FORT HALSTEAD ENERGY STRATEGY

Merseyside Pension Fund

Fort Halstead

Hybrid Application

18 September 2019

CBRE

CONTENTS

CBRE

Executive Summary

Prepared and edited by:	Stephen Kent Senior Consultant For and on behalf of CBRE Ltd. Building Consultancy	[redacted]	
Approved by:	Howard Vander Borght Director For and on behalf of CBRE Ltd. Building Consultancy	[redacted]	
Date of Issue: 18/09/2019	Fort Halstead	**Status:** 3	**Issue:** Final

1 EXECUTIVE SUMMARY

1.1 OVERVIEW

CBRE have been commissioned to develop the energy strategy for the hybrid planning application at Fort Halstead.

The energy strategy for the development follows a structured approach as outlined below.

- Energy Efficient Design – Adopt passive design, energy efficient building services to reduce energy demand
- Low and/or Zero Carbon Technology Interrogation – Assess the feasibility for decentralised energy and the potential for renewable energy sources

To identify total energy demand and CO_2 emissions for the development, energy modelling in compliance with Building Regulations Part L 2013 was completed on each indicative residential and commercial unit type drawing provided by JTP. The energy demand derived from this assessment was then multiplied by the floor area for each unit type to establish the related CO_2 emissions. The CO_2 emissions for each type were then summed to give the total baseline regulated emissions for the development and at each stage of the energy hierarchy.

Site CO_2 Emissions

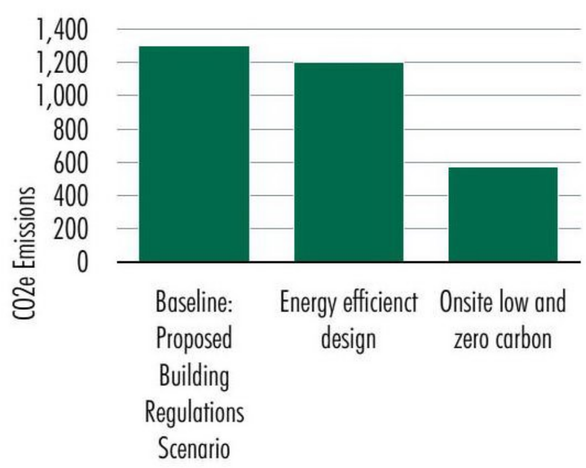
This energy strategy report gives focus to the anticipated significant savings that could be achieved under the proposed building regulations scenario, as these regulations will be in place at the time of delivery.

Therefore, the following energy strategy is proposed.

- It is proposed that the buildings will be designed with high levels of energy efficiency. This is likely to include low fabric and window U-values, low air leakage and thermal bridging. These specifications will ensure that the development achieves a 7% improvement over the proposed building regulations scenario, using the methodology detailed within SAP10.
- Air Source Heat Pumps and 1,120m^2 of solar PV, equating to a 160kWp solar PV system is specified, achieving a 49% improvement over the proposed building regulations scenario.
- Cumulatively, the energy strategy specifications achieve a 56% reduction over the proposed building regulations scenario.

The savings against the proposed building regulations baseline CO_2 emissions are illustrated in Figure 1 below:

Figure 1: Development Carbon Emissions



Note: the carbon emissions for the development, the anticipated carbon savings and the amount of solar PV required to achieve the stated carbon savings, should be subject to a further review as the design progress into the detailed design stages or at future reserved matters applications, to ensure that they reflect the latest design proposals and reflect latest cost/viability calculations.

2 OVERVIEW OF THE PROPOSED DEVELOPMENT

2.1 THE PROPOSED DEVELOPMENT

The hybrid planning permission at Fort Halstead comprising:

In detail:

- Demolition of existing buildings;
- Change of use and works to buildings Q13 and Q14 (including landscaping and public realm);
- Primary and secondary accesses.

In outline:

- Development of business space (use classes B1a/b/c) of up to 27,659 sq m GEA
- Works within the 'X' enclave relating to energetic testing operations, including fencing, access, car parking;
- Development of up to 750 residential dwellings;
- Development of a mixed-use village centre (use classes A1/A3/A4/A5/B1a/D1/D2);
- Development of a one form entry primary school;
- Change of use of Fort Area and bunkers to Historic Interpretation Centre (use class D1) with workshop space;
- Roads, pedestrian and cycle routes, public transport infrastructure, car parking, utilities infrastructure, drainage;
- Landscaping, land forming and ecological mitigation works.

