

Energy Statement



Information for:

Planning Energy Statement



Presented to:

Canmoor

Downley Road, Havant

4-Jul-24



0121 214 8998



Engineering Services Consultancy Ltd
Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW



www.escuk.com

Contents

Record of issue.....	3
Executive Summary.....	4
Introduction	5
Proposed Development	6
Policy and Legislation.....	7
National	7
Local	9
Development Objectives.....	10
Energy Objectives.....	11
Low & Zero Carbon Technology Study	12
Available Technologies	12
Appropriate Technologies	18
Excluded Technologies	19
Implementation.....	20
Local Planning Requirements	20
Building Regulations.....	21
Compliance & Calculation Process.....	22
Building Envelope and M&E Engineering Services Performance.....	22
Compliance with Energy & CO ₂ Emissions.....	25
Building Regulations Criterion 1	25
Building Regulations Criterion 2	26
Building Regulations Criterion 3	26
Summary.....	27
Conclusion.....	28
Appendix A – Unit 1.....	29
Building Regulations UK Part L (BRUKL) ‘As Designed’	29
Appendix B – Unit 2.....	35
Building Regulations UK Part L (BRUKL) ‘As Designed’	35
Appendix C – Unit 3.....	40
Building Regulations UK Part L (BRUKL) ‘As Designed’	40

Record of issue

Our project reference: **ESC2100**

Document reference number: **2144-ESC-00-ZZ-RP-Z-0016**

Document type: **Energy Statement**

Document Name: **Planning Energy Statement**

Project name: **Downley Road, Havant**

Client name: **Canmoor**

Rev	Date	Issued By	Checked By
T1	10 July 2024	Ruairi Devlin	James Tickle

Executive Summary

The Energy Statement supports the full planning application for the construction of three industrial units with associated office space at Downley Road, Havant.

Assessment was required to assess the buildings' compliance with Building Regulations L2 and The Havant Borough Council Planning Policies.

The policies set out several ways in which development should be designed and constructed from an energy and sustainability point of view.

The current proposal incorporates passive thermal measures, efficient system design and Photovoltaics to achieve the above requirements.

The results are as follows:

- ASHP & PV will be utilised to achieve on site generation to comply with planning policies.
- The PV is sized to offset 20% of energy demand.
- The Units achieve a **pass** Building Regulation's Part L2A criterion 1, 2 and 3 requirements.
- The Units achieve an EPC rating of '**A**' using an assumed level of fit out at 'As-Designed' stage.

Regulation And Compliance Clarifications

All L2 computer calculations were undertaken using software programme IES Virtual Environment, which is a Dynamic Simulation Model (DSM) too accredited by the Department of Communities and Local Government for the generation of BRUKL calculations and Energy Performance Certificates.

This report has been produced by Ruairi Devlin, of Engineering Services Consultancy Ltd. The report has been reviewed by James Tickle who is a certified Low Carbon Consultant (Ref 156991).

Introduction

Engineering Services Consultancy Ltd have been commissioned by Canmoor to undertake a Feasibility Study and to produce a report in compliance with the Planning Regulations requirements 2021 for the new development know as Downley Road, Havant

Sustainable development has been defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability requires the balance and integration of economic, environmental, and social issues.

Through sustainable development, we should be able to make our lives today better without resulting in negative consequences for the future population. The world is currently experiencing a number of global megatrends which pose both risks and opportunities. Sustainable development aims to manage these risks and maximise the opportunities.

In the UK there are a number of sustainability issues which have driven current policy and legislation including:

- Climate change;
- Ecosystem decline;
- Energy and fuel consumption;
- Material and resource scarcity;
- Pollution;
- Population growth;
- Urbanisation;
- Water scarcity.

The proposed development aims to mitigate any negative impacts it might have on the environment, economy and society and minimise and consequential risks whilst maximising efficiencies and opportunities to deliver an intrinsically sustainable building.

Proposed Development

The proposed development will be comprised of three industrial units with associated office space, hard landscaping, carparking and service yards.

Unit 1 has a total GIA of 27,395ft². There are two dock doors, 40 car parking spaces (including two accessible bays) and 20 cycle parking spaces.

Unit 2 has a total GIA of 35,535ft². There are three dock doors, 45 car parking spaces (including two accessible bays) and 20 cycle parking spaces.

Unit 3 has a total GIA of 38,500ft². There are three dock doors, 51 car parking spaces (including two accessible bays) and 20 cycle parking spaces.

This report is for the sole use of Canmoor. It is confidential to Canmoor and their authorised professional advisers. Engineering Services Consultancy Ltd accepts no responsibility to any parties other than the Client. No other party may place any reliance whatsoever on this report and no part of the report or reference to it may be used in any way without express written approval from Engineering Services Consultancy Ltd.



Figure 1 - Proposed site plan

Policy and Legislation

National

National Planning Policy Framework

The National Planning Policy Framework (NPPF) was introduced in March 2012 and was revised on 20th December 2023. The NPPF sets out the Government's planning policies for England and how these are to be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. The framework must be considered when granting planning permission for any new development.

The purpose of the planning system and the NPPS is to help achieve sustainable development by meeting the needs of the present without compromising the ability of future generations to meet their own needs. The NPPF divides sustainable development into three objectives which are both independent and mutually supportive:

- Economic
- Social
- Environmental

These objectives should be delivered through the application and implementation of the NPPF policies. The NPPF aims to drive sustainable development and has been established based on a presumption in favour of a sustainable development.

Climate Change Act 2008

The Climate Change Act 2008 was published on 26th November 2008 to:

- Set a target for the reduction of greenhouse gas emissions by 2050.
- Provide a system of carbon budgeting.
- Establish a Committee on Climate Change.
- Establish trading schemes to limit greenhouse gas emissions and encourage activities to reduce or remove greenhouse gases from the atmosphere.
- Reduce domestic waste and encourage recycling.

The Act outlines a target to reduce net UK carbon account by at least 80% by 2050, over the 1990 baseline.

Town and Country Planning Act 1990

The Town and Country Planning Act was published on 24th May 1990 and consolidates several elements relating to town and country planning.

Energy Act 2021

The Energy Act received Royal Assent on 18th December 2021 and makes provision to:

- Set a decarbonisation target.

- Review the electricity market and encourage low carbon electricity generation or secure supply.
- Establish the Office of Nuclear Regulation.
- Protect the government pipeline and storage system'
- Ensure domestic supplies of gas and electricity and regulation for consumers.
- Establish energy licencing categories.
- Establish principles for offshore transmission of electricity during a commissioning period.
- Review the integration of smoke and carbon monoxide alarms.

Planning and Energy Act 2008

The Act was adopted on 13th November 2008 and enables local planning authorities to set requirements for energy use and energy efficiency in local plans.

