions (t/yr)	Improvement
Clean	19.65	
Green	11.12	43.41%

Table 10 - Green CO_2 emissions and improvement over Clean

2.6.1 Roof Mounted Solar (Photovoltaics and Solar Water Heating)

The use of roof mounted technologies for the site – including solar PV – is discounted for the Proposed Development on the basis that the development is within a Conservation Area and the use of roof mounted solar technologies would strongly distract from the architectural elements of the scheme and not reflect the character of either the Proposed or retained building elements.

Therefore, the use of any roof mounted technologies is not considered for the site.

2.6.2 Heat Pumps

Heat Pumps are a good way of reducing the CO_2 emissions associated with heating (and cooling, where specified) systems. All Heat Pump systems consume electricity to operate - the Coefficient of Performance (CoP) of the system is the ratio of electrical energy consumed, to heat energy emitted. Generally, a CoP of 3 - 4 can be achieved, meaning 3 or 4 units of thermal energy are produced for each unit of electricity consumed.

In addition, heat pumps can be located anywhere on the site, allowing for appropriate placement of the plant on this sensitive location.

Heat pumps will only deliver low grade heat (up to ~50°C) efficiently, and therefore these systems alone are relatively inefficient in providing hot water, as this requires additional electrical input (immersion or increased compressor use) to raise the water temperature further.

If desired, heat pumps can also provide cooling to a property should this be desired as part of a mixed-mode system.

Ground Source Heat Pumps

Ground Source Heat Pump (GSHP) systems use the ground as the collector array for any heating and cooling provided. Generally, this is provided through a ground loop system or, in locations where space is at a premium, through boreholes (set ~5m apart).

Although GSHP can provide a greater efficiency of performance, it comes at a significantly higher capital cost, due to the extensive groundworks needed to install either 'slinky' ground loops or 100m+ deep boreholes needed to provide the required collector array surface area.

The Application Site is relatively constrained, with the dwelling taking up a majority of the available space. There are also established trees on site, impeding the groundworks needed for the installation of a GSHP system. Therefore, the use of a ground loop system would not be possible. Likewise, deep level piling would not be appropriate for the site to serve the requirements of a GSHP, therefore this technology is not being proposed at this stage.

The use of GSHP at this stage has therefore been discounted.

Air Source Heat Pump

The use of Air Source Heat Pumps (ASHP) has the potential to supply the heating requirements, cooling requirements, and a large proportion of the hot water requirements of the Proposed Development.

The application of ASHP to the Proposed Development would be subject to the provision of correctly sized heating emitters (oversized radiators and/or underfloor heating). However, as localised comfort cooling is also proposed as part of the Client Specification, the heating and cooling would be provided through fan coil units, delivering heating and cooling through the supply of conditioned air to all spaces. This delivery system further improves the efficiency of the ASHP system for both heating and cooling modes.

ASHPs tend to generate some noise and therefore the location in which the pump is positioned would need to be adequately sound insulated in order to prevent disturbances to the building's occupants and neighbours.

2.6.3 Energy Storage

Energy storage is not considered at this stage as there are no energy generation facilities to be provided on site – with offset provided through ASHP. Therefore, the storage of energy is not necessarily beneficial at this stage. The plant room for the Proposed Development is of a sufficient size for future energy storage to be provided, should this be considered at a later date.

2.7 SEEN – In-use monitoring

It is recommended that the Proposed Development will be supplied with Smart Meters (where available from the utility supplier) and a building energy management system (BEMS) or equivalent SMART home technology, along with associated internal energy displays. This will further improve energy efficiency by allowing occupants to observe their energy use in 'real time' and manage it more effectively.

2.8 Energy Conclusions

The Proposed Development will deliver passive and active energy demand reduction measures along with low and zero carbon technologies in order to reduce energy demand and associated CO_2 emissions resulting from the Proposed Development's operation.

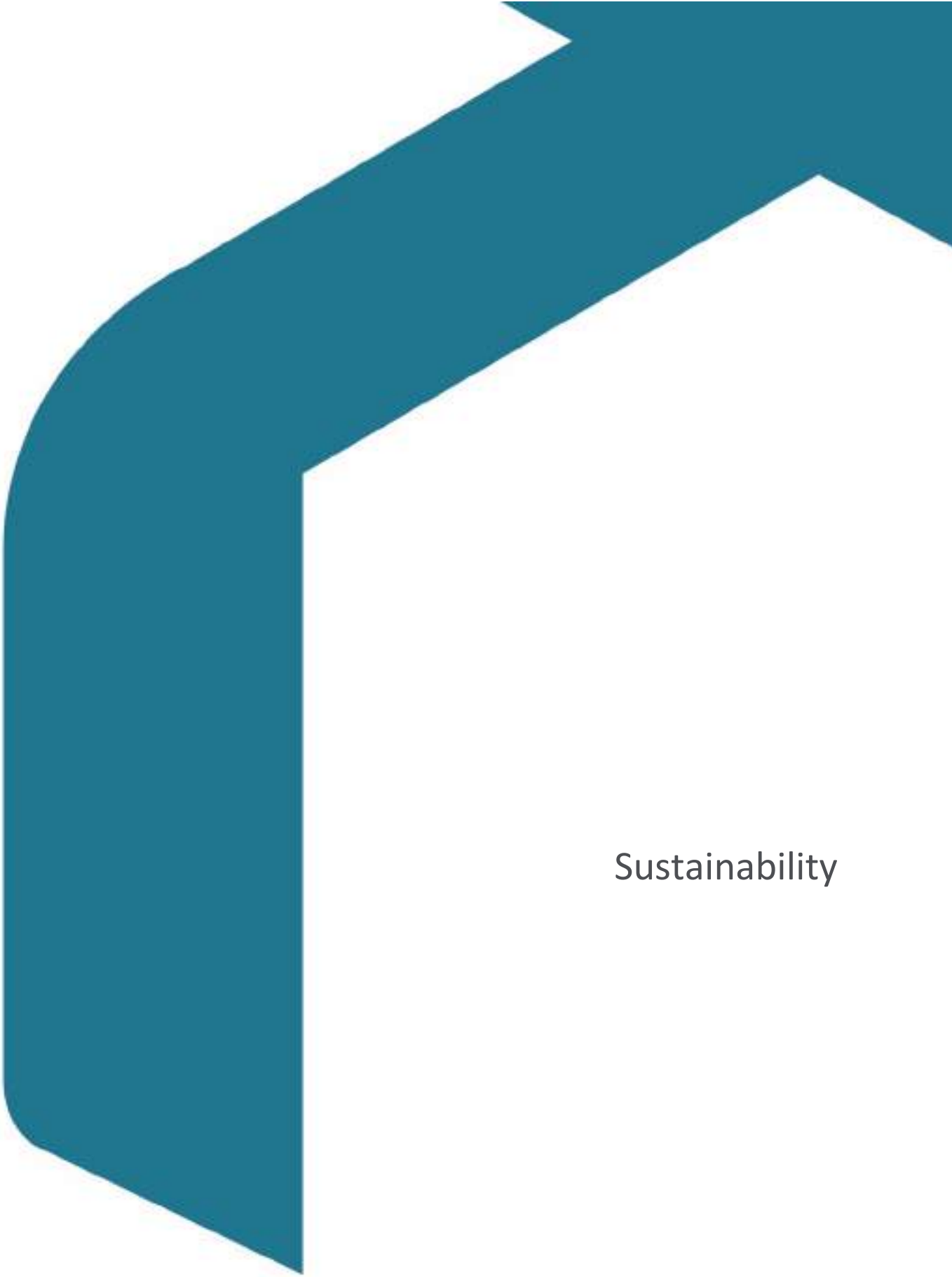
The calculations undertaken demonstrate that the Proposed Development will robustly exceed Building Regulations Part L1B compliance by >35% in line with local and regional policy, with a >20% CO_2 emissions offset on-site through the specification of 'Green' technologies.

