Energy and Sustainability Statement

MAA Architects

Waldegrave Mews
Rear of 189 Waldegrave Road
Teddington

Version	Revision	Date	Author	Reviewer	Project Manager
1	A	17.09.2021	Iain Turrell	Malcolm Maclean	Yin Mui Tang
1	B	08.10.2021	Yin Mui Tang	Malcolm Maclean	Yin Mui Tang

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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Contents

Executive Summary

Executive Summary

This Energy and Sustainability Statement has been written to demonstrate the measures incorporated into the design of the Proposed Development at Waldegrave Mews, Richmond, which will deliver lower energy and water use, lower carbon emissions and lower operational costs than a Building Regulations compliant design.

The energy strategy has been developed by following the Energy Hierarchy of 'Lean, Clean, Green and Seen'. This statement outlines the proposed energy performance of the site, which will meet and exceed the relevant planning policy requirements for a minimum 35% improvement over a Building Regulations Part L baseline on-site. The Proposed Development will incorporate both passive and active design measures, and Green LZC technologies to meet and exceed the minimum standards and maximise renewable and LZC energy generation on site.

	CO_2 Emissions (tonnesCO_2/annum)						
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	**Site-Wide**	**Improvement**
	Block A	Block B	Block C	Block A	Block A		
Baseline	2.45	10.00	9.04	2.63	1.46	**25.58**	-
Lean	2.11	8.98	7.88	1.10	1.23	**21.30**	**16.73%**
Clean	2.50	10.34	9.07	1.36	1.23	**24.50**	**-15.02%**
Green	-3.29	2.64	2.56	1.12	0.91	**3.94**	**83.92 %**
						Total Improvement over Baseline:	84.60%

Table 1 - Summary of CO_2 emissions, incremental improvement and improvement over Baseline

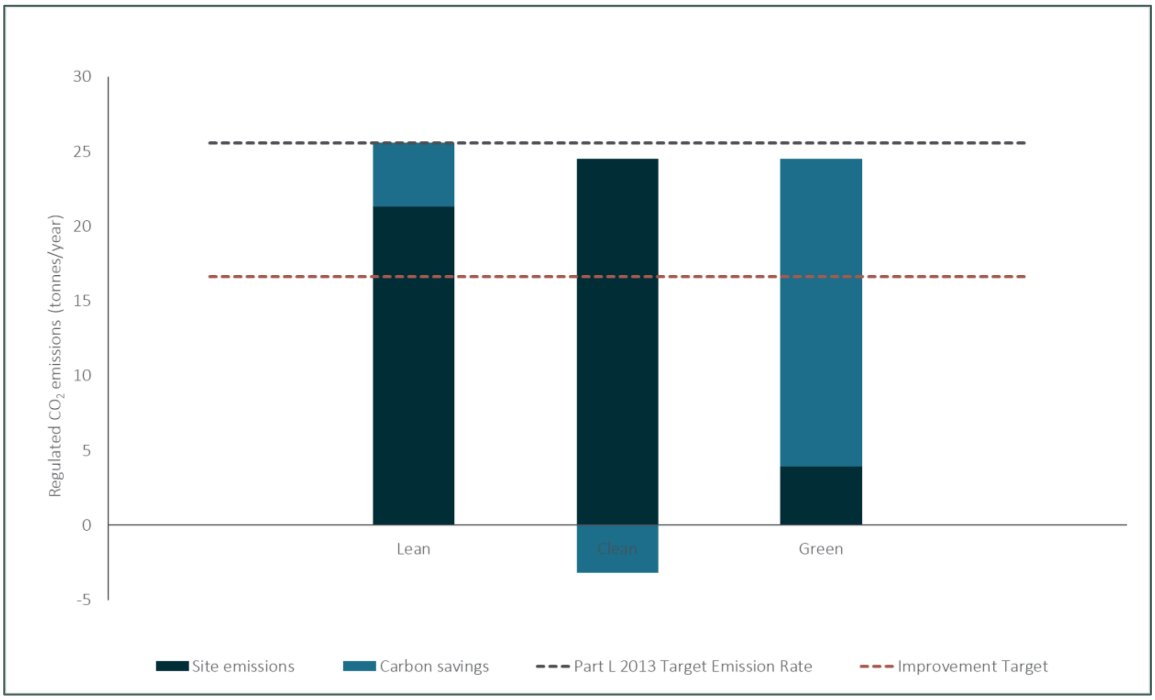

Figure 1: GLA Energy Hierarchy Emissions Graph - sitewide

Proposed Energy Strategy

- Passive and active design measures
- 100% low energy lighting
- Low-E glazing
- Enhanced building fabric and accredited construction detailing (for new build)
- All dwellings to be air pressure tested
- Communal heating provided through ASHP
- Mechanical Ventilation with Heat Recovery
- >35% improvement a minimum of 10% from efficiency measures
- Total 32.55kWp of PV providing site wide CO_2 emissions offset.

Introduction

1.0 Introduction

This Energy and Sustainability Statement has been written by SRE on behalf of MAA Architects (the Client) to demonstrate the measures incorporated into the design of the Proposed residential development at Waldegrave Road, Richmond, (the Proposed Development) which will deliver lower energy and water use, lower carbon emissions and lower operational costs than a Building Regulations Compliant design.

The statement compares the predicted actual building energy requirement with a Building Regulations compliant design, outlines passive and active design measures, and assesses the suitability of low and zero carbon (LZC) technologies specific to this site to address the relevant planning policy requirements.

The statement analyses how the Proposed Development will integrate with its surrounding environment within the context of sustainability to ensure it benefits the surrounding area socially, environmentally and economically.

The Proposed Development consists of 18 no. residential units and 1 no. commercial space. 17 no. of the residential units are of a new build construction, with the commercial space and 1 no. residential dwelling formed from the refurbishment of the existing building at 189 Waldegrave Road. The dwellings are a mix of 1 and 2 bed units.

The Application Site is located at to the rear of 189 Waldegrave Road, and is currently used for car repairs and storage. The majority of the site is currently either hard standing or storage/workshop buildings of poor quality.

All the current buildings and hard standing on the site will be cleared as part of initial site works, with the exception of the current building fronting Waldegrave Road.

Figure 2 – Proposed site map (MAA Architects)

Planning Policy	Requirement
London Borough of Richmond upon Thames – Local Plan, July 2018	Policy LP 20: Climate Change Adaption A. The Council will promote and encourage development to be fully resilient to the future impacts of climate change in order to minimise vulnerability of people and property. B. New development, in their layout, design, construction, materials, landscaping and operation, should minimise the effects of overheating as well as minimise energy consumption in accordance with the following cooling hierarchy: 1. minimise internal heat generation through energy efficient design 2. reduce the amount of heat entering a building in summer through shading, reducing solar reflectance, fenestration, insulation and green roofs and walls 3. manage the heat within the building through exposed internal thermal mass and high ceilings 4. passive ventilation 5. mechanical ventilation 6. active cooling systems (ensuring they are the lowest carbon options). C. Opportunities to adapt existing buildings, places and spaces to the likely effects of climate change should be maximised and will be supported. Policy LP 22 Sustainable Design and Construction A. Developments will be required to achieve the highest standards of sustainable design and construction to mitigate the likely effects of climate change. Applicants will be required to complete the following: 1. Development of 1 dwelling unit or more, or 100sqm or more of non-residential floor space (including extensions) will be required to complete the Sustainable Construction Checklist SPD. A completed Checklist has to be submitted as part of the planning application. 2. Development that results in a new residential dwelling, including conversions, change of use, and extensions that result in a new dwelling unit, will be required to incorporate water conservation measures to achieve maximum water consumption of 110 litres per person per day for homes (including an allowance of 5 litres or less per person per day for external water consumption). 3. New non-residential buildings over 100sqm will be required to meet BREEAM 'Excellent' standard. 4. Proposals for change of use to residential will be required to meet BREEAM Domestic Refurbishment 'Excellent' standard (where feasible). Reducing Carbon Dioxide Emissions B. Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions: 1. All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy. 2. All other new residential buildings should achieve a 35% reduction. 3. All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non-residential buildings should achieve zero carbon standards in line with London Plan policy. Targets are expressed as a percentage improvement

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over the target emission rate (TER) based on Part L of the 2013 Building Regulations.

C. This should be achieved by following the Energy Hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

Decentralised Energy Networks

D. The Council requires developments to contribute towards the Mayor of London target of 25% of heat and power to be generated through localised decentralised energy (DE) systems by 2025. The following will be required:

1. All new development will be required to connect to existing DE networks where feasible. This also applies where a DE network is planned and expected to be operational within 5 years of the development being completed.
2. Development proposals of 50 units or more, or new non-residential development of 1000sqm or more, will need to provide an assessment of the provision of on-site decentralised energy (DE) networks and combined heat and power (CHP).
3. Where feasible, new development of 50 units or more, or new non-residential development of 1000sqm or more, as well as schemes for the Proposal Sites identified in this Plan, will need to provide on-site DE and CHP; this is particularly necessary within the clusters identified for DE opportunities in the borough-wide Heat Mapping Study. Where on-site provision is not feasible, provision should be made for future connection to a local DE network should one become available.

Applicants are required to consider the installation of low, or preferably ultra-low, NOx boilers to reduce the amount of NOx emitted in the borough.

Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged where appropriate.

Retrofitting

E. High standards of energy and water efficiency in existing developments will be supported wherever possible through retrofitting. Householder extensions and other development proposals that do not meet the thresholds set out in this policy are encouraged to complete and submit the Sustainable Construction Checklist SPD as far as possible, and opportunities for micro-generation of renewable energy will be supported in line with other policies in this Plan.
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<tr>
<td rowspan="3">The New London Plan (2021)</td>
<td>Policy SI2

How the zero-carbon emissions target will be met within the framework of the energy hierarchy.</td>
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<td>Policy SI2

A minimum on-site reduction of 35% with at least 15% through energy efficiency (Lean) measures alone for non-residential development and 10% for residential development.</td>
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<td>Policy SI4

Limit internal heat gain through the cooling hierarchy.</td>
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Table 2 - Summary of local planning policy requirements

Policy Interpretation

The Proposed Development is deemed to be a Major Development by the Local Authority due to the provision of greater than 10 no. units. Therefore, in accordance with the New London Plan and local Policy requirements, the following is to be targeted on site:

- Achieve a minimum 35% CO_2 emissions reduction over Building Regulations Part L compliant baseline.
- Internal Water Use: Min. water use of 105 litres/person/day (excluding 5 l/p/d allowance for external use)
- Completed Sustainable Construction Checklist.

