Energy and Sustainability Statement

[redacted]

166-168 Leatherhead Road
Chessington
KT9 2HU
Royal Borough of Kingston upon Thames

SRE

Version	Revision	Date	Author	Reviewer	Project Manager
1	A	29/02/2024	Alaister Coffey	Findlay Matheson	Alaister Coffey

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

Executive Summary

This Energy and Sustainability Statement has been written to demonstrate the measures incorporated into the design of the Proposed Development at 166-168 Leatherhead Road, Chessington, London, which will deliver reduced carbon dioxide equivalent (CO_2e) emissions and reduced Energy Use when compared a Building Regulations 2021 Part LV1 compliant design.

The energy strategy has been developed by following the nationally recognised Energy Hierarchy of 'be Lean', 'be Clean', 'be Green' and 'be Seen'. The chosen energy strategy includes Lean passive and active design measures and Green low and zero carbon (LZC) technologies to achieve over 72% improvement over Baseline CO_2e emissions, as shown in Table 1 and Figure 1 below.

Units	Energy Hierarchy Category	Average Unit CO_2e emissions (t/yr)	Improvement (%)	Average Improvement over Baseline (%)
Units 1-6	Baseline	1.29		
	Lean	1.06	17.83	17.83
	Clean	1.06	0.00	17.83
	Green	0.35	66.98	72.87
Unit 7	Baseline	1.29		
	Lean	1.15	10.85	10.85
	Clean	1.15	0.00	10.85
	Green	0.33	71.30	74.42

Table 1 - Summary of regulated CO_2e savings

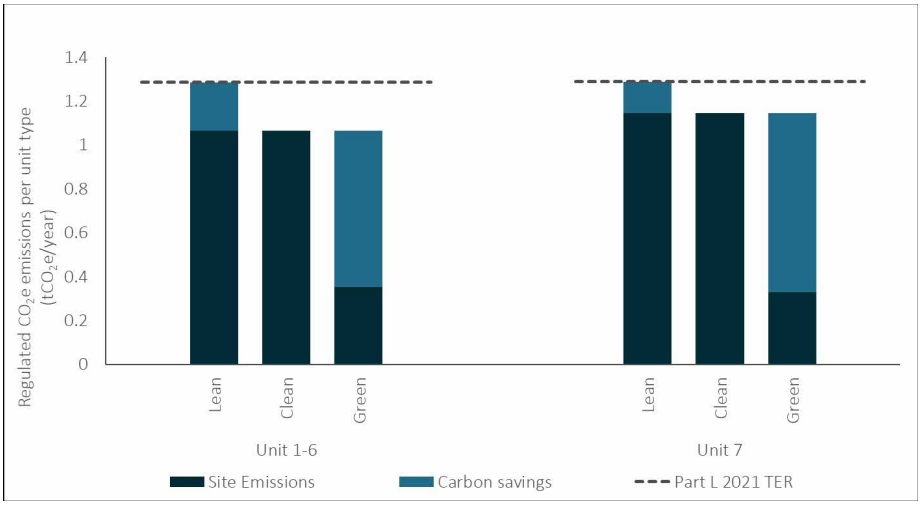


Figure 1 - Summary of regulated CO_2e savings

Proposed Energy Strategy

The Proposed Development will deliver energy demand reduction measures along with LZC technologies in order to reduce energy consumption and associated CO_2e emissions resulting from the Proposed Development's operation.

The calculations undertaken show that the Proposed Development will demonstrate improvement over Building Regulations Part LV1 standards. This is seen through improvements over the Target Emission Rate (TER) outlined in SAP 10.2.

The Proposed Development intends to meet the requirements for compliance through:

- Passive and active design measures
- Enhanced building fabric in line with Building Regulations Part L
- High performance triple low-E glazing
- Medium thermal mass envelope construction
- Balanced Mechanical Ventilation with Heat Recovery (MVHR) system
- An effective cooling strategy utilising the cooling hierarchy
- 100% low energy Light Emitting Diode (LED) lighting
- High efficiency air source heat pump (ASHP)
- Roof-mounted Photovoltaic (PV) array

Proposed Sustainability Strategy

Careful considerations regarding sustainable design and construction have been made for the Proposed Development assessing the impacts of climate change resulting in measures to reduce pollution levels and risk to the environment through the use of an effective sustainability strategy.

The net result of the sustainability measures implemented meets and exceeds the targets set out by planning policy through the following:

Air pollution reduction through use of ASHP
Flooding has been considered and found to not be an issue for the site
Sustainable transport provision: cycle storage
Electric vehicle (EV) charging points
Sustainable Urban Drainage System (SUDS)
Waste hierarchy followed
Sustainable construction techniques
Internal Water Use of 105/p/d with 5/p/d for external use

Introduction

1.0 Introduction

This Energy and Sustainability Statement has been written by SRE on behalf of PMV Planning Ltd for Mr David Tippets (the Client) to demonstrate the measures incorporated into the design of the Proposed Development on 166-168 Leatherhead Road, Chessington, London, which will deliver lower energy and water use, lower carbon dioxide equivalent (CO_2e) emissions and lower operational costs than a Building Regulations 2021 Part LV1 compliant design.

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

Analysis has been done on 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.

1.1 Proposed Development

The Proposed Development located on 166 Leatherhead Road consists of 6 no. 3 bed 6 person (3B6P) houses and 1 no. 3B6P bungalow. The elevations for the houses and bungalow are shown below in Figure 2 and Figure 3 respectively.

Figure 2 – Elevation views of the proposed houses (Matthew Allchurch Architects)

Figure 3 – Elevation views for the proposed bungalow (Matthew Allchurch Architects)

Further architectural drawings have been included in Appendix A.

1.2 Planning Policies

A Summary of local planning policy requirements relevant to the Proposed Development are shown in Table 2.

Planning Policy	Requirement
Royal Borough of Kingston Upon Thames Core Strategy (Adopted: April 2012)	Challenges for the Borough Climate change. Adapting to the effects of climate change and increased risk of fluvial flooding in key areas such as Kingston Town Centre and the Hogsmill Valley and surface water flooding Mitigating Kingston's contribution to climate change by adopting low carbon standards and sustainable designs for new development Monitoring Emissions. The Council will promote good carbon management by monitoring CO_2e emissions to ensure the development is operated within the CO_2e emissions standards of the as-built specification and those outlined within the Council's Sustainable Design and Construction Supplementary Planning Documents (SPD). Measures to ensure these standards are maintained will be monitored by the Council.