	CO_2 emissions (t/yr)	Improvement	Improvement over baseline
Baseline	32.10		
Lean	19.65	38.79%	38.79%
Clean	19.65	0.00%	38.79%
Green	11.12	43.41%	65.35%

Table 11 - Summary of CO_2 emissions, incremental improvement and improvement over Baseline

In delivering the Green energy strategy, the Proposed Development provides:

- Passive and active design measures including:
  - >10% improvement from fabric efficiency measures
  - >20% CO_2 offset from Low/Zero Carbon technologies
  - Advanced temperature controls.
  - 100% low energy lighting.
  - Enhanced hot water storge.
  - Enhanced building fabric.
  - Reduced building permeability.
- Air Source Heat Pump to provide heating and cooling via fan coil units.



Sustainability

3.0 Sustainability

The World Commission on Environment and Development (WCED) report: Our Common Future, describes Sustainable Development as development that:

"meets the needs of the present without compromising the ability of future generations to meet their own needs."

This principle has guided national policy since the WCED report, and continues to be the foundation to which 'sustainability' is embedded within processes of all industries, including construction and development.

Over the years the policy requirements have become more prescriptive in nature, with targets on CO_2 emissions and resource use being tightened through Policy and Regulations changes as the UK moves towards zero carbon by 2050. Changes to regulations gradually, aims to allow industry to adapt to new methods, whilst challenging industry leaders to provide innovative services, technologies and other solutions to meet the ever-stricter demands.

Whilst reducing emissions is key to ensuring the reduction of pollution and CO_2 emissions – the primary cause of anthropogenic Climate Change – the primary aim of sustainable measures is to ensure that future generations have the same – if not better – ability to meet their needs than the current generation. As such, wider aspects must be taken into account when looking at sustainability in the round.

3.1 Environmental Assessment & Whole Life Carbon

The Proposed Development is for the partial fabric removal and extension to an existing residential dwelling. The removal of the previous extensions to the original house on the scheme is considered necessary to allow appropriate internal spaces to be created in line with the Clients requirements for the site, and provide efficient and effective residential accommodation.

The original house is to be retained, with the later low-quality extensions removed to allow new extensions to the residential accommodations to be made.

Over and above the standard requirements for a scheme of this type, the Proposed Development is undertaking a Whole Life Carbon Assessment to establish the Whole Life impact of the proposals in relation to embodied, operational and end of life CO_2 emissions.

A Whole Life Carbon Assessment (WLCA) is being undertaken in accordance with the 'RICS Whole Life Carbon Assessment for the Built Environment' (First Edition, November 2017) which outlines the process of WCLA, and what is, and what is not included. The aim of the RICS document provides clarity on the EN 15978: 2011 for the sustainability assessment of buildings, and provides clarity on the approach required within this methodology.

The aim of this assessment will be to model the whole life carbon impact of the proposed design, and compare this to an alternative scheme where the existing fabric is retained, enhanced and extended to provide the same floor area of residential accommodation. Then a comparison can be made in relation to the potential future impacts of the Proposed Development.

Overall, it has been found that the retention and extension of the existing structure to provide residential accommodation on the same scale as that proposed would be significantly more carbon intensive over the long term, when compared to the current proposals.

Please see the supporting Whole Life Carbon Assessment document from SRE for full details, which supports this application.

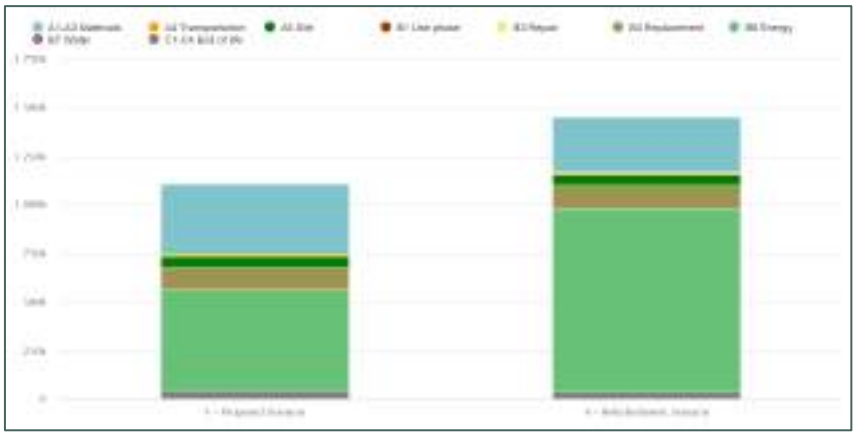


Figure 4 – Outline WLCA Results

3.2 The Circular Economy

The circular economy ethos is driving the move away from a 'Take – Make – Use – Discard' economy to a 'Re-make and Use Again' economy.

