Energy and Sustainability Statement

Liphook A3 Services Ltd

Liphook Service Station
A3 Northbound
Hampshire
GU30 7TT

SRE

Version	Revision	Date	Author	Reviewer	Project Manager
1	A	24.06.2021	Aniruth Raghunathan	Sophie Hopwood	Aniruth Raghunathan

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

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Executive Summary

This Energy and Sustainability Statement has been written to demonstrate the measures incorporated into the design of the Proposed Development at Liphook Service Station (A3 Northbound), Liphook which will deliver a development with lower energy and water use, lower carbon emissions and lower predicted operational costs than a Building Regulations 2013 compliant design. The Proposed Development consists of a conversion of the redundant Travelodge hotel which will consist of 6 no. self-contained office spaces and a drive-thru service will be added onto the existing Starbuck onsite. As such, the conversion of Starbucks would not trigger Part L requirements. Thus, the energy strategy section omits this part of the development and only focuses on the conversion of the Travelodge hotel.

The energy strategy has been developed by following the nationally recognised GLA Energy Hierarchy of Lean, Clean, Green and Seen.

This statement outlines the proposed energy performance of the converted hotel into an office building for the different Energy Hierarchy scenarios. The chosen energy strategy includes Lean passive and active design measures and Green LZC technologies to achieve a 10% improvement over Baseline CO_2 emissions in line with East Hampshire District Council Local Plan Policy CP24 and supporting Sustainability Checklist. The Green scenario successfully exceeds Building Regulations Part L2B compliance by >68%, achieving a BREEAM 'Excellent' rating in energy performance standard. This statement outlines 2 no. 'Green' scenarios that meet these requirements using different low or zero carbon (LZC) technologies:

- Gas boilers with supplementary PV
- Individual Air Source Heat Pumps (ASHP) with supplementary PV

The chosen 'Green' scenario being implemented is ASHP with supplementary PV. The scenario using gas boilers with supplementary PV has been modelled for comparison and to provide an alternate option to meet the energy performance standards.

Table 1 shows the improvements of the energy scenarios compared to baseline CO_2 emissions in line with Building Regulations Part L2B:

Energy scenario	CO_2 emissions (tCO_2/year)	Improvement over Baseline (%)	BREEAM ENE01 credit rating
Baseline	41.91	-	-
Lean	24.42	42	Excellent
Clean	24.42	42	Excellent
Green Gas boilers and PV	17.05	59	Excellent
Green ASHPs and PV	13.42	68	Excellent

Table 1 - Summary of site-wide regulated carbon dioxide savings

Proposed Energy Strategy

The following measures have been assessed and incorporated in support of the Proposed Development:

- Passive and active design measures
- 100% low energy lighting
- Enhanced building fabric
- Air Source Heat Pump or high efficiency gas boilers
- Supplementary PV to offset CO_2 emissions

Introduction

1.0 Introduction

This Energy and Sustainability Statement has been written by SRE on behalf of Liphook A3 Services Ltd (the Client) to demonstrate the measures incorporated into the design of Liphook Service Station, A3 Northbound, Liphook (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 requirements of the site 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 the conversion of the now redundant Travelodge hotel into 6 no. office units, with an addition of a drive-thru facility to the existing Starbucks onsite.

1.1 Planning Policies

The following planning policy and guidance has been used to inform the strategy and to ensure that the Proposed Development meets all requirements imposed on it through Planning Policy.

Key Policies

- East Hampshire District Council – Core Strategy

Supporting Policies & Documents

- National Planning Policy Framework (Mar 2012)

Planning Policy	Requirement
EHDC Local Plan Core Strategy	CP24 Sustainable Construction Planning permission will be granted for development which on completion: a) meets the following minimum Code for Sustainable Home threshold level, and equivalents for non-residential development (unless proven to be financially or technically unviable), as set out below: BREEAM 'very good' to 'excellent' for buildings constructed after 2016. b) provides at least 10% of energy demand from decentralised and renewable or low carbon energy sources (if possible, including connections to a district heating system), unless it is proven that this is not feasible or viable. c) for major areas of development, provides adequate land or funding for waste management infrastructure.

Table 2 - Summary of local planning policy requirements for energy efficiency

1.2 Applicability to Proposed Development

In accordance with the above planning policy and planning conditions applied to the site at this stage, the following standards will be met:

- Building Regulations Part L2B Compliance.
- Min. 10% energy offset from on-site low or zero carbon technologies.
- BREEAM ‘excellent’ level under ENE01 credits.