Energy

2.0 Energy

2.1 Method

The energy strategy design follows national policy guidance[1] and seeks 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 3) have been taken from Building Regulations 2013.

	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 3 - CO_2 conversion factors by energy source

Based on the plans provided by MAA Architects, the dwellings are to be assessed as follows:

- New Build elements: 17 no. apartments – Building Regulations Part L1A
- Refurbishment elements: Refurbishment of 189 Waldegrave Road to provide ground floor commercial space (Building Regulations Part L2B) and a two bed maisonette (Building Regulations Part L1B)

The energy modelling for the Proposed Development has been calculated using SAP 2012 software in accordance with Building Regulations 2013 Part L1A and L1B (outlined above) for the residential units, and energy IESVE-2021 software used for the commercial space.

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

2.2 CO_2 Emissions Baseline and Unregulated CO_2 Emissions

The energy modelling for the Proposed Development has been calculated using SAP software in accordance with Building Regulations 2013 Part L, and these figures converted to SAP 10 (potential revised Building Regulations Part L CO_2 emissions figures) in line with GLA guidance.

During this modelling, a Notional model is also created, which the proposed development must improve upon to achieve Building Regulations Compliance. 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.

	CO_2 Emissions (tonnesCO_2/annum)					
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	Site-Wide
	Block A	Block B	Block C	Block A	Block A	
Baseline	2.45	10.00	9.04	2.63	1.46	**25.58**

Table 4 - Baseline CO_2 emissions

Unregulated Energy and CO_2 emissions

The baseline scenario as outlined above, and all figures generated by compliance calculations accounts for only regulated energy – that is energy (and associated emissions) resulting from heating, hot water, lighting, and cooking. Additional energy use within the dwellings – from appliances, charging, computers etc. - is not accounted within this modelling. This additional energy use is called unregulated energy.

Using calculations in line with the National Calculation Methodology (NCM), estimations for unregulated energy use (and therefore the associated CO_2 emissions) can be made. Based on the current scheme design, the unregulated CO_2 emissions for the Proposed Development are outlined below:

	CO_2 emissions (t/yr)
Unregulated Emissions	21.59

Table 5 – Unregulated CO_2 emissions

Due to the fact that unregulated emissions are unaffected by the measures implemented within the energy hierarchy, the figures illustrated above will not change and are therefore not referenced throughout the report but provided here for reference only.

2.3 LEAN – Demand Reduction

The lean scenario can achieve the following reduction in CO_2 emissions through the implementation of both passive and active design measures throughout the scheme.

	CO_2 Emissions (tonnesCO_2/annum)					
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	Site-Wide
	Block A	Block B	Block C	Block A	Block A	
Baseline	2.45	10.00	9.04	2.63	1.46	**25.58**
Lean	2.11	8.98	7.88	1.10	1.23	**21.30**
					Improvement	**16.73%**

Table 6 - Lean CO_2 emissions and improvement over Baseline

The site will therefore meet the requirement for a >10% CO_2 emissions reduction from energy efficiency measures.

2.3.1 Passive Design Measures

Dwellings have been positioned within the site to maximise the usable space, both for the building and the external amenity and access spaces on this tight sight. All glazed areas will have elements of shading provided by the building form, glazing orientation, and/or internal curtains or blinds.

Overall, the building orientation and design has aimed to maximise solar gain where this is possible within the confines of the overall site layout and space – with window openings provided on the majority of elevations to provide natural daylight and enhance ventilation.

All dwellings will be very well insulated through all external elements with a low infiltration rate proposed. Existing thermal elements within the retained buildings are to be upgraded in line with Building Regulations Part L1B/L2B, with the new build construction exceeding the minimum requirements of Building Regulations Part L1A. All units – both new and upgraded – will be air pressure tested on completion.

Proposed U-values are given within Table 7 below for the refurbishment and new build elements. Overall, the Proposed Development has been deemed to have a 'medium' thermal mass at this stage. A medium thermal mass will balance providing high energy efficiency and limiting overheating during the summer months.

Elements & U-Values	Proposed New Build (L1A)	Proposed Refurbished (L1B)	Proposed Refurbished (L2B)
External Walls	0.14	0.14	0.14
Ground Floor	0.11	N/A	0.11
Roof	0.11	0.11	N/A
Windows and rooflights	1.10	1.10	1.10
External Doors	1.20	1.20	N/A
Air Tightness @ 50 N/m^2	<3 ($m^3/hr/m^2$)	<3 ($m^3/hr/m^2$)	<3 ($m^3/hr/m^2$)
Thermal Bridge	Accredited Details	Default Values	Default Values

Table 7 - Fabric energy efficiencies

2.3.2 Active Design Measures

All elements of the Proposed Development will utilise 100% low energy/LED lighting in excess of Building Regulation requirements. All external lighting (where fitted/installed) 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. Internal communal lighting will also be LED, with PIR and daylight controls to minimise operation time and associated energy use.

Time and Temperature Zone Control is to be installed within all new dwellings to provide an increased level of control of the temperature throughout the space. To allow this to be inputted into the relevant modelling, a minimum of 2 zones will be required per dwelling. Refurbishment dwellings are to receive programmer, room thermostat and TRV controls as standard.

Time, temperature and optimum start/stop controls are proposed for the commercial space.

Heating and hot water will be provided to all units through a high efficiency gas combination boiler within this stage of the Energy Hierarchy.

In addition, within 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.

It has been assumed within all spaces (new and refurbishment) that ventilation will be provided through balanced mechanical ventilation with heat recovery (MVHR). These systems remove damp warm air from kitchen and bathroom spaces, and transfer the heat contained to fresh incoming air, which is supplied to living/habited spaces. This provides constant air changes with minimal energy loss and will aid the removal of moisture and contaminants from within the dwellings.

Openable windows will provide additional fresh air and purge ventilation where this is needed.

Due to MVHR being specified, there is a need to reduce the air permeability rate associated with all spaces. Therefore, at present it is proposed that *all units will be pressure tested*, and all units will achieve a result of <3 $m^3/hr/m^2$.

2.3.3 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 highly insulated, therefore low system losses. Low energy lighting throughout with minimal heat output. Highly insulated hot water storage to be specified.
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 for all units due to traditional construction techniques. Some elements with thermal mass will be provided through the wall construction.
Passive Ventilation	Openable windows will be provided to all rooms for purge ventilation with the majority of units having openings on different facades to aid cross ventilation.
Mechanical Ventilation	MVHR provided to all units, with summer bypass also specified to reduce summer overheating potential.

Table 8 - Design measures following the cooling hierarchy

Active cooling is not proposed within the dwellings. Cooling is proposed within the office space in combination with the heating system, to provide conditions which are now expected within modern work environments.

2.4 CLEAN – Heating Infrastructure

The Proposed Development has 18 no. residential units, 17 of which are newly constructed. 1 dwelling is provided through a refurbishment of an existing dwelling on the site, and the commercial space is also created through the re-use of an existing building.

District Heating

The Proposed Development is located within a Heat Network Priority Area as indicated below but is not located near to an existing district heating scheme, nor to proposed schemes or distribution routes.

The layout and configuration of the site does not allow the implementation of a district heating network due to the size of plant needed and the space constraints of the site. Therefore the connection to, or implementation of a district heating scheme for the site has not been considered further at this stage.

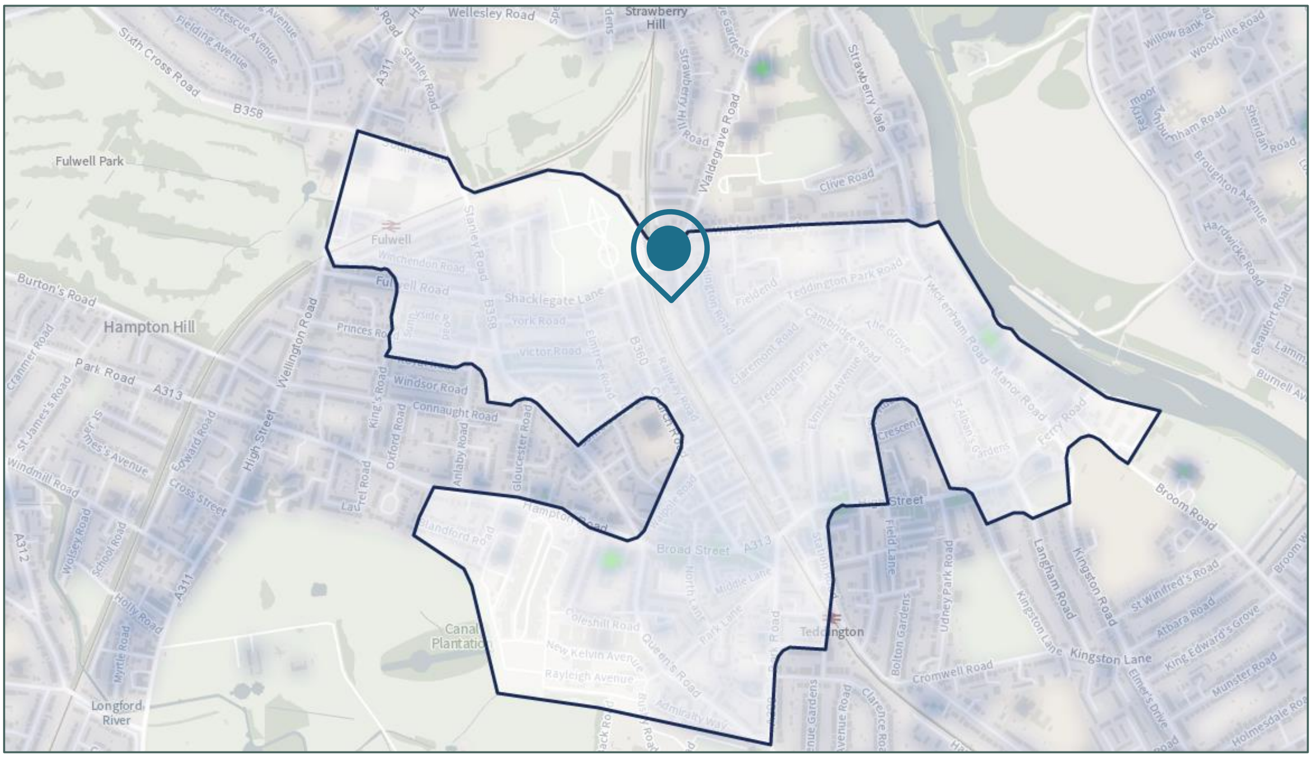

Figure 3 –London Heat Map output showing Application Site (https://maps.london.gov.uk/heatmap)

Cogeneration

The use of cogeneration – the production of both heat and electricity – has been considered for the site and is a viable option in theory to provide heating and hot water for the scheme as a whole.