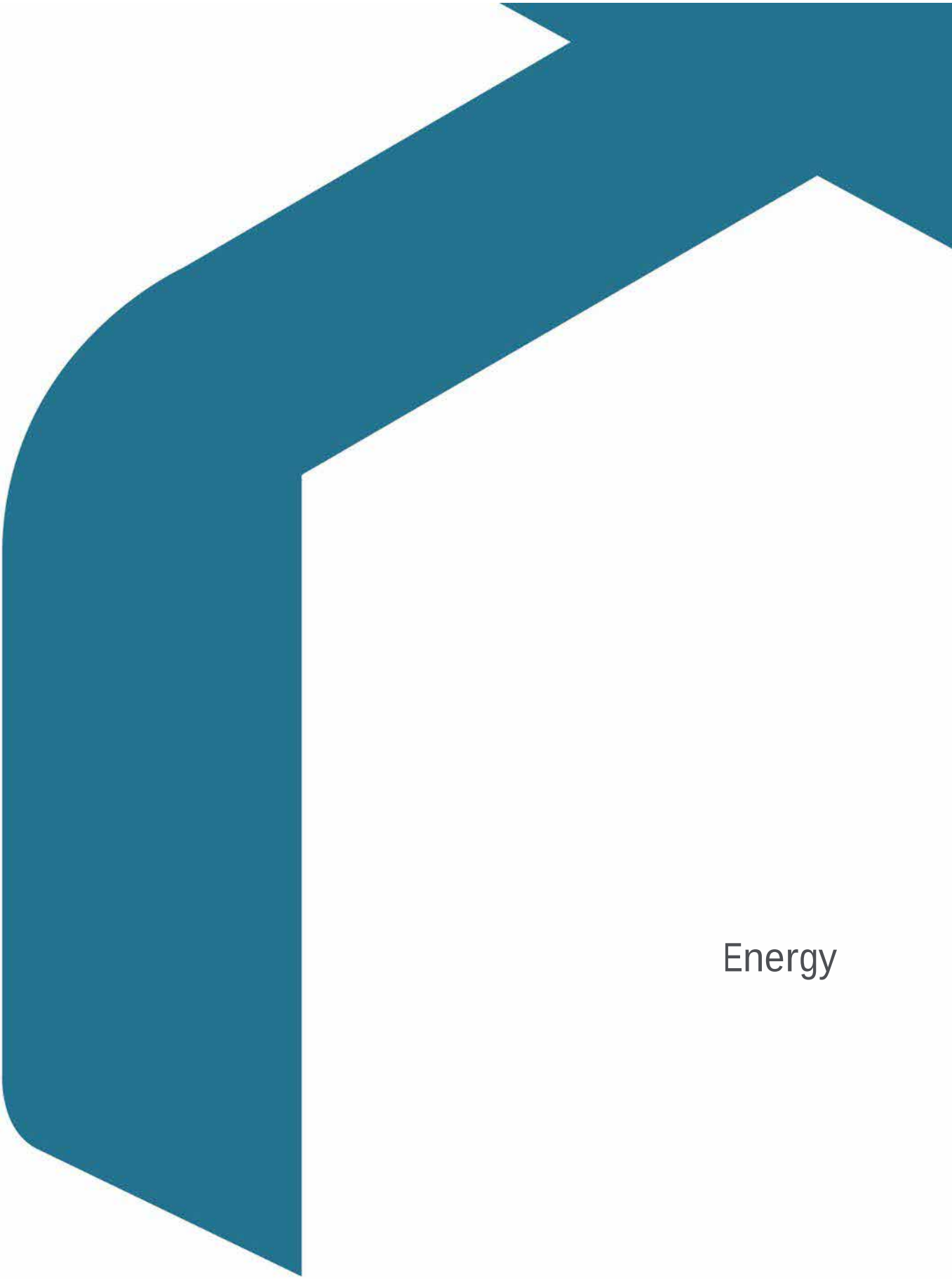
Planning Policy	Requirement
	Policy CS 1 Climate Change Mitigation The Council will: b. ensure that all development (including extensions, refurbishments and conversions) is designed and built to make the most efficient use of resources, reduce its lifecycle impact on the environment and contribute to climate change mitigation and adaptation by: reducing CO_2e emissions during construction and throughout the lifetime of the development building to the highest sustainable design and construction standards minimising water consumption using sustainable materials reducing levels of pollution; air, water, noise and light planning for increased flood risk Policy CS 7 Managing Vehicle Use To manage car use to ensure sustainability, road safety and reduce congestion the Council will: Support the use of low emission vehicles including the provision of electric vehicle charging points
Royal Borough of Kingston Upon Thames Residential Design SPD (Adopted: July 2013, Amended November 2013)	Policy Guidance 3 Sustainable Design Developers are encouraged to exceed statutory requirements as set out in London Plan policy 5.3, the Mayor's Housing SPG, and in Core Strategy Policies DM1 and DM3 with particular attention given to: minimising energy and CO_2e emissions efficient use of natural resources (including water) design of streets and siting of buildings – orientating homes to maximising passive solar gain or shelter from prevailing winds. Designing a residential development so that houses take advantage naturally occurring conditions or features may be challenging on constrained sites flood attenuation by sustainable drainage methods

Table 2 - Summary of local planning policy requirements

Applicability to Proposed Development

The applicability of Royal Borough of Kingston upon Thames Core Strategy to the Proposed Development is summarised below:

Apply measures the reduce and limit the risk of flooding.
Adopt low carbon standards and sustainable design principles.
Minimise CO_2e emissions
Limit water consumption
Apply Sustainable Drainage Methods
Provide electric charging points to promote the use of electric vehicles.



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_2e emissions

Green

Implement suitable technologies to provide renewable and emission free energy sources

Seen

Incorporate monitoring through SMART metering and accessible displays

The CO_2e Conversion Factors have been taken from Building Regulations 2021 which are based on standard yearly figures taken from the Government Standard Assessment Procedure (SAP) Guidance[2]and outlined below in Table 3. Within the SAP10 modelling, the CO_2e conversion factor for electricity vary over the course of the year due to the changing mix of inputs to the electricity grid, i.e., increased photovoltaic (PV) generation in the summer months.

Source	CO_2e Conversion Factor ($kgCO_2e/kWh$)
Electricity (mains)	0.136
Electricity (offset)	-0.136
Gas (mains)	0.210

Table 3 - CO_2e conversion factors by energy source

The energy modelling for the Proposed Development has been calculated using SAP10 software in accordance with Building Regulations 2021 Part LV1[3]. The notional building provides the energy baseline, shown in Table 4 and is the exact size and shape of the Proposed Development but is based on notional U-values and heating specifications outlined in Approved Document LV1.

[1]The New London Plan https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan
[2]The Government Standard Assessment Procedure for Energy Rating of Dwellings Version 10.2 (Table 12, Pg 182): https://files.bregroup.com/SAP/SAP%2010.2%20-%2017-12-2021.pdf
[3] Approved Document Part L: Conservation of fuel and power, Volume 1: Dwellings

Units	Scenario	CO_2e emissions (t/yr)	Fabric Energy Efficiency (kWh/m^2/yr)	Primary Energy Rate (kWh/m^2/yr)
Unit 1-6	Baseline	1.29	39.03	55.61
Unit 7	Baseline	1.29	62.39	68.92

Table 4 - Baseline target values

2.2 LEAN – Demand Reduction

The Lean scenario achieves a reduction in CO_2e emissions over the Baseline of 17.26% and 11.04%, for units 1-6 and unit 7 respectively, using passive and active design measures as seen in Table 5. This has been determined through processing the resulting Dwelling Emission Rate (DER) and the Target Emission Rate (TER) values from SAP10 modelling with the Greater London Authority's (GLA) carbon emission spreadsheet. The GLA carbon emission spreadsheet has been used in order to add the Building Regulations notional PV amount to the Proposed Development to show a direct comparison between been the notional Baseline and the Lean scenario measures over the notional Baseline.