For building development, the impacts to the circular economy can be categorised into the following sections:

- Fabric removal and reclamation
- Design and construction impacts
- Site waste and its management
- Operational waste storage
- End of life disassembly and re-use

Impacts at each of these stages are required to be considered and mitigated as much as possible to ensure that the impact is minimised, and materials are fed back into the supply chain to be re-used.

3.2.1 Fabric Removal and Reclamation

This element of the cycle is the most difficult to control as the current development on the site has been constructed at various stages over the course of a century. Therefore, there are a variety of material types present across the site, with undoubtably little attention shown to the lifecycle impact of the materials at the time of construction.

In addition, the date of some of the extensions to the original house could also mean that potentially dangerous products were used in its construction – such as asbestos.

None the less, all materials on site will be managed in accordance with the waste hierarchy (Figure 5,below) with as much as possible of the removed structure being re-used on the site within the new build elements. Key items being reused are as follows:

- Key construction timbers where these are able to be re-used,
- Internal finishes (Stone flooring etc.) where these can be reclaimed,
- Concrete construction materials (such as blocks etc)
- Roofing tiles where these are undamaged

Where materials cannot be used as reclaimed on site, these will be considered for crushing and reuse within the sub-structure of the Proposed Development, preventing as much as possible of the materials leaving site by way of waste removal.

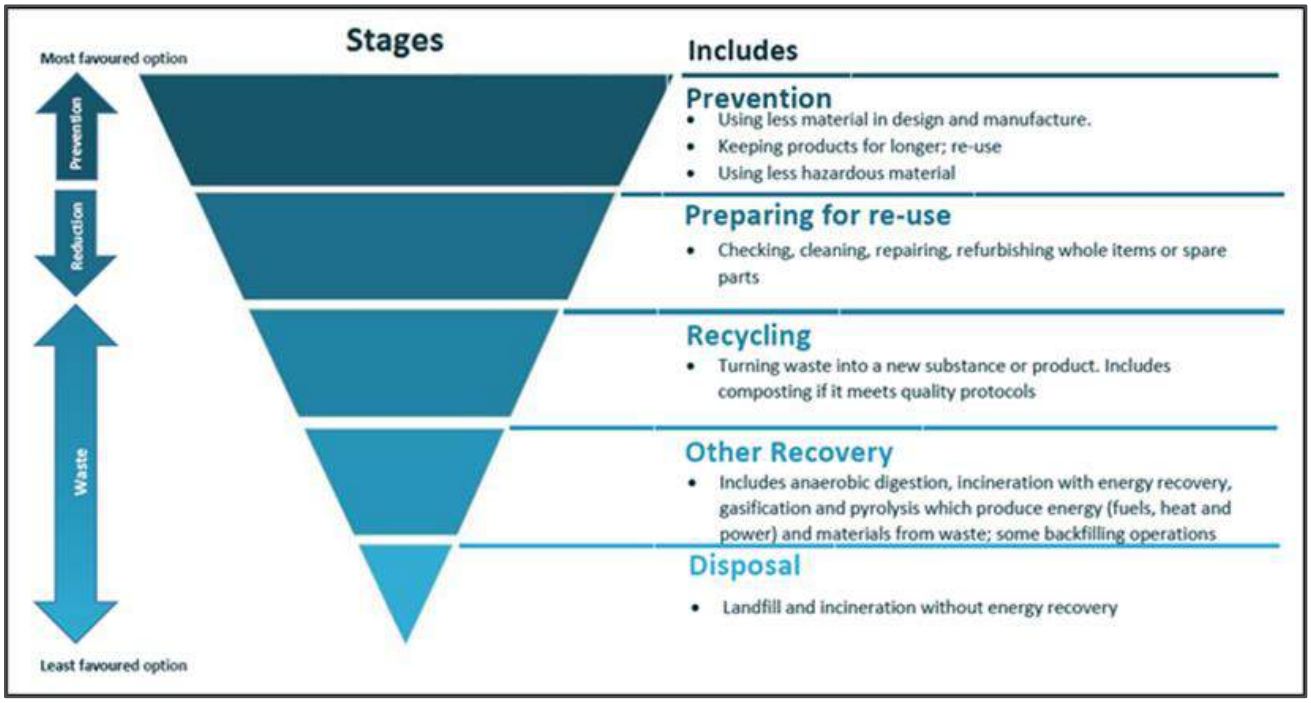


Figure 5 - The waste hierarchy

Where waste has to be removed from site and is not re-usable, this will be managed through a licenced waste contractor with the following benchmarks for diversion from landfill being targeted in line with Best Practice[4]:

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

Table 12 – BREEAM New Construction Wst 01 Diversion from Landfill Benchmarks – Exemplary Level

3.2.2 Design and Construction Impacts

The Proposed Development is aiming to retain much of the original structure as possible with some internal rearrangements being made to make the space work with the new extensions. Primary fabric and structural removal for the original house is to be minimised as far as possible. A complete soft strip of the property has been completed to-date in order to assess the building structure and usability. This waste has been primarily related to plasterboard and finishes and full documentation has been provided confirming total volumes and levels of recycling.

In addition, the re-use of any material within the current structure will be incorporated within the substructure as aggregate, blinding or hardcore.

Due to the nature of the Proposed Development and the structure required for some elements, the use of concrete is unavoidable. The dwelling is to be traditionally constructed with brick and block where structural requirements allow, with reinforced concrete used where required.