3 ENERGY STRATEGY METHODOLOGY

3.1 RELEVANT NATIONAL PLANNING POLICY AND GUIDANCE

Revised National Planning Policy Framework

In July 2018 the Government published its formal update to the NPPF (2012) with the latest amendments issued in June 2019. In respect of sustainability, the documents retain its focus for the role that the planning system has to play in meeting the challenges presented by climate change. As stated in Paragraph 148:

'The planning system should support the transition to a low carbon future in a changing climate…It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

At Paragraph 150 it continues to state:

'New development should be planned for in ways that: a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.[1]*'*

Building Regulations Part L 2013

Building Regulations Part L 2013 – Conservation of Fuel and Power covers the energy efficiency requirements of the building regulations as set out in Part L of Schedule 1 to the Building Regulations and in a number of specific building regulations. Technical guidance is contained in 4 Part L Approved Documents and 2 building services compliance guides.

Primarily, these regulations set the minimum energy performance for developments and outline the methodologies that must be used to calculate the energy performance for developments to confirm compliance with the regulations.

Furthermore, these regulations set minimum performance values for the building fabric (insulation, air permeability, thermal bridging and glazing) and building services (heating, ventilation, air conditioning and hot water), which all new and existing building/developments undergoing refurbishment must comply with.

Deregulation Act 2015

The Deregulation Act introduced in 2015 from the outcome of the Government's housing standards review, sets out the future for England's housing policy. This includes removing the powers Local Planning Authorities (LPAs) have for setting sustainability requirements such as Code for Sustainable Homes and Lifetime Homes standards.

[1] Ministry of Housing, Communities and Local Government (2018), National Planning Policy Framework. Crown Copyright 2018: Open Government License 2018

ENERGY STRATEGY METHODOLOGY

The National Planning Policy Framework policy for allowing the connection of new housing development to low carbon infrastructure such as district heating networks has not been modified as part of this policy.

Building Regulations C. 2020

The Building Regulations Part L – Conservation of Fuel and Power will be updated in 2020/2021, with the consultation being issued by Q4 2019.

To date the key change in the regulations, relates to the significant decrease in the carbon intensity of electricity supplied equipment, with a 0.28 decrease in its intensity, falling from a carbon factor of 0.51 to 0.23, as opposed to only a 0.006 decrease in the carbon intensity of gas supplied equipment.

Essentially, the fall out of this change, will be that in the near future, gas supplied equipment such as individual combi boilers or a centralised district heating Combined Heat and Power System (CHP) will become less favourable because greater carbon savings could be achieved under an all-electric solution.

3.2 RELEVANT LOCAL PLANNING POLICY AND GUIDANCE

Sevenoaks District Council Adopted Core Strategy 2011

The following adopted Sevenoaks District Council policy requirement in relation to energy and sustainability is in place for the Fort Halstead Hybrid Planning Application.

Sevenoaks District Council Policy SP2 – Sustainable Development

New homes will be required to achieve at least Level 3 of the Code for Sustainable Homes (CSH), progressing to Level 4 from 2013 and will be encouraged to achieve Level 6 by 2016;

All new commercial (A1-A5, B1-2, B8, C1, D1) and institutional (C2, D1) development will be required to achieve BREEAM 'Very Good' standards increasing to 'Excellent' standards from 2013.

Achievement of the Code levels and BREEAM standards must include at least a 10% reduction in the total carbon emissions through the on-site installation and implementation of decentralised, renewable or low carbon energy sources.

Note: as stated in section 3.2, the Deregulation Act has withdrawn the Code for Sustainable Homes, as such the Code for Sustainable Homes targets referenced under policy SP5.2 will not be referred to in this energy strategy report.

Sevenoaks Draft Local Plan December 2018

As a material consideration the Draft Local Plan December 2018 proposes the following policy requirements in relation to energy and sustainability:

Policy CC1 - Climate Change, Flooding and Water Management

Climate Change

We will contribute to reducing the causes and effects of climate change by promoting best practice in sustainable design and construction to improve the energy and water efficiency of all new development. We will support climate change mitigation and adaptation measures, including:

a. Appropriate small-scale community led renewable energy schemes;

b. Small scale renewable and low carbon technologies where appropriate;

c. Reducing the need to travel by sustainably locating new housing and supporting the level of services and facilities;

ENERGY STRATEGY METHODOLOGY

d. Promoting sustainable design measures for new developments including passive solar design;

e. Utilising opportunities for decentralised energy and heating where appropriate; and

f. Protecting existing green spaces, trees and vegetation to absorb carbon dioxide, provide summer shading, retain and create habitats and reduce surface water runoff

g. Resilient drainage design which includes a climate change allowance.

All new non-domestic development (including conversions) must achieve BREEAM "Excellent" standards. Applicants will be expected to provide certification evidence of BREEAM score and rating at the design stage and upon completion of development.

3.3 METHODOLOGY TO THE ENERGY STRATEGY

The energy strategy for the development follows a structured approach as outlined below.