Units	Scenario	CO_2e emissions (t/yr)	Improvement (%)
Units 1-6	Baseline	1.29	
	Lean	1.06	17.83
Unit 7	Baseline	1.29	
	Lean	1.15	10.85

Table 5 - Lean CO_2e emissions and improvement over Baseline as per the GLA carbon emission spreadsheet

The passive and active design measures incorporated as part of the Lean scenario additionally result in a 7.52% and 0.51%, for units 1-6 and unit 7 respectively improvement in fabric energy efficiency over the Baseline scenario as seen in Table 6.

Units	Scenario	Fabric Energy Efficiency (kWh/m^2/yr)	Improvement (%)
Unit 1-6	Baseline	39.03	
	Lean	36.09	7.52
Unit 7	Baseline	62.39	
	Lean	62.07	0.51

Table 6 - Lean fabric performance over Baseline

2.2.1 Passive Design Measures

Passive design measures have been enhanced where possible to maximise building efficiency within the confines of the budget. The Proposed Development's location and orientation have been considered and designed to maximise internal day lighting and the internal usable space has been optimised in accordance with this.

While maximisation of natural light is important, overheating has also been considered. This is accounted for passively through openable windows. This will enable natural ventilation and cross-ventilation which can be controlled by the occupants through the warmer summer months, minimising the overheating risks. All glazed areas of the building will also have elements of solar control with low centre-pane G-values of 0.4 limiting thermal overheating risk without heavily impacting light ingress.

The Proposed Development takes on a fabric first approach and the proposed thermal conductance (U-values). These meet and, in many cases, vastly exceed Building Regulations Part L V1 minimum fabric requirements for new elements within new buildings as seen within Table 7. Further detail of the proposed specification is shown in Appendix B.

Element	Proposed (U-Value unless otherwise stated)	Notional (U-Value unless otherwise stated)
External Walls	0.16	0.18
Plane Roof	0.10	0.11
Slope Roof	0.12	0.11
Floors	0.10	0.13
Rooflight	1.60	1.70
Windows	1.20	1.40
External Doors	1.00	1.40
Air Tightness @ 50 N/m^2	4 m^3/hr/m^2	5 m^3/hr/m^2
Thermal Bridge	Recognised Construction Details Psi Values	Elmhurst Notional values

Table 7 - Fabric energy efficiencies

It should be noted that that the thermal bridges have had assumptions made at this stage, but shall either follow recognised construction detailing, be independently assessed or a combination thereof to achieve necessary values.

2.2.2 Active Design Measures

The Proposed Development will utilise 100% low energy/light emitting diode (LED) lighting in excess of Building Regulation requirements, with a luminance efficacy of 85 lm/W. All external lighting will be positioned to avoid

excessive light pollution and be supported by passive infrared (PIR)/daylight sensor and time controls with a maximum lamp capacity of 150W (equivalent) for essential security lighting.

Time and temperature controls for heating system will be installed as a minimum to allow the control of individual zones/rooms throughout the building.

As part of the Lean scenario and in line with the 'notional' building specification in SAP10, a high efficiency gas boiler has been modelled to provide heating and hot water[4]. This is purely indicative to identify the Lean measures. The proposed system has not been represented in the Lean scenario as it is a LZC technology and hence falls under the Green scenario.

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

Balanced mechanical ventilation with heat recovery (MVHR) is specified within the dwelling to provide continuous low-level (and boost mode) cycling of fresh air through the Proposed Development and extraction of the damp air from the kitchen and bathrooms/ensuites. This will operate continuously with a humidistat sensor to boost extract rates when needed. The approach gives good levels of air change and improves air quality, whilst minimising heat losses.

This, in conjunction with the aforementioned passive measures, will minimise the risk of overheating during times of high temperatures. The overall cooling strategy followed within the Proposed Development has been further outlined in 2.2.3.

2.2.3 Cooling

The cooling hierarchy, shown in Table 8 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 with g-value of 0.4 are to be provided to minimise solar gains. All walls are to be well insulated.
Use of thermal mass and high ceilings to manage the heat within the building	Masonry construction is used for the majority of the walls, thus thermal mass is anticipated to be medium subject to finishes. Ceiling levels are designed to be high typically exceeding 2.5m through much of the development.

[4] The high efficiency gas boiler is proposed for only modelling the 'Lean' scenario. This system is not part of the final proposal.

Passive Ventilation	Openable windows will be provided to all rooms with potential for cross ventilation and purge.
Mechanical Ventilation	MVHR is used.

Table 8 - Design measures following the cooling hierarchy

2.3 CLEAN – Heating Infrastructure

The Proposed Development is not within an area where there is a district heating network or particularly high heat density (see Figure 4) and therefore this has not been modelled.

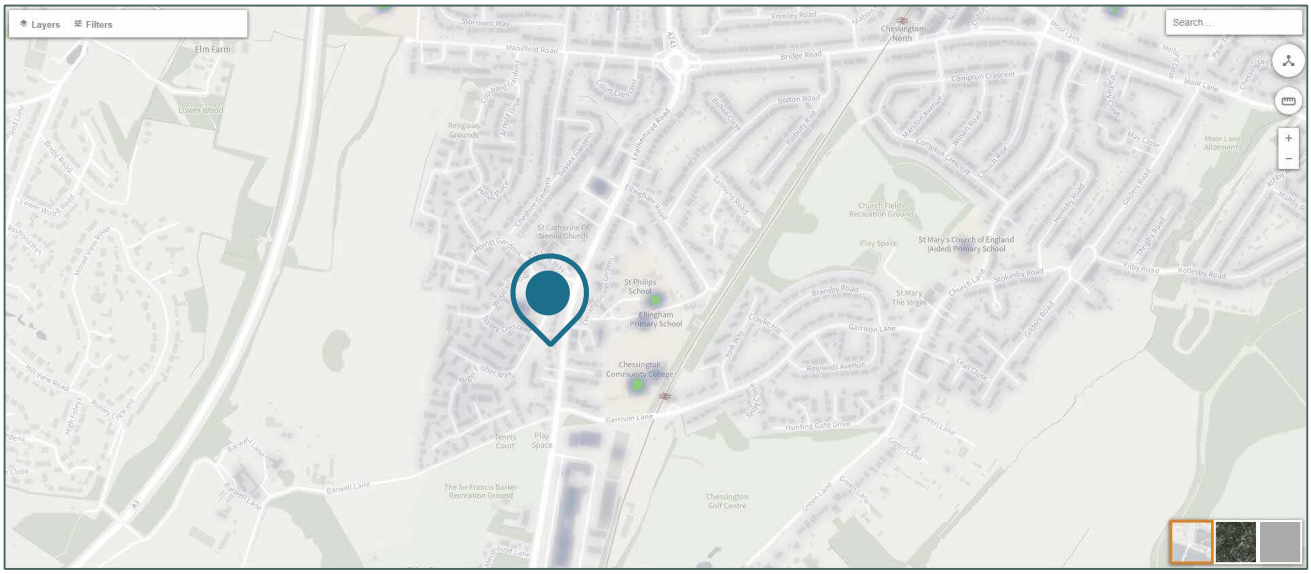


Figure 4 – London Heat Map of the Local Area (London Heat Map)

Futureproofing has still been considered should heat networks be integrated into the area at a later stage. This is seen in the prioritisation of a wet system which will allow for potential connection to a district heating network in the years to come.