Building Regulations

The Building Regulations set out statutory standards developments are to meet. These standards cover measures including energy efficiency, water efficiency, sanitation, fire safety, sound resistance and ventilation.

Part L of the Building Regulations relates to the conservation of fuel and power. Part L covers energy efficiency and sets out the maximum carbon dioxide occupied buildings are to emit. The current 2021 edition came into effect on 7th June 2021.

Local

The Havant Borough Core Strategy (2011)

Adopted in (2011), the Core Strategy sets out the planning framework until 2026. It sets out policies against which individual planning policies will be assessed.

The policies relevant to energy and pertinent to the proposed development are detailed below.

Policy CS14 Efficient Use of Resources

This policy seeks to ensure sustainable construction and high-quality design. Permission will be granted for developments that:

- Provide adequate land or funding for waste management infrastructure. Contribute to the delivery of renewable energy.
- Major developments must ensure that their onsite renewable energy production and resource efficiency is maximised.
- A post completion BREEAM rating of 'very good' is required.

Policy CS16 High Quality Design

Developments will be permitted if they are designed to a high standard, creating places where people want to live, work and relax. Developments must demonstrate that they:

- Identify and respond positively to existing features of natural, historic or local character
- Integrate with existing local landscape features, promote wildlife and biodiversity
- Connect and integrate existing pedestrian and cycle routes and encourage people to use public transport
- Does not cause unacceptable harm to the amenity of neighbours through smell, loss of privacy, outlook, noise and overlooking.
- Building layout reduces opportunities for crime and antisocial behaviour
- Inclusive, considering the needs of those with disabilities, ensuring safe and convenient access for all.
- Mitigates negative environmental impacts through sustainable design and construction methods, resource efficiencies – particularly water and the provision of facilities for waste recycling
- Adapts to the changing needs of the users and the changing climate over the lifespan of the building

Havant Borough Local Plan 2036

The Havant Borough Local Plan 2036 was withdrawn following advice from an independent inspector.

The 'Building a Better Future Plan' (Emerging)

Following the withdrawal of the Havant Borough Local Plan 2036, the Council is working on a new Local Plan to replace the Core Strategy and Allocations Plan.

Development Objectives

Climate change is perhaps the most significant global sustainability issue as it directly impacts all others. Variability in the climate system occurs naturally, however human activity since pre-industrial times has accelerated change.

There has been an unequivocal warming on the global climate system with unprecedented temperature rises since the mid-1950s. Both the atmosphere and oceans have warmed resulting in:

- Rise in the global mean sea level.
- Ocean acidification.
- Altered precipitation levels - wet areas becoming wetter and dry areas becoming drier.
- Increased extremity and frequency of weather and multi-hazard events.
- Changes to ocean salinity.
- Significant ice loss from glaciers, ice sheets and sea ice.
- Reduced snowfall and snow cover.
- Increased permafrost temperatures.

More than half of the observed increase in global average surface temperature from 1951 to 2010 has been caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic influence, largely caused by fossil fuel combustion.

In the UK, communities are becoming increasingly vulnerable to climate change which has resulted in a drive for sustainable development. Having reviewed the policies and consequently established the targets to achieve a sustainable development, the following objectives have been established:

- Meet the challenges of climate change.
- Prevent and minimise pollution.
- Reduce energy use and greenhouse emissions.
- Supporting the use and development of low carbon technologies.

Energy Objectives

Driven by increased urbanisation, globalisation and population growth, demand for energy and fuel continues to rise. However, increased global awareness of the detrimental environmental impact of fossil fuels, combined with rising energy costs is driving the need for alternative fuel sources. Ones that do not release greenhouse gases into the earth's atmosphere.

Fossil Fuels are not only one of the major global sources of greenhouse gases but are also finite sources of energy. There has been an increase in demand for renewable energy sources and more efficient technologies following recognition of the need to drive down energy use.

Reduce Energy Demand

In line with policies CS14 and CS16 the building has been designed to promote efficiency. The Proposed Development is designed with an enhanced building fabric so that the building's thermal performance is improved. Improved u-values and a low air permeability result in fewer heat and air losses and a reduced need for heating and cooling thereby reducing energy use.

Reduce Energy Use

In line with policies CS14 and CS16 efficiency has been integrated throughout the buildings design. Energy usage will be reduced through the specification of energy efficient equipment, including LED lighting, efficient heating and cooling systems and automatic controls. The end user will be encouraged to use efficient equipment including energy labelled white goods and office equipment.

Use Renewable or Low Carbon Technologies

As per policy CS14, where feasible, low or zero carbon technologies will be utilised. The development will be provided with photovoltaic panels ensuring that 20% of the scheme's energy will be renewable. The Proposed Development is designed to provide heating and cooling in the office areas via a VRF system which is classified as an air source heat pump and is therefore intrinsically low carbon.

EPC Rating

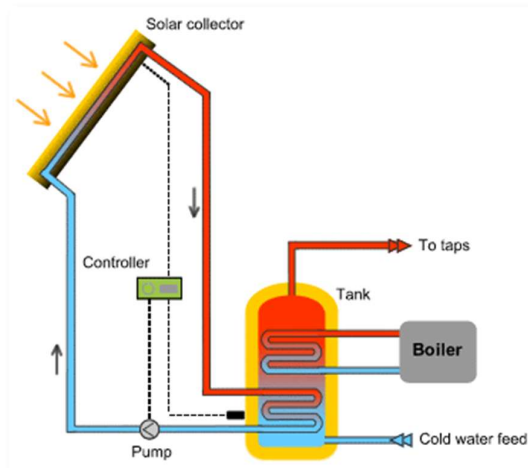
The Proposed Development will demonstrate energy efficiency by achieving an EPC rating of 'A', that shall comply with and better the standards established in current Building Regulations.

Low & Zero Carbon Technology Study

Available Technologies

Solar Hot Water

Solar water heating systems use energy from the sun to heat water. A fluid within the wall/roof mounted panel is heated by the sun. The fluid is then used to heat water. There are two types of collectors available: Flat plate & Evacuated tube



Advantages

Government Renewable Heat Incentive payments.

Relies on a natural source (the sun).

Low maintenance.

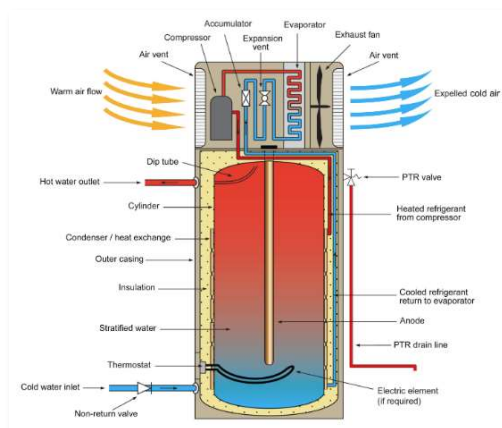
Disadvantages

Panels ideally need to face South and at an incline of 30° to the horizontal.