- Energy Efficient Design – Adopt passive design, energy efficient building services to reduce energy demand
- Low and/or Zero Carbon Technology Interrogation – Assess the feasibility for decentralised energy and the potential for renewable energy sources

To identify total energy demand and CO_2 emissions for the development, energy modelling in compliance with Building Regulations Part L 2013 was completed on each indicative residential and commercial unit type drawing provided by JTP. The energy demand derived from this assessment was then multiplied by the floor area for each unit type to establish the related CO_2 emissions. The CO_2 emissions for each type were then summed to give the total baseline regulated emissions for the development and at each stage of the energy hierarchy.

Note: The regulated emissions is the maximum CO_2 emissions allowed by Building Regulation for the following uses: space and water heating, lighting, cooling, pumps, fans and ventilation. For the purposes of this energy strategy the unregulated emissions (those that are not covered by building regulations) associated with cooking, appliances and equipment are not covered under the calculations.

Applicable Building Regulations

All buildings within the development will be assessed under their respective Building Regulations, as outlined in Table 1 below:

Table 1: Applicable Building Regulations

BUILDING TYPE	APPLICABLE BUILDING REGULATIONS PART L	COMMENTARY
New build domestic – outline element of application	Building Regulations Part L1A 2013 – Conservation of fuel and power in new dwellings	All new build domestic buildings will be assessed under Building Regulations Part L1A 2013
New build non-domestic buildings – detailed and outline elements of application	Building Regulations Part L2A – Conservation of fuel and power in new buildings other than dwellings	All new build non-domestic buildings will be assessed under Building Regulations Part L2A 2013
Existing non-domestic buildings - detailed element of application	Building Regulations Part L2B – Conservation of fuel and power in existing buildings other than dwellings	Th existing non-domestic buildings within the village centre (the detailed element of the application) will be assessed under Building Regulations Part L2B.

ENERGY STRATEGY METHODOLOGY

3.4 STRUCTURE OF THE ENERGY STRATEGY

The Energy Strategy has been structured to confirm compliance with the relevant planning and building control policies detailed above.

This should be read in conjunction with the Fort Halstead Hybrid Sustainability Strategy, which has been structured to confirm that sustainable principles have been established at the outset, ensuring that the sustainability requirements can be met throughout subsequent reserved matters applications.

In summary, the structure of the Energy Strategy is as follows:

- Section 4: Energy Efficient Design
- Section 5: Low and/or Zero Carbon Technology Interrogation
- Section 6: Specified Fabric, Building Services and LZC Technologies
- Section 7: Site Carbon Emissions
- Section 8: Conclusions

4 ENERGY EFFICIENT DESIGN

All buildings within the application will be specified to incorporate energy efficient design features that exceed the requirements of Building Regulations Part L by energy efficiency measures alone. This will reduce the overall energy demands from the site and therefore reduce the need for fuel and/or low and zero carbon technologies to meet energy and carbon reduction targets.

New Build Non-Domestic Buildings – Outline & Detailed Elements

As outlined in section 3.3, the new build non-domestic buildings in the outline and detailed elements of the planning application (including the new build atrium), will adopt a strategy that is focused around the specification of passive design features and energy efficient heating, hot water, ventilation and air conditioning systems that will exceed Building Regulations Part L2A, as outlined below:

The energy efficient fabric and u-values that have been specified for the new build non-domestic buildings are outlined in Table 2 below:

Table 2: New Non-domestic Building Fabric Specifications

ELEMENT	PART L2A 2013 MINIMUM U VALUES W/M²K	NEW BUILD NON-DOMESTIC BUILDINGS U VALUES W/M²K
Floors	0.23	0.13
External Walls	0.35	0.18
Roofs	0.25	0.13
Windows	2.00	1.4
Doors	2.00	1.0
Air Permeability (m^3/hm^2 at 50 Pa)	10	5

Energy efficient ventilation services have also been specified, as illustrated in Table 3 below:

In terms of this stage of the energy hierarchy, a gas boiler and direct electricity for cooling has been chosen in order to establish a baseline for improvement at the subsequent stages.

Table 3: New Non-Domestic Building Services Specifications

BUILDING SERVICES	SPECIFICATION
Space Heating & Cooling (for the purposes of energy efficient design only)	Communal boiler for heating and direct electricity cooling
Ventilation	Occupied spaces: On floor ventilation w/heat recovery WC, BOH spaces: Extract Only
Water Heating	Electric instantaneous hot water
Lighting	100 low energy lighting. Automatic lighting and daylight controls to all occupied spaces and corridors. Manual controls to non-occupied BOH spaces.

By specifying these features, the strategy will facilitate the use of natural day lighting, passive solar design and enable energy reduction through design.

Furthermore, these specifications will support the BREEAM Excellent rating, required by policy SP2, achieving 4 credits under Ene 01 – Reduction of Energy Use and Carbon Emissions, complying with the minimum standard for BREEAM Excellent. Full details of the BREEAM pre-assessment targeting BREEAM Excellent can be found in the Fort Halstead Sustainability Strategy, prepared by CBRE.