2.4 GREEN – Low Carbon and Renewable Energy

The addition of 'Green' technologies can provide a significant reduction in CO_2e emissions and enable the Proposed Development to surpass compliance over Baseline emissions by over 72%, as shown in Table 9.

Units	Scenario	CO_2e emissions (t/yr)	Improvement (%)
Units 1-6	Baseline	1.29	
	Green	0.35	72.87
Unit 7	Baseline	1.29	
	Green	0.33	74.42

Table 9 - Green CO_2e emissions and improvement over Baseline.

2.4.1 Air Source Heat Pumps (ASHP)

All Heat Pump (HP) 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.

HPs will only deliver low grade heat (up to circa 55°C) efficiently, and therefore Heat Pumps systems are sometimes accompanied by an electrical booster element for the domestic hot water (DHW) to maximise system efficiency for high temperatures. It is also important to note that the flow temperatures for ASHP systems is typically <55°C, which is lower than that of a gas boiler system and therefore these generally perform better with underfloor heating or when radiators are over-sized. The use of an individual ASHP system has been proposed as a 'Green' LZC technology to provide space heating and DHW via an air-to-water heat pump system. ASHPs efficiently extract energy from the external air and transfer it to internal air/water for heating.

ASHPs tend to generate some noise and therefore considerations will be made in order to reduce noise levels to residents and the surrounding area. Specification of the ASHP used for modelling has been indicated in the summary sheet in Appendix B. The final ASHP chosen for installation will comply with the minimum standards outlined in the Enhanced Capital Allowances (ECA) product criteria and other relevant issues as outlined in the Microgeneration Certification Heat Pump Product Certification Requirements documents[5].

2.5 SEEN – In-use Monitoring

The Proposed Development will be supplied with Smart Meters along with associated internal energy displays for residents. This will further improve energy efficiency by allowing the occupants to observe their energy use in 'real time' and manage it more effectively.

2.6 Energy Conclusions

The Proposed Development will deliver passive and active energy demand reduction measures along with LZC technologies in order to reduce energy demand and associated CO_2e emissions resulting from the Proposed Development's operation.

The calculations undertaken demonstrate that the Proposed Development will successfully and significantly exceed Building Regulations Part L V1 2021 compliance by over 72% in terms of CO_2e emissions which in turn satisfies the Royal Borough of Kingston upon Thames requirements. A summary of the CO_2e savings is shown in Table 10 and graphically in Figure 5.

Units	Energy Hierarchy Category	Average Unit CO_2e emissions (t/yr)	Improvement (%)	Average Improvement over Baseline (%)
Units 1-6	Baseline	1.29		
	Lean	1.06	17.83	17.83
	Clean	1.06	0.00	17.83
	Green	0.35	66.98	72.87

[5] www.mcscertified.com

Units	Energy Hierarchy Category	Average Unit CO_2e emissions (t/yr)	Improvement (%)	Average Improvement over Baseline (%)
Unit 7	Baseline	1.29		
	Lean	1.15	10.85	10.85
	Clean	1.15	0.00	10.85
	Green	0.33	71.30	74.42

Table 10 - Summary of CO_2e emissions, incremental improvement and improvement over Baseline determined through the GLA carbon emission spreadsheet

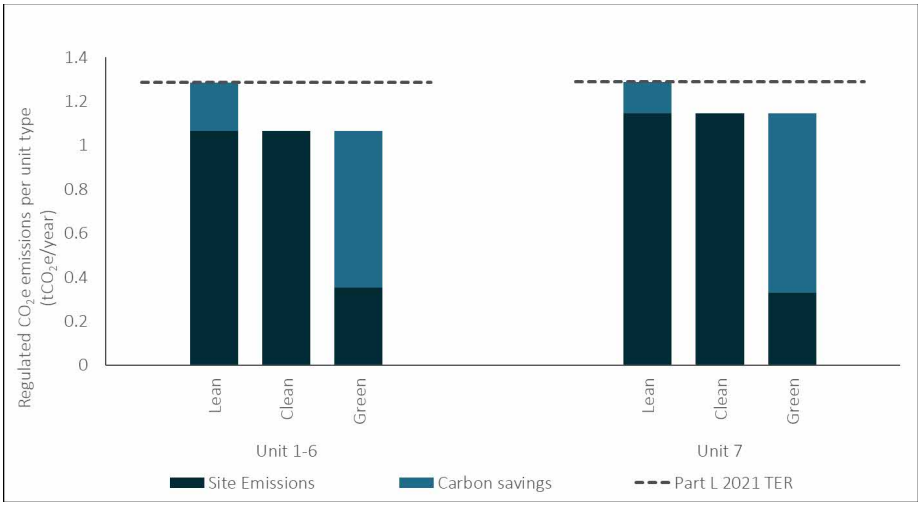


Figure 5 - Summary of Carbon Savings, CO_2e emissions and improvement

The calculations undertaken demonstrate that the Proposed Development will demonstrate improvement over Building Regulations Part L V1 compliance. This is seen through improvements over TER outlined in SAP 10.2.

In delivering the Green energy strategy, the Proposed Development easily meets the requirements for compliance. This is achieved through:

- Passive and active design measures
- Enhanced building fabric in line with Building Regulations 2021 Part LV1
- High performance triple low-E glazing
- Medium thermal mass envelope construction
- Balanced MVHR system
- An effective cooling strategy utilising the cooling hierarchy
- 100% low energy LED lighting
- High efficiency ASHP
- Roof-mounted PV

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."

The Royal Borough of Kingston upon Thames seeks to reduce the local greenhouse gas emissions through efficient design, developing district heating networks, LZC technologies and maintaining or improving biodiversity in order to meet government targets by 2030 and 2050.

3.1 Pollution

3.1.1 Air

The Proposed Development will aim to limit its contribution to local air pollution by not installing gas boilers but instead installing ASHPs to provide heating and DHW. The ASHPs will emit no onsite nitrogen oxides (NO_X) emissions but will consume grid electricity. As the NO_x emissions resulting from the production of electricity decreases at the national scale, the resulting theoretical emissions from the Proposed Development will also decrease.