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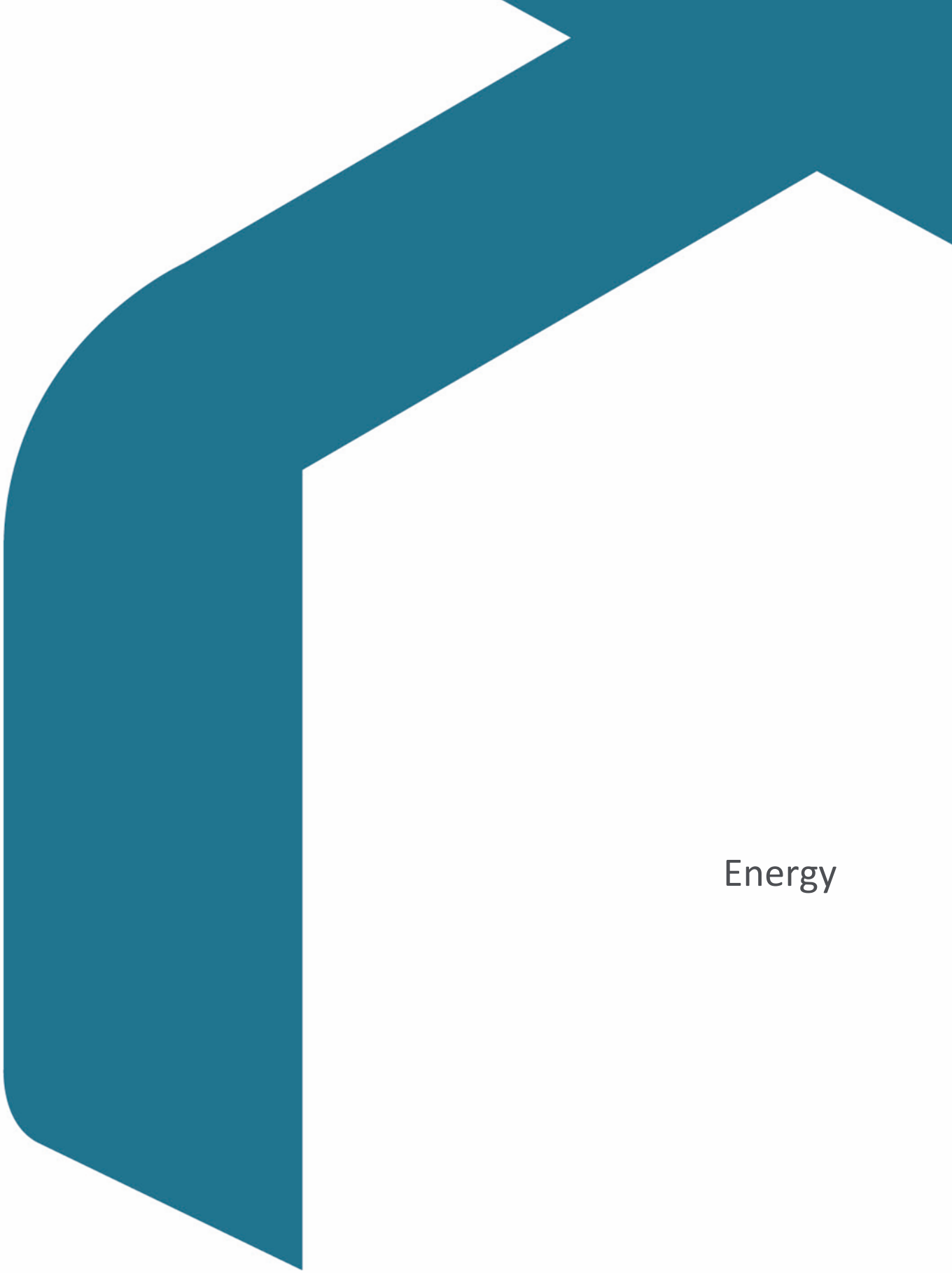


Energy

2.0 Energy

2.1 Method

The energy strategy design follows national policy guidance 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

The energy modelling for the Proposed Development has been calculated using IES VE 2021 software in accordance with Building Regulations 2013 Part L2B. The existing building provides the energy baseline and is the exact size, shape and usage of the Proposed Development and is based on the existing build-up's U-values and heating specifications. Assumptions are made where information is unavailable in accordance with Approved Document L and the Domestic Building Services Compliance Guide - information regarding the existing HVAC system is unknown.

The thermal properties (U-values) of the existing Travel lodge hotel are detailed in Table 6 and the subsequent Baseline Emission Rate is outlined within Table 4for reference.

	Baseline Emission Rate (tCO_2/year)
Liphook A3 Services - Existing Travelodge hotel	41.91

Table 4 – Baseline CO_2 emissions

2.2 LEAN – Demand Reduction

The lean scenario achieves a reduction in CO_2 emissions over the Baseline using passive and active design measures, as seen in Table 5.

	Baseline CO_2 emissions (tCO_2/year)	Lean CO_2 emissions (tCO_2/year)	Improvement (%)
Liphook A3 Services - Office	41.91	24.42	42

Table 5 – Site-wide Lean CO_2 emissions and improvement over existing building

2.2.1 Passive Design Measures

The existing buildings at the Proposed Development have been positioned within the site to maximise the usable space, both for the buildings and their external spaces. All glazed areas of the buildings will be retained, and shading will be provided by internal curtains or blinds.

The orientations of the all the office unit types will have an East-west aspect, allowing good levels of daylighting and solar gain whilst minimising potential overheating from the stronger, Southern sun. There is no glazing on the South or North elevation of unit 1 and 6.

The existing building fabric is made up of cavity walls and a cold roof which has been built to thermal standards of Part L 1995. Further internal insulation is to be added to the walls, floors, and roof to further enhance the thermal performance to current standards, consequently satisfying Part L2B requirements for refurbishments. Proposed U-values for the units are provided within Table 6. These values are based on typical build-ups of structural elements for the type of dwellings proposed; see the indicative Building Performance Specification in Appendix B for details of the currently assumed building fabrics. The buildings should have a medium thermal mass as the existing construction is anticipated to be load-bearing masonry. A medium thermal mass will balance providing high energy efficiency and limiting overheating during the summer months.