The system must be unshaded.

Integrated Heat Pump Hot Water Cylinder

The hot water cylinder has a heat pump, which sits on top of the cylinder, this then generates the hot water by using a refrigeration system which uses less electricity than an immersion system.



Advantages

No Gas required

More efficient

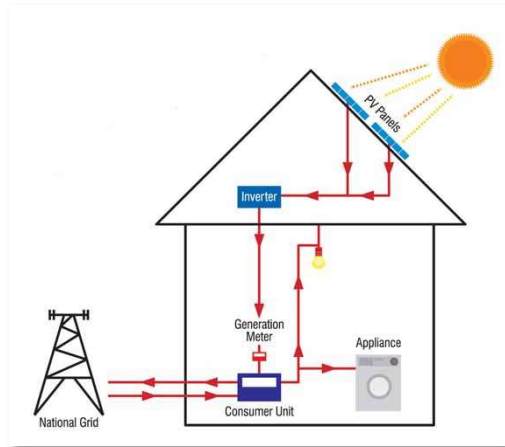
Disadvantages

Cylinder becomes larger

Need two connections to outside

Photovoltaics (PV)

Photovoltaic (PV) systems convert energy from the sun into electricity through semi-conductor cells, connected together in mounted modules.



Advantages

Panels can be incorporated into the building
Feed in Tariff payments.

Relies on a natural source (the sun).

Low maintenance. Silent in operation. No emissions.

Disadvantages

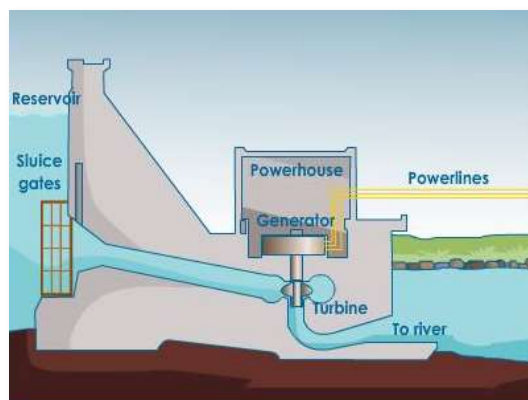
PV panels ideally need to face South and at an incline of 30° to the horizontal.

The system must be unshaded.

Amount of energy generated is dependent upon the daylight availability.

Hydro Power

Hydro power is the process of using river water to generate electricity. Water is used to drive a turbine to generate electricity.



Advantages

Government Feed in Tariff payments.

Surplus energy can be sold to the grid.

Low running and maintenance costs.

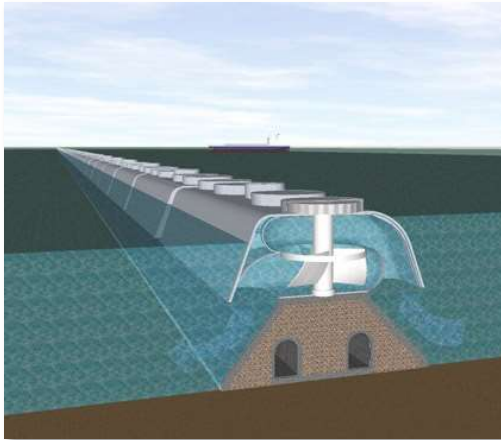
Disadvantages

Installation is expensive.

Very site specific – need an adequate water supply all year round.

Tidal & Wave Power

Tidal/wave power is the process of using tidal waves to generate electricity. Water is used to drive a turbine to generate electricity.



Advantages

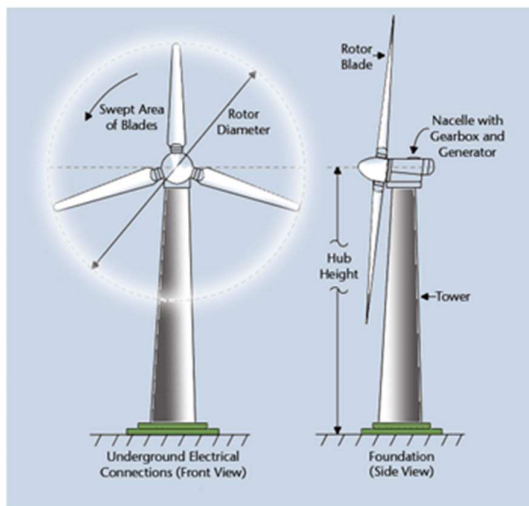
- Government Feed in Tariff payments.
- Surplus energy can be sold to the grid.
- Low running and maintenance costs.
- The tide moves a huge amount of water each day and has the potential to produce a lot of energy.

Disadvantages

- Installation is expensive.
- Very site specific – requires a tidal location

Wind Turbines

Wind turbines harness the power of the wind to generate electricity through a vertical or horizontal axis propeller which harnesses the kinetic energy in wind and converts it to electrical power through a generator. Requires an average wind speed greater than 5m/s according to CIBSE TM 38. (Refer to <https://www.rensmart.com/Maps> to find the average wind speed for the site.)



Advantages

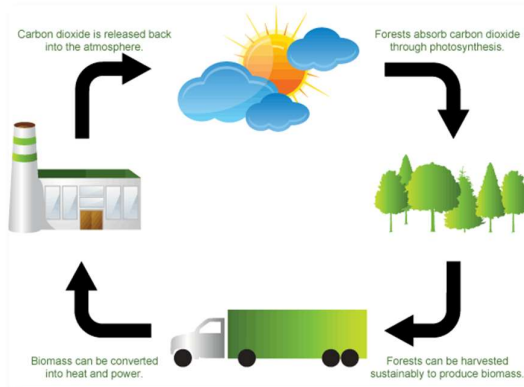
- Wind is free.
- Surplus energy can be sold to the grid.
- Extremely beneficial in exposed or coastal sites.

Disadvantages

- Highly dependent on the speed of the wind at the site of the turbine.
- Wind speed is dependent upon location within the UK and nearby obstructions.
- Very visible. High noise levels.
- Creates a flickering shadow.

Biomass

Wood is burned to provide heat to either a single room, a central heating system or to heat water.