The Proposed Development is located within a low NO_x emissions area as defined by the UK NO_x emissions map, as shown in Figure 6. It will be important to maintain this level through installing low pollutant devices in all new developments.

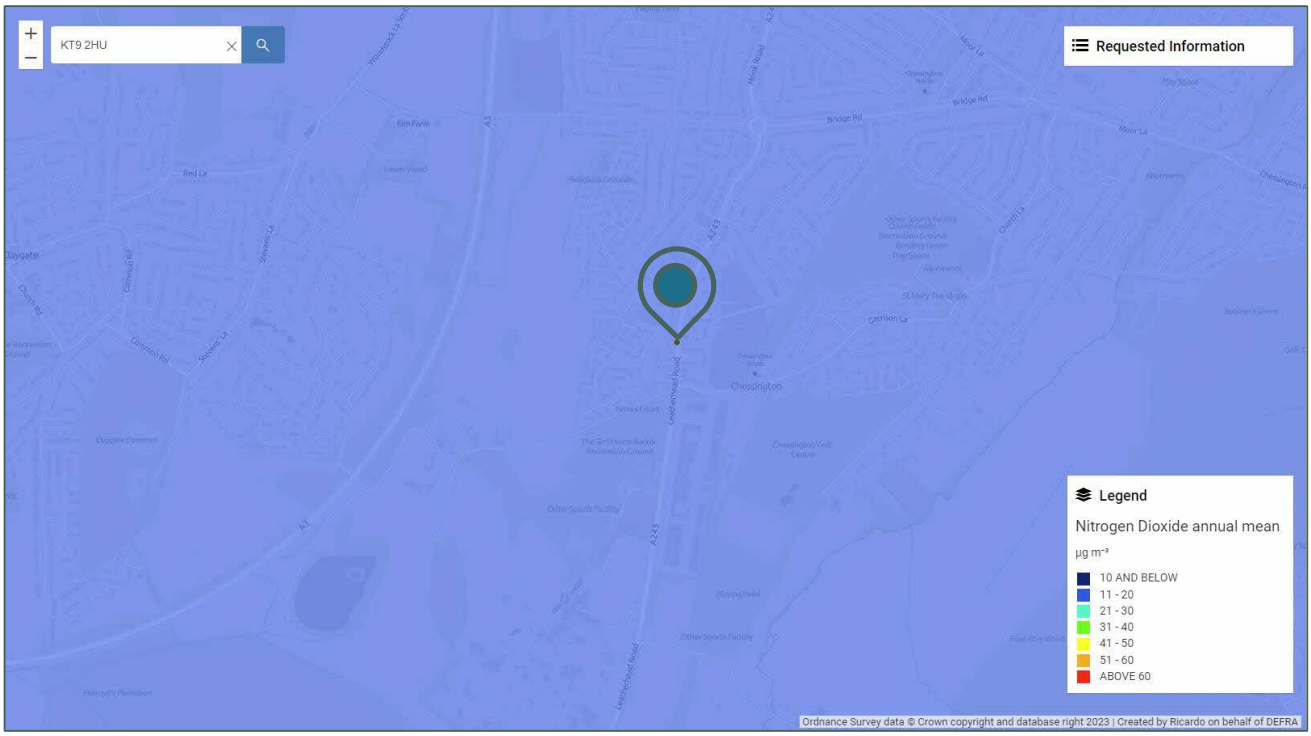


Figure 6 - UK Air Pollution Map showing pollution from Nitrogen Oxides as nitrogen dioxide (NO_2) (https://uk-air.defra.gov.uk/data/gis-mapping/)

Air pollution will be reduced as much as practicable during construction and new materials will be sourced locally where possible to reduce air pollution associated with the transport of materials. Dust management will also be extremely important for controlling air quality on-site during construction and mitigation measures such as water suppression to damp down dust will be implemented where necessary. Through these measures the Proposed Development will minimise any impact to dust in the air within the area helping to ensure it remains relatively good in terms of particulate matter 10 micrometres (PM_{10}) as per Figure 7.

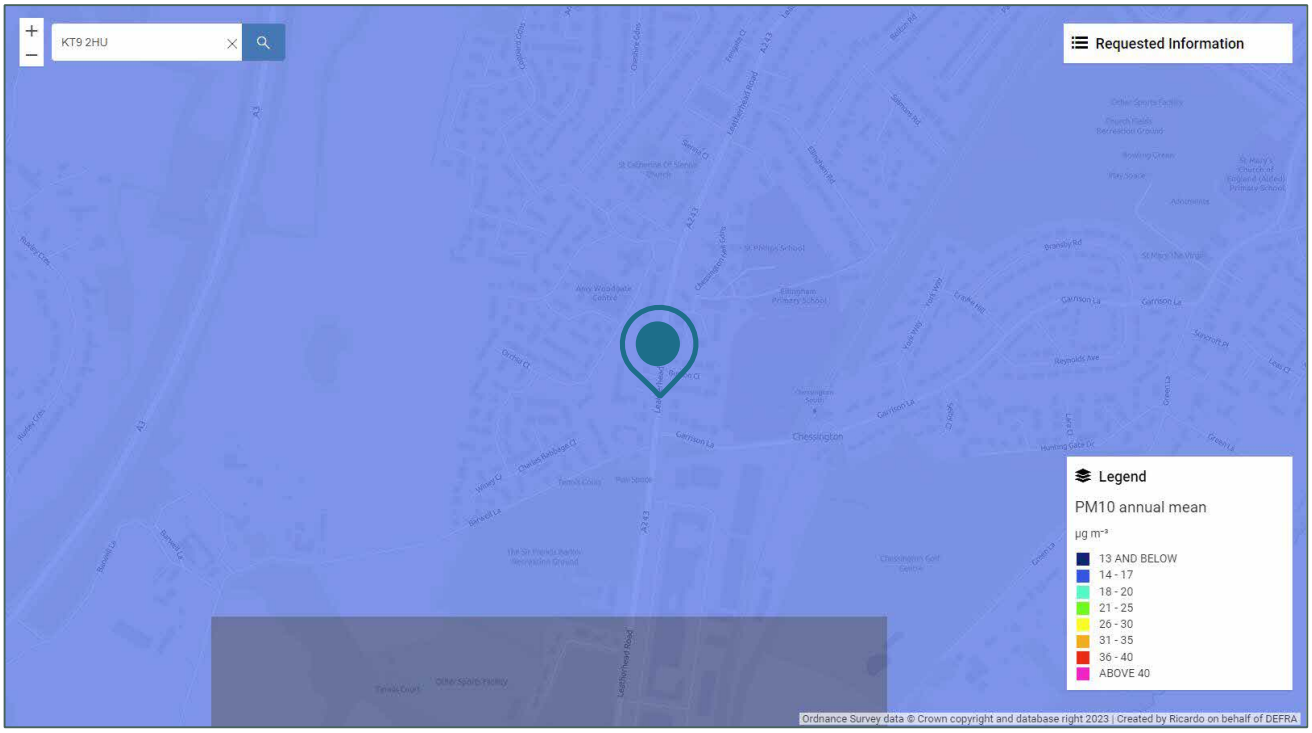


Figure 7 - UK Air Pollution Map showing pollution from PM_{10} particulate matter (https://uk-air.defra.gov.uk/data/gis-mapping/)

3.1.2 Noise

The installation of an ASHP will likely generate additional background noise in the Proposed Development. This will be addressed at detailed design stage to ensure the noise generated by the ASHP is adequately damped or shielded.