The use of co-generation is limited due to the well-insulated nature of the site, and the subsequent low heat demand, which may result in the Combined Heat and Power (CHP) plant not operating to its maximum efficiency. In addition, there are noise considerations on such a confined site within close proximity to other residential dwellings.

The use of CHP has therefore been discounted at this stage in lieu of the use of a community heating system and other, 'Green' technologies.

Community Heating

The Application Site is compact in nature, and of a peculiar shape resulting the inability for the scheme to benefit from a site wide communal system – eg. Little space for a large communal plant space.

However, it is feasible for the scheme to be supplied through heat and hot water through multiple communal systems, each servicing 1 block (A, B and C). Due to the low heat and hot water demand within the commercial unit, and to allow easy separate metering of this unit, the commercial space has been excluded from the implementation of a communal, gas-based system.

The implementation of a 3 no. communal heating systems (1 per block) will provide the following emissions values, based on the use of a gas system.

	CO₂ Emissions (tonnesCO₂/annum)					
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	Site-Wide
	Block A	Block B	Block C	Block A	Block A	
Lean	2.11	8.98	7.88	1.10	1.23	**21.30**
Clean	2.50	10.34	9.07	1.36	1.23 (N/A)	**24.40**
					Improvement	**-15.02%**

Table 9 - Clean CO_2 emissions and improvement over Lean

As can be seen above, the application of a communal gas-based system to each block (excluding the commercial unit) results in *an increase* in the overall site-wide CO_2 emissions. This is due to the distribution losses associated with the implementation of such a system compared to an individual one.

None-the-less a communal system will be proposed in line with the Energy Hierarchy, with further 'Green' technologies implemented to provide further CO_2 emissions reductions.

2.5 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 and exceed the threshold of a 35% improvement over Baseline emissions - and maximise renewable energy generation and the use of Low/Zero Carbon technologies.

	CO₂ Emissions (tonnesCO₂/annum)					
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	Site-Wide
	Block A	Block B	Block C	Block A	Block A	
Clean	2.50	10.34	9.07	1.36	1.23	**24.50**
Green	-3.29	2.64	2.56	1.12	0.91	**3.94**
					Improvement	**83.92%**

Table 10 - Green CO_2 emissions and improvement over Clean

2.5.1 Air Source Heat Pumps

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 or 4 can be achieved, meaning 3 or 4 units of thermal energy are produced for each unit of electricity consumed.

Heat pumps will only deliver low grade heat (up to ~55°C) efficiently, and therefore HP systems alone are generally relatively inefficient in providing hot water, as this requires additional electrical input (immersion or increased compressor use).

Oversized or low temperature radiators, or an underfloor heating system will be required to allow adequate heat to be provided to the dwellings, due to the lower circulation temperatures congruent to ASHP use.

The application of an air source heat pump system – as part of the 3 no. communal systems proposed – would result in condenser units needing to be located within the site, and these will be located where noise pollution is minimised, and access for servicing is convenient.

As with the communal gas systems, hot waster will be stored within the individual dwellings through an internally located hot water cylinder, with heat interface units within each dwelling. This provides clear separation of communal and private systems, whilst also minimising the plant space required for water storage and associated additional distribution networks.

For the commercial space, heat pumps are also proposed in the form of air-to-air VRV/VRF systems to provide heating and cooling. Hot water within this space – due to the low demand – will be provided through point of use electrical heaters.

The application of heat pumps to provide heat to the proposed communal schemes shows the following overall performance improvements.

	CO_2 Emissions (tonnesCO_2/annum)					
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	**Site-Wide**
	Block A	Block B	Block C	Block A	Block A	
Clean	2.50	10.34	9.07	1.36	1.23	**24.50**
Green (ASHP only)	1.89	7.66	6.95	1.12	0.91	**18.53**
					Improvement	**24.37%**

Table 11 - Green CO_2 emissions and improvement over Clean (ASHP only)

In addition to the 24.37% improvement over the 'Clean' Scenario, the application of heat pumps provides a 27.56% improvement over the baseline scenario. Therefore, further technologies will be implemented on site to provide additional CO_2 emissions offset.

2.5.2 Photovoltaics

Photovoltaic (PV) panels convert energy from daylight into direct (DC) electrical current. These are generally roof mounted and provide electrical generation which can either be utilised directly on-site (or nearby), stored in batteries, or exported back to the National Grid.

The installation of PV could be used to offset electrical demand within the Proposed Development. The PV array would be connected into the electrical system via an inverter or series of inverters depending on system size and setup. The PV will be wired back to landlord supply for export to the national grid.

Noise will not be an issue – A PV system does not feature moving parts and is silent during operation.

An indicative investigation into the roof area of the Proposed Development shows that there is approximately a total of 330.7m^2 available flat roof area over Blocks A, B, and C highlighted in Figure 4.

All roofs are of a 'flat' structure, and therefore PV will need to be inclined to 20-30^o Southerly to maximise efficiency and provide maximum CO_2 emissions offset.

Panels will be required to be spaced to prevent overshadowing, and as such an indicative panel coverage of 10m^2/kWp has been used based on a 350W monocrystalline panel (1.7m^2 in size). Based on this rule of thumb, a total of 32.55 kWp (~93 no. panels) could be installed.

Figure 4 –Available roof space at the Proposed Development –area available for PV highlighted in red (MAA Architects)

The CO_2 offset from each proposed array is listed below.

Proposed PV	Size of Array (kWp)	No. 350W panels	Orientation	Energy Generation (kWh/yr)	Offset from PV (tCO_2/yr)
Block A	11.55	33	South	9,975	5.18
Block B	11.20	32	South	9,672	5.02
Block C	9.80	28	South	4,393	4.39
Site-Wide	**32.55**	**93**	-	**24,040**	**14.59**

Table 12 – Proposed PV Array Performance.

For all units at present, it has been assumed that the PV will be allocated to communal/landlords supply. Therefore, the offset from this technology can be applied pro-rata to the dwellings in the relevant block, with the overall CO_2 emissions offset taken into account on a site-wide basis.

Based on the roof area highlighted above, the energy use and CO_2 emissions calculations undertaken, the Proposed Development will exceed the requirement for a 35% CO_2 emissions reduction over Building Regulations.

2.6 Carbon Offsetting

As the Proposed Development is a major development, there is potential that the site would be liable for a Cash in-lieu payment for the remaining CO_2 emissions associated with the site.

Based on Building Regulations 2013 modelling undertaken to date, there is a requirement for 3.94 tonnes of CO_2 to be offset (residual emissions). Based on the price of £95/tonne outlined within the New London Plan (2021), over a 30-year period, this equates to £11,229. This will need to be confirmed by further detailed modelling post-planning.

2.7 SEEN – In-use monitoring

The Proposed Development will be supplied with Smart Meters (where available from the utility supplier) along with associated internal energy displays. This will further improve energy efficiency by allowing building occupants to observe their energy use in 'real time' and manage it more effectively.

2.8 Unviable Technologies

A list of currently unviable technologies for the Proposed Development, and the reasons for their exclusion, can be found within Appendix F.

2.9 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 - through the adoption of the Energy Hierarchy – successfully meet Building Regulations Part L1A compliance and successfully maximise CO_2 offset on the site in line with policy requirements.

	CO_2 Emissions (tonnesCO_2/annum)						
	New Build Dwellings			Refurbishment Dwelling	Refurbishment Commercial Unit	Site-Wide	Improvement
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Clean	2.50	10.34	9.07	1.36	1.23	**24.50**	**-15.02%**
Green	-3.29	2.64	2.56	1.12	0.91	**3.94**	**83.92 %**
					Total Improvement over Baseline:		**85.47%**

Table 13 - Summary of CO_2 emissions, incremental improvement and improvement over Baseline

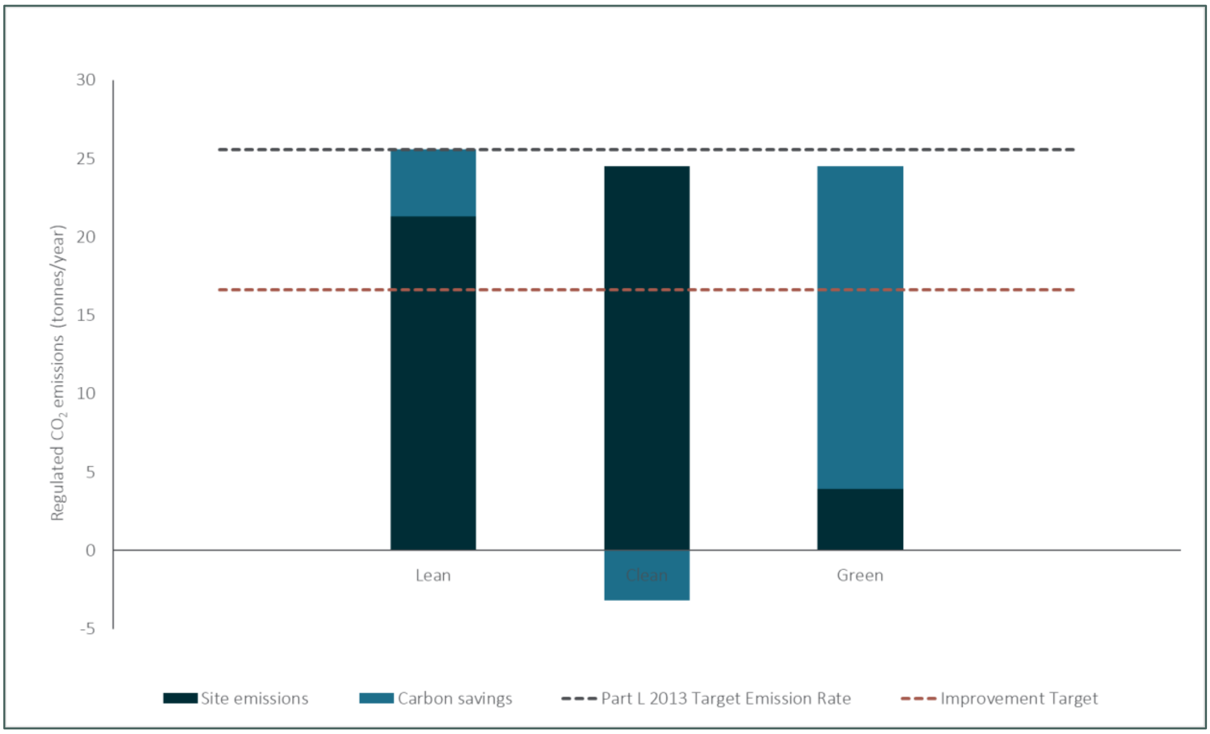

Figure 5: GLA Energy Hierarchy Emissions Graph - Sitewide

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

- Passive and active design measures
- 100% low energy lighting
- Low-E glazing
- Enhanced building fabric and accredited construction detailing (for new build)
- All dwellings to be air pressure tested
- Communal heating provided through ASHP
- Mechanical Ventilation with Heat Recovery
- >35% improvement a minimum of 10% from efficiency measures
- Total 32.55kWp of PV providing site wide CO_2 emissions offset.