ENERGY EFFICIENT DESIGN

Existing Non-Domestic Buildings – Detailed Elements

As outlined in section 3.3, the existing Grade II Listed non-domestic buildings in the detailed elements of the planning application, will be assessed under Building Regulations Part L2B. In accordance with the regulations, all building work will be completed as follows:

- The renovation or replacement of thermal elements will be completed so as to ensure that the elements limit heat gains and losses by complying with the minimum fabric values defined in Building Regulations Part L.
- where the works apply to a building that has a total useful floor area of 1,000m^2 and consist of an extension, initial provision of fixed building services or an increase in the installed capacity of fixed building services, consequential improvements will be undertaken to ensure that the building complies with Building Regulations Part L

As stated within Building Regulation Part L2B, these improvements will be completed in so far as that is technically, functionally and economically feasible. Furthermore, in accordance with the regulations the works will be undertaken in line with the special consideration status that is given for historical and traditional buildings, as follows:

- the aim of the building works for the existing Grade II listed buildings will be to improve the energy efficiency as far as reasonably practical without prejudicing the character or increase long term-risk of the building fabric or fittings.
- The existing Grade II listed buildings will be exempt from the energy efficiency requirements for any improvement works that would unacceptably alter the character or appearance of the buildings
- Advice from Historic England and the local conservation officer will be taken into account prior to any works being specified or undertaken.

Taking the above into account and initial correspondence with the appointed heritage consultant, the Grade II listed status of the existing buildings prohibits any energy efficiency improvement works that would alter the external shell/façade of the buildings. As such, the following internal energy efficiency improvements are proposed for the planning application, as detailed in Table 4 below.

Table 4: Existing Non-domestic Buildings Energy Efficiency Improvements – Energy Efficient Stage

BUILDING SERVICES	SPECIFICATION
Internal face of external walls	Internal insulation – note the amount of insulation will be confirmed subject to detailed calculations confirming that this will not be in detriment to the existing building or increase interstitial condensation risk.
Space Heating & Cooling	VRF – Air Source Heat Pump with High COP
Ventilation	Occupied spaces: On floor ventilation w/heat recovery – thermal wheel 73% WC, BOH spaces: Extract Only
Water Heating	Electric instantaneous hot water
Lighting	100 low energy lighting. Automatic lighting and daylight controls to all occupied spaces and corridors. Manual controls to non-occupied BOH spaces.

Note: the proposed energy efficiency improvements will be investigated in more detail as the detailed design phase progresses, in line with BCO, Building Regulation and Historic England / Heritage Consultant advice.

CBRE

ENERGY EFFICIENT DESIGN

New Build Domestic Buildings – Outline Element

As outlined in section 3.3, the new build domestic buildings in the outline element of the planning application will adopt a strategy that is focused around the specification of passive design features and energy efficient heating, hot water and ventilation systems that will exceed Building Regulations Part L1A, as outlined below:

The energy efficient fabric and u-values that have been specified for the new build domestic buildings are outlined in Table 5 below:

Table 5: New Build Domestic Fabric Specifications

ELEMENT	PART L 2013 MINIMUM U VALUES W/M²K	NEW BUILD DOMESTIC U VALUES W/M²K
Floors	0.25	0.13
External Walls	0.30	0.18
Separating Walls to unheated spaces (stairwells)	0.30	0.18
Party Walls	0.20 Unfilled cavities with effective edge sealing at all abutting edges	0.00 Fully filled cavities with effective edge sealing at all abutting edges
Roofs	0.20	0.13
Windows	2.00	1.4 Double glazed, argon filled, low emissivity (0.05), soft coat
Doors	2.00	1.0
Thermal Mass		Medium (250 kJ/m²K)
Thermal Bridging		Masonry Cavity Walls Accredited Construction Details (ACDs)
Air Permeability	10	3
(m³/hm² at 50 Pa)		

Energy efficient ventilation services have also been, as illustrated in Table 6 below:

In terms of this stage of the energy hierarchy only, a gas boiler has been chosen in order to establish a baseline for comparison and improvement at the subsequent stages of the energy hierarchy.

Table 6: New Build Domestic Services Specification – Energy Efficient Stage

BUILDING SERVICES	SPECIFICATION
Boiler	Apartments: Gas fired, modulating, condensing combi boiler with a room sealed flue and fan fuelled – 89% efficiency Houses: Gas fired, modulating, condensing system boiler with a room sealed flue and fan fuelled – 89% efficiency
Water Heating	Apartments: No cylinder – instantaneous combi Houses: 180L Hot water cylinder – 1.5kWh/d loss factor, fully insulated primary pipework
Heating Controls	Apartments: Delayed start thermostat, TRVs Houses: Delayed start thermostat, time and temperature zone controls by suitable arrangement of plumbing and electrical services
Emitters	Radiators
Ventilation	Centralised mechanical ventilation with heat recovery w/ summer override (MVHR)
Lighting	100% low energy lighting

By specifying these features, the strategy will facilitate the use of natural day lighting, passive solar design and enable energy reduction through design.