Element	Existing building – min. 1995 regs (U-value)	Proposed – Part L2B 2013 Threshold (U-value)
External Walls	0.45	0.30
Ground Floor	0.45	0.25
Roof	0.25	0.16
Windows	3.3 (g-value – 0.50)	3.3 (g-value – 0.50)
External Doors	3.3	3.3
Air Tightness @ 50 N/m^2	15 (m^3/hr/m^2)	15 (m^3/hr/m^2)
Thermal Bridge	Default values	Default values

Table 6 – Proposed fabric energy efficiencies for the office units

2.2.2 Active Design Measures

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

A high efficiency modern condensing boiler with time, temperature, and zone controls will be installed as a minimum to allow the control of the individual units throughout the building. A minimum of 2 no. heating zones per unit will be required.

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

It has been assumed at present that standard extract ventilation will be provided to all tea stations and toilet spaces, in line with Building Regulation Part F 'System 1' requirements. Openable windows will provide fresh air and purge ventilation where this is needed.

2.2.3 Cooling

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

Cooling Hierarchy	Potential Design Measures
Minimising internal heat generation through energy efficient design	All primary pipework to be insulated, therefore low system losses. High specification hot water cylinders installed with low heat loss. Low energy lighting throughout.
Reducing the amount of heat entering the building in summer	Internal blinds are to be provided to minimize solar gain. All walls are to be well insulated.
Use of thermal mass and high ceilings to manage the heat within the building	Thermal mass is anticipated to be medium with some element of exposed mass.
Passive Ventilation	Openable windows will be provided to all rooms and cross ventilation is possible.
Mechanical Ventilation	Standard extract fans will be provided in wet rooms and kitchens.

Table 7 - Design measures following the cooling hierarchy

No active cooling is proposed, and no overheating risk has been highlighted by the dynamic Level 5 modelling undertaken to date.

2.3 CLEAN – Heating Infrastructure

The Proposed Development will implement a heat pump (ASHP – wet) heating strategy which will provide space heating and hot water. Furthermore, whilst connection to a district heat network is not currently possible, the installation of a 'wet' system would allow each office unit within the Proposed Development to easily connect to a new heat source in the future.

An initial investigation into the Proposed Development shows that the use of a communal system is not viable for the site. Therefore, there are no potential CO_2 savings in the 'Clean' model.

	Lean CO_2 emissions (tCO_2/year)	Clean CO_2 emissions (tCO_2/year)	Improvement (%)
Liphook A3 Services - Office	24.42	24.42	0.00

Table 8 – Site-wide Clean CO_2 emissions and improvement over Lean

District Heat Networks

An initial assessment through The Association for Decentralised Energy Installation Map shows that there are no current district heating networks within the local area, with no major heat generating land use (such as a hospital or university) nearby. Therefore, connection to an existing district communal heating scheme is not possible.

Communal Systems

The design and layout of the application scheme, with different use type buildings laid out throughout the site, makes the installation of a site-wide system technically challenging and delivering nominal benefit when compared to individual systems due to the distribution losses associated with a communal system. There would also be a requirement for a centralised 'energy centre' containing boilers (or other plant) located somewhere on the site, which may not be in keeping with the design of the scheme or that of the surroundings.

Due to the above, the application of communal systems has been discounted at this stage.

2.4 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 comply with Policy CP24, with an emissions improvement >68% compared to the existing building.

In order to maximise the energy generated from renewable sources, the proposed options for the Green scenario include the use of individual low temperature flow Air Source Heat Pumps for heating and hot water demand and individual photovoltaic (PV) arrays supplementing electricity demand. There are 2 no. proposed Green scenarios that have been modelled, giving the developers different options for meeting planning requirements:

- Gas boilers with supplementary PV
- Air Source Heat Pumps (ASHP) with supplementary PV

The scenario with ASHP and supplementary PV has been chosen for the Proposed Development. However, the gas boilers and PV scenario is detailed for comparison.

Energy scenario	CO_2 emissions (tCO_2/year)	Improvement over Clean (%)	Improvement over Baseline (%)
Clean	24.42	-	42
Green Gas boilers and PV	17.05	30	59
Green ASHPs and PV	13.42	45	68

Table 9 – Site-wide Green CO_2 emissions and improvement over Clean and Baseline

2.4.1 Air Source Heat Pumps

The use of heat pumps is often the most direct method of reducing CO_2 emissions for a Proposed Development with minimal change in aesthetics or the way in which a building is designed. Often a 'straight swap' alternative for a gas system boiler, the use of heat pumps has the potential to provide significant offset in CO_2 emissions.

All heat pump systems consume electricity to operate - the Coefficient of Performance (CoP) of the system is the ratio of the heat energy emitted to electrical energy consumed. 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 generally deliver low grade heat (up to ~55°C) efficiently, and therefore HP systems alone are generally relatively less efficient in providing hot water, as this requires additional electrical input (immersion or increased compressor use).

The use of Air Source Heat Pumps (ASHP) has the potential to supply the Proposed Development with the heating requirements, subject to the provision of oversized/low temperature radiators or underfloor heating systems.

ASHPs tend to generate some noise and therefore the location/space in which the pumps are positioned would need to be adequately sound insulated or appropriately sited in order to prevent disturbances to the building's occupants and neighbours.

High efficiency Mitsubishi Ecodan units have been utilised within the modelling at this stage[1]. Table 10 shows the improvements in CO_2 emissions when replacing the existing gas boilers with ASHPs for the Proposed Development.