Advantages

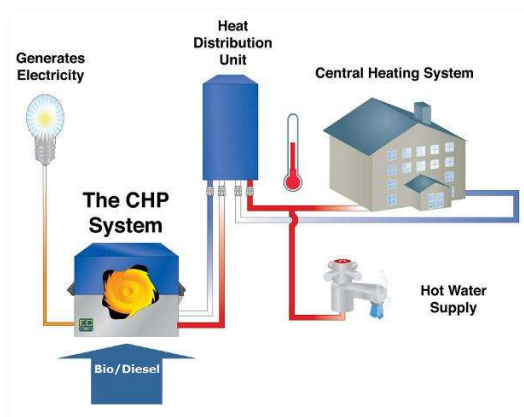
May be eligible for Renewable Heat Incentives.
Affordable fuel.

Disadvantages

Wood is renewable but trees take a longer time to grow than to burn.
CO₂ emitted when wood is burned.
Requires regular deliveries of wood pellets.
The chimney must be carefully considered as it is generally significantly taller than the building.

Combined Heat and Power (CHP)

A CHP system generates heat and electricity simultaneously through an internal combustion engine that drives an electrical alternator.



Advantages

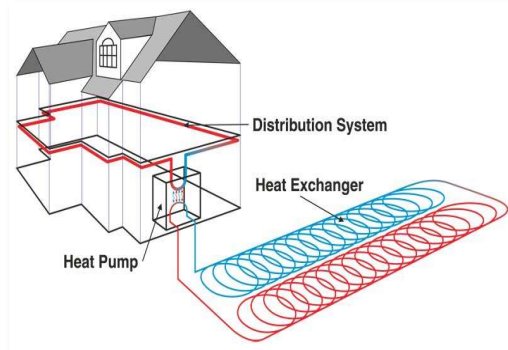
Electricity generated as a by-product of heat.
Can burn a variety of fuels, such as natural gas, diesel oil, or biofuels such as bioethanol.
Feed in Tariff payments.
Easy installation.
Cheap maintenance costs.

Disadvantages

Typically powered by mains gas or LPG.

Ground Source Heat Pumps

Ground source heat pumps extract heat from the ground via pipes buried in the ground. The pipes contain a fluid which is heated, this heat can then be used for heating or hot water.



Advantages

Government Renewable Heat Incentive payments.

Can be used throughout the entire year as the ground remains at a consistent temperature.

Disadvantages

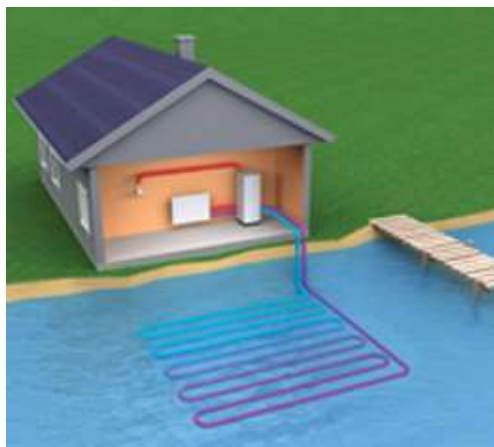
The ground must be suitable for digging a trench or boreholes.

Require regular maintenance.

Initial installation can be expensive.

Water Source Heat Pumps

Water source heat pumps absorb heat from a water source which can then be used for heating or hot water.



Advantages

Government Renewable Heat Incentive payments.

High rate of heat transfer.

Disadvantages

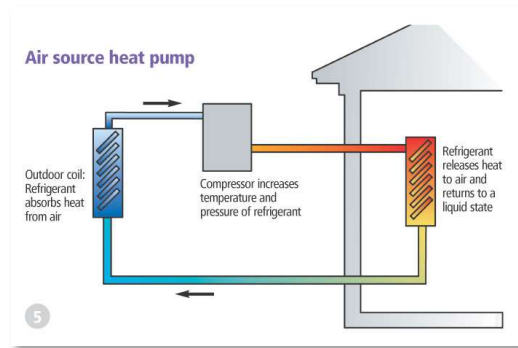
Require regular maintenance.

The ground must be suitable for digging a trench or boreholes.

Site specific as it requires an adequate water source.

Air Source Heat Pumps

Air source heat pumps absorb heat from the outside air which can then be used for heating or hot water.



Advantages

Government Renewable Heat Incentive payments.

Relatively low capital costs.

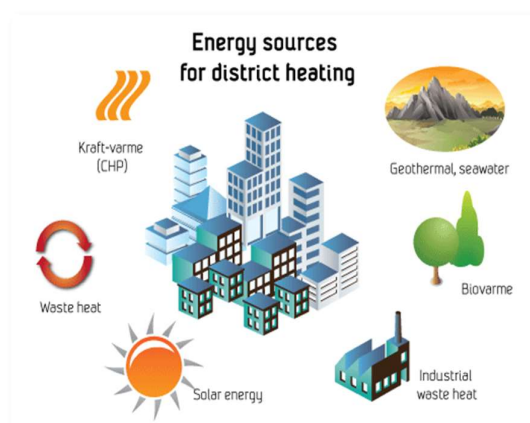
Disadvantages

Require regular maintenance.

Requires additional plant space.

Community/District Heating

A centralised heating network supplies heat from a central source to businesses/homes through a network of pipes carrying hot water.



Advantages

Cost-effective.

Government funding often available.

Disadvantages

Expensive installation.

Often requires existing network to allow a connection.

Appropriate Technologies

From calculations generated on the project, we have found after the fabric first approach, the following technologies are feasible for consideration on this development:

Photovoltaics (PV)

The building has large roof spaces available for installation. Should a building not achieve compliance with Building Regulation's ADL2 then implementing this technology is highly recommended.

Carbon emissions associated with electrical usage within the building will be reduced due to onsite generation.

Air Source Heat Pumps (ASHP)

The proposed development is designed to provide heating and cooling in the office areas via a VRF system which is classified as an air source heat pump and is therefore intrinsically low carbon

Excluded Technologies

Hydro Power

There is no suitable water source to allow for a hydroelectric power installation.

Tidal & Wave Power

There is no suitable water source to allow for a tidal or wave power installation.

Ground Source Heat Pumps

Ground source heat pumps can be suitable for this development; however, capital cost will be greater than air source heat pumps which reduces the payback period.

Solar Thermal Collectors

The nature of the building will benefit from the efficient generation of hot water, we feel the heat pump version is in keep with the current government guidelines

Water Source Heat Pumps

There is no suitable water source to enable the installation of a water source heat pump system.

Wind Turbines

Not accepted by the local planning

Biomass

Increases local air pollutants, therefore deemed unacceptable

Combined Heat and Power

The use of fossil fuels is trying to be avoided, therefore deemed unacceptable.

Community / District Heating

The buildings are not located within a national district heating area.