[4] BREEAM New Construction 2018 – Wst 01 'Construction Waste Management' criteria. (Table 52)

However, as part of the procurement process, the use of materials with a high recycled content and locally produced will be investigated. In addition, the use of the suppliers and manufacturers with a certified Environmental Management System will also for a key part of the procurement strategy.

Timber also forms a key part of the construction, with timber used in the studding of internal and external walls, floor joists and boarding. The use of re-used timber for some elements will be considered but will be subject to the condition of the materials (rot, damp and warping etc.) removed and whether they are appropriate for the required use. Where new timber is purchased this will be accompanied with appropriate chain of custody certification (FSC/PEFC) ensuring it is from a sustainable supply.

The predominant construction materials proposed on the site – brick, block and timber – are inherently reusable at the end of the building life with the main elements not re-usable being the surface finishes (plasterboard, vinyl flooring etc). As such, the reuse of materials following the proposed building end of life has been considered.

3.2.3 Site Waste and its Management

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. As with the Fabric Removal stage of works, waste from the site will be managed via a certified waste contractor and will be monitored through best practice site management procedures.

Quantity of waste diverted from landfill will be in accordance with Table 12 above, with regular reports requested from the waste contractor, and stored as part of ongoing site monitoring and management.

To facilitate the re-use of materials on the site, appropriate areas will be allocated within the allocated within the Construction Works Plan and associated method statement for the storage of re-usable materials from the demolition and construction phases.

3.2.4 Operational Waste Storage

The ability of the occupier to appropriately sort and store domestic waste as part of the general operation of a dwelling is strongly influenced by the location and ease of access of the waste stores provided.

Therefore, the appropriate storage of refuse and recycling both internal and external will be incorporated into the overall design and layout of the scheme.

The London Borough of Camden offer waste collection services to the site and provide conventional refuse collections (fortnightly) in addition to mixed recycling and food waste collections (weekly).

The "Waste storage and arrangements for residential and commercial units"[5] offers full and complete guidance on the services offered and requirements for storage of these waste streams.

Waste storage is considered in both internal and external locations, with the following being required to achieve general compliance with the standards for residential dwellings:

Internal Storage:

- Internal bin within the kitchen space (or other appropriate space) that comprises 2 no. segregated storage spaces (for general waste and recycling) or equal volume – min. 60 litre capacity.
- At least a 7 litre allowance for food waste storage allowed for within the kitchen layout.
- Total minimal capacity: 127 litres

[5] 4f682792-29fa-89ca-00b1-f2a7fb5a6dc1 (camden.gov.uk)

External Storage:

With regards to external waste storage, the Waste storage and arrangements for residential and commercial units document outlines the following:

"The minimum bin storage space for general waste on a kerbside street accessed collection based on a 0-3 bedroom property is a 240L bin. For larger residences up to 9 bedrooms an additional 20L for general waste and 20L for mixed recycling per bedroom per week."

Therefore, the Proposed Development will have an allowance for 320 litres of conventional waste storage and 400 litres of mixed recycling.

For external food waste bins, sizing is not determined within the Camden guidance, however it is assumed at this stage that this will be provided through a minimum of a 23 litre external 'kerbside caddy'.

In line with best practice, a dedicated storage position with clear and appropriate access from the kitchen will be provided to the waste storage location. This should generally be no more than 30m from the nearest door, and be as level and accessible as possible with appropriate surfaces for walking.

It is assumed that this stage that waste storage is to be in line with the Camden requirements and therefore wheelie bins are to be provided. Where alternative arrangements are to be made, appropriate consideration will also be given to prevent rodent and other pests gaining access to the stored waste.

3.2.5 End of life disassembly and re-use

The consideration of the materials used on the site have been selected on multiple basis including the potential for re-use at the end of the buildings useful life. As such, high quality and durable materials are selected to ensure a long and maintenance free lifespan of the building.

The predominant construction materials on the site are brick, concrete block and timber – all of which are potentially re-usable when the building is demolished.

Brickwork is to be unrendered, and therefore minimising the effort required to clean up the product at the end of use on this site. This is the same as the blockwork on the site, with the majority being internal facing and with a light skim coat of plaster as a finish. As such these main construction materials will be suitable for re-use with minimal effort.

Timber will be adequately protected from the potential for rot, warping and damp to allow this to be reused at the end of life. The majority of timber will be mechanically fixed in place with minimal use of adhesives, resulting in a more effective removal of the material with minimal damage sustained.

3.3 Pollution

Air

The Proposed Development will aim to limit its contribution to local air pollution by installing a heating and cooling system which emits zero on site emissions (ASHP). The ASHP will emit no onsite NOx emissions but will consume grid electricity. As the NOx emissions resulting from the production of electricity decreases at the national scale, the resulting theoretical emissions from the Proposed Development will do also – further improving the carbon emissions associated with the site.

The Proposed Development is located within a high NOx emissions area as defined by the UK NOx emissions map, see Figure 6. Therefore, the proposed energy strategy will assist in the reduction in emissions with contribute to poor air quality, and associated health conditions.

Noise

The Proposed Development is located on the site of an existing residential dwelling and will therefore not produce any greater noise pollution than was generated during the operation of the current site conditions.

ASHPs do tend to produce some noise during their operation, therefore the siting and shielding of this technology will be carefully considered as part of the Detailed Design.

In addition, the Proposed Development will be a highly insulated building with excellent air-tightness which should limit any noise from inside the building far below that of the existing.

The Proposed Development is not a change of use, and is remaining a residential building. Therefore there is not anticipated to be any additional vehicular traffic associated with the site over and above that currently.