Energy scenario	CO_2 emissions (tCO_2/year)	Improvement (%)
Clean	24.42	-
ASHP only	20.79	15

Table 10 – Site-wide CO_2 emissions reduction from ASHP installation only

2.4.2 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 in line with the Local Plan's guidance that the use of renewable technologies should be maximised. The Landscape Appraisal that has been performed for the Proposed Development supports the use of PV, indicating they are a suitable technology for this site.

The PV array would be connected into the electrical system via an inverter. Noise will not be an issue – A PV system does not feature moving parts and is silent during operation.

The building features a pitched roof, therefore either an 'Integrated' PV tile or a 'Module' PV system are appropriate depending on aesthetics and available roof areas. An indicative location of the 'Module' PV system array is shown in Figure 1. The designed area (indicative only - array size may reduce or increase in the latter

[1] Indicative product only - this does not constitute a product endorsement.

stages of the design) for PV installation is 50 m^2 on the West elevation and 50 m^2 on the East elevation. 55 no. of 330W panels on the East and West elevation together would potentially generate 14,223 kWh per annum.

Figure 1 – PV location (indicative only)

The PV module systems would be installed onto a mounting frame fitted flush with the angle of the roof pitch (at an inclination of ~20°) and provide a stable and secure structure for the array.

The calculations of PV have been based on East/West orientated arrays at a 20 degree pitch – in line with the roof pitch of the majority of the units. South facing PV is the best performing in the Northern hemisphere due to the sun's path across the Southern sky. However, there is minimal roof area facing South in the Proposed Design. It is not practical to split the PV between South and East/West facing panels because of the way inverters work. Modern inverters can function well with PV arrays split between East and West facing panels, but not when split between South and East/West. Having East/West facing PV only will mean a second inverter is not required for each array and it gives a worst performing scenario for the PV.

For the purposes of this report a 330W module will be used as an example of a standard module. Each panel covers an area of ~1.7m^2 (1.7m x 1m) and has a peak output of 330W.

The 2 no. Green scenarios that have been modelled have the same amounts of PV to meet the required 10% reduction in CO_2 emissions, as required in Local Plan Policy CP24.

The Green scenario with ASHP in office units and standard 330W PV panels has been chosen for planning. The CO_2 emissions offset of all the Green scenarios is outlined within Table 11 below for reference:

Green scenario	Location	Maximum no. Panels	Total Site Array Size (kWp)	Total Site Energy Generated (kWh/yr)	Total Site CO_2 Offset ($kgCO_2$/yr)
Gas boilers with PV	East/West facing roof	55, 330W panels	18.15	14223	7382
ASHPs with PV	East/West facing roof	55, 330W panels	18.15	14223	7382

Table 11 – Predicted PV performance of two Green scenarios

2.5 Carbon Offsetting

There is currently no Carbon Offsetting scheme in operation within the EHDC Authority and therefore no payment to a Fund will be necessary.

2.6 SEEN – In-Use Monitoring

It is recommended that 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 occupants to observe their energy use in 'real time' and manage it more effectively.

2.7 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 successfully exceed Building Regulations Part L2B compliance by >68% in line with EHDC Planning Policy CP24 and wider sustainability checklist for non-residential developments, whilst maximising the energy generation provided via renewable, low or zero carbon technologies. Table 12 shows the improvements of the energy scenarios over Building Regulations Part L2B Baseline.

Energy scenario	CO_2 emissions (tCO_2/year)	Improvement over Baseline (%)	BREEAM ENE01 credits rating
Baseline	41.91	-	-
Lean	24.42	42	Excellent
Clean	24.42	42	Excellent
Green Gas boilers and PV	17.05	59	Excellent
Green ASHPs and PV	13.42	68	Excellent

Table 12 - Summary of site-wide CO_2 emissions and improvements over Baseline

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

- Passive and active design measures
- 100% low energy lighting
- Enhanced building fabric
- Air Source Heat Pump or high efficiency gas boilers
- Supplementary PV to offset CO_2 emissions

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 Pollution

Air

Poor specification of resources as part of the construction process can have a major environmental impact both in terms of the resources' manufacturing process, but also in terms of transport of the resources to site. Therefore, it is recommended that emissions related to building specifications and their transportation to the construction site are limited as much as practicable.

Within the Proposed Development's design, all the existing windows will be openable and cross ventilation will be achieved within the buildings to reduce the risk of overheating, thus negating the need for air conditioning (comfort cooling).

As standard practice all new insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of less than 5, further minimising the Proposed Development's effect on global Climate Change.

Furthermore, the use of PV panels will decrease the import of electricity from the National Grid and replace it with PV generated electricity which produces no emissions during operation.

On-site air pollution will be reduced through the specification of either ASHP heating systems (emitting no on-site emissions) or low (<40mg/kWh) NOx boilers within each unit.

Noise

Being close to the A3 motorway, an existing Starbucks, and an existing gas station, it is not anticipated that the Proposed Development will have an adverse noise pollution impact that will affect the quality of life for neighbouring properties and the surrounding area. Furthermore, the Proposed Development will be highly insulated which should limit any noise from inside the buildings.

The positioning of any equipment for the Proposed Development will be carefully considered to avoid nuisance to surrounding new or existing dwellings. This will include the positioning of ASHP external condenser units (if installed) which, whilst quiet in operation, will need to be placed considerately to avoid any inadvertent noise intrusion into habitable spaces.