ENERGY EFFICIENT DESIGN

Overall Energy Efficiency Performance Commentary

In summary, the energy efficient design features specified as part of this hybrid planning application, seek to ensure that best practice design principles are embedded at the outset. Reducing the need to rely on cost intensive big-ticket items such as communal heating/cooling systems and low or zero carbon technology to reduce on-site carbon emissions.

Furthermore, the energy efficient design features have sought to minimise the risk of overheating and the need for mechanical cooling. Overheating in the new build domestic buildings, in particular, has been addressed through the following passive design measures:

- Reduction of internal heat gains by specifying efficient lighting systems;
- High levels of thermal mass achieved through the architectural solution;
- Fully openable windows;
- Specification of performance glazing that achieves the necessary solar control without compromising the natural light entering the space.
- MVHR with summer override.

CBRE

5 LOW AND/OR ZERO CARBON TECHNOLOGY INTERROGATION

5.1 DECENTRALISED ENERGY NETWORKS

In line with Sevenoaks Policy SP2, the potential for supplying energy efficiently via district heating and cooling infrastructure has been investigated, as illustrated below:

Table 7: Summary of Decentralised Energy

SOLUTIONS	FINDINGS
Connection to local existing network	The site is in a location, where there are no existing district heating and cooling networks for the development to connect into.
On site combined heat and power	Combined Cooling Heating and Power (CCHP) has been shown to be economically unfeasible due to the lack of diversity in heat loads on the site and the high thermal performance criteria adopted within the energy efficiency design section. Furthermore, under an updated Building Regulations scenario a gas fired CCHP system will likely become more carbon intensive and operationally it may be costlier to run compared to alternative fuel sources. Therefore, it is considered that a CCHP/CHP system is not suitable for the development.

As indicated in a decentralised energy network is not proposed for the development, there are no existing networks in close proximity and under an updated Building Regulations scenario a gas fired C/CHP system will likely become more carbon intensive and operationally it may be costlier to run compared to alternative fuel sources.

5.2 LOW AND/OR ZERO CARBON ENERGY GENERATION

An initial appraisal of the development has been undertaken to establish the potential low or zero carbon technologies (LZC) for the scheme. This appraisal is to provide direction regarding the most applicable and viable low/zero carbon energy solutions for consideration within the scheme.

This has been appraised on a site-wide and a building by building basis. Table 8 below summarises the findings of the preliminary appraisal:

Table 8: On Site Zero Carbon Energy Technology Appraisal

TECHNOLOGY	COMMENTARY	SPECIFIED
	ONSITE LOW CARBON TECHNOLOGY	
Air Source Heat Pumps	An air source heat pump (ASHP) can extract heat from the air at low temperature. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the air is constantly being renewed naturally Under an updated Building Regulations scenario, as the primary source of energy for ASHP systems is electricity, the technology can result in considerable CO_2 savings compared to conventional gas fired systems. To be considered on a building by building basis.	✓
Biomass	Biomass can considerably enhance the environmental credentials. Biomass fuel is also approximately 20% cheaper than either natural gas or light fuel oil. However, consideration has to be made to fuel supply security, delivery and storage of the fuel. There are also concerns in relation to air quality. This technology is not to be considered.	✗
Ground Source Heat Pumps	Ground Source Heat Pumps can support the main heating demand. However, as this technology consists of extracting heat from the ground via a loop array buried in the ground, greater ground investigations would be needed to identify if ground conditions are suitable. Furthermore, if such a system was to provide heat for the whole development considerable space would be needed for the loop arrays. This technology is not to be considered.	✗
	ONSITE ZERO CARBON ENERGY GENERATION	
Photovoltaics (PV)	Solar PV systems are semiconductor devices that convert sunlight into electricity. PV systems don't require direct sunlight to generate electricity (although greater amounts of electricity are generated as sunlight levels increase). Therefore, energy can still be produced in overcast or cloudy conditions and used successfully.	✓

LOW AND/OR ZERO CARBON TECHNOLOGY INTERROGATION

		PV is the preferred solar technology, in respect to planning policy compliance and carbon reduction purposes. Solar PV can be easily installed across the apartment blocks and non-domestic units, due south at an optimal angle of 30^0. It is proposed that the Solar PV is included in the outline element of the application only, as the detailed element includes the conservation area and is in close proximity of the Scheduled Monument and Grade II listed buildings. To be considered on a building by building basis, subject to conservation and visual assessment.	
Solar Panels	Thermal	Would compete with Solar PV for roof space. Solar thermal is less effective in winter months when sunlight is not so strong, Solar PV systems are more versatile, Solar PV has a longer lifespan. Solar thermal would also compete with the thermal base load that would be served by the ASHP. This technology is not to be considered.	×
Wind turbines		In order to minimise turbulence from the adjacent buildings it is recommended that the turbine should be at least 10m above the tallest building within 100m. Additionally, the implementation on a wide scale necessary to achieve a significant improvement could result in significant nuisance due to flicker and low level noise. It could also lead to vibration issues through the structure. This technology is not to be considered.	×

As indicated in Table 8 building level air source heat pump systems and a solar PV array will be considered for the development.