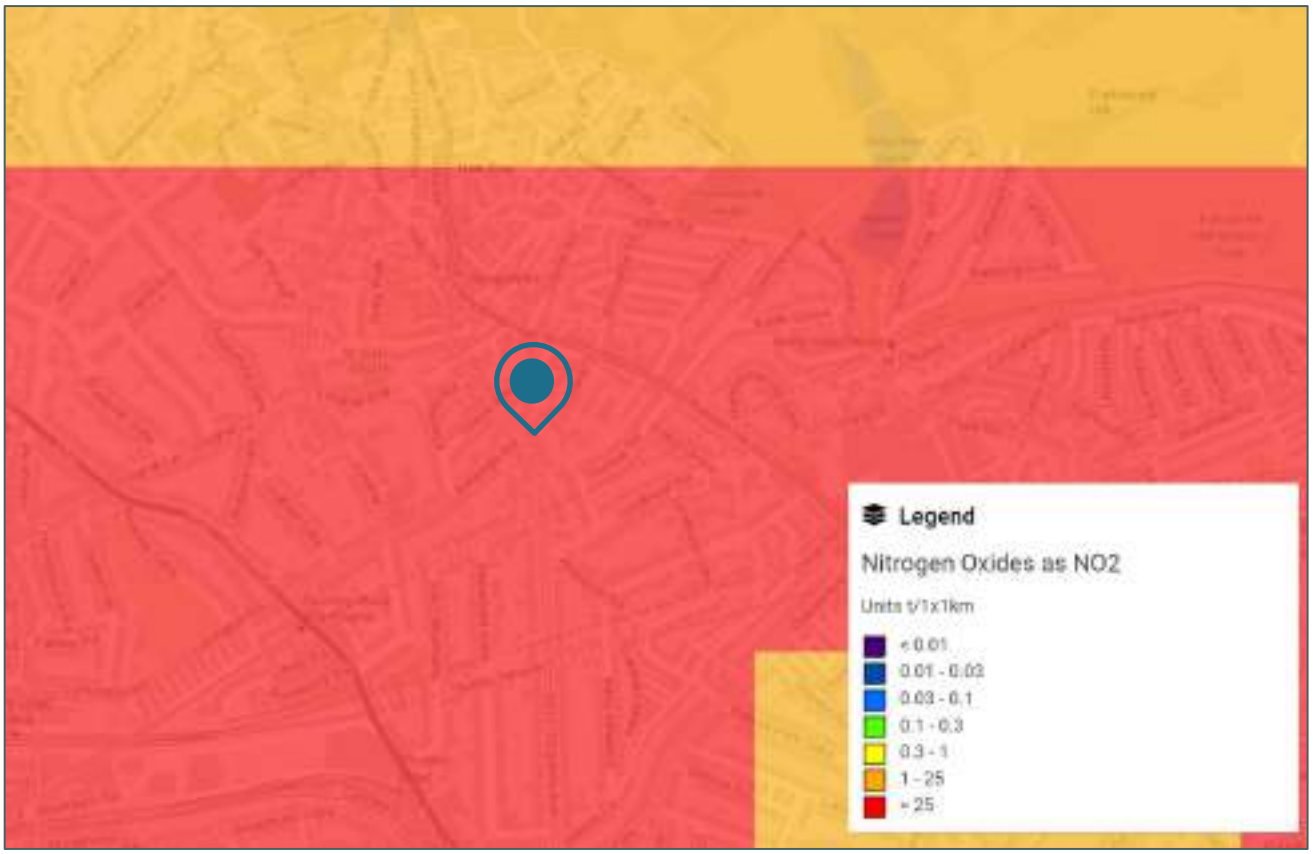


Figure 6- UK Air Pollution Map showing pollution from Nitrogen Oxides as NO2 (https://naei.beis.gov.uk/emissionsapp/)

Light

The design and layout of the site for practical use has been considered while trying to maximise internal daylight levels and provide a building of high architectural quality – reflecting elements of the retained, original house. All spaces occupied by residents have glazing to provide natural daylight, and light-coloured curtains or roller blinds will be provided to enable glare control and privacy.

Light Pollution will be minimised where possible through the careful specification and positioning of external lighting around the Proposed Development, ensuring minimal light pollution from the site. Special attention will be given to security lighting (where fitted) to ensure it is appropriately focussed and controlled.

All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight/timer controlled. Any external signage, where installed and lit, will be installed and controlled with appropriate PIR and dawn-till-dusk sensors.

3.4 Flood Risk

The selected site is at very low risk of flooding from rivers and seas (Figure 7) and while the surrounding area has several roads shown as at risk of flooding from surface water, the areas adjacent are mainly very low and low risk with the actual site is not shown as at risk of flooding from surface water (Figure 8).

The Proposed Development has undertaken a full flood risk assessment and will include Sustainable urban Drainage System (SuDS) as part of the measures to reduce surface water run-off from the site. This will be assessed under the BREEAM issue Pol03.