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."

3.1 Site Location and Land Use

Located to the rear of existing commercial and residential properties on Waldegrave Road, Teddington, the Proposed Development occupies an area of land currently used for car repairs. Generally, however, the Application Site is located in a majority domestic area with the immediate surroundings also including comprising small scale commercial units facing Waldegrave Road.

As indicated below, the Application Site is located within an Area of Mixed Use, and therefore in accordance with Policy LP 35 of the LBRuT Local Plan smaller residential dwellings are acceptable in these locations.

The London Borough of Richmond upon Thames policies map does not show that the site is within a conservation area.

On the whole, the proposal for the site to enhance the residential offering in the area is in line with Local policy and the characteristics of surrounding properties whist retaining key commercial frontage.

Figure 6 – Extract from the London Borough of Richmond upon Thames Proposals Map (site highlighted by red dot)

3.2 Pollution

Air

The site is located within an area of poor air quality in terms of NOx emissions, particulates, sulphur dioxide and other pollutants. This is presumably due to the site being located in Greater London, and the associated traffic emissions within this area generally.

Therefore, the Proposed Development will aim to limit its contribution to local air pollution by installing low pollution heating and hot water systems that limit the emission materials that impact local air quality.

Low NOx emissions boilers will be specified throughout. In line with best practice these will have a NOx emission rate of <40mg/kWh, far in excess of the 'Class 5' NOx classification, which requires an emissions rate of <70mg/kWh.

The Proposed Development is located within a high NOx emissions area as defined by the UK NOx emissions map, see Figure 7.

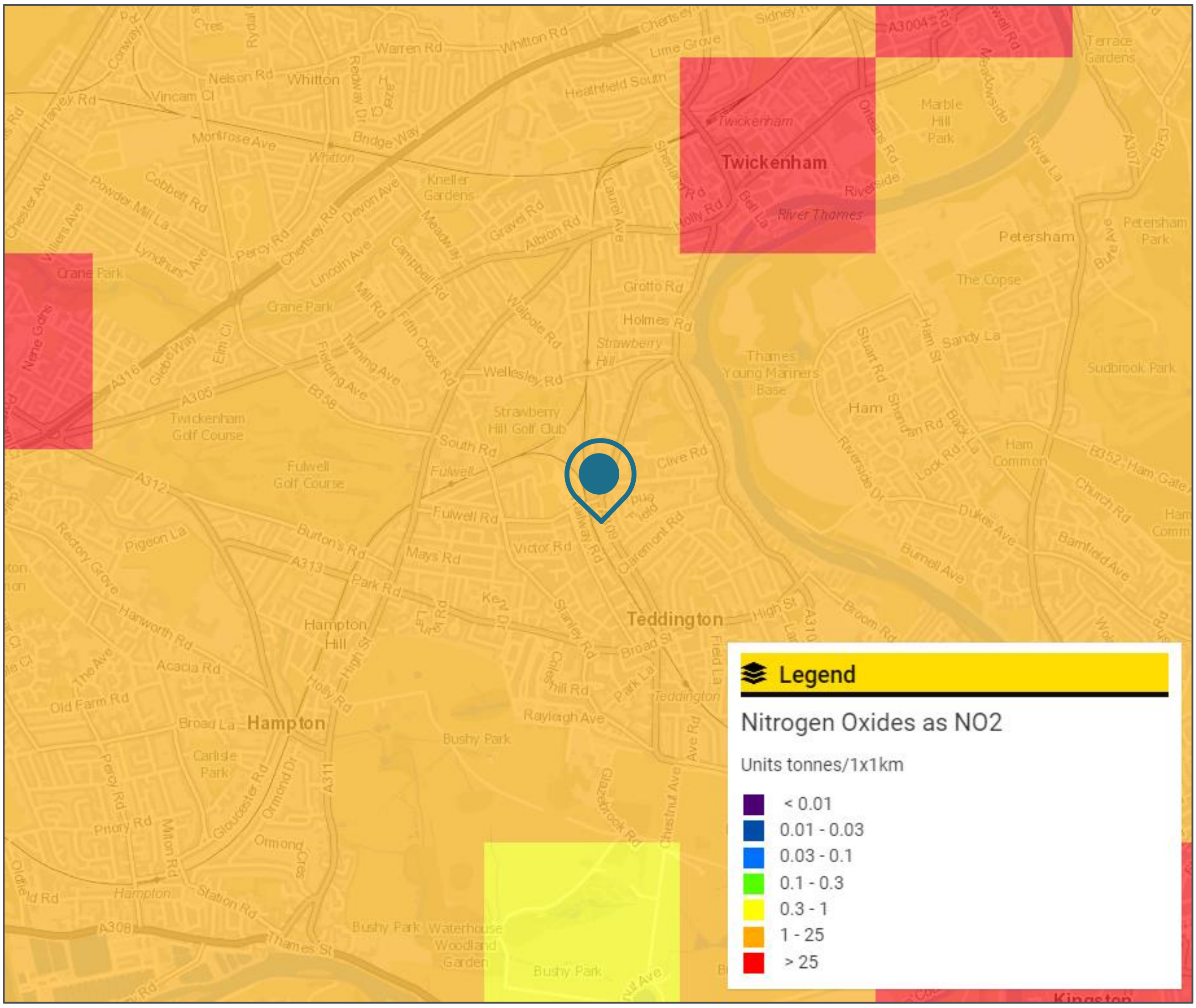

Figure 7 - UK Air Pollution Map showing pollution from Nitrogen Oxides as NO2 (https://naei.beis.gov.uk/emissionsapp/)

Noise

The Proposed Development is located on a former commercial site with other buildings in the vicinity currently being of residential and commercial use. Therefore, the noise emanating from the Proposed Development will be in line with the predominantly residential surrounding areas, and will likely be less than that of the previous commercial use.

Located adjacent to the railway will cause some challenges regarding the ingress of noise to within the dwellings. However, the Proposed Development will be highly insulated with excellent air-tightness, which will limit any noise encroachment. Further guidance will be sought from an acoustician to ensure disturbance to occupants is minimised.

In addition, the use of the site for a residential purpose will fit in well with the immediate surroundings of the site, with usage patterns more appropriate to this area. The current commercial space facing Waldegrave Road is to be retained.

The Proposed Development also encourages the use of sustainable transport options through the provision of cycle storage, the close proximity to bus stops, and the proximity of the site to rail and underground services (See Section 3.4 below). Residents will be encouraged to use the sustainable transport options through the provision of detailed information on the bus and train transport available, and through the provision of detailed instructions on how to use the secure cycle stores provided.

Light

The design and layout of the site for practical use has been considered while trying to maximise internal daylight levels and create a residential development which is in keeping with the surrounding scale and aspect of other buildings. The site has a North/South axis and, due to this, all spaces (residential and commercial) will have majority east and west facing glazed elements to maximise natural light whilst minimising overheating potential. This also maximises solar gain on the site, ultimately reducing the energy load of the site associated with heating and lighting.

All spaces occupied by residents have glazing to provide natural daylight, and light-coloured curtains or roller blinds will be provided to control glare, heat gain 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 or overspill 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. No external lit signage is anticipated at this stage.

3.3 Flood Risk

The selected site is at very low risk of flooding from rivers and seas (Figure 7) and while the surrounding area has some areas shown as at high risk of flooding from surface water, this is unlikely to affect the site directly. The actual site shows limited instances of surface water flooding, with run-off mitigated as part of the site drainage design where required (Figure 8).

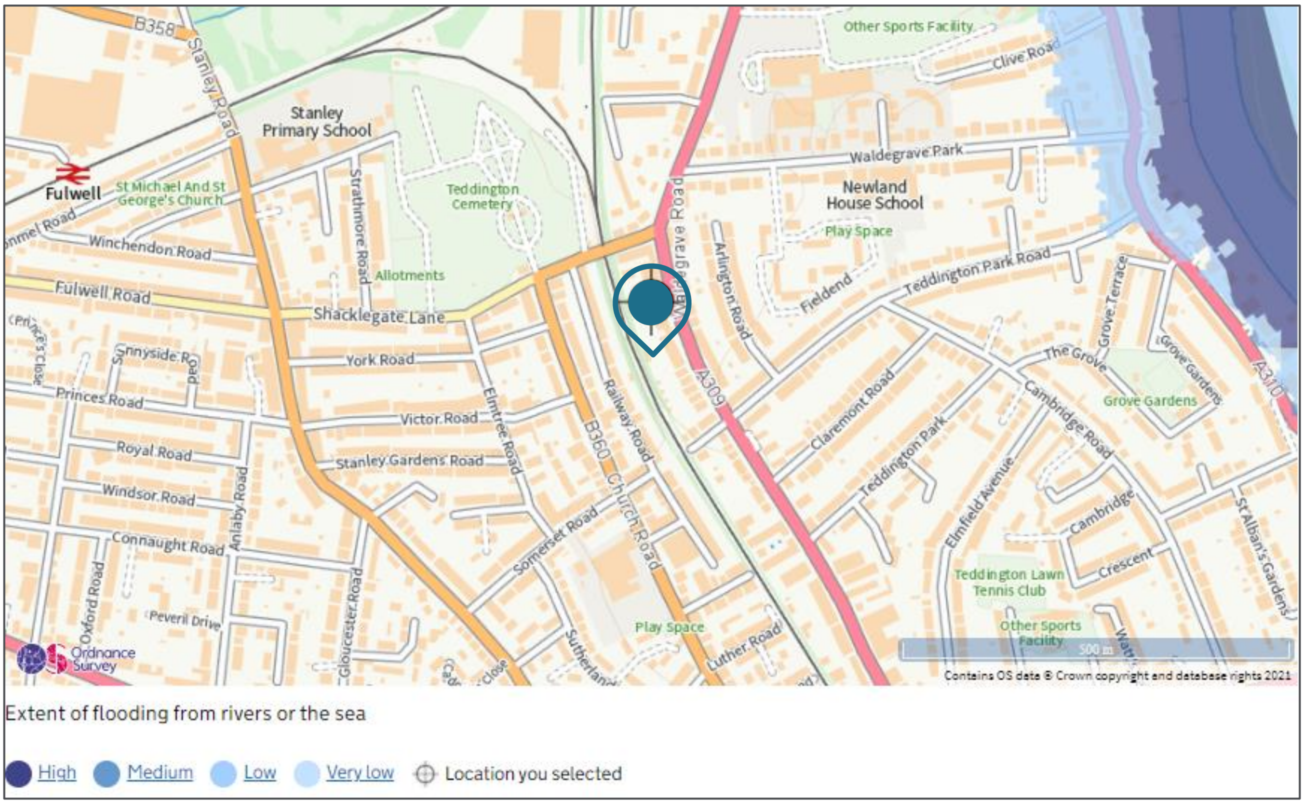

Figure 8 - Flood map showing risk of flooding from rivers or the sea (Flood Warning Information Service)