Implementation

To maximise the energy efficient opportunities the following actions shall be incorporated into the development of Energy Statement:

- Identification of low carbon and renewable energy sources
- Specification of water-efficient systems

Local Planning Requirements

The Havant Borough Core Strategy (2011) and Allocations Plan (2014) establish a long-term aim of providing sustainable development. The policy requires all future developments to meet the highest standards of sustainable design and construction. Through compliance with the policy, the Proposed Development shall include measures to:

- Meet the challenges of climate change;
- Conserve and enhance the natural environment;
- Promote sustainable transport;
- Prevent and minimise pollution;
- Reduce waste and encourage reuse and recycling;
- Reduce energy use and greenhouse emissions;
- Reduce water consumption;
- Manage flood risk and promote sustainable drainage measures.
- The policies require the development to achieve a BREEAM rating of 'Very Good', however it will aim to surpass this and achieve 'Excellent'.

Building Regulations

Approved document L2 helps drive down the energy usage within buildings, the new 2021 Regulations has now taken the next step to reduce fossil fuel usage, with three key criteria, the strategy below outline how we achieve the Regulations compliance:

Baseline Building, built to exceed the requirements of Building Regulations, maximising the building envelope performance.

Utilise systems to service the building which are highly energy efficient and which are controlled to suit the use pattern of the building.

Consider the use of renewable energy equipment to generate some or all of the resulting energy demand of the building

1. **Carbon Dioxide Emission.** The amount of carbon dioxide emitted by the proposed development is calculated by an approved Energy Assessor, using approved software tools. Within the approved software, the Energy Assessor creates a virtual building model which is compared against the "Notional Building". The Notional Building is generated automatically within the accredited software and mimics the physical size, shape, orientation, location, and layout of the virtual model. To pass the Criterion One assessment for compliance with ADL2 2021, the carbon emission of the virtual building must be equal to, or less than, the carbon dioxide emission of the notional building.
2. **Fabric Performance.** This part of the criteria assesses the proposed building fabric U-Values and building Air Permeability to ensure that minimum standards prescribed by the Building Regulations are met. M&E building services must also meet minimum energy efficiency standards.
3. **Overheating Criteria.** The building is assessed during the summer period then ensure the building construction, fabric and window ratios don't present issues with overheating, solar heat gain need to be less than or equal to the notional building benchmark.

This methodology needs a structured and analytical approach to understanding the overall value of each element of design. The first two steps, those of making the building envelope energy efficient and then utilising equipment to service the building which is also very energy efficient, are well proven. However, the results from implementing renewables are variable as many of the technologies are dependent on the variables of weather and of building usage.

Compliance & Calculation Process

All L2 computer calculations were undertaken using software programme IES Virtual Environment, which is a Dynamic Simulation Model (DSM) too accredited by the Department of Communities and Local Government for the generation of BRUKL calculations and Energy Performance Certificates.

For calculation and compliance purposes, we have assumed the proposed buildings to be B2/B8 usage.

Building Envelope and M&E Engineering Services Performance

To assess the building against Criteria One, Two and Three, the building envelope and M&E building services performances were applied to the building model, as summarised below. In addition, the values and systems stated are based on the mechanical and electrical tender design.

Please refer to the BRUKL output document in Appendix A.

Table 1 - SBEM Building Envelope Performance

Element	Proposed
External Wall U-value	0.26 W/m ² .K
Roof U-value	0.16 W/m ² .K
Ground Floor U-value	0.18 W/m ² .K
Opaque Door U-value (including doors between unheated shell and heated core areas)	1.60 W/m ² .K
Window U-value (frame & glass, including glazed doors)	1.60 W/m ² .K
Rooflight U-value (frame & glass)	1.30 W/m ² .K
Air Permeability	3.0 m ³ /(h.m ²) @ 50Pa

Table 2 - SBEM M&E Building Services Strategy

System/Zone	Description
Open Plan Office Spaces	VRF heat pump for heating and cooling, with mechanical ventilation via heat recovery unit
Reception & Landing Spaces	VRF heat pump for heating and cooling, with natural/passive ventilation
WCs & Cleaners Cupboards	Electric panel heaters, with local extract fans
Circulation Spaces	Electric panel heaters, with natural/passive ventilation
Warehouse (Shell)	No HVAC System
All Areas	DHWS: Local point of use electric water heaters

Table 3 - SBEM Specified Building Services Performance

System/Zone	Description
Mechanical Ventilation Heat Recovery Units	Heat recovery efficiency = 75% All Units: SFP = 1.5 W/(l/s)
Electric Panel Heaters	Heating efficiency = 81%
Toilet Extract Fans	Specific Fan Power = 0.4 W/(l/s)
Protected Stairway Supply Fans	Specific Fan Power = 0.4 W/(l/s)
VRV/F Heating/Cooling Efficiencies	Heating: SCOP = 4.0. Cooling: SEER = 5.0
DHWS	Local point of use electric water heaters = 100% efficiency.
Photovoltaics	Unit 1 – 170m ² to 190m ² PV panels area, with module efficiency of 20.1%. Annual generation achieved = 28,000 kWh Unit 2 - 200m ² to 220m ² PV panels area, with module efficiency of 20.1%. Annual generation achieved = 33,000 kWh Unit 3 - 230m ² to 250m ² PV panels area, with module efficiency of 20.1%. Annual generation achieved = 36,000 kWh

Table 4 - SBEM Minimum Electrical Lighting Performance

Room	Luminaire Efficacy (lm/cW)	Design Illuminance (lux)	Parasitic Power (W/m²)
Office Spaces	120	500	0.10
Reception	120	300	0.10
Circulation & Landing	120	200	N/A
Toilets	120	200	N/A
Cleaners	120	200	N/A
Warehouse (Shell)	95	100	0.3

Table 5 - SBEM Minimum Lighting Control Performance

Room	Automatic detection	Daylight Control
Office Spaces	Absence	Photocell controlled dimming
Reception	Manual	Photocell controlled dimming
Circulation	Presence	No daylight control
Toilets, WC Areas & Cleaners Stores	Presence	No daylight control
Warehouse (Shell)	Presence	Photocell controlled dimming

Compliance with Energy & CO₂ Emissions

Building Regulations Criterion 1

Based on the compliance calculations carried out on at Energy Statement and using the performance criteria highlighted in Section 3, it was found that the Units pass all regulations at the design stage. The projected carbon emission BRUKL calculation results and EPC rating for the unit are tabulated below:

Table 6 - Summarised SBEM As Designed Results from BRUKL – Unit 1

Emission Rate (kg.CO2/m2.Annum)	Target (TER)	1.49
	Building (BER)	0.60
Primary Energy (KWh/m2.annum)	Target (TPER)	15.7
	Building (BPER)	6.99
PV Generation	(kWh generated per Annum)	28,000
20% Contribution from PV		Yes
Building Regulations Compliance?		Yes
EPC Rating		A