Solar PV Analysis

Based on a preliminary appraisal, it has been determined that the scheme could indicatively accommodate 1,120m^2 of solar PV spread across the new build domestic and non-domestic buildings, at a due south orientation and a pitch of 30^O. The 1,120m^2 of solar PV, equates to 160kWp of solar PV.

An investigation has been made into incorporating solar PV on the detailed elements of the application. However, as the village centre is in close proximity to the Scheduled Monument and contains a Grade II listed building, where the external shell/façade is listed, it is considered that the technology would have a negative visual impact, unacceptably altering the character of the buildings and area.

Therefore, as the constraints posed by the Scheduled Monument and the Grade II listed status limit the prospect of renewable technology being incorporated into the design for the detailed element of the hybrid planning application, the energy strategy is proposing to include a commitment within the Fort Halstead Sustainability Framework to investigate the 10% reduction in total carbon emissions through on-site energy generation at future reserved matter applications.

By doing so, the framework is being mindful of the heritage constraints for the detailed elements of the application and ensuring flexibility within the wider masterplan. Allowing future reserved matters applications to embed best practice design measures and comply with the latest national and local Sevenoaks planning policy that is in place at the time the reserved matters application is submitted.

6 SPECIFIED FABRIC, BUILDING SERVICES AND LZC TECHNOLOGIES

In summary, based on the above analysis in section 5, the following features are specified for new building domestic and non-domestic buildings for the Fort Halstead hybrid planning application:

Table 9: New Build Domestic Fabric Specifications

ELEMENT	PART L 2013 MINIMUM U VALUES W/M²K	NEW BUILD DOMESTIC U VALUES W/M²K
Floors	0.25	0.13
External Walls	0.30	0.18
Separating Walls to unheated spaces (stairwells)	0.30	0.18
Party Walls	0.20 Unfilled cavities with effective edge sealing at all abutting edges	0.00 Fully filled cavities with effective edge sealing at all abutting edges
Roofs	0.20	0.13
Windows	2.00	1.4 Double glazed, argon filled, low emissivity (0.05), soft coat
Doors	2.00	1.0
Thermal Mass		Medium (250 kJ/m²K)
Thermal Bridging		Masonry Cavity Walls Accredited Construction Details (ACDs)
Air Permeability (m³/hm² at 50 Pa)	10	3

Table 10: New Build Domestic Services Specification

BUILDING SERVICES	SPECIFICATION
Heating System	Air Source Heat Pump with High COP
Water Heating	Apartments: 210l Hot water cylinder – 1.5kWh/d loss factor, fully insulated primary pipework Houses: 500L Hot water cylinder – 1.5kWh/d loss factor, fully insulated primary pipework
Heating Controls	Apartments & houses: Delayed start thermostat, time and temperature zone controls by suitable arrangement of plumbing and electrical services
Emitters	Underfloor heating
Ventilation	Centralised mechanical ventilation with heat recovery w/ summer override (MVHR)
Lighting	100% low energy lighting

Table 11: New Build Non-Domestic Fabric Specifications

ELEMENT	PART L2A 2013 MINIMUM U VALUES W/M²K	NEW BUILD NON-DOMESTIC BUILDINGS U VALUES W/M²K
Floors	0.23	0.13
External Walls	0.35	0.18
Roofs	0.25	0.13
Windows	2.00	1.4
Doors	2.00	1.0
Air Permeability (m³/hm² at 50 Pa)	10	5

Specified Fabric, Building Services and LZC Technologies

Table 12: New Build Non-Domestic Services Specification

BUILDING SERVICES	SPECIFICATION
Space Heating & Cooling	Air Source Heat Pump with high COP
Ventilation	Occupied spaces: On floor ventilation w/heat recovery WC, BOH spaces: Extract Only
Water Heating	Electric instantaneous hot water
Lighting	100 low energy lighting. Automatic lighting and daylight controls to all occupied spaces and corridors. Manual controls to non-occupied BOH spaces.

Table 13: Renewable Technology

RENEWABLE TECHNOLOGY	SPECIFICATION
160kWp of Solar PV (1,120m^2)	Spread across new build domestic and non-domestic units, within outline element of application

CBRE

7 SITE CARBON EMISSIONS

This section outlines the carbon emission savings that have been achieved from the energy efficient design features detailed within section 4 and the low and or zero carbon technologies detailed within section 5, over the current regulated Building Regulations Part L 2013 baseline

Furthermore, as the scheme will have a long phase of delivery, the anticipated savings that could be achieved under an amended building regulations scenario are also illustrated, as it is likely that these regulations will be in place at the time of delivery.