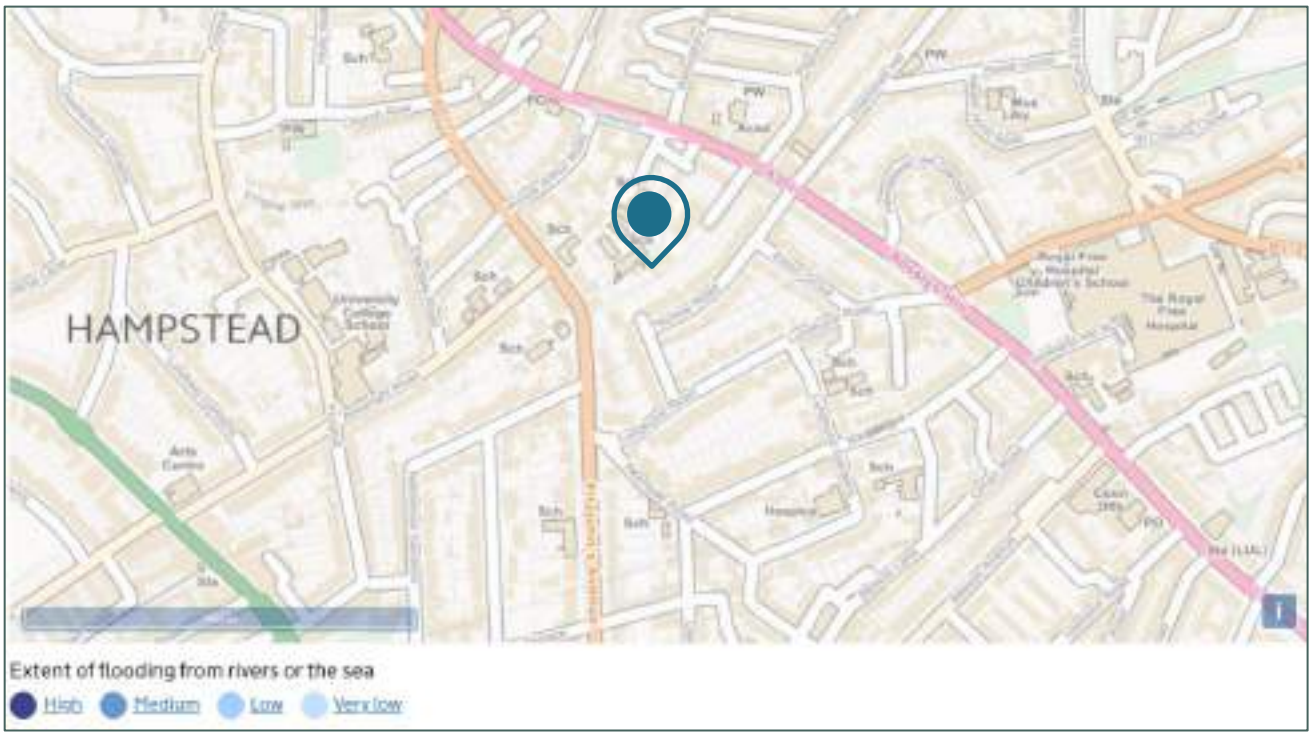


Figure 7 - Flood map showing risk of flooding from rivers or the sea (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

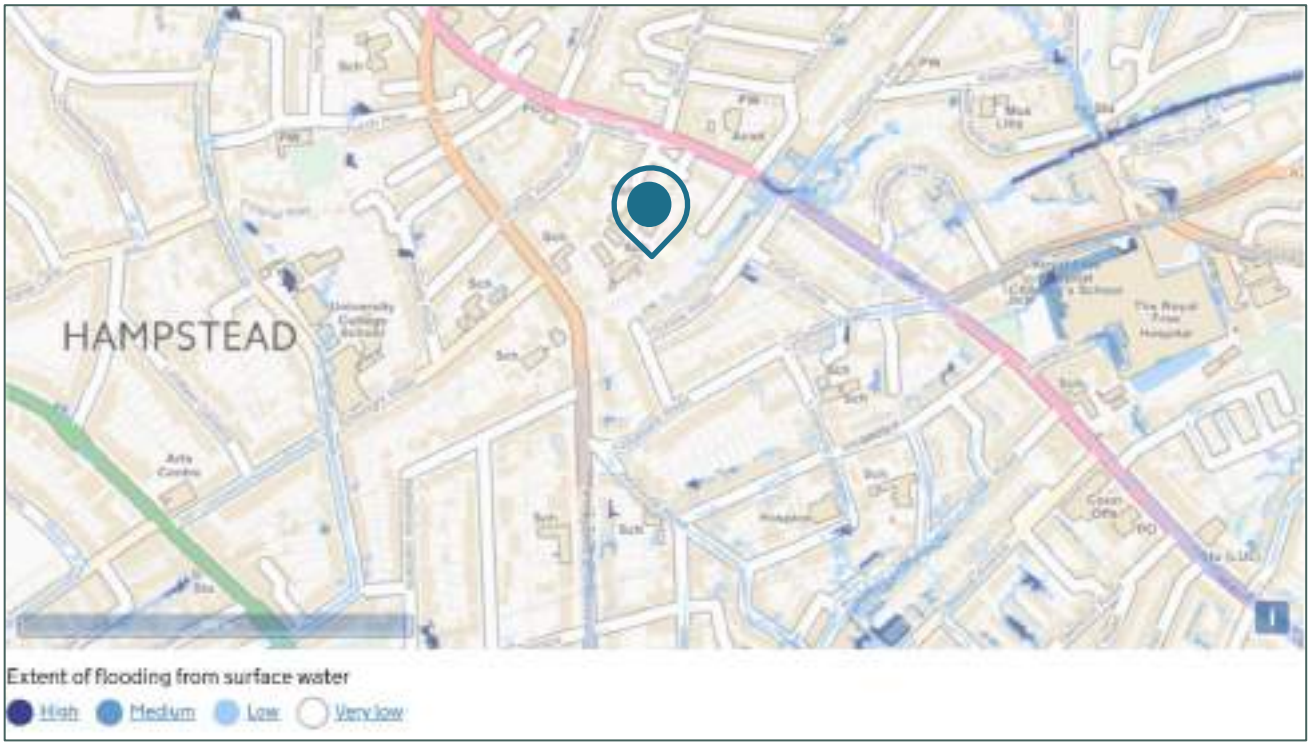


Figure 8 - Flood map showing risk of flooding from surface water (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

3.5 Transport

Public Transport

Being located in central London, the Proposed Development is well served by public transport which will assist in the reduction of emissions associated with the use of private vehicles for local trips.

Bus stops are located 100m to the east of the site, along Spring Walk, on Fitzjohn's Avenue, and provide bus services to Paddington, City of London, and Muswell Hill. Further stops are located to the west of the site offering services to Golders Green, and Finchley Road Station to the south. All routes offer connections to the wider TfL bus network to provide local, city-wide travel opportunities.

The nearest train station for overground services is West Hampstead which provides Thameslink Services. This station is located 1.3km so the south west of the Application Site. The nearest London Underground station to the Proposed Development is Hampstead, 400m to the north of the site, offering Northern Line Services to the wider London Underground Network.

Overall, the Proposed Development has a wide offering of Public Transport, which will assist in the occupants making sustainable transport decisions for local and long-distance travel.

Parking

Parking provision on the site is to be re-aligned to allow easier access to the dwelling, and allow a greater extent of soft landscaping to be included within the overall site design.

On-site parking will reduce the overall parking burden on the local surrounding areas on-street parking provision.