The Proposed Development is located on Leatherhead Road (A243) and as such, there will need to be measures in place to mitigate the impact of noise for occupants of the Proposed Development e.g., by using triple glazing and well insulated Walls and Roof.

3.1.3 Light

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 focused and controlled.

All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight/timer controlled, as discussed in Section 2.2.2 of this document.

3.2 Flood Risk

Figure 8 shows that the selected site of the Proposed Development has very low risk of flooding from rivers and seas. In addition, the Proposed Development is in an area with low risk of surface water flooding, as shown in Figure 9. Sustainable urban drainage systems (SUDS) will be implemented to further manage flooding risk and further future proofing the development should flooding become a problem.

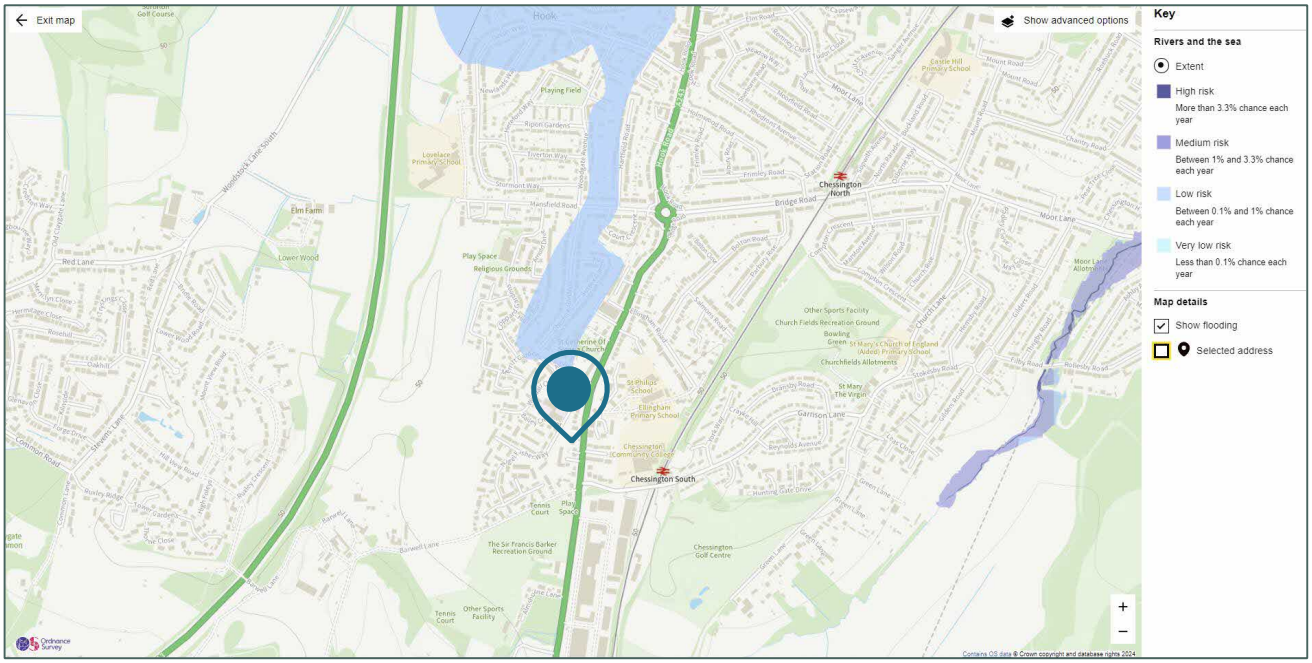


Figure 8 - Flood map showing risk of flooding from rivers or the sea (https://www.gov.uk/check-long-term-flood-risk)

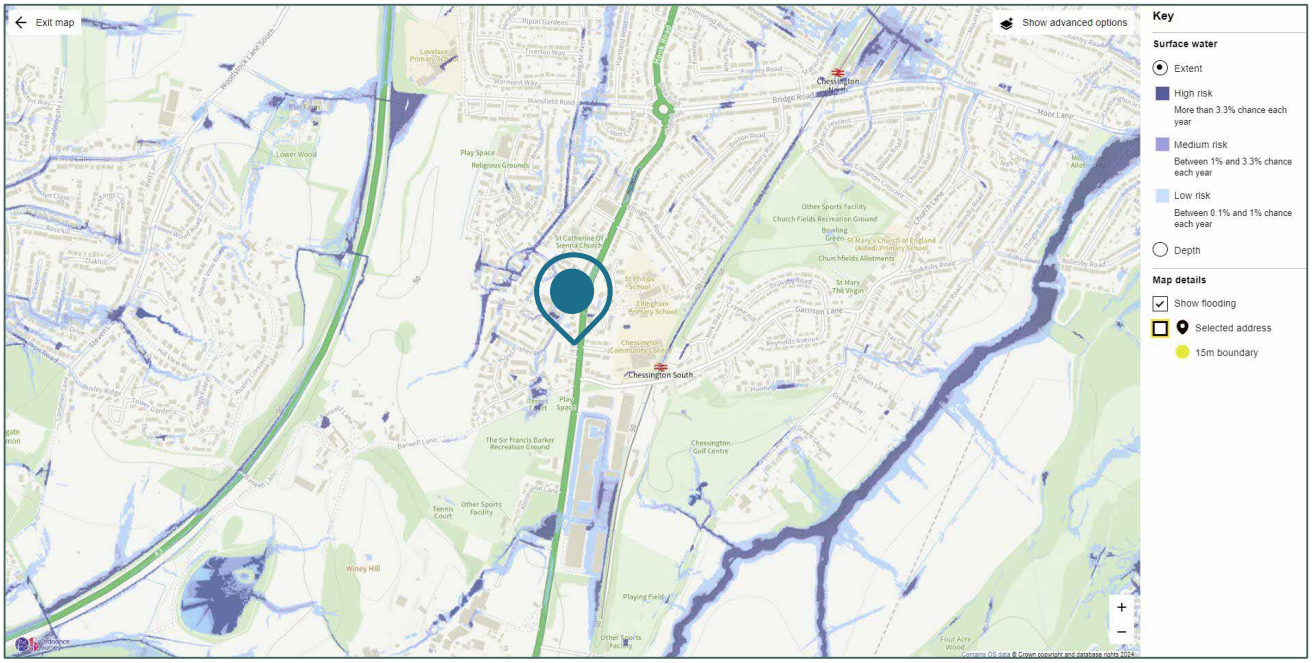


Figure 9 - Flood map showing risk of flooding from surface water (https://www.gov.uk/check-long-term-flood-risk)

3.3 Transport

3.3.1 Public Transport

The Proposed Development is located 0.2 miles from Chessington South train station allowing for connection to the greater London area. In addition to this the development is opposite Garrison Lane stop D bus stop and 0.1 mile from the Garrison stop C bus stop providing transport around the Chessington area. For further information as part of the overall planning submission Magna Transport Planning Ltd have produce a transport statement.