Light

The design and layout of the site for practical use has been considered while trying to maximise internal daylight levels for the proposed dwellings. All spaces occupied by the office residents have glazed openings to provide natural daylight, and light-coloured curtains or roller blinds will be provided to enable glare control and privacy.

Light Pollution will be minimised where possible through the careful specification and positioning of external lighting (Energy Efficient/LEDs) around the Proposed Development, ensuring that no lighting negatively impacts the local surroundings.

The use of daylight sensors or timers along with PIR sensors on space lighting will prevent lights being left on when not required. Special attention should be given to security lighting (where fitted) to ensure it is appropriately focused and controlled. Security lights must have a maximum wattage of 150W.

3.2 Flood Risk

The selected site is not highlighted as being at risk of flooding from rivers and seas (Figure 2) or surface water (Figure 3).

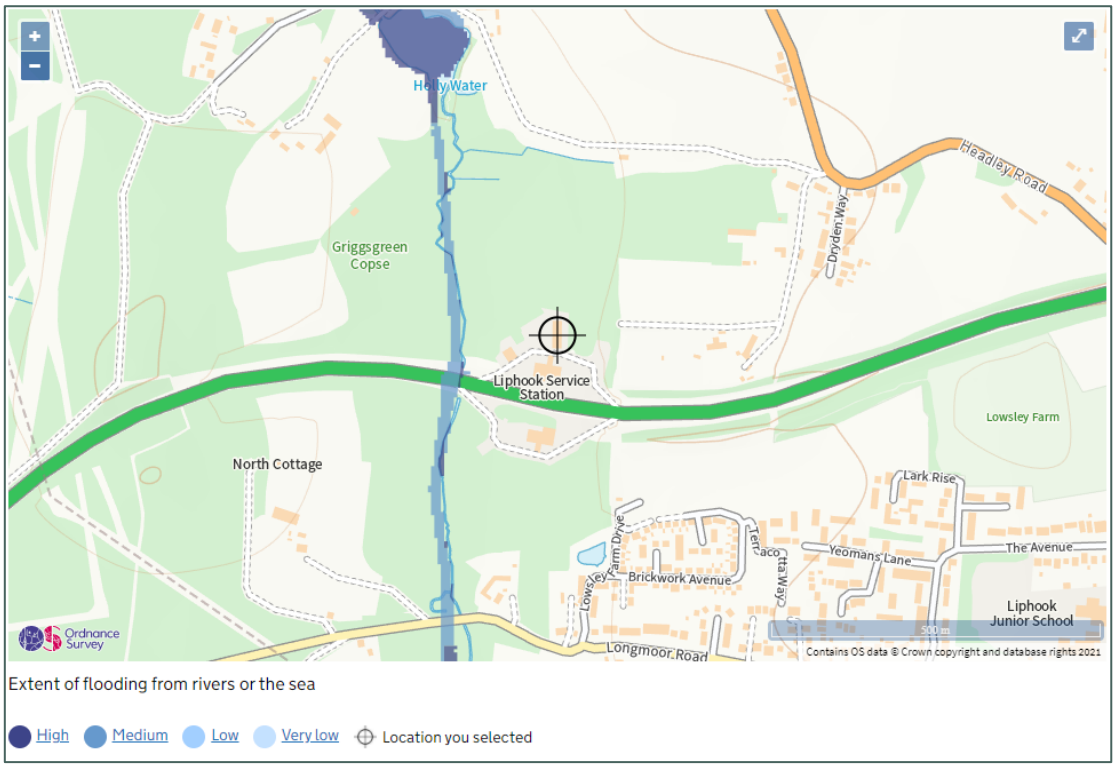


Figure 2 - Flood map showing risk of flooding from rivers or the sea (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