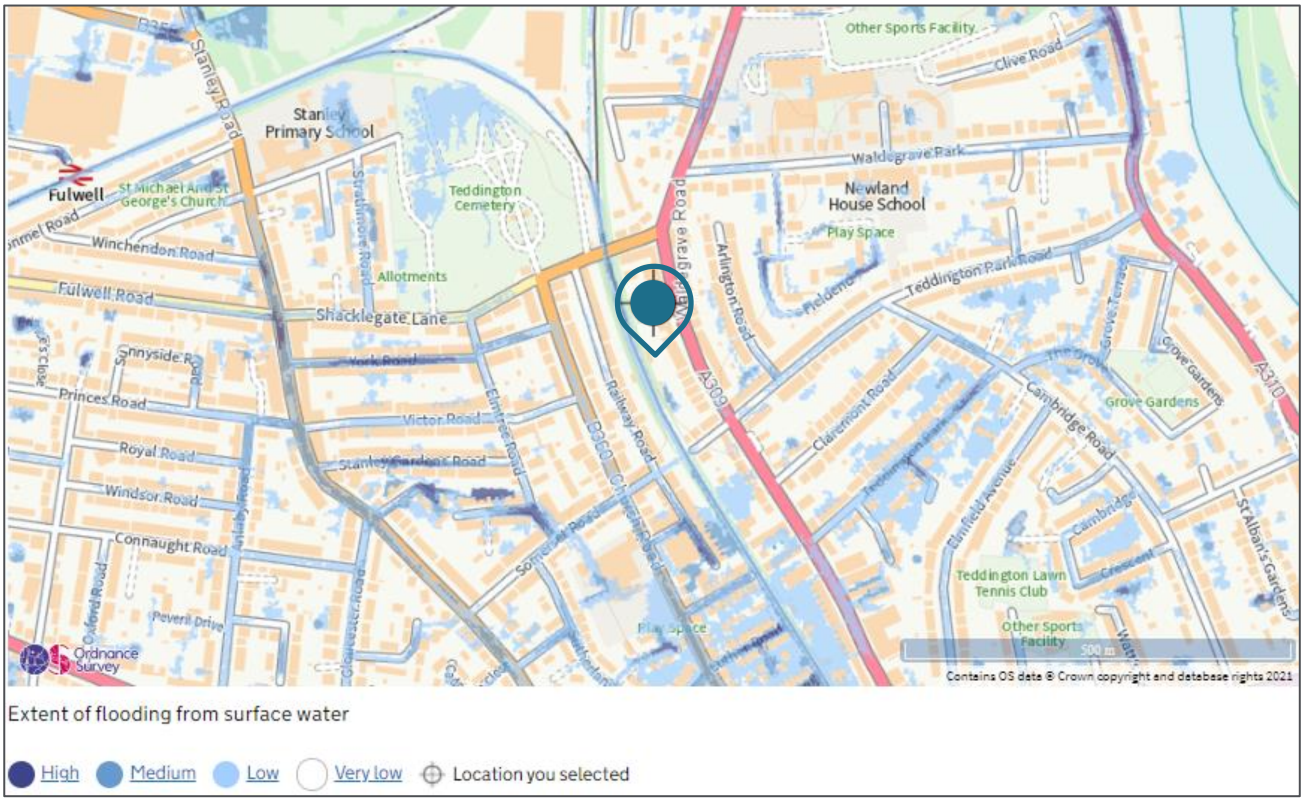

Figure 9 - Flood map showing risk of flooding from surface water (Flood Warning Information Service)

3.4 Transport

Public Transport

The site has multiple bus stops in the surrounding area, with closest being:

- Waldegrave Road/Shacklegate Lane: TfL bus route 33. Route from Teddington to Hammersmith, via Twickenham, Richmond and Mortlake..

The nearest mainline train station to the site is Strawberry Hill Railway Station, ~800m to the North of the site, which can be accessed by cycle, foot, bus (from Waldegrave Road). Typical services from this station include 2 trains per hour to London Waterloo via Richmond, and 2 trains per hour to London Waterloo via Wimbledon.

Southbound services split just south of the station, with one branch operating services to other London Suburbs and terminate at Shepperton. Services south also operate via Kingston, re-joining the London-Portsmouth main line at New Malden. From here, services to the wider network are then available.

Parking

The Proposed Development will not be providing off-street parking for any units at this stage. Therefore, the Proposed Development is in line with Local Policy principle, with a preference for car-free development.

The site currently has a PTAL rating of 3, with immediate surrounding areas having higher levels of public transport access.

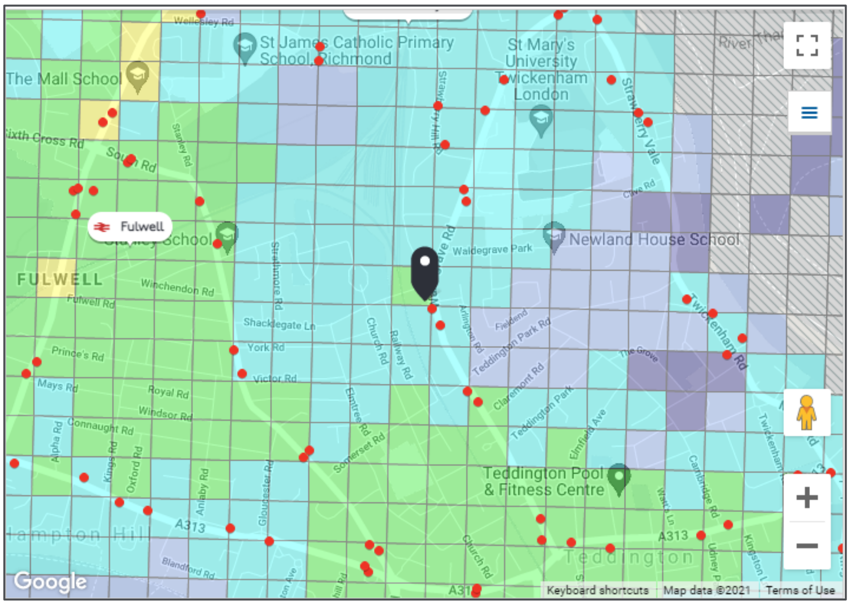

Figure 10: Public Transport Accessibility (PTAL) Map showing Proposed Development

Electric Vehicle Charging

Due to parking not being provided on site as part of the Proposed Development, electric vehicle charging facilities will also not be provided. However, the nearest publicly accessible charging station is located on Rectory Lane, to the north east of the site. This station is operated by Source London.

Car-Pooling/Car Clubs

Car Clubs are a useful way to get all the benefits of using a private vehicle, without the expense of owning one. As a member of a car club you can rent a car out by the hour or day.

Zipcar is one example of a Car Club which operates in this area, with the nearest location to the Application Site being on Claremont Road.

Cycle Storage

Cycle storage is encouraged both within Local Policy and within the wider New London Plan. Therefore, in line with this guidance secure, weather-proof and well-lit cycle storage is to be provided for all dwellings within internal communal stores. These will be in line with Table 6.3 of the London Plan with 24 no. storage positions provided – 1 no. per 1 bed, and 2 no. per 2 bed.

3.5 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The Proposed Development currently consists of existing buildings, outbuildings and associated hard standing

Trees or any other significant areas of vegetation are not evident on the site, and therefore it is assumed that the ecological value of the site is low, with the likelihood of any protected species also being low.

Due to some of the buildings on site not being fully sealed and also not intensively used, thorough checks will be undertaken prior to any demolition works to ensure that birds, bats and other wildlife are not inhabiting the site. Where wildlife is found this will be relocated in line with UK best practice requirements, and the advice of an ecologist will be sought where and when required.

3.6 Resource efficiency

Construction Phase Waste Management

The Proposed Development will aim to minimise the waste produced from the site during the construction phase.

A comprehensive Construction Management Plan will be implemented from the outset of site works following the principles of the waste hierarchy. Targets will be set in relation to the volume of construction waste and diversion from landfill and will be reviewed at practical completion.

The construction waste generated as part of the redevelopment will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

Reusing materials on site will reduce the embodied energy of the development through the reuse of the energy that exists in that material. Transportation of new material to the site will be reduced, reducing the CO_2 emissions associated with transportation and material manufacture.

Where waste will need to be disposed of, this will be done in line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste recycling contractor. Nominal construction waste should be sent to landfill or for incineration unless this is unavoidable due to the materials found on the existing site.

Resource Management

Policies will be put in place for management of site impacts such as air and water pollution in line with industry best practice. Monitoring and reporting on carbon emissions and water use from site related activities will take place in line with national benchmarks.