3.3.2 Cycle Storage

A total of 14 cycle storage (2 per dwelling) spaces will be provided to all residents of the Proposed Development through the installation of cycle sheds. In addition to this, a cycle stand will be provided for visitors.

3.3.3 Electric Vehicles (EV)

In order to promote the use of low carbon transport methods, each dwelling within the Proposed Development will be provided with electric vehicle charging points in accordance with Building Regulations Part S.

3.4 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The construction industry is very environmentally disruptive to plant species and wildlife. Therefore, it is important to protect and enhance biodiversity onsite where possible.

The Proposed Development will take a considered approach to the biodiversity of the area and ensure all planting prioritises retention of on-site biodiversity where possible and any new planting shall be of native species spanning herbage, shrubs and primary canopy trees. Permeable paving and SuDS shall also be incorporated within the overall site where applicable and shall work in conjunction with the native planting to enhance the site and that of the surrounding environment.

3.5 Resource Efficiency

3.5.1 Construction Phase Waste Management

The Proposed Development will aim to minimise the waste produced from the site during the construction phase through a mix of site policies and effective and efficient design and construction processes. A comprehensive Construction Environmental Management Plan (CEMP) will be implemented from the outset of site works and will follow the principles of the waste hierarchy, shown in Figure 10 below. Targets have been set in relation to volume of construction waste and diversion from landfill, with performance monitored by the Contractor to ensure exceedance of these levels is achieved.

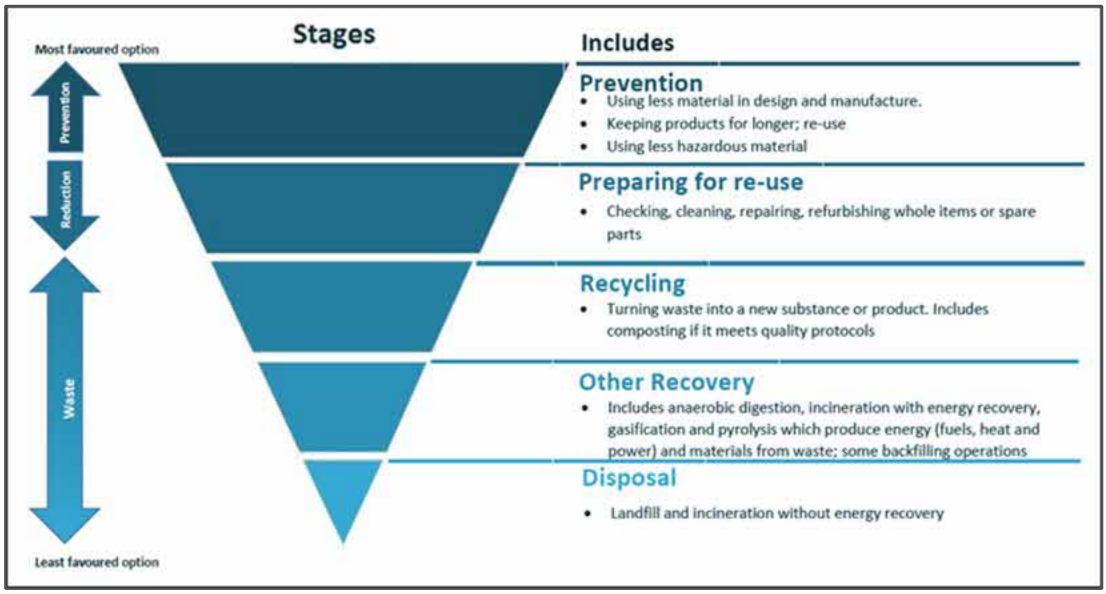


Figure 10 - The waste hierarchy

3.5.2 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 CO_2e emissions and water use from site related activities will take place in line with national benchmarks.

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 to landfill.

Reusing materials on site will reduce the embodied CO_2e and support our transition to a more circular economy. Transportation of new material to the site will be reduced, reducing the CO_2e 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 (Figure 10), 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 nature of the materials found on the existing site.

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

3.5.3 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.

All timber and timber-based products used on-site will be legally sourced from a reputable forest certification scheme, such as Forest Stewardship Council (FSC) with appropriate Chain of Custody certification to confirm this. All other materials sourced from suppliers who have an accredited Environmental Management System (EMS) certified through ISO 14001 or the Eco-Management and Audit Scheme (EMAS) ensuring that any environmental impacts caused are managed and reduced. BES 6001 certification should also be considered to ensure products have been made with constituent materials that have been responsibly sourced.

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.

3.5.4 Water

The South East of England and London has been declared an area of 'serious water stress' by the Environment Agency. Water is a vital resource and efficient usage should be encouraged in all new buildings. Average water use in the UK is in the region of 139 litres/person/day[6] and the Proposed Development aims to significantly reduce mains water use through a combination of efficiency measures. These should include the use of fittings with a low capacity or flow restrictors.

Internal water use will be reduced in line with Planning Policy and enhanced water standards in Building Regulations Part G for all dwellings of 110l/person/day (including 5l/person/day external water use). The following specification provides an indicative method, subject to manufacturers information on the installed white goods and sanitary ware, of achieving this level of water use:

- WCs: 4/2.6 litre dual flush
- Kitchen Taps: 5.00 litres/minute
- Taps (all other): 4.00 litres/minute
- Baths: 175 litres to overflow
- Showers: 9.00 litres/minute
- Washing Machine: Max. 8.17 litres/kg dry load
- Dishwasher: 1.25 Litres/place setting

3.6 Sustainability Summary

Careful considerations regarding sustainable design and construction have been made for the Proposed Development. These considerations have accounted for the impacts of climate change and will result in measures to reduce CO_2e emissions through the use of a highly efficient energy strategy on-site.

Overall, the Proposed Development has aimed to minimise its impact on the environment at both construction and operational phases and will provide several sustainable family suited dwelling which respond positively to the surroundings, and local and regional policy.

The sustainability measures implemented meet and exceed the targets set out by planning policy through the following:

Air pollution contributions will be negligible on site and minimised on a national scale through use of ASHPs for space heating and DHW.
Noise pollution measures have been taken by minimising air infiltration and enhanced fabric and design, ensuring neighbours and occupants are not impacted.
Flooding has been considered and found to not be an issue for the site or immediate surrounding area.
Sustainable transport provision has been provided onsite in the form of secure cycle storage. Design locality has also been considered with respect to proximity to public transport systems.
EV charging points have been provided.
The Proposed Development will retain planting where possible and prioritise any new planting to be of native species. This will ensure a well-rounded and considered approach for the Proposed Development to meet all biodiversity requirements of the site.