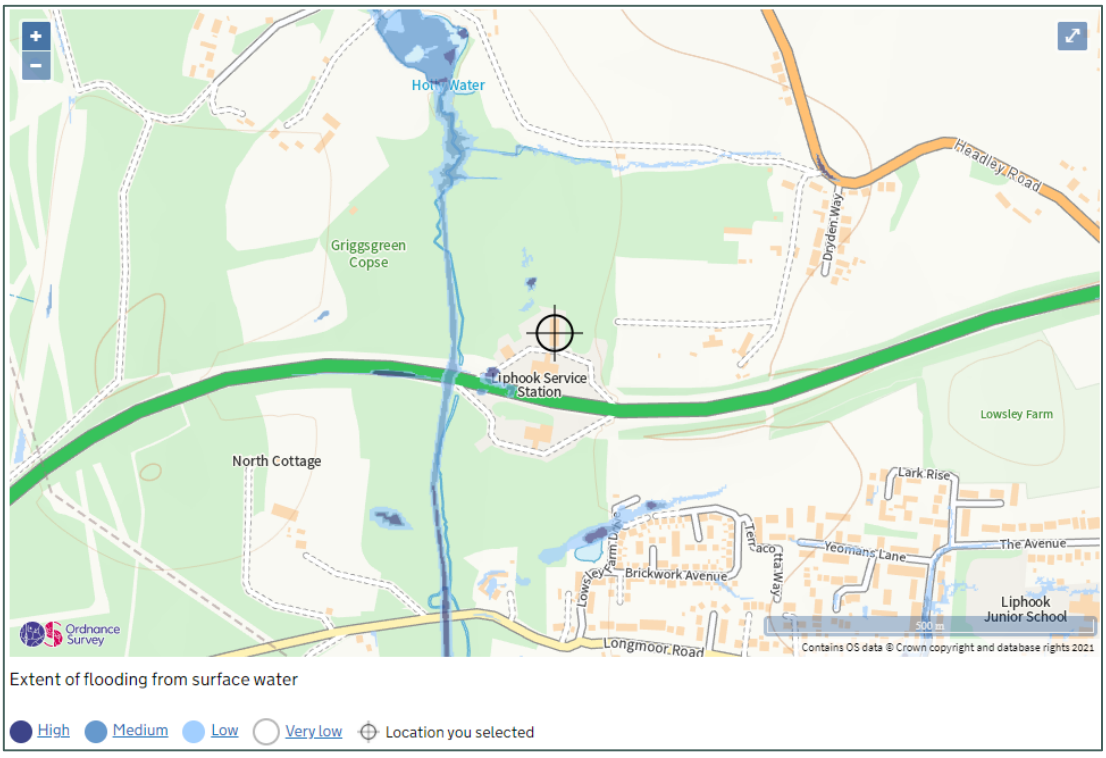


Figure 3 - Flood map showing risk of flooding from surface water (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

Any surface water on the site will be managed through the use of Sustainable Urban Drainage Systems (SUDS) where applicable, with landscape features also incorporated into the site design (such as ditches) to manage overall site runoff.

3.3 Transport

The EHDC Local Plan Policy CP31: Transport states that the fullest possible use of sustainable modes of transport (including cycling, walking and public and community transport) and reduced dependence on the use of private cars will be encouraged. The only access to the location is through the A3 motorway, thus reducing dependence on private cars is impractical for this development.

The Proposed Development forms a part of the Liphook motorway Service Station on the A3 which links Portsmouth to Southwest London. It is also linked to the B3006, which leads to the A31. Access is then available to the wider national road network.

Public Transport

The location of the Proposed Development has innate restriction for more sustainable modes of transport i.e., public transport. There are no bus stops within 1 km radius of the site, however, Liphook Railway Station is located a 15 minute (4.8 km) bike ride away. The station is on the South Western Railway line that goes between Portsmouth Harbour and London Waterloo.

Parking

Since personal vehicles will be the primary mode of transport into the Proposed Development, car parking is provided to all office units and the drive-thru in line with the requirements of the Local Plan, with 54 no. spaces provided for the 6 no. offices and 20 no. spaces provided for Starbucks drive-thru. This will be located outdoors without any covering.

Electric Vehicle (EV) Charging

The EHDC Local Plan Core Strategy only requires provision of electric charging points in the Whitehill and Bordon areas. Still, the Proposed Development will provide 2 no. charging points for the drive-thru and 2 no. charging points for the office units which will encourage low carbon mode of transport.

3.4 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The Proposed Development location is currently a brownfield site consisting of paved tarmac and concrete bounded by established trees and hedgerows.

The landscaping proposal includes the retention of most existing trees in the area and the addition of new 90 no. native trees and further planting on the Northwest corner of the site. In addition, planting schedules will be developed at the detailed design stage and will incorporate native species where possible to enhance local biodiversity and support existing wildlife.

Please see a detailed supporting landscaping report no. D3039-FAB-00-XX-RP-L-0001 document for further information.

3.5 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 and will follow the principles of the waste hierarchy. Targets have been set in relation to volume of construction waste and diversion from landfill, and these can be viewed within the respective Pre-Assessments for each building.

The construction waste generated as part of the development 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.

Appropriate targets and benchmarks will be set in line with best practice requirements.