7.1 SITE CARBON EMISSION SAVINGS OVER CURRENT BUILDING REGULATIONS PART L 2013

Regulated Baseline CO_2 Emissions – Part L 2013

Under the current Building Regulations Part L 2013, the regulated baseline emissions for the site are illustrated in Table 14 below.

Table 14: Baseline CO_2 Emissions – Part L 2013

DEVELOPMENT	REGULATED BASELINE CO_2 EMISSIONS (TONNES CO_2/YR)
Fort Halstead	1,438

Through the specification of the energy efficiency design features detailed in section 4 and the specification of building level ASHP systems and a solar PV array detailed in section 5, the following savings are made over the baseline detailed in Table 14

Energy Efficient Design CO_2 Emissions – Part L 2013

The impact of the energy efficient design features, outlined in section 4 above, upon the baseline regulated CO_2 emissions for the development is illustrated in Table 15 below:

Table 15: Be Lean Regulated CO_2 Emissions – Part L 2013

DEVELOPMENT	REGULATED BASELINE CO_2 EMISSIONS (TONNES CO_2/YR)	ENERGY EFFICIENT DESIGN CO_2 EMISSIONS (TONNES CO_2/YR)
Fort Halstead	1,438	1,381
% Improvement over baseline		4%

As indicated in Table 15 above, the energy efficient design features achieve a 4% improvement over the current Building Regulations Part L 2013 regulated baseline.

Onsite Low and Zero Carbon Energy Generation CO_2 Emissions – Part L 2013

The impact of the incorporation of the onsite low and zero carbon technologies detailed in section 5 upon the baseline regulated CO_2 emissions for the development is illustrated in Table 16 below:

Table 16: Onsite Zero Carbon CO_2 Emissions – Part L 2013

DEVELOPMENT	REGULATED BASELINE CO_2 EMISSIONS (TONNES CO_2/YR)	ONSITE ZERO CARBON CO_2 EMISSIONS (TONNES CO_2/YR)
Fort Halstead	1,438	1,269
% Improvement over baseline		8%

As indicated in Table 16 above, the incorporation of low and zero carbon technologies achieve an 8% improvement over the current Building Regulations Part L 2013 regulated baseline.

Cumulative CO_2 Savings – Part L 2013

Cumulatively, the energy efficient design features and the incorporation of low and zero carbon technologies achieve a 12% improvement over the

SITE CARBON EMISSIONS

current Building Regulations Part L 2013 regulated baseline, as illustrated in Table 17 below:

Table 17: Cumulative Savings - Part L 2013

	REGULATED CO_2 SAVINGS	
	TONNES CO2/YR	%
Savings from energy efficiency	57	4
Savings from low and zero carbon	112	8
Cumulative onsite Savings	**169**	**12**

7.2 ANTICIPATED SITE CARBON EMISSIONS SAVINGS UNDER A PROPOSED BUILDING REGULATIONS SCENARIO

Due to the proposed change in the carbon factor of electricity, whereby the carbon factor of electricity will be reduced to 0.23, the anticipated savings from the specifications detailed in sections 4 and 5 are considerably greater than those achieved under the current building regulations, as follows:

Energy Efficient Design CO_2 Emissions – Proposed Building Regulations Scenario

The energy efficient design features achieve a 7% improvement over baseline regulated CO_2 emissions, as opposed to a 4% improvement under the current Building Regulations Part L 2013, as illustrated in Table 18 below:

Table 18: Energy Efficient Design Features Proposed Building Regulation Scenario

	PROPOSED BUILDING REGULATIONS SCENARIO REGULATED CO_2 SAVINGS	
	TONNES CO2/YR	%
Savings from energy efficiency	97	7
Improvement Over Current Building Regulations Part L 2013		**3**

Onsite Low and Zero Carbon Energy Generation CO_2 Emissions – Proposed Building Regulations Scenario

The specification of building level ASHP systems and a 160kWP solar PV array achieves a 49% improvement over baseline regulated CO_2 emissions, as opposed to an 8% improvement under the current Building Regulations Part L 2013, as illustrated in Table 19 below.