Table 7- Summarised SBEM As Designed Results from BRUKL – Unit 2

Emission Rate (kg.CO2/m2.Annum)	Target (TER)	1.33
	Building (BER)	0.54
Primary Energy (KWh/m2.annum)	Target (TPER)	14.04
	Building (BPER)	4.62
PV Generation	(kWh generated per Annum)	33,000
20% Contribution from PV		Yes
Building Regulations Compliance?		Yes
EPC Rating		A

Table 8 - Summarised SBEM As Designed Results from BRUKL – Unit 1

Emission Rate (kg.CO2/m2.Annum)	Target (TER)	1.53
	Building (BER)	0.79
Primary Energy (KWh/m2.annum)	Target (TPER)	16.09
	Building (BPER)	7.28
PV Generation	(kWh generated per Annum)	36,000
20% Contribution from PV		Yes
Building Regulations Compliance?		Yes
EPC Rating		A

Building Regulations Criterion 2

Using the performance criteria highlighted in this document, the unit meets the minimum performances, both in construction and servicing, of Building Regulations Criterion Two.

Building Regulations Criterion 3

Using the performance criteria highlighted in this document, all occupied areas of the units meet the minimum performances of Building Regulations Criterion Three.

Summary

The development aims to mitigate any negative impacts it might have on the environment and minimise and consequential risks whilst maximising efficiencies and opportunities to deliver an intrinsically sustainable building.

The Proposed Development has established the following aims:

- Meet the challenges of climate change.
- Conserve and enhance the natural environment.
- Prevent and minimise pollution.
- Reduce energy use and greenhouse emissions.

Energy consumption reduction objectives have been established to meet the long term aims and include actions throughout the planning, design, construction and operation phases of the development.

The objectives will be delivered through the implementation of:

- Approved Document L2 of the Building Regulations (2021).

Air Source Heat Pumps and PV will be utilised.

Conclusion

Sustainable development aims to meet the needs of the present without compromising the ability of future generations to meet their own needs.

The proposed development aims to mitigate negative impacts and target opportunities relating to the environment. The development has been designed to incorporate several sustainability measures to address the aims and objectives established so that an intrinsically sustainable building is delivered.

Engineering Services Consultancy Ltd

04 July 2024

Appendix A – Unit 1

Building Regulations UK Part L (BRUKL) 'As Designed'

BRUKL Output Document

 HM Government
Compliance with England Building Regulations Part L 2021

Project name	Shell and Core
Unit 1	As designed
Date: Thu Jul 04 19:14:32 2024	

Administrative Information

Building Details

Address: Units 1-3, Havant, PO

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Certifier details

Name: James Tickle

Telephone number: 0121 214 8998

Address: Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW

Foundation area [m²]: 239.34The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	1.19
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	0.62
Target primary energy rate (TPER), kWh _e /m ² annum	15.7
Building primary energy rate (BPER), kWh _e /m ² annum	5.28
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{o,limit}	U _{o,calc}	U _{i,calc}	First surface with maximum value
Walls*	0.26	0.26	0.26	NT000020:Surf[1]
Floors	0.18	0.18	0.18	NT00000C:Surf[0]
Pitched roofs	0.18	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	WR000002:Surf[2]
Windows** and roof windows	1.6	1.6	1.6	NT000020:Surf[0]
Rooflights***	2.2	1.3	1.3	WR000002:Surf[1]
Personnel doors ^Δ	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	WR000002:Surf[4]
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{o,limit} = Limiting area-weighted average U-values [W/(m²K)]
U_{o,calc} = Calculated area-weighted average U-values [W/(m²K)]
U_{i,calc} = Calculated maximum individual element U-values [W/(m²K)]
* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
^Δ For fire doors, limiting U-value is 1.8 W/m²K
NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Electric Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- VRF & MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	1.5	0.75
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

Shell and core configuration

Zone	Assumed shell?
Circ - WC Lobby FF Unit 1	NO
Circ - WC Lobby GF Unit 1	NO
Circ Lobby - FF Unit 1	NO
Entrance - GF Unit 1	NO
Office 01 - FF Unit 1	NO
Office 02 - FF Unit 1	NO
Stair 01 - FF Unit 1	NO
Stair 01 - GF Unit 1	NO
Stair 02 - FF Unit 1	NO
Stair 02 - GF Unit 1	NO
Store - FF Unit 1	NO
Store - GF Unit 1	NO
Warehouse UC 01 - GF Unit 1	YES
Warehouse UC 02 - GF Unit 1	YES
WC - FF Unit 1	NO
WC - GF Unit 1	NO
WC Dis - FF Unit 1	NO
WC Dis - GF Unit 1	NO
Warehouse - Unit 1	YES

General lighting and display lighting		Display light source	
Zone name	General luminaire	Efficacy [lm/W]	Power density [W/m²]
	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Circ - WC Lobby FF Unit 1	120	-	-

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Electric Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- VRF & MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	1.5	0.75
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

Shell and core configuration

Zone	Assumed shell?
Circ - WC Lobby FF Unit 1	NO
Circ - WC Lobby GF Unit 1	NO
Circ Lobby - FF Unit 1	NO
Entrance - GF Unit 1	NO
Office 01 - FF Unit 1	NO
Office 02 - FF Unit 1	NO
Stair 01 - FF Unit 1	NO
Stair 01 - GF Unit 1	NO
Stair 02 - FF Unit 1	NO
Stair 02 - GF Unit 1	NO
Store - FF Unit 1	NO
Store - GF Unit 1	NO
Warehouse UC 01 - GF Unit 1	YES
Warehouse UC 02 - GF Unit 1	YES
WC - FF Unit 1	NO
WC - GF Unit 1	NO
WC Dis - FF Unit 1	NO
WC Dis - GF Unit 1	NO
Warehouse - Unit 1	YES

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Circ - WC Lobby FF Unit 1		120	-	-