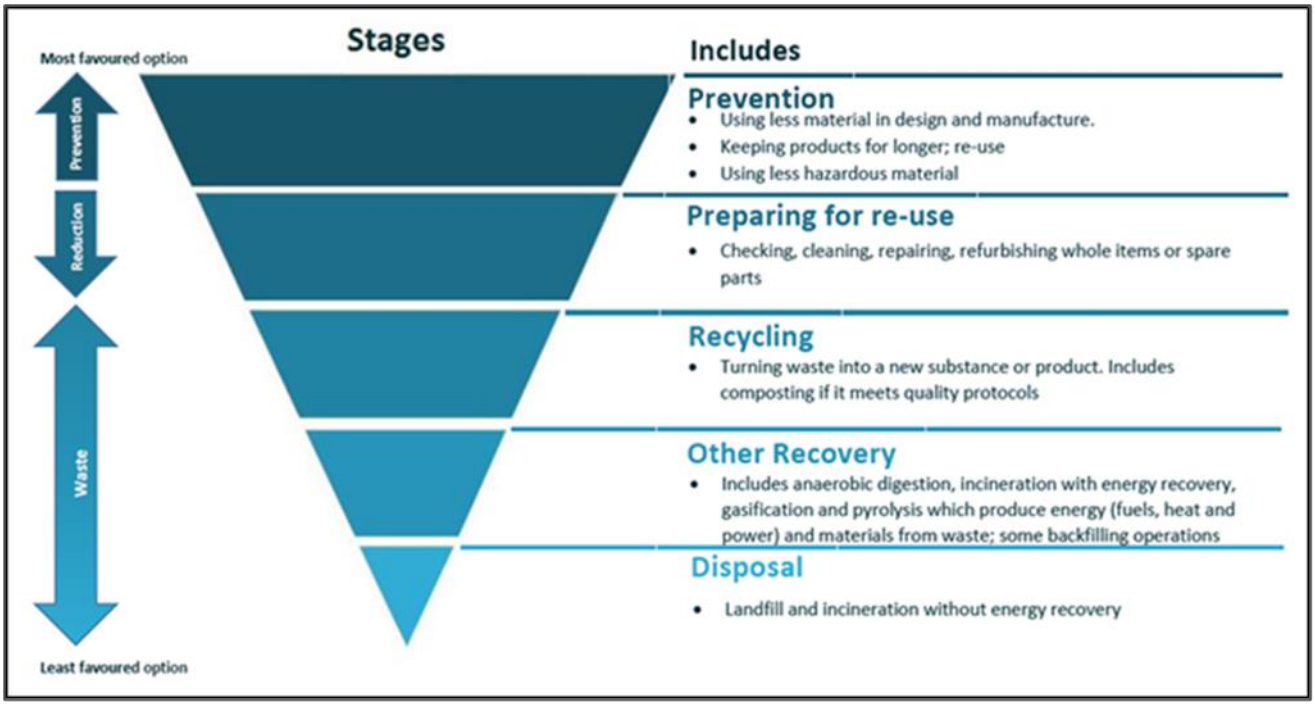


Figure 4 - The waste hierarchy

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.

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.

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 South-East England have been declared areas of 'serious water stress', particularly Greater London and the south coast. 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 the EHDC Local Plan Policy CP26 to standards of a BREEAM 'excellent' building. The specification below gives an example specification which would meet these requirements.

- W/Cs: Dual Flush 4 litres effective flush volume
- Showers: 6 litres/minute flow rate
- Kitchen Taps: 5 litres/minute flow rate
- All Other Taps: 4.5 litres/minute flow rate
- Dishwashers: 12 litres/cycle

3.6 Sustainability Conclusions

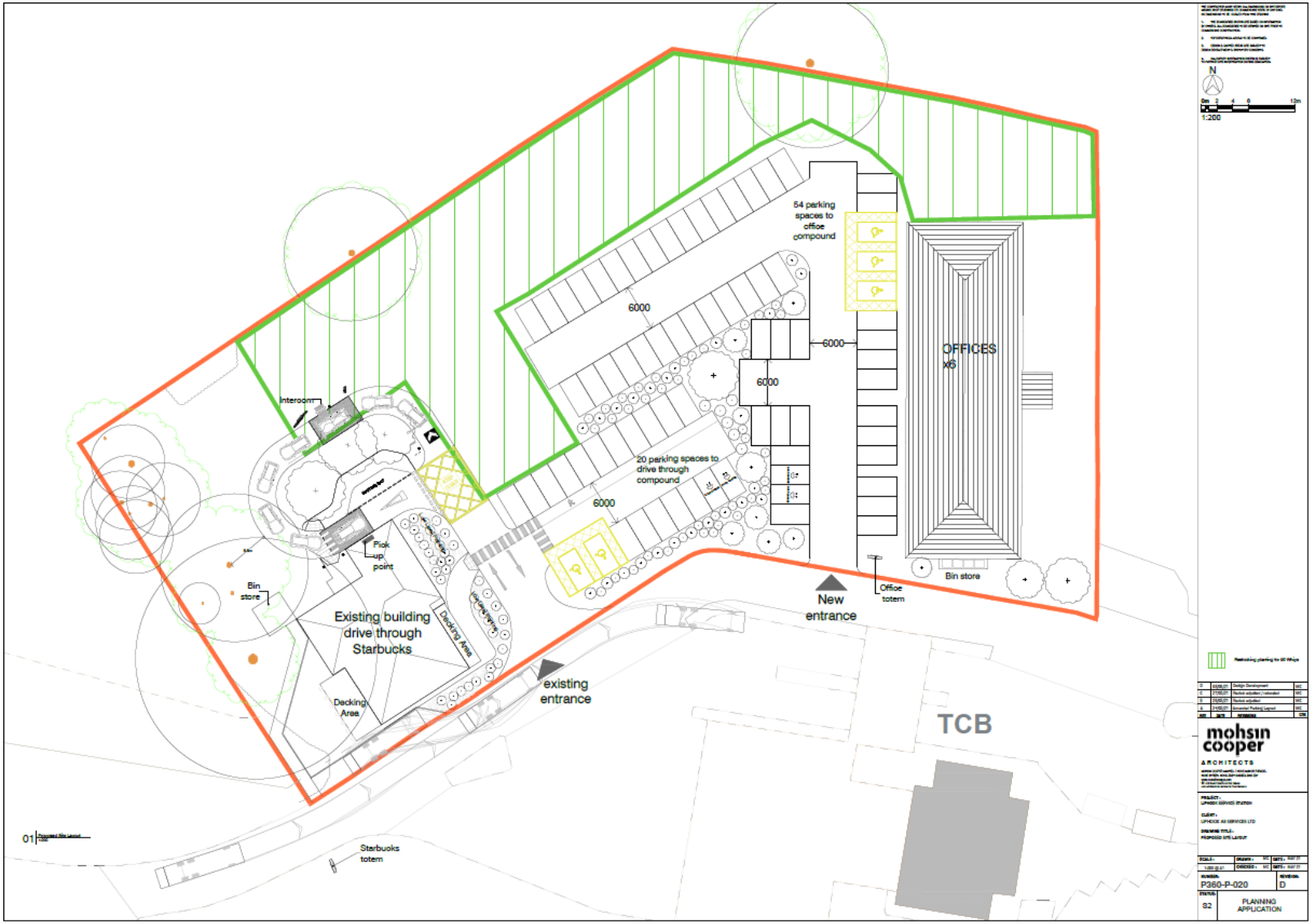
Through a considered approach to sustainability, the Proposed Development is aiming to deliver a highly sustainable development which is within an appropriate area for this use and at an appropriate scale. The Proposed Development will make maximum use of the Application Site, providing 6 no. converted office units in line with the EHDC Local Plan Core Strategy requirements.