Table 19: Onsite Zero Carbon CO2 Emissions – Proposed Building Regulations Scenario

	PROPOSED BUILDING REGULATIONS SCENARIO REGULATED CO_2 SAVINGS	
	TONNES CO2/YR	%
Savings from onsite low and zero carbon	632	49
Improvement Over Current Building Regulations Part L 2013		**41**

Cumulative CO_2 Savings – Proposed Building Regulations Scenario

Cumulatively, the energy efficient design features and the low and zero carbon technology features, achieve a 56% improvement over baseline

SITE CARBON EMISSIONS

regulated CO_2 emissions, as opposed to a 12% improvement under the current Building Regulations Part L 2013, as illustrated in Table 20 below:

Table 20: Cumulative Savings - Proposed Building Regulations Scenario

	PROPOSED BUILDING REGULATIONS SCENARIO REGULATED CO_2 SAVINGS	
	TONNES CO_2/YR	%
Savings from energy efficiency	97	7
Savings from low and zero carbon	632	49
Cumulative onsite Savings	**728**	**56**
Improvement Over Current Building Regulations Part L 2013		**44**

CBRE

8 CONCLUSION

In summary, whilst the carbon savings under the current Building Regulations scenario are conservative, as this is predominantly an outline application with a long phase of delivery, this energy strategy report gives focus to the anticipated significant savings that could be achieved under the proposed building regulations scenario, using the SAP10 methodology, as these regulations will be in place at the time of delivery.

Therefore, the following energy strategy is proposed.

- It is proposed that the buildings will be designed with high levels of energy efficiency. This is likely to include low fabric and window U-values, low air leakage and thermal bridging. These specifications will ensure that the development achieves a 7% improvement over a proposed regulated building regulations scenario.
- Decentralised energy measures have not been proposed because the site is not within an area where a district heat network exists and CHP has been shown to be economically unfeasible due to the lack of diversity in heat loads on the site and the high thermal performance criteria adopted.
- Air Source Heat Pumps and 1,120m^2 of solar PV, equating to a 160kWp solar PV system is specified, achieving a 49% improvement over a proposed regulated building regulations scenario.
- Cumulatively, the energy strategy specifications achieve a 56% reduction over a proposed regulated building regulations scenario, as illustrated in Table 21 below.

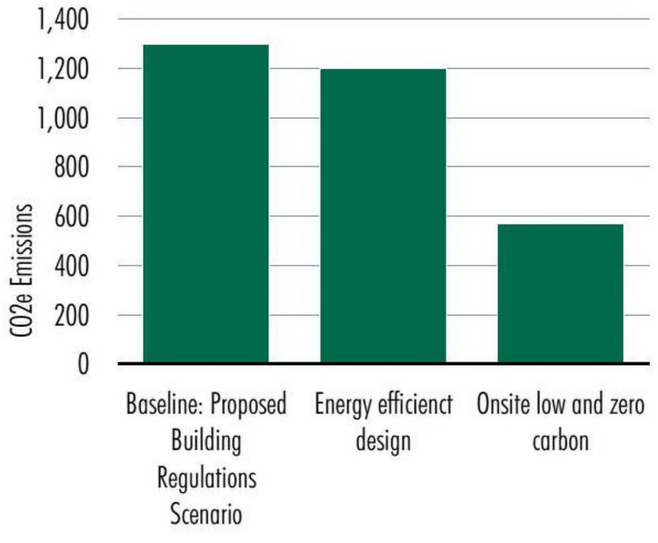
Table 21: Cumulative Savings - Proposed Building Regulations Scenario

	PROPOSED BUILDING REGULATIONS SCENARIO REGULATED CO_2 SAVINGS	
	TONNES CO_2/YR	%
Savings from energy efficiency	97	7
Savings from low and zero carbon	632	49
Cumulative onsite Savings	**728**	**56**

The new build non-domestic buildings are specified to achieve 4 credits under Ene 01 – Reduction of Energy Use and Carbon Emissions, complying with the minimum standard for BREEAM Excellent.

The savings against the proposed building regulations scenario are illustrated in Figure 2 below:

Figure 2: Development Carbon Emissions



CONCLUSION

Note: the carbon emissions for the development, the anticipated carbon savings and the amount of solar PV required to achieve the stated carbon savings, should be subject to a further review as the design progress into the detailed design stages or at future reserved matters applications, to ensure that they reflect the latest design proposals and reflect latest cost/viability calculations.

Total Carbon Emissions (Regulated and Unregulated Emissions)

Whilst it is acknowledged that current Sevenoaks District Council Policy SP2, requires developments to incorporate renewable technologies to achieve a 10% reduction in total carbon emissions, it is noted that the proposed Sevenoaks Draft Local Plan, Policy CC1 does not refer to a carbon reduction target or an onsite energy generation target.

In relation to the detailed component of the application, the Grade II listed building limits renewable technology being incorporated into the design for the detailed element of the hybrid planning application. The energy strategy proposes to include a commitment within the Fort Halstead Sustainability Framework to investigate the 10% reduction in total carbon emissions through on-site energy generation at future reserved matter applications.

By doing so, the framework is being mindful of the heritage constraints for the detailed elements of the application and ensuring flexibility within the wider masterplan. Allowing future reserved matters applications to embed best practice design measures and comply with the latest national and local Sevenoaks planning policy that is in place at the time the reserved matters application is submitted.