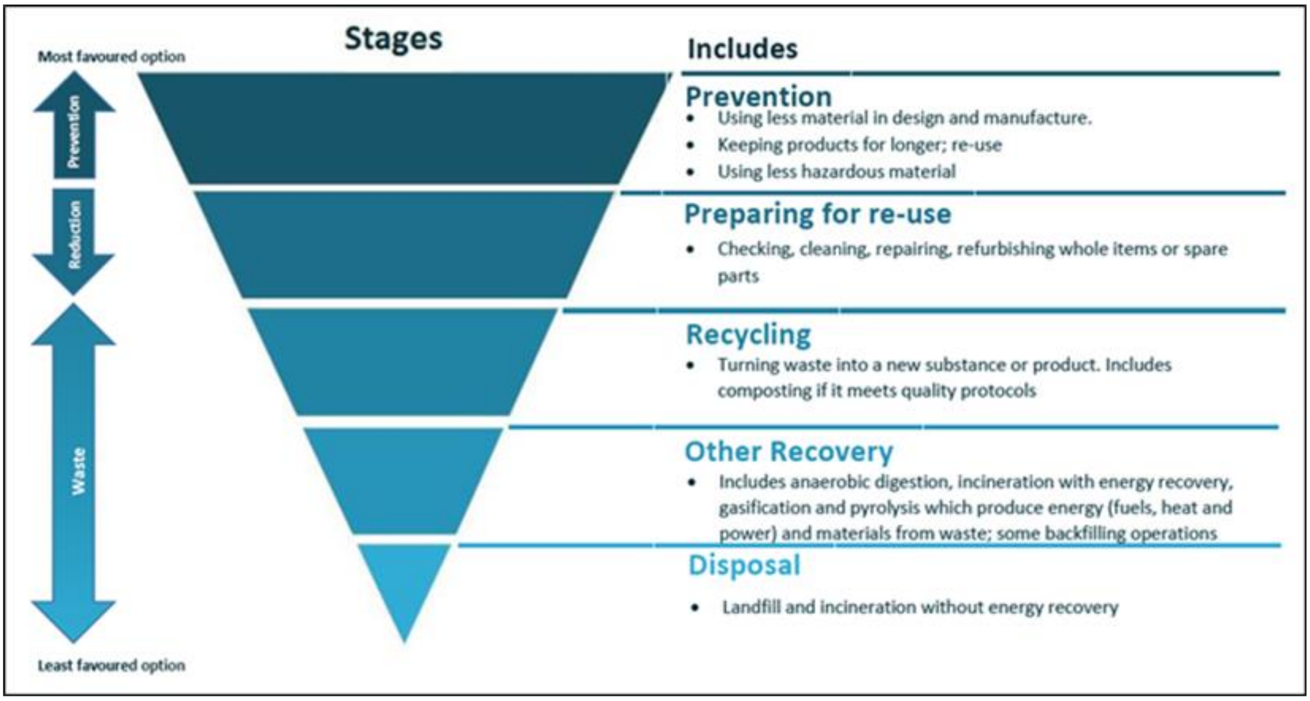

Figure 11 - The Waste Hierarchy

The overall management of the construction waste will be monitored through the Considerate Constructors Scheme as part of Best Practice Site Management.

Materials

The Proposed Development is to use high quality, low impact materials in order to minimise the overall impact on the environment as far as possible.

Internal materials of the existing building are to be retained in the main, with additional insulation and finishing materials being added to enhance thermal performance, improve space requirements, and bring the interior of the property up to modern standards.

For the new dwellings, the form of construction is assumed at this stage to be of traditional load bearing masonry.

All timber materials for finishing elements will be sourced from FSC and/or PEFC sources and all other materials sourced from suppliers who have an accredited Environmental Management System (EMS) (ISO14001, BS8555 or BES6001) for the extraction and process stages of the material manufacturing, ensuring that any environmental impact caused by the building materials is analysed and mitigated where possible.

All timber and timber-based products used on-site will be legally sourced with appropriate Chain of Custody certification to confirm this.

As standard industry best-practice, all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the Proposed Developments effect on global Climate Change.

Water

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 new buildings. 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 to reduce water use.

Internal water use will be reduced in line with best practice to meet the requirements of the London Borough of Richmond upon Thames Local Plan for an internal water use of 105 litres/person/day (excluding a 5 l/p/d allowance for external use). The following specification gives an indicative method to achieving this requirement:

- W/Cs: 2.6/4 litre dual flush
- Basin taps: restricted to 3 litres/minute
- Kitchen taps: restricted to 5 litres/minute
- Baths: max. capacity of 170 litres to overflow (not allowing for displacement)
- Showers: restricted to 8 litres/minute
- Washing Machine: Max. 8.17 litres/kg dry load
- Dishwasher: Max. 1.25 litres/place setting

All restrictors installed will be permanent to secure the ongoing reduction in water use for the lifespan of the fittings installed.

3.7 Sustainability Conclusions

Through a considered approach to sustainability, the Proposed Development is aiming to deliver a highly sustainable residential development whilst retaining key commercial frontage. The Proposed Development also utilises and enhances an existing building, with the Application Site being within an area appropriate for residential use with close links to public transport.

Through the adoption of a sustainable approach to the design and construction, the Proposed Development provides:

- Development which is in keeping with the surrounding existing building uses
- Retaining prominent Commercial frontage to Waldegrave Road
- Provision of much needed housing within the local area
- Excellent access to local public transport and services
- Low internal water use
- Low impact development with minimal noise, light and air pollution and the utilisation of an existing building.
- Comprehensive site waste management during construction and operation

Appendices

Appendix A – Proposed Ground Floor Plan

Appendix B SAP Summary Sheet – New Build Apartments (L1A)

Waldegrave Mews, Teddington

BRegs L1A 2013

Option Type	Block Plot No	External Wall U Value	Party Wall U Value	Ground Floor U Value	Pitched Roof (Joists) U Value	Windows/ Glazed Door U Value	Solid Door U Value	Boiler Make	Delayed Start Thermostat Y/N	Boiler Interlock Y/N	Weather / load Compensator Y/N	Secondary Heating Y/N	HW Cylinder (per unit) (litres)	Renewables (PV) (kWp)	Mechanical Ventilation Type	Air- Permeability	DER vs TER improvement %
Green	Block A	0.14	0	0.11	-	1.1	1.2	Communal ASHP	N	N	N	N	150.00	11.55	MVHR	3	134.29
	Block B	0.14	0	-	-	1.1	1.2	Communal ASHP	N	N	N	N	150.00	11.20	MVHR	3	73.6
	Block C	0.14	0	-	0.11	1.1	1.2	Communal ASHP	N	N	N	N	150.00	9.80	MVHR	3	71.68

Scheme being assessed under block compliance for the each Block

Element	U Values	Description
External Wall SAP Wall Type 1	0.14	102.5mm brick outer leaf, 100mm cavity filled with 90mm Kingspan K106 insulation (0.018 conductivity), 100mm dense blockwork, 12.5mm plasterboard on dabs, plaster skim (Buildup TBC)
Party Wall SAP Wall Type 2	0.00	Filled cavity with edge sealing achieves default U-value of 0
Ground Floor SAP Floor Type 1	0.11	65mm screed, separation layer, 120mm Kingspan K103 insulation (0.018), 150mm concrete slab. (Buildup TBC)
Pitched Roof (Joists) SAP Roof Type 1	0.11	250mm mineral wool over joists, 150mm joists fully filled with mineral wool (0.042), 12.5mm plasterboard. (Buildup TBC)
Windows / Glazed Door	1.10	Assumed: Double glazed low-E hard 0.2 windows with whole window U-Value of 1.1, Frame factor of 0.7 and G-Value of 0.4
Entrance Door	1.20	Solid door to have whole U-value of 1.2
Construction Details (PSI values)	-	Accredited Construciton Details psi-values have been proposed for all applicable junctions.
Boiler	Y	Communal ASHP with assumed 300% efficiency (TBC)
Controls	-	Programmer and at least two room thermostats
Heating Emitters	-	Underfloor heating
HW Cylinder	-	150L Cylinder Volume with 1.32 kWh/day standing loss (TBC)
Secondary Heating	-	n/a
Mechanical Ventilation	Y	MVHR modelled based on Nuaire MRXBOXAB-ECO2 (Exact model TBC)
Lighting	-	100% Low Energy Lighting - CFL or LED
Renewables	Y	Block A 11.55 kWp, Block B 11.20 kWp, Block C 9.80 kWp Based on 0.35W panels South-facing with 30 degree pitch
Overheating	-	OVERHEATING RISK: Windows half open-fully open therefore security restrictors need to be fitted on ground floor glazing.
Notes		Assumed unheated corridors and stairs,

Sign Off of details	Name	PP M Maclean	Date	08.10.2021	On behalf of the contractor/client:	Name		Date	
	Sign	(on behalf of SRE)				Sign			

Appendix C SAP Summary Sheet – Commercial Unit (L2B)

Building Regulations 2013 L2A

Waldegrave Mews, Richmond

Building Type	Address	As-Designed/ As-Built Drawings	SBEM Level	Asset Rating (A-G) (0-150)	BER/TER Improvement (%)
B1: Office	Waldegrave Mews, Richmond	As Designed	5	TBC	37.67%

Construction Element	U-Value	L2B	Description
External Wall (WT01)	0.14	0.28	102.5mm brick outer leaf, 100mm cavity filled with 90mm Kingspan K106 insulation (0.018 conductivity), 100mm dense blockwork, 12.5mm plasterboard on dabs, plaster skim (Buildup TBC)
Ground Floor (FT01)	0.11	0.22	65mm screed, separation layer, 120mm Kingspan K103 insulation (0.018), 150mm concrete slab. (Buildup TBC)

Construction Element	U-Value		G Value	Frame Factor	Description (manufacturer, make and model)
Windows	1.10	1.60	0.4	10%	Double Glazed LowE, whole window U-value of 1.1 with G-value of 0.4
Glazed Doors	1.10	1.80	0.4	10%	Double Glazed LowE, whole door U-value of 1.1 with G-value of 0.4

Construction Notes	Description (manufacturer, make and model)
Construction Details	Accredited Construction Details
Air-permeability	3 (TBC)

Heating and Cooling	System Details	Emitter	Controls
Heating / Cooling system 1	VRF - (SCOP 3,0 SEER 3.0, EER 3.0) - TBC	Ceiling Cassette	Time, Temperature and optimum start/stop Controls
CHP	N	n/a	n/a

Hot Water	System Details	Secondary Circulation	Circulation Losses (W/m)	Pump Power (kW)	Loop Length (m)	Storage Tank (l)	Storage Losses (kWh/l.day)	
Hot Water	Point of use electric water heater	n/a	-	-	-	50	0.0232	

Ventilation	System Details	SFP (W/l/s)	Leakage tested ductwork CEN Classification	AHU CEN leakage standards class	Heat Recovery	Heat Recovery Efficiency (%)	Heat Recovery Type	Variable HR
Mechanical Ventilation	MVHR	0.90	n/a	n/a	N	80%	Plate heat exchanger	N

Electrical Flow Control			#
Power Correction Factor	N		-
Separate Metering	N		-

Renewables	Description
PV	n/a
Solar Water Heating	n/a
Wind Turbine	n/a

Lighting	Description
Lighting	LED lighting with average efficacy of 80 Lm/W. LOR = 1
Lighting Controls	None
Parasitic Power	-
Notes	All buildups and M&E specs TBC

Sign Off of details	Name		Yin Mui Tang	Date	15.09.2021	By signing this document, I declare that the aforementioned details are all correct as per the final "as designed" specifications:	Name		Date	
							Sign			