The adoption of a sustainable approach to the design and construction has allowed the Proposed Development to provide:

- Development which is suitable for the site with access to public services
- Low internal water use
- Low impact development with minimal noise, light and air pollution
- Consideration of biodiversity on the site within the landscaping design
- Comprehensive site waste management during construction and operation.

Appendices

Appendix A – Site Plan



Appendix B – Specification Summary Sheet (Green scenario with ASHP and PV)

Liphook A3 Services - Conversion of hotel to office										
Building Regulations 2013 L2B										
Building Type	**Address**			**As-Designed/ As-Built Drawings**	**Weather File**	**SBEM Level**	**Asset Rating (A-G) (0-150)**	**BER**	**TER**	**BER/TER Improvement (%)**
Conversion	Liphook A3 Services, North Bound, GU30 7TT			As-Designed	London	5	-	-	-	-
Construction Element	**U-Value**	**Description**								
External Wall - Refurbished	0.30	Internal insulation to existing cavity walls								
Internal Walls - Single Thickness	-	Traditional (Build-up to be confirmed)								
Ground Floor - Reburbished	0.25	Insulation to existing floor (Build ups - TBC)								
Pitched Roof - Refurbished	0.16	Insulation to the ceiling of the existing cold roof (Build ups - TBC)								
Internal Floor	-	Traditional (Build-up to be confirmed)								
Construction Element	**U-Value**	**G Value**	**Frame Factor**	**Light transmittance**	**Description (manufacturer, make and model)**					
External Window - New	3.30	0.50	10%	0.71	Build-ups to be confirmed					
Solid Door	3.30	n/a	n/a	n/a	Build-ups to be confirmed					
Construction Notes	**U-Value**	**G Value**	**Frame Factor**	**Description (manufacturer, make and model)**						
Air-permability	15			-						
Heating and Cooling	**System Details**			**Emitter**	**Leakage Class**	**Leakage Standard**	**Seasonal Efficiency (%)**		**Controls**	
Heating System 1	Air Source Heat Pump - Mitsubishi Ecodan			Radiators	Not tested	Not tested	3.19		Time and Temperature control	
Hot Water	**System Details**			**a) Secondary Circulation**	**a) Circulation Losses (W/m)**	**a) Pump Power (kW)**	**a) Loop Length (m)**	**b) Delivery Efficiency**	**Storage Tank (l)**	**Storage Losses (kWh/l.day)**
Hot Water System	500 Litre tank with 20 mm insulation			-					500	calculated
Ventilation	**System Details**			**SFP (W/l/s)**	**Leakage Class**	**Leakage Standard**	**Heat Recovery**	**Heat Recovery Efficiency (%)**	**Heat Recovery Type**	**Variable HR**
Mechanical Ventilation - Extract	Decentralised Mechanical Extract Ventilation			0.70	Not tested	Not tested	No	-	-	-
Electrical Flow Control	**Description**									
Power Correction Factor	N	-								
Separate Metering	Y	-								
Renewables	**Description**									
PV	55 no of 330W panels									
Solar Water Heating	None									
Wind Turbine	None									
Lighting	**Description**									
Luminous efficacy lm/W - LOR 1.00	100 lm/W									
Lighting Controls	None									
Parasitic Power	n/a									
Sign Off of details	**Name**	Aniruth Raghunathan	**Date**	24.06.2021	**By signing this document, I declare that the aforementioned details are all correct as per the final "as designed" specifications:**	**Name**		**Date**		
						Sign				

Appendix C – Unfeasible Low and Zero Carbon Technologies

Biomass Boiler

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

The use of a biomass boiler system to supply space heating and HW has been deemed unsuitable due to the high level of particulates emitted from their use. The use of such a system would negatively impact the air quality of the surrounding area.

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 HW demand at the Proposed Development it is likely to provide minimal CO_2 emissions reductions, while taking up roof-space, better utilised for photovoltaics.

Ground Source Heat Pump

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

Beyond 1m below ground level, an average temperature of 15^{o}C is maintained throughout the year. Because of the ground's high thermal mass, it stores heat from the sun during the summer. GSHPs can transfer this heat from the ground into a building to provide space heating by a similar process to an air source system.

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 a system is installed – the primary heat source that GSHPs rely on is solar derived, and shading can affect the 're-charge' of the ground within which the ground loop is laid. This can affect year-on-year CoPs, steadily increasing running costs and reducing CO_2 offset.

Although GSHPs can provide a greater efficiency performance than ASHPs, it comes at a significantly higher capital cost, due to the extensive groundworks needed to install either 'slinky' ground loops or 50-100m deep boreholes.

Because of the significantly higher capital costs of installing a GSHP system, it is not considered to be financially viable for the scheme. Alternative additional technologies will be considered for inclusion within the energy strategy at the site.

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