Energy Statement

Downley Road, Havant for Canmoor
2144-ESC-00-ZZ-RP-Z-0016 4-Jul-24

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Circ - WC Lobby GF Unit 1	120	-	-	-
Circ Lobby - FF Unit 1	120	-	-	-
Entrance - GF Unit 1	120	15	9	-
Office 01 - FF Unit 1	120	-	-	-
Office 02 - FF Unit 1	120	-	-	-
Stair 01 - FF Unit 1	120	-	-	-
Stair 01 - GF Unit 1	120	-	-	-
Stair 02 - FF Unit 1	120	-	-	-
Stair 02 - GF Unit 1	120	-	-	-
Store - FF Unit 1	120	-	-	-
Store - GF Unit 1	120	-	-	-
Warehosue UC 01 - GF Unit 1	95	-	-	-
Warehosue UC 02 - GF Unit 1	95	-	-	-
WC - FF Unit 1	120	-	-	-
WC - GF Unit 1	120	-	-	-
WC Dis - FF Unit 1	120	-	-	-
WC Dis - GF Unit 1	120	-	-	-
Warehouse - Unit 1	95	-	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Entrance - GF Unit 1	YES (+9.1%)	NO
Office 01 - FF Unit 1	NO (-3.8%)	NO
Office 02 - FF Unit 1	NO (-33.6%)	NO
Warehosue UC 01 - GF Unit 1	NO (-34%)	NO
Warehosue UC 02 - GF Unit 1	NO (-29.2%)	NO
Warehouse - Unit 1	YES (+1%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	2983.8	2983.8		Retail/Financial and Professional Services
External area [m ²]	6128.2	6128.2		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	SOU	SOU		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	5		General Industrial and Special Industrial Groups
Average conductance [W/K]	1622.92	1953.21	100	Storage or Distribution
Average U-value [W/m ² K]	0.26	0.32		Hotels
Alpha value* [%]	24.95	10		Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				Residential Institutions: Residential Schools
				Residential Institutions: Universities and Colleges
				Secure Residential Institutions
				Residential Spaces
				Non-residential Institutions: Community/Day Centre
				Non-residential Institutions: Libraries, Museums, and Galleries
				Non-residential Institutions: Education
				Non-residential Institutions: Primary Health Care Building
				Non-residential Institutions: Crown and County Courts
				General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger Terminals
				Others: Emergency Services
				Others: Miscellaneous 24hr Activities
				Others: Car Parks 24 hrs
				Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.99	2.93
Cooling	0.77	0.38
Auxiliary	0.68	1.54
Lighting	3.79	4.44
Hot water	4.24	3.82
Equipment*	29.4	29.4
TOTAL**	13.47	13.11

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	10.52	2.61
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>10.52</i>	<i>2.61</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	33.24	25.06
Primary energy [kWh _{pe} /m ²]	5.28	15.7
Total emissions [kg/m ²]	0.62	1.49

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	122.5	85.3	9.2	7.4	6.5	3.71	3.18	4	5
Notional	75.3	61.3	7.5	3.7	14.9	2.78	4.63	----	----
[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	217.8	0	56.7	0	0	1.07	0	0.81	0
Notional	203.1	0	40	0	0	1.41	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Appendix B – Unit 2

Building Regulations UK Part L (BRUKL) 'As Designed'

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

 HM Government

Project name

Unit 2

Date: Thu Jul 04 19:08:40 2024

Shell and Core

As designed

Administrative information

Building Details
Address: Units 1-3, Havant, PO

Certifier details
Name: James Tickle
Telephone number: 0121 214 8998
Address: Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW

Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.26
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.26
BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 203.76

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	1.33
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	0.54
Target primary energy rate (TPER), kWh _e /m ² annum	14.04
Building primary energy rate (BPER), kWh _e /m ² annum	4.62
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a Limit	U _a Calc	U _i Calc	First surface with maximum value
Walls*	0.26	0.26	0.26	FF000004:Surf[2]
Floors	0.18	0.18	0.18	NT000012:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	WR000006:Surf[2]
Windows** and roof windows	1.6	1.6	1.6	FF000004:Surf[0]
Rooflights***	2.2	1.3	1.3	WR000006:Surf[1]
Personnel doors ^Δ	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	WR000006:Surf[3]
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_a Limit = Limiting area-weighted average U-values [W/(m²K)] U_i Calc = Calculated maximum individual element U-values [W/(m²K)]

U_a Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^Δ For fire doors, limiting U-value is 1.8 W/(m²K)

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Energy Statement

Downley Road, Havant for Canmoor
2144-ESC-00-ZZ-RP-Z-0016 4-Jul-24

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Electric Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2 VRF & MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	1.5	0.75
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

Shell and core configuration

Zone	Assumed shell?
Circ - Lobby FF Unit 2	NO
Circ - WC Lobby FF Unit 2	NO
Circ - WC Lobby GF Unit 2	NO
Office 01 - FF Unit 2	NO
Stair 01 - FF Unit 2	NO
Stair 01 - GF Unit 2	NO
Stair 02 - FF Unit 2	NO
Stair 02 - GF Unit 2	NO
Store - FF Unit 2	NO
Store - GF Unit 2	NO
WC - FF Unit 2	NO
WC - GF Unit 2	NO
WC Dis - FF Unit 2	NO
WC Dis - GF Unit 2	NO
Warehouse - Unit 2	YES
Entrance - GF Unit 2	NO
Warehouse UC 01 - GF Unit 2	YES

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
Circ - Lobby FF Unit 2		120		-	-

Energy Statement

Downley Road, Havant for Canmoor
2144-ESC-00-ZZ-RP-Z-0016 4-Jul-24

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
Circ - WC Lobby FF Unit 2		120		-	-
Circ - WC Lobby GF Unit 2		120		-	-
Office 01 - FF Unit 2		120		-	-
Stair 01 - FF Unit 2		120		-	-
Stair 01 - GF Unit 2		120		-	-
Stair 02 - FF Unit 2		120		-	-
Stair 02 - GF Unit 2		120		-	-
Store - FF Unit 2		120		-	-
Store - GF Unit 2		120		-	-
WC - FF Unit 2		120		-	-
WC - GF Unit 2		120		-	-
WC Dis - FF Unit 2		120		-	-
WC Dis - GF Unit 2		120		-	-
Warehouse - Unit 2		95		-	-
Entrance - GF Unit 2		120		15	9
Warehosue UC 01 - GF Unit 2		95		-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Office 01 - FF Unit 2	NO (-6%)	NO
Warehouse - Unit 2	YES (+2.3%)	NO
Entrance - GF Unit 2	YES (+38.8%)	NO
Warehosue UC 01 - GF Unit 2	NO (-19.8%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	3680.5	3680.5		Retail/Financial and Professional Services
External area [m ²]	7427.2	7427.2		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	SOU	SOU		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	5		General Industrial and Special Industrial Groups
Average conductance [W/K]	1892.41	2392.13	100	Storage or Distribution
Average U-value [W/m ² K]	0.25	0.32		Hotels
Alpha value* [%]	24.98	10		Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				Residential Institutions: Residential Schools
				Residential Institutions: Universities and Colleges
				Secure Residential Institutions
				Residential Spaces
				Non-residential Institutions: Community/Day Centre
				Non-residential Institutions: Libraries, Museums, and Galleries
				Non-residential Institutions: Education
				Non-residential Institutions: Primary Health Care Building
				Non-residential Institutions: Crown and County Courts
				General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger Terminals
				Others: Emergency Services
				Others: Miscellaneous 24hr Activities
				Others: Car Parks 24 hrs
				Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.15	2.32
Cooling	0.82	0.32
Auxiliary	0.42	0.91
Lighting	3.57	3.95
Hot water	4.29	3.87
Equipment*	29.77	29.77
TOTAL**	12.05	11.36