[6] Energy Savings Trust: Advice to help you save water at home - Energy Saving Trust & AHHW2 final.pdf (energysavingtrust.org.uk)

Waste management will be ensured following the waste hierarchy and adopting the reuse, recycle and recovery methodology for construction and demolition.

Implementation of sustainable construction techniques and materials, inclusive design, site management and sustainable procurement procedures shall be utilised.

Water use will be controlled in alignment with Part G requirements ensuring policy requirements are met not exceeding 110l/person/day (including 5l/person/day external water use).

Appendices

Appendix A – Site Plan

Appendix B – SAP Summary Sheet

Leatherhead Road (116)

8Regs LV1 2021			Planning Authority: Royal Borough of Kingston upon Thames																	Rev A
Option	Unit	External Wall	Room in Roof Wall	Pitch Roof (Rafters)	Pitch Roof (Joists)	Ground Floor	Flat Roof	Windows	Roof Lights	Ext. Door	Heating Strategy	HW Cylinder	Renewables (PV)	Renewables (Area)	Mechanical Ventilation	Air- Permeability	EPC	DER v TER Improvement	DFEE vs TRE E Improvement	DPER vs TPER Improvement
Type	Plot No	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	Make	(litres)	(kWp)	m^2	Type	$m^3/hr/m^2$	Rating	%	%	%
End Terrace House	3	0.16	0.20	0.12	0.10	0.10	0.00	1.00	1.60	1.20	5kW ASHP	150.00	1.20	6.00	Extract	4.00	85B	72.54	8.35	41.38
Mid Terrace	5	0.16	0.20	0.12	0.10	0.10	0.00	1.00	1.60	1.20	5kW ASHP	150.00	1.20	6.00	Extract	4.00	87B	72.63	6.57	40.45
Bungalow	7	0.16	0.20	0.12	0.10	0.10	0.00	1.00	1.60	1.20	5kW ASHP	150.00	2.40	12.00	Extract	4.00	84B	74.42	0.51	40.90

Element	U Values	Description
External Wall	0.16	Modelled as - 102.5mm Brick Outerleaf, 25mm Low-e Cavity, 110mm Phenolic Insulation (0.019W/mK) (Plastic Wall Ties), 100mm Concrete Block, 12.5mm Plasterboard
Room in Roof Wall	0.20	Modelled as - 12.5mm Plasterboard, 75mm Phenolic Insulation (0.019 W/mK) between Timber Battens, Vapour Control Layer, 10mm Unventilated Air Space between Counter Battens, 41.5mm Insulated Plasterboard (30mm Phenolic Insulation 0.019W/mK + 12.5mm Plasterboard)
Pitch Roof (Rafters)	0.12	Modelled as -Tiles on Battens, Vapour Control Layer, 150mm Phenolic Insulation (0.019W/mK) between Battens, 50mm Phenolic Insulation (0.019W/mK), 12.5mm Plasterboard
Pitch Roof (Joists)	0.10	Modelled as - 250mm Mineral Wool (0.038W/mK), 150mm Mineral Wool between Battens (0.038W/mK), 12.5mm Plasterboard
Ground Floor	0.10	Modelled as - Beam and Block Foundation, PIR Insulation (0.022W/mK), 65mm Screed
Windows	1.00	Triple Glazed windows with a centre pain G-value of 0.40
Roof Lights	1.60	Double Glazed windows (Vertical U-value 1.20 W/m^2K +0.40 W/m2K for 30 degree incline as per SAP 10.2 guidance) with a centre pain G-value of 0.40
External Door	1.20	Solid Wooden Door
Construction Details (PSI values)	-	Accredited Construction Details Psi Values used where relevant (see separate sheet)
Heating Strategy	-	Modelled as Ecodan 5kW ASHP
Controls	-	Modelled as - Time and Temperature Zone Control
Heating Emitters	-	Radiators
Hot Water Cylinder	-	Modelled as - 150 L Hot water tank with 1.30kWh/day heat loss
Waste Water Heat Recovery	-	n/a
Air- Permeability	-	4.00 $m^3/hr/m^2$ as per the Blower Door Method @ 50 pa
Mechanical Ventilation	-	Modelled as - Nuaire MRXBOXAB-ECO3
Lighting	-	Modelled as - 12W, 85lm/W, 1020lm
Renewables	-	Modelled with 3 panels per dwelling - rated at 0.4kWp with the resulting total of 1.2kW for units 1-6/ 6 panels - rated at 0.4kWp resulting in a total of 2.4kW for unit 7
Overheating	-	
Notes	-	

Sign Off of details	Name	PP M Maclean	Date	29/02/2024	On behalf of the contractor/client:	Name		Date	
	Sign	(on behalf of SRE)	[redacted]			Sign			

Leatherhead Road (118)

Bridge Type	Notional Psi Value	Psi Value	Reference
E2 Other Lintel	0.05	0.025	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E3 Sill	0.05	0.023	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E4 Jamb	0.05	0.018	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E5 Ground floor (normal)	0.16	0.057	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E6 Intermediate floor within a dwelling	0.00	0.00	Elmhurst Notional Psi Value
E10 Eaves (insulation at ceiling level)	0.06	0.064	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E11 Eaves (insulation at rafter level)	0.04	0.023	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E12 Gable (insulation at ceiling level)	0.06	0.039	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E13 Gable (insulation at rafter level)	0.08	0.039	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E16 Corner (normal)	0.09	0.033	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E17 Corner (Inverted)	-0.09	-0.061	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
E18 Party Wall between dwellings	0.06	0.037	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
P1 Party Wall - Ground Floor	0.08	0.043	https://www.recognisedconstructiondetails.co.uk/walls/masonry-cavity-wall-hybrid-insulation
P2 Party Wall - intermediate floor within a dwelling	0.00	0.00	Elmhurst Notional Psi Value
P4 Party Wall - Roof (insulation at rafter level)	0.12	0.12	Elmhurst Notional Psi Value
P5 Party Wall - Roof (insulation at rafter level)	0.08	0.08	Elmhurst Notional Psi Value
R1 Head of Roof Window	0.08	0.08	Elmhurst Notional Psi Value
R2 Sill of Roof Window	0.06	0.06	Elmhurst Notional Psi Value
R3 Jamb of Roof Window	0.08	0.08	Elmhurst Notional Psi Value
R4 Ridge (vaulted ceiling)	0.08	0.08	Elmhurst Notional Psi Value
R8 Roof to Wall (rafter)	0.06	0.06	Elmhurst Notional Psi Value

Sign Off of details					On behalf of the contractor/client:			
	Name	PP M Maclean	Date	21/02/2024		Name		Date	
	Sign	(on behalf of SRE)		[redacted]		Sign			

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