Appendix D SAP Summary Sheet – Refurbished Flat (Block A)

Waldegrave Mews, Teddington

BRegs L1B 2013

Option	Units	External Wall	Party Wall	Exposed Floor	Pitched Roof (Joists)	Windows/ Glazed Door	Windows/ Glazed Door	Boiler	Delayed Start Thermostat	Boiler Interlock	Weather / load Compensator	Secondary Heating	HW Cylinder	Renewables (PV)	Renewables (Area)	Mechanical Ventilation	Air- Permeability	DER vs TER improvement
Type	Plot No	U Value	U Value	U Value	U Value	U Value	U Value	Make	Y/N	Y/N	Y/N	Y/N	(litres)	(kWp)	m^2	Type		%
Mid floor flat	A-04	0.14	0	0.11	0.11	1.1	1.2	Communal ASHP	Y	Y	N	N	150.00	0.00	0.00	MVHR	3	53.7

Scheme being assessed under block compliance for the flats

Element	U Values	L1B	Description
External Wall - New SAP Wall Type 1	0.14	0.28	102.5mm brick outer leaf, 100mm cavity filled with 90mm Kingspan K106 insulation (0.018 conductivity), 100mm dense blockwork, 12.5mm plasterboard on dabs, plaster skim (Buildup TBC)
External Wall - Upgraded SAP Wall Type 2	0.14	0.55	102.5mm brick outer leaf, 100mm cavity filled with 90mm Kingspan K106 insulation (0.018 conductivity), 100mm dense blockwork, 12.5mm plasterboard on dabs, plaster skim (Buildup TBC)
Party Wall SAP Wall Type 3	0.00	-	Filled cavity with edge sealing achieves default U-value of 0
Exposed Floor SAP Floor Type 1	0.11	0.22	65mm screed, separation layer, 120mm Kingspan K103 insulation (0.018), 150mm concrete slab. (Buildup TBC)
Pitched Roof (Joists) - New SAP Roof Type 1	0.11	0.16	250mm mineral wool over joists, 150mm joists fully filled with mineral wool (0.042), 12.5mm plasterboard. (Buildup TBC)
Windows	1.10	1.60	Assumed: Double glazed low-E hard 0.2 windows with whole window U-Value of 1.1, Frame factor of 0.7 and G-Value of 0.4
Glazed Door	1.10	1.80	Assumed: Double glazed low-E hard 0.2 windows with whole window U-Value of 1.1, Frame factor of 0.7 and G-Value of 0.4
Entrance Door	1.20	1.80	Solid door to have whole U-value of 1.2
Construction Details (PSI values)	-		Accredited Construciton Details psi-values have been proposed for all applicable junctions.
Boiler	Y		Communal ASHP with assumed 300% efficiency
Controls	-		Programmer, room thermostat, TRV
Heating Emitters	-		Radiators
HW Cylinder	-		150L Cylinder with 1.32kWh/day standing loss
Secondary Heating	-		n/a
Mechanical Ventilation	Y		MVHR modelled based on Nuaire MRXBOXAB-ECO2 (Exact model TBC)
Lighting	-		100% Low Energy Lighting - CFL or LED
Renewables	N		No Renewable technologies applied to Block A
Overheating	-		OVERHEATING RISK: Windows half-fully open therefore security restrictors need to be fitted on ground floor glazing.
Notes			Assumed unheated corridors and stairs

Sign Off of details	Name	PP M Maclean	Date	15.09.2021	On behalf of the contractor/client:	Name		Date	
	Sign	(on behalf of SRE)				Sign			

Appendix E –SAP 10 GLA Reporting Tool (for new build dwellings 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	19.4	
After energy demand reduction (be lean)	16.5	
After heat network connection (be clean)	19.7	
After renewable energy (be green)	1.9	

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	2.9	15%
Be clean: Savings from heat network	-3.2	-17%
Be green: Savings from renewable energy	17.7	92%
Cumulative on site savings	**17.4**	**90%**
Annual savings from off-set payment	1.9	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**58**	-
Cash in-lieu contribution (£)	**5,517**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Appendix F LBRuT Sustainable Construction Checklist

LBRUT Sustainable Construction Checklist - June 2020

This document forms part of the Sustainable Construction Checklist SPD. This document **must** be filled out as part of the planning application for the following developments: all residential development providing **one or more new residential units (including conversions leading to one or more new units)**, and all other forms of development providing **100sqm or more of non-residential floor space**. Developments including new non-residential development of less than 100sqm floor space, extensions less than 100sqm, and other conversions are strongly encouraged to comply with this checklist. Where further information is requested, please either fill in the relevant section, or refer to the document where this information may be found in detail, e.g. Flood Risk Assessment or similar. **Further guidance** on completing the Checklist may be found in the Justification and Guidance section of this SPD.

Property Name (if relevant):	Waldegrave Mews	Application No. (if known):	
Address (include. postcode)	Rear of 189 Waldegrave Road, Teddington TW11 8LX		
Completed by:	Iain Turrell. SRE Ltd. Greenforde Farm, Stoner Hill Road, Froxfield, Petersfield. Hampshire. GU32 1DY		
For Non-Residential Size of development (m2)	29.8	*For Residential* Number of dwellings	18

1 MINIMUM COMPLIANCE (RESIDENTIAL AND NON-RESIDENTIAL)

Energy Assessment

Has an energy assessment been submitted that demonstrates the expected energy and carbon dioxide emissions saving from energy efficiency and renewable energy measures, including the feasibility of CHP/CCHP and community heating systems? If yes, please select TRUE.	TRUE	

Carbon Dioxide emissions reduction

What is the on site carbon dioxide emissions reduction against a Building Regulations Part L (2013) baseline	56.26	%
Policy LP 22 B. and Draft London Plan Policy 9.2.5 require a 35% onsite reduction in CO_2 emissions beyond Building Regulations 2013.		
What is the percentage reduction from efficiency measures alone	15.77	%
Policy LP 22 C. and Draft London Plan Policy 9.2.6 require a 10% onsite reduction in CO2 emissions beyond Building Regulations 2013 from efficiency measures for residential and 15% for non-residential.		
Percentage of **total** site CO2 emissions saved through renewable energy installation?	54.82	%
What is the total remaining carbon to be offset	10.93	Tonne
Policy LP 22 B. and Draft London Plan Policy 9.2.4 require Major developments to achieve Zero Carbon after offsetting.		
Are remaining emissions going to be offset through offset fund payment in accordance with current guidelines issued for the cost per tonne of CO2?	TRUE	
What is the total predicted cost of offset?	31,150.50	£
The London Plan sets this as £95/tonne per year over 30 years, this should be updated based on As Build calculations.		

1A MINIMUM POLICY COMPLIANCE (NON-RESIDENTIAL AND DOMESTIC REFURBISHMENT)

Please check the Guidance Section of this SPD for the policy requirements

Environmental Rating of development:

Non-Residential new-build (100sqm or more)			
BREEAM Level	Please Select	Have you attached a pre-assessment to support this?	FALSE
Excellent required under Policy LP22 A 3			
Extensions and conversions for residential dwellings			
BREEAM Domestic Refurbishment	Please Select	Have you attached a pre-assessment to support this?	FALSE
Excellent required under Policy LP22 A 4			
Extensions and conversions for non-residential buildings			
BREEAM Level	Please Select	Have you attached a pre-assessment to support this?	FALSE
Excellent required under Policy LP 22			

Score awarded for Environmental Rating: **Subtotal** 0

BREEAM: Good = *0*, Very Good = 4, Excellent = *8*, Outstanding = *16*

1B MINIMUM POLICY COMPLIANCE (RESIDENTIAL)

Water Usage

	Score	
Internal water usage after gray/rainwater systems limited to 105 litres person per day. (Excluding an allowance 5 litres per person per day for external water consumption). Calculations using the water efficiency calculator for new dwellings have been submitted.	*1*	TRUE
110l/p/d Required for new dwellings under Policy LP22 A 2 105l/p/d required under Draft London Plan Policy SI5		
Subtotal	1	

2. ENERGY USE AND POLLUTION

2.1 Need for Cooling

a. How does the development incorporate cooling measures? Tick all that apply:

	Score	
Energy efficient design incorporating specific heat demand to less than or equal to 15 kWh/sqm	*6*	FALSE
Reduce heat entering a building through providing/improving insulation and living roofs and walls	*2*	TRUE
Reduce heat entering a building through shading	*3*	FALSE
Exposed thermal mass and high ceilings	*4*	FALSE
Passive ventilation	*3*	FALSE
Mechanical ventilation with heat recovery	*1*	TRUE
Active cooling systems, i.e. Air Conditioning Unit	*0*	FALSE

See Draft London Plan SI4

2.2 Heat Generation

b. How have the heating and cooling systems, with preference to the heating system hierarchy, been selected (defined in London Plan policy **SI3**) Tick all heating and cooling systems that will be used in the development:

	Score	
Connection to existing heating or cooling networks powered by renewable energy	*6*	FALSE
Connection to existing heating or cooling networks powered by gas or electricity	*5*	FALSE
Site wide CHP network powered by renewable energy	*4*	FALSE
Site wide CHP network powered by gas	*3*	FALSE
Communal heating and cooling powered by renewable energy	*2*	FALSE
Communal heating and cooling powered by gas or electricity	*1*	TRUE
Individual heating and cooling	*0*	FALSE

See Draft London Plan SI3

2.3 Pollution: Air, Noise and Light				
a.	Does the development plan to implement reduction strategies for dust emissions from construction sites?	2		TRUE
b.	Does the development plan to include a biomass boiler?			FALSE
	If yes, please refer to the biomass guidelines for the Borough of Richmond, please see guidance for supplementary information. If the proposed boiler is of a qualifying size, you may need to complete the information request form found on the Richmond website.			
c.	Has an air quality impact assessment been provided			TRUE
	If yes, has 'Emissions Neutral' been achieved	1		TRUE
	If yes, have occupants of new development been protected from existing pollution	1		TRUE
	If no to any of the above are there any sensitive receptors as defined in Policy LP 10 present?	-1		FALSE
	see Policy LP 10			
d.	Please tick only one option below			
	Has the development taken measures to reduce existing noise and enhance the existing soundscape of the site?	3		TRUE
	Has the development taken care to not create any new noise generation/transmission issues in its intended operation?	1		TRUE
	see Policy LP 10			
e.	Has the development taken measures to reduce light pollution impacts on character, residential amenity and biodiversity?	3		TRUE
	see Policy LP 10			
f.	Have you attached a Lighting Pollution Report?	-		
		Subtotal	15	

Please give any additional relevant comments to the Energy Use and Pollution Section below

Communal Heat Pumps are proposed with one communal system per block.
Air Quality Report has been provided confirming air quality neutral status.
Conversion of site from commercial (car repairs) to residential is most likely to reduce the noise eminating from the site.
Light pollution controlled through PIR and daylight sensors.