Car-Pooling

In addition to the location of public services surrounding the site, the option to car pool is also a popular method of having all the advantages of a private vehicle, without the need to own one.

There is a car-pooling service provided by Zip Car, located 200m north east of the site on Willoughby Road. This is a round trip vehicle, and therefore will always be at this location when available. To use this service, you must be a member of the Zip Car scheme (join online for free). Proximity to a car-pooling service will allow residents access to cars without the need to own one.

3.6 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The Proposed Development currently consists of an existing dwelling which is to have some element of fabric removal, with a new extension provided.

The new extension broadly follows the outline of the current buildings, with the key areas of external space to the south of the site retained and enhanced.

Current areas of hard standing are to be removed, and access to the site reconfigured to provide a greater area of private garden space to the south, with appropriate planting added in line with Client requirements.

It is recommended that in general, native species are investigated to be included within the proposed planting mix to enhance local biodiversity and allow feeding and habitat opportunities for native wildlife.

3.7 Resource efficiency

Internal Water Use

Areas of the South East of England have been declared areas of 'serious water stress', particularly Greater London. Water is a vital resource and efficient usage should be encouraged in all buildings.

In line with policy CC3: Water and Flooding, the Proposed Development aims to significantly reduce mains water use through a combination of efficiency measures, including the use of fittings with a low capacity or flow restrictors.

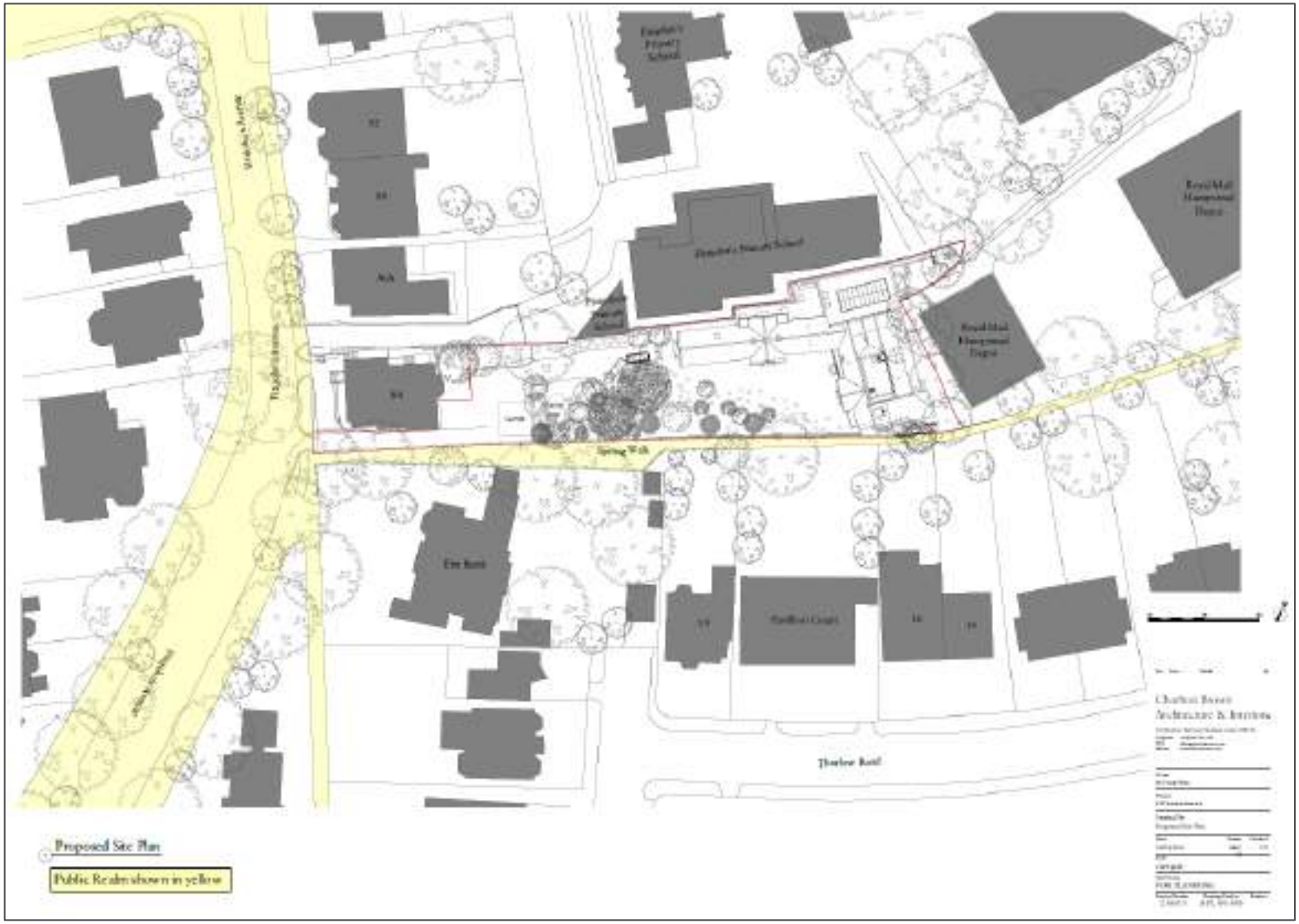
Internal water use will be reduced to less than 110 litres/person/day in line with Policy requirement. The specification below gives an indication of the flow rates and capacities needed to achieve this requirement, but final calculations will be needed based on the sanitaryware and appliances installed to confirm.