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	9.47	1.98
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>9.47</i>	<i>1.98</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	25.4	19.58
Primary energy [kWh _{pe} /m ²]	4.62	14.04
Total emissions [kg/m ²]	0.54	1.33

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	131.6	107.8	9.9	9.4	6.4	3.71	3.18	4	5
Notional	78.7	79.5	7.9	4.8	13.8	2.78	4.63	----	----
[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	222.8	0	58	0	0	1.07	0	0.81	0
Notional	212.2	0	41.8	0	0	1.41	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Appendix C – Unit 3

Building Regulations UK Part L (BRUKL) 'As Designed'

BRUKL Output Document



Compliance with England Building Regulations Part L 2021

Project name

Shell and Core

Unit 3

As designed

Date: Thu Jul 04 19:04:31 2024

Administrative information

Building Details

Address: Units 1-3, Havant, PO

Certifier details

Name: James Tickle

Telephone number: 0121 214 8998

Address: Griffin House, 19 Ludgate Hill, Birmingham, B3
1DW

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 317.71

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² :annum	1.53
Building CO ₂ emission rate (BER), kgCO ₂ /m ² :annum	0.79
Target primary energy rate (TPER), kWh _e /m ² :annum	16.09
Building primary energy rate (BPER), kWh _e /m ² :annum	7.28
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{Limit}	U _{Calc}	U _{Calc}	First surface with maximum value
Walls*	0.26	0.26	0.26	NT00001E:Surf[1]
Floors	0.18	0.18	0.18	NT00001A:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.16	0.16	WR00000A:Surf[2]
Windows** and roof windows	1.6	1.6	1.6	NT00001E:Surf[0]
Rooflights***	2.2	1.3	1.3	WR00000A:Surf[1]
Personnel doors ^Δ	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	WR00000A:Surf[3]
High usage entrance doors	3	-	-	No high usage entrance doors in building
U _{Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{Calc} = Calculated area-weighted average U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. Δ For fire doors, limiting U-value is 1.8 W/(m ² K) NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				U _{Calc} = Calculated maximum individual element U-values [W/(m ² K)]

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Electric Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- VRF & MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	1.5	0.75
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

Shell and core configuration

Zone	Assumed shell?
Circ - Lobby FF Unit 3	NO
Circ - WC Lobby FF Unit 3	NO
Circ - WC Lobby GF Unit 3	NO
Office 01 - FF Unit 3	NO
Office 02 - FF Unit 3	NO
Stair 01 - FF Unit 3	NO
Stair 01 - GF Unit 3	NO
Stair 01 Unit 3	NO
Stair 02 - FF Unit 3	NO
Stair 03 - FF Unit 3	NO
Stair 03 - GF Unit 3	NO
Store - FF Unit 3	NO
Store - FF Unit 3	NO
Store - GF Unit 3	NO
Store - GF Unit 3	NO
Warehouse UC 02 - GF Unit 3	YES
WC - FF Unit 3	NO
WC - GF Unit 3	NO
WC Dis - FF Unit 3	NO
WC Dis - GF Unit 3	NO
Warehouse - Unit 3	YES
Entrance - GF Unit 3	NO
Warehouse UC 01 - GF Unit 3	YES

Energy Statement

Downley Road, Havant for Canmoor
2144-ESC-00-ZZ-RP-Z-0016 4-Jul-24

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Circ - Lobby FF Unit 3		120	-	-
Circ - WC Lobby FF Unit 3		120	-	-
Circ - WC Lobby GF Unit 3		120	-	-
Office 01 - FF Unit 3		120	-	-
Office 02 - FF Unit 3		120	-	-
Stair 01 - FF Unit 3		120	-	-
Stair 01 - GF Unit 3		120	-	-
Stair 01 Unit 3		120	-	-
Stair 02 - FF Unit 3		120	-	-
Stair 03 - FF Unit 3		120	-	-
Stair 03 - GF Unit 3		120	-	-
Store - FF Unit 3		120	-	-
Store - FF Unit 3		120	-	-
Store - GF Unit 3		120	-	-
Store - GF Unit 3		120	-	-
Warehosue UC 02 - GF Unit 3		95	-	-
WC - FF Unit 3		120	-	-
WC - GF Unit 3		120	-	-
WC Dis - FF Unit 3		120	-	-
WC Dis - GF Unit 3		120	-	-
Warehouse - Unit 3		95	-	-
Entrance - GF Unit 3		120	15	9
Warehosue UC 01 - GF Unit 3		95	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Office 01 - FF Unit 3	NO (-8.2%)	NO
Office 02 - FF Unit 3	NO (-47%)	NO
Warehosue UC 02 - GF Unit 3	NO (-50%)	NO
Warehouse - Unit 3	YES (+1.2%)	NO
Entrance - GF Unit 3	YES (+6.7%)	NO
Warehosue UC 01 - GF Unit 3	NO (-22.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	4131.9	4131.9		Retail/Financial and Professional Services
External area [m ²]	8246.7	8246.7		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	SOU	SOU		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	5		General Industrial and Special Industrial Groups
Average conductance [W/K]	2189.8	2663.74	100	Storage or Distribution
Average U-value [W/m ² K]	0.27	0.32		Hotels
Alpha value* [%]	24.95	10		Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				Residential Institutions: Residential Schools
				Residential Institutions: Universities and Colleges
				Secure Residential Institutions
				Residential Spaces
				Non-residential Institutions: Community/Day Centre
				Non-residential Institutions: Libraries, Museums, and Galleries
				Non-residential Institutions: Education
				Non-residential Institutions: Primary Health Care Building
				Non-residential Institutions: Crown and County Courts
				General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger Terminals
				Others: Emergency Services
				Others: Miscellaneous 24hr Activities
				Others: Car Parks 24 hrs
				Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.17	3.04
Cooling	0.81	0.48
Auxiliary	0.64	1.35
Lighting	3.7	4.43
Hot water	4.28	3.86
Equipment*	30.24	30.24
TOTAL**	13.59	13.13

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	9.28	2.38
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	9.28	2.38

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	35.11	27.03
Primary energy [kWh _{pe} /m ²]	7.28	16.09
Total emissions [kg/m ²]	0.79	1.53

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	136.9	91	10.3	7.9	6.3	3.71	3.18	4	5
Notional	79.4	75.1	7.9	4.5	13.3	2.78	4.63	-----	-----
[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	242	0	63	0	0	1.07	0	0.81	0
Notional	228.9	0	45.1	0	0	1.41	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type