3. TRANSPORT

3.1 Provision for the safe efficient and sustainable movement of people and goods				
a.	Does your development provide opportunities for occupants to use innovative travel technologies?			FALSE
	Please explain:			
		Score		
b.	Does your development provide for 100% active provision for electric vehicle charging point(s) and have you successfully demonstrated that it would be able to operate satisfactorily in the future expectation of all vehicles being electrically powered?	2		FALSE
c.	**For major developments ONLY**: Has a Transport Assessment been produced for your development based on TfL's Best Practice Guidance?			
	If you have provided a Transport Assessment as part of your planning application, please tick here and move to Section 3 of this Checklist.	5		TRUE
	See policy LP44			
d.	**For smaller developments ONLY**: Have you provided a Transport Statement?	5		FALSE
e.	Does your development provide cycle storage? (Standard space requirements are set out in the Council's Parking Standards - Local Plan Appendix 3)	2		TRUE
	If so, for how many bicycles?	24		
	Is this shown on the site plans?			TRUE
	See Local Plan Appendix 3			
f.	Will the development create or improve links with local and wider transport networks? If yes, please provide details.	2		FALSE
		Subtotal	7	

Please give any additional relevant comments to the Transport Section below

1 cycle space per 1 bed, 2 cycle spaces per 2 bed provided in line with London Plan. Short Stay provided as an addition.

4 BIODIVERSITY

4.1 Minimising the threat to biodiversity from new buildings, lighting, hard surfacing and people						
a.	Does your development involve the loss of an ecological feature or habitat, including a loss of garden or other green space? (Indicate if yes)			-2		FALSE
	If so, please state how much in sqm?				sqm	
b.	Does your development involve the removal of any tree(s)? (Indicate if yes)					FALSE
	If so, has a tree report been provided in support of your application? (Indicate if yes)					FALSE
c.	Does your development plan to add (and not remove) any tree(s) on site? (Indicate if yes)					FALSE
d.	Please indicate which features and/or habitats that your development will incorporate to improve on site biodiversity:					
	Pond, reedbed or extensive native planting	6	Area provided:		sqm	FALSE
	An extensive green roof	5	Area provided:	~50	sqm	TRUE
	An intensive green roof	4	Area provided:		sqm	FALSE
	Garden space	4	Area provided:	~100	sqm	TRUE
	Additional native and/or wildlife friendly planting to peripheral areas	3	Area provided:	~50	sqm	TRUE
	Additional planting to peripheral areas	2	Area provided:	~50	sqm	TRUE
	A living wall	2	Area provided:		sqm	FALSE
	Bat boxes	0.5				TRUE
	Bird boxes	0.5				TRUE
	Swift boxes	0.5				TRUE
	Other	0.5				FALSE
e.	Does your development use at least 70% of available roof plate as green/brown roof			1		Please Select:
	Policy LP 17 requires 70%					
				Subtotal	15.5	

Please give any additional relevant comments to the Biodiversity Section below

Site is currently all hard standing and building. Generally the Proposed Development will have low level, domestic scale planting to soften and ehnace the building and Mews characteristics. Amenity spaces are also provided in the form of balconies or garden/terrace spaces.. Where appropriate peripheral planting will be of a native species.

Regarding roof space, the priority has been to maximise the renewable energy generation of the site and therefore much of the roof is taken up by PV. .remaining areas will have green roofs to reduce surface water run-off.

5 FLOODING AND DRAINAGE

5.1 Mitigating the risks of flooding and other impacts of climate change in the borough

a.	Is your site located in a high flood risk zone (Zone 3)? (Indicate if yes)	-2	FALSE
	Have you submitted a Flood Risk Assessment? (Indicate if yes)		TRUE
b.	Which of the following measures of the drainage hierarchy are incorporated onto your site? (tick all that apply)		
	Store rainwater for later use	5	FALSE
	Use of infiltration techniques such as porous surfacing materials to allow drainage on-site	3	TRUE
	Attenuate rainwater in ponds or open water features	4	FALSE
	Store rainwater in tanks for gradual release to a watercourse	3	FALSE
	Discharge rainwater directly to watercourse	2	FALSE
	Discharge rainwater to surface water drain	1	FALSE
	Discharge rainwater to combined sewer	0	TRUE
	Have you submitted a Drainage Statement (Indicate if yes)		TRUE

See Policy LP 21 and Draft London Plan SL 13

c. Please give the change in area of permeable surfacing which will result from your development proposal: ______ sqm

Please provide details of the permeable surfacing below — *please represent a loss in permeable area as a negative number*

Subtotal 3

Please give any additional relevant comments to the Flooding and Drainage Section below

Due to the Proposed Development being for a pedestrian mews with minimal vehicular traffic, there is a high potential for the adoption of permeable surfaces throughout the site to minimise run-off to the local drainage system. Green roofs (where not used for PV) will also aid in reducing the level of water run-off.

6 IMPROVING RESOURCE EFFICIENCY

6.1 Reduce waste generated and amount disposed of by landfill though increasing level of re-use and recycling

a.	Will demolition be required on your site prior to construction? *[Points will only be awarded if 10% or greater of demolition waste is reused/recycled]*	1	TRUE
	If so, what percentage of demolition waste will be reused in the new development?	80 %	
	What percentage of demolition waste will be recycled?	95 %	
b.	Does your site have any contaminated land?	1	FALSE
	Have you submitted an assessment of the site contamination?	2	FALSE
	Are plans in place to remediate the contamination?	2	FALSE
	Have you submitted a remediation plan?	1	FALSE
	Are plans in place to include composting on site?	1	FALSE
c.	Will a waste management plan and facilities be in place in line with Policy LP24		

6.2 Reducing levels of water waste

a.	Will the following measures of water conservation be incorporated into the development? (Please tick all that apply):		
	Fitting of water efficient taps, shower heads etc	1	TRUE
	Use of water efficient A or B rated appliances	1	TRUE
	Rainwater harvesting for internal use	4	FALSE
	Greywater systems	4	FALSE
	Fit a water meter	1	TRUE

Subtotal 3

Please give any additional relevant comments to the Improving Resource Efficiency Section below

demolition of the existing road surface and buildings will take place with the majority of the road surface being crushed and used on site. What waste is removed from site - min. 95% will be diverted from landfill.

Low water flixturees and fittings used through out, with low water white goods also to be spoecified.

7 ACCESSIBILITY

7.1 Ensure flexible adaptable and long-term use of structures

a. **If the development is residential,** will it meet the requirements of the nationally described space standard for internal space and layout? — 1 — TRUE

If the standards are not met, in the space below, please provide details of the functionality of the internal space and layout

AND

b. **If the development is residential**, will it meet Building Regulation Requirement M4 (2) 'accessible and adaptable dwellings'? — 2 — TRUE

If this is not met, in the space below, please provide details of any accessibility measures included in the development.

For major residential developments, are 10% or more of the units in the development to Building Regulation Requirement M4 (3) 'wheelchair user dwellings'? — 1 — Please Select:

OR

c. **If the development is non-residential,** does it comply with requirements included in Richmond's Local Plan LP1, LP28.B, LP30 & LP45 — 2 — Please Select:

Please provide details of the accessibility measures specified in the Local Plan that will be included in the development

Subtotal 3

Please give any additional relevant comments to the Design Standards and Accessibility Section below

LBRUT Sustainable Construction Checklist- Scoring Matrix for *New Construction* **(Non-Residential and domestic refurb)** ***TOTAL*** ***47.5***

Score	Rating	Significance
84 or more	*A+*	Project strives to achieve highest standard in energy efficient sustainable development
75-83	*A*	Makes a major contribution towards achieving sustainable development in Richmond
56-74	*B*	Helps to significantly improve the Borough's stock of sustainable developments
40-55	*C*	Minimal effort to increase sustainability beyond general compliance
39 or less	*FAIL*	Does not comply with SPD Policy

LBRUT Sustainable Construction Checklist- Scoring Matrix for New Construction **Residential new-build**

Score	Rating	Significance
85 or more	A++	Project strives to achieve highest standard in energy efficient sustainable development
68-84	*A+*	Project strives to achieve higher standard in energy efficient sustainable development
59-67	*A*	Makes a major contribution towards achieving sustainable development in Richmond
39-58	*B*	Helps to significantly improve the Borough's stock of sustainable developments
24-38	*C*	Minimal effort to increase sustainability beyond general compliance
23 or less	*FAIL*	Does not comply with SPD Policy

Authorisation:

I herewith declare that I have filled in this form to the best of my knowledge

Signature ______________ **Date** ______________

Appendix G Unfeasible Low and Zero Carbon Technologies

Ground Source Heat Pump

As with ASHP, ground source heat pump (GSHP) systems consume electricity in order to operate.

Beyond 1m below ground level, an average temperature of ~12^{o}C is maintained throughout the year. Because of the ground's high thermal mass, it stores heat from solar radiation during the summer. GSHP can transfer this heat from the ground into a building via a 'transfer liquid' to provide space heating by a similar process to an air source system.

Should this technology be selected, and to ensure that the equipment is installed in a manner which will ensure maximum efficiency, it is recommended that the ground conditions of the site be assessed in detail (through consultation with a GSHP manufacturer and/or purchase of a Ground Conditions report from the British Geological Survey) before the potential bore hole based system is installed.

GSHP has the potential to provide a greater efficiency performance than ASHP. However, it comes at a significantly higher capital cost due to the extensive groundworks needed to install either 'slinky' ground loops or circa 50-100m deep boreholes.

The lack of surrounding space on the site for a slinky type installation, and the cost implications of drilling dedicated boreholes (as no other boreholes will be required on site) would make the installation impractical. Couple this with the lack of space for a centralised plant, and the proximity of the site to the railway which pay preclude deep level piling, the use of GSHP has been deemed unviable for the site.

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, with the site located within a Smoke Control Area and an Air Quality Management Area. The use of such a system would also negatively impact the air quality of the surrounding area.

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.

Solar Water Heating

Solar Water Heating (SWH) can be used to offset a proportion of the domestic hot water demand (DHW) within a building.

However, due to the low DHW demand at the Proposed Development it is likely to provide minimal CO_2 emissions reductions, while takin up roof-space, better utilised for photovoltaics.

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