- W/Cs: 4/6 litre dual flush
- Basin Taps: 4 litres/minute
- Bath: Max. 200 litres to overflow[6]
- Showers: 7 litres/minute
- Kitchen Taps: 5 litres/minute
- Washing Machines: 8.17 litres/kg dry load
- Dishwashers: 1.25 litres/place setting

[6] Please note that this is the volume of the bath to overflow without the allowance for displacement

Appendix A

Appendix A – Site Plan



Appendix B – SAP Summary Sheet

82 Fitzjohn's Avenue

BRegs LTA 2013

Option	Units	External Wall	Roof	Floor	Windows	Ext Door	Boiler	Delayed Start Thermostat	Weather / load Compensator	Secondary Heating	HW Cylinder	Renewables (PV)	Renewables (Area)	Mechanical Ventilation	Air - Permeability	DER v TER improvement	DFEE vs TFEE improvement
Type	Plot No	U Value	Y/N	U Value	U Value	U Value	Make	Y/N	Y/N	Y/N	(litres)	(kWp)	m^2	Type		%	%
82 Fitzjohn's Avenue	1	0.13/0.15	0.10/0.11/0.12	0.09	0.8/4.8	1.0/3	N/A	Y	N	N	500.00	N/A		Exract	8	34.35	8.38

Element	U Values	Description
New External Wall (TYPE K) SAP Wall Type 2	0.13	(Specification TBC by Charlton Brown architects)
New External Wall (TYPE A, B, L) SAP Wall Type 2	0.13	(Specification TBC by Charlton Brown architects)
External Wall (TYPE M) SAP Wall Type 1	0.15	Retained retrofitted with insulation (Specification TBC by Charlton Brown architects)
New New Floor SAP Floor Type 2	0.09	(Specification TBC by Charlton Brown architects)
Floor SAP Floor Type 1	0.09	Retained retrofitted with insulation (Specification TBC by Charlton Brown architects)
Existing Pitched Roof SAP roof Type 1	0.12	Retained retrofitted with insulation (Specification TBC by Charlton Brown architects)
New Pitched Roof	0.11	(Specification TBC by Charlton Brown architects)
New Flat Roof (T2) SAP roof Type 2	0.10	(Specification TBC by Charlton Brown architects)
Windows Ground floor	0.80	(Specification TBC by Charlton Brown architects) Assumed: Triple Glazed, LowE (Whole window U-values provided, no g-value provided or spec to assume FF
Windows First floor	1.60	(Specification TBC by Charlton Brown architects) Assumed: Triple Glazed, LowE (Whole window U-values provided, no g-value provided or spec to assume FF
Roof Lights (velux)	1.00	(Specification TBC by Charlton Brown architects)
New External Door	1.00	U-value assumed - (Specification TBC by Charlton Brown architects) (timber, upvc etc.)
Existing External Door	3.00	As existing from SAP appendix A
Construction Details (PSI values)	-	standard Accredited Construciton Details have been assumed
Boiler	Y	Mitsubishi ECODAN PUHZ-HW140-VHA(2)-BS
Controls	-	Time and Temperature Zone Control Assumed programmer and room thermostats
Heating Emitters	-	Fan coil units
HW Cylinder	Y	500 litre cylinder at 3 Loss (kwh/day)
Secondary Heating	Y	N/A
Mechanical Ventilation	Y	Standard extract ventilation
Lighting	-	100% Low Energy Lighting - CFL or LED
Renewables	?	N/A
Overheating	-	N/A
Notes		

Sign Off of details					On behalf of the contractor/client:		
	Name	Harrison Notter	Date	16/03/2021	Name		Date
	Sign	(on behalf of SRE)			Sign		

Appendix C – Unfeasible Low and Zero Carbon Technologies

Biomass Boiler

Biomass boilers generate heat from the burning of renewable or 'waste' fuels. They require a regular feed of fuel and regular heat demand to operate efficiently. A flue taller than the surrounding buildings must be incorporated into the design to minimise air pollution impacts at ground level from particulate emissions.

The use of a biomass boiler system to supply space heating and DHW has been deemed unsuitable due to the high level of particulates emitted from their use. The use of such a system would negatively impact the air quality of the surrounding area and furthermore, could impact the usability of the roof terrace amenity.

Wind Power

Wind power is a developed and productive method of renewable energy generation, however the main limiting factor to its implementation is opposition at a local public and local government level.

To generate a meaningful amount of electricity, large-scale turbines are required which have noise and the visual impacts for the local area. The use of wind turbines has therefore been deemed unsuitable.

Appendix D – Internal Water Use Calculations

Building Regulations 2013 Part G	Planning Stage Specification				
		Capacity / flow rate	Use factor	Fixed use (litres/ person/ day)	Litres/ person/ day
WC (single flush)	Flush volume (litres)	0.00	4.42	0.00	0.00
WC (dual flush)	Flush volume (litres)	6.00	1.46	0.00	8.76
	Part flush volume (litres)	4.00	2.96	0.00	11.84
WCs (multiple fittings)	Average flush volume (litres)	0.00	4.42	0.00	0.00
Taps (excluding kitchen / utility)	Flow rate (litres/minute)	4.00	1.58	1.58	7.90
Bath (where shower also present)	Capacity to overflow (litres)	200.00	0.11	0.00	22.00
Shower (where bath also present)	Flow rate (litres/minute)	7.00	4.37	0.00	30.59
Bath only	Capacity to overflow (litres)	0.00	0.50	0.00	0.00
Shower only	Flow rate (litres/minute)	0.00	5.60	0.00	0.00
Kitchen/utility room sink taps	Flow rate (litres/minute)	5.00	0.44	10.36	12.56
Washing machine	Litres/kg dry load	8.17	2.10	0.00	17.16
Dishwasher	Litres/place setting	1.25	3.60	0.00	4.50
Waste disposal unit	Litres/use	0.00	3.08	0.00	0.00
Water softener	Litres/person/day	0.00	1.00	0.00	0.00
				Total calculated use	115.31
				Contribution from greywater (litres/person/day)	0.00
				Contribution from rainwater (litres/person/day)	0.00
				Normalisation factor	0.91
				Total internal water consumption	**104.93**
				External water use	5.00
				Total water consumption	**109.93**

Appendix E – GLA SAP 10 Conversion Tables (for reference only)

SAP 10.0 Performance

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations Compliant Development	30.7	
After energy demand reduction (be lean)	18.7	
After heat network connection (be clean)	18.7	
After renewable energy (be green)	5.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: Savings from energy demand reduction	12.0	39%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	13.7	44%
Cumulative on site savings	**25.7**	**84%**
Annual savings from off-set payment	5.0	-

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